

**2012-2013 Home Performance with ENERGY STAR®
Process Evaluation/Market Characterization
Assessment**

Final Appendix

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Abstract

This report presents the findings from the combined process evaluation and market characterization and assessment (PE/MCA) of the Home Performance with ENERGY STAR® program (HPwES) that occurred in 2014 and early 2015. This project aimed to assess the program's activities and progress during 2012-13, to determine potential strengths and weaknesses of the program's processes and explore the benefits and concerns of participating in HPwES, and to characterize current and emerging home improvement markets in New York State. First, the team used data from the program database to assess program activities completed during 2012-13. Second, the team identified strengths and weaknesses of the program's processes, as well as the benefits and concerns of participation, through surveys with 13 HPwES staff, 52 participating contractors, 570 participating households, and 312 households that had an HPwES home energy audit but did not further participate in the program. Third, the team used data from these surveys, in addition to surveys of 129 nonparticipant residential contractors and 770 nonparticipant households, as well as secondary sources to characterize current and emerging home improvement markets in New York State, including HPwES target markets and future market potential.

Key Words

Green Jobs – Green New York (GJGNY), Home Performance with ENERGY STAR®, energy efficiency, existing single-family homes, market assessment, market characterization, process evaluation, Regional Greenhouse Gas Initiative (RGGI), whole-home energy upgrades.

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Appendix A Program Description and Staff Perspectives Memorandum

This memo includes the program description and results of interviews with program staff and implementers for the Process Evaluation and Market Characterization Assessment (PE/MCA) of the Home Performance with ENERGY STAR® (HPwES) Program, conducted for New York State Energy Research and Development Authority (NYSERDA). This evaluation covers the 2012 and 2013 program years. The HPwES program is constantly evolving, however, and two key initiatives have changed or will change the HPwES program in the near future. First, a mid-2014 internal HPwES process review resulted in substantial changes to the HPwES program, with the goal of clarifying, simplifying, and speeding up the program process for participants. These program changes are noted in these sections, as applicable. Second, New York State's recent establishment of the Clean Energy Fund will likely result in a shift in NYSEDA's program administration activities away from incentive-based resource acquisition programs to market transformation programs and market-based initiatives to support energy efficiency and renewable energy in the state.¹ These proposed changes started following the design of data collection activities for this evaluation, and are still in development. The introduction and conclusion of the HPwES PE/MCA report presents insights from this evaluation to inform NYSEDA's evolving role in the state's new energy efficiency landscape.

A.1 Program Description

NYSERDA's HPwES program has been an integral part of NYSEDA's energy efficiency program portfolio since its launch in 2001. The annual number of completed projects steadily increased year over year, reaching an all-time high of 6,842 projects in 2011. In total, NYSEDA's HPwES program has completed nearly 55,000 projects. The program reported savings of more than 34 gigawatt hours (GWhs) of electricity and 1.8 million British thermal units (MMBtus) between 2001 and 2013.

The HPwES program has several components, including: a market rate HPwES path; an Assisted path for income-eligible households; access to free or subsidized audits and a financing component, both supported by Green Jobs Green New York (GJGNY) funding; and an opportunity to address homes with delivered fuels (oil, wood, propane) using funds from the Regional Greenhouse Gas Initiative (RGGI). The program delivered more than 48,000 home energy audits since its inception, with nearly 35,000 audits completed during the evaluated program period, 2012-2013.

¹ See "Proceeding on a Motion of the Commission to Consider a Clean Energy Fund" (CASE 14-M-0094) 5/8/2014 and "Reforming the Energy Vision" (CASE 14-M-0094) 4/24/2014, State of New York Public Service Commission.

The HPwES program uses building science and a whole-house approach to identify opportunities to increase the energy efficiency of existing, low-rise residential buildings. The program is designed to reduce the energy use in New York State's existing one- to four-family housing stock through heating fuel and electricity-related savings. The improvements in the building shell and heating systems typically result in significant cost-effective fuel savings. Energy efficiency improvements through this program include building shell measures, high-efficiency heating and cooling systems, hot water heaters, ENERGY STAR appliances and lighting. To encourage customer demand, Energy Efficiency Portfolio Standard (EEPS) and RGGI funds provide financial incentives to help offset the cost of cost-effective installed measures. In addition to the cost-effective energy savings offered, HPwES addresses residential health and safety issues pertaining to indoor air pollutants, focusing on carbon monoxide and other pollutants associated with combustion appliances, ventilation, and moisture control. This effort also increases the long-term durability of New York's housing stock by addressing problems such as ice damming, mold, and mildew.

Assisted Home Performance with ENERGY STAR (AHPwES) is an income-eligible component of the HPwES program. AHPwES is designed to reduce the energy burden on households whose incomes are between 60% and 80% of Area Median Income (AMI). Like the market rate HPwES, AHPwES uses building science and a whole-house approach to energy efficiency, but provides additional financial support to qualifying homeowners. Unless explicitly defined, the acronym HPwES refers to the program as a whole, including both assisted and market-rate tracks.

The HPwES program expects contractors to address how the whole house functions and provides incentives and financing to support installation of a wide array of eligible measures that achieve extensive and long-lasting natural gas and electric savings. Contractors complete Comprehensive Home Energy Assessments (CHEAs) – hereafter referred to as ‘audits’ – for all enrolled homeowners by taking an inventory of the current home conditions, including diagnostic testing of combustion appliances and blower-door testing for air-infiltration rates, and developing a work scope for proposed improvements, including a cost and energy savings estimate. The energy audit allows the contractor to recommend holistic improvements that maximize energy savings in every home.

HPwES relies on Building Performance Institute (BPI) accredited contracting firms to assess and install these improvements. An aggressive workforce development initiative to strengthen the program delivery infrastructure complements the program by providing training and accreditation for technicians, as well as marketing, outreach, and education to spur customer demand.

The following sections provide additional details about program objectives, program funding and incentives, contractor participation, marketing, and program processes.

A.1.1 Program Objectives²

The HPwES program operates with the long-term objective of changing the market for residential energy efficiency by increasing the supply of highly qualified contractors trained in building science methods that maximize energy savings potential from qualified projects. Program marketing is paired with incentives and attractive financing to increase demand for services of program-qualified contractors. The HPwES program's guidance for contractors describes these program objectives in the following way: "The objectives of the Program are to enhance the delivery of building performance services and use state-of-the-art diagnostic tools and building science principles to cost-effectively reduce energy consumption, while simultaneously addressing health issues."

The long-term goals for the HPwES Program are to:

1. Create a market-based system of supply and demand that supports the renovation of existing homes toward greater energy efficiency using a "house-as-a-system" approach.
2. Enhance the capacity of the market to supply "one-stop-shop" services for comprehensive energy efficiency for existing one- to four-family homes.
3. Improve the quality of residential energy efficiency installations through a whole-house approach emphasizing the "house-as-a-system" approach and high-quality installation techniques.
4. Develop a network of BPI-certified contractors and accredited contracting firms that market, sell, and provide comprehensive "house-as-a-system" energy audits and services that focus on increasing the health, safety, durability, comfort, and energy efficiency of existing one- to four-family homes.
5. Lessen the burden imposed by energy consumption and other utility-related costs with a significant emphasis on providing this benefit for low- to moderate-income residents.
6. Create sustainable energy savings and environmental benefits.

The HPwES program also has short-term goals for program participation, including to serve 6,523 electric customers and 7,337 natural gas customers every year from 2012-2015.³

² Content for this section and the Program Funding section also appears in the Home Performance with ENERGY STAR Logic Model Final Report, March 2014. <https://www.nyserda.ny.gov/-/media/Files/Publications/PPSER/Program-Evaluation/2014ContractorReports/2014-PLM-Home-Performance-Energy-Star.pdf>

³ Customers receiving electric services and customers receiving gas services are not additive. From the EEPS Supplemental Revision to the SBC Operating Plan (2012-2015) filed 12/22/2011 (p 12-28).

A.1.2 Program Funding

The program budget for HPwES is comprised of funding from a variety of sources: System Benefits Charge (SBC) III, EEPS I, EEPS II, for a total of approximately \$223.4 million from 2006 through December 31, 2015 (Table A-1). Since 1998, New York State's SBC has funded initiatives targeting energy efficiency measures, research and development, and the low-income sector. The New York Public Service Commission first authorized EEPS in 2008, and added natural gas in 2009.

Table A-1. Home Performance with ENERGY STAR Program Budget Allocation (\$ millions)

Sources: System Benefits Charge, Operating Plan for New York Energy SmartSM Programs (July 1, 2006-December 31, 2011) As Amended February 28, 2011 (revised April 2011); NYSERDA, New York's System Benefits Charge Programs Evaluation and Status Report, Year Ending December 31, 2011, March 2012 (Revised April 2012); Public Service Commission, Order Modifying Budgets and Targets for Energy Efficiency Portfolio Standard Programs and Providing Funding for Combined Heat and Power and Workforce Development Initiatives, December 17, 2012.

Funding Source	SBC III	EEPS I Electric	EEPS I Gas	EEPS II Electric	EEPS II Gas	Total
Market	\$40.7	\$1.8	\$21.7	\$17.2	\$52.3	\$133.7
Assisted	\$47.9	\$0.9	\$8.0	\$7.8	\$25.1	\$89.7
Total Program by Funding Source	\$88.6	\$2.7	\$29.7	\$25.0	\$77.4	\$223.4

In addition, the HPwES program leverages quarterly allocations from RGGI auctions. In 2013, these allocations totaled nearly \$4.5 million for HPwES and more than \$6 million for AHPwES. RGGI funds help support incentives for delivered fuel efficiency measures and a GJGNY Residential program that offers customers free or reduced cost energy audits and low-interest financing to fund qualifying measures and projects, as described below.

A.1.2.1 RGGI and GJGNY

RGGI supports HPwES by providing funding for the GJGNY program, which provides free and reduced-cost audits, as well as a low-interest revolving loan fund for cost-effective scopes of work.⁴ GJGNY is expected to lead to increased participation in HPwES and utility rebate programs that are delivered through contractors participating in NYSERDA's HPwES program. In particular, where utility rebates provide a greater incentive for the homeowner than NYSERDA's cash-back incentive, contractors participating in NYSERDA's HPwES program can offer the homeowner the utility rebate and the GJGNY low-interest loan for the balance of the cost. GJGNY is expected to lead to increased participation in AHPwES due to the inclusion of alternative underwriting criteria. GJGNY funds also support a variety of activities performed by a set of selected constituency-based organizations (CBOs). CBOs are contracted by

⁴ Funded through the Green Jobs - Green New York Act of 2009 (A.8901/S.5888 and chapter amendment A.9031/S.6032) Laws of New York, 2009.

NYSERDA to engage in targeted marketing and outreach activities expected to lead to increased uptake of HPwES, and particularly AHPwES, projects within their communities. These organizations provide marketing support, direct customers to the program, and sometimes act as liaisons between customer, program, and contractor.⁵

In addition to financing, RGGI funding supports HPwES by providing opportunities for customers who might not be eligible for EEPS incentives. RGGI funding is designed to help reduce greenhouse gas emissions and thus supports projects among customers that use oil and propane for space and domestic water heating purposes. The funds will offset part of the cost for consumers to replace inefficient oil and propane heating equipment and other measures that have a direct impact on reducing oil and propane consumption (e.g., insulation, air sealing). NYSERDA is also coordinating with Long Island Power Authority (LIPA), New York Power Authority (NYPA), and municipal electric service providers to offer these heating efficiency services to their customers. In the event natural gas funds are not available, NYSERDA may expand the use of RGGI funds to natural gas-fired heating equipment.

A.1.3 Participant Incentives and Financing

HPwES offers subsidized energy audits and incentives for the installation of qualifying energy-efficient measures (Table A-2). These incentives vary based on household income. Households with incomes between 60% and 80% of AMI, calculated based on the number of full-time occupants and the median county income, are eligible for AHPwES, and receive enhanced installation subsidies. All households with incomes less than 200% of AMI are eligible for a free energy audit.

Table A-2. Participant Audit Subsidy and Installation Incentives

Subsidy	Market Rate (>80% AMI)	Assisted (60-80% AMI)
Free or reduced cost energy audit for most households	Free for households with incomes under 200% AMI Partially subsidized for households with incomes 200% to 400% AMI	
Measure installation subsidies and incentives	High Efficiency Measure Incentive (HEMI): 10% of eligible measure cost up to \$3,000	Incentive: up to 50% of costs eligible measures, up to \$5,000 for single- and \$10,000 for 2-4-family buildings.

The HPwES Program maintains a list of eligible home improvement measures, including pre-qualified measures and those that require site-specific cost-effectiveness screening. In addition to natural gas and electric measures, some delivered fuels measures are also incented through RGGI funding. Additional

⁵ A more complete discussion of the role of Constituency-Based Organizations can be found in a Process Evaluation and Market Characterization Assessment of the GJGNY Outreach Program, prepared by Research Into Action and published in March 2014.

health and safety upgrades do not qualify for incentives, but may be eligible to be financed using one of the NYSERDA loan products discussed below, as long as the amount does not exceed 15% of the project total.

Through GJGNY, NYSERDA offers two loan products to HPwES participants: The On-Bill Recovery (OBR) Loan and The Smart Energy Loan. The OBR Loan is paid through the utility bill, and transferred with the house in the case of sale. It is available for projects completed with most of the major utilities in New York State where the project is “revenue neutral” (that is, projected monthly energy savings are greater than or equal to the monthly loan payment). The Smart Energy Loan is a separate loan product and does not transfer with the house. Both loans offer below-market interest rates (3.49%, as of January 2015), and qualify homeowners based on a combination of credit score, debt-to-income ratio, mortgage payment history, bankruptcy, foreclosure, repossession history, and outstanding collections. These eligibility requirements include two tiers: Tier 1 provides “standard” qualification requirements consistent with Fannie Mae financing standards for the state, and Tier 2 qualification requirements allow homeowners with lower credit scores to qualify. Loan qualification criteria have changed several times since their introduction. Starting in mid-2014, GJGNY loans no longer require a two-year bill payment history, and Tier 2 qualification requirements are streamlined with a minimum credit score of 540. Financed projects must be cost-effective overall. NYSERDA also offers a third loan product, the Residential Loan Fund, in four counties of the state, which is designed for borrowers with lower credit.⁶

A.1.4 Contractor Participation and the Building Performance Institute

HPwES energy audits and energy efficiency upgrades must be installed by participating HPwES installation contractors. NYSERDA expects participating contractors to complete at least 24 projects or \$100,000 in HPwES work per year (although, in practice, these minimums are flexible), and conducts QA/QC activities to ensure contractors’ work meets NYSERDA’s standards.⁷ To ensure that HPwES contractors are fully versed with the program’s whole-house approach to energy efficiency upgrades, NYSERDA requires that participating contractor firms be accredited with the BPI (GoldStar™ Firms as of 2014).⁸ As the organization that develops and maintains best practice standards for the whole-house building science approach, BPI is closely involved in the HPwES program. NYSERDA and BPI have worked together to develop contractor certification guidelines and manage contractor accreditations for over a decade. BPI-accredited firms have specialized training in energy audits and efficiency retrofits based on this whole-house building science approach. Becoming a participating HPwES contractor requires contracting firms to ensure sufficient staff certification to meet BPI accreditation requirements, apply to

⁶ See <https://www.nyserdanyny.gov/-/media/Files/EERP/Residential/Programs/Existing-Home-Renovations/res-loan-info-form.pdf> for a complete explanation of loan approval criteria.

⁷ See Perspectives on Contractors section.

⁸ BPI replaced accreditation with GoldStar in mid-2014.

NYSERDA for approval, and sign a program agreement. HPwES-affiliated contractors are eligible for incentives that help offset the cost of BPI testing.

A.1.4.1 Contractor Incentives and Reimbursements

NYSERDA provides technical, financial, and marketing support to participating contractors, and specific incentives and reimbursements for contractors encouraging a variety of activities desired by the program. A complete list of contractor incentives is included in Table A-3.

Table A-3. Contractor Incentives and Reimbursements

Name	Description	Rationale
Audit Reimbursement	Up to \$400 (\$250 for most single-family homes)	Offsets the time required to conduct comprehensive audits necessary to identify jobs that are more cost-effective for the customer and more profitable for the contractor. Encourages contractors to offer these services and customers to request them by reducing the cost involved to both parties
Advanced Modeling Incentive	5% of the value of eligible measures installed, up to \$500 per project	Makes it beneficial for contractors to model the home using program-approved software and to incorporate the whole house model into their business successfully
Referral Incentive	2% of the value of eligible measures installed, up to \$500 per project	Encourages referrals among BPI-certified contractors with different specialist certifications
Electric Reduction Incentive	\$75 for ENERGY STAR refrigerator or freezer, \$25 for Room AC or dehumidifier	Encourages contractors to suggest energy efficient appliance replacement as part of the program-qualified scope of work
Cooperative Advertising	See below. Sliding scale based on advertising type and project volume	Helps contractors promote their services while building consumer awareness of HPwES
Equipment Incentive	One-time offer for new contractors or new-to-region contractors, 20% of eligible equipment cost, up to \$4,000	Offsets the cost of equipment necessary to perform advanced diagnostics
BPI Certification Reimbursement Incentive	50% of written and field exam fees for new certifications 50% of field exam fee for renewals	Encourages contractors to obtain their BPI certification and to renew existing certifications
Company BPI Accreditation	50% of cost for new accreditation, decreasing by 10% per year from 2014 to 2016 for renewals	Offsets the cost of obtaining and maintaining BPI accreditation
First Completion Incentive	One-time \$500	Encourages new contractors to complete their first project within three months of enrolling in the program
First Year Production Incentive	One-time \$1,500 for completing 24 projects and at least \$180k of work within first 12 months	Encourages new contractors to embrace HPwES by offering an incentive to new contractors that meet certain thresholds in project volume or value

A.1.5 Program Promotion and Marketing

HPwES program promotion occurs through a mixture of NYSERDA-sponsored activities, the efforts of program-affiliated contractors, and outreach conducted by CBOs.⁹ NYSERDA creates awareness of the HPwES Program using direct marketing channels (primarily online), but also through newspaper and radio outlets. NYSERDA streamlined and shifted the messaging focus of their website and marketing materials as part of the mid-2014 internal process review. Section 5.1 *Program Marketing and Outreach* provides an overview of these changes. CBOs play a minor marketing role compared to the other marketing channels, but serve the program by delivering program information to harder-to-reach market segments. CBOs also refer eligible homeowners in specific regions. NYSERDA also supports contractor-initiated marketing through its cooperative marketing program. Contractors completing at least one HPwES project are eligible for cooperative marketing funds on a sliding scale. Contractors qualify for \$5,000 to \$200,000 in co-op marketing funding per year (Table A-4), depending on the number of projects completed in the previous calendar year.¹⁰ The overall budget for this marketing program is \$1.5 million.

Table A-4. Annual Co-op Marketing Funding Levels

Number of Contractor Projects	Available Co-op Funds
1-50	\$5,000
51-100	\$12,500
101-150	\$25,000
151-200	\$75,000
Over 201	Up to \$200,000

The level of cooperative marketing funds available depends on the marketing channel used by the contractor. The three-tier structure is as follows:

- Tier 1: 60% reimbursement for direct mail, half-page print ads, quarter page newspaper ads, and magazine and newspaper inserts. This also covers “pay per click” or Facebook advertising and online banner ads.
- Tier 2: 40% of the costs of broadcast media, radio, vehicle signage/wraps, billboards, sponsorship signage, collateral materials (such as brochures), lawn signs, and coupon inserts.

⁹ See the Process Evaluation and Market Characterization Assessment: GJGNY Outreach Program, prepared by Research Into Action and NMR Group, published in March 2014: <https://www.nysesda.ny.gov/-/media/Files/Publications/PPSER/Program-Evaluation/2014ContractorReports/2014-EMEP-GJGNY-Outreach.PDF>

¹⁰ If a contractor’s production in the current calendar year exceeds the previous year, the contractor will be eligible for the co-op marketing incentives based on their current production level.

- Tier 3: 20% of small print space (less than a quarter page) and referral cards.

To maintain brand consistency, NYSERDA requires that all promotional materials receiving co-op funds:

- Include HPwES and BPI logos.
- Include the name of the contracting company (as listed in the HPwES Partnership Agreement).
- Promote either the HPwES and/or the AHPwES program within the text, graphics, or logos.

A.1.6 Energy Efficiency Upgrade Process

Completing an energy efficiency upgrade through the HPwES program involves a number of key steps. This section outlines the major processes for participants, contractors, and program staff within each of these steps, and notes any changes to program processes during or after the 2012-2013 evaluation period.

Recruitment. NYSERDA, contractors, and CBOs conduct marketing and outreach activities to recruit participants (see section 1.2.2 *Program Promotion and Marketing*).

Comprehensive Home Energy Assessment. After making the decision to apply for an energy audit, prospective participants complete and submit a GJGNY audit application and select a contractor from a list of participating contractors in their area (if they have not already approached or been approached by a contractor.) The program team reviews and approves the audit application, and the contractor must claim the reservation number before moving forward with the audit. After scheduling and completing the audit using one of the program-approved audit software options, the contractor uses this software and an approved modeling software to generate a comprehensive home audit report for the participant, including audit results and recommended upgrades. The customer reviews this report (usually with the contractor) and makes the decision whether or not to proceed with an energy efficiency upgrade.

Change: The mid-2014 internal process review updated the audit application form to promote online submission, reduce and simplify the application fields, facilitate contractor selection, and reduce approval time.

Work Scope Development. If the customer elects to complete an upgrade, the contractor works with the customer to apply for GJGNY financing or Assisted Home Performance incentives (each requires an application) and develop a scope of work using one of the approved energy modeling software packages. Once the customer has given their approval, the contractor submits this scope of work (in the form of a model including costs and measures) to the program team for review and approval or rejection. After the program team has approved the model, the contractor and customer sign the program contract (which includes this model), and the customer finalizes any financing documents.

Change: The mid-2014 internal process review streamlined these processes, making changes designed to simplify audit and subsidy applications, combine the contract and model to reduce the number of customer signatures, and facilitate faster model approval. See the Audit and Project Paperwork and Processing section for further details.

Installation. After the contract is final (including any financing and/or AHPwES subsidies), the contractor proceeds with installation. Any changes to the scope of work require a customer- and contractor-signed change order form and the program team's review and approval.

Test-out. Once the contractor has completed installation, they perform the necessary test-out procedures to document the house's efficiency, and submit a signed certificate of completion and other final paperwork to the program team. After project completion, fifteen percent of projects receive an on-site Quality Assurance review and the program team disburses the incentives.

A.2 Staff and Implementer Perspectives

The HPwES Program is delivered by internal NYSERDA staff supported by a substantial network of external program staff housed at Conservation Services Group (CSG), Honeywell, Energy Finance Solutions (EFS), Energy Savvy, and Brand Cool. The evaluation team interviewed key staff at NYSERDA and CSG, the organizations primarily responsible for delivering the program to the market. This chapter describes the findings from interviews with eight NYSERDA HPwES staff members and five implementation staff members from CSG, which occurred in early 2014.

A.2.1 Summary

Several organizations are involved in delivering HPwES; the coordination between NYSERDA, CSG, BPI, EFS, Brand Cool, and Honeywell is extensive and effective. NYSERDA requires that participating contractor firms be accredited (GoldStar Firms as of 2014) with BPI. BPI participating contractors play a critical role in the outreach, communication, and installation of HPwES projects. NYSERDA staff reported frequent contact with contractors, and emphasized contractor commitment to the Home Performance approach. NYSERDA and BPI continue to work together closely to ensure alignment between HPwES and BPI guidelines.

In interviews, NYSERDA and CSG staff identified project timelines, costs, and funding restrictions as key challenges they face in managing the program and increasing project volume. Multi-stepped, often manual processes for submitting projects, eligibility screening, and approval can create delays. Comprehensive or multi-measure HPwES projects are typically expensive for participants, and incentives that vary by fuel source, income, and location can complicate contractors' efforts to explain incentives. Program and implementation staff members have demonstrated responsiveness in identifying and making changes to

address these challenges, mentioning several opportunities they had pursued to address these challenges and expand program uptake, including the sweeping internal process review that occurred in mid-2014.

A.2.2 Staff Roles

NYSERDA and CSG work collaboratively to deliver the HPwES Program (Table A-5). As the program administrator, NYSERDA oversees all aspects of the program, including managing all implementation contractors and reviewing and adjusting program guidelines and measure eligibility as needed. Both NYSERDA and CSG staff members track program metrics, budgets, and incentives to monitor the progress and financial standing of the program. NYSERDA staff members also provide oversight for program marketing and resolution of customer concerns. Both QA/QC are managed by the QA/QC team at NYSERDA; this team also manages QA/QC for NYSERDA’s other residential programs. Honeywell is primarily responsible for implementing the quality assurance component of the HPwES program.¹¹ Through the QA process, 10% of completed projects are randomly selected for field inspections by Honeywell.¹² QC refers to on-going support of contractors during project scoping and completion, which is conducted by CSG. QC also includes provision of appropriate program training to participating contractors.

Table A-5. Program Staff Major Responsibilities

Organization	Oversight of field staff	Program Marketing	Quality Assurance	Quality Control
NYSERDA	—	Lead	Contributor	Lead
CSG	Lead	Contributor	Contributor	Contributor
Honeywell	—	—	Lead	Contributor

As the lead implementation contractor, CSG is responsible for day-to-day program operations, including marketing and delivery of the program, project tracking, and QC. CSG also serves as the first point of contact for customer concerns and complaints through their call center. To support QC, CSG staff:

- Provide program information and enrollment assistance to interested new contractors and ensure that they meet program requirements;
- Review applications to ensure that the energy modeling is reasonable and that fields are complete; and

¹¹ Honeywell declined to be interviewed by the PE/MCA team as part of this evaluation project.

¹² All contractors are included in this random selection. New contractors will typically have their first three jobs field inspected.

- Work with contractors and customers to resolve any issues identified by Honeywell during QA inspections.

The CSG staff also assists Honeywell with QA by providing supplemental inspections when required. Both CSG and Honeywell track the status of projects with documented quality issues.

A.2.3 Perspectives on Program Processes

The following sections summarize staff perspectives on communications across staffing groups; the key elements of program marketing; the importance of GJGNY audits; the complexities related to tracking multiple funding sources and program options; and how the program provides financing products to participants.

A.2.3.1 Staff Communication

NYSERDA and CSG staff described frequent communication facilitated by meetings and ongoing conversations regarding coordination and resolution of specific customer issues. During regular joint meetings, they discuss delivery of all elements of the HPwES Program. NYSERDA staff noted that ongoing and frequent internal communication enables the organizations involved to respond to customer concerns and resolve any quality issues quickly.

A.2.3.2 Program Marketing

The staff members described the marketing efforts for the program as “extensive” and emphasized a cooperative approach for raising program awareness and generating consumer interest. In the following sections, we describe marketing strategies and the cooperative marketing efforts supported by the program.

Marketing Messages and Strategy

NYSERDA contracts with Brand Cool, a New York State-based marketing agency, for the design and distribution of marketing materials for the HPwES Program. To ensure brand consistency, NYSERDA staff provides guidelines and reviews the marketing materials and plans. NYSERDA staff reported that previous marketing to homeowners primarily promoted the cost-savings potential of using a comprehensive home performance approach when upgrading the energy efficiency of homes. More recent campaigns have expanded to promote benefits such as increased comfort, as well as health and environmental benefits. Current advertising campaigns continue to explore new messages to engage customers. As an example, staff members cited social comparison messages designed to encourage friendly competition and conservation. Program advertising also has moved away from printed media and now focuses more on electronic formats like email. As part of the 2014 process improvements, NYSERDA staff members revised the HPwES website and marketing to eliminate jargon and minimize the complexity of information, make the pages easier to navigate. NYSERDA also refined the messaging to focus on program benefits that resonate with homeowners. Staff members reported that previous program marketing focused on the value

of BPI and the HPwES brand, but their research showed that these program benefits were not important to customers. Instead, staff shifted messaging to emphasize homeowner benefits like lowering energy bills and fixing broken equipment.

Cooperative Marketing

NYSERDA provides participating contractors access to cooperative marketing dollars to promote the HPwES and AHPwES programs through deployment of a cooperative marketing budget. In collaboration with Brand Cool, NYSERDA developed the cooperative advertising guide, which provides detailed guidance for the content and placement of cooperative advertising. CSG supports contractors by providing logo sheets and assistance, coordinating day-to-day cooperative marketing activities, and working with contractors to approve their marketing materials and place orders for these materials using a Lockheed Martin fulfillment site.

In addition to financial support, the cooperative marketing program provides participating contractors access to marketing webinars, a website widget, and an online portal with tools and information. The website widget tool allows contractors to easily add information about the program to their own website.

CSG staff indicated that the program is popular among program-affiliated contractors with about half of the contractors using co-op marketing funds. A CSG contact indicated that 40-50% of the 250 program contractors have participated in the cooperative marketing program, and these contractors accounted for about 80% of completed projects in 2013.

CSG staff indicated that contractors most often use cooperative marketing funds for print and online advertising, and less frequently for broadcast media such as television and radio. Contractors typically mail print materials to homeowners or distribute them at trade shows. In addition to standard templates and messages, contractors have the option of presenting innovative or creative advertising approaches to CSG for approval. CSG staff report that contractors are satisfied with the cooperative marketing offerings, but would likely prefer a streamlined explanation of the funding guidelines, such as a quick reference guide.

Tracking and Portal Functionality

CSG staff monitors the advertising type, estimate audit, and retrofit production rates associated with the cooperative advertising conducted by each participating contractor. A recently enhanced contractor web portal allows contractors the option of linking specific marketing efforts to projects in order to determine which of their marketing efforts are resulting in the most completed projects. Linking marketing efforts to projects is an optional component of participation, but CSG staff expects that more contractors will link their specific marketing activities to leads as they use the portal more frequently and better understand its functionality. Tangentially, a NYSERDA contact reported recent increases in allocations for online advertising because contractors are increasingly embracing this outreach channel.

Regional Variations in Marketing

CSG staff noted that contractors use marketing channels best suited for reaching their targeted market (Upstate, Downstate, rural or urban markets) while balancing regional cost differences. For example, some urban-area contractors are deploying online advertising such as “pay-per-click” banner ads because the cost of paper-based advertising in those areas is cost prohibitive.

A.2.3.3 Comprehensive Home Energy Assessments

GJGNY legislation provides funding for audits offered to participants either free of charge or at a reduced cost. HPwES energy audits (also referred to as energy audits) include air quality and safety inspections; diagnostic testing of the building envelope and all energy-using systems, including HVAC and hot water heating systems; and energy modeling to estimate upgrade costs and savings. NYSERDA and CSG staff members agree that the comprehensive energy audit is a vital first step in the HPwES participation process.

Role of Audits

According to program staff, program-related energy audits serve multiple purposes. From a marketing perspective, the free and reduced cost audit is an important promotional tool. From a customer education perspective, audits are used to identify energy-saving opportunities and safety improvements for specific homes. Further, from a sales perspective, the audit is a customer-contractor engagement process that serves to build trust while scoping an appropriate upgrade project, addressing financial issues, and making a case for moving forward with recommended upgrades. In the ideal case, the customer is engaged in the on-site audit process, observes the contractor’s skills, attributes value to the comprehensive approach, and this experience combined with the contractor’s BPI accreditation builds the customer’s trust in the contractor. After conducting the audit, the contractor provides the homeowner with a list of recommended upgrades, including pricing estimates. Contractors upload the audit results through the HPwES web portal and are paid for completing the audit.

After the contractor files their audit report, CSG maintains the program’s engagement with audit participants who have not completed an upgrade project with a program contractor. CSG sends these customers a reminder that outlines next steps to encourage implementation of recommended upgrades. If a project appears to have stalled, Brand Cool will develop and send targeted emails to encourage homeowners to take action and remind them of their opportunities with the program.

According to implementation staff, nationally, a good audit-to-retrofit conversion rate is between 33-35%. Staff reported that the audit conversion rate of each participating contractor firm varies based on a number of factors, perhaps most notably homeowner and contractor interest in completing a retrofit through the HPwES program. Project staff reported that program-wide, approximately 30% to 33% of the audits currently result in a completed HPwES project. Staff reported that they suspect that contractors with low conversion rates are completing the GJGNY audit and then completing the upgrades outside of the

program. Program guidelines state that contractors must try to complete upgrades through the program. In their contractor support role, CSG staff work with contractors with a conversion rate lower than 10-15% to improve their conversion rate and bring more projects through the program, or, as a last resort, recommend their removal from the program.

Audits may have some spillover effects, as the staff hypothesizes that participants not moving forward with an HPwES project may still use audit information to complete energy saving measures outside of the program. As part of their impact evaluation of the HPwES program, the impact evaluation team is currently conducting an audit of subsequent energy efficiency upgrades among GJGNY audit recipients who did not complete HPwES projects to quantify these impacts.¹³

At the time of interviews, NYSERDA staff was considering adding a direct install component to the audit process to capture energy savings from all participating homes, including those not pursuing recommended upgrades through the program. A direct install component would require contractor installation of a few energy-saving measures, such as light bulbs, during the audit.

Contractor Role in Audits

The overall purpose of the audit is to promote comprehensive energy efficiency projects in the residential sector. NYSERDA staff members reported that contractors conducting the audit employ skills taught during BPI training and use advanced whole-building modeling software tools specified by the program. Program staff members expressed some concern that contractors are conducting audits with varying levels of quality and detail based on their expectation of homeowner ability and intention to pursue an upgrade project. While the incentive limits contractors' out-of-pocket audit costs, staff want to make sure that contractors are conducting audits in a manner consistent with the intent of the program offering: educating consumers, promoting the whole-building approach, and encouraging comprehensive upgrades or promoting incentive-eligible measures. Staff reported that they review a portion of the audit reports to ensure quality and comprehensiveness. At least 10% of audits are reviewed through the QA Administrative review (see below).

A.2.3.4 Audit and Project Paperwork and Processing

NYSERDA and CSG staff members agreed that project-related paperwork and processing have historically created delays and may even cause contractors to dissuade customers from bringing their projects to the HPwES program. With the introduction of the free and reduced cost audits, contractors began submitting their audit reports to NYSERDA and CSG in order to receive the incentives. While allowing for program monitoring of audit quality, audit reporting processes have, in turn, increased the paperwork and data collection burden on contractors. A program contact indicated that about half of program paperwork CSG

¹³ The impact evaluation is in progress. Will update with final citation for the final report.

receives has at least one error that requires the contractor to revise and resubmit the form(s). Typically, these involve missing information or savings estimates that do not align with the recommended measures. During 2014, program staff began considering new software tools that may help to reduce this burden by providing a faster and more accurate way for contractors to, a) collect and submit the information collected during the audit and b) to generate a comprehensive energy model.

To further address these concerns, project paperwork processing was a focus of the 2014 internal process review. HPwES staff reduced the data fields required for the audit application form and changed CSG's audit approval processes. These changes resulted in reductions in the time needed from application submittal to audit approval. Program staff also implemented several changes focused on streamlining the project approval process, with the ultimate goal of enabling real-time electronic and auto-approvals. HPwES staff reduced the separation between the project modeling and customer contract paperwork to reduce the amount of paperwork and ensure consistency and transparency for the participants. Staff members also are working with contractors to expand their use of the Eligibility Screening Tool (EST) and "what-if" mode that would help contractors develop project scopes, and thus help the project review and approval process become more automatic, requiring less direct review and adjustment by CSG staff by increasing the portion of projects approved at application. These changes were designed to increase the responsibility of contractors to submit correctly modeled projects (thus reducing CSG's responsibility to correct project models), while providing contractors with more training to do so. In the future, a fully automated system could streamline contractor-homeowner interactions by allowing contractors to electronically upload a proposed work scope and receive project approval in real time.

A.2.3.5 Requirements of Funding Source

In recent years, HPwES has adapted to comply with changes made to eligibility rules and conditions that occurred with the shift from SBC to EEPS funding. Program staff reported a variety of issues stemming from the complicated budget and funding landscape that require project activities and expenditures be linked to specific funding sources, which may have different restrictions. From the perspective of the program staff, the incentive structure has become increasingly complicated and in recent years required frequent updates to program materials and changes to consumer messaging. Confusion in the marketplace and project delays have resulted from a more complex incentive schedule and increased limitations on measure eligibility based on fuel type, funding stream, and site-specific cost-effectiveness. According to program staff, the changes in program processes and increasing incentive complexity can diminish contractor engagement and may have resulted in fewer completed program projects since 2011, when EEPS II guidelines began requiring measure-level cost-effectiveness screening. One of the 2014 process improvements included expanding the list of prequalified upgrade measures; although some measures (such as windows) still require site-specific cost-effectiveness screening, this change is intended to reduce the burden on staff, contractors, and customers.

A.2.3.6 Project Financing

The GJGNY legislation provided NYSEDA the capital needed to directly fund loans, as opposed to working with individual lenders to buy down interest rates on qualified loans as had been the case prior to 2011. NYSEDA partnered with EFS and Concord Servicing Corporation to set up systems that enable NYSEDA to offer HPwES retrofit financing statewide. Staff members report that within 150 days NYSEDA had developed a loan product and made it available throughout New York State.

Staff agreed that the financing application and approval process for HPwES and AHPwES projects is one of the most complex elements of the program and navigating the paperwork required for accessing financing can be a challenge for participants. Contractors and program staff both seek to match the homeowner with an appropriate financing package (including incentives), guided by the homeowner's specific financial situation. Linking customers with financing requires that contractors undertake the sometimes delicate process of determining which financing, incentives, or other program options (including low-income services through Empower) will best meet homeowners' needs.

Upon receipt of required financial documents uploaded via the New York Home Performance Portal, the program's loan originator (EFS), reviews loan paperwork. The documents required for completing an application depends on the type of financing associated with a project. OBR provides a simple repayment option (since it can be added to a regular utility bill), but has title search requirements because the loan is associated with the property and can be transferred to a new owner. OBR-funded projects also must meet the "1/12th" rule, meaning that the cost of loan repayment must be less than the annual savings divided by 12. This requirement is designed to create cash flow-neutral upgrades for participating households and to convince homeowners to move forward.

NYSEDA offers two tiers of GJGNY residential retrofit loans. Tier 1 reflects historical Fannie Mae underwriting standards for New York, while Tier 2 allows NYSEDA to explore other ways of identifying credit worthiness, beyond FICO scores and typical limits on debt-to-income ratios. Loans for Tier 2 borrowers tend to require additional time, primarily because of the need to confirm satisfactory mortgage and utility bill payment history. Even with the variety of financing options available, about 30% of applicants are denied financing, most commonly because of high debt-to-income ratios and low credit scores.

Through the 2014 internal process review, NYSEDA staff implemented several changes designed to streamline the loan process. Staff clarified financing information on the website, simplified the application, and modified the Tier 2 loan criteria, including omitting the two-year utility bill payment history, because staff identified it as a potential barrier and EFS had experienced difficulty confirming it. Staff also changed the signature requirements to allow contractors and customers to sign both project approval and loan documents after loan approval, reducing the number of trips the contractor must make to the participant's house. In the future, the credit approval process may be automated by giving customers access to these

features within the New York Home Performance Portal. In combination with automated approval, financing automation could facilitate financing by providing an immediate issue of loan documents for customers, and thereby facilitate the ability of the contractor to close a sale.

A.2.3.7 Quality Assurance and Quality Control

As noted above, NYSERDA's residential QA/QC team operates the HPwES program's QA/QC activities, which are related, but not identical. While both activities are expected to ensure projects meet BPI standards and conform to health and safety requirements, they are managed by separate contractors. CSG leads QC activities; these activities are designed to support project quality during installation by way of contractor mentoring and support and customer relations.

QA is a more formal process, managed by Honeywell, the third party contractor in charge of QA inspections. Through the QA process, 10% of projects are randomly selected for administrative reviews, and 15% of completed projects are randomly selected for field inspections. Administrative reviews include a review of all project paperwork, including the audit report, contract and work scope, modeling, and measure list; field inspections include a physical inspection of the work site. Homeowners with completed projects also may request an inspection for their project within a year of completion. Contractors on probation will have more than 15% of their jobs inspected (see below for more information on the probation process). Field inspections last about ninety minutes and include a comprehensive check list of items including moisture, venting, draft testing, and inspection of installed equipment. Inspectors also verify that the installed equipment matches the submitted paperwork. Projects are scored on a six-level scale, with three levels of passing projects and three levels of projects that require corrective action, with additional codes for each reason.

Some contractors use the inspections as a field training opportunity for new staff. Program staff indicated that contractors are present for approximately 75 to 90 percent of inspections.

Not all findings require corrective action: minor issues, such as a customer remarks about a contractor, may simply be provided as feedback to the contractor. Some findings also relate to project scope comprehensiveness rather than the quality of the measures installed. Items identified as deficient during field inspection result in a Program Information Notification Statement (PINS) or Declaration of Completion (DOC). PINS contain feedback that does not require corrective action, such as missed opportunities for a more comprehensive project or minor errors. DOCs require corrective action from the contractor within 30 days and must be signed by both the contractor and the customer when resolved. PINS require follow-up, but can be resolved through verbal communication with the contractor. Notice of a DOC is emailed to the contractor within five days of the inspection. Contractors are allowed to be present at the time of an inspection and can correct issues immediately to avoid receiving a DOC.

CSG tracks the PINS/DOC status of projects, the resolution of any issues, and sends weekly reports to contractors documenting their projects' QA scores. Contractors are allowed a maximum of five unresolved DOCs at a time before risking probation. NYSERDA and CSG staff work closely together throughout the QA process and have access to the same database for monitoring project quality. Honeywell generates monthly reports documenting the number of inspections, results of the inspections, and status of any issues pending resolution.

Staff indicated that the QA process is a strength of the program, because contractors can tell their customers they are working with a state-sponsored program with third-party oversight and use that as a selling point. Marketing materials inform customers about the QA process and participants are given information about what is involved, so they are not surprised by the process.

NYSERDA staff report that more than half of field-inspected projects have at least one finding, although not all findings require corrective action. QA processes are constantly evolving to more fully meet the needs of the program while simplifying the process for homeowners and contractors as much as possible. In mid-2014, the HPwES program began testing a revised process expected to be more transparent to contractors and capture multiple components of performance, rather than project inspections that result in DOCs for all negative findings. The program staff is seeking strategies to provide ongoing feedback to contractors about both the positive aspects of their projects and any aspects, which might need improvement.

A.2.3.8 Tracking and Managing Goals

Program staff track and monitor several aspects of the program to ensure it is achieving the expected number of projects by fuel type, appropriately allocating various funding sources, and attributing projects to the correct targets. Both NYSERDA and CSG are working to increase the number of projects completed annually, as well as maximizing the savings achieved from those projects. One contact indicated that participation appears to have plateaued at about 6,000 projects a year. Staff identified the stagnant economy and the low cost of natural gas as possible factors contributing to the plateau of projects.

HPwES is supported by several internal and external tracking systems and databases. The primary database for the HPwES Program is the CRIS (Comprehensive Residential Information System) database, which is managed by NYSERDA. CSG maintains a separate NY HPwES database, also known as Citrix, HUB, and/or Core App. This database stores audit reports as PDFs, claimed incentives, and QA information (see below). The addition of the New York Home Performance Portal in 2013 was expected to increase transparency and improve contractor access to the status of each of their projects. By mid-2014, 96% of the

approximately 200 participating contractors were using the portal to track project status and upload applications.¹⁴

HPwES is further supported by databases that track:

- Data about application processing and use of newly developed tools for contractors; primarily contained in a database supported by Energy Savvy
- The status of financing applications and loan documents; managed by EFS
- The volume and outcome of calls to the NYSERDA information hotline and CSG hotline; tracked by Lockheed Martin and CSG, respectively
- Volume of web traffic and “click-throughs” on HPwES micro site pages; tracked via NYSERDA web hosting
- Results of a Net Promoter Score rolling survey launched in 2014; currently managed by CSG: collected via *Qualtrics* and sent to NYSERDA program staff

A.2.3.9 Program Changes

NYSERDA and CSG staff members consistently respond to program and market needs. As mentioned above, the sweeping 2014 internal process review resulted in changes to clarify and streamline key steps in the participation process, including: simplifying customer-facing materials and contractor selection, streamlining program paperwork and paperwork review processes, increasing prequalified measures, and expanding access to financing. HPwES staff implemented these changes to:

- Reduce application errors
- Speed application processing
- Increase uptake of financing
- Increase satisfaction among participants and contractors
- Increase the percentage of customers that move from website information gathering to application and, ultimately, complete a project

In interviews, NYSERDA and CSG staff identified a number of additional changes completed or underway to target underserved markets. To expand participation, CSG is piloting an approach using CSG staff to

¹⁴ Contractor experience and perspectives on the portal will be reported in a separate section documenting the results of a survey of participating contractors.

conduct audits and sell projects to homeowners. After the project is scoped and sold, a participating contractor installs the measures. CSG staff indicated this strategy has been successful, particularly as a contractor training technique. NYSEDA also expected to promote the HPwES low-rise option in a more intentional manner in 2014. Eligibility for multi-unit upgrades in low-rise buildings began in 2010, and has expanded from 1- 4 unit properties to 1- 8 unit properties with small residential heating systems. Staff introduced this program option to address the low program uptake in low-rise buildings through providing a bridge for properties that are too small to benefit from NYSEDA's Multifamily Performance Program (MPP). The HPwES low-rise option provides slightly higher incentives than HPwES due to the reduced program administration costs of completing several concurrent projects in the same building. Though this option was not advertised in early 2014, contractors could offer it to customers. Low-rise projects can include EmPower-eligible customers and measures as appropriate. Finally, the program is considering working with HVAC contractors to train them to do home performance and move towards a more "whole house" approach.

A.2.4 Perspectives on Contractors

Participating contractors have a critical role in the outreach, communication, and installation necessary to deliver HPwES to the residential market. To protect the quality of services provided by the program, participation is limited to contractors accredited by the BPI.¹⁵ Both NYSEDA and CSG staff members continuously communicate with the BPI staff to inform improvements to installation guidelines.¹⁶ BPI also serves as a technical resource for residential contractors. NYSEDA encourages technicians working on HPwES projects to obtain specialized certifications, and CSG facilitates BPI testing for contractors pursuing certification by acting as a test proctor. Staff members from both NYSEDA and CSG described their relationship with BPI as "intertwined."

In the sections below, we discuss the standards NYSEDA sets for HPwES contractors, how contractors work with the HPwES program, and how CSG evaluates and monitors participating HPwES contractors.

A.2.4.1 Contractor Management

In 2013 and 2014, the HPwES program did not actively recruit new contractors; instead, they sought to increase the volume of qualified projects brought by the existing cohort of contractors. The program will recruit new contractors as appropriate to reach a new or underserved segment of the residential market. CSG continued to provide enrollment assistance for contractors who expressed an interest in the program. When approached by an interested contractor, CSG evaluates potential new contractors based on their

¹⁵ In mid-2014 BPI shifted from accrediting firms to a GoldStar™ Contractor label.

¹⁶ For a more complete description of the relationship between BPI and NYSEDA, please see the BPI Report Section in the complete HPwES report, which presents the results of in-depth interviews with BPI staff and leadership.

accreditations, crew size, and access to the necessary equipment to complete audits, as well as their ability to accurately complete paperwork associated with the program. Staff reported that a wide range of contractors are participating in the program, ranging from small to large firms with varying levels of experience. Contractors successful at promoting Home Performance projects typically demonstrate an ongoing focus on education and training. Program staff indicated that 20% of the contractors participating are responsible for completing 80% of the projects in the program.

Program guidelines state contractors are expected to complete a minimum of 24 projects or submit at least \$100,000 worth of invoices. The program has the option of removing low performing contractors from the qualifying list posted on the NYSERDA HPwES site. CSG actively tracks the number of qualifying and active contractors and their project completions. During inspections, contractors found to have quality issues may be placed on probation, specifically for failure to meet BPI standards of practice. In the extreme cases of a BPI-certified contractor being excluded from further participation, NYSERDA maintains the right to work with BPI to have the contractors' BPI certification revoked.

A.2.4.2 Benefits of Participation to Contractors

NYSERDA staff report having frequent contact with program-affiliated contractors and remarked on participating contractors' commitment to the HPwES program and the home performance approach in general.

In addition to the incentives available to contractors, described in the Contractor Incentives and Reimbursements section, the staff mentioned other benefits the program provided to participating contractors. Additional benefits include access to cooperative marketing funds (as detailed in the Cooperative Marketing section), funding to offset the cost of training and certification, funds to purchase equipment used in program processes, and the ability to offer free energy audits to generate customer interest. In addition to providing a service to homeowners, program staff indicated the reduced cost or free audits are a valuable tool for contractors because the audits provide contractors access to customers, and the opportunity to demonstrate their expertise by using advanced diagnostic tools, and produces information for educating homeowners on the benefits of a whole-house approach. The program provides a modeling incentive to contractors to help cover the additional time required for HPwES, compared with utility equipment rebates.

While the program provides many benefits, the staff also recognized drawbacks associated with complying with program processes. The program staff reported that some contractors choose not to submit projects to the program to avoid the additional administrative costs associated with the program-related paperwork, time to process and other requirements. Nonparticipating contractors cannot access cooperative marketing funds or offer HPwES program incentives, financing, or subsidized energy audits; however, they may offer utility incentives and write off some of the cost of their own audits conducted outside the program.

Appendix B Logic Model Report

B.1 Introduction

The Purpose of this document is to present the overarching logic model for HPwES.

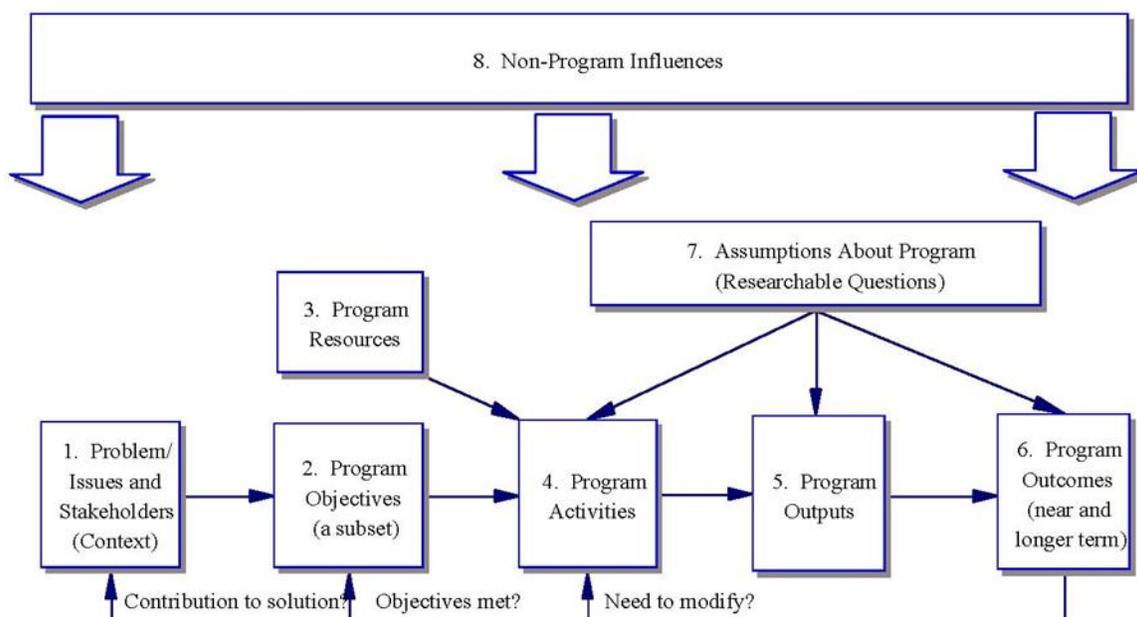
Since 1998, New York's SB has funded public policy initiatives not expected to be adequately addressed by New York's competitive electricity markets, including energy programs targeting efficiency measures, research and development, and the low-income sector, which includes many of NYSERDA's energy efficiency program efforts. The initial funding was enhanced in 2008, when the New York Public Service Commission authorized the Energy Efficiency Portfolio Standard, and again in 2009, when the Commission adopted a natural gas efficiency policy. In October 2011, the Commission issued an order reauthorizing the EEPS program through 2015. In addition to SBC funding, GJGNY funding from New York State's RGGI funds, as authorized by the GJGNY Act of 2009, is included in the HPwES program.

This appendix is organized as follows:

1. **Program Context, Stakeholders, Intent, and Design:** Describes the problem(s) the program is attempting to solve, or issues it will address, and the regulatory and stakeholder environments (context) within which the program is working.
1. **Program Objectives:** Provides a high-level description of the program's ultimate purpose and targets.
2. **Program Resources:** Identifies the funding, workforce, partnership, and other resources the program is providing.
3. **Program Activities:** Describes the program's various research, product development, demonstration, and commercialization progress, and support activities.
4. **Program Outputs:** Describes the anticipated immediate results associated with program activities.
5. **Program Outcomes:** Describes expected achievements in the near, intermediate, and longer term.
6. **Assumptions about Program:** Describes assumptions about how program activities and outputs will lead to the desired near, intermediate, and longer-term outcomes.
7. **External Influences:** Describes factors outside the program that may drive or constrain the achievement of outcomes.

Figure B-1 details the relationship between these eight items.

Figure B-1. Program Design Template



B.2 Program Context, Stakeholders, Intent, and Design

This section describes the design of the HPwES Program, the goals of the program, and the market barriers the program was designed to address.

B.2.1 Program Description

NYSERDA’s HPwES Program is an integral part of NYSERDA’s energy efficiency program portfolio and a key component of the residential Energy EEPS. There are several components of the HPwES Program, all of which are addressed, to some extent, in this logic model report. These components include a market rate HPwES path, an assisted path for income-eligible households and a financing component supported by GJGNY funding. HPwES can address homes with delivered fuels (oil, propane) using funds from the RGGI.

The HPwES Program uses building science and a whole-house approach to identify opportunities to increase the energy efficiency of residential buildings. The program is designed to reduce the energy use in New York’s existing one- to four-family housing stock through heating fuel and electricity-related savings. The need for improvements in the building shell and heating systems typically results in cost-effective fuel savings. Energy efficiency improvements promoted by this Program include building shell measures, high-efficiency heating and cooling systems, hot-water heaters, ENERGY STAR appliances and lighting, and specific health and safety measures. To encourage customer demand, EEPS funds provide financial incentives to help offset the cost of cost-effective installed measures; however, not all upgrades are eligible for EEPS incentives. All program-qualified upgrades are eligible for GJGNY financing.

AHPwES is an income-eligible component of the HPwES Program. AHPwES is designed to reduce the energy burden on households whose income meets eligibility requirements. Households with income equal to or lower than 80% of state or county median income (whichever is greater) are eligible for the program. Like market rate HPwES, AHPwES uses building science and a whole-house approach to energy efficiency.

HPwES seeks to increase the long-term durability of New York's existing housing stock by ensuring quality workmanship within the Program, allowing an opportunity for homeowners to budget accordingly for future upgrades, and decreasing concern of failing equipment. Through AHPwES, local contractors are able to deliver high-quality comprehensive services to segments of the population that might otherwise be unable to afford to make such improvements to their homes.

HPwES addresses how the whole house functions and includes a wide array of eligible measures expected to achieve extensive and long-lasting savings in natural gas, heating fuel, and electricity. For homeowners who qualify for a free or reduced-cost audit, a contractor takes an inventory of the current home conditions (including diagnostic testing of combustion appliances and blower-door testing for air-infiltration rates) and develops a work scope for proposed improvements, including a cost and energy savings estimate. This audit allows the contractor to recommend improvements that are holistic and maximize the energy savings achieved in every home.

HPwES seeks to transform the whole-house retrofit market by requiring Building Performance Institute (BPI) accreditation for participating contracting firms who then install comprehensive energy-efficient improvements and technologies in one- to four-family homes and low-rise multi-unit residential buildings.¹⁷ This requirement is expected to increase the supply of highly qualified whole-house contractors and increase the likelihood that such projects are completed with an eye toward maximizing both energy savings and resident health and safety. HPwES is complemented by an aggressive workforce development initiative that strengthens the Program delivery infrastructure through the training and certification of technicians and accreditation of contracting firms through BPI. Marketing, outreach, and education are expected to help spur customer demand.

HPwES projects also address residential health and safety issues pertaining to indoor air pollutants, focusing on carbon monoxide and other pollutants associated with combustion appliances, ventilation, and moisture control. Addressing health and safety issues is expected to increase the long-term durability of New York's housing stock and protect the health of future residents by addressing common ventilation and moisture problems.

¹⁷ Low-rise multi-unit residential buildings are residential structures up to three stories or less with up to eight units that are constructed using building techniques common to 1- to 4- family homes and can be served by residential scale heating equipment with a maximum rating of 300,000 Btus.

B.2.2 Barriers

The barriers to building and expanding the market for whole- house energy upgrades like those promoted by the HPwES program include technological, economic, information, and institutional barriers (Table B-1).¹⁸

Table B-1. Problems to be Addressed by NYSERDA’s HPwES Program

Problem Area and Barrier Details	Affected and/or Involved Group(s)
1. Market Barriers	
Lack of trained whole-house energy upgrade contractors	Contractors
Lack of customer demand for energy efficiency upgrades	Residential Customers
Lack of trust in residential contractors	Residential Customers
Cost of energy efficiency upgrades for homeowners	Residential Customers
Competing priorities for limited home improvement dollars	Residential Customers
Specialized and fractured residential contracting market limits “house as a system” knowledge	Contractors and Residential Customers
2. Economic Barriers	
Upfront project costs	Residential Customers
Uncertainty that the value of BPI certification and accreditation is greater than the cost	Contractors and Contracting Firms
Uncertainty that value of energy upgrades will be realized	Residential Customers
Limited access to attractive financing	Contractors and Residential Customers
3. Informational Barriers	
Lack of awareness of benefits of energy efficiency upgrades	Residential Customers
Lack of awareness of rebates and financing that can offset the cost of projects	Residential customers
Lack of awareness of the value of hiring BPI accredited firms	Residential customers
Conflicting bids, scopes of work, and cost estimates from BPI/non-BPI contractors	Contractors and Residential Customers
Presence of competing utility rebates that create confusion	Contractors and Residential Customers

¹⁸ *Home Performance with ENERGY STAR Program Logic Model Report*, Prepared by GDS Associates, Inc., December 2010.

B.2.3 Program Stakeholders

The stakeholders in the HPwES Program include a range of organizations, from trade allies and utilities to financial service providers:¹⁹

- NYSERDA’s HPwES Program Implementation, Marketing, Quality Assurance Contractors
- NYSERDA’s HPwES Contractors
- DOE/EPA
- Suppliers of energy modeling software
- NYSERDA-sponsored Clean Energy Training Program providers
- NYSERDA’s Financing Contractors/Partners – currently Energy Finance Solutions and Concord Servicing Corporation, New York Energy Smart Loan Fund Participating Lenders, and participating AHPwES lenders
- Building Performance Institute (BPI)
- Trade ally organizations – i.e., the Building Performance Contractors Association of New York State and Efficiency First
- New York State Weatherization Director’s Association (NYSWDA)
- Economic Development Growth Extension (EDGE) Contractors
- Green Jobs - Green New York Community Outreach Coordinators and other Community Based Organizations
- New York utilities

B.3 Program Objectives

The HPwES program operates with the long-term objective of transforming the market for residential energy efficiency by increasing the supply of highly qualified contractors trained in building science approaches most likely to maximize the energy savings potential from qualified projects. In addition, program marketing paired with incentives and attractive financing are expected to create demand for the services of program-qualified contractors.

¹⁹ Program Implementation Services for Residential Programs Request for Proposal 2470.

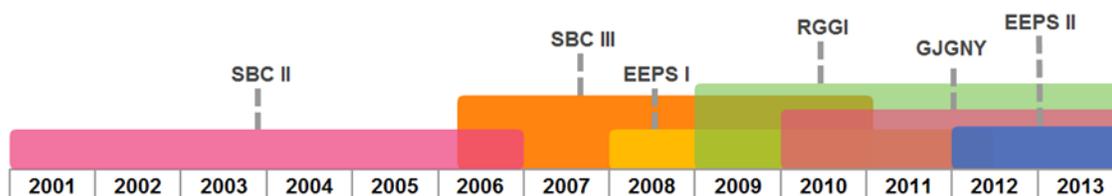
The long-term goals for the HPwES Program are to:

1. Create a market-based system of supply and demand that supports the renovation of existing homes toward greater energy efficiency using a “house-as-a-system” approach.
2. Enhance the capacity of the market to supply “one-stop shop” services for comprehensive energy efficiency for one- to four-family homes.
3. Improve the quality of residential energy efficiency installations through a whole house approach emphasizing the “house-as-a-system” approach and high quality installation techniques.
4. Develop a network of BPI-certified contractors (and accredited contracting firms) that market, sell, and provide comprehensive “house-as-a-system” energy audits and services that focus on increasing the health, safety, durability, comfort, and energy efficiency of existing one-to-four family homes.
5. Lessen the burden imposed by energy consumption and other utility-related costs with a significant emphasis on providing this benefit for low- to moderate-income residents.
6. Create sustainable energy savings and environmental benefits.

B.3.1 Program Timeline and Status

The following timeline displays primary funding sources over the 12 years that the HPwES program has operated (Figure B-2). SBC II and III funding supported HPwES and AHPwES from program inception in 2001 through 2012. EEPS I and EEPS II funding also has funded the program since 2010. EEPS II is scheduled to provide funding to HPwES through 2015. Starting in 2011, RGGI funding enhanced services for homes heated with oil or propane, and starting in 2010, GJGNY funding (a subset of RGGI funding) began funding free or reduced-cost comprehensive audits to homeowners in New York and financing to HPwES and AHPwES projects.

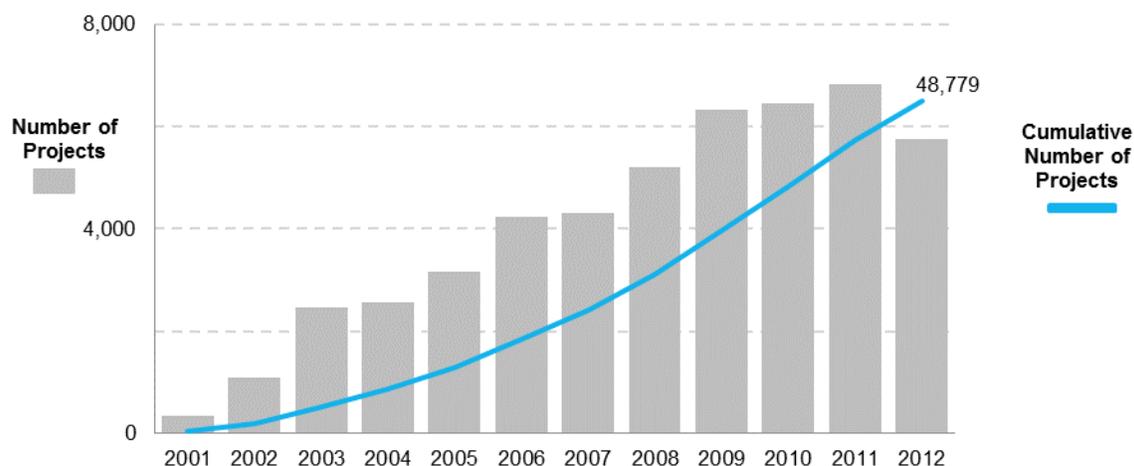
Figure B-2. HPwES Timeline with Funding Sources*



* HPwES access to specific funding sources differs somewhat from when each source was allocated to NYSERDA. HPwES started using EEPS I natural gas funding in May 2010, EEPS I electric funding in August 2011, RGGI funding in February 2011, GJGNY funding in November 2010, and EEPS II funding in January 2012.

HPwES is a mature program, having operated continuously since 2001. The number of HPwES projects steadily increased year over year until 2012, when the annual number of projects dropped below 6,000 (Figure B-3).

Figure B-3. Number of Projects by Year



B.4 Resources

The ability of the HPwES Program to accomplish the outputs and outcomes needed to achieve its goals is dependent on the level, quality, and effectiveness of inputs that go into these efforts. Program budget resources are presented in Table B-2, while other program resources are presented in Table B-3.

As presented in Table B-2, the program budget for HPwES includes funding from a variety of sources: SBC III, EEPS I, EEPS II, for a total of approximately \$223.4 million through December 31, 2015. In addition, the HPwES program leverages quarterly allocations from RGGI auctions. In 2013, these allocations totaled nearly \$4.5 million for HPwES and just over \$6 million for AHPwES. RGGI funds help support incentives for bulk fuel efficiency measures and a GJGNY Residential program that offers customers free or reduced-cost Comprehensive Home Energy Assessments and low-interest financing to fund qualifying measures/projects.

Table B-2. Home Performance with ENERGY STAR Program Budget Allocation

Sources: System Benefits Charge, Operating Plan for New York Energy SmartSM Programs (July 1, 2006-December 31, 2011) As Amended February 28, 2011 (revised April 2011); NYSERDA, New York’s System Benefits Charge Programs Evaluation and Status Report, Year Ending December 31, 2011, March 2012 (Revised April 2012); Public Service Commission, Order Modifying Budgets and Targets for Energy Efficiency Portfolio Standard Programs and Providing Funding for Combined Heat and Power and Workforce Development Initiatives, December 17, 2012.

Funding Source	SBC III	EEPS I Electric	EEPS I Gas	EEPS II Electric	EEPS II Gas	Total
Market	\$40.7	\$1.8	\$21.7	\$17.2	\$52.3	\$133.7
Assisted	\$47.9	\$0.9	\$8.0	\$7.8	\$25.1	\$89.7
Total Program by Funding Source	\$88.6	\$2.7	\$29.7	\$25.0	\$77.4	\$223.4

Table B-3. Program Resources

Funding
<ul style="list-style-type: none"> • SBC, EEPS, and RGGI funding for the incentive pool, including HEMI incentives • RGGI funding for GJGNY CHEA and project financing
NYSERDA Staff Resources
<ul style="list-style-type: none"> • Staff experience and expertise • Experience of implementation contractor
External Resources
<ul style="list-style-type: none"> • BPI contractor training expertise • Cadre of BPI-certified contractors and accredited firms capable of delivering high-quality program-qualified projects • The national Home Performance with ENERGY STAR program • Local and national ENERGY STAR promotion activities • Utility programs in the National Grid, ConEd, Central Hudson and other New York service territories • Expertise of stakeholder groups, including the Building Performance Contractors Association, Efficiency First, and creating an Industry Working Group
Intangible Resources
<ul style="list-style-type: none"> • Green Bank • Existing awareness of and engagement with NYSERDA programs among market actors • Existing awareness of energy efficiency program incentives among New York homeowners • Political support for energy efficiency, clean energy, and carbon emissions reduction

B.5 Activities

Activities within NYSERDA’s Home Performance with ENERGY STAR Program have been designed to work strategically with demand-side, mid-market, and infrastructure market actors to help address key barriers. The program provides incentives the installation of eligible energy efficiency measures designed to increase the energy efficiency of existing homes. Additions, gut rehabs, substantial renovations, conversion of unconditioned space into conditioned space, or energy improvements required by residential building code are not eligible for HPwES.

According to NYSERDA’s Contractor Resource Manual, the objectives of the HPwES program are to enhance the delivery of building performance services and use state-of-the-art diagnostic tools and building science principles to reduce energy consumption cost-effectively, while simultaneously addressing health issues pertaining to indoor air quality, ventilation, and moisture control. NYSERDA provides technical, financial, and marketing support to participating contractors, and specific incentives and reimbursements for contractors encouraging a variety of activities desired by the program. A complete list of contractor incentives is included in Table B-4.

Table B-4. Contractor Incentives and Reimbursements

Name	Rationale
Comprehensive Home Energy Assessment Reimbursement	Offsets the time required to conduct comprehensive audits necessary to identify jobs that are more cost-effective for the customer and more profitable for the contractor. Encourages contractors to offer these services and customers to request them by reducing the cost incurred by both parties.
Advanced Modeling Incentive	Makes it beneficial for contractors to model the home using program-approved software and to incorporate the whole-house model into their business successfully.
Referral Incentive	Encourages referrals among BPI-certified contractors with different specialist certifications.
Electric Reduction Incentive	Encourages contractors to suggest energy-efficient appliance replacement as part of the program-qualified scope of work.
Equipment Incentive	Offsets the cost of equipment necessary to perform advanced diagnostics.
BPI Certification Reimbursement Incentive	Encourages contractors to obtain their BPI certification and to renew existing certifications.
Company BPI Accreditation	Offsets the cost of obtaining and maintaining BPI accreditation.
Cooperative Advertising	Helps contractors promote their services, while building consumer awareness of HPwES.
First Completion Incentive	Encourages new contractors to complete their first project within three months of enrolling in the program.
First Year Production Incentive	Encourages new contractors to embrace HPwES by offering an incentive to new contractors that meets certain thresholds in project volume or value.

In addition to the incentives and support provided to contractors directly, participating contractors are able to provide access to financial incentives (including subsidized low interest rate loans) available through NYSERDA to qualified homeowners for the installation of eligible energy efficiency measures. Financial incentives and access to financing encourage consumer investment in building performance services and advanced diagnostics.

Participating contractors contract directly with homeowners of existing one-to-four- family homes to provide advanced building performance services that comply with Program requirements and standards. Ensuring that the delivery channel can provide these services requires that the program support quality

training programs and provides support to contractors committed to building science principles. Ensuring that program-supported projects achieve cost-effective energy reduction and that health and safety upgrades are identified and done properly is facilitated by provision of audits and robust QA/QC activities.

Finally, NYSERDA conducts separate marketing and general awareness efforts that are designed to affect the existing homes market by increasing demand for energy efficiency improvement services and equipment.

Table B-5. Activities of the Home Performance with ENERGY STAR Program*

Provision of Consumer Financial Incentives (Including Financing)
Offer financing options for program-qualified home upgrade projects.
Provide a High Efficiency Measure Incentive (HEMI) of 10% of the cost of eligible measures up to \$3,000.
Provide low- to moderate-income households with incentives of up to 50% of the costs associated with the installation of eligible measures (up to a maximum of \$5,000 per household or \$10,000 for a two- to four-family building).
Marketing and Outreach Activities
Provide cooperative advertising incentives to support and leverage contractor advertising and increase awareness of the program among the target market.
Promote HPwES with information about project value and referral to the list of program-qualified contractors.
Support constituency-based organizations recruited to promote the program to specific populations in specific geographic areas.
Provide Incentives and Other Trade Ally Support
Offer financial assistance to offset the cost of BPI certification, accreditation, and continuing education.
Offer financial assistance to reduce the cost of diagnostic equipment and approved modeling software, a requirement to participate in the program.
Provide training and support for contractor use of program tracking and modeling software.
Conduct Comprehensive Home Energy Assessments (CHEA)
Provide payments that offset the contractor costs associated with conducting CHEA.
Quality Control Activities
Develop and maintain comprehensive QA/QC objectives and procedures, including materials and installation guidelines, as well as standards for quality installation.

* HPwES Program Logic Model Report, Prepared by GDS Associates, Inc., December 2010.

B.6 Outputs

This section describes program outputs, program outcomes, and influences that are external to the program and that can facilitate or impede the achievement of a program’s outcomes. At the outset, it is important to distinguish between outputs and outcomes. Outputs are the immediate measurable results of program activities. These results are typically easily identified and quantified, often by reviewing program records. Outcomes are the expected market effects of a program. They are anticipated by and frequently the same as

program goals and objectives. Outcomes vary depending on the period assessed. On a continuum, program activities lead to immediate program outputs that, if successful, collectively work toward achievement of anticipated short-term, intermediate-term, and long-term program outcomes.

This section describes the anticipated immediate results associated with program activities, primarily in a table of outputs with indicators and potential data sources for the indicators (see Table B-6).

Table B-6. Outputs, Indicators, and Potential Data Sources

Output	Potential Data Sources
Provision of Consumer Financial Incentives (Including Financing)	
<ul style="list-style-type: none"> • Number of projects accessing financing • Dollar value of financing provided 	CRIS database
<ul style="list-style-type: none"> • Number of projects with HEMI • Type and value of projects with HEMI 	CRIS database
<ul style="list-style-type: none"> • Number of AHPwES projects • Dollar value of AHP incentives paid • Characteristics of AHP projects 	CRIS database
Marketing and Outreach	
<ul style="list-style-type: none"> • Dollar value of cooperative advertising incentives; value of leveraged marketing dollars • Number of contractor firms accessing co-op incentives • Where and when co-op advertising is used 	Program records Surveys with participating contractors
<ul style="list-style-type: none"> • Number of marketing materials that promote HPwES • Diversity of promotional activities • Value or impressions linked to HPwES target market 	NYSERDA marketing records
<ul style="list-style-type: none"> • Number of contractors included on program website list • Inquiries/web analytics for page 	Program records
<ul style="list-style-type: none"> • Number of CBOs engaged to promote program • Audit-only and program participants affiliated with CBOs 	Program records
Provide Incentives and Other Trade Ally Support Activities	
<ul style="list-style-type: none"> • Number and dollar value of training, certification, accreditation, and renewal incentives 	Program records
<ul style="list-style-type: none"> • Number and dollar value of financial assistance for diagnostic equipment • Type of equipment purchased 	Program records
<ul style="list-style-type: none"> • Number and type of trade ally training and technical support activities provided by program field representatives 	Program records
Continued	

Output	Potential Data Sources
Conduct Comprehensive Home Energy Assessments (CHEA)	
<ul style="list-style-type: none"> • Number of audits 	CRIS
<ul style="list-style-type: none"> • Number of audit reports • Measures/upgrades identified in audit • Health and safety issues identified • Estimated costs 	Program records
Quality Control Activities	
<ul style="list-style-type: none"> • QC procedures documented 	Program records
<ul style="list-style-type: none"> • Number of projects inspected • Findings of inspections 	Program records

B.7 Outcomes and Logic Diagram

This section contains the table of outcomes (Table B-7), including short-term, medium-term, and long-term outcomes, along with the indicators and potential data sources for the indicators. The logic model diagram (Figure B-4) is included at the end of this section.

Outcomes are the less certain theoretical changes that are expected to result from program activities.

Outcomes can occur as soon as program activities begin and can continue to occur after a program ends.

For the current HPwES Program, we define *short-term* outcomes as those expected to occur before the end of 2014, *intermediate-term* outcomes as those expected to occur in 2015 and 2016, and *long-term* outcomes as any that might be measurable only after the precursor activities, outputs, and outcomes have occurred.

Thus, long-term outcomes may occur after the end of the program cycle or could reflect the accomplishments of previous program efforts. Program spillover and market effects can occur at any point, but are typically most evident only when long-term outcomes are measured.

It is important to note that because the HPwES program has operated continuously since 2001, it is possible that indicators of long-term outcomes are starting to occur and that these indicators provide evidence of potential market effects.

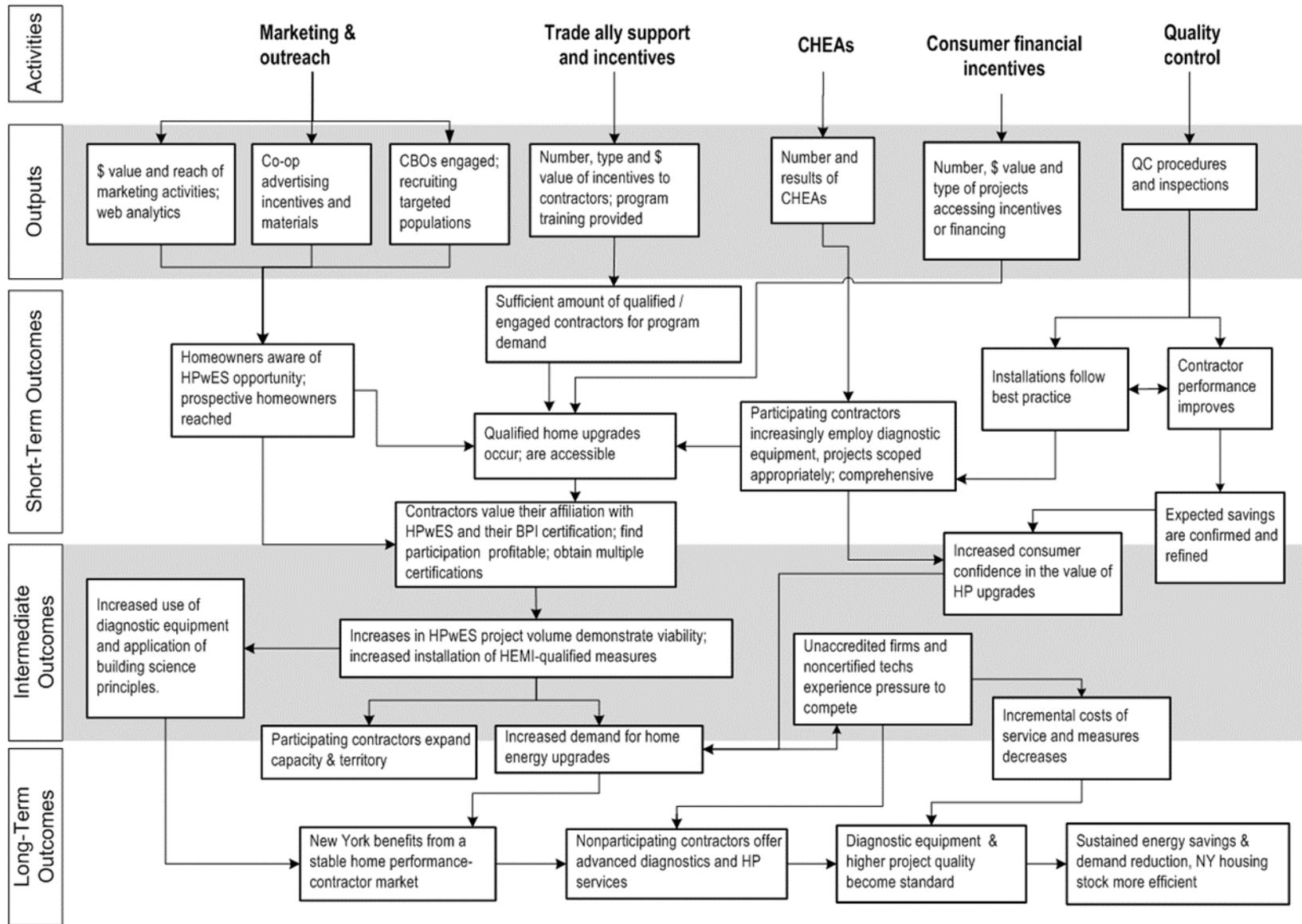
Table B-7. Outcomes, Indicators, and Potential Data Sources

Outcomes	Indicators	Data Sources and Potential Collection Approaches
Short-Term/Intermediate Outcomes from Provision of Consumer Financial Incentives and Financing		
1. HPwES-qualified home upgrades occur	<ul style="list-style-type: none"> • Audit conversion rate • Increasing portion of New York housing stock receiving HPwES services 	<ul style="list-style-type: none"> • Program records • Census • Industry reporting
2. Increased installation of qualified measures	<ul style="list-style-type: none"> • Market share of qualified measures 	<ul style="list-style-type: none"> • Surveys or other data from equipment vendors
3. HPwES projects accessible to more households	<ul style="list-style-type: none"> • Diversity of applicants in income and education levels 	<ul style="list-style-type: none"> • Program records • Participant, audit-only, and market surveys
Short-Term/Intermediate Outcomes from Marketing and Outreach Activities		
4. Program affiliated contractors reach prospective homeowners	<ul style="list-style-type: none"> • Number and value of projects • Referral rate for contractors that tap co-op dollars 	<ul style="list-style-type: none"> • Interviews with participating contractors
5. New York homeowners aware of HPwES	<ul style="list-style-type: none"> • Awareness of program brand or service 	<ul style="list-style-type: none"> • Surveys of participant and nonparticipant households
Short-Term/Intermediate Outcomes from Incentives and Other Trade Ally Support Activities		
6. Program affiliated contractors value their affiliation with HPwES	<ul style="list-style-type: none"> • Program affiliated contractor tenure • Project volume • Expectations for future participation 	<ul style="list-style-type: none"> • Program records • Contractor surveys
7. Certified contractors value BPI certification	<ul style="list-style-type: none"> • Certification/accreditation status, intention to maintain certification • Profitability of HPwES projects • Increasing portion of accredited firms' technicians with certification 	<ul style="list-style-type: none"> • Participating and nonparticipating contractor surveys
8. Increases in HPwES project volume demonstrates viability of services	<ul style="list-style-type: none"> • Affiliated contractors routinely offer HP; represent an increasing portion of business 	<ul style="list-style-type: none"> • Surveys of participating contracting firms
9. Firms expand capacity or geography	<ul style="list-style-type: none"> • Firms accessing incentives to add capacity or expand into new geographic areas • Tenure of firms 	<ul style="list-style-type: none"> • Program records • Surveys of participating contracting firms
Continued		

Outcomes	Indicators	Data Sources and Potential Collection Approaches
Short-Term/Intermediate Outcomes from Comprehensive Home Energy Assessments		
10. Program-affiliated contractors increasingly use diagnostic equipment and apply building science principles	<ul style="list-style-type: none"> • Portion of all jobs or bids that include diagnostic equipment • Application of these approaches to nonparticipant homes • Use of equipment in overall sales 	<ul style="list-style-type: none"> • Contractor surveys
11. HPwES projects are scoped appropriately and meet consumer needs	<ul style="list-style-type: none"> • Audit scope relative to project scope • Higher conversion rate • Level of homeowner satisfaction with audit, bid, and/or work completed 	<ul style="list-style-type: none"> • Interviews with staff and contractors • Program records • Surveys with audit-only participants • Participant surveys
12. The program supports increasingly comprehensive projects	<ul style="list-style-type: none"> • Portion of projects with more than one measure • Portion of household energy savings expected or modeled. 	<ul style="list-style-type: none"> • Program records
13. Increasing numbers of technicians & firms are certified to deliver multiple services	<ul style="list-style-type: none"> • Portion of firms with multiple certifications • Increased portion of techs with multiple certifications 	<ul style="list-style-type: none"> • BPI records • Contractor surveys
Short-Term/Intermediate Outcomes from Quality Control Activities		
14. Installations follow best practice	<ul style="list-style-type: none"> • Results from QC reviews 	<ul style="list-style-type: none"> • Program records • Interviews with QC contractors
15. Contractor quality improves	<ul style="list-style-type: none"> • Level of disciplinary action 	<ul style="list-style-type: none"> • Program records
16. Incremental costs associated with program-qualified measures or services decrease	<ul style="list-style-type: none"> • Project pricing, job costs, incremental costs of high efficiency measures promoted by the program 	<ul style="list-style-type: none"> • Program records • Efficient product pricing research • Surveys with contractors and homeowners • Estimates from competing bids or comparable nonparticipating projects
17. Increased consumer confidence in the value of comprehensive upgrades	<ul style="list-style-type: none"> • Resident satisfaction; willingness to recommend HPwES services • Nonparticipant confidence that energy savings will be realized 	<ul style="list-style-type: none"> • Participant surveys • Market/homeowner surveys
18. Increased consumer demand for or interest in energy-saving upgrades	<ul style="list-style-type: none"> • Value of energy-saving upgrades relative to other upgrades • Intention to pursue energy-saving upgrades 	<ul style="list-style-type: none"> • Participant surveys • Market/homeowner surveys
19. Expected savings are confirmed and refined	<ul style="list-style-type: none"> • Realization rate 	<ul style="list-style-type: none"> • Impact evaluations
Continued		

Outcomes	Indicators	Data Sources and Potential Collection Approaches
Longer-Term Outcomes		
20. Unaccredited firms and noncertified techs experience pressure to compete	<ul style="list-style-type: none"> • Reported level of interest in obtaining BPI certification or accreditation • Pay or profitability differential among certified contractors and/or accredited firms 	<ul style="list-style-type: none"> • Interviews with accredited firms • Surveys of certified and noncertified contractors • Prevailing wage data
21. New York benefits from a stable home performance contractor market	<ul style="list-style-type: none"> • Tenure of accredited firms • Expectations for the future 	<ul style="list-style-type: none"> • BPI records • Surveys with participating firms and contractors
22. Nonparticipating contractors offer advanced diagnostics and HP services	<ul style="list-style-type: none"> • Familiarity with advanced diagnostic approaches • Rate at which nonparticipant firms possess diagnostic equipment • Familiarity with and intent to pursue BPI certification 	<ul style="list-style-type: none"> • Nonparticipant contractor survey
23. Changes in standard practice increase project quality and energy savings attained	<ul style="list-style-type: none"> • Evidence of changes in diagnostic and installation practices that align with building science principles 	<ul style="list-style-type: none"> • Nonparticipant contractor survey • Participant contractor survey
24. More efficient housing stock in New York	<ul style="list-style-type: none"> • Building science principles applied to increasing portion of HVAC replacements and other upgrades that affect energy use and building envelope 	<ul style="list-style-type: none"> • Statewide residential housing stock studies • Nonparticipant contractor survey • Participant contractor survey
25. Sustained energy savings and demand reduction	<ul style="list-style-type: none"> • Upgraded homes consume less energy than comparison homes for 10 or more years 	<ul style="list-style-type: none"> • Statewide residential housing stock studies • Impact evaluations

Figure B-4. Initiative Logic Diagram



B.8 Assumptions About Strategies

This section describes the testable hypotheses or testable assumptions about the program to be explored in the PE/MCA and Impact evaluations.

B.8.1 Baseline Market Conditions

NYSERDA's HPwES program has operated continuously since 2001 and has evolved over the years to incorporate a variety of contractor and homeowner incentives, including access to free or reduced audits and provision of multiple financing options. This section describes the key activities expected to affect the market for home performance services in New York and identifies the pathways for program spillover and for out-of-program spillover.

B.8.2 Mid-market Supply-Side Actors

Prior to the implementation of HPwES, the New York residential retrofit market was perceived to be highly fragmented. This fragmentation was evidenced by the following observations:

- Contractors focused on one specialty
- Lack of quality CHEA services
- No or limited deployment of advanced diagnostics, such as blower-door tests and infrared photography
- Lack of consistently applied standards for effective sizing and installation of energy-using equipment

In response to these observations, the HPwES program aligned with efforts to improve the overall quality of the residential contracting market and sought to specifically intervene in areas that most directly include applications of building science principles to residential upgrades. The fundamental assumption behind these activities is that *the HPwES program needs to build an industry of professionals who can diagnose and treat homes with high energy bills, shell or comfort problems, or health and safety problems*. This home performance approach is embodied in the “house as a system” concept and promoted by the Building Performance Institute (BPI), a certification body supported by NYSERDA since the beginning of the HPwES program. BPI has leveraged the support of NYSERDA to develop a system of guidelines and credentials that are now available to home performance contractors throughout the United States. Through BPI, NYSERDA has sought to support building this industry of professionals in New York by:

- Facilitating access to training and certification activities
- Promoting contractors with specific credentials

- Requiring all potential projects to first receive an audit
- Providing incentives to contractors to offset the time needed to comply with program requirements that might otherwise limit the profitability of program-qualified projects

The HPwES program promotes the application of building science principles and a high-quality workforce by requiring involvement of BPI-accredited firms and specifying roles for BPI-certified technicians within those firms. Thus, BPI status confers real benefits (e.g., access to program resources and incentives) and hypothetical benefits (e.g., market differentiation and profitability). Identifying potential sources of market pressure that could lead to market effects will require understanding and documenting the mechanisms by which non-affiliated firms and non-certified technicians experience market pressures that force them to consider aligning with HP-type services. Market pressures result from the expectation that perception of higher quality and potential profitability will create pressure on unaffiliated market actors. These market pressures act on four key mid-stream market actors in different ways (Table B-8).

Table B-8. Four Mid-Stream Populations

BPI Status	Indicators of Market Pressure
Accredited Firm	If successful, accredited firms should: <ul style="list-style-type: none"> • Maintain their accredited status • Be more profitable • Be able to sell HP-quality services Other evidence of differentiation: <ul style="list-style-type: none"> • Expanded in size or in services offered • Established expectations for enhanced standard practices on specific types of upgrades
Non-Accredited Firm	The success of BPI-accredited firms will: <ul style="list-style-type: none"> • Create pressure to offer similar services • Create pressure to obtain BPI accreditation • Create interest in BPI-certified technicians • Force consideration of – and eventual implementation of – changes in standard practice to align with accredited firms
Certified Technicians	If successful, certified technicians should: <ul style="list-style-type: none"> • Maintain their certification status • Be paid a higher wage • Have supervisory or oversight responsibility over non-certified technicians • Possess better skills and employ standard practices in line with building science and home performance • Differentiate themselves from their peers
Non-Certified Technicians	The success of certified technicians will: <ul style="list-style-type: none"> • Create financial pressure based on perceived wage disparity • Create pressure to avoid oversight by peer (within accredited firm) • Increase interest in BPI certification • Increase interest in and commitment to align standard practice with BPI-certified peers or the expectations of customers or employers

HPwES fundamentally focuses on supporting and promoting contractors with specific credentials, so it is important to verify that those credentials are valuable. The premise is that diffusion of those credentials, along with pressure from competing contractors, and overall increased interest in obtaining energy efficiency will create pressure on the non-BPI market actors to adjust services or practices accordingly. If this occurs then the difference between BPI and non-BPI standard practices (and thus, energy savings associated with BPI, as opposed to good contractor practices) will be smaller, and some portion of that change is likely attributable to BPI.

Another important component of understanding the validity of the assumptions discussed here is to understand and document the mechanisms by which contracting firms and individual technicians become aware of any market advantage created by the program or by BPI credentials. There are numerous potential sources for awareness (requests from potential customers, demand for access to incentives, trade magazines, trade shows or professional gatherings, direct promotion activities conducted by the program or BPI) that could inspire nonparticipant firms or uncertified technicians to seek out information. Exploring the mechanisms through which contractors become aware of emerging credentials and business opportunities should be a topic for contractor data collection.

B.8.3 Demand-Side Activities

HPwES seeks to inform New York homeowners about the benefits and opportunities of home upgrades supported by advanced diagnostics and application of building science principles.

This is achieved by:

- Providing homeowners with access to a free or reduced-cost comprehensive home audit
- Providing access to incentives to offset the cost of specific measures
- Linking homeowners to attractive financing options that reduce the up-front costs associated with comprehensive home upgrades
- Offering quality assurance services to increase the confidence that program-qualified projects perform as expected

Access to free or reduced-cost audits encourages homeowners to find out what their home needs, while financing options remove initial economic barriers. A potentially important component of the program was the addition of free and reduced-cost audits and attractive financing options, both funded through GJGNY. These items are embedded within the HPwES program and likely supported participating contractors during contractions in the residential contracting market after the housing market collapsed in 2007/2008.

An important demand-side assumption of the program strategy is that providing CHEAs to homeowners in addition to incentives and financing to reduce the cost of upgrades will lead to increasingly comprehensive

efficiency retrofits. The expectation is that contractors trained in the whole-house approach will offer more comprehensive services (outcome 13) and will complete more comprehensive projects (outcome 12).

An important component of surveys with participating homeowners, as well as the market survey, will be investigating how homeowners become aware of the program and select a contractor, and the relative priority placed on upgrades to achieve energy savings (or other sustainability goals).

B.8.4 Spillover and Market Effects

Spillover and other net-to-gross approaches have been deployed to estimate energy program impact for many years. Approaches to reliably estimate market effects, however, are nascent and thus there is no standard approach to estimate direct or indirect market effects. As a mature program, with over a decade of consistent effort in market preparation and program deployment, HPwES is likely responsible for some movement in indicators of long-term outcomes. Whether the effect is large enough to reliably measure remains to be seen.

Combining the mid-market and demand-side activities yields the following path to both out-of-program spillover and market effects (associated logic model outcomes from Table B-7 are numbered in parenthesis):

1. Certified contractors have superior standard practices that increase overall project quality and expected energy savings over comparable projects completed by non-certified contractors. (10, 11, 12)
2. Accredited firms systematically apply the changes to standard practice expected from their certified technicians to all program-qualified projects. (14, 15)
3. Consumers are receptive to these services and request them. (18)
4. Both certified contractors and accredited firms apply changes to standard practice in audit and installation to projects that do not ultimately participate in the program. (10, 23)
5. These services are profitable. (8, 9)
6. Incremental costs for program sponsored services and energy conservation measures decline. (16)
7. Both certified contractors and accredited firms apply these changes to standard practice to all projects that include measures associated with home energy performance. (23)
8. Non-certified or accredited firms obtain these skills in response to competition from accredited firms. (20, 22, 23)

B.9 Non-Program Influence on Outcomes

This section describes the influences that are external to the program that may affect the outcomes, such as the economy and other influences over which NYSERDA programs have no direct influence.

- Broad changes in the market for residential upgrades affected by expectations for housing price appreciation, future income, and other economic concerns
- Mild winter/cool summers reducing interest in weatherization improvements
- Declining costs of natural gas that result in fewer measures or projects passing cost-effectiveness screening
- Confusion in the marketplace due to competing utility rebate programs
- Restrictions created by funding sources or legislative requirements that increase program complexity
- Changes in political priorities that result in increases or decreases in program resources
- Revisions to state and federal tax codes that encourage or discourage purchases of energy-efficient equipment by residential customers

B.10 References

This section includes a list of all of the materials used to develop the report.

- GDS Associates, Home Performance with ENERGY STAR® Program: Market Characterization and Market Assessment. Final Report, February 2009.
- GDS Associates, System Benefit Charge Home Performance with ENERGY STAR® Program Logic Model Report, December 2010.
- NYSERDA, 2014, *Home Performance with ENERGY STAR®*, <http://www.nyserdera.ny.gov/home-performance> for webpage.
- NYSERDA, NY Home Performance with ENERGY STAR® Program Contractor Resource Manual, revised August 2013.
- NYSERDA, New York's System Benefits Charge Programs Evaluation and Status Report, Year Ending December 31, 2011, March 2012 (Revised April 2012).
- NYSERDA, Program Implementation Services for Residential Programs Request for Proposal 2470.

- NYSERDA, *System Benefits Charge, Operating Plan for New York Energy SmartSM Programs* (July 1, 2006-December 31, 2011), as amended February 28, 2011 (revised April 2011).
- Public Service Commission, Order Modifying Budgets and Targets for Energy Efficiency Portfolio Standard Programs and Providing Funding for Combined Heat and Power and Workforce Development Initiatives, December 17, 2012.

Appendix C Analysis of CRIS Data Memorandum

This chapter presents the results of initial analyses of the NYSERDA Comprehensive Residential Information System (CRIS) database, which houses the HPwES program tracking data. This analysis is integrated with the findings from other data collection activities in the final report. The evaluation team analyzed project data from the CRIS database and drafted this memorandum to:

- Share insights and program trends with NYSERDA staff and solicit their input
- Detail methodological approaches so NYSERDA staff can clarify data assumptions

C.1 Summary

NYSERDA's HPwES program supported more than 54,000 projects between 2001 and 2013, totaling 34.2 million kilowatt-hours (kWh) of estimated electricity savings and 1.9 million British thermal units (MMBtu) of estimated non-electricity savings.²⁰ Since 2012, insulation has been responsible for achieving the largest portion of program energy savings in electric, natural gas, and delivered fuel heated homes.

While the program experienced a steady increase in the number of projects completed each year between 2004 and 2007, the total and per-project program-estimated kWh savings declined during this period. This is likely attributable to improvements in modeling and savings estimation, rather than substantial changes to project characteristics. From 2007 to 2011 the total estimated program savings increased; however, the average kWh saved per project remained constant during those years. The increase in total estimated electric savings from 2007 to 2011 is, in part, due to increased program participation.

The portion of HPwES project costs covered by direct incentives to homeowners has declined since the GJGNY financing products were made available in 2011. In 2013 the program disbursed a total of \$30.6 million in financial assistance (including both rebates and loans), \$20.1 million (about two-thirds) of which came from GJGNY loans.

Consistent with the results of previous studies, a small group of contractors is highly engaged with the HPwES program. Specifically, the top ten percent of contractors completed the majority of projects each program year. Of the 406 contractors active at any time between 2003 and 2013, about one-third of the contractors active in 2003 (24 of 75) have been continually active throughout the program. These 24 contractors completed about one-third of all HPwES projects (32%) from 2003 to 2013 (16,888 of the 53,209 total projects connected with a specific contractor ID).

²⁰ From program tracking system, not verified net savings.

CRIS provides evidence that most of the contractors enrolled in HPwES are able to bring projects with multiple major measures to the program but that specific projects may not reflect this capacity for comprehensiveness. Because project scope is affected by conditions of the home, expertise of the contractor, and household financial constraints, it is difficult to determine the extent to which each of these items may or may not be affecting project comprehensiveness. Survey data from participating contractors and households will help NYSERDA understand the likelihood of each scenario.

C.2 Methods

The evaluation team downloaded four comma-delimited reports from NYSERDA's CRIS database:

- HPprojects – Data contain project-level information from homeowners who have completed a project through NYSERDA's HPwES program. HPprojects contains data from program inception, 2001, to December 31, 2013.²¹
- HPReport – Measure-level information from homeowners who have completed a project through NYSERDA's HPwES program. HPReport contains data from program inception in 2001 through December 31, 2013.
- ProjectExport – Audit application information from homeowners who have applied for or completed an audit subsidized through GJGNY. ProjectExport contains data from November 2010 to December 31, 2013.
- CompleteProjectStatusDates – Data contains dates for key status changes including audit approval, audit complete, and HP work complete. CompleteProjectStatusDates contains data from November 2010 to December 31, 2013.

All four tables contain key identification variables to link data from one file to another, allowing the evaluation team to import information from one dataset to another. The evaluation team linked data from HPprojects and HPReport using the ProjectID variable. The evaluation team also linked data from ProjectExport and CompleteProjectStatusDates using the ResNum variable. All projects that received a GJGNY-funded audit had a ResNum identification number attached.²² The evaluation team linked project level information from completed projects (HPprojects) to audit application information (ProjectExport) using the GJGNY Resnum variable for all completed projects with a GJGNY-funded audit.

²¹ This Process Evaluation and Market Characterization Assessment covers the 2012-2013 program years.

²² GJGNY-funded audits began on November 15, 2010. (Source: *Process Evaluation and Market Characterization and Assessment: Green Jobs – Green New York Residential Program*. September 2012. Prepared by NMR Group, Inc. for NYSERDA.)

For the HPprojects and HPReport tables, the evaluation team calculated the year the project was completed by extracting the year from the COMPLETEDT date variable (referred to as YearCompleted in this document). The evaluation team analyzed all available data from these four tables to identify key trends in the HPwES program. Findings in this document focus predominantly on the HPprojects and HPReport data to allow identification of long-term trends across the bulk of the program timeline (i.e., 2001 to 2013), expected to inform the market characterization and assessment in 2014.

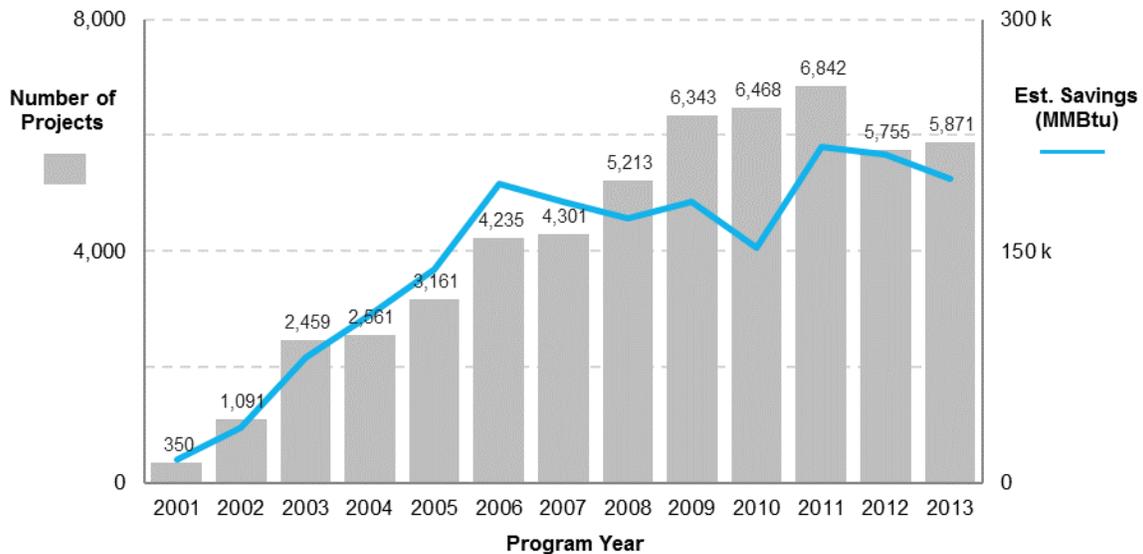
C.3 Findings

The findings below provide detailed summaries of the program data housed in CRIS.

C.3.1 Estimated First-Year Program Energy Savings

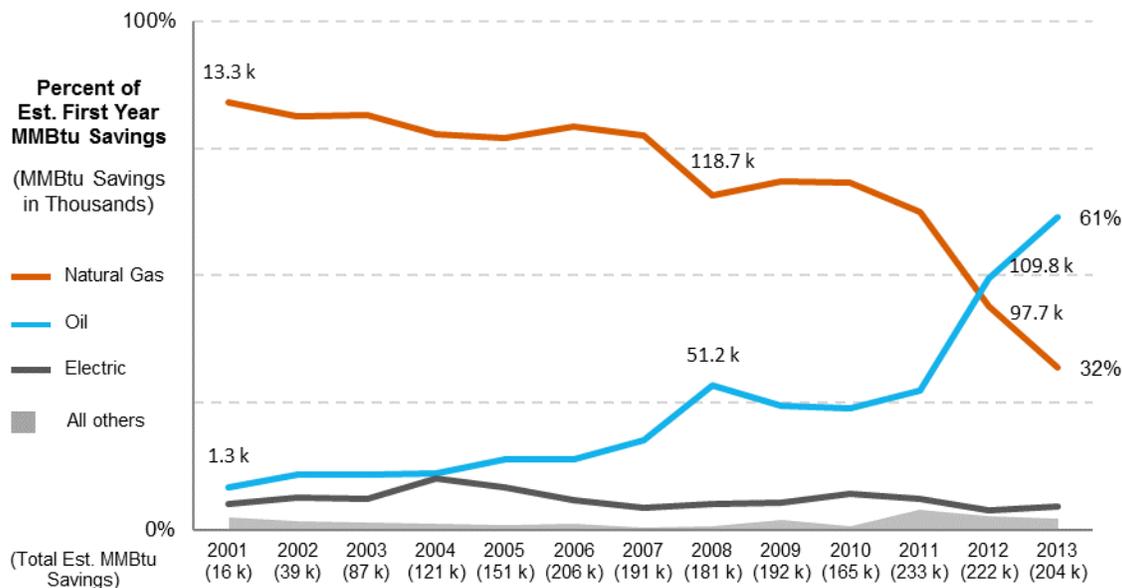
The evaluation team summed first-year estimated non-electric energy savings (in MMBtu) and the number of projects by year. The number of annual projects has steadily increased from 2001 to 2011 (Figure C-1). While participation declined from 2011 to 2012, participation rebounded slightly in 2013. Also, the estimated MMBtu savings per year remained steady from 2011 and 2012, dropping slightly in 2013, yielding similar overall MMBtu savings across the three years (218 k MMBtu in 2011, 213 k MMBtu in 2012, and 197 k MMBtu in 2013).

Figure C-1. Number of Projects and Estimated MMBtu First-Year Savings by Year



To compare estimated first-year MMBtu savings by heating fuel type, the evaluation team summed MMBtu energy savings for all heating types by year.²³ Estimated first-year MMBtu savings for oil projects has steadily increased from about 10% of projects in 2001 to more than half of all projects in 2013 (Figure C-2). While the proportion of natural gas savings has declined since program inception, the overall annual natural gas savings remains large (about 65,000 MMBtu in 2013).

Figure C-2. Percentage of Estimated First-Year Savings by Heating Fuel Type (MMBtu) by Year



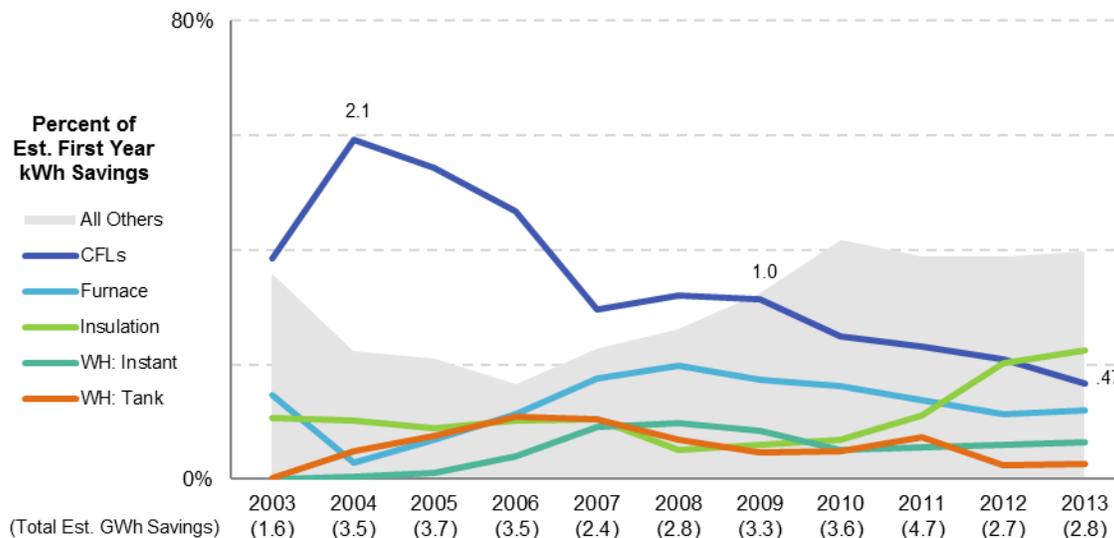
To investigate estimated first-year electricity savings by measure, the evaluation team summed estimated kWh savings by NYSERDA’s measure sub-categories.²⁴ While installation of compact fluorescent lights yielded the largest first-year kWh savings for completed projects through 2012, insulation overtook compact fluorescent lamps (CFLs) savings for completed projects in 2013. Additionally, estimated first-year kWh savings have decreased by about 8% annually from a high of 2.1 gigawatt hour (GWh) in 2004 to a low of 0.47 GWhs saved in 2013 (Figure C-3). Electricity savings from insulation increased to 0.55 GWhs and accounted for 24% of electric savings in 2013 – the largest saver of electricity in 2013.

²³ Variables used: FY_COAL_MMBTU_SAVINGS, FY_GAS_MMBTU_SAVINGS, FY_KEROSENE_MMBTU_SAVINGS, FY_OIL_MMBTU_SAVINGS, FY_PELLETS_MMBTU_SAVINGS, FY_PROpane_MMBTU_SAVINGS, FY_WOOD_MMBTU_SAVINGS, and YearCompleted from the HPRReport table.

²⁴ Variables used: NYSERDA_SUB_CATEGORY and YearCompleted from the HPRReport table. The evaluation team excluded the following sub-categories when calculating the annual proportion of kWh savings: Auxiliary Electric, Boiler – Steam, CAZ Improvements, Ground Source Heat Pump, Heat Energy Recovery Ventilator, Other Costs, Reset Control, Skylight, Smoke, Radon, CO Detectors, Storm Windows/Doors, Ventilation Fan, and Water Heater – Solar. These sub-categories are not included in the “all others” category for Figure C-3.

Electricity savings from insulation averaged .34 GWh annually from 2003 to 2013. All other measures have similar levels of electric savings between years.

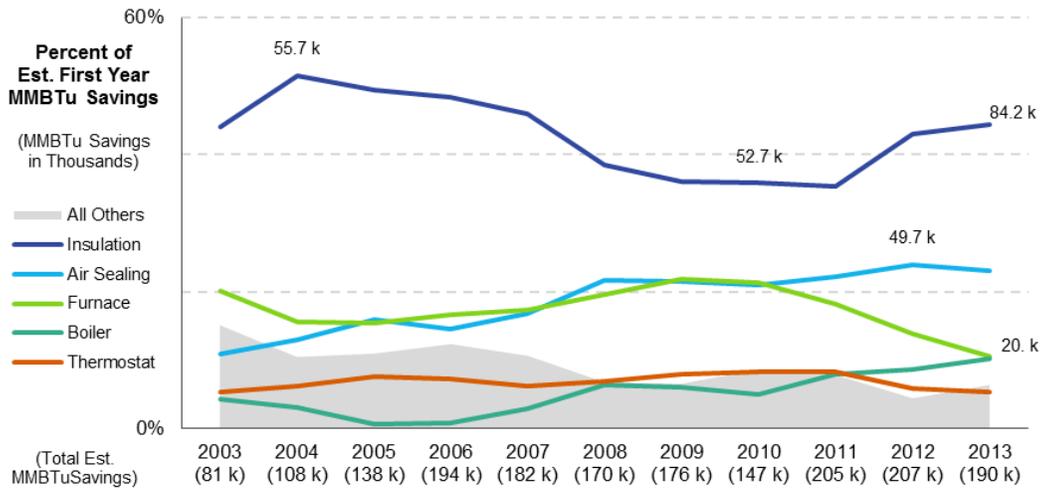
Figure C-3. First-Year Electricity Savings by Top Five Measures by Year



To investigate estimated first-year MMBTU savings by measure, the evaluation team summed estimated MMBTU savings by NYSERDA’s measure sub-categories.²⁵ Similar to kWh savings, both insulation and furnaces also yield high first-year MMBTU savings. Insulation consistently produced the largest estimated first year MMBTU savings, with air sealing and furnaces consistently yielding the second and third highest first year MMBTU savings across all program years. Starting in 2010, MMBTU savings for furnaces began to decrease, while air-sealing savings increased (Figure C-4).

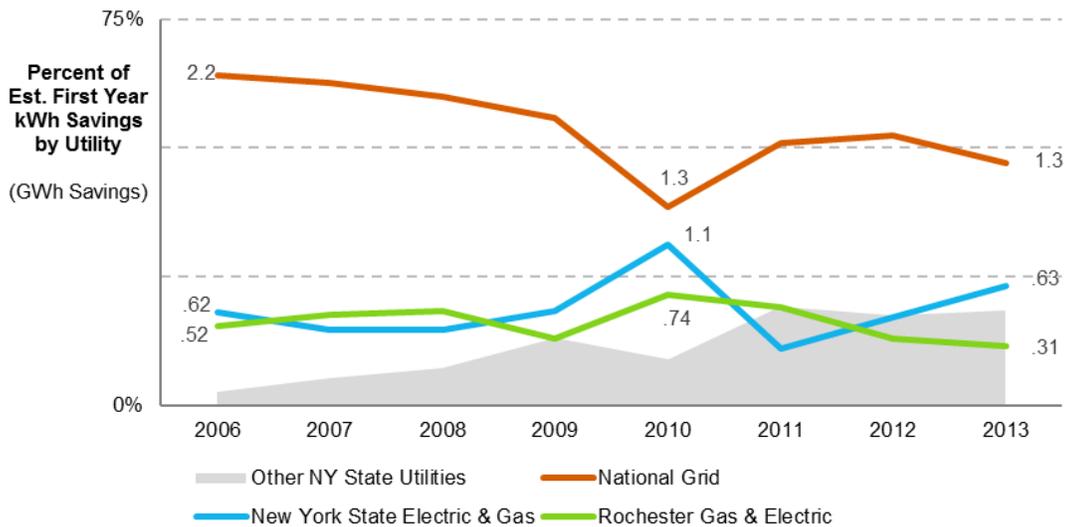
²⁵ Variables used: NYSERDA_SUB_CATEGORY and YearCompleted from the HReport table. The evaluation team excluded the following sub-categories when calculating the annual proportion of Total MMBTU savings: Auxiliary Electric, Boiler – Steam, CAZ Improvements, Ground Source Heat Pump, Heat Energy Recovery Ventilator, Other Costs, Reset Control, Skylight, Smoke, Radon, CO Detectors, Storm Windows/Doors, Ventilation Fan, and Water Heater – Solar. These sub-categories are not included in the “all others” category for Figure C-4. Note that Total MMBTU savings includes natural gas, and delivered fuel MMBTU savings.

Figure C-4. First-Year MMBTU Savings by Top Five Measures by Year



The evaluation team summed the first-year electric savings for customers of each participating electric utility in New York State by year.²⁶ The majority of first-year electric savings come from projects in National Grid territory (Figure C-5, orange line). However, the total electric savings in National Grid territory continues to decrease from a high of 2.2 GWh savings in 2006 to a low of 1.3 GWh savings in 2013 (Figure C-6). Also, in 2010, the proportion of first-year GWh savings for New York State Electric & Gas and Rochester Gas & Electric increased to 31% (1.1 GWhs) and 22% (.74 GWhs) respectively.

Figure C-5. Proportion of Estimated First Year GWh Savings by Utility and Year

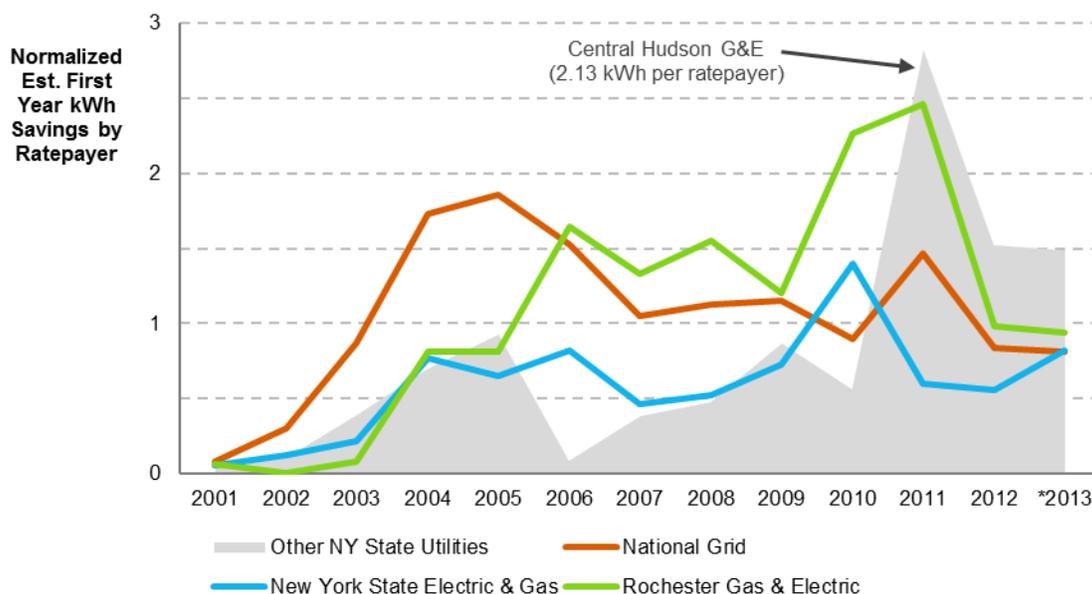


Note: Other NY State Utilities include Consolidated Edison, Central Hudson Gas & Electric, Orange & Rockland, Long Island Power Authority, municipal utilities, and multiple providers.

²⁶ Variables used: ELEC_UTIL_NAME, FY_KWH_SAVINGS, and YearCompleted in HPRReport table

Controlling for the number of ratepayers shows the increase in savings obtained from Rochester Gas & Electric since 2009, as well as the decline in savings for both National Grid and Rochester relative to Central Hudson Gas & Electric in 2011 and 2012.

Figure C-6. First-Year kWh Savings by Utility and Year per Residential Ratepayer

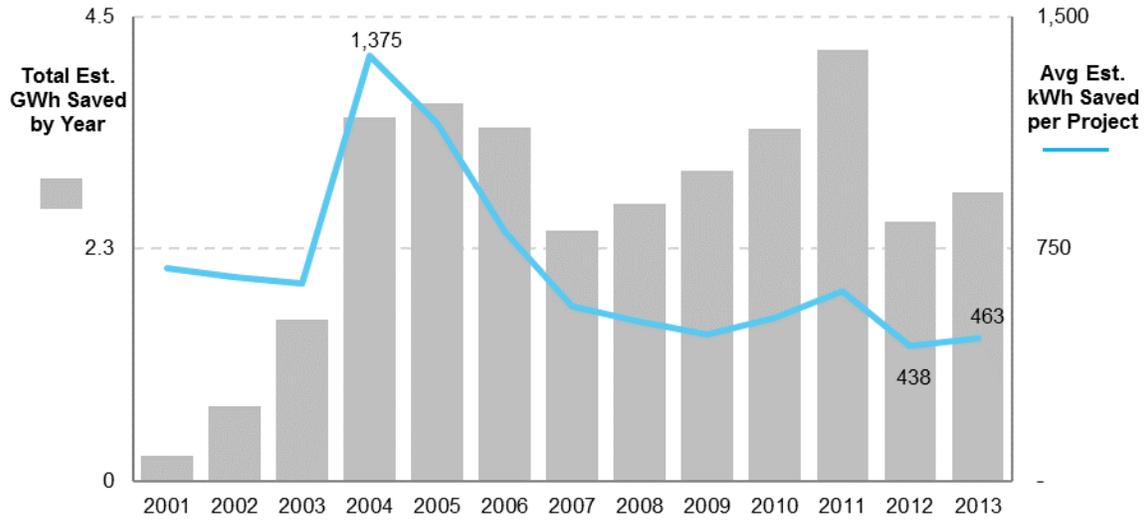


* First year estimated kWh savings divided by the annual total residential ratepayers within the utility territory. The Energy Information Administration has not published 2013 residential ratepayer counts by utility territory; the evaluation team used 2012 totals as 2013 estimates.

To examine the relationship between average project energy savings and the total energy savings by year, the evaluation team plotted the program’s total estimated annual savings as bars for Figure C-7 and Figure C-8 and then plotted the average estimated savings per project as a line for both figures.²⁷ Between program launch in 2001 and the end of 2013, NYSERDA’s HPwES program completed 54,650 projects with an estimated total savings of 34.2 GWh. On average, each completed project saved an estimated 625 kWh. While total estimated program savings increased from 2007 to 2011, the average kilowatt hours saved per project remained constant during those years (at around 500 per project, Figure C-7). The increase in total estimated electric savings from 2007 to 2011 is, in part, due to increased program participation.

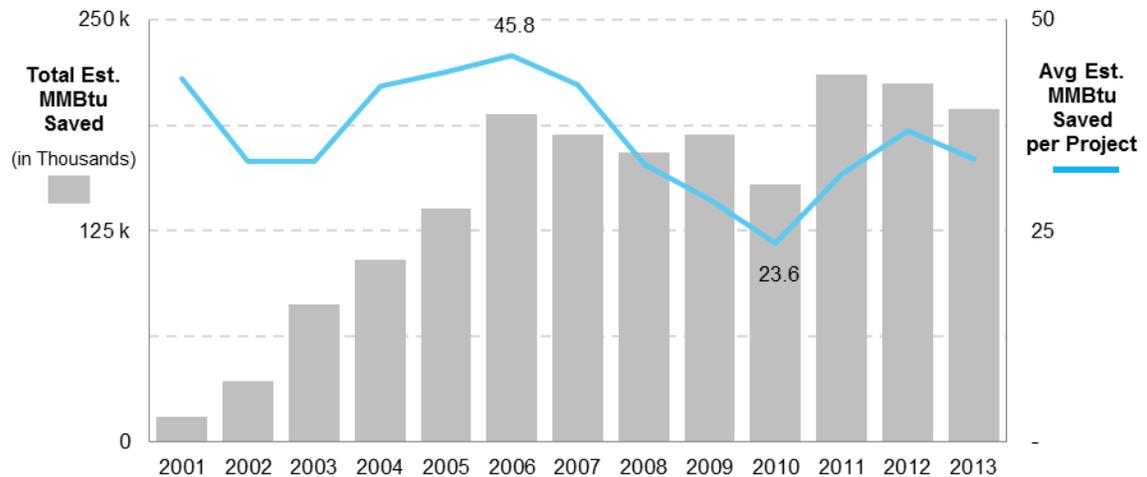
²⁷ Variables used: FY_KWH_SAVINGS, FY_MMBTU_SAVINGS and YearCompleted from the HPRReport table

Figure C-7. First-Year Estimated kWh Total and Average Savings by Year



Program-reported total MMBtu program savings remained constant between 2006 and 2009, dropped in 2010, increased to all-time highs in 2011 and 2012, and dropped slightly in 2013 (Figure C-8). While total program-reported MMBtu savings remained constant from 2006 to 2009, the average reported MMBtu savings per project decreased from a high of 45.8 MMBtu in 2006 to a low of 23.6 MMBtu in 2010. This decrease in average MMBtu savings coincided with an increase in participation levels, allowing for a near constant level of total MMBtu savings. Average program reported MMBtu savings rebounded in recent years to an average of 33.5 MMBtu savings per project in 2013.

Figure C-8. First-Year Estimated MMBtu Total and Average Savings by Year



C.3.1.1 Program Participation Levels

To investigate changes in program participation for Market and Assisted projects, the evaluation team summed all completed projects by type (Market versus Assisted) for each year beginning in 2006.²⁸ The portion of market-driven HPwES projects steadily increased from 64% in 2006 to 75% of total program projects in 2010 and then dropped back to 65% of total projects in 2011 (Figure C-9 and Table C-1). This trend continues with more than one-third of total projects completed through AHPwES in 2012 and 2013.

Figure C-9. Percent and Count of Market versus Assisted HPwES Projects

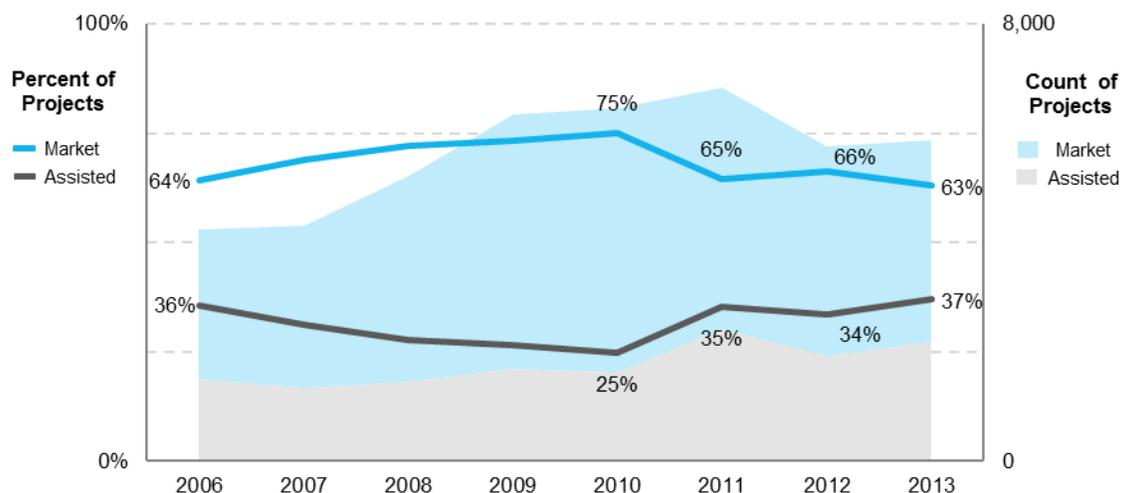


Table C-1. Count of Market versus Assisted HPwES projects by Year

Project Type	2006	2007	2008	2009	2010	2011	2012	2013
Assisted	1,508	1,338	1,452	1,693	1,612	2,424	1,936	2,172
Market	2,727	2,963	3,761	4,650	4,856	4,418	3,819	3,699
Total Projects	4,235	4,301	5,213	6,343	6,468	6,842	5,755	5,871

To identify project participation by region, the evaluation team adopted the same Upstate and Downstate categories used in the 2012 GJGNY Process and Market Characterization & Assessment report.²⁹ This categorization scheme divides Upstate into two regions, Upstate A and Upstate B, and includes Long Island

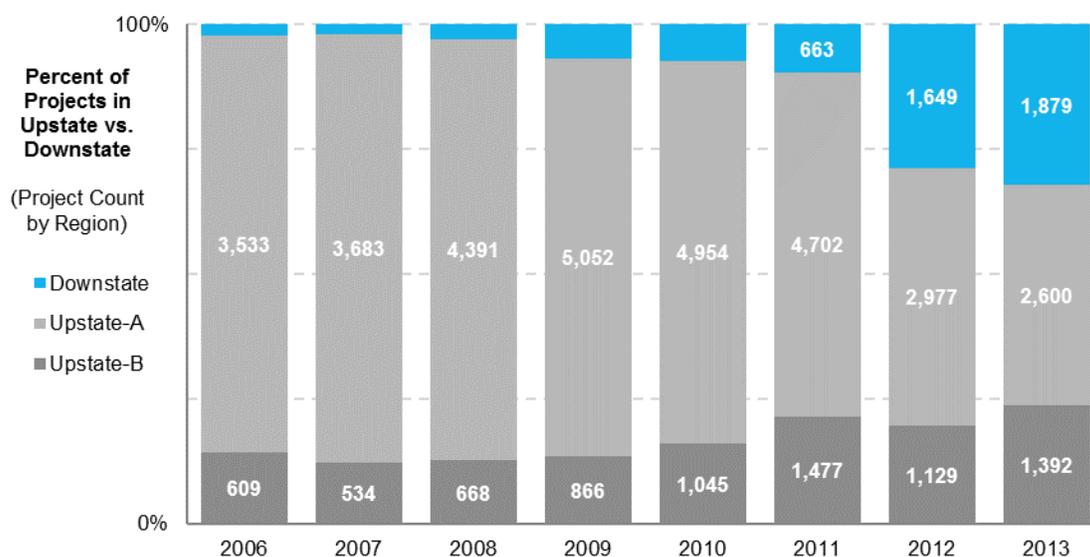
²⁸ Variables used: MARKET_ASSISTED_IND, count of PROJECTID, and YearComplete from HPprojects table

²⁹ <http://www.nyscrda.ny.gov/Energy-Data-and-Prices-Planning-and-Policy/Program-Evaluation/NYES-Evaluation-Contractor-Reports/2012-Reports/-/media/Files/EDPPP/Program%20Evaluation/2012ContractorReports/2012%20GJGNY%20Process%20MCA%20Final%20Report.pdf>

counties (Nassau and Suffolk) in its Downstate region.³⁰ The evaluation team compared the total number of projects by region.³¹

While most HPwES projects continue to take place in Upstate New York, project volume in Downstate New York is increasing (Figure C-10). The height of the bars in Figure C-10 shows the increasing proportion of projects in the Downstate region, while the number indicates the total number of projects for that year. The inclusion of Nassau and Suffolk counties since 2010 has, in part, led to a larger proportion of Downstate projects from 2010 to 2013. In 2013, half of completed projects (50%) took place in five counties: Suffolk (15% or 878 projects), Monroe (10% or 607 projects), Erie (9% or 519 projects), Onondaga (8% or 467 projects), and Westchester counties (8% or 457 projects). Two of these five high-volume counties are in Downstate New York (Suffolk and Westchester counties).

Figure C-10. Proportion of Projects Upstate versus Downstate by Year



The evaluation team also compared participation rates by Energy \$mart Region.³² While Central and Western New York and Finger Lakes have consistently had the largest portion of participation, when

³⁰ **Upstate A:** Allegany, Cattaraugus, Cayuga, Chautauqua, Cortland, Erie, Genesee, Livingston, Madison, Monroe, Niagara, Oneida, Onondaga, Ontario, Orleans, Oswego, Seneca, Wayne, Wyoming, and Yates.

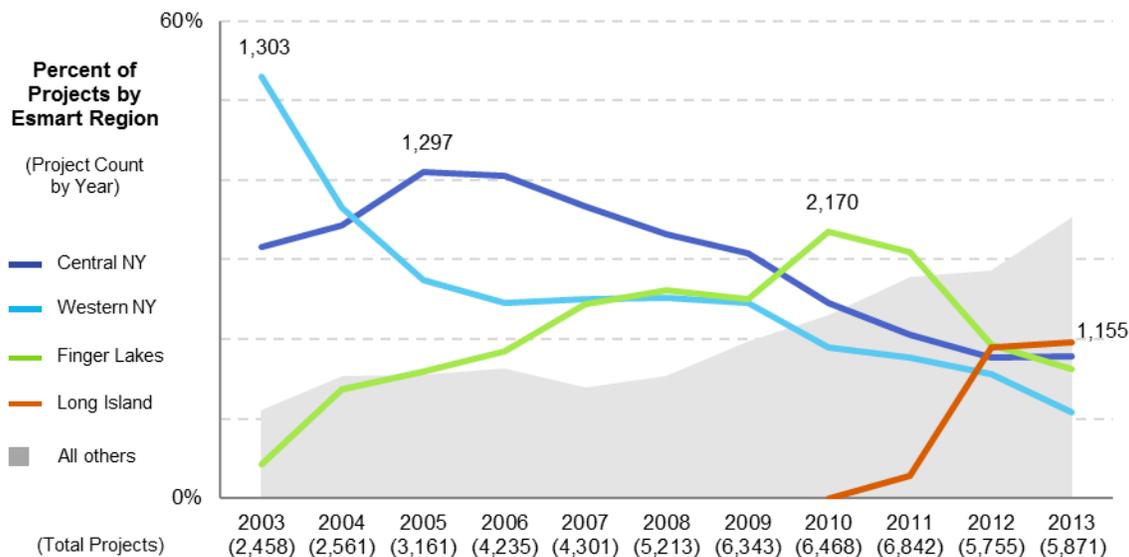
Upstate B: Albany, Broome, Chemung, Chenango, Clinton, Columbia, Delaware, Dutchess, Essex, Franklin, Fulton, Greene, Hamilton, Herkimer, Jefferson, Lewis, Montgomery, Otsego, Putnam, Rensselaer, St. Lawrence, Saratoga, Schenectady, Schoharie, Schuyler, Steuben, Sullivan, Tioga, Tompkins, Ulster, Warren, and Washington.

Downstate: Bronx, Kings, Nassau, New York, Orange, Queens, Richmond, Rockland, Suffolk, and Westchester

³¹ Variables used: COUNTY, and count of PROJECTID from HPprojects table

compared to other Energy \$mart regions, participation has increased in Long Island and New York City (Figure C-11). In 2013, Long Island completed more projects than any other region (20% of projects), and Southern Tier and New York City regions completed 8% and 10% of all projects, respectively.³³ Lines in Figure C-11 show the proportion of projects for the top four Energy \$mart regions for each year. The grey shading shows the proportion of projects for the remaining Energy \$mart regions and the numbers shown in the graph show the largest project count for that region.

Figure C-11. Percent of Projects by Energy \$mart Region and Year



C.3.1.2 Program Costs and Homeowner Financial Assistance

This section investigates trends in financial assistance options, and measure and installation costs across program years. To examine differences in financial assistance options across program years, the evaluation team summed all financial assistance options marked “HOI” in the HPprojects table by year.³⁴

From 2003 to 2010, the use of ENERGY STAR loans decreased from a high of 59% to a low of 23%. AHPwES subsidies continued to steadily provide about 40% of HPwES financial assistance, while High

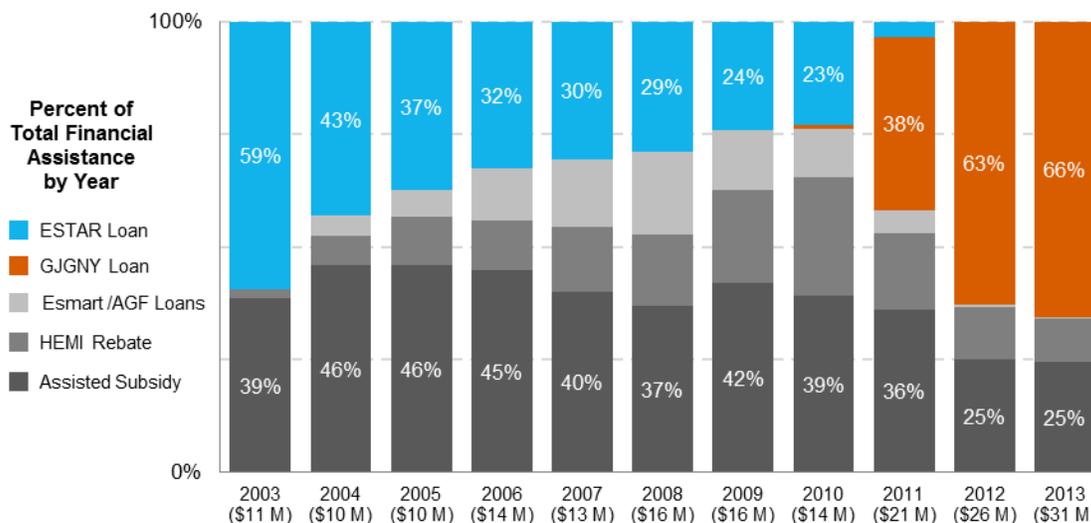
³² Variables used: ENERGY_SMART_COMMUNITY, count of unique PROJECTID, and YearCompleted from HPprojects table

³³ While the evaluation team lacks the data to support the claim, the disproportionate amount of 2013 projects occurring on Long Island may have been a result of the rebuilding effort following Hurricane Sandy of October 2012. Similarly, Hurricane Irene in August 2011 and Tropical Storm Lee in September 2011 may also have contributed to increased project activity. Additionally, as of May 2010 HPwES benefited from an additional funding source – the federally funded Better Buildings Neighborhood Program – which may also have resulted in an increase in project activity.

³⁴ Variables used: HOI_AHP_AMT, HOI_ESMART_AMT, HOI_ESTAR_AMT, HOI_AGF_AMT, HOI_GJGNY_AMT, HOI_HFI_AMT, and YearCompleted from HPprojects table.

Efficiency Measure Incentives (HEMI), Energy \$mart loans, and American General Finance (AGF) loans increased to provide a combined 35% of financial assistance by 2010. Once GJGNY financing became available in 2011, it became the largest source of financing in the program and use of Energy \$mart loans and AGF loans tapered off during that same period (Figure C-12). In 2013, the program disbursed a total of \$30.6 million in financial assistance (including both rebates and loans), \$20.1 million (about two-thirds) of which came from GJGNY loans.

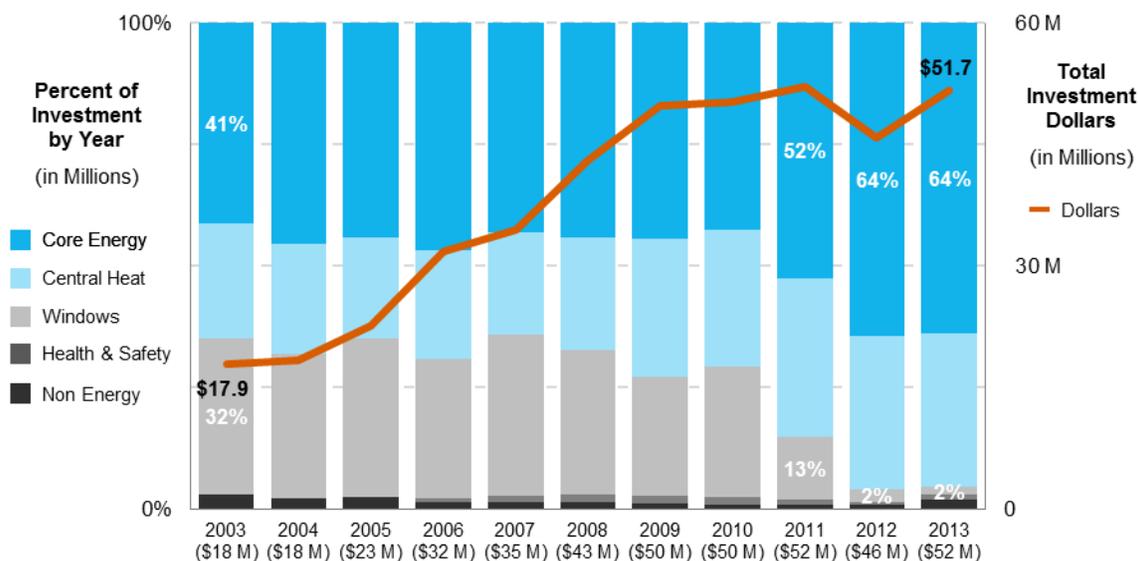
Figure C-12. Distribution of Financial Assistance Options by Year



To investigate trends in measure and installation costs by program year, the evaluation team summed all “COST” variables in the HPprojects table.³⁵ Total measure and installation costs have increased as program volume has increased (from a low of \$17.9 million in 2003 to \$51.7 million in 2013, Figure C-13). Since program inception, core energy measures – insulation, air sealing, appliance, and lighting investments – were the largest area of program investment, in 2012 and 2013 these measures accounted for almost two-thirds of all 2013 costs. This is largely due to the decrease of financial assistance for window measures starting in 2011. By 2012, these core energy measures along with central heating measures made up 95% of project investments.

³⁵ Variables used: COST_BREAKDOWN_CORE_ENERGY, COST_BREAKDOWN_CENTRAL_HEAT, COST_BREAKDOWN_WINDOWS, COST_BREAKDOWN_NON_ENERGY, COST_BREAKDOWN_HEALTH_SAFETY, and YearCompleted from HPprojects table.

Figure C-13. Measure and Installation Cost by Core Measure Area and Year*



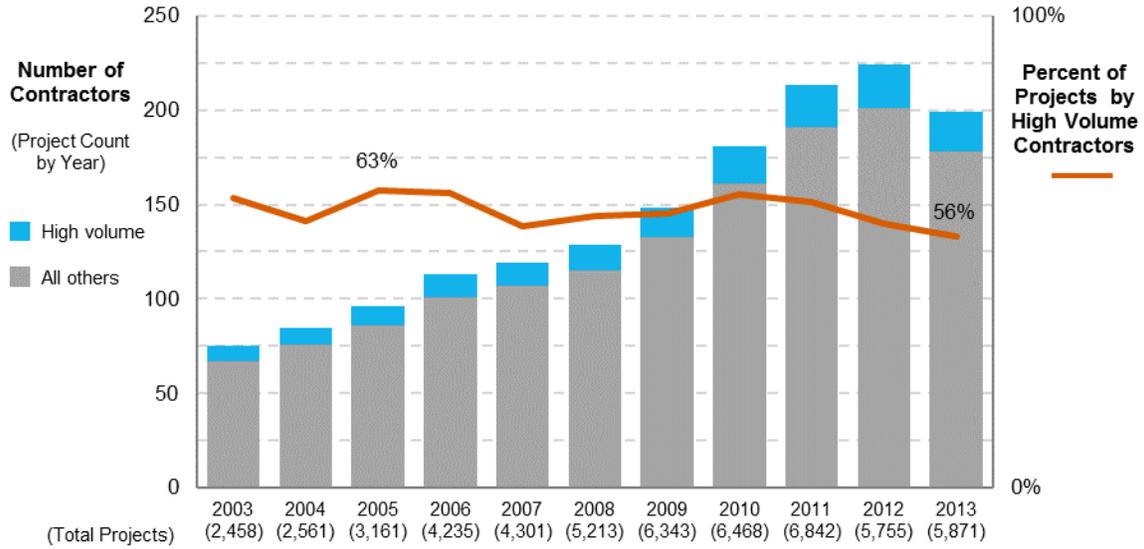
* Variables used: COST_BREAKDOWN_CORE_ENERGY, COST_BREAKDOWN_CENTRAL_HEAT, COST_BREAKDOWN_WINDOWS, COST_BREAKDOWN_NON_ENERGY, COST_BREAKDOWN_HEALTH_SAFETY, and YearCompleted from HPprojects table.

C.3.1.3 Contractor Participation

To understand the project volume associated with distinct contractors, the evaluation team isolated all unique CONTRACTORIDS in the HPprojects database.³⁶ The number of contractors completing at least one project steadily increased by a rate of approximately 17 contractors per year, from a total of 75 contractors in 2003 to 224 contractors in 2012. It then decreased to 199 contractors in 2013 (Figure C-14). A small group of contractors are highly engaged with the HPwES program. Specifically, the top ten percent of contractors completed more than 50% of total projects. For example, in 2005, ten of the 96 active contractors completed 63% of the projects, and in 2010, 20 of the 181 active contractors completed 62% of the projects. Of the 406 contractors active at any time between 2003 and 2013, about one-third of the contractors active in 2003 (24 of 75) have been continually active throughout the program. These 24 contractors completed about one-third of all HPwES projects (32%) from 2003 to 2013 (16,888 of the 53,209 total projects connected with a specific contractor ID).

³⁶ Variables used: CONTRACTORID, count of PROJECTID, and YearCompleted from HPprojects table

Figure C-14. Number of Contractors and Percent of Projects Completed by High Volume Contractors*

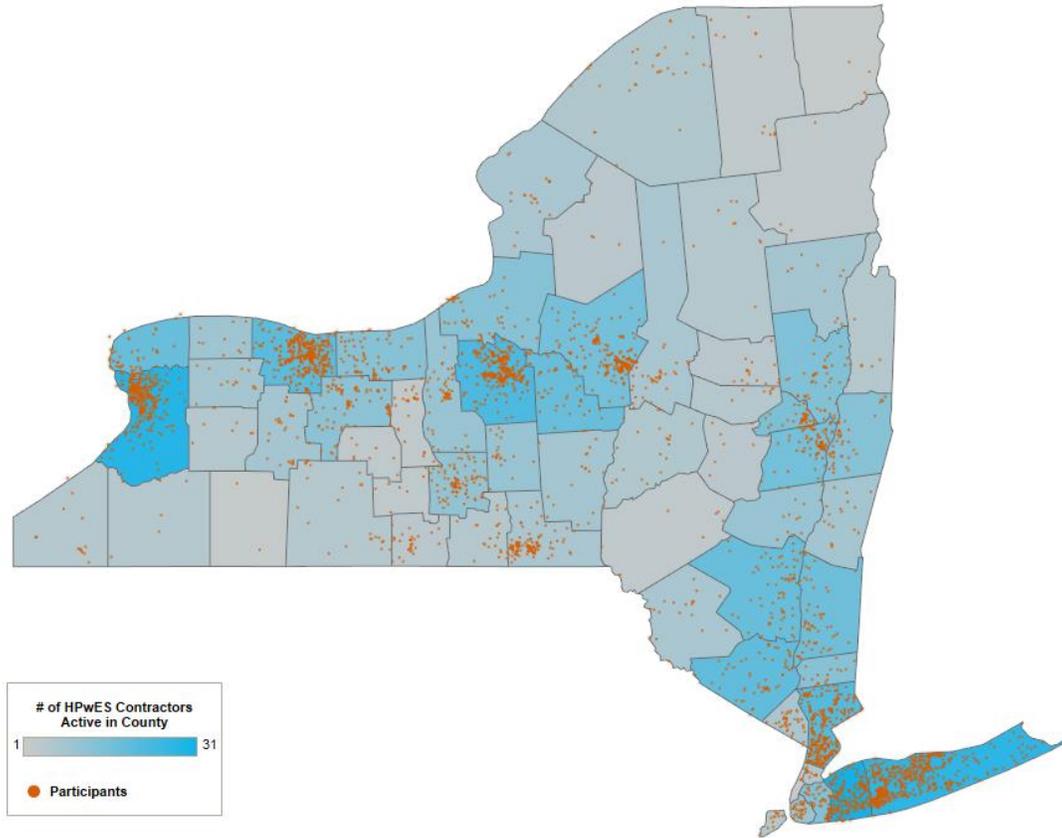


* High volume contractors completed the top ten percent of total projects for a given year.

The evaluation team cataloged the counties in which individual contractors completed projects for 2013.³⁷ Nassau County had the highest concentration of individual contractors in all of New York State, with 16% (31 of the 199) of active contractors completing projects within Nassau County in 2013. Erie, Suffolk, and Onondaga counties also had high concentrations of active contractors in 2013 (ranging from 11% to 14% of the total active contractors). Figure C-15 shows the strong relationship between number of active contractors (those counties with a turquoise background) and the concentration of projects completed in 2013 (depicted with orange dots).

³⁷ Variables used: COUNTY, CONTRACTORID, and count of PROJECTID from HPprojects table

Figure C-15. Number of Projects across New York State and Active Contractors by County in 2013



C.3.1.4GJGNY Audit to HPwES Project Completion

To investigate contractor retention from audit to project completion, the evaluation team matched a contractor’s company name from the ProjectExport (audit application) table to company names from HPprojects table. Contractor company names varied between the two tables; the evaluation team used fuzzy matching to match similar company names and then isolated unique CONTRACTORIDs that corresponded to the matched company names in the HPprojects and ProjectExport tables.

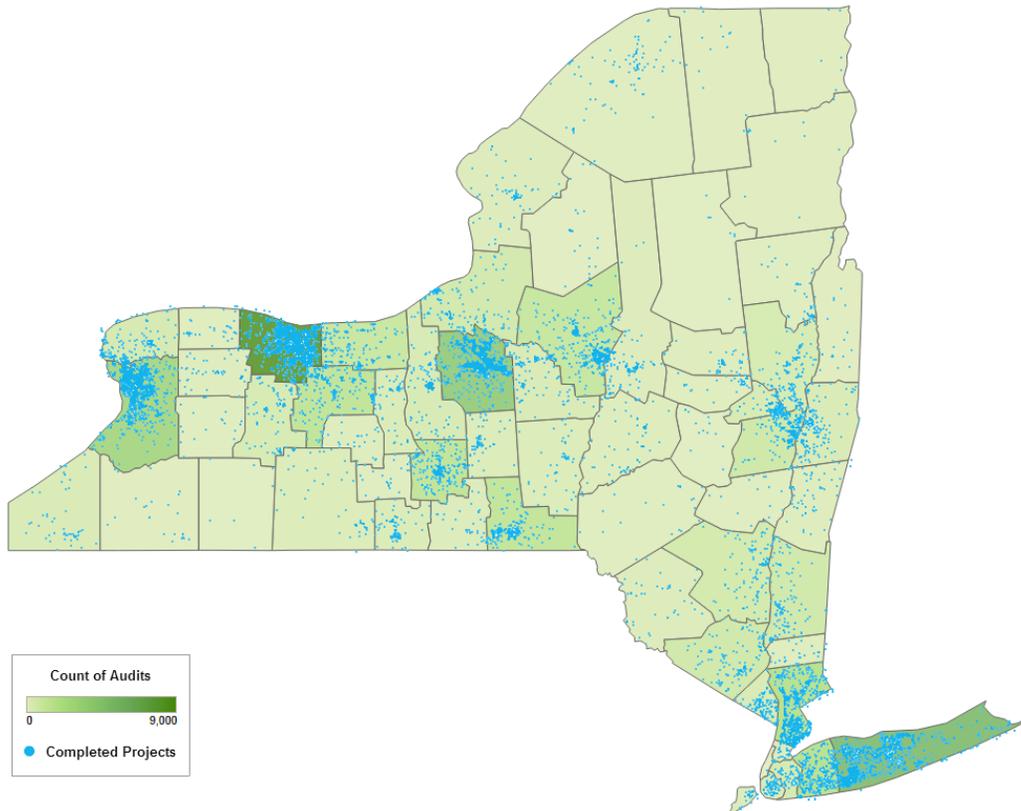
More than 90% of HPwES participants from 2011 to 2013 used the same contractor to complete their audit and project (Table C-2). Contractor retention did not differ by Energy \$mart region, county, or Upstate/Downstate region.

Table C-2. Number and Percent of Projects with the Same Contractor

Year	Count of Projects with Same Contractor	Percent of Projects with Same Contractor
2011	2,612	94%
2012	3,823	92%
2013	4,149	91%

The evaluation team cataloged the counties in which contractors conducted audits from 2010 to 2013.³⁸ Six counties account for more than 50% of audits conducted from 2011 to 2013. Specifically, contractors in Monroe County conducted the most audits (19%), followed by Suffolk (11%), Onondaga (9%), Erie (7%), Westchester (4%), and Nassau (4%) counties. Counties with a larger proportion of audits correspond with HPwES project completions from 2011 to 2013 (Figure C-16).³⁹

Figure C-16. Projects Completed from 2011 to 2013 Corresponds to Number of Audits in Area



C.3.2 Cycle Time Analysis

C.3.2.1 Methodology

To calculate the cumulative number of days the project took to achieve each milestone, the evaluation team first identified all completed projects with milestone dates, and identified the key milestone descriptions from the ProjectAllStatusReport downloaded from CRIS. The evaluation team then ordered these key

³⁸ Variables used: COUNTY, and count of ResNum from ProjectExport table

³⁹ The evaluation team took homeowner addresses from HPprojects table and geocoded them to enable comparisons between the audit data (ProjectExport) and the participant data (HPprojects).

milestone descriptions in the typical order found in the report by ordering descriptions with earlier dates before descriptions with later dates by project. Milestones follow a logical path from application received, to audit approval, to audit completion, and so on.

The evaluation team then calculated the cumulative days from the date reported at the project start (Open/Received) to the dates reported for each key milestone. While the evaluation team excluded non-typical descriptions from the key milestones, the cumulative days from project start to completion remain the same.⁴⁰ Table C-3 shows the typical order for projects, along with four example project timelines, starting at zero (Open/Received) to the total number of days taken to achieve the HP work complete milestone.

Table C-3. Project Milestone Order with Example Project Cycle Time in Cumulative Days

Typical Project Milestone Order	Example Project 1	Example Project 2	Example Project 3	Example Project 4
1. Open/Received	0	0	0	0
2. Approved for audit	35	0	7	0
3. Customer selected audit contractor	75	0	55	6
4. HP audit complete	82	35	55	30
5. HP work approved	106	183	114	64
6. HP work complete	106	183	345	64

The program is not currently tracking (and possibly cannot track) several key decision-making milestones between “HP audit complete” and “HP work complete.” Many of these decision-making milestones are specific to choices the HPwES participant must make about how to pay for their project, level of comprehensiveness, or specific measures to install. Since the program is not currently tracking these milestones, the evaluation team is unable to identify any additional delays between the currently tracked milestones (HP audit complete, HP work approved, and HP work complete).

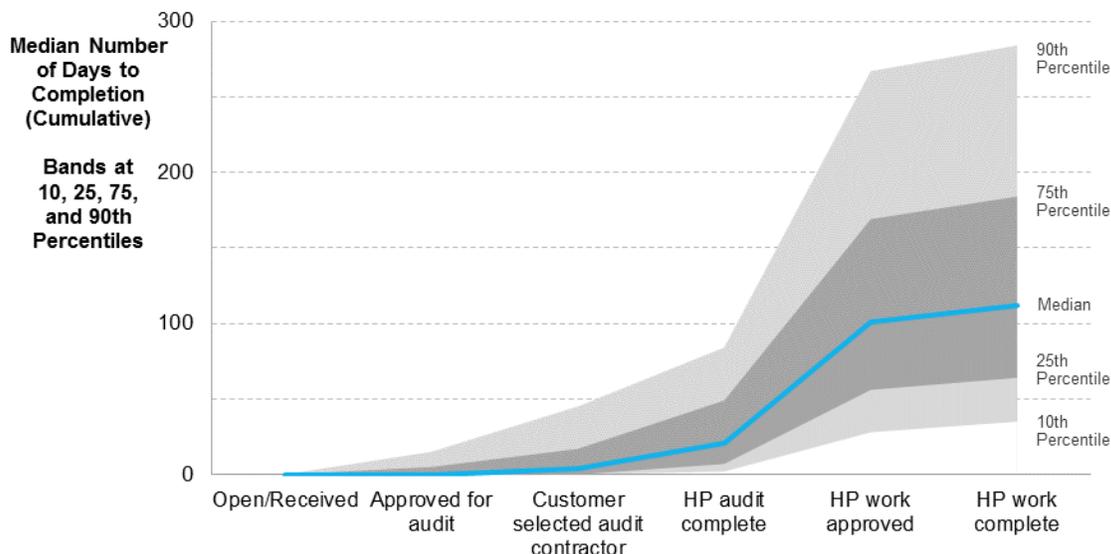
C.3.2.2 General Cycle Time

The median time from project start to completion across all completed projects in the database was 112 days. Most projects took between 35 to 284 days (10th and 90th percentiles of total project time respectively). Figure C-17 shows the typical length of time completed HPwES projects took by milestone. The figure includes the time range for most projects (10th and 90th percentiles), the range for the middle

⁴⁰ The evaluation team did not include non-typical descriptions in the cycle time analysis. The following are non-typical descriptions present in the database: Audit Approval Expired, Customer Declined Free/Reduced Cost Audit, Customer ineligible, Customer Non-Responsive, Customer Referred to LIPA HPD, Duplicate Entry, Pending/Hold – Admin, Pending/Hold – Customer, Pending/Hold – New Online Application, Project Completed through LIPA.

50% of projects (25th and 75th percentiles), and the typical length of time taken across all completed projects (median).⁴¹ The largest increase in time across all projects falls between the HP audit complete and HP work approved milestones, presumably when homeowners are choosing to participate, choosing what type of measures they want to upgrade, and figuring out how they are going to pay for the project.

Figure C-17. Typical Cycle Time from Project Start to Completion



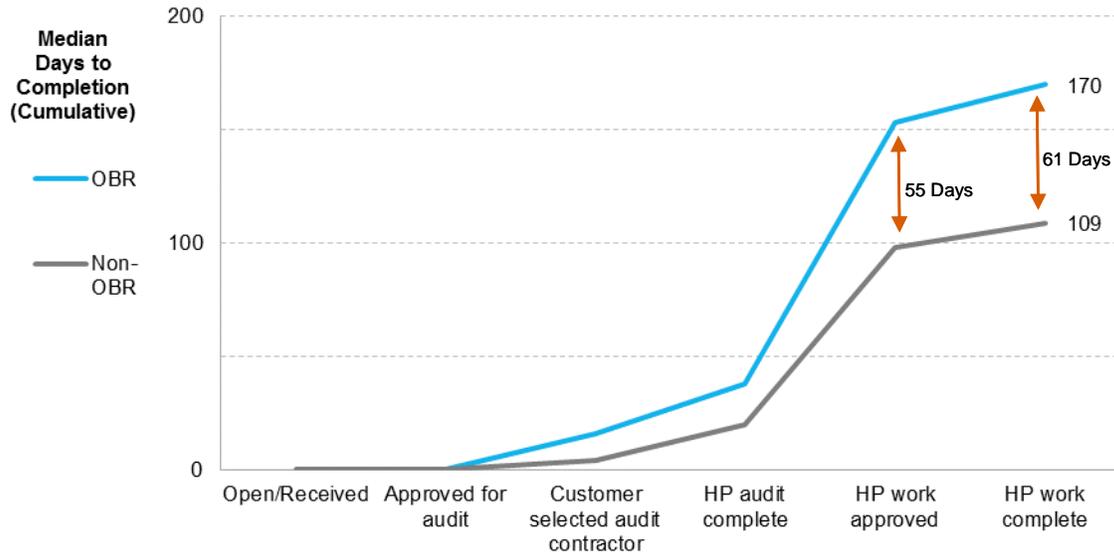
C.3.2.3 Differences in Cycle Time

This section compares cycle times for various programmatic differences available in HPWES, such as financing or funding type, Assisted or Market projects, the contractor a customer uses, or heating fuel type. The largest increases in cycle time result from choosing on-bill recovery (OBR) financing or by having delivered fuel. There are smaller increases in cycle time resulting from fuel switching, assisted projects, or funding type (Energy Efficiency Portfolio Standard 1 [EEPS] or EEPS 2).

Projects including OBR financing took about 61 days longer to complete than did projects without OBR financing. While OBR projects take consistently longer than non-OBR projects from audit-contractor selection to project completion, the largest delay occurs during the project approval phase (Figure C-18).

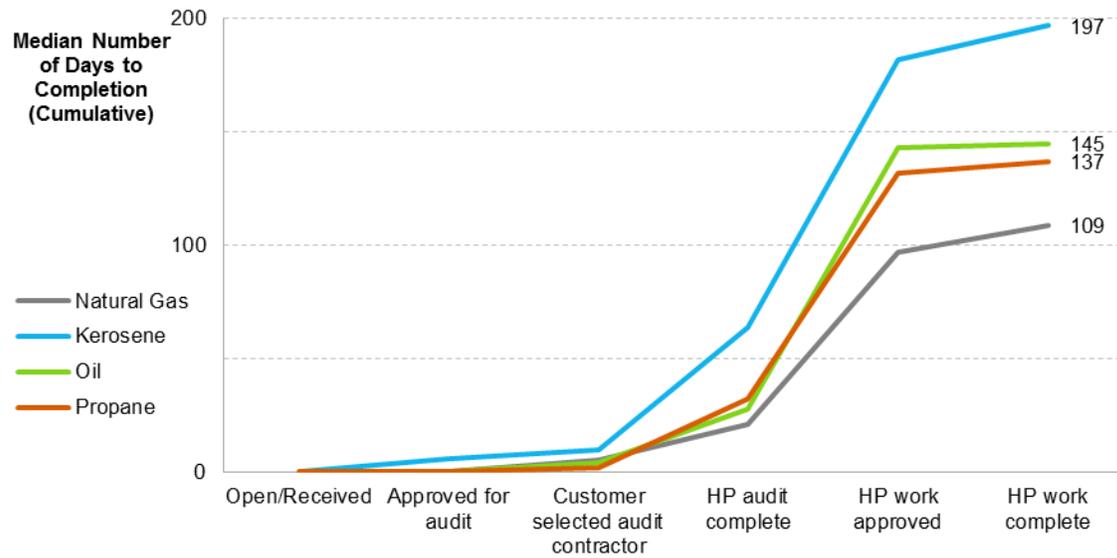
⁴¹ The evaluation team chose to use the median as the best measure of “typical” time since the data were highly skewed. Highly skewed data pull the mean statistic toward the extreme data points and make it seem that most projects take longer than most actually do. In cases where data are highly skewed, the best measure of “average” or “typical” is the median statistic.

Figure C-18. Differences in Cycle Time for OBR Financed Projects and Non-OBR Financed Projects



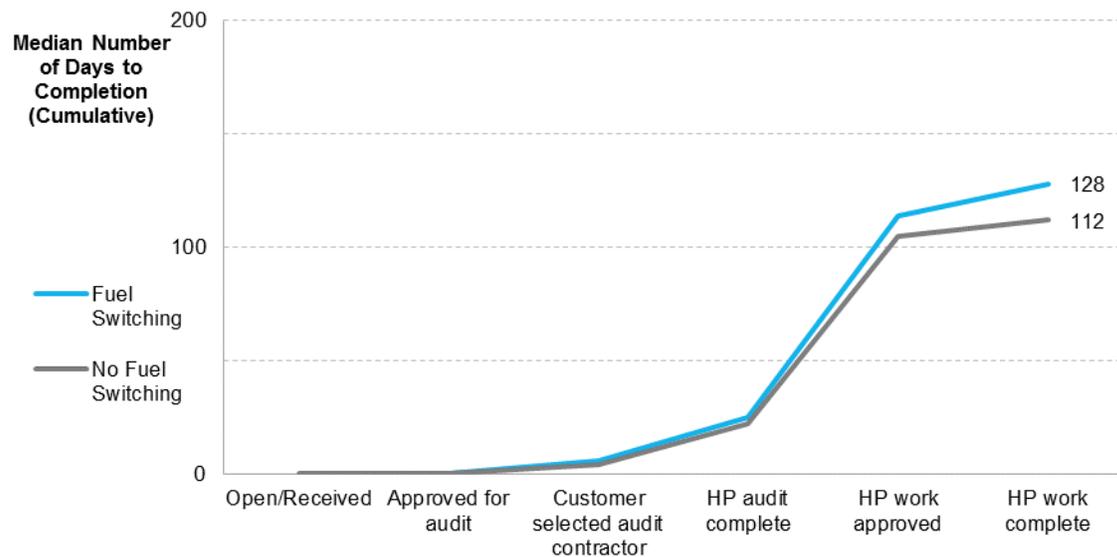
Projects involving delivered fuels increased cycle time when compared to natural gas projects (Figure C-19). Homes heated with kerosene took the longest to complete (88 days longer than natural gas projects). Kerosene projects took three times longer to complete an audit than did natural gas projects, and 1.5 times longer to get the work approved for an HPwES project than did natural gas projects. In contrast, oil and propane projects took between 1.5 and 1.9 times longer to complete an audit than did natural gas projects – shorter than kerosene projects – and between 1.5 and 1.3 times longer to get the work approved than did natural gas projects – about the same delay as kerosene projects. Delivered fuels led to approximately a three-month increase in project time for projects with kerosene heating fuel and about a month increase for projects with both oil and propane heating fuels when compared to projects using natural gas as their primary heating fuel.

Figure C-19. Differences in Cycle Time for Projects by Heating Fuel Type



While projects with delivered heating fuels took longer to complete, projects that switched from a delivered fuel to natural gas took only slightly longer to complete than did non-fuel switching delivered fuel projects (16 days longer, Figure C-20).

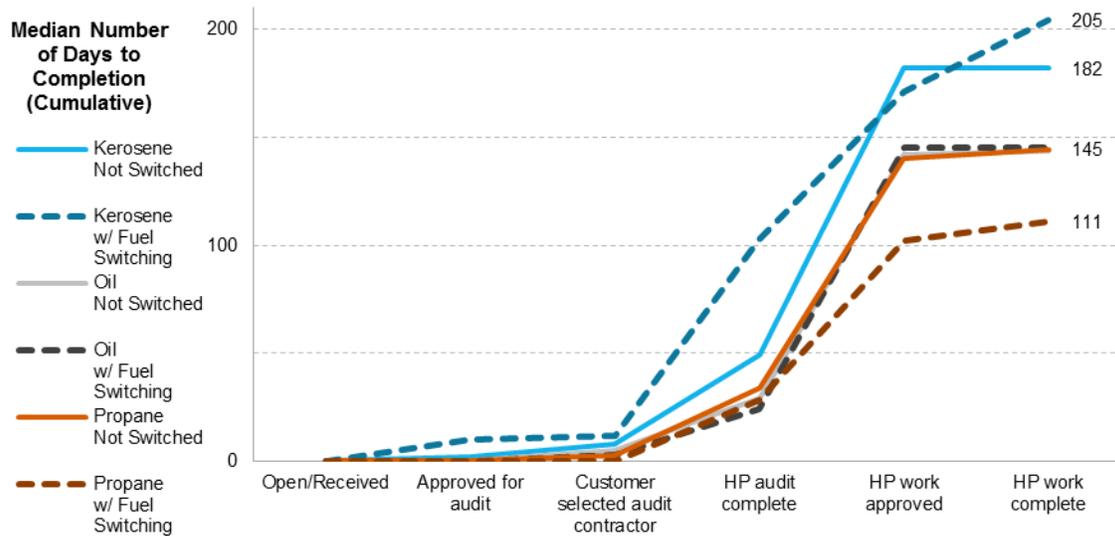
Figure C-20. Differences in Cycle Time for Projects with Fuel Switching and No Fuel Switching



When cycle time is broken down by delivered fuel type, the data show similar cycle times for most fuel switching projects and non-fuel switching projects with two exceptions (Figure C-21). Projects that switched from kerosene to natural gas took about 23 days longer to complete than did projects with

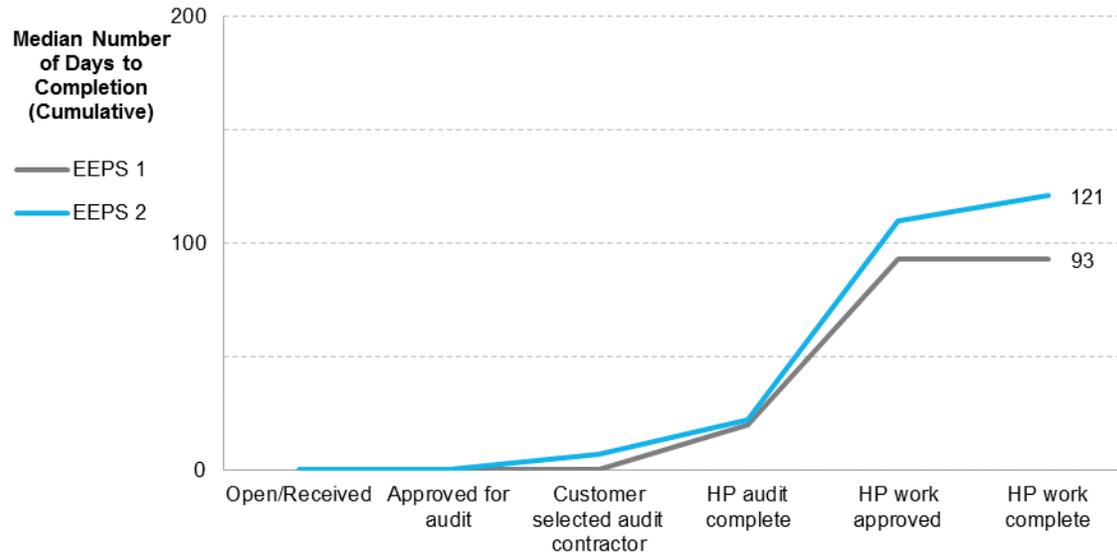
kerosene that did not switch to natural gas. In contrast, switching from propane to natural gas sped up project completion by about a month when compared to propane projects that did not switch to natural gas.

Figure C-21. Differences in Cycle Time for Projects by Heating Fuel Type and Fuel Switching



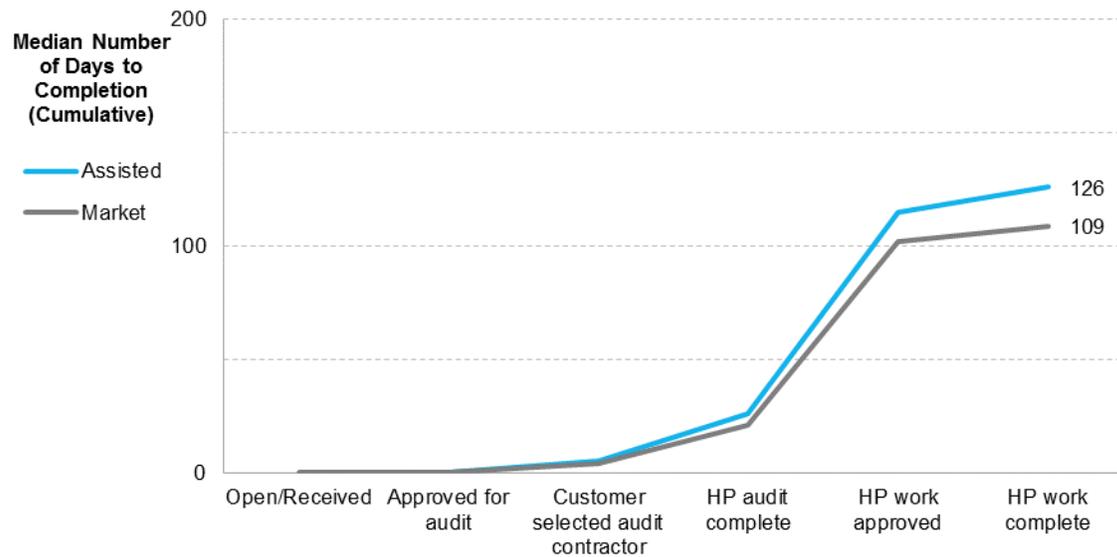
EEPS 2 funded projects took about a month longer to complete than to complete EEPS 1 funded projects (Figure C-22). EEPS 2 funded projects took about 17 days longer for project approval, and about 28 days longer for project completion. Changes in program processes over time may have contributed to this increase, and the rigorous TRC requirements dictated in EEPS 2 likely contributed to the increase in project modelling and approval time.

Figure C-22. Differences in Cycle Time for Projects with EEPS 1 and EEPS 2 Funding



Assisted projects took about 17 days longer to complete than it took to complete market rate projects (Figure C-23). Assisted projects tended to take slightly longer during audit completion (about four days), project approval (about eight days), and project completion (about four days), adding up to a half-month of additional time when compared to the time it took to complete market rate projects.

Figure C-23. Differences in Cycle Time for Assisted and Market Rate Projects



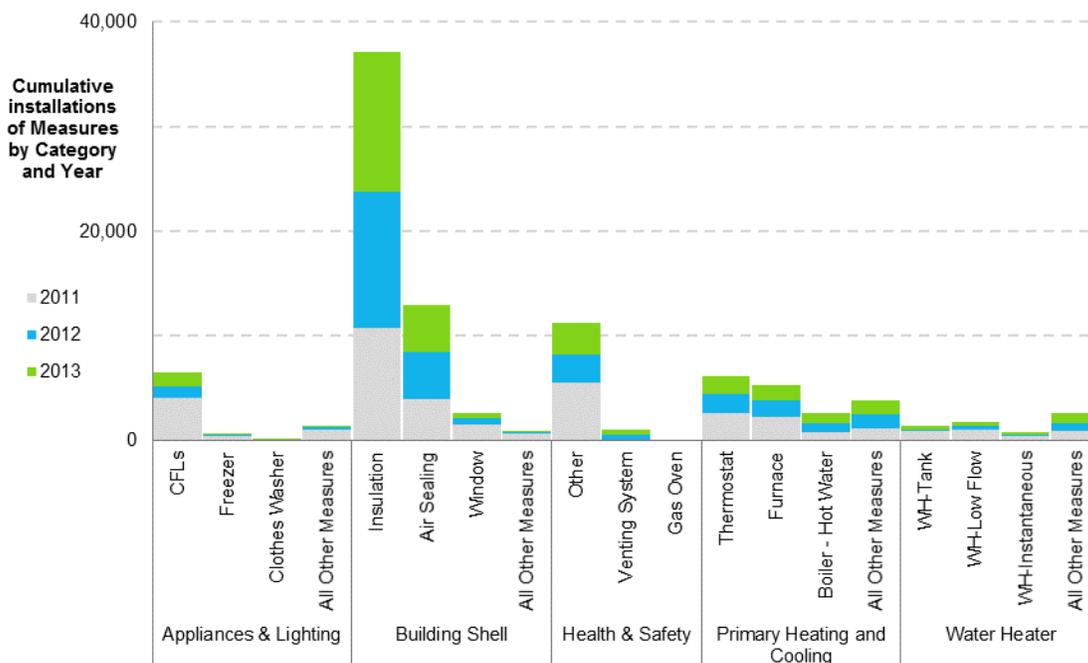
C.3.3 Measure Level Findings

This section summarizes measure-level project data from the HReport dataset in CRIS.

C.3.3.1 General Measure Level Trends

From 2011 to 2013, the program installed more than 37,000 insulation measures, about 13,000 air-sealing measures, and more than 11,000 “other” health and safety measures. The program installed all other measures much less frequently (Figure C-24).

Figure C-24. Cumulative Counts of Installed Measures by Category



C.3.3.2 Indicators of Comprehensiveness

To better understand the extent to which comprehensive “whole-house” services are delivered by participating contractors and supported by HPwES, the evaluation team reviewed CRIS data from two perspectives: the distribution of measure type by contractor company (CONTRACTORID in HReport) and the distribution of measures within specific projects (by PROJECTID in HReport).

Distribution of Measure Type by Contractor

Understanding the extent to which individual contractor firms deliver comprehensive projects required collapsing projects into three major measures and filtering for projects completed between January 1, 2012 and December 31, 2013. The evaluation team selected both high-volume, and canonical measures as stand-ins for the three major trades (Insulation, HVAC, and Plumbing). Specifically, the evaluation team used:

- Building Shell (BS) insulation as a stand-in for the Shell trade,

- HVAC furnace as a stand-in for the HVAC trade, and
- A composite of several water heating measures to stand in as the plumbing trade (HVAC Boiler, Water Heater (WH) Indirect Fired, WH Instant, WH Tank, and WH Tankless Coil).

The evaluation team then calculated the percent of projects that installed the “canonical” trade measures per contracting company (CONTRACTORID). The evaluation team coded each contracting company into the following four categories shown in Table C-4:

- **Cross Trade:** Contractors who consistently installed canonical measure across the three major trades
- **HVAC + Shell:** Contractors who installed either water heating, or HVAC measures in addition to shell measures
- **Shell + Water Heating:** Contractors who consistently installed water heating measures along with shell measures
- **Shell only:** Contractors who primarily installed shell measures

Table C-4. Level of Comprehensiveness

Category	Category Specifics	Number of Contractors	Number of Projects	Average % of Installations per Type		
				Insulation	HVAC Furnace	Water Heating*
Multiple Trades	Cross Trade	16	1,220	63%	54%	16%
	HVAC + Shell	9	450	92%	20%	13%
	Shell + WH	11	1,282	73%	7%	38%
Single Trade	Shell	10	853	97%	2%	3%
Total		46	3,805	78%	25%	18%

* The evaluation team created a composite water heating metric by selecting the highest percentage from the following measures (HVAC Boiler, WH Indirect Fired, WH Instant, WH Tank, and WH Tankless Coil)

This analysis confirms most participating contractor firms are bringing projects with multiple major measures to the program, as evidenced by the portion of their projects that include more than one category (HVAC, insulation/air sealing, domestic water heater); however, this is not the case for every project or for every contractor. Those with HVAC projects appear more likely to install measures across trades as evidenced by the portion of contractors with HVAC projects that also have at least one shell measure.

Project Comprehensiveness by Contractor SIC Categories

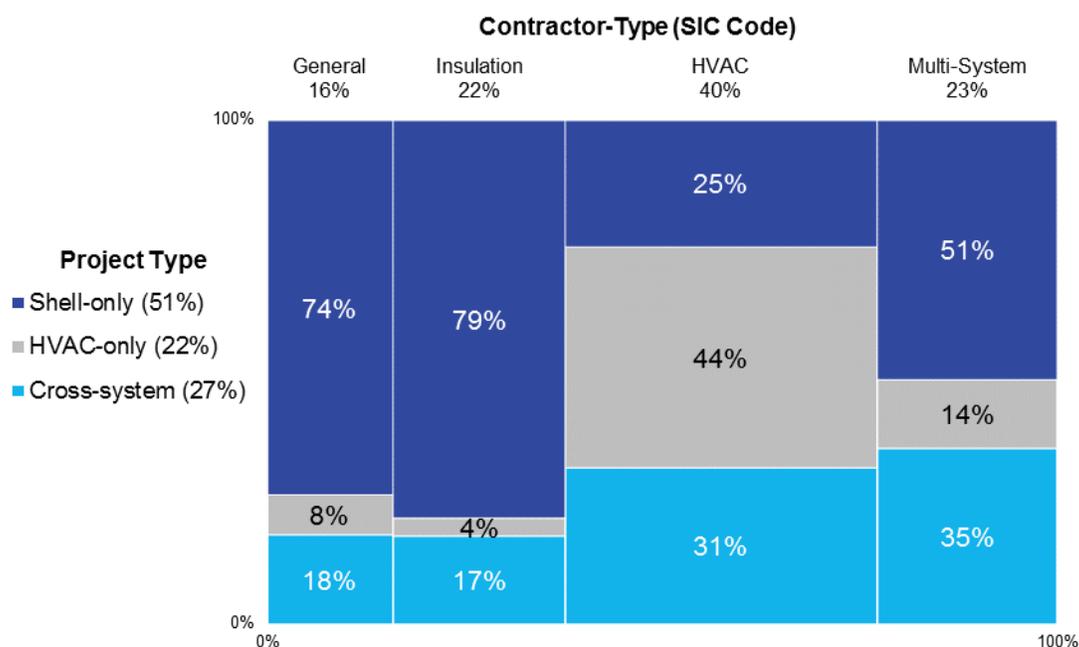
To investigate which type of contractors were most likely to complete comprehensive projects, the evaluation team categorized all projects into three major categories: shell-only projects, HVAC-only projects, and cross-category projects. This analysis then compared these projects by contractor type. Shell-only projects include a basic shell measure (air sealing, insulation), but no major measures from other categories. Similarly, HVAC-only projects include installation of at least one of three major HVAC measures (furnace, boiler, central AC).⁴² Plumbing-only projects made up less than one percent of completed projects and, consequently, are not a major category in this analysis. As measures, however, plumbing measures were still considered when categorizing project comprehensiveness. Consequently, cross-system projects – the more comprehensive projects - include installations across shell, HVAC, or plumbing.

The evaluation team used the contractor's self-selected contractor category SIC code – insulation, HVAC, multi-system, and general contractors, to categorize contractors by trade type. Almost half (46%, 42 of 92) of participating contractors used SIC codes associated with HVAC contractors, while about 20% identified as insulation (19 of 92) or general contractors (18 of 92), and a minority (14% - 13 of 92) identified themselves as multi-system contractors. The evaluation team then compared the types of projects incented through the program – shell, HVAC, or cross-system projects – by contractor type.

Participating contractors completed 7,379 projects, with the majority of these projects consisting of a single measure category project, completed by contractors in the corresponding trades (e.g. insulation contractors completed many shell-only projects, Figure C-25). HVAC contractors, the largest group of contractors, completed more projects that spanned project types (shell-only, HVAC-only, and cross-system) than any other contractor type. In contrast, general, insulation, and multi-system contractors installed shell-only projects the majority of the time. Consequently, the majority of projects (51%) were shell-only projects. While multi-system contractors completed more cross-system projects than any other contractor-type, cross-system projects consisted of only 27% of the total projects completed through the program.

⁴² The evaluation team categorized shell, HVAC, and plumbing projects using the following measures: shell=BS AirSealing, BS Insulation; HVAC=HVAC Furnace, HVAC BoilerHW, HVAC CentralAC; plumbing= WH Instant, WH LowFlow, WH Tank, WH TanklessCoil.

Figure C-25. Proportion of Projects by Contractor and Project Type



Distribution of Measures within Projects

To understand the extent to which individual projects appear to be comprehensive (i.e., include more than one major measure), the evaluation team ran an exploratory factor analysis (EFA) using measure-level project information. The evaluation team initially included all 36 HPwES measures available to install in the EFA model. Through several model iterations, the evaluation team reduced the number of measures in the model to 13 measures that provided optimal model fit. The evaluation team considered both a three-factor model and a four-factor model; the four-factor model provides clearer factors.⁴³

The final EFA model loadings show four clear factors (Table C-5), each focused on a major measure category – insulation, water heating, HVAC, and miscellaneous small upgrades. The factor loadings suggest many HPwES projects focus their upgrades within a major measure category, rather than including upgrades across several major measure categories (a more comprehensive approach).

⁴³ The screen plot for the EFA models indicated that either a three or a four-factor model would be adequate.

Table C-5. Exploratory Factor Analysis Factor Loadings for Project Level Data

Factors	1	2	3	4
	HVAC	Shell	Plumbing	Misc. Small
HVAC Other Measure	0.79			
Central AC	0.75			
Thermostat	0.74			
Furnace	0.69			
Water Heater Insulation		0.73		
Duct Sealing		0.73		
Air Sealing		0.77		
Insulation		0.73		
Water Heater Indirect Fired			0.93	
Hot Water Boiler			0.91	
Window				0.90
Water Heater Tank				0.77
CFL				0.79

Extraction Method: Minimal Residual

Rotation Method: Varimax.

Deleted loadings that were less than .5

Data dichotomous. The evaluation team used polychoric matrix to compute a factor analysis using dichotomous data.

The factors in the model provide evidence that HPwES projects align to traditional contractor trades; shell, plumbing, and HVAC. EFA results also show a close association between air sealing and insulation measures, and not between HVAC and air sealing measures.

C.3.4 Quality Assurance Inspection Findings

In order to identify the percentage of projects that passed or failed inspections, the evaluation team reviewed post-installation inspection data in CRIS. NYSERDA implementation staff completed 905 HPwES inspections for projects completed between 2012 and 2013 (Table C-6). In 2012, the program met its 10% inspection rate goal, however, in 2013, the inspection rate dropped to 5%.

Table C-6. Project Inspections by Year

Year	Projects		
	Completed (n)	Inspected (n)	Target %
2012	5575	590	10%
2013	5845	315	5%
Total	11,600	905	8%

Almost two-thirds of the projects passed inspections (64%) between 2012 and 2013, while about one-third failed their inspection (36%). There are three scoring levels for projects that fail inspection with “F1” denoting a minor oversight by the contractor, and “F3” denoting a major oversight. Most (83%) of the F1-rated failed inspections failed due to minor infractions in health and safety (such as small gas leaks, or no CO detectors installed) or minor shell installation issues (such as insufficient insulation coverage or inadequate air sealing). Notes associated with projects receiving “F1” and “F2” scores support the finding that health and safety issues were the most common reasons for failing the inspections. Not all failed projects contained note fields in CRIS; however, the notes field provides useful detail about why projects failed inspections.⁴⁴ The following notes are indicative of reasons why projects fail their inspections:

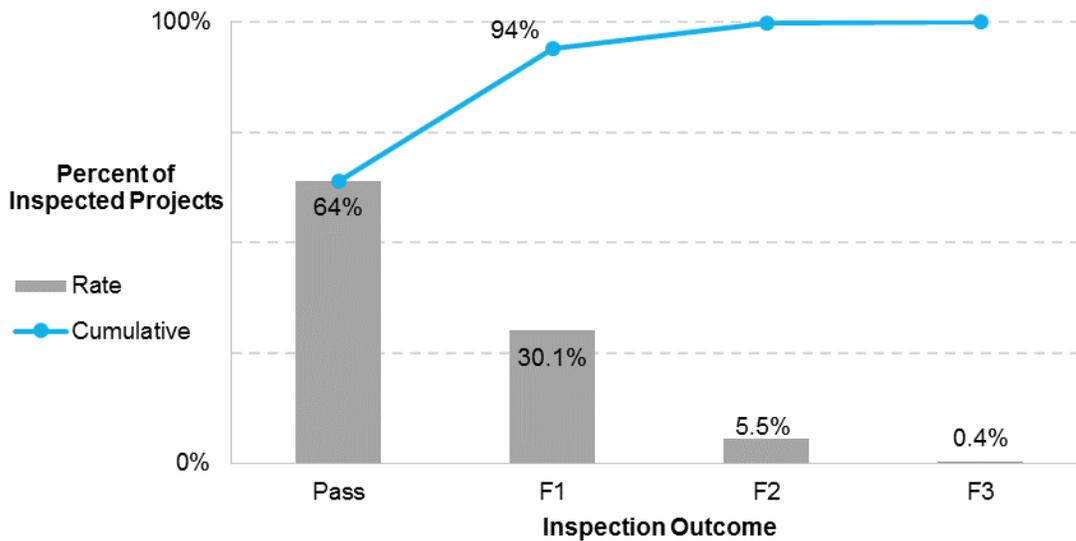
- F1:
 - “No CO detector. Basement batt insulation not installed with vapor barrier oriented towards conditioned space. Attic insulation coverage not uniform or to specified thickness. Customer was dissatisfied with contractor.”
 - “Weather stripping for 2 doors was not installed. Gas leak at meter identified - leak was repaired by gas utility. Missed opp(ortunity) to recommend crawl space insulation.”
 - “Gas leak identified. DOC to be issued. Missed opportunity to recommend a furnace filter slot cover.”
 - “No CO detector. Cust(omer) alleges a subcontractor installed windows but no sub(contractor) was identified by the contractor as required by program standards.”
- F2:
 - “Gas leak identified. Bathroom exhaust fan not vented outside unconditioned attic. Attic access door not insulated per BPI standards. Air sealing not entirely completed. DOC to be issued. Missed opportunity to recommend heating system clean and tune.”

⁴⁴ About a third (36%) of inspected projects contain a note field in the CRIS database.

- “2 gas leaks identified. Missed areas of rim joist insulation. Band joist area in attic missed during foam insulation installation to bring attic into conditioned space. DOC to be issued”
- “Air leakage paths betw(een) living sp(ace) and attach(ed) garage were not air-sealed as required by BPI standards. Cust(omer) dissatisfied w(ith) contractor.”
- F3:
 - “Unvented space heater in bsmt. Stairwell rim-joist insul(ation) partially installed. Slopes not dense packed. 1 kneewall area shows no sign of contr(actor) access. Missed opp(ortunity) to recommend rim joist insul(ation), addtl air sealing & exterior wall insul(ation).”

In total, 94% of all inspected projects either passed the inspection or failed for minor infractions. Less than one percent of inspected projects received a failure score of F3 – indicating major program infractions (Figure C-26).

Figure C-26. Inspection Outcomes



Appendix D Nonparticipant Contractor MCA/Survey Results Memorandum

D.1 Summary

There are at least 9,300 general, HVAC, insulation, and other specialty contractors in New York State (NYS) whose work includes at least one service in the single-family low-rise sector supported by HPwES (“market contractors”).^{45,46} The contractors participating in the NYSERDA HPwES program (“participating contractors”) comprise about 2% of the 9,300 market contractors. Nearly two-thirds of market contractors identified as general contractors and one-third as specialty contractors; two thirds of the specialty contractors reported that they specialize in heating, ventilation, and air conditioning (HVAC), 5% in insulation, and about one-third in “other” specialty services.

Using survey results from 129 nonparticipant contractors, data from the InfoUSA sample frame, NYSERDA’s CRIS database, NYS market contractors’ annual sales revenues from residential projects is about \$18.2 billion, of which participating contractors generate about 6%. In addition, NYS market contractors employ about 73,000 workers, with 6% employed by participating contractors. Based on the BPI website around 4% of NYS market contractors have at least one employee certified by BPI. Over one-third of the surveyed participating and nonparticipating contractors (40%) reported having at least one employee who has taken or is currently taking training on energy efficiency improvements for existing homes by an organization other than BPI. Of these contractors, over half reported at least one employee with certification from a professional trade organization and about one-third reported employees with certifications from two or more professional trade organizations.

Approximately 20% of the sample of NYS market contractors reported providing residential energy audits, but the audits performed by nonparticipant contractors do not appear to be as comprehensive as those provided by participating contractors. About three-fourths of the sample of NYS nonparticipant contractors reported promoting energy-efficient products and just over half reported installing these products, which is much less than participating contractors. There are substantial differences between the contractor trades, or segments, and between nonparticipant and participating contractors in regard to the services they provide and products they install.

⁴⁵ “Other specialty contractors” do not provide general contracting services or specialize in HVAC or insulation services, but do offer at least one service supported or incented by HPwES. These primarily include energy management contractors and auditors, electricians, and plumbers.

⁴⁶ HPwES supported and/or incented services includes home energy audits, HVAC system upgrades, building shell insulation and weatherization upgrades, and water heating system upgrades.

About two-thirds of the sample of NYS nonparticipant contractors reported awareness of NYSERDA incentive programs and slightly over half reported awareness of HPwES. The most commonly reported sources of awareness are trade allies, word of mouth, and advertisements. Nearly three fourths of NYS nonparticipant contractors sample reported awareness of utility incentive programs, the three most common of which are National Grid, Con Edison, and NYS Electric & Gas.

D.2 Methods

To characterize the market of home improvement contractors in NYS, the PE/MCA team used a two-stage approach. First, the team collected and analyzed existing contractor market data from InfoUSA, the BPI, and NYSEDA's CRIS database. Second, the PE/MCA team collected and analyzed primary telephone survey data from a sample of NYS nonparticipant contractors (see below) and participating contractors (Appendix G) regarding firms' characteristics, current business and contracting practices, and involvement or interest in energy efficiency incentive programs in NYS.

D.2.1 Telephone Survey Sampling

The PE/MCA team used a sample of 16,553 NYS contractor firms with primary or secondary Standard Industrial Classification (SIC) codes in the 152 category (General Building Contractors – Residential Buildings) and the 17 category (Construction Special Trade Contractors) from InfoUSA, which provided a more comprehensive list than comparable sources such as Hoover's.⁴⁷ The InfoUSA list contains a count of contractors of different types as well as contact information, annual sales revenues, and number of employees for each firm. Participating contractors (n=231) and contractors who once participated in HPwES but were no longer participants as of December 31, 2013 (former-participating contractors, n=199) were obtained from the CRIS database. A list of nonparticipant contractor firms with a BPI-certified employee (BPI-certified nonparticipants, n=174) in NYS was obtained from the BPI website in December 2014.⁴⁸

The PE/MCA team matched about half of participating contractors, nearly one-third of former-participating contractors, and nearly 20% of BPI-certified nonparticipant contractor firms to nonparticipant contractor firms in the InfoUSA list using a combination of firm name, address, and telephone number (Table D-1).⁴⁹ The PE/MCA team separated from the InfoUSA list all of the matched firms, and excluded any InfoUSA

⁴⁷ The list obtained from InfoUSA is likely a conservative estimate of contractor firms in NYS. InfoUSA employs verification methods using telephone calls to and Yellow Page searches of firms, and thus likely does not include some firms that are currently active but had not been verified. The PE/MCA team found the InfoUSA list to be more comprehensive than lists provided by companies like Hoover's, also which employs verification and screening methods, but less comprehensive than lists provided by firms like findthebest.com, which does not employ verification methods but instead draws from multiple listing firms in the U.S.

⁴⁸ BPI-certified nonparticipant contractor firms include firms with BPI GoldStar accreditation and firms without GoldStar accreditation but with at least one BPI-certified employee.

⁴⁹ Less than one-third of participant contractors were matched to a Hoover's list of NYS residential contractors.

nonparticipant contractor firms that did not have a primary or secondary SIC code found among the primary or secondary SIC codes designated by matched participating, former participating, and BPI-certified nonparticipant contractor firms.⁵⁰ The resulting InfoUSA list of nonparticipant contractors is comprised of 12,927 unique firms that, to the best of the PE/MCA team’s knowledge, have not been participants and/or were not listed in BPI’s directory of firms with a BPI-certified employee(s), but have primary or secondary SIC codes found among participating, former-participating, and BPI-certified nonparticipant contractor firms (Table D-1).

To use the InfoUSA list as a sample frame for conducting the telephone survey, the PE/MCA team added all former participating and BPI-certified nonparticipant contractor firms to the list, which resulted in 13,300 nonparticipant contractor firms (Table D-1). Participating contractors were not added to the telephone survey sample frame because the PE/MCA team surveyed them separately from nonparticipant contractors (Appendix G).

Table D-1. Number of Different Types of New York State Contractors Included and Not Included in the InfoUSA Sample Frame*

Contractor Types	Sample Count
Former-participating contractors matched to InfoUSA list	66
Former-participating contractors not matched to InfoUSA list	133
BPI-certified nonparticipant contractors matched to InfoUSA list	31
BPI-certified nonparticipant contractors not matched to InfoUSA list	143
Nonparticipant contractors in InfoUSA list	12,927
Total nonparticipant contractors in sample frame	13,300
Participating contractors matched to InfoUSA List	103
Participating contractors not matched to InfoUSA list	128
Total market contractors in all lists	13,531

* Bold indicates inclusion in the telephone survey sample frame.

For sampling and analysis purposes, the PE/MCA team separated the all contractors with SIC code data into two segments: general and specialty contractors. *General* contractors include general contractors, home improvement and remodeling contractors, building contractors, and several other contractor types identified by the firm’s primary 152 SIC code prefix for General Building Contractors-Residential Buildings. These contractors often possess licenses to perform work on multiple household systems, and may subcontract system-specific work, such as HVAC installation or service, to specialty contractors.

⁵⁰ Firms can choose two SIC codes, a primary and a secondary.

The *specialty* contractors segment includes firms that primarily install or work on specific household systems, or a set of related systems that improve safety, comfort, and energy efficiency of homes, such as HVAC, building shell, electrical, and plumbing. Nonparticipant contractors in the specialty contractor segment were identified by the primary 17 SIC code prefix for Construction Special Trade Contractors. The PE/MCA team further divided specialty contractors into three sub-segments using the primary SIC code designations based on the major types of work incited by HPwES: HVAC installation contractors, insulation contractors, and other specialty contractors.⁵¹

To group contractors into the contractor segments, the PE/MCA team relied first on the contractors' primary SIC codes. Contractors with a generalist primary SIC code were grouped with generalists and contractors with a specialty primary SIC code were grouped with the appropriate specialty group. If a contractor's primary SIC code did not fit into any of the contractor segments, the PE/MCA team grouped the contractor by the secondary SIC code, in an effort to be as comprehensive as possible and include any contractors involved in the residential home improvement market for HPwES-supported upgrades.

As shown in Table D-2, a much higher percentage of InfoUSA nonparticipant contractors have a general primary SIC code compared to the matched participating, former participating, and BPI-accredited nonparticipant contractor firms. Among the generalist segment across all contractor types, a higher percentage of participating, former participating, and BPI-certified nonparticipant contractor firms have a primary SIC code directly related to "home improvement" compared to InfoUSA nonparticipant contractors. Trends among the specialty subgroups are varied between contractor types, but HVAC contractors are the most common and, with the exception of participating contractors, insulation contractors are the least common (Table D-2).

Table D-2. Count and Percentage of New York State Contractor Types in the InfoUSA List, by General and Specialty Segments

	Participating Contractors	Former-Participating Contractors	BPI-certified Nonparticipant Contractors	InfoUSA Nonparticipant Contractors
Total with SIC codes	103	66	31	12,927
General	20 (19%)	19 (29%)	6 (18%)	8,403 (65%)
<i>Home Improvement</i>	8 (38%)	8 (40%)	2 (33%)	1,681 (20%)
<i>Other</i>	12 (62%)	11 (60%)	4 (67%)	6,722 (80%)
Specialty	83 (81%)	47 (71%)	25 (82%)	4,524 (35%)
<i>HVAC</i>	47 (56%)	18 (38%)	17 (70%)	2,488 (55%)
<i>Insulation</i>	19 (23%)	14 (29%)	3 (11%)	226 (5%)
<i>Other</i>	17 (21%)	15 (33%)	5 (19%)	1810 (40%)

⁵¹ "Other specialist contractors" do not provide general contracting services or specialize in HVAC or insulation services, but do offer at least one service supported or incited by HPwES. These primarily include energy management contractors and auditors, electricians, and plumbers.

Since the majority of InfoUSA nonparticipant contractors are general contractors and most participating, former participating, and BPI-accredited nonparticipant contractor firms are specialty contractors, the PE/MCA team established contractor segment quotas for the telephone survey data collection (Table D-3). The segment quotas were applied so that the team could obtain a higher percentage of specialty contractors from each of the sub-segments than would be the case without the quotas, and the team applied weights in the analyses below to account for the disproportionate number of specialty contractors in the sample compared to the population.⁵² In addition, the survey team included screening questions in the phone survey to determine if each respondent was involved in the home improvement market and which services their firm provides from a list, including: HVAC; electrical; windows, siding, or doors; insulation; general contracting or renovations; home building; plumbing; and/or integrated energy efficiency services.

Table D-3. Survey Data Collection Quotas for New York State Contractor Segments

Contractor Segment	Quota
Generalist	65
Specialty	80
<i>HVAC</i>	40
<i>Insulation</i>	20
<i>Other</i>	20
Total	145

D.2.2 Nonparticipant Contractor Telephone Survey Disposition and Data Analysis

Abt SRBI fielded the telephone survey of nonparticipant contractors between December 3 and December 22, 2014, and 7,235 telephone numbers were called, of which 17% were bad numbers (Table D-4). Of the remaining 6,011 good numbers called, 129 completed surveys; the remainder were not contacted, or were contacted but were no longer in business, chose not participate in the survey, or screened out. This resulted in a 3% response rate.⁵³ The average completion time was 24 minutes. In addition, the quotas for the contractor segments (Table D-3) were met for generalist contractors and HVAC specialty contractors, but not for insulation and other specialty contractors before the sample lists for these sub-segments were exhausted (Table D-4).

⁵² Weights calculated by dividing the proportion of each contractor segment in the sample list by the proportion of each contractor segment in the completed sample ($[\text{number of contractors in contractor segment in sample list} / \text{total number of contractors in sample list}] / [\text{number of contractors in contractor segment in completed sample} / \text{total number of contractors in completed sample}]$).

⁵³ Response rate calculated using American Association for Public Opinion Research (AAPOR) Response Rate 1: $\text{Completes} / (\text{Completes} + \text{Partial Completes} + \text{Refusals/Break-offs} + \text{Non-contacts} + \text{Other} + \text{Unknown})$.

Table D-4. Nonparticipant Contractor Telephone Survey Disposition Results

	Respondents
Total numbers in list	13,300
Total numbers dialed	7,235
Bad numbers dialed	1,224
Good numbers dialed	6,011
Not contacted	759
Contacted but did not participate	3,758
Contacted but no longer in business	112
Contacted but screened out	1144
Contacted but quota reached	109
Contacted and completed survey	129
General completes	65
Specialty completes	64
<i>HVAC</i>	41
<i>Insulation</i>	11
<i>Other</i>	12
Response Rate*	3%

* American Association of Public Opinion Research (AAPOR) Response Rate 1 Calculation:
 Completes / (Completes + Partial Completes + Refusals/Break-offs + Non-contacts + Other + Unknown) =
 129 / (129 + 3758 + 759)

In the discussion of the survey data analysis below, the PE/MCA team compared results from the survey of nonparticipant contractors with results from the survey of participating contractors on the questions both surveys shared in common. Comparisons between the contractor segments are discussed for results in which large differences were found between the groups. In addition, “Don’t know” answer categories are excluded from analyses unless otherwise indicated.

D.2.3 InfoUSA Data Analysis & Extrapolation

For the analysis of the InfoUSA data, the PE/MCA team used the disposition and screening question data from the telephone survey results to update the InfoUSA list counts and calculate market estimates for the total count of active contractor firms, and the totals and averages of annual sales revenue and number of employees. Participating, former-participating, and BPI-certified nonparticipant contractor firms were also included in these analyses.

Of the 7,235 NYS nonparticipant contractor firms called during the survey, the 1,224 firms with “bad” numbers (17%), and the 1,256 firms screened out of the survey or no longer in business (21%) were removed from the list. This resulted in 4,755 firms with good numbers, who were not screened out, and were still in business (66% of sample).

To calculate the count of nonparticipant contractor firms, the PE/MCA team randomly removed the percentage of contractors who had a bad number, who were out of business, or who were screened out (38%) from the InfoUSA list of 6,065 nonparticipant contractor firms not called during data collection. The PE/MCA team then added the resulting firms to the 4,755 firms remaining in the InfoUSA list who were called, and the 231 participating contractors who were previously excluded from the list.

To calculate the total sales revenue and number of employees, the PE/MCA team computed the average sales revenue and number of employees for the 103 participating firms, 66 former-participating firms, and 31 BPI-certified nonparticipant firms matched in the InfoUSA list. The PE/MCA team applied these averages to the 128 participating, 133 former participating, and 143 BPI-certified nonparticipant contractor firms not matched in the InfoUSA list, respectively. Total sales revenues and number of employees were available in the InfoUSA list for nonparticipant contractors. The PE/MCA team summed the numbers across all the contractors in the InfoUSA list to compute the totals.

D.2.4 Estimates of Contractor Firms in NYS

In NYS, an estimated number of at least 9,300 contractor firms (including participating, former-participating, and BPI-certified nonparticipant firms) are active in the residential home improvement market and provide at least one service supported by HPwES (Table D-5).⁵⁴ About two-thirds of all nonparticipant contractors in the list are general contractors and among the approximately one-third who are specialty contractors, two-thirds are HVAC contractors, about one-third are other specialty contractors, and 5% are insulation contractors. HPwES contractors comprise about two percent of the home improvement contractor market.

⁵⁴ Services incented by HPwES include home energy audits, HVAC system upgrades, insulation and weatherization upgrades, water heating system upgrades, appliance upgrades, and window/door upgrades.

Table D-5. Count and Percentage of New York State Contractors in the Home Improvement Market, by Contractor Type and Segment (InfoUSA 2014)*

	Total Firms	% of Total Firms
Nonparticipant Contractors	8704	93.5%
General Contractors	5778	66.4%
HVAC Contractors	1950	22.4%
Insulation Contractors	112	1.3%
Other Specialty Contractors	864	9.9%
Nonparticipant BPI-certified Contractors	174	1.9%
General Contractors	31	0.3%
HVAC Contractors	100	1.1%
Insulation Contractors	16	0.2%
Other Specialty Contractors	27	0.3%
Former-participating Contractors	199	2.1%
General Contractors	58	0.6%
HVAC Contractors	54	0.6%
Insulation Contractors	41	0.4%
Other Specialty Contractors	47	0.5%
Participating Contractors	231	2.5%
General Contractors	44	0.5%
HVAC Contractors	105	1.1%
Insulation Contractors	43	0.5%
Other Specialty Contractors	39	0.4%
All Contractors	9308	100%
General Contractors	5911	63.5%
HVAC Contractors	2208	23.7%
Insulation Contractors	212	2.3%
Other Specialty Contractors	977	10.5%

* Methods used to derive these counts are described in Sections D.2.2 and D.2.3.

The 2012-14 NYSERDA Residential Statewide Baseline Study (RSBS) reports over 18,000 HVAC and plumbing contractors in NYS. The large discrepancy between the estimates provided by the RSBS and those provided by the HPwES PE/MCA team are at least partially explained by each study's focus on different contractor populations. The RSBS study identified any HVAC or plumbing contractors who may work in the residential market while the PE/MCA team identified general, HVAC, insulation, and other specialty contractors who provide HPwES-like services.

In addition, the two studies used different sources for the list of contractor firms in NYS. The RSBS team obtained the list of plumbing and HVAC contractors from companies.findthebest.com, which compiles lists of businesses from multiple listing companies in the U.S., like Dun and Bradstreet, USAspending.com, and others, but does not employ verification methods. The list source used by the PE/MCA team, InfoUSA, employs verification methods such as calling firms or conducting a Yellow Page search of firms to confirm the businesses are in operation, and thus may be less comprehensive.

The PE/MCA and RSBS teams also used different list cleaning methods and criteria. The estimate of contractors provided in the RSBS is the total number of firms in the “uncleaned” list. The RSBS team estimated that at least 17% of firms in the list were ineligible based on four criteria: a) the firm sold commercial equipment only, b) the firm did not sell any of the equipment in the HVAC assessment, c) the firm was out of business or retired, or d) the firm owner was deceased. An unknown percentage of firms were likely duplicate listings, or provided other types of residential HVAC and plumbing services, the latter of which is in line with the goals of the RSBS.

Differences between these counts are also due to the following.

- The PE/MCA team conducted a survey of contractors and used the results to exclude ineligible firms based on the RSBS criteria.
- The PE/MCA team categorized some contractors who provided residential HVAC services into the general contractor or other specialty contractor categories if their primary SIC code was not related to HVAC and/or if their business included other energy-related system services (other specialty) or other general residential services (general contractor).

D.3 Firmographics and Business Outlook

Estimates from the InfoUSA data show that the total sales revenue of all market contractors in the list is about \$31.7 billion, with an average per firm of \$3.4 million. Participating contractor firms’ sales revenues comprise four percent of the total, and the average revenue per firm is substantially higher than that of nonparticipant contractors; however, results from the survey data indicate that the average percentage of contractors’ revenue in residential buildings (new and existing) is 85% for participating contractors and 56% for nonparticipant contractors. The adjusted totals result in nearly \$1 billion in annual residential sales for participating contractors and about \$17.3 billion in annual residential sales for all other contractors (Table D-6).⁵⁵

⁵⁵ Sales estimates were calculated from self-reported values in the InfoUSA list. Contractors that were not matched to the list were randomly assigned a trade based on the proportion of matched contractors’ trades and were assigned the average annual sales value reported by matched contractors. Participating and

Continued...

Table D-6. Annual Residential Sales Revenues and Percentage of Total Residential Sales in the New York State Home Improvement Market, by Contractor Type (InfoUSA 2014)*

	Total Annual Residential Sales (\$ in billions)**	% of Total Annual Residential Sales
Nonparticipant Contractors	\$16.5	90.7%
General Contractors	\$12.3	67.7%
HVAC Contractors	\$2.7	15.0%
Insulation Contractors	\$0.07	0.4%
Other Specialty Contractors	\$1.1	6.1%
Nonparticipant BPI-certified Contractors	\$0.5	2.6%
General Contractors	\$0.1	0.7%
HVAC Contractors	\$0.3	1.4%
Insulation Contractors	\$0.02	0.1%
Other Specialty Contractors	\$0.06	0.3%
Former-participating Contractors	\$0.3	1.5%
General Contractors	\$0.1	0.7%
HVAC Contractors	\$0.07	0.4%
Insulation Contractors	\$0.03	0.2%
Other Specialty Contractors	\$0.05	0.3%
Participating Contractors	\$0.9	5.2%
General Contractors	\$0.3	1.6%
HVAC Contractors	\$0.4	2.3%
Insulation Contractors	\$0.1	0.5%
Other Specialty Contractors	\$0.1	0.7%
All Contractors	\$18.2	100%
General Contractors	\$12.8	70.7%
HVAC Contractors	\$3.5	19.2%
Insulation Contractors	\$0.2	1.3%
Other Specialty Contractors	\$1.3	7.4%

* Methods used to calculate annual revenues are described in Sections D.2.2 and D.2.3.

** Numbers may not sum to total due to rounding.

According to InfoUSA data, contractors in the list employ approximately 73,000 people, with 6% employed by participating contractors (Table D-7).⁵⁶ The average number of employees per firm is

nonparticipant contractor respondents in the PE/MCA team surveys reported the percentage of sales from residential projects.

⁵⁶ The number of employees was calculated from self-reported values in the InfoUSA list. Contractors that were not matched to the list were randomly assigned a trade based on the proportion of matched contractors' trades and were assigned the average number of employees value reported by matched contractors.

substantially higher for participating contractors compared to nonparticipant contractors, and both averages are similar to the results from the survey data; participating contractors reported an average of 19 employees per firm and nonparticipant contractors reported an average of eight employees per firm.⁵⁷

Table D-7. Number and Percentage of New York State Contractor Firm Employees (InfoUSA 2014)*

	Total Employees	% of Total Employees
Nonparticipant Contractors	64199	88.1%
General Contractors	41689	57.2%
HVAC Contractors	13876	19.0%
Insulation Contractors	888	1.2%
Other Specialty Contractors	7746	10.6%
BPI-certified Nonparticipant Contractors	2561	3.5%
General Contractors	157	0.2%
HVAC Contractors	1258	1.7%
Insulation Contractors	314	0.4%
Other Specialty Contractors	832	1.1%
Former-Participating Contractors	1926	2.6%
General Contractors	340	0.5%
HVAC Contractors	505	0.7%
Insulation Contractors	279	0.4%
Other Specialty Contractors	802	1.1%
Participating Contractors	4158	5.7%
General Contractors	514	0.7%
HVAC Contractors	2284	3.1%
Insulation Contractors	727	1.0%
Other Specialty Contractors	633	0.9%
All Contractors	72844	100.0%
General Contractors	42700	58.6%
HVAC Contractors	17923	24.6%
Insulation Contractors	2208	3.0%
Other Specialty Contractors	10013	13.7%

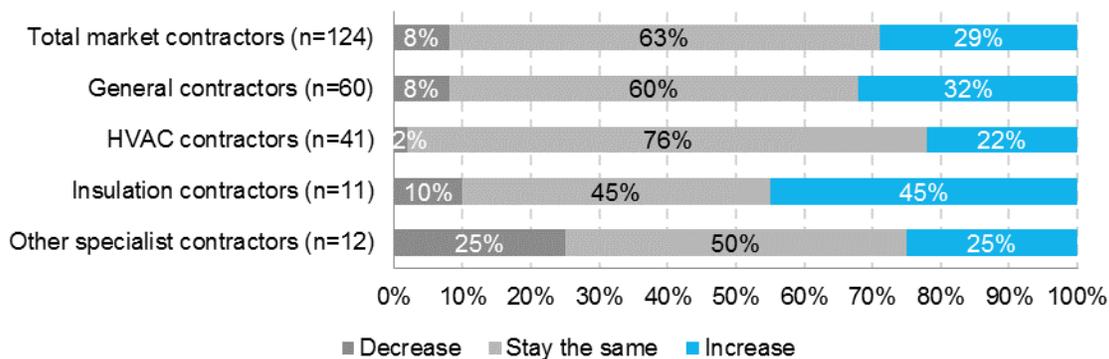
* Methods used to calculate number of employees are described in Sections D.2.2 and D.2.3.

Nonparticipant contractors reported an average of 25 years in home improvement contracting, compared to 17 for participating contractors.⁵⁸ Most of the nonparticipant (85%) and participating contractors (87%) have one location in NYS, although a few reported up to four or more locations.

⁵⁷ The 2013-14 RSBS estimated an average of 11.5 employees per HVAC and Plumbing market contractor firm.

Most participating and nonparticipant contractors (87%) reported a favorable or very favorable outlook for their overall business. A majority of nonparticipant contractors also expect their residential revenue percentage to stay the same over the next two years, with about one-fourth expecting an increase and nearly 10% expecting a decrease (Figure D-1). This outlook varies by contractor segment; a higher percentage of insulation contractors expect an increase in their residential work revenues compared to HVAC, other specialty, and general contractors.

Figure D-1. Percentage of New York State Nonparticipant Contractors Who Expect Their Residential Revenues to Decrease, Stay the Same, or Increase over the Next Two Years, by Contractor Segment



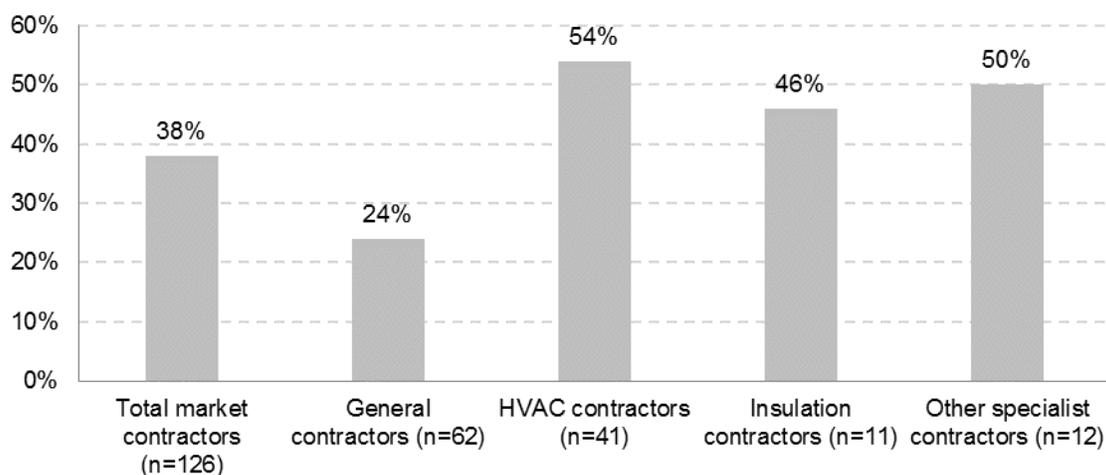
Over one-third of NYS nonparticipant contractors (37%) reported being interested or very interested in expanding the types of residential contracting services they offer in the next two years. The most common types of services reported include installing energy-efficient measures – particularly those related to HVAC, electrical, and plumbing – conducting energy audits, and installing building automation systems.

D.4 Training

Over one-third of NYS nonparticipant contractors (38%) and 94% of participating contractors reported that someone in the firm has taken or is currently taking training on energy efficiency improvements for existing homes from an organization other than BPI (Figure D-2). Extrapolating these results to the InfoUSA list, approximately 3,700 contractors in the NYS home improvement market have at least one employee trained in energy efficiency. For nonparticipant contractors, this varies by contractor segment, in which a higher percentage of HVAC, insulation, and other specialty contractors reported employee training compared to general contractors (Figure D-2).

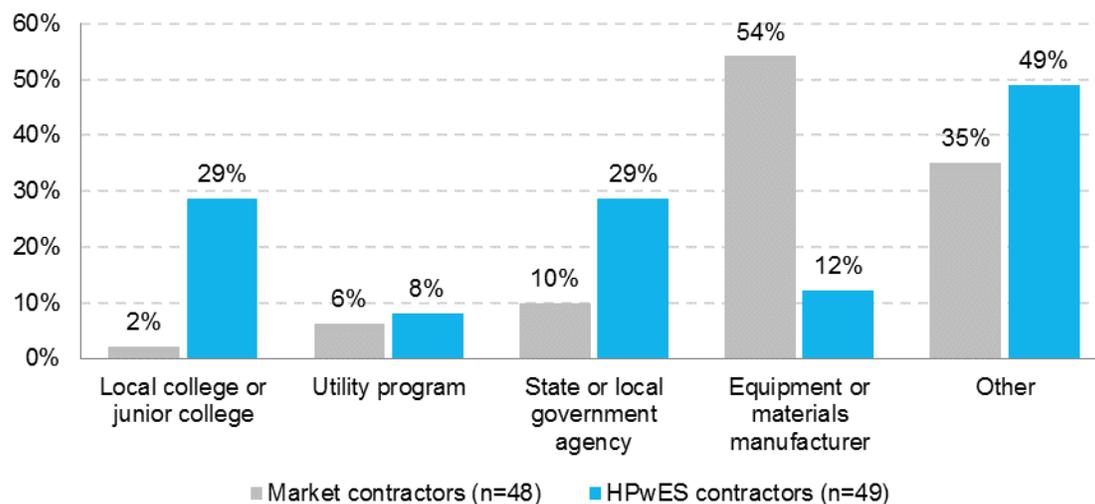
⁵⁸ The 2013-2014 RSBS estimated that HVAC and Plumbing market contractors have been in business an average of 35 years.

Figure D-2. Percentage of New York State Nonparticipant Contractors Who Have Taken or are Currently Taking Non-BPI Training on Energy Efficiency Improvements for Existing Homes, by Contractor Segment



Equipment or materials manufacturers and “Other” organizations are the most common types of non-BPI organizations that provided training reported by nonparticipant contractors. A higher percentage of participating contractors reported receiving training from colleges, government agencies, and “Other” organization types (Figure D-3). Nearly all of the “Other” organization types were trade organizations.

Figure D-3. Percentage of New York State Nonparticipant and Participating Contractors Reporting Training from Different Organization Types*



* Respondents could select more than one.

Of the nonparticipant contractors that reported having employees with training in residential energy efficiency from an organization other than BPI, 58% (22% of the sample) reported that one or more of their employees is *certified* by a trade organization. In addition, 54% of these contractors (12% of the sample)

reported employees with certifications from more than one trade organization. Contractors most commonly cited the following organizations as certification providers: North American Trade Excellence (NATE), American Society of Heating, Refrigerating, and Air Conditioning Engineers (ASHRAE), and “Other” types. The most common “Other” types of organizations that provided certified training include manufacturers, Environmental Protection Agency (EPA), Refrigeration Service Engineers Society (RSES), Occupational Safety and Health Administration (OSHA), North American Board of Certified Energy Practitioners (NABCEP), Leadership in Energy and Environmental Design (LEED), and Institute of Inspection Cleaning and Restoration Certification (IICRC) (Table D-8).

Table D-8. Percentage of New York State Nonparticipant Contractor Firms with Certified Employees and Average Number of Certified Employees per Firm (n=129)*

	North American Technician Excellence (NATE)	Residential Energy Services Network (RESNET)	American Society of Heating, Refrigerating, and Air Conditioning Engineers (ASHRAE)	Air Conditioning Contractors of America (ACCA)	National Oil-heat Research Alliance (NORA)	Other
Percent of firms with certified employee	21%	6%	20%	14%	11%	21%
Average certified employees/firm	9	1	8	2	2	5

* Respondents could select more than one.

In addition, about one-fourth of all nonparticipant contractors (27%) and nearly two-thirds of participating contractors (62%) who reported employee training mentioned that there are gaps in training opportunities they would like to see addressed. The most commonly reported barriers to training include having fewer convenient training locations and times, and more and better training on software, electrical work, and various energy efficiency measures.

D.4.1 BPI Training and Certification

Twenty-one percent of surveyed nonparticipant contractors and 92% of surveyed participant contractors reported at least one employee with BPI certification; however, the percentage of nonparticipant contractors who reported a BPI-certified employee appears to be a large overestimate.⁵⁹ According to the BPI website, as of December 2014 there were 412 unique firms with a BPI certified employee and about

⁵⁹ Extrapolating the reported 21% of contractors with a BPI-certified employee to the population results in about 2,400 firms, whereas the BPI website lists 412 firms, a 582% overestimate.

1,600 individuals with BPI certification (BPI 2014) (Table D-9).⁶⁰ Two hundred of the firms in the BPI list matched firms in the list of 231 participating contractor firms; these firms comprise 49% of all firms in the BPI list. ⁶¹ Thirty-eight of the firms in the BPI list matched firms in the list of 199 former participating contractors, and these firms comprise 9% of firms in the BPI list. The remaining 174 firms in the BPI list have not been affiliated with HPwES. These firms comprise 42% of firms in the BPI list and 2% of the 8,878 nonparticipant contractors. To verify the 2% estimate, the PE/MCA team compared the 129 surveyed nonparticipant contractors to the BPI list and identified three matching firms, or 2% of the total respondents. Overall, 4% of contractors in the InfoUSA list and in the lists of HPwES participating and former participating contractors were matched to the BPI-certified contractor list.

Table D-9. Number of Firms in New York State Matched to BPI’s List of Firms with a BPI-Certified Employee, by HPwES Participation Status

Contractor Type	Number of contractors	Matched to BPI list of certified contractors	
		Number	Percentage
Participating contractors	231	200	87%
Former participating contractors	199	38	19%
Nonparticipant contractors	8,878	174	2%
Total	9,308	412	4%

The over reporting of BPI-certified employees by surveyed nonparticipant contractors is likely due to several factors. First, some contractor firms will subcontract with other contractors who have skills needed on specific projects. If surveyed nonparticipant contractor firms subcontracted with a BPI-certified contractor, the respondent may have included the BPI-certified subcontractor as part of their own staff when responding to the survey. Second, survey respondents may have cited employees with expired BPI certifications or those who are currently pursuing, but have not yet completed the process, as currently certified. Third, if some surveyed nonparticipant contractors have recently hired a BPI-certified employee, or have an employee who recently earned certification, their firm may not be included the BPI list if the list was not up to date at the time the PE/MCA team obtained it in December 2014. Fourth, some nonparticipant contractor respondents may have an employee(s) with a certification(s), was unsure of what organization provided the certification, and mistakenly responded ‘yes’ to the BPI survey question.

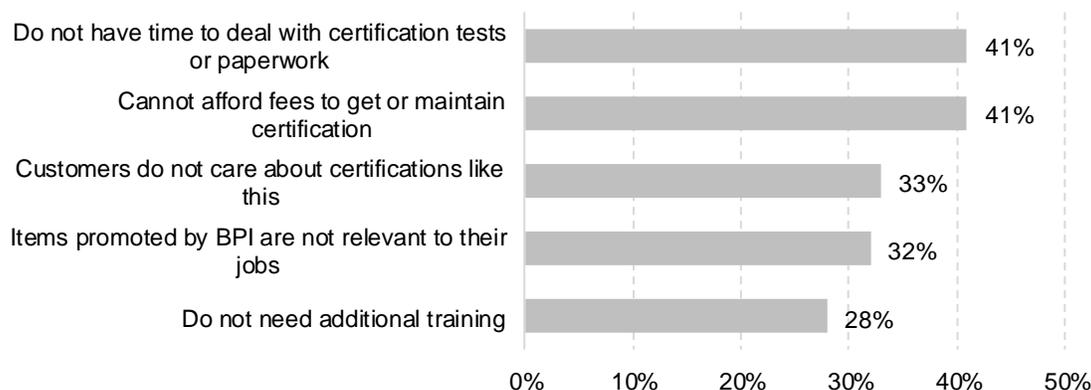
There was very little interest in BPI certification among nonparticipant contractors (11%) with no BPI-certified employee and little interest in pursuing certification. Of these contractors, 41% agreed that they

⁶⁰ The PE/MCA team was unable to determine when the BPI list was last updated or how frequently BPI updates its lists of firms and individuals.

⁶¹ Participating contractors not matched to the BPI list may have staff who was pursuing certification when the PE/MCA team obtained the list, or who received certification before BPI updated its list.

don't have time to deal with certification tests or paperwork, 41% agreed that they can't afford the fees to get or maintain certification, 33% agreed that their customers don't care about certifications, 32% agreed that items promoted by BPI are not relevant to their jobs, and 28% agreed that they don't need additional training (Figure D-4).

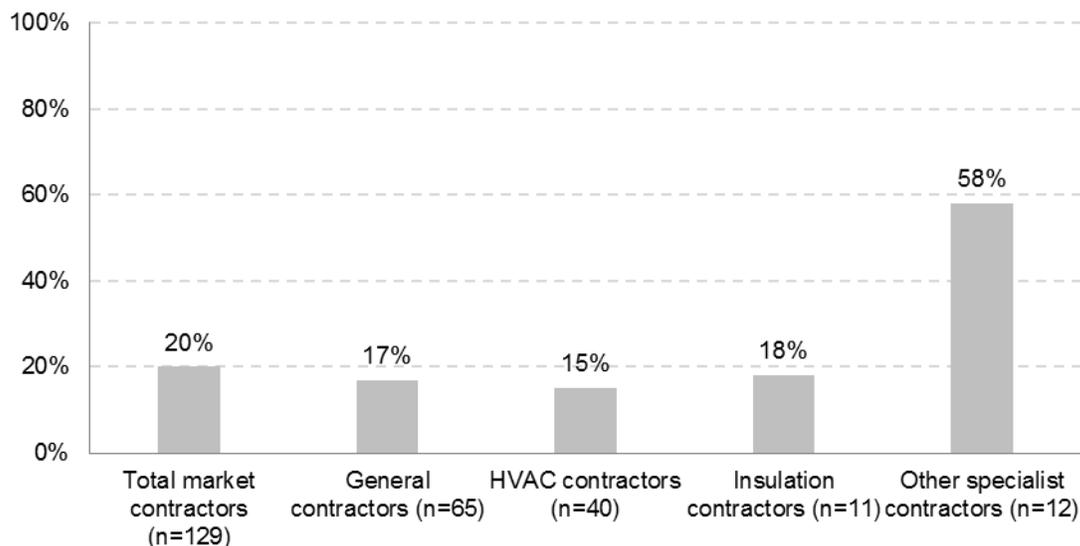
Figure D-4. Percentage of Nonparticipant Contractors Without BPI-certified Employees or Interest in Pursuing BPI-certification Who Agree with Statements about Not Becoming Certified (n=96)



D.5 Home Energy Audits

Substantially fewer nonparticipant contractors (20%, n=26) reported providing an energy audit to their residential customers in the past two years compared to participating contractors (62%, n=32) who reported providing audits outside the program. Extrapolating this finding to the InfoUSA list results in about 2,000 firms in the home improvement market that provide energy audits. In addition, the percentage of nonparticipant contractors who reported providing audits varies by contractor type (Figure D-5). A much higher percentage of the other specialty contractors reported providing energy audits compared to HVAC, insulation, and general contractors.

Figure D-5. Percentage of New York State Nonparticipant Contractors Who Provide Energy Audits, by Contractor Type



Among NYS nonparticipant contractors who reported performing energy audits, the most common audit methods reported are on-site walk-throughs and a full diagnostic audit (Table D-10). All insulation and other specialty contractors reported providing diagnostic audits, compared to two-thirds of general and HVAC contractors. In addition, over half of NYS nonparticipant contractors who reported performing diagnostic audits reported not charging their customers for the energy audit, those who do charge for energy audits reported prices ranging from \$75 to \$2,500. Over one-third of nonparticipant contractors who reported providing energy audits reported that 80% or more of their audits are supported by incentives from a utility, local government, or other entity.

Table D-10. Percentage of New York State Nonparticipant Contractors' Audit Types and Prices (n=26)*

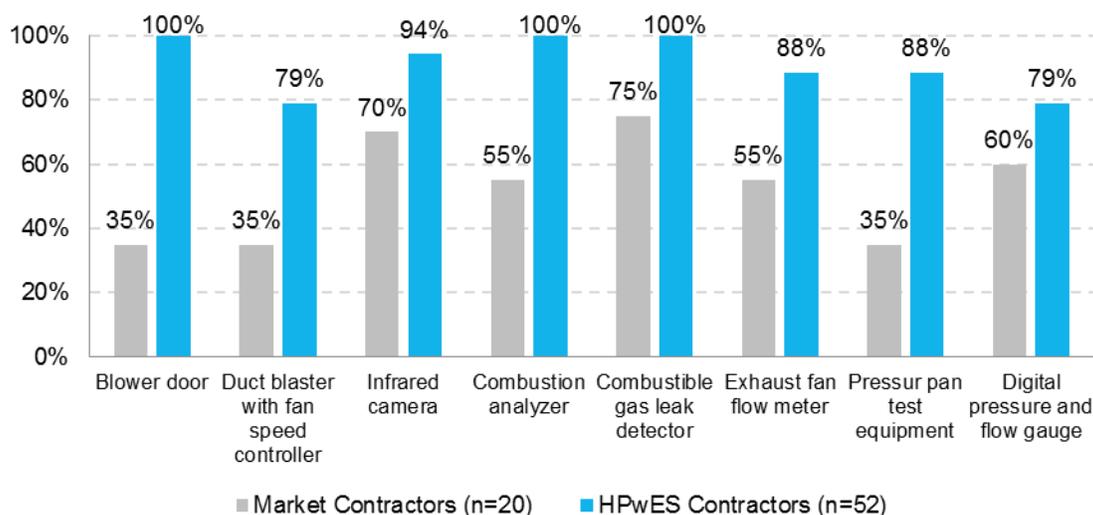
	Nonparticipant contractors
Percent performing on-site walk-through audit	96%
Percent performing full diagnostic audit	77%
Percent performing on-line or telephone audits**	4%
Percent performing audit for free	60%
Percent reporting most audits supported by incentives	37%

* Respondents could select more than one.

** On-line and telephone energy audits are performed through a survey (either via on-line or telephone) in which a resident answers questions about their home's physical and energy characteristics; a home energy auditor analyzes the responses and produces an audit report.

New York State nonparticipant contractors who reported performing diagnostic audits are less equipped to do the energy audits compared to participating contractors (Figure D-6). Further, it is likely they are not performing full diagnostic energy audits, particularly to the extent recommended by HPwES (Table D-11). For example, only 35% of nonparticipant contractors who reported performing diagnostic energy audits reported having blower-door test equipment, which is required to perform full diagnostic audits in most housing types. This indicates that these nonparticipant contractors may be unfamiliar with requirements for a full diagnostic audit.

Figure D-6. Energy Audit Equipment Reported by New York State Nonparticipant and Participating Contractors Who Perform Diagnostic Audits*



* Respondents could select more than one.

Table D-11. Percentage of New York State Nonparticipant Contractors Who Have Test Equipment and Provide Test in Any and All Audits (n=20)

	Have Test Equipment % (n)	Provide Test in Any Applicable Audit % (n)	Provide Test in All Applicable Audits % (n)
Infrared inspection	70% (14)	79% (11)	18% (2)
Combustion efficiency for heating equipment	55% (11)	82% (9)	56% (5)
Blower door test	35% (7)	100% (7)	14% (1)
Duct leakage test	35% (7)	86% (6)	0% (0)
Refrigeration diagnostics for Air Conditioning	Not asked	50% (10)	20% (2)
Combustion Appliance Zone (CAZ) test	Not asked	40% (8)	13% (1)
Radon test	Not asked	10% (2)	50% (1)

Nearly half of NYS nonparticipant contractors who reported performing diagnostic audits also reported using software to model energy savings, which is considerably less than the 100% of participating contractors. Among nonparticipant contractors, fewer general contractors (29%) reported using modeling software compared to HVAC, insulation, and other specialty contractors (50%). The type of modeling software reported by nonparticipant contractors varies greatly among contractors – there was one mention each for *Targeted Retrofit Energy Analysis Tool (TREAT)*, *Wrightsoft*, *Manual J*, *3E*, *O’Brien’s Quickload*, *Auditor*, *Excel*, and *Flyer*, while participating contractors overwhelmingly use *TREAT* (81%) or the software provided by Richard Heath and Associates, Inc. (*RHA*) (15%). Some nonparticipant contractors who reported using modeling software may, however, be confused about what modeling software is adequate for conducting energy audits. For example, *Wrightsoft*, *Manual J*, and *O’Brien’s Quickload* software are for HVAC system design and sizing, *3E* is used for pipe insulation, and *Excel* is a generic spreadsheet application. The team could not find information on *Flyer* or *Auditor*.

NYS nonparticipant contractors also reported longer times to complete the different stages of the diagnostic energy audit compared to participating contractors, particularly for generating the audit report (Figure D-7). In addition, fewer nonparticipant contractors reported *always* providing a copy of the report to their customers compared to participating contractors (Figure D-8). Nearly all of both NYS nonparticipant and participating contractors reported reviewing the report with their customers and doing the review within one month of the audit; over half of both groups also reported that it takes one month or less for the customers to decide to go forward with their project.

Figure D-7. Average Hours Reported to Perform Aspects of the Energy Audit, by Contractor Status

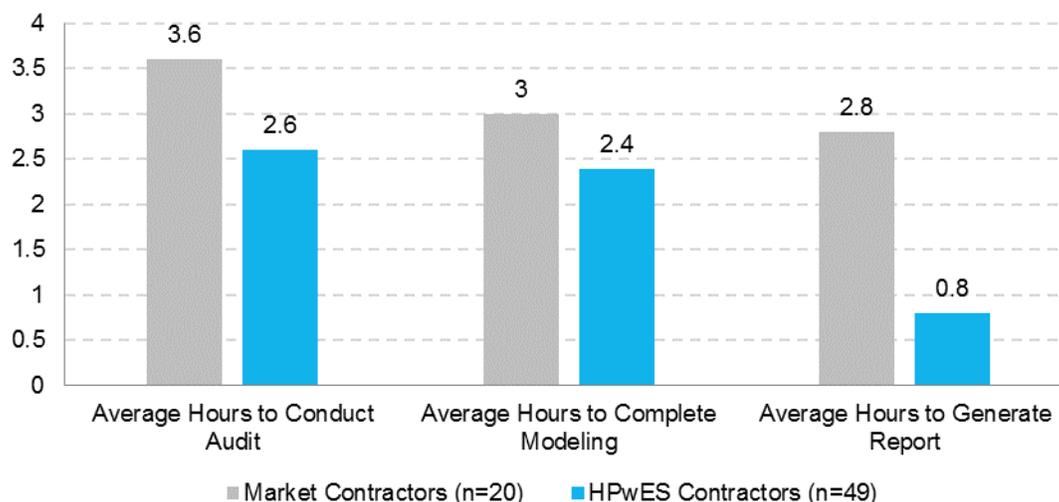
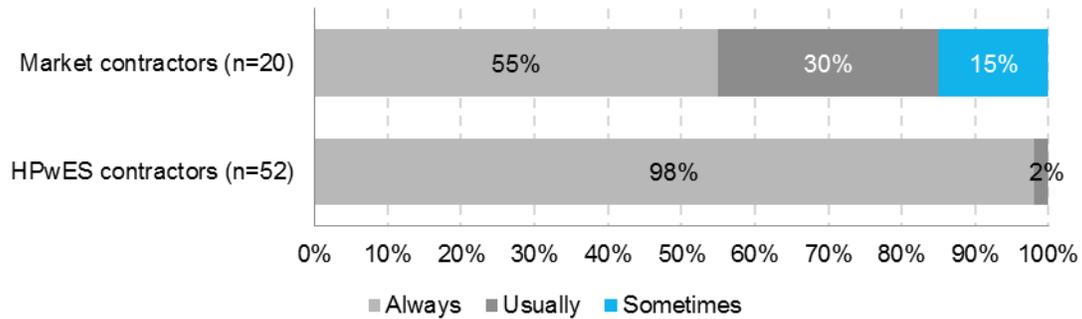
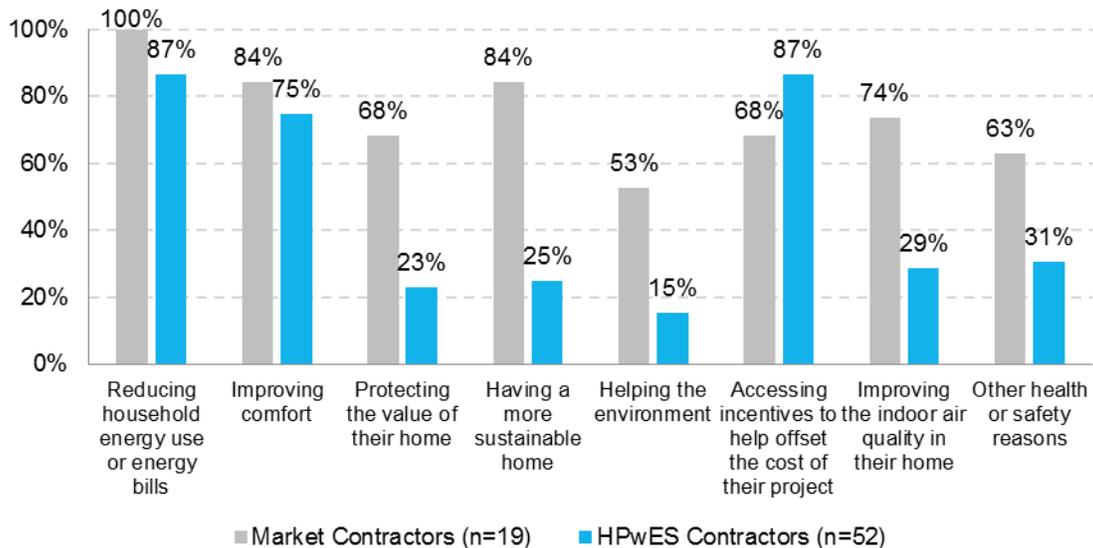


Figure D-8. Frequency that New York State Nonparticipant and Participating Contractors Provide Customers with a Copy of the Energy Audit Report



In addition, about 60% of NYS nonparticipant contractors who reported performing audits reported that their customers show moderate to high interest in hiring ‘green’ or ‘sustainable’ contracting firms, and two-thirds indicated that their low- to moderate-income customers were less interested compared to their higher-income customers. A majority of NYS nonparticipant contractors who reported performing audits also rated as “critically important” several motivations that may influence their customers to purchase energy-efficient equipment (Figure D-9). Their ratings are higher than ratings provided by participating contractors in regards to all but one of the motivations: the importance of incentives.

Figure D-9. Percentage of New York State Nonparticipant and Participating Contractors Who Rated Customer Motivations to Purchase Energy Efficient Equipment as Critically Important



D.6 Financing and Installation

D.6.1 Financing

About half of NYS nonparticipant contractors reported advising their customers on options for paying for their projects and one-fourth reported offering at least one financing option to their customers. This varies by contractor segment (Figure D-10). Among NYS nonparticipant contractors who reported offering financing options, manufacturer financing, in-house financing, distributor financing, and bank financing are the most commonly mentioned, compared to NYSERDA financing for participating contractors (Figure D-11).

Figure D-10. Percentage of New York State Nonparticipant Contractors Who Advise Customers on Payment Options and Provide Financing for Projects, by Contractor Type

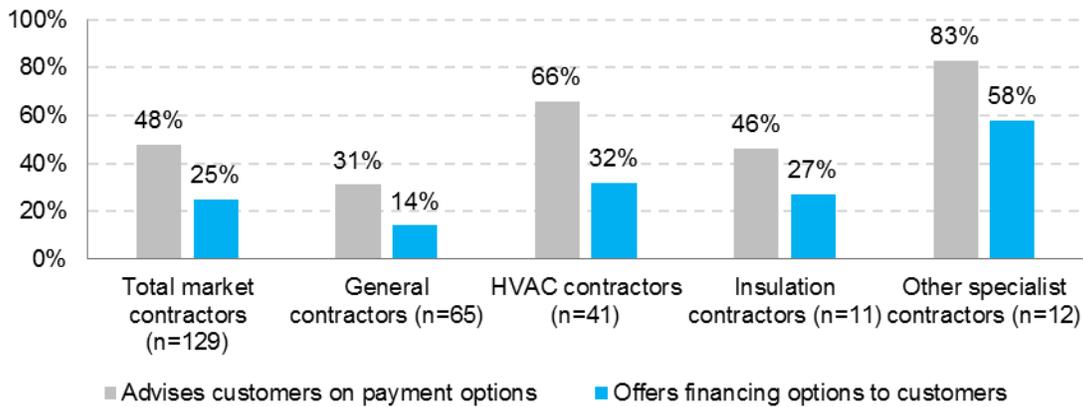
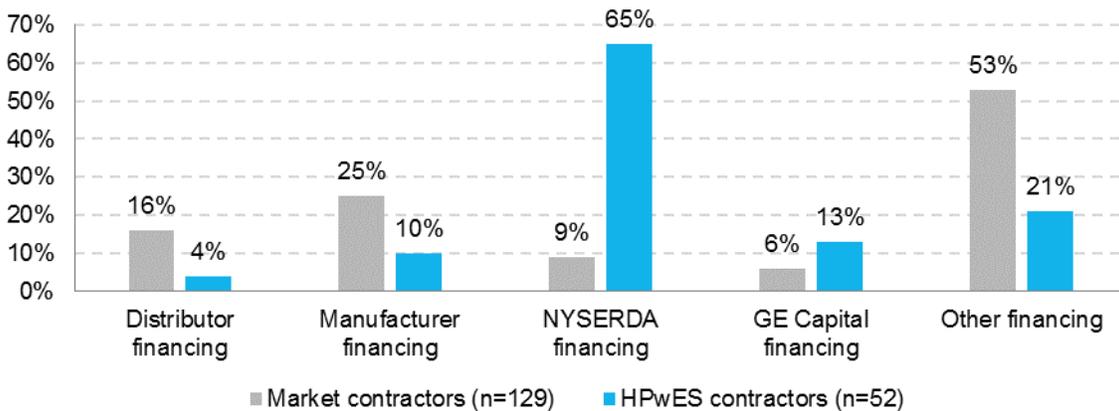


Figure D-11. Percentage of New York State Nonparticipant and Participating Contractors Who Offer Different Financing Options to Customers*, **



* Respondents could select more than one.

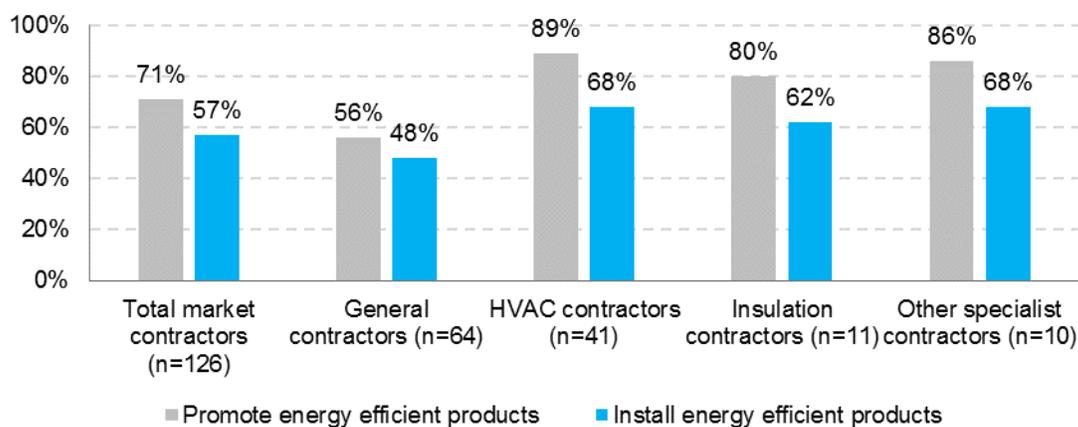
** "Other" financing options nonparticipant contractors provide includes in-house (19%), bank (16%), utility (6%), and other third party (13%).

D.6.2 Installation

D.6.2.1 Promotion and Installation of Energy Efficient Products

On average, NYS nonparticipant contractors reported promoting energy efficient products over standard products in nearly three-fourths of their residential projects, yet reported installing energy-efficient products in just over half. In contrast, participating contractors reported installing energy-efficient products in 79% of their projects, on average, including those they completed in the program.⁶² The percentage of nonparticipant contractors who reported promoting and installing energy-efficient products varies by contractor type (Figure D-12). A higher percentage of specialty contractors reported promoting and installing energy-efficient products compared to general contractors. Among nonparticipant contractors who reported promoting energy-efficient products, half indicated that they are ‘likely’ or ‘very likely’ to increase their promotion of energy-efficient products.

Figure D-12. Average Percentage of Projects in Which New York State Nonparticipant Contractors Promote and Install Energy-Efficient Products, by Contractor Type

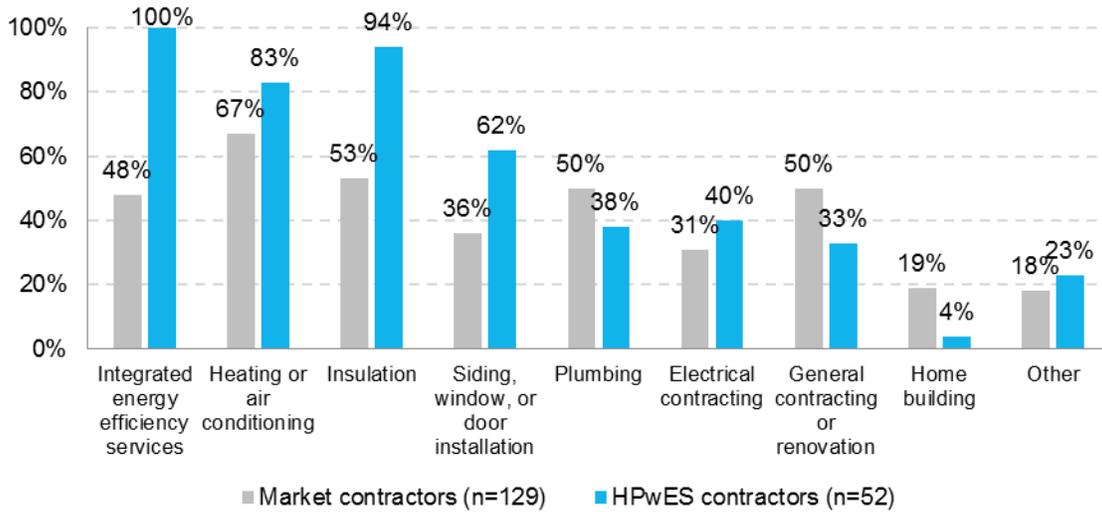


D.6.2.2 Services and Measures

NYS nonparticipant contractors involved in residential projects are quite different from participating contractors in regards to the services they provide. Lower percentages of nonparticipant contractors reported providing the core services of HPwES (energy efficiency, HVAC, insulation, and building shell), while a higher percentage reported providing more general services, like plumbing and general contracting, compared to participating contractors (Figure D-13). About half of nonparticipant contractors reported providing integrated energy efficiency services and insulation services, two-thirds reported providing HVAC services, and about one-third reported providing building shell services.

⁶² Because energy efficiency is inherent to HPwES contractors, this sample was not asked questions related to the promotion of energy efficiency when surveyed.

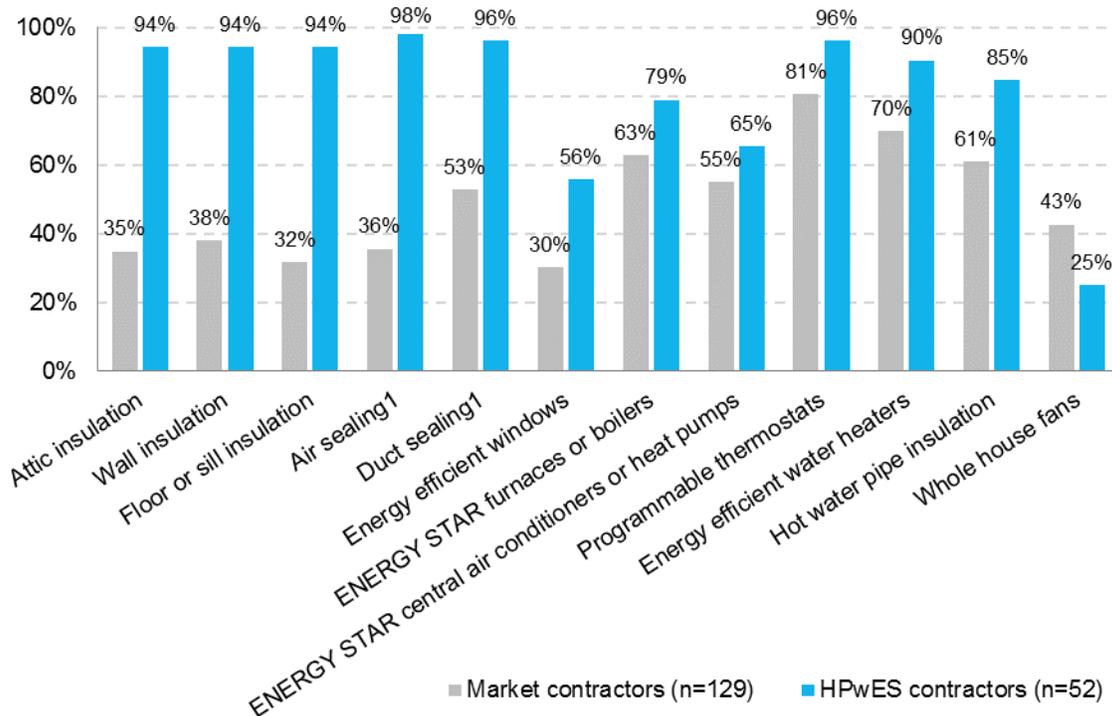
Figure D-13. Percentage of New York State Nonparticipant and Participating Contractors who provide Different Residential Contracting Services, by Service*



* Respondents could select more than one.

Similar differences are found in regards to the different types of equipment or measures that contractors reported installing in residential buildings. Substantially lower percentages of nonparticipant contractors reported installing all of the measures displayed in Figure D-14, except whole-house fans, compared to participating contractors.

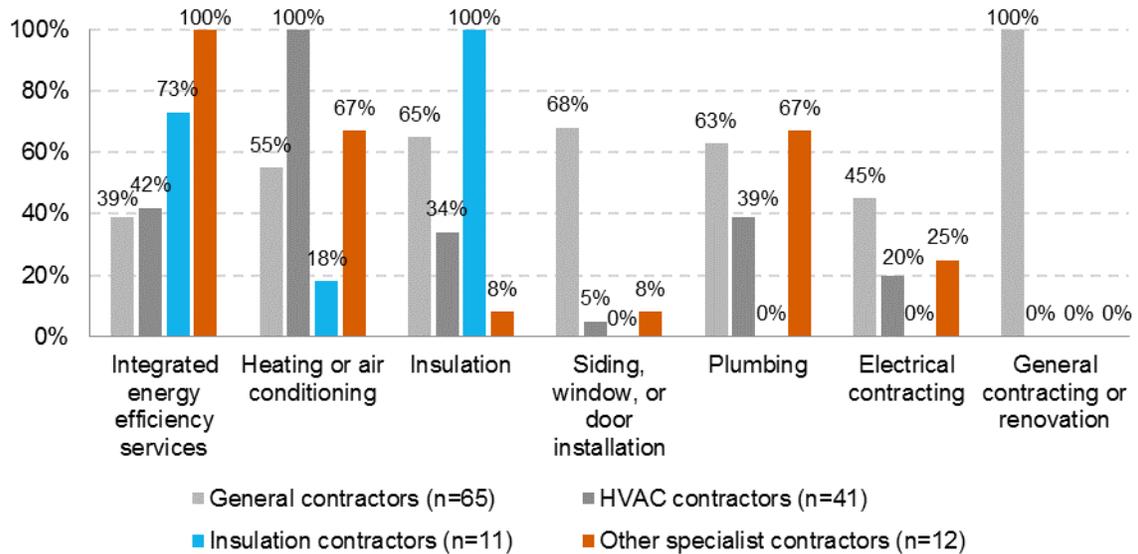
Figure D-14. Percentage of New York State Nonparticipant and Participating Contractors Who Install Different Types of Residential Energy Measures, by Measure



¹ n = 121 for nonparticipant contractors.

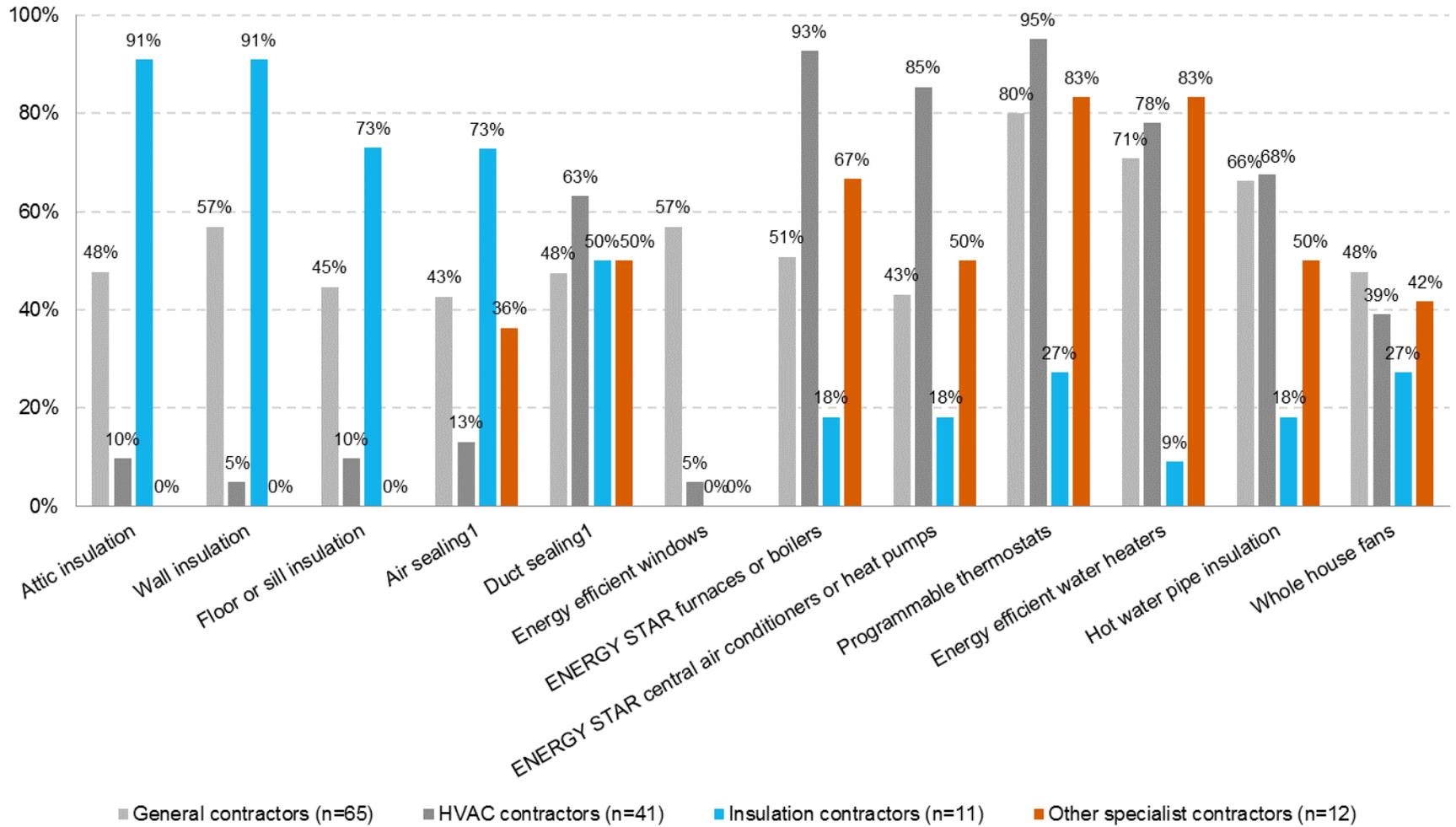
The percentages of nonparticipant contractors who reported providing most of the services in Figure D-13 and installing most of the measures in Figure D-14 vary by contractor segment. All of the contractor segments reported providing their trade’s respective services (i.e. 100% of general contractors provide general contracting services, etc.), but some of the specialty contractors reported providing services outside their respective trade (Figure D-15).

Figure D-15. Percentage of New York State Nonparticipant Contractor Segments Who Provide Different Residential Services, by Service



Similar trends also are found among nonparticipant contractor segments in regards to the different measures they reported installing. A substantial percentage of general contractors reported installing each of the measures in Figure D-16 and high percentages of specialty contractors reported installing measures closely related to their specialty trade.

Figure D-16. Percentage of New York State Nonparticipant Contractor Segments Who Install Different Measures, by Measure

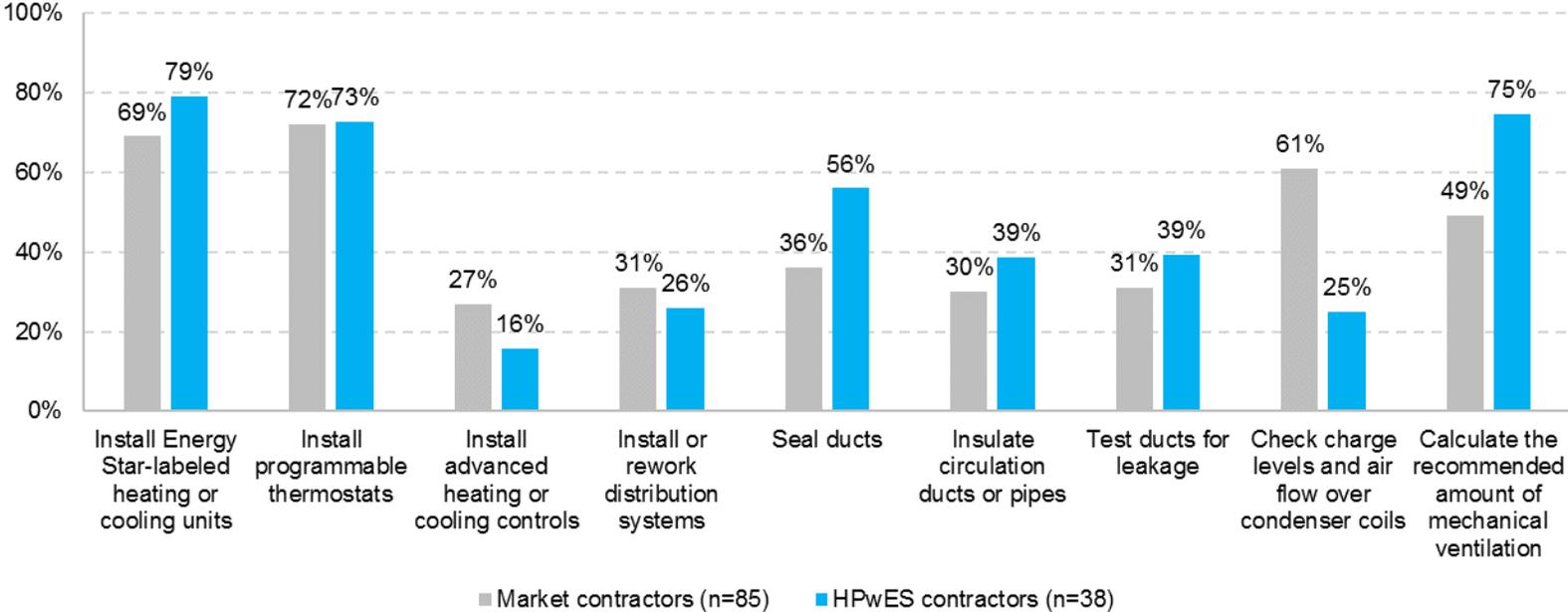


¹ n=61 for general contractors and n=38 for HVAC contractors

D.6.2.3HVAC Installation

NYS nonparticipant and participating contractors who reported providing HVAC services reported the percentage of their projects in a typical year in which they perform various HVAC practices (Figure D-17). Both nonparticipant and participating contractors reported installing ENERGY STAR heating or cooling units and programmable thermostats in the majority of their HVAC projects. Less commonly, they reported installing advanced heating or cooling controls, installing or reworking air distribution systems, testing ducts for leakage, and insulating ducts or pipes. In addition, nonparticipant contractors reported installing advanced controls, and checking charge levels and airflow over condensed coils in a substantially higher percentage of projects than participating contractors. Participating contractors reported installing ENERGY STAR heating or cooling units, sealing ducts, and calculating recommended amount of mechanical ventilation in more projects than nonparticipant contractors.

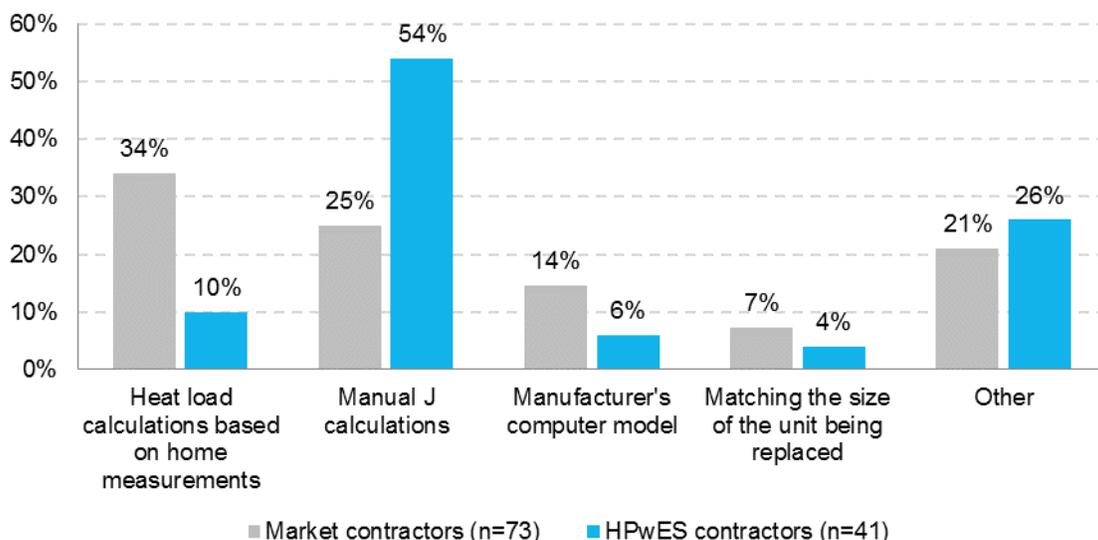
Figure D-17. Percentage of Projects in Which New York State Nonparticipant and Participating Contractors Perform Various HVAC Practices*



* Respondents could select more than one.

Most NYS nonparticipant contractors reported sizing the HVAC equipment using heat load calculations, based on home measurements or using *Manual J calculations*, while most participating contractors reported using *Manual J calculations* (Figure D-18). Those who mentioned “Other” included hiring a subcontractor or using a qualified employee in the firm, doing an audit on the HVAC system, or using ASHRAE standards.

Figure D-18. Percentage of New York State Nonparticipant and Participating Contractors Reporting the Most Typical Method Used to Size HVAC Equipment*



* Respondents could select only one.

D.6.2.4 Subcontracting

More than one-third of NYS nonparticipant contractors reported ever hiring subcontractors for their residential projects and, of those, the average reported percentage of projects in which subcontractors are hired is 34%. This varies substantially by contractor type, in which more general contractors reported hiring subcontractors compared to specialty contractors (Table D-12). However, all NYS nonparticipant contractors who reported hiring subcontractors do so in less than half of their residential projects. In addition, general contractors and other specialty contractors reported hiring more variety of subcontractors compared to HVAC and insulation contractors (Table D-12).

Table D-12. Percentage of New York State Nonparticipant Contractors Who Ever Hire Subcontractors and Percentage of Jobs in Which They Are Hired

	Percent Hiring Subcontractors	Average Percent of Projects in which Subcontractors Are Hired
Total (n=129)	39%	34%
General Contractors (n=64)	63%	36%
HVAC Contractors (n=41)	10%	20%
Insulation Contractors (n=11)	18%	8%
Other Specialty Contractors (n=12)	33%	41%

Table D-13. Percentage of New York State Nonparticipant Contractors Who Hire Different Types of Subcontractors*

Subcontractor Type	General Contractors (n=40)	HVAC Contractors (n=4)	Insulation Contractors (n=2)	Other Specialty Contractors (n=4)
Electrical	55%	75%	0%	50%
HVAC installation	48%	0%	0%	25%
Plumbing	45%	50%	0%	25%
Insulation & air sealing	25%	25%	0%	75%
Duct & sheet metal work	18%	25%	50%	25%
Carpentry	18%	0%	50%	50%
Window or door installation	13%	0%	0%	50%
Controls	10%	0%	0%	25%
Roofing or siding	8%	0%	0%	0%
Masonry	5%	0%	0%	0%

* Respondents could select more than one.

D.6.2.5 Quality Assurance

On average, NYS nonparticipant and participating contractors reported that they have to return to the project site in about 9% of the projects in which they installed energy efficient upgrades to address a customer complaint. Of these, 15% to 20% reported that there are specific types of projects of measures that seem to cause issues, and 100% reported that they typically address the complaint by returning to the project site to make a repair. Most of the specific types of problems reported were related to the HVAC system not working correctly or educating the customer on using or maintaining the equipment.

D.7 Program Awareness

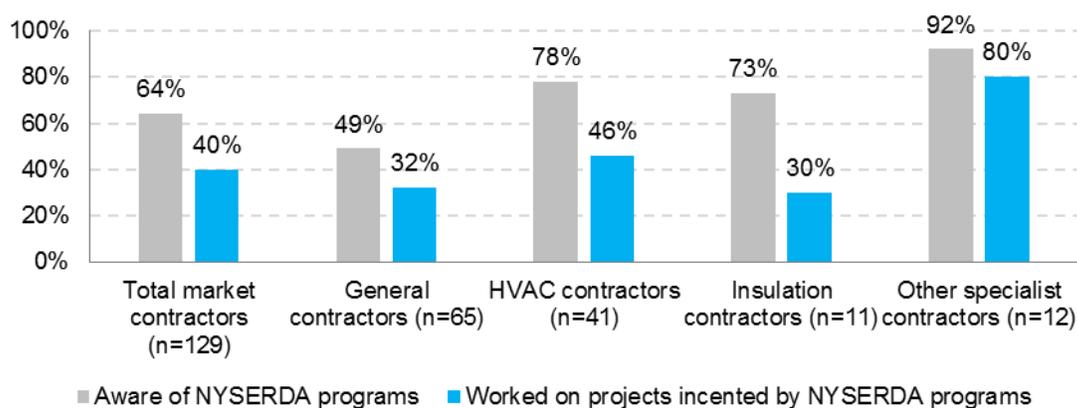
D.7.1 NYSERDA Programs

About two-thirds of surveyed NYS nonparticipant contractors (64%) indicated that they were aware that NYSERDA provides financial incentives to offset the costs of installing energy-efficient equipment and

upgrades, and 40% reported working on residential projects that qualified for incentives through any of NYSERDA’s programs (Figure D-19. Percentage of New York State Nonparticipant Contractors Aware of NYSERDA Programs and Have Been Involved in NYSERDA-Incented Projects, by Contractor Segment

). Substantially more specialty contractors indicated awareness of NYSERDA incentives compared to general contractors. More HVAC and other specialty contractors also reported working on NYSERDA-incented projects compared to insulation and general contractors.

Figure D-19. Percentage of New York State Nonparticipant Contractors Aware of NYSERDA Programs and Have Been Involved in NYSERDA-Incented Projects, by Contractor Segment



Nearly all the NYS nonparticipant contractors with reported awareness of NYSERDA programs also reported awareness of NYSERDA’s HPwES (90%, 58% of sample); the most commonly reported sources of awareness are trade allies, word of mouth, and advertisements (Table D-14). In contrast, in 2004, 18% of combined nonparticipant builders and contractors reported awareness of HPwES. In addition, half of nonparticipant contractors with reported awareness of NYSERDA residential programs indicated at least some interest in pursuing participation in these programs, compared to more than half (59%) of nonparticipant contractors with reported *unawareness* of NYSERDA programs (54% of sample).

Table D-14. Percentage of New York State Nonparticipant Contractors Aware of NYSERDA HPwES, by Source of Awareness (n=129)

Source of Awareness	Percentage*
Any source	64%
Trade ally	22%
Word of mouth	18%
Other ads (email, flyers, TV, bill inserts, trade journal)	18%
Online ad	11%
Previous participation	8%

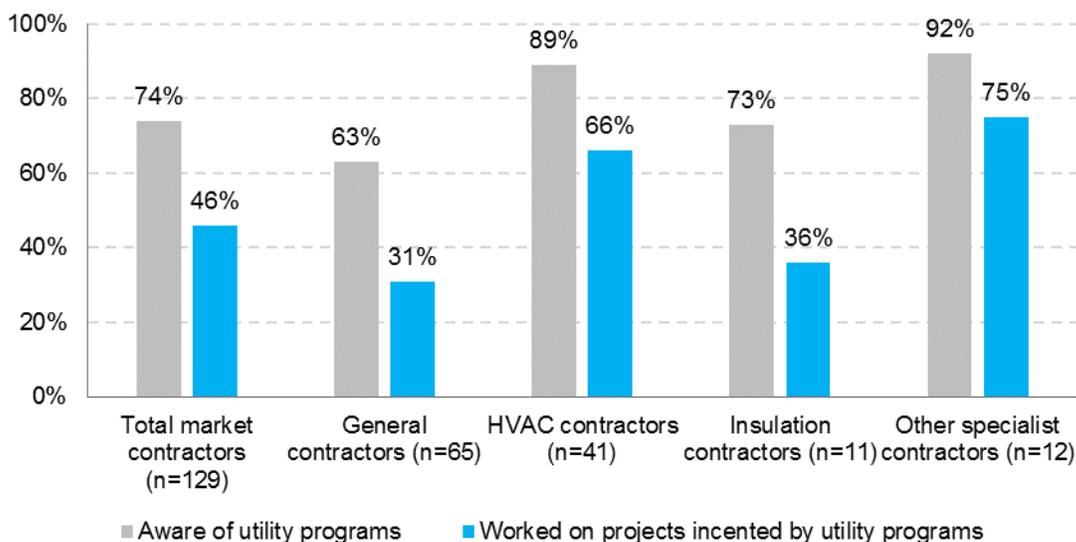
Colleague	7%
Vendor	7%
NYSERDA	5%
Utility	4%
BPI or other training	4%

* Numbers do not sum to 64% since respondents could report more than one source.

D.7.2 Utility Programs

Three-fourths of NYS nonparticipant contractors reported awareness of utility program incentives for energy efficiency upgrades and nearly half (46%) of all nonparticipant contractors reported installing upgrades that received local utility company incentives (63% of contractors who reported awareness, Figure D-20). Substantially more HVAC and other specialty contractors reported awareness of utility programs and working on utility-incented projects compared to general and insulation contractors.

Figure D-20. Percentage of New York State Nonparticipant Contractors Aware of Utility Programs and Have Been Involved in Utility-Incented Projects, by Contractor Segment



Of the NYS nonparticipant contractors who reported working on a utility-incented project, National Grid, Con Edison, and NYS Electric and Gas were the most cited utilities (Table D-15). In addition, half of nonparticipant contractors who reported unawareness of local utility incentives indicated at least some interest in pursuing these incentives for their energy efficiency upgrade projects.

Table D-15. Percentage of New York State Nonparticipant Contractors Who Worked on Residential Project that Received Utility Incentives, by Utility (n=129)

Utility	Percentage*
Any utility	46%
National Grid	39%
Con Edison	18%
NYS Electric & Gas	18%
Rochester Gas & Electric	12%
Public Service Enterprise Group	9%
Central Hudson	9%
National Fuel	7%
Orange & Rockland	7%
Alpha Gas & Electric	4%
Board of Public Utilities	4%
Niagara Mohawk	2%

* Numbers do not sum to 46% since respondents could report more than one utility.

D.8 Survey Instrument

D.8.1 Introduction

Hello, my name is _____. I'm calling on behalf of NYSERDA, the New York State Energy Research and Development Authority, from Abt SRBI. We are conducting research to assess the market for energy efficiency upgrades in residential construction.

Your opinions are very important and your suggestions may help improve services for contractors like you.

S1. Does your firm deliver residential contracting services in New York State? [Yes/No]

If No: thank and terminate.

S2. [If S1= yes] does your firm provide...? [RANDOMIZE, but keep "Other" as the last option; READ, CHECK ALL THAT APPLY]

Expertise	1 = Yes 2 = No 98 = DK 99 = Ref
Heating or air conditioning for homes	
Electrical contracting	
Siding, window or door installation	
Insulation	
Renovation or general contracting	

Nonparticipant Contractor MCA/Survey Results Memorandum

Home building	
Plumbing	
Integrated energy efficiency services (such as energy audits, air sealing, duct sealing, insulation and heating or cooling system improvements for homes)	
Any other contracting services other than those I mentioned? (specify)	

PROGRAMMER IF ALL S2a. –S2.i = NO: Thank and Terminate; IF ANY = YES, CONTINUE,

IF S2e = YES then Respondent = General Contractor (even if they also answer YES for any other items)

IF any combination (one or more) of ONLY S2b, c, f, g, OR i = YES then THANK AND TERMINATE

IF ONLY S2a = YES then Respondent = HVAC (even if they also answer YES on S2b, c, f, g, OR i)

IF ONLY S2d = YES then Respondent = Insulation (even if they also answer YES on S2b, c, f, g, OR i)

IF ONLY S2h = YES then Respondent = Multi-system (even if they also answer YES on S2b, c, f, g, OR i)

IF any combination (two more more) of S2a, d, OR h = YES then GO TO QUESTION S3 (even if they also answer YES on S2b, c, f, g, OR i)

S3. Which of the following would you say is the PRIMARY area in which your company focuses?
[READ-IN only the selected S2a, d, and h responses selected, if two or more of those options are selected]

1. Heating or air conditioning for homes [PROGRAMMERS NOTE: if selected, Respondent = HVAC]
2. Insulation [PROGRAMMERS NOTE: if selected, Respondent = Insulation]
3. Integrated energy efficiency services [PROGRAMMERS NOTE: if selected, Respondent = Multi-system]

I'd like to ask you some more detailed questions about your services. My questions should take approximately 15 minutes depending upon your answers. Is this a convenient time for us to talk? [If not, schedule another time; if so, continue]

Please know that we will keep your responses confidential to the full extent of the law; nothing you say will be identified with you in our reports.

Do you have any questions before we get started?

D.8.2 Respondent Role [ASK ALL]

We have a few questions to help us understand your experience, and give us context for your perspective, so let's start with some information about you.

- Q1. For how many years have you been involved in home repair or home improvement contracting?
__ years Range = 1 to 40 where = 1 or less and 40 = 40 or more 98= Don't know 99 Refused
- Q1. About what percentage of your firm's revenue comes from work in residential buildings (excluding large multifamily)? Range = 1 to 100, 101 = Don't know 102 = Refused __ % [If 0 – thank and terminate. We are interested in speaking with contractors involved in residential contracting, thank you very much for your time today.]
- Q2. Do you expect this percentage to increase, decrease, or stay the same over the next two years?
1. Increase
 2. Stay the same
 3. Decrease
98. Don't know
99. Refused
- Q3. And, what percentage of your firm's revenue comes from residential projects in low- to moderate-income homes, excluding multifamily? %
- Q4. And, about what percentage of your firm's revenue comes from work in new construction? [If 100% - thank and terminate. We are interested in speaking with contractors that work in existing buildings, thank you very much for your time today]. Range = 0 to 100

D.8.3 Program Awareness and Sources of Awareness

- Q5. [ALL] Before today, were you aware that NYSERDA, the New York State Energy Research & Development Authority, provides financial incentives to offset the costs of installing energy efficient equipment and upgrades in residential buildings?
1. Yes
 2. No
98. DK
99. Refused
- Q6. [IF Q5=YES] Before today, had you heard of NYSERDA's Home Performance with Energy Star program for residential buildings?
1. Yes
 2. No
98. Don't know
99. Refused
- Q7. [IF Q6=YES] How did you hear about NYSERDA's Home Performance with Energy Star program? [RECORD VERBATIM]

- Q8. [IF Q5=YES] During the past two years, has your company worked on residential projects that qualified for incentives through *any* of NYSERDA's programs [IF NEEDED: not just Home Performance]?
1. Yes
 2. No
 98. Don't know
 99. Refused
- Q9. [IF Q5=YES] Using a 1-5 scale where "1" means "not at all interested" and "5" means "very interested," please rate how interested your company would be pursuing NYSERDA residential energy efficiency incentives for your customers? 98 = DK 99 = Ref
- Q10. [IF Q5=NO] NYSERDA offers a few programs, like its Home Performance with Energy Star program, which provide financial incentives to offset the costs of installing energy efficiency upgrades in residential buildings with less than five units. Using a 1-5 scale where "1" means "not at all interested" and "5" means "very interested," please rate how interested your company would be in obtaining NYSERDA incentives for your customers?
1. Record rating
 98. Don't know
 99. Refused
- Q11. [ALL] Before today, had you heard of any utility program incentives for energy efficiency upgrades?
1. Yes
 2. No
 98. Don't know
 99. Refused
- Q12. [IF Q11=YES] During the past two years, has your company installed any residential energy efficient equipment or upgrades that received incentives from local utility companies?
1. Yes Q13a. [If yes] From which utilities? (Record)_____
 2. No
 98. Don't know
 99. Refused
- Q13. [IF Q11 OR Q12= NO] Using a 1-5 scale where "1" means "not at all interested" and "5" means "very interested," how interested would your company be in pursuing utility program incentives for installing energy efficient equipment?
1. Record rating
 98. Don't know
 99. Refused
- Q14. In what percentage of your residential projects do you *promote* highly energy efficient products over standard efficiency products to your customers? % Range = 0 to 100, 101 = Don't know 102 =Refused
- Q15A. [IF Q14=0] Using a scale where "1" means "not at all likely" and "5" means "very likely," during the next two years, how likely are you to start promoting the benefits of high energy efficiency products?
1. Record rating

- 98. Don't know
- 99. Refused
- Q15B. [IF Q14 >0 & <100] Using a scale where "1" means "not at all likely" and "5" "means "very likely," during the next two years, how likely are you to increase your promotion of high energy efficiency products?
 - 1. Record rating
 - 98. Don't know
 - 99. Refused
- Q15. In what percentage of your residential projects do you *install* highly energy efficient products? %
Range = 0 to 100, 101 = Don't know 102 = Refused
- Q16. Please rate how interested your customers are in hiring "green" or "sustainable" contracting firms, using a scale where "1" means "not at all interested" and "5" "means "very interested."
 - 1. Record rating
 - 98. Don't know
 - 99. Refused
- Q17. [IF Q3>0 AND <100] Are your low- to moderate-income customers more, equally, or less interested in hiring "green" or "sustainable" contracting firms compared to your higher-income customers?
 - 1. More
 - 2. Equally
 - 3. Less
 - 98. Don't know
 - 99. Refused

D.8.4 Audits and assessments [ASK ALL]

- Q18. In the past two years, have you provided energy audits to your residential customers?
 - 1. Yes
 - 2. No
 - 98. Don't know
 - 99. Refused
- Q19. [IF Q18= Yes] Do you offer? [Read all, in order; no rotating or randomizing]

a. On-line or Phone audits	1. Yes 2. No	98. DK99 Ref
b. On-site walk-throughs	1. Yes 2. No	98. DK99 Ref
c. Audits using on-site diagnostic tools?	1. Yes 2. No	98. DK99 Ref

[IF Q19c=NO or DK, SKIP TO Q32]
- Q20. [IF Q19c=YES] Does your organization have a...?

a. Blower door	1. Yes 2. No	98. DK99 Ref
b. Duct blaster fan with fan speed controller	1. Yes 2. No	98. DK99 Ref
c. Infrared camera	1. Yes 2. No	98. DK 99 Ref

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- d. Combustion analyzer 1. Yes 2. No 98. DK99 Ref
- e. Combustible gas leak detector 1. Yes 2. No 98. DK99 Ref
- f. Exhaust fan flow meter 1. Yes 2. No 98. DK99 Ref
- g. Pressure pan test equipment 1. Yes 2. No 98. DK99 Ref
(for duct leakage diagnostics)
- h. Digital pressure and flow gauge (simultaneous display of both duct pressure and Duct Blaster® fan flow readings) 1. Yes 2. No 98. DK 99 Ref

Q21. [IF Q19c=YES] On your residential jobs do you provide? [RANDOMIZE]

Service:	1=Yes/2=No/98=DK/99=Ref	If yes to each: On what percentage of jobs do you offer this service? [Record percent or percentage range]
a. [IF Q21c=YES] Infrared inspection of insulation		22aa.
b. [IF Q21a=YES] Blower door test for infiltration		22bb
c. [IF Q21b=YES] Duct leakage testing		22cc
d. [IF Q21d=YES] Combustion efficiency for heating equipment		22dd
e. [Ask ALL] Refrigeration diagnostics for air conditioning equipment (for homes with air conditioning)		22ee.
Health and Safety items:		
f. [Ask ALL] Radon testing		22ff.
g. [Ask ALL] Combustion Appliance Zone (CAZ) test		22gg.

Q22. [IF Q19c=YES] When you do diagnostic audits, do you use software to model energy savings estimates?

- 1. Yes
- 2. No
- 98. DK
- 99. Refused

Q23A. [IF Q23Q22=YES] What software (brand or platform) do you use for modeling energy savings estimates? Record:

Q23. [IF Q19c=YES] We're interested in learning about how long it takes to complete the various stages of a diagnostic assessment.

- A. About how many hours does it take to conduct the audit? [.25 to 180.] 1 = 1 or less 998 = Dk 999 = Ref
- B. And how many hours does it take complete the modeling associated with these assessments, if results are modeled? [.25 - 180] 1 = 1 or less 998 = Dk 999=Ref
- C. And how many hours does it typically take to generate an audit report? [.25 - 180] 1 = 1 or less 998 = DK 999 = Ref

Q24. [IF Q19c=YES] How often do you provide a copy of the assessment results to the homeowner? Would you say...

- 1. Always
- 2. Usually

- 3. Sometimes
- 4. Rarely
- 5. Never
- 98. DK
- 99. Refused

- Q25. [IF Q19c=YES and Q24 ≠ 5 “NEVER”] Do you review the document with them?
- 1. Yes
 - 2. No
 - 98. DK
 - 99. Refused
- Q26. [IF Q19c=YES AND Q24 ≠ 5 “NEVER”] Do you follow-up with the customer at a later date after the assessment has been provided?
- 1. Yes
 - 2. No
 - 98. DK
 - 99. Refused
- Q27. [IF Q19c AND Q26=YES] Typically, how long after you provide the assessment do you follow-up with your audit customers?
- a. RECORD Range of time (DAYS: 1-365) 998 = Dk 999=999
- Q28. [IF Q19c=YES] How long does it take, on average, for customers to go forward with a project after you do the audit? Range of time (WEEKS: .5-104) 1 = 1 or less 998 = Dk 999=Ref
- Q29. [IF Q19c=YES] And how much do you typically charge for diagnostic audits? \$ [RANGE: \$0 - \$2500] 9998=DK 9999 = Ref
- Q30. [IF Q19c=YES] What percentage of your audits are supported by incentives from a utility, local government, or other entity? % Range 0 to 100, 101 = DK, 102 = Ref
- Q31. I’m going to list several factors that might motivate your customers to purchase energy efficient equipment for their home. Thinking about your typical customer, please rate how important each is using a 1-5 scale where “1” means “not at all important” and “5” means “critically important.” How do you rate the importance of: 98 = Don’t know 99 = Refused [RANDOMIZE]
- a. Reducing household energy use or energy bills
 - b. Improving comfort
 - c. Protecting the value of their home
 - d. Having a more sustainable home
 - e. Helping the environment
 - f. Accessing incentives to help offset the cost of their project
 - g. Improving the indoor air quality in their home
 - h. Other health or safety reasons

D.8.5 Financing [ALL]

- Q32. Do you advise your customers on options for paying for their projects (such as tax credits, efficiency loans, or other potential sources of funds)?
- 1. Yes
 - 2. No
 - 98. DK
 - 99. Refused
- Q33. Do you offer financing to your customers, such as distributor, manufacturer, or NYSERDA financing?
- 1. Yes
 - 2. No
 - 98. DK
 - 99. Refused
- Q34. [IF Q33 = YES] What type of financing do you offer? [DO NOT READ; MULTIPLE RESPONSES PERMITTED]
- 1. Distributor financing
 - 2. Manufacturer financing
 - 3. Other financing (specify): [OPEN-ENDED RESPONSE]
 - 98. Don't know
 - 99. Refused

D.8.6 Construction and Installation [ALL]

[ASK ALL]

- Q35. Does your organization install?
- | | | | |
|--|--------|-------|--------------|
| a. [Display insulation items if S1d=YES] | | | |
| a. Attic insulation? | 1. Yes | 2. No | 98. DK99.Ref |
| b. Wall insulation? | 1. Yes | 2. No | 98. DK99.Ref |
| c. Floor or sill insulation? | 1. Yes | 2. No | 98. DK99.Ref |
| b. Air sealing | 1. Yes | 2. No | 98. DK99.Ref |
| c. Duct sealing | 1. Yes | 2. No | 98. DK99.Ref |
| d. [Display if S1c=YES] Energy efficient windows | 1. Yes | 2. No | 98. DK99.Ref |
| e. [Display if S1a=YES] ENERGY STAR furnaces or boilers | 1. Yes | 2. No | 98. DK99.Ref |
| f. [Display if S1a=YES] ENERGY STAR central air conditioners or heat pumps | 1. Yes | 2. No | 98. DK99.Ref |
| g. Programmable thermostats | 1. Yes | 2. No | 98. DK99.Ref |
| h. Energy efficient water heaters | 1. Yes | 2. No | 98. DK99.Ref |
| i. Hot water pipe insulation | 1. Yes | 2. No | 98. DK99.Ref |
| j. Whole house ventilation fans | 1. Yes | 2. No | 98. DK99.Ref |
- Q36. [ASK IF Q35e “ENERGY STAR furnace or boiler” OR Q35f “ENERGY STAR central air conditioner or heat pump.” = YES] How do you usually size HVAC equipment? [*Interviewer instructions – do not read, probe to code*]
- 1. Matching the size of the unit being replaced
 - 2. Heat load calculations based on home measurements
 - 3. Manual J calculations
 - 4. Manufacturer’s computer model
 - 5. Other [Specify:]
 - 98. Don't know

99. Refused

Q37. Thinking about all of your residential HVAC projects over a typical year, in what percent of residential HVAC installation projects in existing homes do you typically? Range = 0 to 100, 101 = Don't know 102 = Refused

- a. Install Energy Star-labeled heating or cooling units %
- b. Install programmable thermostats %
- c. Install advanced heating or cooling controls such as: zone controls, NEST or similar "smart" thermostats, or thermostats that can be controlled remotely through cell phones or computers %
- d. Install or rework distribution systems such as ducts or heat pipes %
- e. Seal ducts %
- f. Insulate circulation ducts or pipes %
- g. Test ducts for leakage %
- h. Check charge levels and air flow over condenser coils %
- i. Calculate the recommended amount of mechanical ventilation %

Q38. Do you ever hire subcontractors for your residential contracting projects?

1. Yes

2. No

98. DK

99. Refused

Q38A. [IF Q38=YES] For what percentage of your residential contracting projects do you hire sub-contractors? Range = 1 to 100, 101 = Don't know 102 = Refused

Q38B. [IF Q38=YES] What type of subcontractors do you typically use?
[MULTIPLE RESPONSE – DO NOT READ, PROBE TO CODE]

1. Insulation and air sealing
2. Controls
3. Electrical [including lighting]
4. Plumbing
5. HVAC installation
6. Duct and sheet metal work
7. Carpentry
8. Window or door installation

[Do not read:]

96. Other, please specify: [OPEN-ENDED RESPONSE]

97. Not applicable

98. Don't know

99. Refused

D.8.7 Quality Assurance

Next, we have a couple of questions about how you provide quality assurance to your residential customers.

Q39. In what percentage of your residential projects in which you installed energy efficiency upgrades do you have to return to the home to address a customer complaint? % Range 0 to 100, 101 = Don't know 102 = Refused

Q40. Are there specific types of projects or measures that seem to cause issues?

- 1. Yes
- 2. No
- 98. Don't know
- 99. Ref

Q41. [IF Q40=YES] How have you been addressing these issues?

D.8.8 Training [ALL]

We also have a few questions about the training available for you or your employees.

Q42. Has anyone in your firm, including yourself, taken or is currently taking training on energy efficiency improvements for existing homes?

- 1. Yes
- 2. No
- 98. Don't know
- 99. Refused

Q43A. [IF Q42=YES] What organizations sponsored the training? *[Interviewer instructions – do not read, probe to code]* [MULTIPLE RESPONSES PERMITTED]

- 1. The Building Performance Institute
- 2. Local college or junior college
- 3. Utility
- 4. State or local government
- 5. Equipment or materials manufacturer
- 6. Other (specify):

- 98. Don't know
- 99. Refused

Q43. [IF Q42=YES] Are there gaps in training opportunities that you'd like to see addressed?

- 1. Yes
- 2. No
- 98. Don't know
- 99. Refused

Q44A. [If Q44=YES] What gaps do you see?

Q44. [ASK ALL] What about certifications? Including yourself, how many of your staff are currently certified by ... [RANGE: 0 – 250] 998 = DK 999 = Ref

- a. BPI [Building Performance Institute] [Enter Number, or DK]
- b. NATE [North American Technician Excellence] [Enter Number, or DK]
- c. RESNET [Residential Energy Services Network] [Enter Number, or DK]

- d. ASHRAE [American Society of Heating, Refrigerating, and Air Conditioning Engineers] [Enter number, or DK]
 - e. ACCA [Air Conditioning Contractors of America] [Enter number, or DK]
 - f. NORA [National Oil heat Research Alliance] [Enter number, or DK]
 - g. Other(s) certifications [please specify]: [Enter number, or DK]
- Q45. [IF Q42A.1=YES] How many staff do you have that are pursuing new BPI certification? [RANGE 0 – 250] 998=DK, 999=Ref
- Q46. [IF Q44a > 0 AND ≠ DK OR REF OR Q46>0 AND ≠ DK OR REF] Is your firm affiliated with the Building Performance Institute [IF NEEDED: Individuals can become *certified* while entire firms can become *accredited*]?
- 1. Yes
 - 2. No
 - 98. DK
 - 99. Ref
- Q47A. [IF Q47=NO] Has your firm ever been affiliated with BPI? 1=Yes, 2=No, 98=DK, 99=Ref
- Q47B. [If Q47A=YES] Why did you stop renewing your affiliation? [RECORD REPOSE]
- Q47C. [IF Q45a=0 OR Q47A=NO] The Building Performance Institute, or BPI, is a national institution that develops standards for energy efficiency work and provides professional certifications on advanced building science topics like building analytics, envelope and shell, HVAC, and energy auditing. On a scale of 1 to 5, where 1=not at all likely, and 5=very likely, how likely is it that your firm will pursue BPI affiliation in the future? 6 = It depends 98 = Don't know 99 = Refused [RECORD RATING]
- Q47D. [IF Q47C = 6] What does it depend on? [PROBES: Cost, availability, location, requirements, etc.] [RECORD ANSWER]
- Q47. [IF Q45a = 0 OR Q47C<3] I'm going to list several reasons firms choose not to obtain advanced building science certifications from or to not become affiliated with organizations like BPI. Please tell me how much you agree with each statement, using that same 1 to 5 scale, where 1 = do not at all agree and 5 = strongly agree. [Record agreement 1-5, 8 = DK, 9 = RF] [RANDOMIZE ORDER]
- a. I don't have time to deal with certification tests or paperwork.
 - b. My customers do not care about certifications like this.
 - c. I can't afford the fees to obtain or maintain certifications like this.
 - d. I don't need additional training.
 - e. The items promoted by BPI are not relevant to my jobs.

D.8.9 Contractor view of BPI [ASK ONLY IF Q44a >0, HAVE BPI CERTIFIED EMPLOYEE(S)]

- Q48. Have your customers typically heard of BPI?

- 1. Yes
 - 2. No
 - 98. Don't know
 - 99. Refused
- Q49. Do you explain your affiliation with BPI to customers?
- 1. Yes
 - 2. No
 - 98. Don't know
 - 99. Refused
- Q50. In terms of helping differentiate you from competitors, how valuable is BPI affiliation to your firm? Please give your response on a 1 to 5 scale, where 1 is “not at all valuable” and 5 is “very valuable.” 98 = Don't know 99 = Refused

D.8.10 Firmographics – MCA / ME [ASK ALL]

Finally, I have some questions about your company, staffing levels, and the home performance market in New York.

- Q51. On a scale of 1-5, where 1 is “very unfavorable” and 5 is “very favorable,” how would you describe the current overall outlook for your business? 98 = Don't know 99 = Refused
- Q52. Including your location, how many separate locations does your company have in the state of New York? [RANGE: 1 – 100] 100 = 100 or more 998 = Dk 999 = REf
- Q53. Including yourself, how many employees work at your location? [RANGE: 1 – 1000] 1000= 1000 or more 9998 = Dk 9999=Ref
- Q54. When hiring staff, does your company prefer candidates with BPI certification(s)? 1 Yes 2 No 98 Don't know 99 Refused
- Q55. [IF Q44a>0] Do your BPI certified employees earn a higher wage than employees with similar responsibilities who have not been certified?
- 1. Yes
 - 2. No
- [Do not read:]
- 98. Don't know
 - 99. Refused
- Q56. Please rate how interested your company is in expanding the types of residential contracting services offered within the next two years? “1” means “not at all interested” and “5 means “very interested.” 98 Don't know 99 Refused
- Q57A. [IF Q56 = 4 or 5] What types of services would you like to offer? _____
- Q57. Thank you very much for your time, before I let you go, do you have any final thoughts on how energy efficiency might affect your industry over the next few years?

Those are all my questions—thank you so much for your time today.

Appendix E Nonparticipant Household MCA Memorandum

E.1 Summary

Using multiple sources of publicly available data, the evaluation team characterized the typical NYS single-family home and estimated the volume of owner-occupied home improvement projects, with a focus on understanding the rate of upgrades in several measures of interest to HPwES. In 2013, almost one-fourth (24%) of owner-occupied households in the Northeast reported doing at least one home improvement project for which they hired a professional (AHS 2013). Extrapolated to the NYS population, this represents more than 900,000 households with professionally installed home improvement projects in 2013. Using these data, the evaluation team estimates about \$10.9 billion was spent on professional home improvement projects in NYS in 2013, of which approximately \$2 billion likely went to energy-related upgrades.

Among the likely energy-related upgrades reported by owner-occupied households in 2013, appliances and major equipment replacements (including water heaters) were the most common (6.6%), followed by heating, ventilation and air conditioning (HVAC) replacements (4.3%), window or door replacements (3.8%), and insulation upgrades (1.7%). Owner-occupied households reported spending the most on HVAC projects (about \$866 million), followed by window or door replacements (about \$514 million), appliance and major equipment replacements (about \$214 million), and insulation upgrades (about \$106 million).

In addition, about 7% of Northeast owner-occupied households reported completing an energy-related home improvement project, and about 12% of single-family households in NYS reported participating in an energy efficiency program. The most common upgrades made through energy efficiency programs include insulation and weatherization (4.2%), heating equipment (2.6%), lighting (2.5%), refrigerator or freezer (2.3%), cooling equipment (1.7%), water heating equipment (1.3%), and appliances and clothes washers (0.9% and 0.6% respectively).

Trends in home improvement projects in the Northeast region over the past ten years show a slight overall increase in the percentage of homes undertaking projects that include measures of interest to HPwES. This trend appears different compared to the decline and rebound during the same period for total home improvement activity. Compared to national trends in home improvement, spending on the measures of interest to HPwES have been less volatile over the past 10 years.

Plenty of opportunities remain to upgrade and improve the NYS housing stock:

- One in five NYS single-family households consumes 12,000 kWh or more annually.

- About one in ten NYS occupied households reported being uncomfortably cold for 24 or more hours; common reasons included equipment breakdowns, cost of heating, inadequate insulation, and inadequate heating capacity.
- About half of NYS single-family homes reported their main heating equipment is 10 years old or older, and more than one-third reported not performing routine maintenance on their main heating unit.
- While air conditioning (AC) equipment was generally newer than heating equipment, more than one-third of central AC units in NYS single-family homes are 10 years old or older, and nearly half (45%) are below current energy codes. Nearly half (44%) of NYS single-family households also reported not performing routine maintenance on their central AC unit.
- More than one-third (40%) of the water heaters in NYS single-family homes are 10 years old or older, and 77% of water heaters in NYS occupied homes are not insulated with a water heater blanket.
- Nearly one in five NYS occupied homes reported their home is poorly insulated or has no insulation, and one in five NYS single-family homes have no or poorly installed door weatherstripping. Nearly half of NYS single-family homes also do not have foundation insulation.

E.2 Methods and Data Sources

The PE/MCA team collected and analyzed information about the existing housing stock in NYS from the 2013-14 NYSEDA Residential Statewide Baseline Study (RSBS 2015), 2013 American Community Survey (ACS 2013) five year estimates, Harvard University's Joint Center for Housing Studies (JCHS 2015), 2012-13 American Housing Survey (AHS 2013), 2009 Residential Energy Consumption Survey (RECS 2009), and NYSEDA's Comprehensive Residential Information System (CRIS) database (Appendix C). The housing-type criterion for participation in HPwES is single-family, one- to four-unit homes (referred to as the "target population"), but each of the data sources contains a different level of detail on variables of interest to the HPwES PE/MCA study since data for the specific population of interest is limited. For this reason, the tables in this section pull from the most relevant and recent data (Table E-1), and the level of analysis and detail varies in the tables below.

- The 2013-14 NYSEDA RSBS Single-Family Volume contains the most up-to-date data for the target population (i.e., single-family one-to-four unit homes) in NYS. The RSBS reports statistics for household and housing characteristics, energy fuels and usage, energy-related characteristics such as materials and equipment in the household, and awareness of and participation in energy efficiency programs. It also reports some statistics for all target population households, some for existing households built before 2012, and some for new construction households, built after 2011.

The PE/MCA report includes estimates from this source for all applicable characteristics for which data are available, and the following analyses indicate whether these estimates are for all target population households or for existing target population households built before 2012.

- The 2013 ACS contains recently collected demographic, economic, and housing data for all occupied and owner-occupied homes (including multi- and single-family units) in NYS. The PE/MCA team provides estimates of both occupied and owner-occupied households for reported characteristics that are unavailable for the target population since there is a very high likelihood that the estimate for the target population falls between the estimates for occupied and owner-occupied units. In addition, the ACS contains very little data on energy-related or home-improvement characteristics.
- The 2013 JCHS data provides information for the national and northeast regional Remodeling Market Index and trends in home improvement activity expenditures over time. As noted below, the JCHS also provides additional data from the 2012-13 AHS that the PE/MCA team used, where noted below, to calculate percentages that were unavailable from other sources.
- The 2012-13 AHS contains recent data on housing and home improvement characteristics for all owner-occupied housing units (including multi- and single-family units) in the Northeast region, which includes the states of Pennsylvania, New Jersey, New York, Connecticut, Rhode Island, Massachusetts, Vermont, New Hampshire, and Maine.
- The 2009 RECS has somewhat older data on housing and energy-related characteristics, such as equipment and materials, for occupied households (includes owned and rented multi- and single-family units) in NYS.

Table E-1. Data Source Characteristics

Data source	Level of Analysis	Unit of Analysis	Topics
2013-14 NYSEDA RSBS	NYS	Target population: one to four single-family housing units	Household and housing characteristics, fuels and energy usage, energy-related characteristics like equipment and materials in households, energy efficiency program awareness and participation
2013 ACS (Five-year estimates)	NYS	Occupied and owner-occupied multi- and single-family housing units	Housing counts, household and housing characteristics
2013 JCHS	Northeast (PA, NJ, NY, CT, RI, MA, VT, NH, MN)	Owner-occupied multi- and single-family housing units	Remodeling market index, trends in homeowner improvement activity expenditures, and random subsample of 2012-13 AHS data
2012-13 AHS	Northeast (PA, NJ, NY, CT, RI, MA, VT, NH, MN)	Owner-occupied multi- and single-family housing units	Household and housing characteristics, fuels and usage, housing deficiencies, and past and present home improvement activities
2009 RECS	NYS	Occupied multi- and single-family housing units	Household and housing characteristics, fuels and usage, household energy-related characteristics, equipment and materials in household

E.3 New York State Housing and Demographic Characteristics⁶³

According to the 2013 ACS five-year estimates, NYS has about 5.3 million one- to four-unit (single-family) housing units. Of these, about two-thirds are one-unit detached (65%), eight percent are one-unit attached, 16% are two units, and 11% are three or four units. In addition, about two-thirds of the one- to four-unit housing stock are owner-occupied (65%), about one fourth are renter-occupied (24%), and 11% are vacant.

⁶³ Data in this section come primarily from the 2013-14 RSBS and the 2013 ACS NYS five-year estimates for all occupied and owner-occupied households.

Table E-2. Number and Percentage of One to Four Unit Housing Stock in NYS, by Housing and Occupancy Type (ACS 2013; RSBS 2015)

Housing Type	Count	Percent of Total One to Four Unit*
Total one- to four-unit**	5,275,483	100%
Housing Type**		
One unit, detached	3,410,021	65% (72%)
One unit, attached	401,652	8%
Two units	861,737	16%
Three or four units	602,073	11%
Occupancy Type		
Owner-occupied one- to four-unit	3,406,619	65% (81%)
Renter-occupied one- to four-unit	1,293,981	24%
Vacant one- to four-unit	574,883	11%

* Results from 2013-14 RSBS 1-4 unit housing built before 2012 in parentheses.

** Includes occupied and vacant units.

The largest percentage of householders in NYS are between the ages of 35 and 54 (40-41%), followed by householders aged 65 or older (23-28%), 55 to 64 (23-28%), and under 35 (18-8%) (Table E-3; ACS 2013). The largest percentage of householders also has a Bachelor's degree or higher (36-40%), followed by householders with high school diploma or less (38-33%) and those with some college or an Associate's degree (26-27%) (ACS 2013).

Slightly more than one-third of the NYS target population reported an annual household income equal to or less than \$50,000 (35%); another third reported household incomes between \$50,000 and \$100,000 (35%); and less than one-third reported an annual household income of \$100,000 or more (30%) (Table E-3; ACS 2013). The median household income of the target population likely falls between \$58,000 (all occupied households) and \$80,000 (owner-occupied households) per year. In addition, between 34% and 44% of the target population spends 30% or more of their annual income on housing costs (ACS 2013).

Table E-3. Demographic Characteristics of NYS Households (ACS 2013; RSBS 2015)

Demographic Characteristic	All occupied households	Owner-occupied households
Age of Householder		
Under 35	18%	8%
35-54	40%	41%
55-64	19%	23%
65 or older	23%	28%
Education of Householder		
High school or less	38%	33%
Some college or Associate's degree	26%	27%
Bachelor's degree or higher	36%	40%
Annual Household Income (median)	\$58,003	\$80,227
Less than \$50K*	35%	-
\$50K to less than \$100K*	35%	-
\$100K or more*	30%	-
Housing Costs 30% or More of Annual Household Income	44%	34%

* 2013-14 RSBS one to four unit single-family households.

The average NYS target population housing unit has an average of three bedrooms and about three full-time occupants (Table E-4; RSBS 2015). The units are typically between 1,500 and 2,499 square feet (44-45%), the average being 1,800 square feet, followed by units less than 1,500 square feet (31-38%), and units 2,500 square feet or larger (18-24%) (RSBS 2015; RECS 2009). About 90% of target population housing units were built in the 20th century or earlier, of which more than half were built before 1959; the median build year for NYS housing units is likely between 1956 and 1958 (RSBS 2015; ACS 2013). In addition, the dollar value of owner-occupied housing units falls into approximate quartiles of less \$150,000 (29%), \$150,000 to less than \$300,000 (23%), \$300,000 to less than \$500,000 (25%), and \$500,000 or more (24%) (ACS 2013).

Table E-4. Housing Characteristics of NYS Households (RSBS 2015; RECS 2009, ACS 2013)

Housing Characteristic	
Average Number of Bedrooms ^a	3.1
Average Number of Occupants ^a	2.8
Structure Size ^{a,c} (square feet) (average ^b)	1,832
Less than 1,500	31% (38%)
1,500 to 2,499	45% (44%)
2,500 or larger	24% (18%)
Year Structure Was Built ^a (median ^d)	1956 – 1958
Before 1940	28%
1940-1959	25%
1960-1979	21%
1980-1999	15%
2000 or later	11%
Home Value ^e (median)	\$288,200
Less than \$150,000	29%
\$150,000 to less than \$300,000	23%
\$300,000 to less than \$500,000	25%
\$500,000 or more	24%

^a 2013-14 RSBS: one to four unit households built before 2012.

^b 2009 RECS: all occupied households.

^c Estimates in parentheses are from onsite inspections, not self-reported.

^d 2013 ACS five-year estimates: all occupied households – owner-occupied households.

^e 2013 ACS five-year estimates: owner-occupied households.

E.4 Household Energy Characteristics

The majority of one- to four-unit households built before 2012 in NYS consume between 2,501 and 12,000 kWh annually (70%) (Table E-5; RSBS 2015). One in five households consumes more than 12,000 kWh (20%), and one in ten consumes 2,500 or less kWh annually (10%) (RSBS 2015).

Table E-5. Annual kWh Consumption of NYS One to Four Unit Housing (RSBS 2015, Housing Units Built Before 2012)

Annual kWh Consumption	Percentage
2,500 kWh or less	10%
2,501 – 6,000 kWh	30%
6,001 – 12,000 kWh	40%
12,000 kWh or more	20%

All owner-occupied households in the Northeast region use electricity, more than half use natural gas (58%), and slightly more than one-third use fuel oil (36%) (Table E-6; AHS 2013).⁶⁴ Northeast households spend the least on natural gas, with a median monthly cost of \$108, and the most on fuel oil, with a median monthly cost of \$167; the median monthly cost of electricity in the Northeast falls in between, at \$118.

Table E-6. Northeast Owner-Occupied Household Monthly Fuels Costs (2013 AHS)

Energy Use and Costs	Electricity	Natural Gas	Fuel Oil
Portion of households using	100%	58%	36%
Median Monthly Cost	\$118	\$108	\$167
Portion of households spending*...			
Less than \$100	35%	42%	18%
\$100-\$149	34%	27%	19%
\$150-\$199	15%	13%	17%
\$200 or more	14%	12%	39%

* Percentages do not sum to 100% because "Don't Know" answers are excluded.

E.4.1 Heating Characteristics & Behaviors

All owner-occupied housing units in the Northeast region have primary heating fuel (AHS 2013). Overall, more than half (55%) of target population households built before 2012 in NYS use natural gas as the primary heating fuel, one-quarter use fuel oil, and a few households use propane (7%), electricity (7%), wood/wood pellets (4%), or other heating fuel source (3%) (RSBS 2015).

In addition, the heating fuel type varies substantially across the different housing unit types that comprise the target population (Table E-7). A majority of all target population housing unit types use natural gas, except for mobile homes, in which propane is the most common heating fuel (36%). Nearly one-third of one-unit detached households (29%) and 15% of one-unit attached households use fuel oil, and 20% of two- to four-unit households use electricity as the primary heating fuel.

⁶⁴ Other heating fuels not listed include: bottled gas (13.5%); wood (3.1%); and other liquid fuel (1.2%). Less than one percent use another source of heating fuel, including coal.

Table E-7. Percentage of the NYS Target Population that Use Primary Heating Fuels, by Housing Unit Type (RSBS 2015, Housing Units Built Before 2012)

Heating Fuel Type	Total	One Unit Detached	One Unit Attached	Two to Four Units	Mobile home
Natural gas	55%	51%	71%	75%	22%
Fuel oil	25%	29%	15%	4%	14%
Propane (bottled gas)	7%	7%	2%	0.3%	36%
Electricity	7%	5%	11%	20%	1%
Wood/wood pellets	4%	5%	1%	1%	9%
Other*	3%	3%	0.5%	0.3%	18%

* Other primary heating fuel includes kerosene (1%), geothermal (1%), district steam (0.1%), solar (0.1%), and unspecified other (1%).

All owner-occupied housing units in the Northeast also have primary heating equipment and about one-third (34%) have supplemental heating equipment in addition to their primary heating equipment (AHS 2013). Overall, nearly half of the NYS target population uses a warm air furnace (46%), nearly one-third uses a steam or hot water system (28%), and 18% uses baseboard heat; less than five percent of households use a heating stove or fireplace, a heat pump, a portable heater, or any other equipment type (RSBS 2015). In addition, about one-third (34%) of primary heating systems in the NYS target population are ENERGY STAR rated (RSBS 2015, on-site inspections for all housing units).

The primary heating equipment in the target population varies substantially by the heating fuel type (Table E-8; RSBS 2015). The majority of target population households with natural gas (55%) or propane (66%) have a central forced-air furnace. About one third of households with natural gas (32%) or fuel oil (38%) have a steam/hot water system, and about one third of households with fuel oil (34%) or electricity (38%) have baseboard heat.

Table E-8. Percentage of the NYS Target Population that Use Primary Heating Equipment, by Heating Fuel Type (RSBS 2015, All Housing Units)

Heating Type	Total	Natural Gas	Fuel Oil	Propane	Electricity	Other*
Central forced air furnace	46%	55%	27%	66%	32%	31%
Steam/hot water system	28%	32%	38%	8%	10%	7%
Baseboard heat	18%	10%	34%	10%	38%	8%
Stove/fireplace	3%	0.2%	0.1%	4%	3%	40%
Other**	4%	3%	2%	11%	18%	14%

* Other primary heating fuel includes kerosene (1%), geothermal (1%), district steam (0.1%), solar (0.1%), and unspecified other (1%).

** Other primary heating equipment includes air or ground source heat pump (1%), electric or portable kerosene heater (1%), and unspecified other (2%).

About half of the primary heating equipment types in the NYS target population built before 2012 (49%) are 10 or more years old, or near the age of replacement (Table E-9; RSBS 2015). The heating equipment types in order of oldest to newest are those fueled by fuel oil (60% 10 years or older), electricity (55% 10 years or older), natural gas (47% 10 years or older), other (42% 10 years or older), and propane (39% 10 years or older).

Table E-9. Age of Primary Heating Equipment in NYS Target Population, by Heating Fuel Type (RSBS 2015, Housing Units Built Before 2012)

Age	Total	Natural Gas	Fuel Oil	Propane	Electricity	Other*
Less than 2 years old	11%	13%	7%	11%	10%	7%
2 – 4 years old	16%	17%	10%	21%	18%	26%
5 – 9 years old	24%	25%	24%	30%	16%	25%
10 – 14 years old	17%	18%	20%	15%	16%	9%
15 – 19 years old	10%	9%	11%	9%	10%	11%
20 or more years old	22%	20%	29%	15%	29%	22%

* Other primary heating equipment includes air or ground source heat pump (1%), electric or portable kerosene heater (1%), and unspecified other (2%).

About two-thirds (66%) of the NYS target population with a central forced air furnace, steam/hot water system, or heat pump performed an annual tune-up on their heating system, the majority of whom used a contractor to perform the tune-up (Table E-10; RSBS 2015). About one-third (34%) do not perform annual tune-ups.

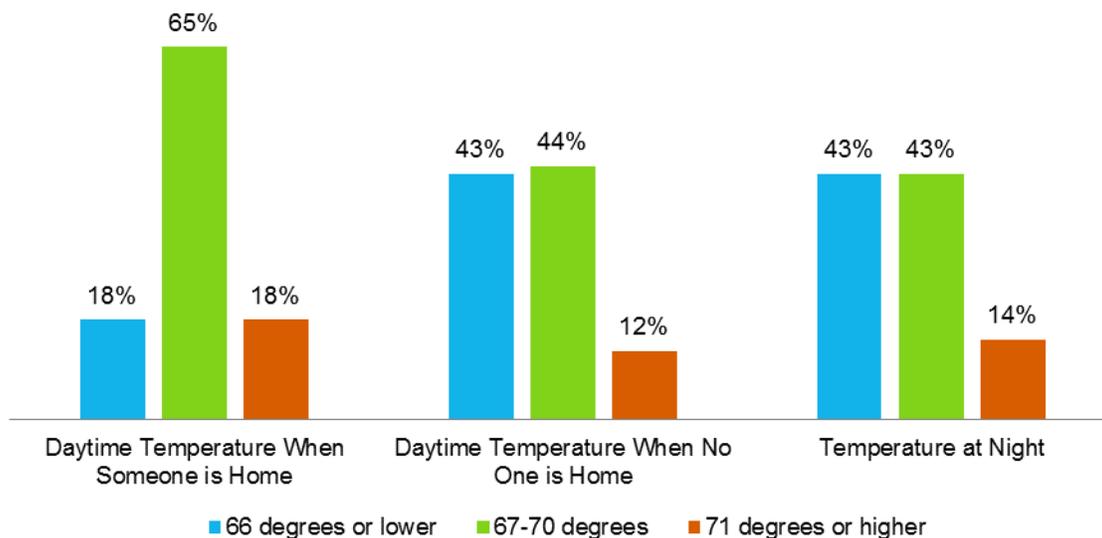
Table E-10. Percentage of the NYS Target Population that Performs an Annual Tune-Up on the Heating Equipment* (RSBS 2015, All Housing Units)

Annual Heating Tune-Up Status	
Yes, done by a heating contractor	50%
Yes, done by someone in the household or landlord	16%
No	34%

* Includes central forced air furnace, steam/hot water, and heat pump heating equipment types.

Two-thirds of NYS occupied households have a thermostat to control their main heating equipment (RECS 2009). Of these, about half (48%, or 32% of all households) have a programmable thermostat. In addition, many NYS occupied households lower the winter indoor temperature during the day when no one is home and at night, compared to during the day when someone is home (Figure E-1, RECS 2009). Households reported setting thermostats 71 degrees or higher during the day when someone is home do not appear to lower the temperature when no one is home or at night.

Figure E-1. Percentage of NYS Occupied Households That Set Indoor Winter Temperatures Under Different Conditions (RECS 2009)



Although all owner-occupied households in the Northeast have primary heating equipment, and most have a thermostat, a few (5%) reported being uncomfortably cold for 24 or more hours due to potential problems with their heating equipment (AHS 2013). Reasons for being uncomfortably cold that are related to the heating equipment are equipment breakdowns (3%), the costs of heating (2%), or inadequate heating capacity (1%).

E.4.2 Cooling Characteristics & Behaviors

A large majority of the NYS target population (85%) reported having some type of air conditioning (AC) equipment (RSBS 2015). Overall, the most common type of AC equipment is a room/window unit (48%), and over one-third (35%) have a central AC unit; very few households have a heat pump or other type of AC equipment (Table E-11; RSBS 2015). These trends are similar for households' *primary* AC equipment: among households with AC, more than half (57%) use a room/window unit and 41% a central AC unit as their primary equipment.

The type of AC equipment in the target population also varies by the housing type (Table E-11; RSBS 2015). Nearly equal percentages of one-unit, detached households have a room/window unit (43%) or a central AC unit (40%), while a majority of one-unit detached (57%), two- to four-unit (69%), and mobile home households (54%) have a room/window unit. A substantial percentage of two- to four-unit (20%) and mobile home households (32%) do not have any AC equipment.

Table E-11. Percentage of the NYS Target Population with AC Equipment, by Housing Unit Type (RSBS 2015, All Housing Units)

Air Conditioning Type	Presence of Equipment					Primary Equipment
	Total	One Unit Detached	One Unit Attached	Two to Four Units	Mobile Homes	Total
Room/window AC	48%	43%	57%	69%	54%	57%
Central AC	35%	40%	28%	10%	15%	41%
Heat pump	2%	2%	2%	1%	0%	2%
Unspecified other	1%	1%	0%	0%	0%	1%
No AC	15%	15%	13%	20%	32%	NA

Overall, the majority of AC equipment in the NYS target population is less than 10 years old (57%), but a substantial percentage is 10 years or older (43%) (Table E-12; RSBS 2015); however, on-site inspections found that respondents tended to overestimate the age of the AC equipment (RSBS 2015). In addition, the age of AC equipment varies by equipment type: central AC equipment in the target population is older, on average, compared to room/window AC units, and most heat pumps are relatively new.

Table E-12. Age of AC Equipment in NYS Target Population, by AC Equipment Type (RSBS 2015, All Housing Units)

Age	Total*	Room/Window AC	Central AC	Heat Pump
Less than 2 years old	19% (19%)	19%	13%	58%
2 – 4 years old	12% (16%)	16%	9%	0%
5 – 9 years old	26% (32%)	30%	24%	33%
10 – 14 years old	19% (19%)	19%	20%	4%
15 – 19 years old	12% (8%)	8%	17%	0%
20 or more years old	12% (7%)	8%	18%	6%

* Estimates in parentheses are from onsite inspections.

Nearly half (45%) of central AC units in the NYS target population are below code and one-third are at code (Table E-13; RSBS 2015). In contrast, nearly all room/window AC units are at (54%) or above code (41%). In addition, the 2013 AHS reports that 27% of Northeast households with a central AC unit and 45% with a room/window unit have an ENERGY STAR-rated unit. Among NYS target population households that have primary AC equipment less than 10 years old, 85% are ENERGY STAR rated (RSBS 2015, all housing units).

Table E-13. Efficiency of Central and Room/Window AC Equipment in the NYS Target Population (RSBS 2015, All Housing Units)

Efficiency Level ^a	Central AC	Room/Window AC
Below code, low efficiency ^b	45%	5%
At code, medium efficiency ^c	33%	54%
Above code, high efficiency ^d	22%	41%

^a AC equipment efficiency codes obtained from U.S. Dept. of Energy.

^b Central AC: 12.5 or lower SEER; Room/Window AC: 7 or lower EER

^c Central AC: 13 SEER; Room/Window AC: 8.0 – 9.8 EER

^d Central AC: 13.25 or higher SEER; Room/Window AC: 10 or higher EER

More than half (56%) of the NYS target population performed an annual tune-up on their non-room/window AC equipment, the majority of whom used an AC contractor to perform the tune-up (Table E-14; RSBS 2015). Nearly half (44%) of the target population did not perform an annual tune-up.

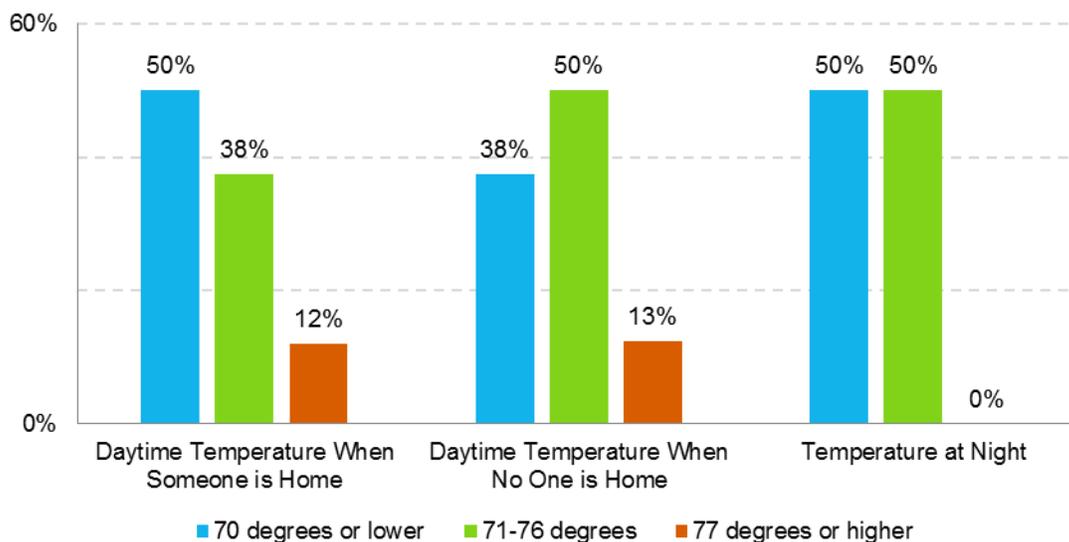
Table E-14. Percentage of the NYS Target Population that Performs an Annual Tune-Up on the AC Equipment* (RSBS 2015, All Housing Units)

Annual AC Tune-Up Status	Percentage
Yes, done by a AC contractor	45%
Yes, done by someone in the household or landlord	11%
No	44%

* Excludes room/window AC units.

Almost all (94%) occupied households in NYS with central AC equipment have a thermostat to control the temperature and, of these, nearly two-thirds (61%, or 57% of all central AC households) have a programmable thermostat (RECS 2009). In addition, a majority of NYS occupied households that have central AC equipment (53%) or a ceiling fan (54%) use them “a lot” (versus “only a few times when needed”) during the summer, but a majority of households with a room AC unit use it “only a few times when needed” (versus “a lot”) during the summer (RECS 2009). As shown in Figure E-2, air conditioning set points in the summertime indicate that few NYS occupied households adjust the indoor temperature based on occupancy or sleep; some households do set the temperature higher than 76 degrees in the summer during the day, but none set it this high at night.

Figure E-2. Percentage of NYS Occupied Households That Set Indoor Summer Temperatures under Different Conditions (RECS 2009)



E.4.3 Water-Heating Characteristics

All occupied households in NYS have some type of water heater (2009 RECS). Nearly three-fourths (73%) of the NYS target population has a storage tank water heater; about one-fourth (23%) have a space-heating boiler with water heater attachment; and a few have a tankless (4%) or heat pump (0.3%) water heater (Table E-15; RSBS 2015).

Table E-15. Percentage of the NYS Target Population with Different Types of Water Heaters (RSBS 2015, All Housing Units)

Water Heater Type	Percentage*
Storage tank water heater	73%
Space-heating boiler with storage tank, coil, tankless coil, indirect water heaters	23%
Tankless water heater	4%
Heat pump water heater	0.3%

* Percentages are from onsite inspections and not self-reports.

Natural gas is the most common water-heating fuel type among the NYS target population (54%) (Table E-16; RSBS 2015). A substantial percentage of households use electricity (20%) or fuel oil (18%), and a few households use propane (7%) or other fuel type (1%).

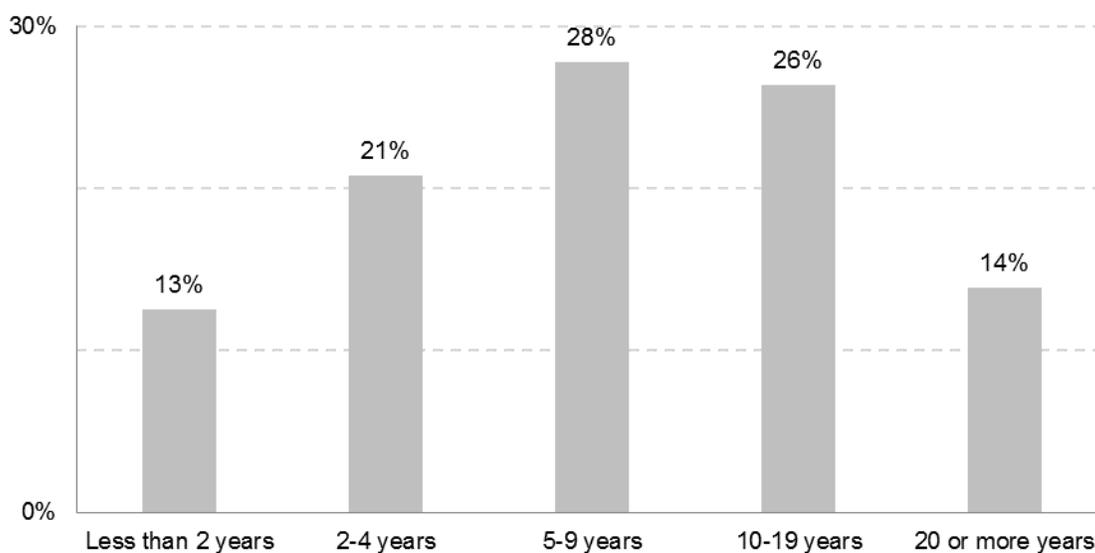
Table E-16. Percentage of the NYS Target Population Using Different Fuels for Water Heating (RSBS 2015, All Housing Units)

Water Heating Fuel Type	Percentage
Natural gas	54%
Electricity	20%
Fuel oil	18%
Propane (bottled gas)	7%
Other*	1%

* Other includes solar (0.2%), kerosene (0.1%), and unspecified other (0.4%)

Nearly half (40%) of storage tank water heaters in NYS occupied households are 10 years or older (Figure E-3; RECS 2009). In addition, only 13% of the storage water heaters in NYS occupied households are insulated with a water heater blanket (RECS 2009).

Figure E-3. Age of Water Heaters in NYS Occupied Households (RECS 2009)



E.4.4 Shell Characteristics

About half (46%) of the NYS target population does not have foundation insulation and ten percent does not have wall insulation (Table E-17; RSBS 2015). Fiberglass batts are the most common foundation (31%), wall (64%), and floor (74%) insulation types; however, about one-fourth (23-26%) of the target population has other types of insulation in these areas.

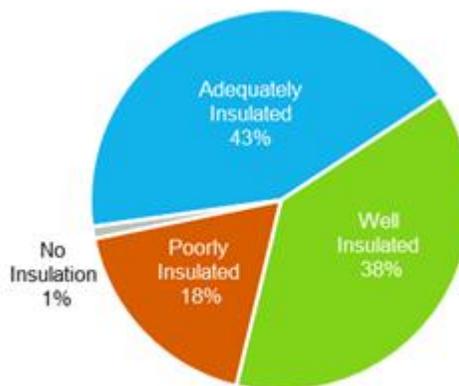
Table E-17. Percentage of the NYS Target Population with Foundation, Wall, and Floor Insulation (RSBS 2015, all housing units)^a

Insulation Type	Foundation Insulation	Wall Insulation	Floor Insulation
None	46%	10%	0%
Fiberglass batts	31%	64%	74%
Other	23% ^b	26% ^c	26% ^d

- ^a Percentages are from on-site inspections and not self-reports.
- ^b Other foundation insulation includes: XPS (9%); EPS (4%); polyisocyanurate (3%); fiberglass blanket (3%); spray foam (2%); fiberglass fill, cellulose, fiberglass batts + EPS, fiberglass batts + polyisocyanurate, fiberglass board + XPS, radiant barrier, rock wool, rock wool + XPS, spray foam + XPS, XPS + polyisocyanurate, fiberglass board, fiberglass batts + XPS, fiberglass batts + spray foam (less than 1% each)
- ^c Other wall insulation includes: cellulose (9%); fiberglass + rigid foam (5%); spray foam (3%); XPS (1%); fiberglass fill (1%); unspecified other (1%); spray foam + rigid foam, cellulose + rigid foam, fiberglass batts + spray foam, rock and mineral wool, wood/log walls, EPS, polyisocyanurate, vermiculite, fiberglass batts + foil, rock wool + rigid foam, fiberglass batts + cellulose (less than 1% each)
- ^d Other floor insulation includes: fiberglass fill (7%); fiberglass belly wrap (5%); spray foam (4%); XPS (3%); polyisocyanurate (2%); cellulose (2%); radiant barrier (1%); unspecified other (2%).

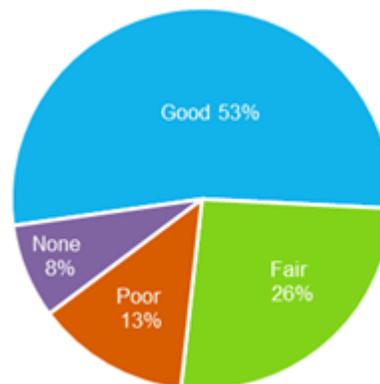
According to the 2009 RECS, more than three-quarters (81%) of occupied housing units in NYS reported having well insulated or adequately insulated homes (Figure E-4); however, nearly one in five homes (19%) reported having poor or no insulation, and, according to the 2013 AHS, about one percent of Northeast occupied households were uncomfortably cold for 24 hours or longer due to inadequate insulation.

Figure E-4. Adequacy of Insulation in NYS Occupied Housing Units (RECS 2009)



Nearly all NYS target population households (92%) have door weatherstripping; however, among these, a substantial percentage were rated as installed with fair (26%) or poor (13%) quality (vs. good quality) (Figure E-5).

Figure E-5. Adequacy of Door Weatherstripping in NYS Target Population Housing Units (RSBS 2015, ALL HOUSING UNITS)



E.5 Home Improvement Activity & Characteristics

In the Northeast region of the U.S., about 31% of owner-occupied households performed at least one of 74 different home improvement activities in 2013 (JCHS 2015, see Table E-18).⁶⁵ Extrapolated to NYS, this results in approximately 1.2 million owner-occupied households that had home improvement projects in 2013. Each household performed an average of 2.7 projects, resulting in about 3 million projects in NYS in 2013. On average, households spent about \$10,717 on home improvements and nearly \$4,000 per project, resulting in about \$13 billion spent on home improvements in NYS in 2013 (JCHS 2015).

Nearly one-fourth of northeast owner-occupied households (24%) reported at least one home improvement project performed by a professional, which extrapolates to about 900,000 NYS owner-occupied households (Table 18; JCHS 2015). The average number of professional projects per household is 2.3, resulting in more than 2 million professional projects in NYS in 2013. Households spent an average of about \$11,500 on professional projects (or about \$5,000 per project), which extrapolates to about \$10.9 billion spent in NYS in 2013 (JCHS 2015).

Table E-18. Northeast Owner-Occupied Home Improvement Households, Projects, and Expenditures Extrapolated to NYS (JCHS 2015)

	2013 AHS Data	NYS Extrapolation*
All projects		
Households with at least one home improvement project	31%	1.2 million households
Average home improvement projects per household with projects	2.7	3 million projects
Average home improvement expenditure per household with projects	\$10,717	\$13 billion
Average expenditure per project for household with projects	\$3,969	
Professional Projects		
Households with at least one professional home improvement project	24%	911,122 households
Average professional home improvement projects per household with professional projects	2.3	2.2 million projects
Average professional home improvement expenditure per household with professional projects	\$11,578	\$10.9 billion
Average professional home improvement expenditure per project for households with professional projects	\$5,058	

* Assumes about 3.9 million owner-occupied households. Extrapolation assumes the rate and costs of projects in the Northeast region reported by JCHS applies proportionally to New York.

⁶⁵ The AHS was conducted in 2012 and 2013 but this study uses only the annual 2013 results from the 2012-13 AHS as calculated by JCHS. AHS respondents in 2013 were asked about home improvement activities that occurred in 2011 and 2012.

As shown in Table E-19, in the Northeast region, among the measures of interest to HPwES, appliance and major equipment projects, which include water heaters, were the most common professionally installed home improvement measures, followed by windows and doors, HVAC, and insulation (JCHS 2015). Extrapolated to NYS, this resulted in about 257,000 professional appliance or major equipment projects, 149,000 professional window and door projects, 169,000 professional HVAC projects, and 65,000 professional insulation projects in 2013. The 2013 AHS, however, reported estimates for HVAC and water-heating replacements are slightly lower than the 2013-14 RSBS estimates for the NYS target population (JCHS 2015; RSBS 2015).

In addition, the average professional project expenditure was highest for HVAC projects, followed by windows and doors, insulation, and appliances and major equipment (Table E-19; JCHS 2015). Extrapolating to NYS, about \$1 billion was spent on professional HVAC projects, \$583 million was spent on professional windows and doors projects, \$257 million was spent on professional appliance and major equipment projects, and \$107 million was spent on professional insulation projects in 2013.

National-level estimates indicate that more than one-third (38%) of all appliance and major equipment projects and half (50%) of all appliance and major equipment project expenditures (both professional and Do-It-Yourself [DIY] projects) were for water heaters (AHS 2013). Among HVAC projects, national-level estimates indicate that half of all the projects and 45% of expenditures were for heating equipment, and half of projects and 55% of expenditures were for central air conditioning equipment.⁶⁶

⁶⁶ Data for water heater project and heating or cooling project categories are available only for all projects in the U.S.; data for professional projects and/or Northeast projects are unavailable for these measure categories.

Table E-19. Professional HVAC, Insulation, Window/Door, and Appliance/Major Equipment Improvements Extrapolated to NYS (JCHS 2015)

Home Improvement Activities with High Potential for Energy Efficiency Upgrades	2013 AHS Data	NYS Extrapolation ^a
Professional HVAC Projects		
Owner-occupied households with professional HVAC projects	4.3% (6.1%-9.8%) ^b	169,000
Average professional HVAC expenditure among households with professional HVAC projects	\$5,131	\$866 million
Professional Insulation Projects		
Owner-occupied households with professional insulation project	1.7%	66,700
Average professional insulation expenditure among households with professional insulation projects	\$1,587	\$106 million
Professional Appliance & Major Equipment Projects (includes water heaters)		
Owner-occupied households with professional appliance or major equipment project, including water heaters	6.6% (7.5%) ^c	259,000
Average professional appliance or major equipment expenditure among households with professional appliance or major equipment projects	\$827	\$214 million
Professional Window & Door Projects		
Owner-occupied households with professional window and door project	3.8%	149,000
Average professional window and door expenditure among households with professional window and door projects	\$3,448	\$514 million
Other Home Improvement Activities with Some Potential for Energy Efficiency Upgrades		
Owner-occupied households with professional kitchen or bath remodeling project	3.1%	122,000
Owner-occupied households with professional room addition project	1.4%	55,000
Owner-occupied households with professional roofing or siding project	6.0%	235,000
Owner-occupied households with professional floor/wall/ceiling project	5.7%	224,000

^a Assumes about 3.9 million owner-occupied households. Extrapolation assumes the rate and costs of projects in the Northeast region reported by JCHS applies proportionally to New York.

^b 2013-14 RSBS estimate of the percentage of the NYS target population that replaced heating and cooling equipment, respectively, per year.

^c 2013-14 RSBS estimate of the percentage of the NYS target population that replaced water heating equipment per year.

Nearly 90% of those installing new HVAC equipment reported using a professional, while about two-thirds of those reporting appliances and major equipment projects, window and door projects, and insulation projects used professionals (Figure E-6; JCHS 2015). Most of the expenditures for HVAC, windows and

doors, insulation, and appliances and major equipment projects also were spent on professional projects (versus DIY projects) (Figure E-7; JCHS 2015).

Figure E-6. Professional versus DIY Installation by Measure in 2013 (JCHS 2015)

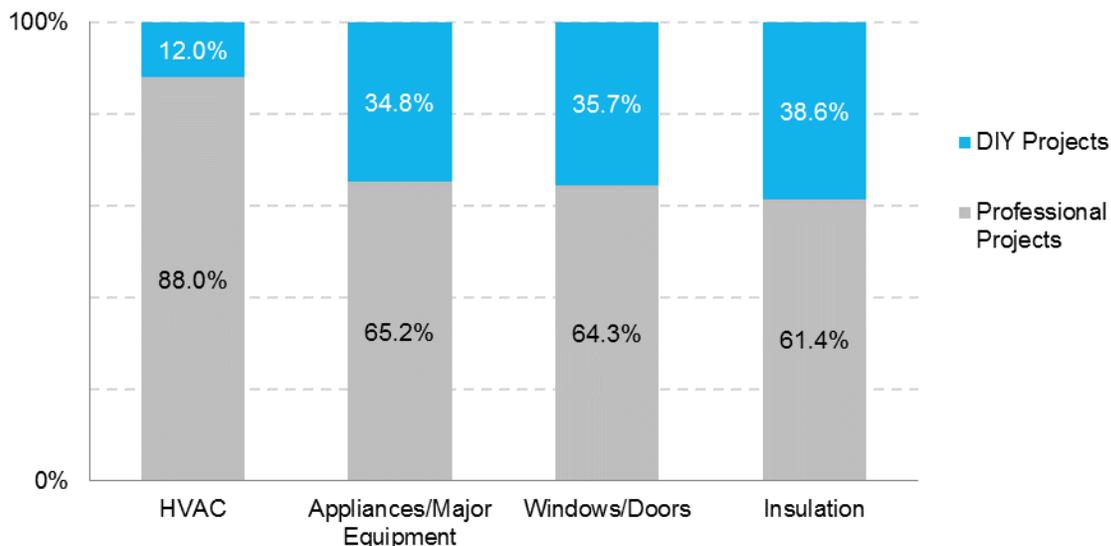
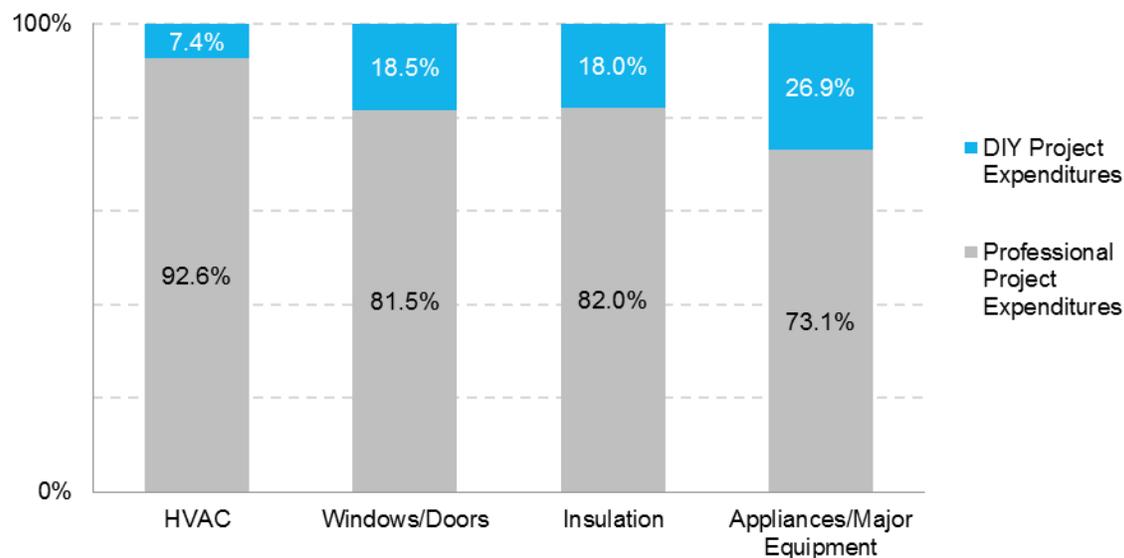


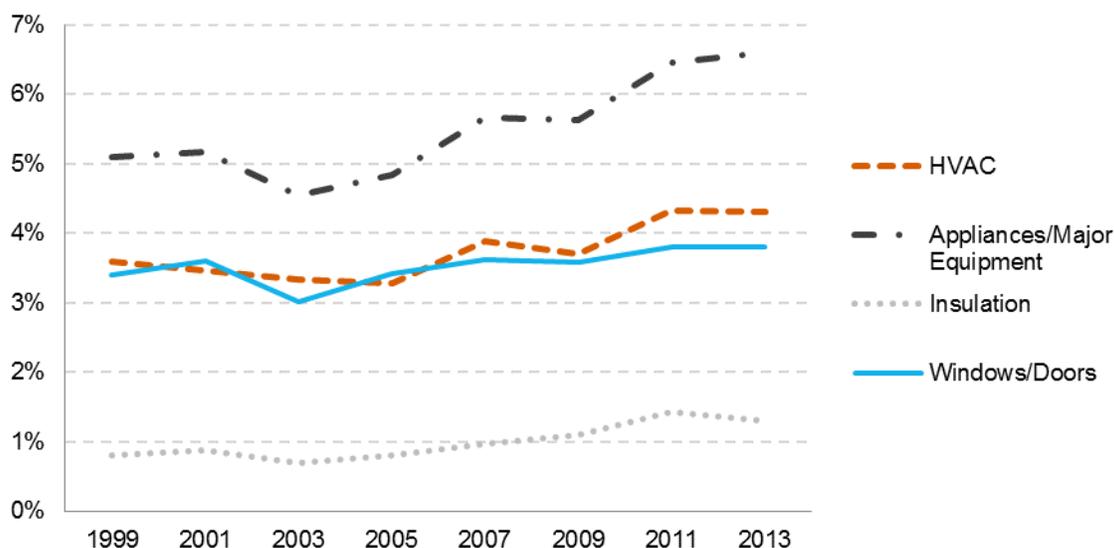
Figure E-7. Professional versus DIY Expenditures by Measure in 2013 (JCHS 2015)



The percentage of owner-occupied households that hired a professional to complete projects varies by measure, but has slightly increased over the past 12 years for all measures (JCHS 2015). For example, a low of 4.5% of households reported professional HVAC improvements in 2003 and a high of 6.6% reported these projects in 2013; each measure exhibits similar trends (Figure E-8). In contrast, the percentage of households performing some other professional home improvement activities – kitchen/bath

remodels, adding a room, replacing siding, work on ceilings/walls/floors – has been flat or declined since 2007.

Figure E-8. Percentage of Northeast Owner-Occupied Households Reporting Professionally-installed Projects, by Measure, 1999-2013 (JCHS 2015)



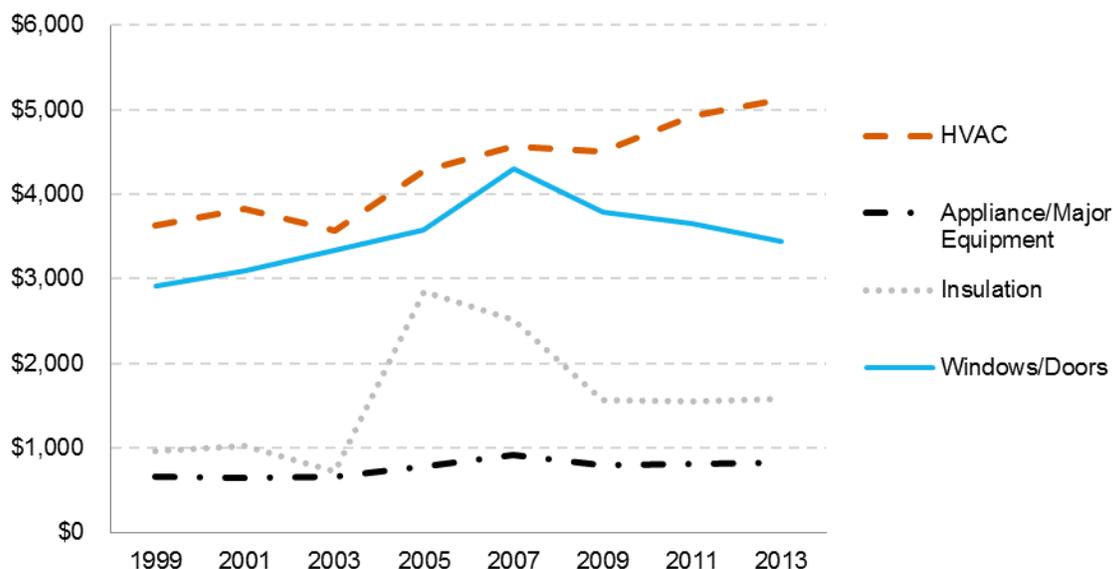
These trends are somewhat mirrored in the Remodeling Market Index, which accounts for the amount of home remodeling activity, by quarter, in the U.S. and regionally (JCHS 2015). As shown in Figure E-9, there was a substantial decline in activity from 2007 to 2008, at the height of the economic recession in the U.S., but activity has been gradually rebounding. The increase in activity since 2008 also is found among the individual measures in Figure E-8, but there was not as sharp a decline in 2008 for these measures compared to general remodeling activities.

Figure E-9. Quarterly Remodeling Index for the U.S. and Northeast, 2005-13 (JCHS 2015)



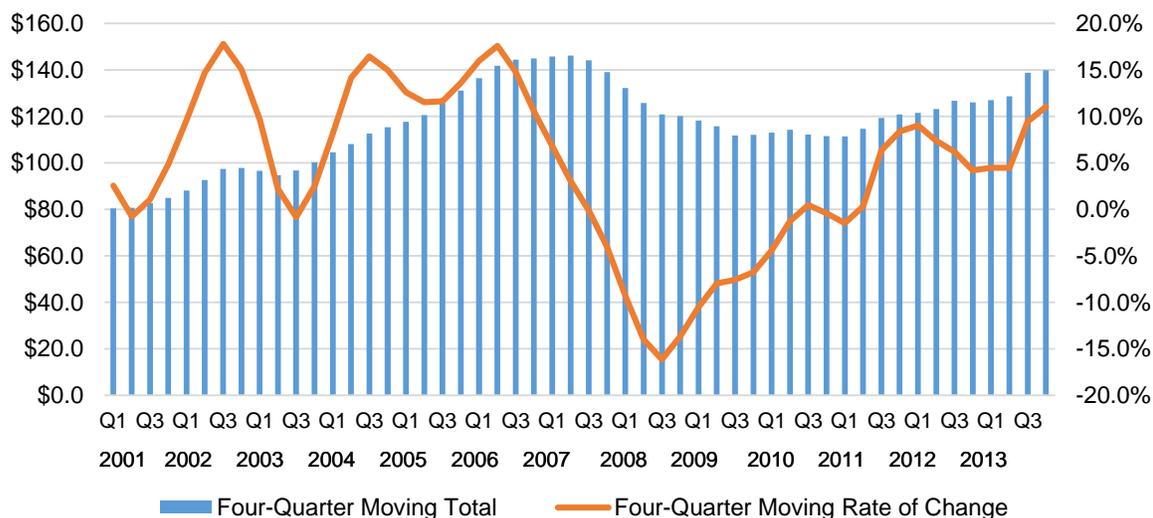
Past trends in average expenditures for professional home improvement services vary by measure. As shown in Figure E-10, the average professional HVAC expenditures have been slightly increasing over time, the average expenditures for appliances and major equipment have remained flat since 1999, and expenditures for insulation and windows/doors peaked in 2005 and 2007, respectively, but declined afterwards (JCHS 2015).

Figure E-10. Average Expenditures for Professional Projects by Measure in Northeast Owner-Occupied Households, 1999-2013 (JCHS 2015)



Expenditure trends are more dramatic when viewed through the national Leading Indicator of Remodeling Activity (LIRA), which tracks the amount spent and rate of change in expenditures in household remodeling activities in the U.S. (JCHS 2015). As shown in Figure E-11, home remodeling spending peaked in 2007, declined sharply in 2008 at the height of the economic recession, and has been rebounding since.

Figure E-11. Leading Indicator of Remodeling Activity (LIRA) Four Quarter Moving Expenditure Total and Rate of Change, 2001-2013 (JCHS 2015)



E.5.1 Energy Efficiency Home Improvement Projects, Program Participation, and Awareness

According to the 2013 AHS, 21% of northeast owner-occupied households that performed a home improvement project in 2013, or 6.6% of the total owner-occupied household population, reported the project was done for energy efficiency purposes. In NYS, this resulted in about 261,000 households that reported performing an energy-efficiency home improvement project in 2013.

Among households in the NYS target population, 12.2% reported participating in an energy efficiency program in 2013-14 (Table E-20; RSBS 2015). The types of equipment upgraded or recycled through program participation, from most to least common, are insulation or weatherization, unspecified other, heating equipment upgrade, lighting upgrade, refrigerator or freezer recycling, cooling equipment upgrade, water heating equipment upgrade, appliance upgrade, and clothes washer upgrade.

Table E-20. Percentage of NYS Target Population that Participated in an Energy Efficiency Program and Purchased/Recycled Equipment (RSBS 2015)

	% of Target Population	% of Program Participants
Participated in energy efficiency program	12%	100%
Equipment purchased or recycled through program		
Insulation or weatherization	4.2%	34.7%
Other, unspecified	2.8%	22.8%
Heating equipment	2.6%	21.5%
Lighting	2.5%	20.8%
Refrigerator or freezer recycling	2.3%	18.8%
Cooling equipment	1.7%	13.7%
Water heating equipment	1.3%	10.4%
Appliances	0.9%	7.6%
Clothes washer	0.6%	5.1%

Nearly 90% of the NYS target population did not participate in an energy efficiency program in 2013-14 (Table E-21; RSBS 2015). The most to least common reasons reported for not participating include: lack of awareness of programs, inability to afford new equipment, lack of a need for upgrades, lack of awareness of who to contact to participate, low energy bills, respondent was a renter, respondent was too busy, unspecified other, or respondent recently moved residences.

Table E-21. Percentage of the NYS Target Population that Did Not Participate in an Energy Efficiency Program and Reasons for Nonparticipation (RSBS 2015)

	% of Target Population	% of Nonparticipants
Did not participate in energy efficiency program	88%	100%
Reasons for not participating		
Am not aware of any	45.1%	51.4%
Can't afford to install new equipment	16.8%	19.1%
Do not need anything done	13.6%	15.5%
Don't know who to contact to participate	12.7%	14.5%
My energy bills are not that high	11.3%	12.9%
I rent	10.6%	12.1%
Too busy	7.8%	8.9%
Other, unspecified	6.1%	7.0%
Recently moved	4.4%	5.0%

Appendix F Nonparticipant Household Survey Results Memorandum

F.1 Summary

The Process Evaluation/Market Characterization Assessment (PE/MCA) team identified 770 New York State (NYS) homeowners from a web panel representative of homeowners in New York State. These 770 homeowners (nonparticipant home energy upgraders) live in one- to four-unit homes, made home improvements in the past two years that cost at least \$2,000 and included an energy-related upgrade. These energy-related upgrades included insulation, air sealing, water heating system, heating system, cooling system, windows, and/or appliances. These surveyed nonparticipant home energy upgraders are, on average, older and have higher education and incomes than households that participated in the NYSEDA HPwES program in the past two years (participating households) and the general single-family household population in NYS.

Very few surveyed nonparticipant home energy upgraders reported having a home energy audit in the past two years (8%); however, about two-thirds of surveyed nonparticipant home energy upgraders report a high or very high interest in having a home energy audit before their next home improvement project. In addition, more than half of surveyed nonparticipant home energy upgraders who reported having an audit in the past two years identified upgrades from the audit that they had not previously considered, and large majorities reported that the audit was performed well and the results and recommendations seemed valuable and reasonable.

About two-thirds of surveyed nonparticipant home energy upgraders reported not hiring their home energy auditor to install the energy-related upgrades, while most participating households (86%) reported hiring their energy auditor to install their HPwES upgrades. About one-third of nonparticipant home energy upgraders reported not hiring a contractor at all and instead installed the upgrades themselves. Among those who reported hiring a contractor, about half reported getting multiple bids and the most commonly reported sources for finding a contractor are referrals and a previous relationship.

In general, more than three-fourths of nonparticipant home energy upgraders reported always considering the contractor's service quality and cost of the bid when looking for a contractor. Most also reported preferring a contractor who can make energy saving recommendations (76%) and can estimate energy savings potential (68%). Very few nonparticipant home energy upgraders (7%) reported hearing about the Building Performance Institute (BPI). In contrast, nearly half of participating households had heard of BPI.

More than two-thirds of surveyed nonparticipant homeowners in New York State (67%) reported completing a home improvement project of any kind, similar to the AHS's estimate of 60% of Northeast owner-occupied households who reported a home improvement project. Forty-four percent of the surveyed

nonparticipant homeowners reported including an energy-related upgrade as part of their home improvement project in the past two years of \$2,000 or more (home energy upgraders), and 8% reported installing four to seven energy-related upgrades.

The most common primary reasons nonparticipant home energy upgraders reported for doing the upgrades included remodeling, upgrading, or modernizing their home, remodeling or upgrading a kitchen or bath, replacing or upgrading appliances or fixtures, and installing or upgrading HVAC or water heating systems. The most common secondary reasons reported include improving comfort or aesthetics and saving energy or energy costs. Nearly all of the nonparticipant home energy upgraders who reported making the upgrades for improving comfort or reducing energy costs agreed or strongly agreed that the upgrades fulfilled their expectations. In addition, the most common problems nonparticipant home energy upgraders reported experiencing before their upgrades were air leakage or drafty rooms, poor HVAC performance, and poor water heating performance; nearly all of these home energy upgraders reported that the upgrades resolved these problems. Overall, 93% of nonparticipant home energy upgraders reported being somewhat or very satisfied with the upgrades they made and the quality of their contractor's work (if applicable), and more than three-quarters reported satisfaction with the energy savings obtained so far.

About half of surveyed nonparticipant home energy upgraders reported plans for making energy upgrades in the next two years, the most common of which are windows and doors, lighting, appliances, and insulation. A majority mentioned that confidence in realizing energy savings (75%) and rebates to offset the cost of the upgrades (72%) were important or extremely important in helping them to purchase energy efficient upgrades for their future project(s).

Most nonparticipant home energy upgraders reported paying for their upgrades with cash (65%) and/or credit cards (42%). About one-third of participating households reported using a program-sponsored loan (30%), 47% reported paying with cash or check, and 5% reported paying with credit card. In addition, nearly two-thirds of nonparticipant home energy upgraders reported awareness of utility incentives or rebates, but very few reported receiving these to make their upgrades (14%). Nearly one-third of nonparticipant home energy upgraders reported awareness of NYSERDA programs that provide incentives or rebates, and 21% reported awareness of HPwES specifically. In contrast, in 2004, 20% of nonparticipant respondents, who reported installing HVAC and/or insulation upgrades in the previous two years, reported awareness of HPwES. About one in ten nonparticipant home energy upgraders reported considering using HPwES to make their upgrades, and the most common reasons reported for why they did not use HPwES include ineligibility, low incentive amounts, or too much time required to participate.

F.2 Methods

To characterize the market of nonparticipant home energy upgraders in NYS, the PE/MCA team used a two-stage approach. In both stages, the team used a web panel representative of NYS homeowners

provided by Research Now, an online sampling and data collection company. Households opt-in to the Research Now panels via invitations and intercepts on websites, and panelists receive a number of reward points, based on the length of survey, for completing surveys. Research Now reported that the web panel is representative of New York State’s 3.4 million homeowners; however, information about the web panel, including response rates and the demographic characteristics of panel members, is proprietary to Research Now and was not provided to the PE/MCA team.

In the first stage, the team performed an incidence test with a random sample of members in the web panel of NYS homeowners. They performed the test to determine if it was feasible to use the web panel to estimate the proportion of homeowners who spent \$2,000 in the past two years on a project that included installing the NYSEDA HPwES core upgrades (for example, HVAC systems, insulation and/or performing air sealing) and the proportion that included other energy-related upgrades (“other upgrades”). Second, after demonstrating the feasibility of using the web panel to identify nonparticipant home energy upgrades, the team conducted a more extensive survey with a larger web panel.

F.2.1 Incidence Test Survey Methods and Results

The PE/MCA team conducted an incidence test with a random sample of 2,500 members of the web panel of NYS homeowners 18 and older. The six-question web survey, fielded on November 21-23, 2014, asked whether households did a home improvement project in the past two years that cost \$2,000 or more and what types of energy-related upgrades were made as part of their project. Two hundred forty-five households responded to the web survey, resulting in a 10% participation rate (Table F-1).⁶⁷ One hundred twenty-six respondents screened out due to ineligibility, the reasons for which included the respondent was not the primary decision maker for the household, the respondent lived in a multifamily dwelling, or the respondent did not spend \$2,000 or more on a home improvement project in the past two years.

Table F-1. Web Survey Incidence Test Disposition Results

Incidence Test Target Group	Respondents
Total sample size	2,500
Responded	245
Participation rate	10%
Screened out	126
Respondent not the primary decision maker in household	25
Respondent lives in multifamily dwelling	21
Respondent did not spend \$2,000 or more on a home improvement project in past two years	80
Eligible respondents	119 (49%)

⁶⁷ The team was unable to calculate the response rate because the panel provider could not provide the full survey disposition.

Of the 119 eligible respondents that spent \$2,000 or more on a home improvement project in the past two years, 40% reported making one or more core energy upgrades, which may have included some other energy upgrades. Thirty-six percent reported making only other energy upgrades, and about one-quarter (24%) reported not making any energy-related upgrades (Table F-2).

Table F-2. Web Incidence Test Survey Results

Incidence Test Screening Criteria	Respondents (n=119)
Made one or more core energy upgrades*	40%
Made one or more other energy upgrades only**	36%
Did not make energy upgrades	24%

* Includes HVAC, insulation, and/or air sealing; respondents could select more than one.

** Includes windows, programmable thermostat, water heating equipment, and/or appliances but no core upgrades; respondents could select more than one.

F.2.2 Web Survey Methods & Analysis

To conduct a more comprehensive survey with a larger web panel representative of NYS homeowners, the team sent a web survey email invitation to web panelists on January 15, 2015 and closed data collection on January 21, 2015.⁶⁸ The web survey included seven screening questions similar to those used in the web incidence test (Section F.2.1) to determine whether the respondent was a “home energy upgrader” (i.e., they spent \$2,000 or more in the past two years on a project that included at least one home energy upgrade). The screening questions asked whether the respondent was a renter or owner, the housing type, the type of home improvement(s) made in the past two years, the total cost of the home improvement(s), the home-improvement completion date, whether or not the respondent received public assistance, and whether or not the respondent previously participated in HPwES.

Respondents could choose from the following energy upgrades: adding insulation in attic, floors or walls, performing air sealing, replacing windows, adding or replacing water heating equipment, installing a new heat pump or heating system, adding or replacing a central air conditioner, and/or installing new appliances. Respondents could also choose from among four home improvement activities that may or may not have included a home energy upgrade: breaking through an outside wall or raising the roof, remodeling a kitchen, adding or remodeling a bathroom, or finishing a basement. Respondents who reported performing one or more of these home improvement activities, but did not report at least one of the home energy upgrades were screened out. The web survey included an additional 53 questions about: respondent and household demographics, awareness and utilization of NYSERDA and utility programs, home

⁶⁸ The total number of households in the sample is proprietary information of the web panel provider and is thus unavailable. As a result, the PE/MCA is unable to calculate the response rate.

improvement project funding, home energy audits, contractor selection preferences, home energy-related upgrades and future plans, and motivations for and satisfaction with the home improvement project(s).

While 1,933 homeowners in the web panel visited the survey, 200 did not start the survey (Table F-3). Of the 1,733 respondents to the survey, one percent screened-out because they lived in a housing unit not supported by HPwES, such as a five or more unit apartment building, and three percent screened-out because they reported participating in HPwES in the past (Table F-3). About one-quarter screened-out because they did not make any of the home improvement upgrades in the past two years, and an additional 23% screened-out because they did not spend \$2,000 or more on a home improvement project in the past two years that included at least one home energy upgrade. This resulted in 770 respondents who qualified to participate in the full web survey, or slightly less than half of all respondents, which exceeded the total goal of 668 respondents established by the PE/MCA team. Respondents completed the survey in about 14 minutes on average.

Table F-3. Screening Question Results from NYS Nonparticipant Consumers Survey

Screening Criteria	Count (Percentage)
Visited survey website	1,933
Did not start survey	200
Total respondents	1,733
Screened out:	
Previous HPwES participant	58 (3%)
Housing type not qualified	12 (1%)
Did not make a home improvement upgrade in the past two years	489 (28%)
Made a home improvement project but did not spend \$2,000 or more in past two years that included a home energy upgrade*	404 (23%)
Total eligible respondents	770 (44%)

* Home energy upgrades include adding insulation in attic, floors or walls, performing air sealing, replacing windows, adding or replacing water heating equipment, installing a new heat pump or heating system, adding or replacing a central air conditioner, and/or installing new appliances.

Using the results from the web incidence test, the PE/MCA team estimated anticipated completes for two groups based on the types of energy upgrades reported: a core energy upgrades group and an “other” energy upgrades group (Table F-4).⁶⁹ The team placed respondents in the core upgrades group if they reported an upgrade to their HVAC system, insulation, and/or air sealing. The team placed respondents in the other upgrades group if they did not upgrade any of the core measures, but did do one of the following: replaced windows, added or replaced water heating equipment, and/or upgraded appliances. In addition, the

⁶⁹ The team did not apply any screening criteria to meet anticipated completes or apply statistical weights to results since the proportions of these groups among the NYS household population was unknown.

team also estimated a minimum number of anticipated completes for home energy upgraders that likely qualify for Assisted-HPwES. The team placed respondents in the assisted group if they reported receiving Social Security or disability income, or any public assistance such as Home Energy Assistance, Lifeline telephone service assistance, health assistance like Medicaid, or nutrition assistance like food stamps.

Of the 770 nonparticipant home energy upgraders, 60% reported making one or more of the core upgrades, which is higher than the results from the web incidence test and what the team anticipated (Table F-4). The remaining 40% reported making at least one of the other upgrades and not any core upgrades. In addition, 31% of the home energy upgraders reported qualifying for public assistance, which also was substantially higher than what the team anticipated.

Table F-4. NYS Nonparticipant Web Survey Quota Group Results

Group	Anticipated Completes	Actual Completes	Completes with Assisted Group Respondents Allocated to Core and Other Upgrades Groups
Core Upgrades Group ^a	200 (30%)	323 (42%)	462 (60%)
Other Upgrades Group ^b	400 (60%)	208 (27%)	308 (40%)
Assisted Group ^c	68 (10%)	239 (31%)	--
Total	668 (100%)	770 (100%)	770 (100%)

^a Households that spent at least \$2,000 on energy-related upgrades that include any combination of insulation, HVAC, and air sealing in the past two years.

^b Households that spent at least \$2,000 on energy related upgrades that did not include the core upgrades in the past two years

^c Households likely to qualify for Assisted-HPwES, and that spent at least \$2,000 on energy-related upgrades in the past two years

The PE/MCA team conducted statistical analyses with the survey data using SPSS and Excel. The team reported sample statistics generalizable to the web panel of homeowners when applicable, which extrapolates to the New York State homeowner population since the panel is representative of this population. The team also compared results across four groups, when applicable: nonparticipant home energy upgraders versus HPwES participating households (Appendix C; Appendix H); home energy upgraders who made core versus other upgrades; assisted versus non-assisted home energy upgraders; and home energy upgraders who hired a contractor for their project versus those who did the project without a contractor (“DIY respondents”). The results below only report statistically significant differences at the $p \leq .05$ level between each of the groups. In addition, “Don’t know” and “Refused” responses are omitted from analyses unless otherwise indicated.

F.3 Respondent and Household Characteristics

Nearly all NYS nonparticipant home energy upgraders (95%) and participating respondents (90%) reported being white, which is much higher than the statewide percentage of white owner-occupied households (71%) (Table F-5). The average reported household size, including children, is 2.6 people for both nonparticipant home energy upgraders and participating respondents, compared to 2.8 for NYS owner-occupied households. The average reported age of nonparticipant home energy upgraders is 58 years and slightly more than half of respondents (54%) are between the ages of 35 to 64 (Table F-5). Participating respondents reported the same average age, but a higher percentage were between the ages of 35-64 (59%). Both nonparticipant home energy upgraders and participating respondents are on average older than the statewide owner-occupied household population.

More than two-thirds of nonparticipant home energy upgraders reported having a bachelor's degree or higher, and just 9% reported having a high school diploma or less. Participating respondents reported less education overall, in which 63% have a bachelor's or higher and 14% have a high school diploma or less (Table F-5). Both groups have a much higher percentage of reported college graduates compared to the NYS owner-occupied household population. In addition, nearly half of nonparticipant home energy upgraders reported a household income of \$100,000 or more, and just 11% reported a household income of less than \$50,000. Participating respondents are much less affluent overall and similar to the NYS single-family household population, in which less than one-third reported a household income of \$100,000 or more and about one-third reported \$50,000 or less.

Table F-5. New York State Nonparticipant Home Energy Upgrader and Participating Household Demographic Characteristics

Characteristics	NYS Households	2012-2013 NYS Participating Households			2013-2014 NYS Nonparticipant Home upgraders
		Market	Assisted	Total	
% White*	71%	91%	90%	90%	95%
Average Household Size*	2.8	2.6	3.0	2.6	2.6
Age* (median)	--	59	57	58	58
Under 35	8%	3%	5%	4%	5%
35-54	42%	30%	36%	32%	28%
55-64	23%	28%	25%	27%	26%
65 or older	27%	39%	34%	37%	41%
Education*					
High School or less	33%	10%	24%	14%	9%
Some college	27%	17%	36%	23%	21%
College degree	40%	73%	40%	63%	69%
Annual Household Income* (median)	\$57,683				
Less than \$50,000	29% (35%)**	20%	66%	34%	11%
\$50,000 to less than \$100,000	33% (35%)**	40%	30%	37%	40%
\$100,000 or more	38% (30%)**	40%	4%	29%	49%

* Results from 2013 American Community Survey five-year estimates for owner-occupied households.

** Results in parentheses from 2013-14 NYSERDA Residential Statewide Baseline Study of single-family 1-4 unit households.

About one-third of both nonparticipant home energy upgraders (31%) and participating households (36%) are “assisted.”⁷⁰ Assisted nonparticipant home energy upgraders reported an average age of 65 compared to an average age of 55 reported by non-assisted home energy upgraders. Furthermore, nearly two-thirds of assisted nonparticipant home energy upgraders (65%), compared to less than half of non-assisted home energy upgraders (46%), reported a household income of \$60,000 or less controlling for the number of persons per household.⁷¹ The percentage of NYS households receiving any kind of public assistance is unavailable, but in 2013 29% of all NYS households had Social Security income, 6% had Supplemental Security income, 3% received cash public assistance income, and 15% received Food Stamp/SNAP benefits. There is, however, some overlap among these percentages since they are not mutually exclusive (ACS 2013).

⁷⁰ Nonparticipant respondents reported in the nonparticipant survey whether they received public assistance and the CRIS database indicated which participant respondents participated in Assisted-HPwES.

⁷¹ The PE/MCA team calculated household income per household member by taking the midpoint of the income categories included in the survey and dividing it by the number of reported household members.

Nearly all NYS nonparticipant home energy upgraders reported living in a single-family detached house. This is slightly more than participating respondents who reported more single-family attached housing types. Both groups reported much more single-family detached housing as compared to the NYS single-family population. Nonparticipant home energy upgraders reported a median house age of 52 years, which is substantially newer than the median house age of 65 years reported by participating respondents. Nonparticipant home energy upgraders also reported living in their home for more than 21 years, on average, slightly longer than participating respondents. A much higher percentage of nonparticipant home energy upgraders, compared to participating respondents, reported planning to live in their home ten or fewer years (Table F-6).

Table F-6. New York State Nonparticipant Home Energy Upgraders’ and Participating Households’ Housing Characteristics

Characteristics	NYS Households*, **	2012-2013 NYS Participating Households			2013-2014 NYS Nonparticipant Home Energy Upgraders
		Market	Assisted	Total	
Type					
Single-family detached	78% (77%)	92%	83%	90%	95%
Single-family attached	19% (20%)	7%	15%	9%	4%
Other single-family	3% (3%)	1%	2%	1%	1%
Year House Built					
Before 1940	28% (28%)	25%	40%	25%	19%
1940-1959	27% (25%)	27%	24%	27%	27%
1960-1979	24% (25%)	29%	28%	29%	25%
1980 or later	22% (26%)	20%	8%	20%	30%
Median house age		57	65	64	52
Average years lived in home	--	18	20	19	18
Percentage who plan to live in home 10 or fewer years	--	28%	34%	31%	31%

* Results from 2013 American Community Survey five-year estimates for owner-occupied households

** Results in parentheses from 2013-14 NYSERDA Residential Statewide Baseline Study of single-family 1-4 unit households.

F.4 Home Energy Audits

In the past two years, 8% of NYS nonparticipant home energy upgraders who spent \$2,000 in the past two years on a project that included a home upgrade (3% of panel) reported having an energy audit performed at their home, which is substantially less than the 95% of HPwES participating households who had an audit (Figure F-1). More nonparticipant home energy upgraders who reported installing core energy upgrades and/or hiring a contractor reported having an energy audit performed compared to those who reported installing other upgrades and/or not hiring a contractor, respectively (Figure F-2). More than half

of home energy upgraders who reported not having a home energy audit in the past two years (56%) indicated high or very high interest in having a home energy audit performed before their next home improvement project. An additional 11% indicated high or very high interest if the cost of the audit was offset by financial incentives (27% of panel) (Figure F-3).

Figure F-1. Percentage of NYS Nonparticipant Home Energy Upgraders and Participating Households who had a Home Energy Audit Performed in the Past Two Years

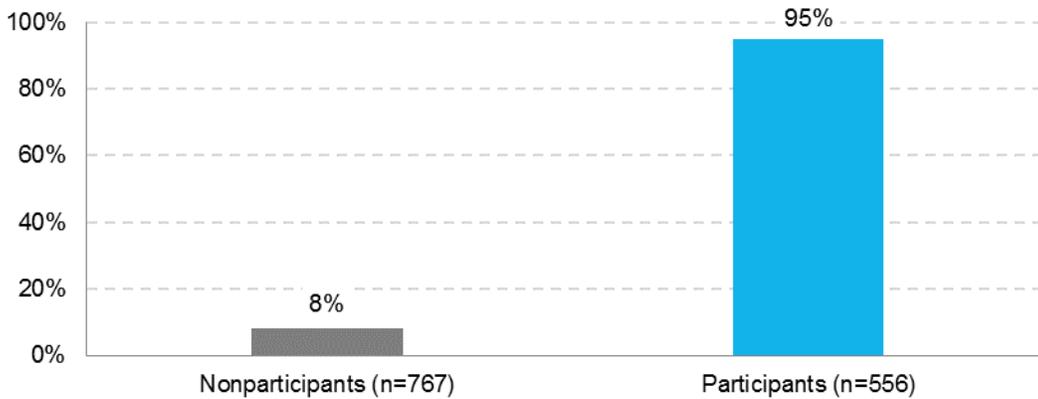


Figure F-2. Percentage of NYS Nonparticipant Home Energy Upgraders who had an Energy Audit Performed at their Home in the Past Two Years, by Respondent Type

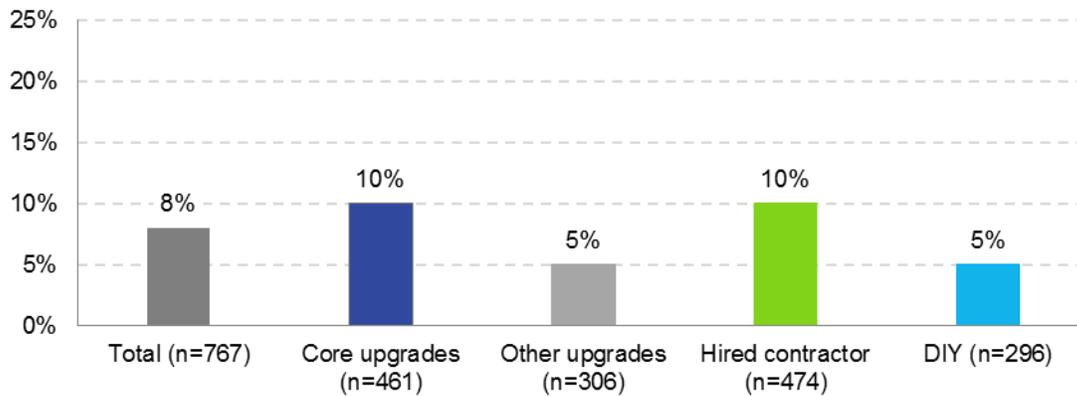
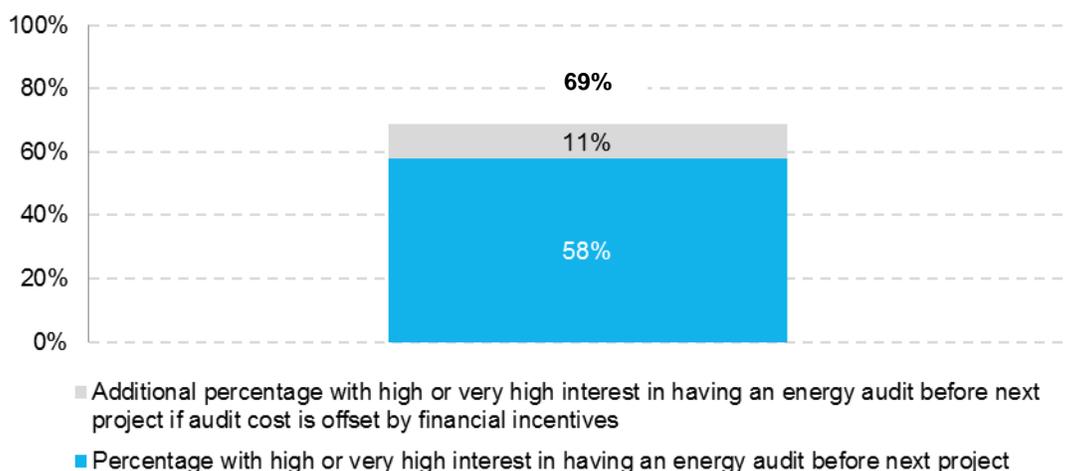
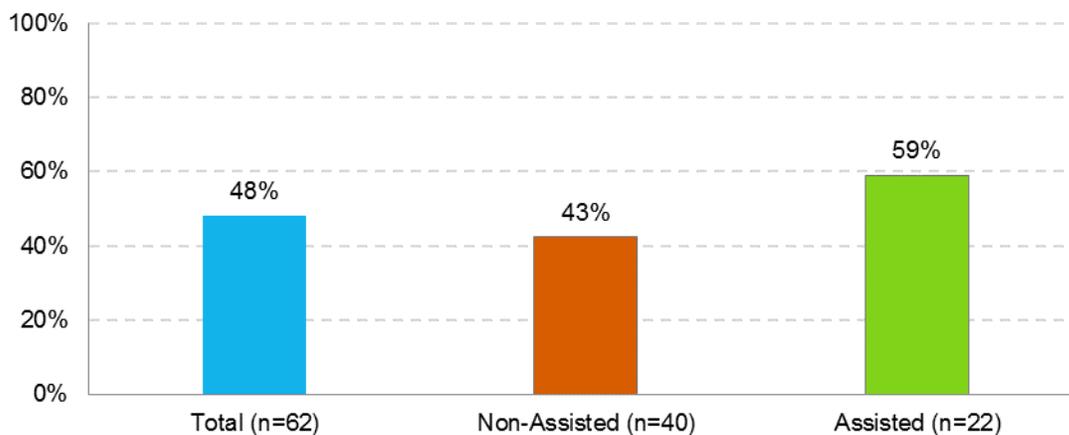


Figure F-3. Percentage of NYS Nonparticipant Home Energy Upgraders with High or Very High Interest in Having an Energy Audit before their Next Home Improvement Project (n=635)



About half of nonparticipant home energy upgraders who reported having an energy audit (48%) reported receiving a discount or incentive to offset the cost of the audit, and this percentage is substantially higher for assisted respondents compared to non-assisted respondents (Figure F-4). In addition, about half of the home energy upgraders who reported receiving a discount or incentive (47%) reported receiving an incentive from their utility, NYSERDA, or other organization.

Figure F-4. Percentage of NYS Nonparticipant Home Energy Upgraders Who Received a Discount or Incentive for their Energy Audit, by Respondent Type



Among the nonparticipant home energy upgraders who reported receiving a discount or incentive, more than three-fourths (77%) reported not paying anything for the audit (Table F-7). Nearly half of home energy upgraders who reported not receiving a discount or incentive also reported not paying anything for the audit. The mean reported cost of the audit for those respondents who received a discount or incentive

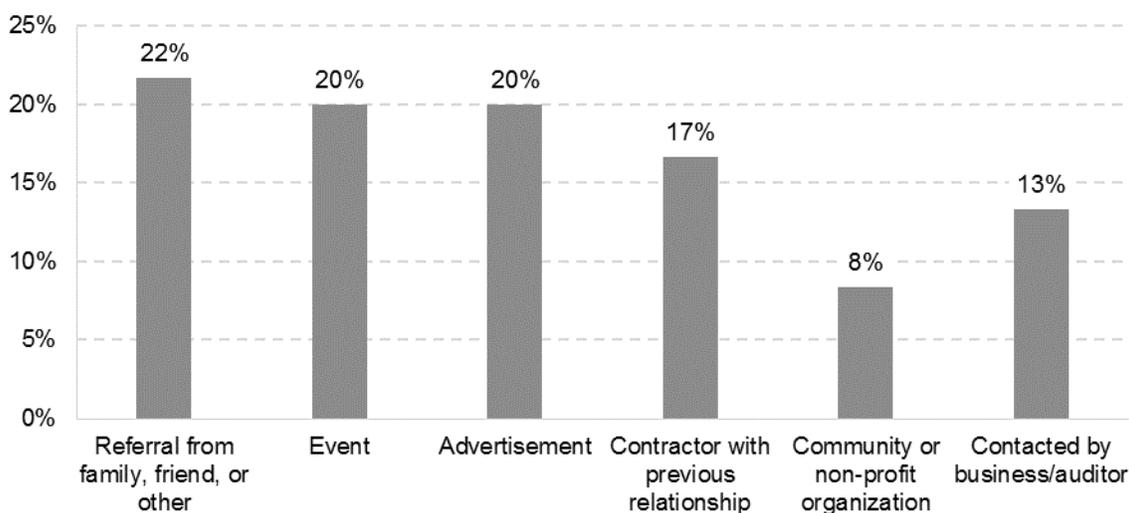
and paid some amount, is \$380, with a range of \$50 to \$1,000; the mean reported cost of the audit for those respondents who did not receive a discount or incentive, and paid some amount, is \$326, with a range of \$50 to \$1,000.

Table F-7. Amount NYS Nonparticipant Home Energy Upgraders Paid for their Energy Audit

	Received discount or incentive for audit (n=30)	Did not receive discount or incentive for audit (n=32)
Did not pay anything for audit	77%	44%
Paid for audit	23%	56%
Mean cost paid	\$380	\$326

NYS nonparticipant home energy upgraders who had an energy audit reported finding their auditor from a variety of sources, including referrals from friends, family, or others, events like home shows or street fairs, advertisements, their contractor, or community or non-profit organizations (Figure F-5). Some home energy upgraders reported being contacted directly by a business or auditor.

Figure F-5. Percentage of NYS Nonparticipant Home Energy Upgraders Who Found their Energy Auditor from Different Sources (n=60)



About three-fourths of NYS nonparticipant home energy upgraders who reported receiving an energy audit indicated that their auditor emphasized the upgrades that would save the most energy (73%) and that would most likely improve the comfort of their home (74%). This is substantially lower than the percentages for participating households who received an audit (Figure F-6). In addition, more nonparticipant assisted home energy upgraders and home energy upgraders who installed core energy upgrades reported that their auditor emphasized energy-saving and comfort-improving upgrades than did non-assisted home energy upgraders and home energy upgraders who reported installing other upgrades (Figure F-7).

Figure F-6. Percentage of NYS Nonparticipant Home Energy Upgraders and Participating Households Who Reported their Auditor Emphasized Upgrades that Save the Most Energy and that Most Likely Improve Comfort

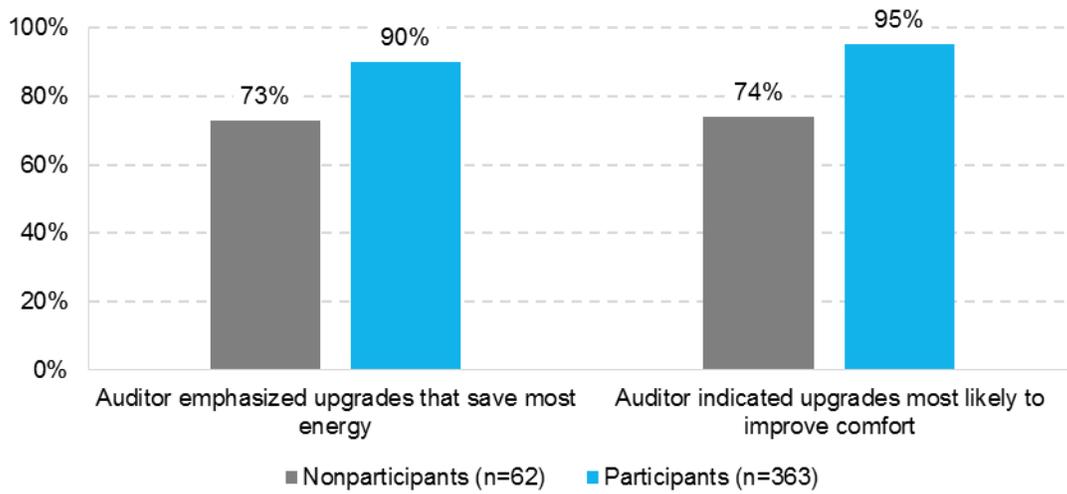
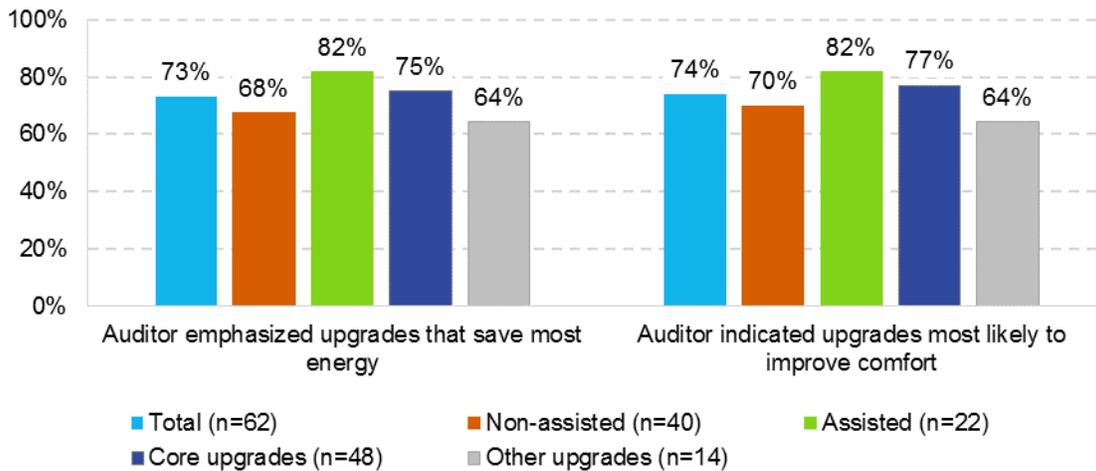
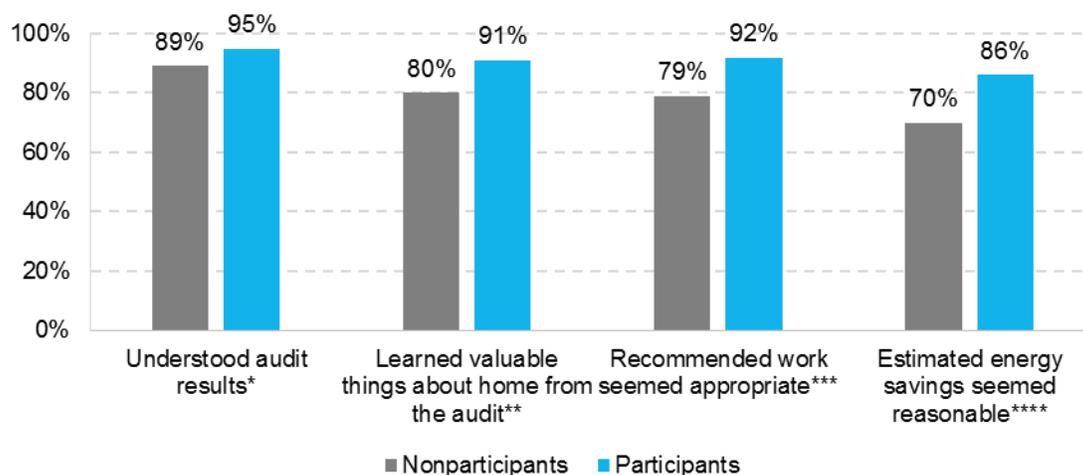


Figure F-7. Percentage of NYS Nonparticipant Home Energy Upgraders Who Reported that their Auditor Emphasized Upgrades that Save the Most Energy and that Most Likely Improve Comfort, by Respondent Type



A majority of NYS nonparticipant home energy upgraders who reported having an audit also ‘agreed’ or ‘strongly agreed’ with several statements about their audit. These included that they understood the audit results, they learned valuable things about their home from the audit, the recommended work seemed appropriate, and the estimated energy savings seemed reasonable (Figure F-8). Higher percentages of participating households, however, ‘agreed’ or ‘strongly agreed’ with the statements compared to nonparticipant home energy upgraders.

Figure F-8. Percentage of NYS Nonparticipant Home Energy Upgraders and Participating Households Who Agreed or Strongly Agreed with Statements about their Audit



* Nonparticipants = 61; Participants = 454

** Nonparticipants = 60; Participants = 433

*** Nonparticipants = 58; Participants = 442

**** Nonparticipants = 56; Participants = 404

About two thirds of NYS nonparticipant home energy upgraders who reported having an audit (66%, or 2% of panel) reported considering energy upgrades before the audit was performed. Slightly more non-assisted home energy upgraders and home energy upgraders who reported hiring a contractor considered energy upgrades before the audit compared to assisted home energy upgraders and home energy upgraders who reported not hiring a contractor (Figure F-9). The most common upgrades considered included insulation, windows, siding and/or doors, appliances, and HVAC (Figure F-10).

Figure F-9. Percentage of NYS Nonparticipant Home Energy Upgraders Who Considered Energy Upgrades before Energy Audit was performed, by Respondent Type

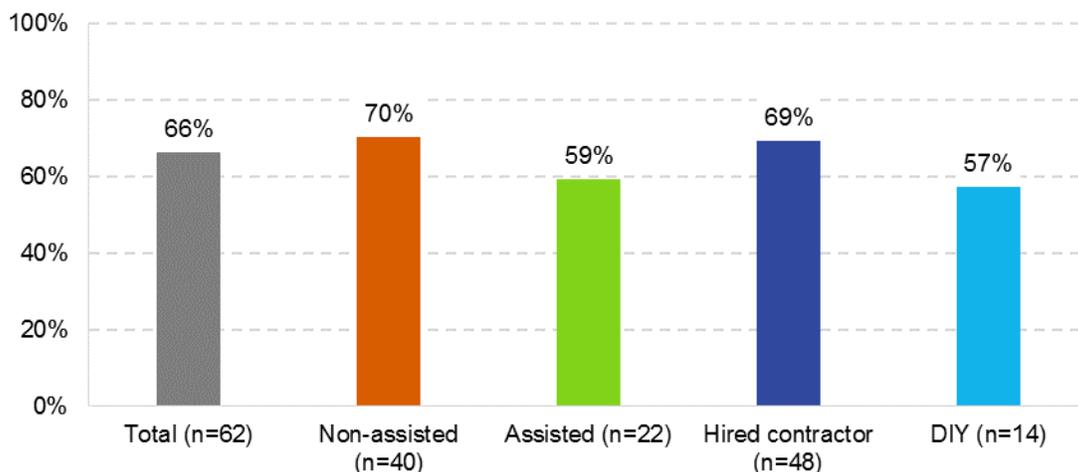
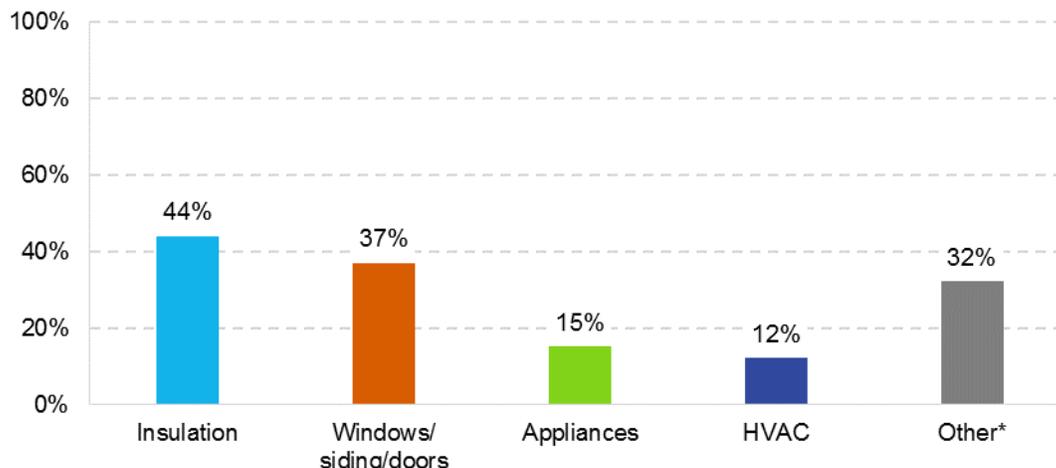


Figure F-10. Most Common Energy Upgrades Considered by NYS Nonparticipant Home Energy Upgraders before Energy Audit was Performed (n=41)



* Other includes solar, basement/attic finishing, efficient technologies (unspecified), water heater, roof, weatherization, and remodeling (unspecified).

Among NYS nonparticipant home energy upgraders who considered upgrades before their audit, more than half (56%) reported identifying upgrades through the audit they had not previously considered. Insulation was the most common previously unconsidered upgrade reported (57%), and other reported upgrades included weatherization, HVAC, windows or doors, ventilation, appliances, and plumbing (Table F-8). About half (48%) reported completing the recommended upgrade(s) in the past two years.

Table F-8. Upgrades Identified in Energy Audit that Nonparticipant Home Energy Upgraders had not Previously Considered

Upgrade	Number (n=23)
Insulation	13
Weatherization	3
HVAC	2
Windows/Doors	2
Ventilation	1
Appliances	1
Plumbing	1

About two-thirds of NYS nonparticipant home energy upgraders who reported having an energy audit also reported not hiring the firm that performed the audit to install their home improvement upgrades. This is a substantially higher percentage of households than was reported by participating households (Figure F-11). Nonparticipant home energy upgraders who reported not hiring the auditor’s firm reported that the auditor’s bid was too expensive, they installed the upgrades without a contractor, they had an existing

relationship with another contractor, they wanted a second opinion, they were referred to another contractor, and/or the auditor was unable to perform the work (Table F-9).

Figure F-11. Percentage of NYS Nonparticipants Home Energy Upgraders and Participating Households who had an Energy Audit but did Not Hire the Auditor to Install the Energy Upgrades

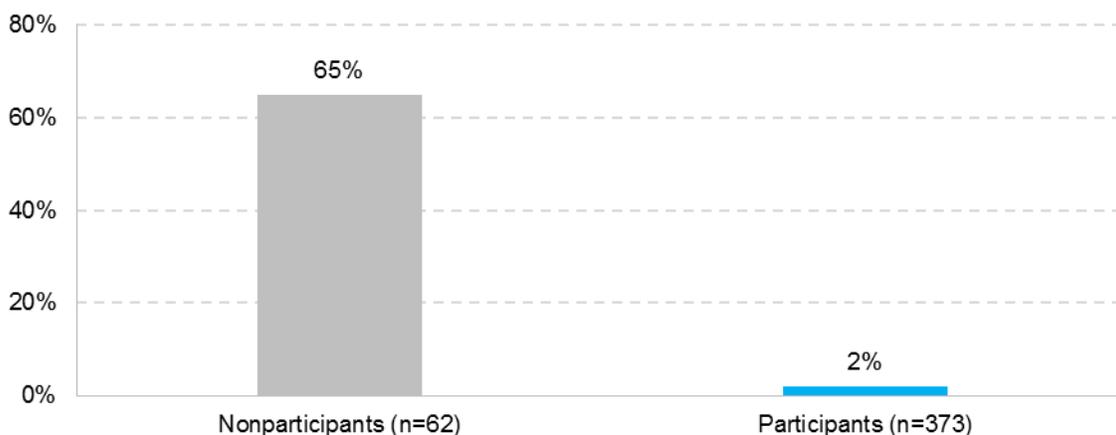


Table F-9. Reasons Nonparticipant Home Energy Upgraders Who Had an Energy Audit Did Not Hire the Auditor to Install Upgrades (n=40)

Reasons for not hiring auditor*	Percentage
Auditor’s bid was too expensive	28%
Did not need contractor to install upgrades	18%
Had existing relationship with another contractor	18%
Wanted a second opinion	10%
Auditor referred respondent to another contractor	5%
Auditor was unable to perform the work	5%
Other reason	20%

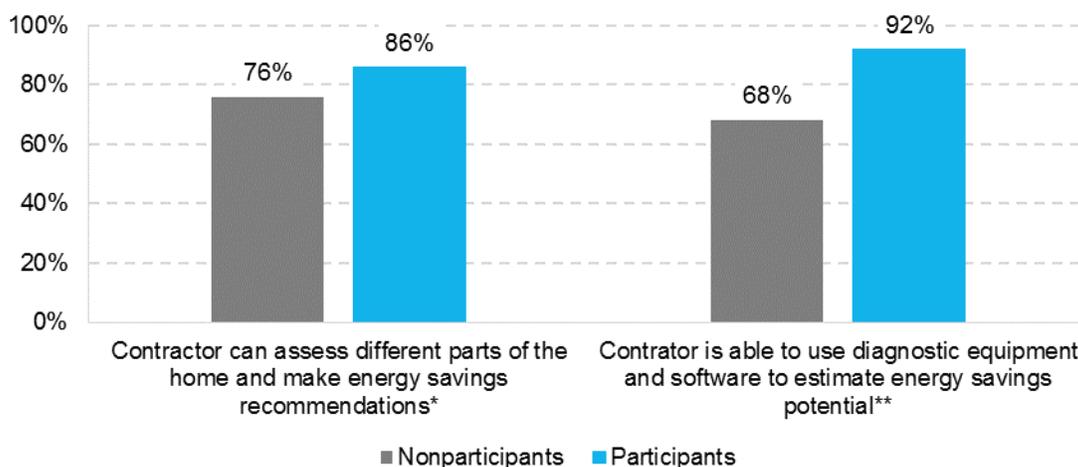
* Percentages sum to more than 100% because multiple responses were allowed.

F.5 Contractor Selection & Home Energy Upgrades

F.5.1 Contractor Selection

In general, when looking for a contractor, about three-fourths of all NYS nonparticipant home energy upgraders rated the contractor’s ability to assess different parts of the home, such as lighting or HVAC, and make energy savings recommendations as ‘important’ or ‘very important’ (Figure F-12). More than two-thirds rated the contractor’s ability to use diagnostic equipment or software to estimate energy savings potential as ‘important’ or ‘very important’. A higher percentage of participating households rated both of these contractor qualities as ‘important’ or ‘very important’.

Figure F-12. Percentage of Nonparticipant Home Energy Upgraders and Participating Households Who Think Contractors Who Can Assess and Diagnose Home Energy Systems and Potential Savings Are Important or Very Important

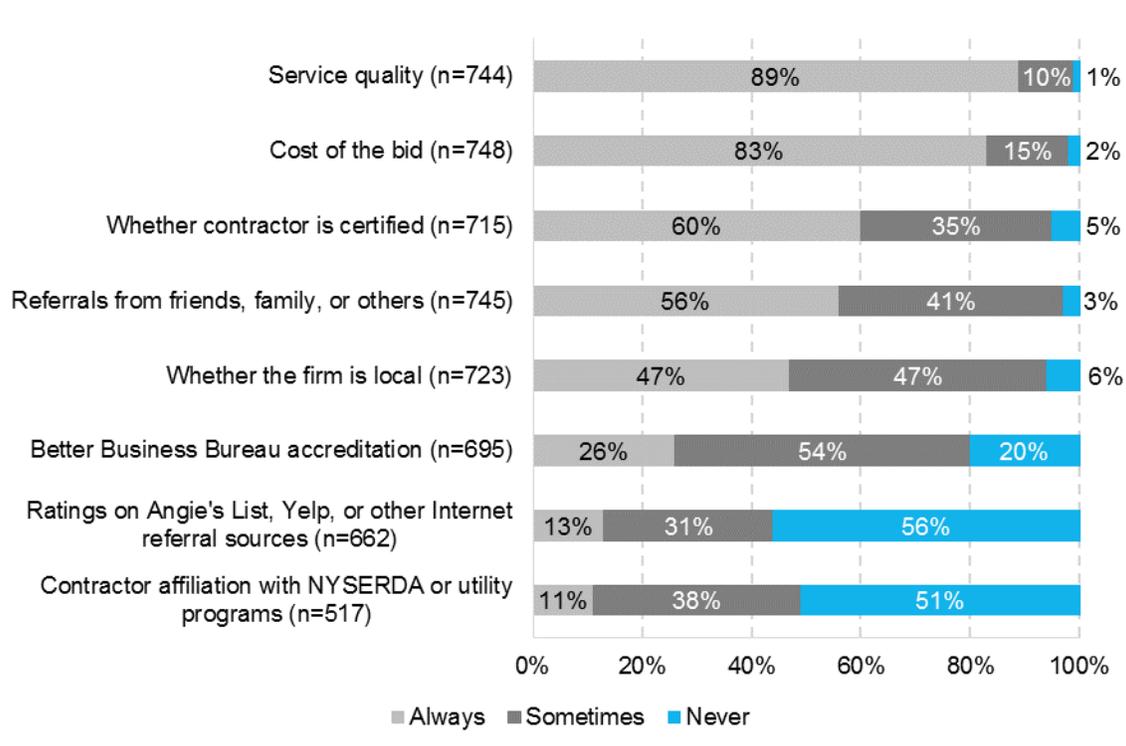


* Nonparticipants = 742; Participants = 485

** Nonparticipants = 709; Participants = 524

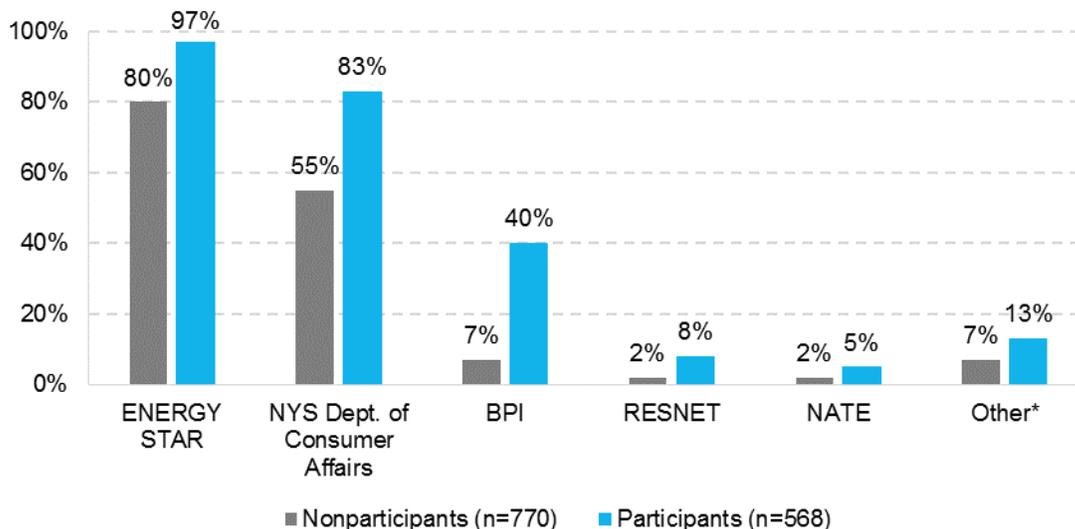
Nearly all NYS nonparticipant home energy upgraders also reported that they ‘always’ or ‘sometimes’ consider the contractor’s service quality; cost of bids; certification; referrals from friends, family, or others; local location; and Better Business Bureau accreditation when looking for a contractor (Figure F-13). A minority of home energy upgraders reported always or sometimes considering the contractor’s ratings on Angie’s List, Yelp, or other internet referral sources, or their affiliation with NYSERDA or utility programs. About 10% of home energy upgraders mentioned other means they use to evaluate contractors, which includes the following from most to least common: insured and/or licensed, local associations or referrals, previous work experience, availability, and personal interviews. In addition, compared to participating households, the only substantial difference is that a higher percentage of nonparticipant home energy upgraders reported always considering contractor certification (60% versus 41%, not shown in figure) when looking for a contractor.

Figure F-13. Percentage of NYS Nonparticipant Home Energy Upgraders Who Always, Sometimes, or Never Consider Various Contractor Characteristics



A majority of NYS nonparticipant home energy upgraders reported awareness of two organizations or agencies that contractors might be certified by or affiliated with: ENERGY STAR and the NYS Department of Consumer Affairs (Figure F-14). A small minority of home energy upgraders reported awareness of other organizations or agencies that the PE/MCA team asked about, such as the Building Performance Institute (BPI), the Residential Energy Services Network (RESNET), or North American Technician Excellence (NATE). A higher percentage of participating households reported awareness of all of the organizations or agencies compared to the nonparticipant home energy upgraders.

Figure F-14. Percentage of Nonparticipant Home Energy Upgraders and Participating Households Who Have Heard of Organizations or Agencies Contractors Might Be Certified by or Affiliated With



* "Other" includes county/state certification or license (unspecified), insured/bonded, Better Business Bureau rating, electrical or plumbing certification, ASHRAE, NARI, or union-affiliated.

Nearly two-thirds of NYS nonparticipant home energy upgraders (62%, or 25% of panel) reported hiring a contractor to perform their home improvement upgrades. There were no differences among assisted and non-assisted home energy upgraders (differences between home upgraders with reported core and other upgrades are discussed in the next section). Among home energy upgraders who reported hiring a contractor, about half (47%) reported getting more than one bid in the process of deciding on a contractor, which is substantially more than participating households reported getting (Figure F-15). In addition, more non-assisted home energy upgraders than assisted home upgraders reported getting multiple bids (Figure F-16). Nonparticipant home energy upgraders who reported getting multiple bids got, on average, three bids, with a range from two to 11.

Figure F-15. Percentage of NYS Nonparticipant Home Energy Upgraders and Participating Households who got Multiple Bids from Different Contractors

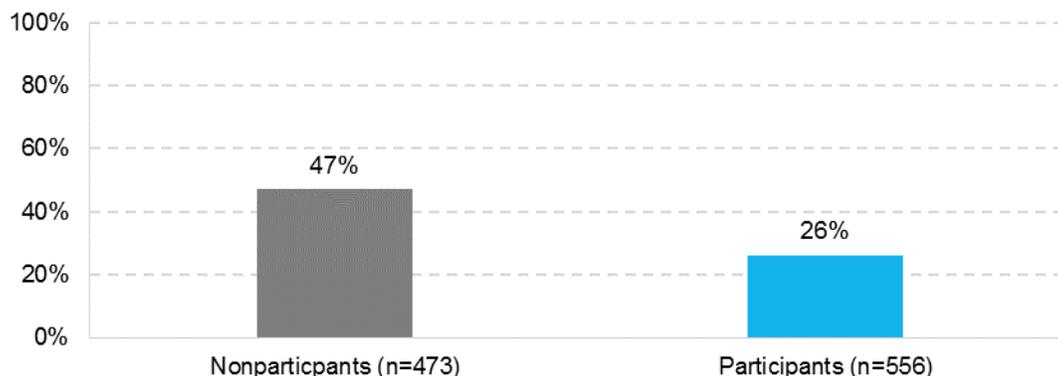
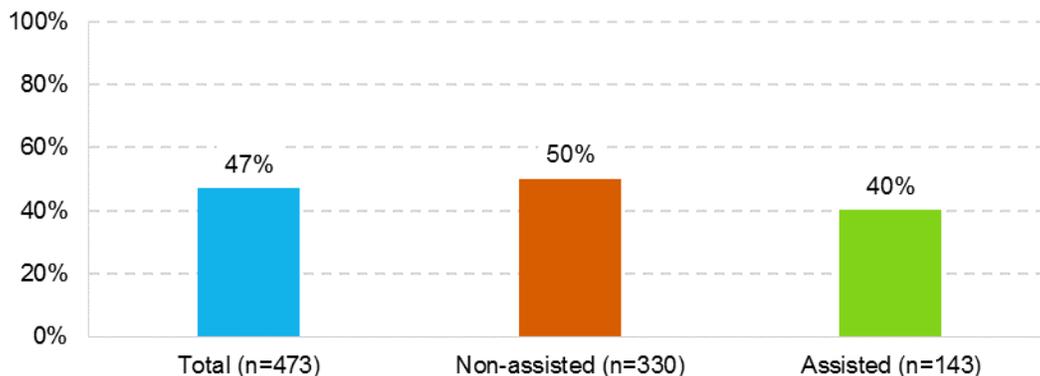
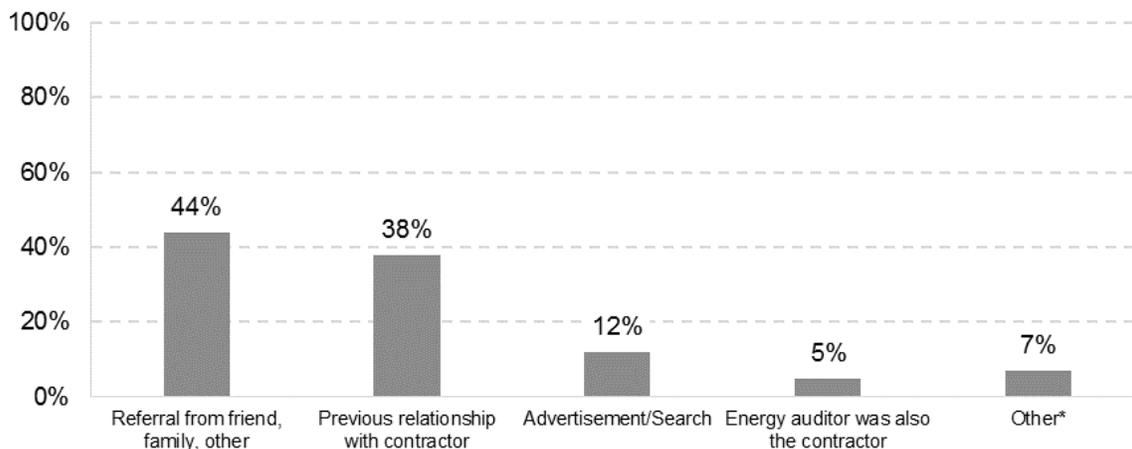


Figure F-16. Percentage of NYS Nonparticipant Home Energy Upgraders who got Multiple Bids from Different Contractors, by Respondent Type



Most NYS nonparticipant home energy upgraders who reported hiring a contractor reported receiving a contractor referral from friends, family, or others, or had a previous relationship with a contractor (Figure F-17). In contrast, nearly all participating households (81%) reported finding their contractor through their energy auditor or were contacted directly by their contractor (6%). A small percentage of nonparticipant home energy upgraders reported finding their contractor through advertisements or searches, or hiring their home energy auditor (if applicable). Among the home energy upgraders who reported finding their contractor through advertisements or searches, the most to least reported sources were the internet, newspapers, yellow pages, Angie’s List, and TV or radio (Table F-10).

Figure F-17. Percentage of NYS Nonparticipant Home Energy Upgraders Who Hired a Contractor and that Found their Contractor from Different Sources (n=448)



* "Other" includes community or non-profit organization, or events like home shows or street fairs.

Table F-10. Percentage of NYS Nonparticipant Home Energy Upgraders Who Found their Contractor through Advertisements or Searches, by Source (n=52)

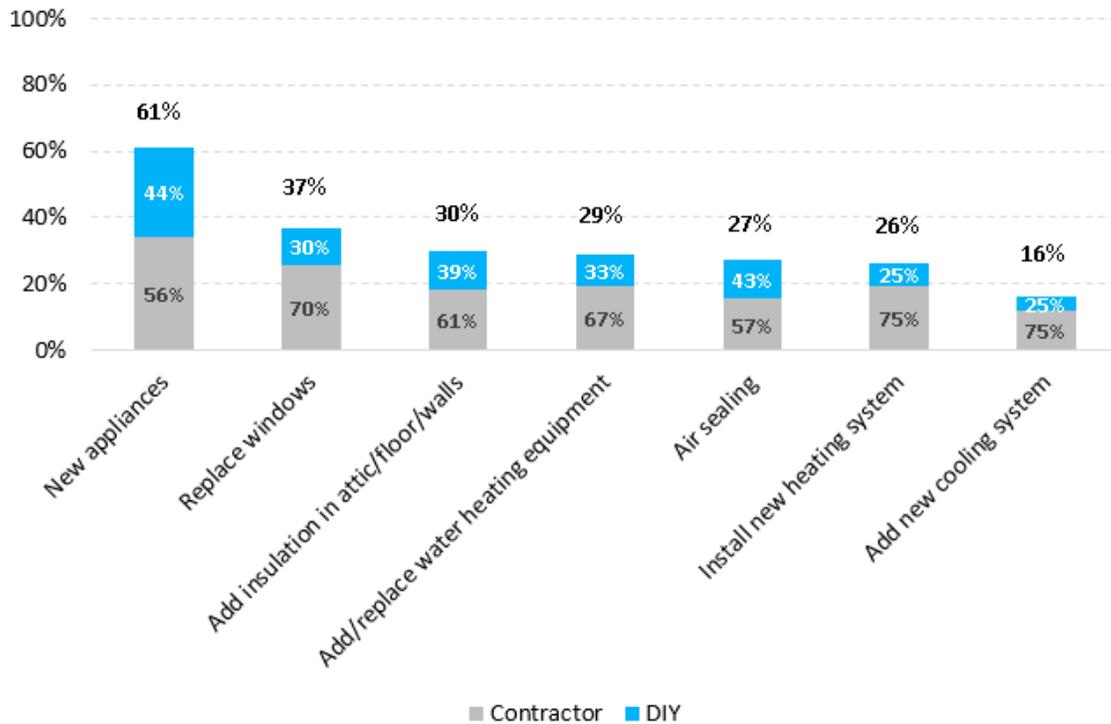
Advertisement or search source	Percentage
Internet	36%
Newspaper	31%
Yellow Pages	13%
Angie's List	10%
TV or radio	10%

F.5.2 Home Improvements

Over two-thirds of surveyed nonparticipant homeowners (67%) reported completing a home improvement in the past two years, which is similar to the AHS's (2013) estimate of 60% of Northeast owner-occupied households who reported a home improvement project in the past two years. Two-thirds of these nonparticipant homeowners (44% of panel) reporting making a home energy upgrade(s) as part of a home improvement project of \$2,000 or more in the past two years (nonparticipant home energy upgraders). A majority of nonparticipant home energy upgraders reported installing new appliances (61%, 25% of panel) and close to one-third reported replacing windows (37%, 15% of panel), adding insulation in the attic, floor, and/or walls (30%, 12% of panel), or adding or replacing water heating equipment (29%, 12% of panel) (Figure F-18). About one-fourth or less reported air sealing (27%, 11% of panel), installing new heating system (26%, 11% of panel), or adding a new cooling system (16%, 7% of panel).

More than half of nonparticipant home upgraders who reported making each home energy upgrade reported hiring a contractor for their home improvement project (Figure F-18). Substantially higher percentages of home upgraders who reported replacing windows or installing or adding HVAC systems, compared to home upgraders who made other upgrades, reported hiring a contractor.

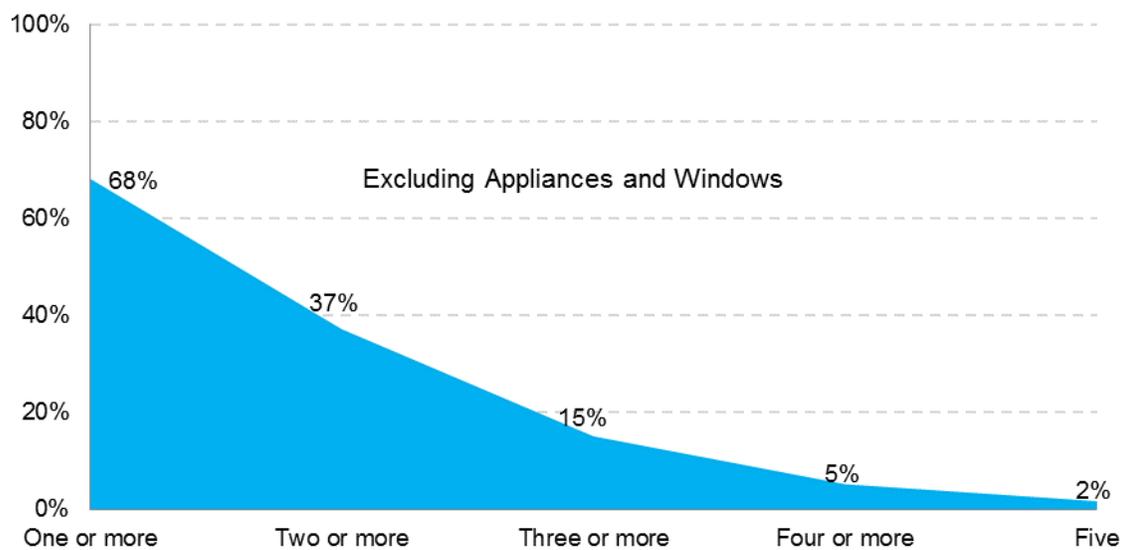
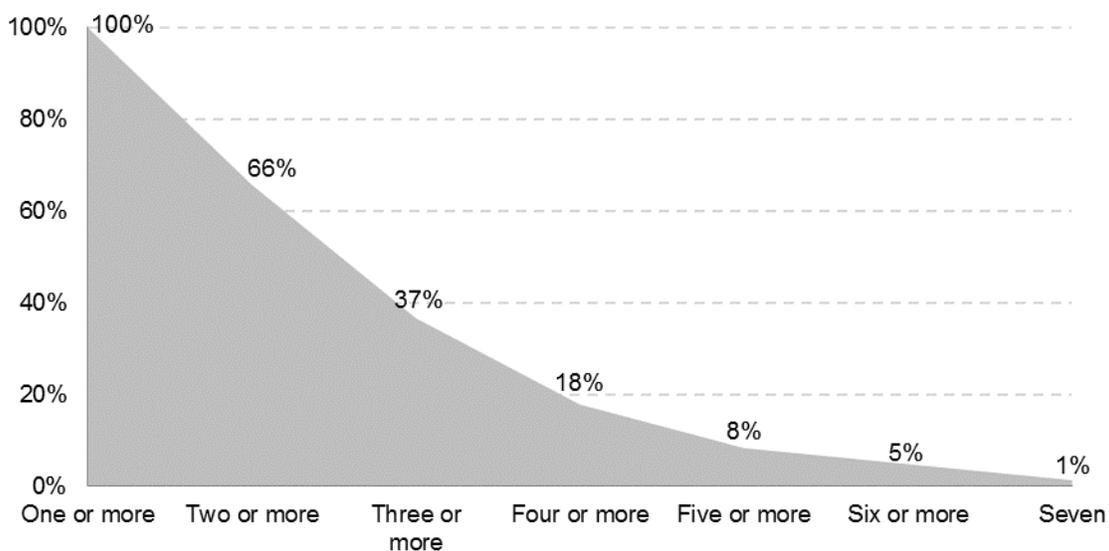
Figure F-18. Percentage of NYS Nonparticipant Home Energy Upgraders who Made Energy-Related Upgrades, and who Hired a Contractor or did the Upgrade Themselves (n=770)*



* Respondents could select more than one upgrade

. The average number of reported upgrades made per home energy upgrader is three, but some indicated a whole-house approach to installing their upgrades (Figure F-19). Eighteen percent (7% of panel) reported four or more of the energy-related upgrades, including insulation, air sealing, windows, water heating system, heating system, cooling system, and appliances; 5% reported four or more of the home energy upgrades, excluding windows and appliances.

Figure F-19. Percentage of Nonparticipant Home Energy Upgraders Who Made One or More Energy-related Upgrades as Part of their Home Improvement Project in the Past Two Years (n=770)*

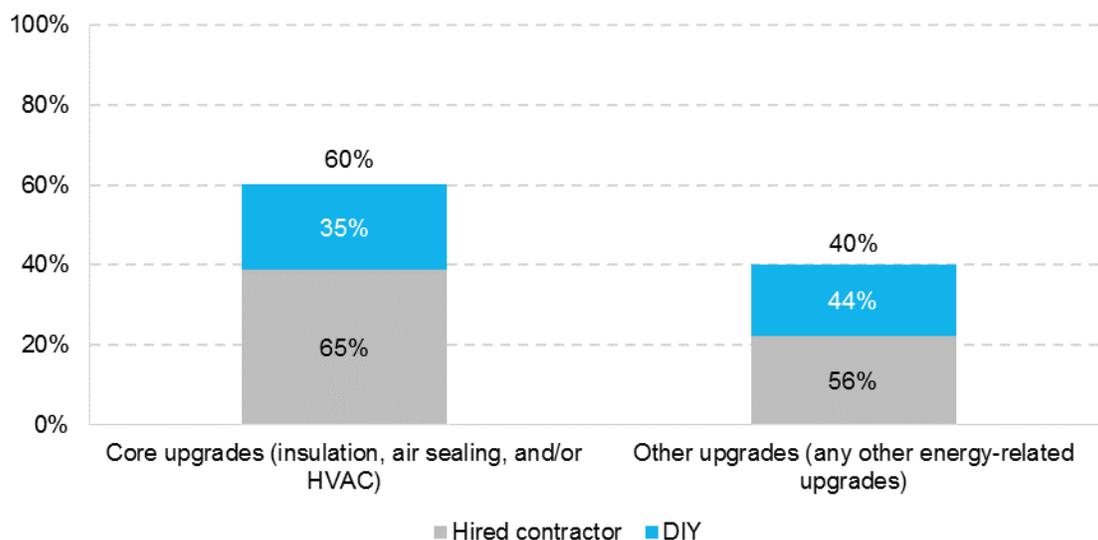


* Energy-related upgrades include heating equipment, cooling equipment, air sealing, insulation, appliances, windows, and water-heating equipment

In addition, substantially more nonparticipant home energy upgraders reported doing one or more of the core energy upgrades (60%, 25% of panel) compared to home energy upgraders who reported doing other upgrades (40%, 16% of panel) during the past two years (Figure F-20). Twenty percent (8% of panel) reported installing measures from all three core upgrade categories. In 2004, 3.4% of households (excluding Long Island) reported installing HVAC and/or insulation upgrades in the previous two years. In 2013, 23% of home energy upgraders (including those in Long Island) reported installing at least one of these measures in the past two years. Nearly two-thirds of the home energy upgraders who reported making

the core upgrades, compared to more than half of home energy upgraders who reported making other upgrades, reported hiring a contractor (Figure F-20).

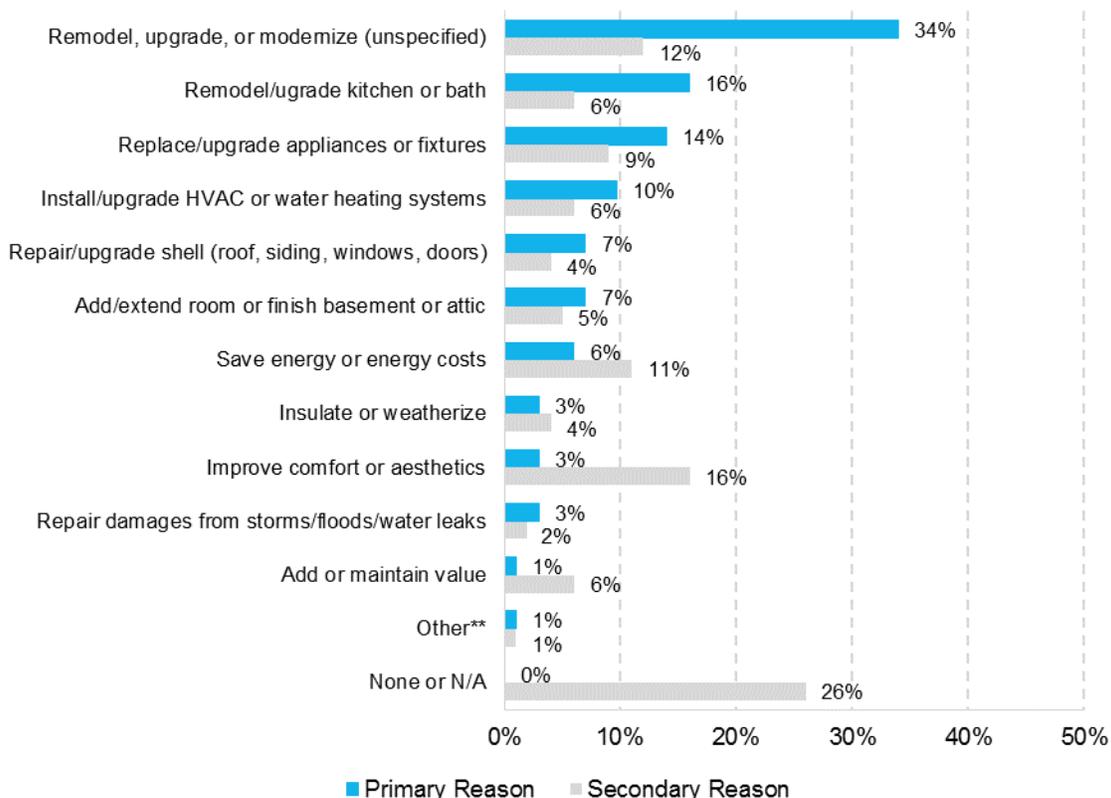
Figure F-20. Percentage of Nonparticipant Home Energy Upgraders with Home Improvement Projects that Included Core Energy Upgrades and Other Energy Upgrades (n=770)



F.5.2.1 Reasons, Motivations, and Satisfaction

Remodeling, upgrading, or modernizing the home was the most frequently mentioned open-ended reason NYS nonparticipant home energy upgraders reported for doing their home improvement project (Figure F-21). Some home energy upgraders also reported remodeling or upgrading their kitchen and/or bath, replacing or upgrading appliances and/or fixtures, or installing or upgrading the HVAC and/or water heating systems. Very few home energy upgraders mentioned repairing or upgrading the shell, adding or extending a room or finishing a basement or attic, saving energy or energy costs, insulating or weatherizing, improving comfort and/or aesthetics, repairing damages, or adding or maintaining the house’s value. Improving comfort and/or aesthetics, however, was the most frequently mentioned secondary reason reported by home energy upgraders. The next most frequent response was saving energy or energy costs.

Figure F-21. Percentage of NYS Nonparticipant Home Energy Upgraders Who Reported Primary and Secondary Reasons for their Home Improvement Project (n=770)*

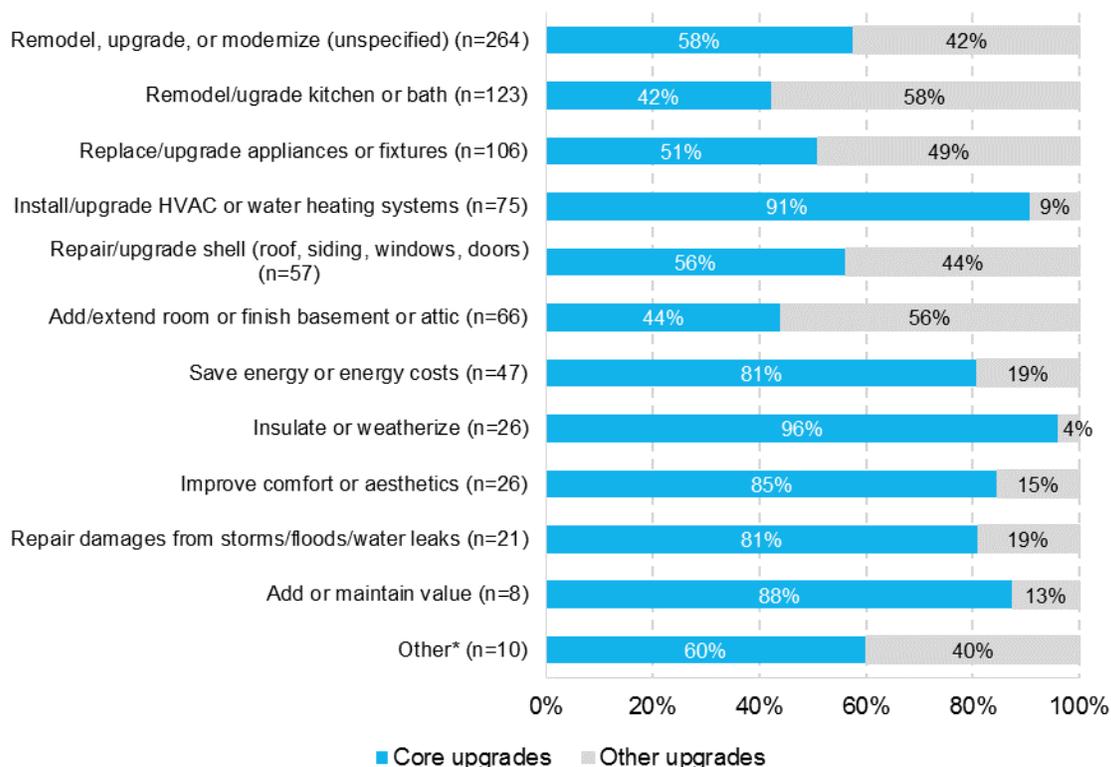


* Some respondents reported more than one primary and/or secondary reason

** "Other" includes build or buy a new home and upgrade/repair plumbing or electrical work

A substantially higher percentage of NYS nonparticipant home energy upgraders who spent \$2,000 in the past two years on a project reported installing the core upgrades if their primary reason for doing their home improvement project was energy system or housing value related. These reasons include insulating or weatherizing, installing or upgrading the HVAC and/or water heating systems, adding or maintaining the house’s value, improving comfort and/or aesthetics, saving energy or energy costs, repairing damages, or doing an unspecified remodel, upgrade, or modernization (Figure F-22). None of the core upgrades were most common when their primary reason included remodeling or upgrading a kitchen and/or bath, or adding or extending a room or finishing a basement or attic.

Figure F-22. Percentage of NYS Nonparticipant Home Energy Upgraders Who Installed Core Upgrades or Other Upgrades, by Primary Reason for Doing their Home Improvement Project



* "Other" includes build or buy a new home and upgrade/repair plumbing or electrical work

Most NYS nonparticipant home energy upgraders ranked as ‘important’ or ‘very important’ several motivations for doing their home improvement projects from a pre-defined list of potential motivations provided in the survey. These included: improving comfort, protecting home value, updating features, increasing home value, and reducing energy use or costs (Figure F-23). A majority of home energy upgraders also reported improving indoor air quality and helping the environment, and about half reported adding living space as ‘important’ or ‘very important’. Of the motivations in the list, more home energy upgraders rated improving comfort as the most important, followed by updating features and reducing energy use or costs (Figure F-23). In addition, a majority of home energy upgraders who ranked each of the motivations for doing their home improvement project in Figure 23 as important or very important also reported that their project fulfilled their motivations (Figure F-24).

Figure F-23. Percentage of NYS Nonparticipant Home Energy Upgraders Who Rated Motivations for Doing their Home Improvement Project as Important or Very Important, and the Most Important Motivation

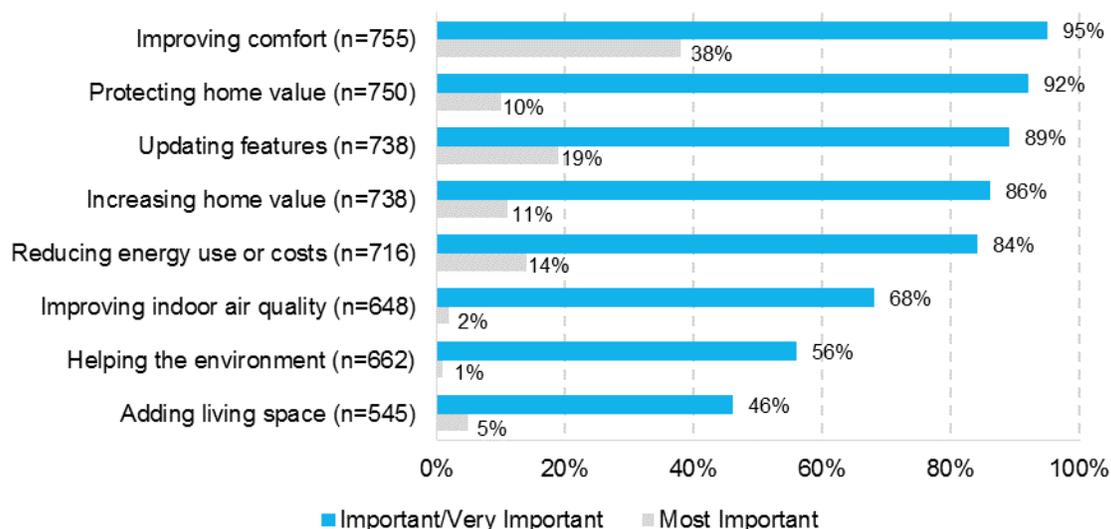
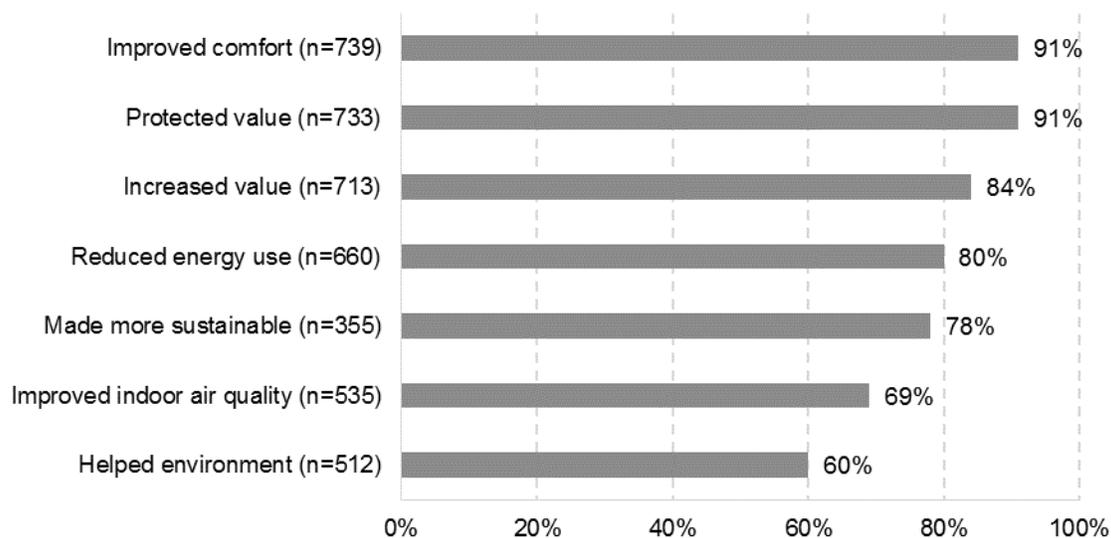


Figure F-24. Percentage of NYS Nonparticipant Home Energy Upgraders Who Agreed or Strongly Agreed that their Project Fulfilled their Motivation for Doing It

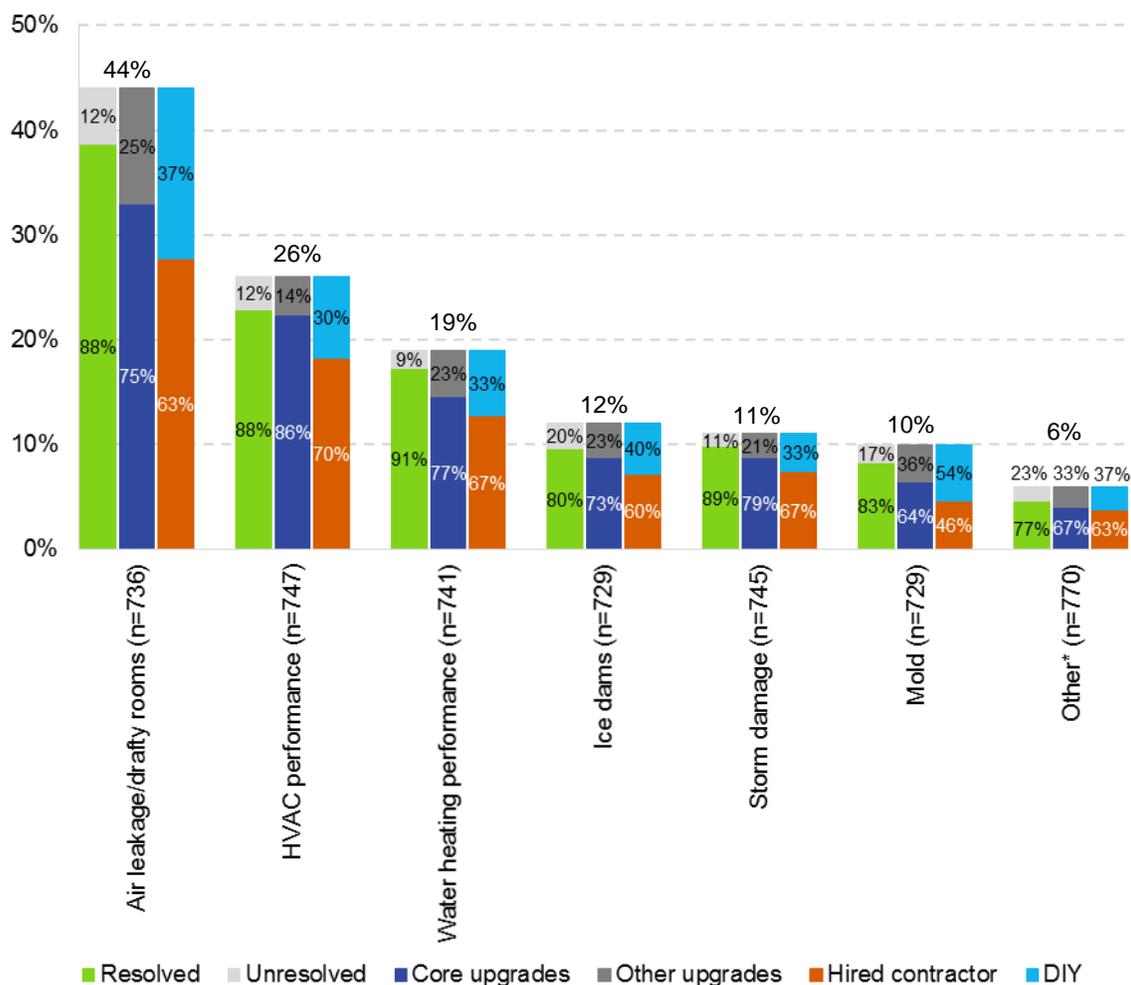


Before doing their home improvement project, about half of NYS nonparticipant home energy upgraders reported that they experienced problems with air leakages or drafty rooms (44%, 18% of panel), and about one-fourth reported problems with HVAC performance (26%, 11% of panel). Less than one-fourth reported problems with water heating equipment (19%, 8% of panel), ice dams (12%, 5% of panel), storm damage (11%, 5% of panel), mold (10%, 4% of panel), or other unspecified problems (6%, 2% of panel) (Figure

F-25). Nearly all nonparticipant home energy upgraders with each problem resolved the problem when doing their home improvement project.

A substantially higher percentage of nonparticipant home energy upgraders reported installing the core upgrades if they were experiencing problems with HVAC performance or storm damage compared to respondents who reported experiencing the other problems, although a majority experiencing any of the problems reported installing the core upgrades (Figure F-25). A higher percentage also reported hiring a contractor if they were experiencing problems with HVAC performance, water heating performance, or storm damage compared to respondents who were experiencing other problems (Figure F-25); however, a majority of home energy upgraders who were experiencing any of the problems, except mold, reported hiring a contractor to do their home improvement project.

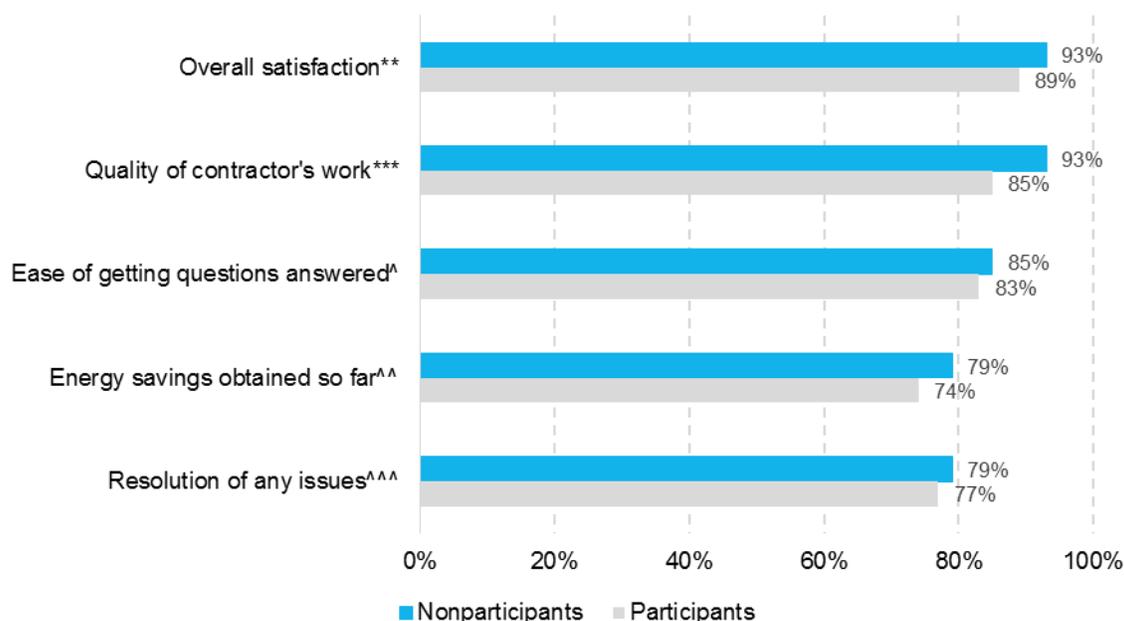
Figure F-25. Percentage of NYS Nonparticipant Home Energy Upgraders Who Experienced Problems before their Home Improvement Project, and, of those, whether their Problem was Resolved after their Project, whether they Installed Core or Other Upgrades, and whether they Hired a Contractor



* "Other" includes radon, water leakage, appliance, old age, plumbing or electrical, pest, gutter, or foundation problems.

Most NYS nonparticipant home energy upgraders reported being somewhat or very satisfied with their home improvement project overall, and with the quality of their contractor’s work (if applicable) (Figure F-26). Large percentages also reported satisfaction with the ease of getting their questions answered, the energy savings they obtained so far, and the resolution of any issues that emerged during the project. Home energy upgraders who reported dissatisfaction with any of these aspects also mentioned the reasons they were dissatisfied, which include low quality or incomplete contractor work, no or insufficient energy savings, and poor contractor communication or availability (Table F-11).

Figure F-26. Percentage of NYS Nonparticipant Home Energy Upgraders and Participating Households Somewhat or Very Satisfied with Aspects of their Home Improvement Project*



* Differences between nonparticipant home energy upgraders and participating households are not statistically significant.

** Nonparticipants = 751; Participants = 564

*** Nonparticipants = 472; Participants = 565

^ Nonparticipants = 698; Participants = 561

^^ Nonparticipants = 643; Participants = 532

^^^ Nonparticipants = 386; Participants = 465

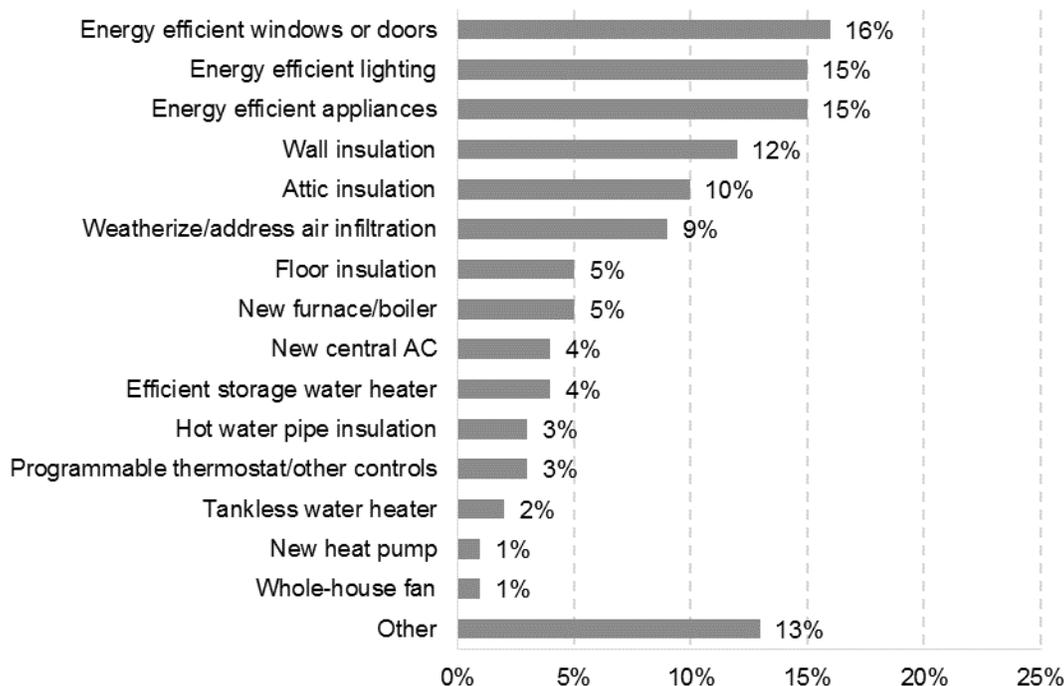
Table F-11. NYS Nonparticipant Home Energy Upgraders' Reasons for Dissatisfaction with Aspects of their Home Improvement Project

	Primary reason(s)	Other reason(s)
Dissatisfied with quality of contractor's work (n=30)	80% low quality or incomplete work	20% poor communication or higher than expected costs
Dissatisfied with energy savings obtained so far (n=29)	81% no or not enough savings	19% poor quality or costly upgrade(s)
Dissatisfied with ease of getting questions answered (n=33)	88% poor communication or availability	12% had to go to supervisor/manager
Dissatisfaction with resolution of any issues (n=32)	46% poor availability, responsiveness, or quality 38% respondent resolved alone, paid more to resolve, filed insurance claim, or hired another contractor	16% issue not yet resolved

F.5.2.2 Future Upgrades

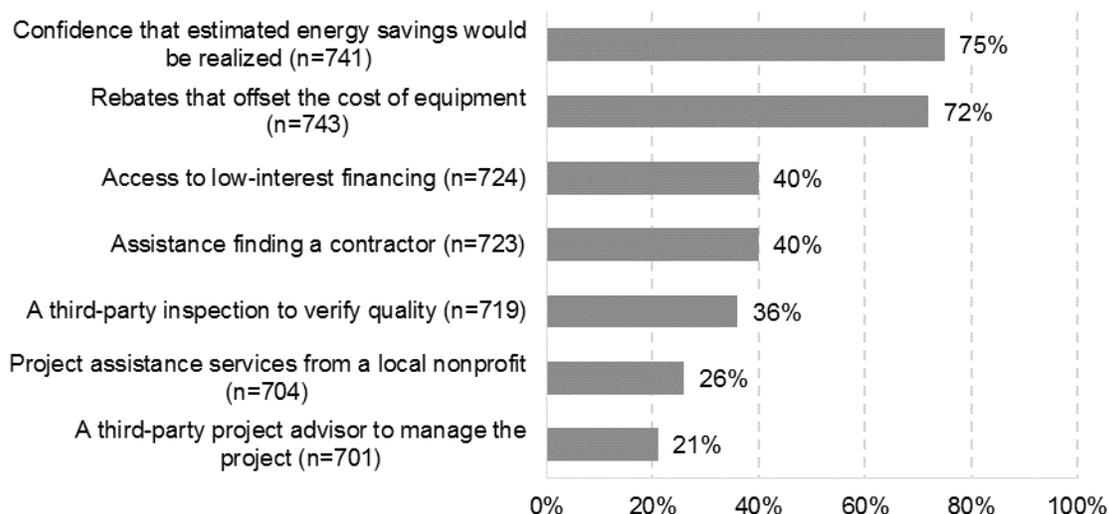
About half of NYS nonparticipant home energy upgraders (49%, or 20% of the panel) reported planning to do at least one other upgrade in the next two years to reduce their home's energy usage. The most frequently mentioned upgrades include energy-efficient windows or doors, energy-efficient lighting, energy-efficient appliances, wall or attic insulation, and weatherization (Figure F-27).

Figure F-27. Percentage of NYS Nonparticipant Home Energy Upgraders Who Plan to Make Upgrades to Reduce their Home's Energy Use in the Next Two Years (n=770)



About three-fourths of NYS nonparticipant home energy upgraders who spent \$2,000 in the past two years on a project that included a home upgrade indicated that confidence in realizing estimated energy savings and rebates to offset the cost of upgrades were ‘important’ or ‘extremely important’ in helping them purchase energy-efficient upgrades in the future (Figure F-28). More than one-third mentioned access to low-cost financing, assistance finding a contractor, or a third-party inspection to verify quality; about one-fourth reported project assistance services from a local nonprofit or a third-party project advisor to manage the project.

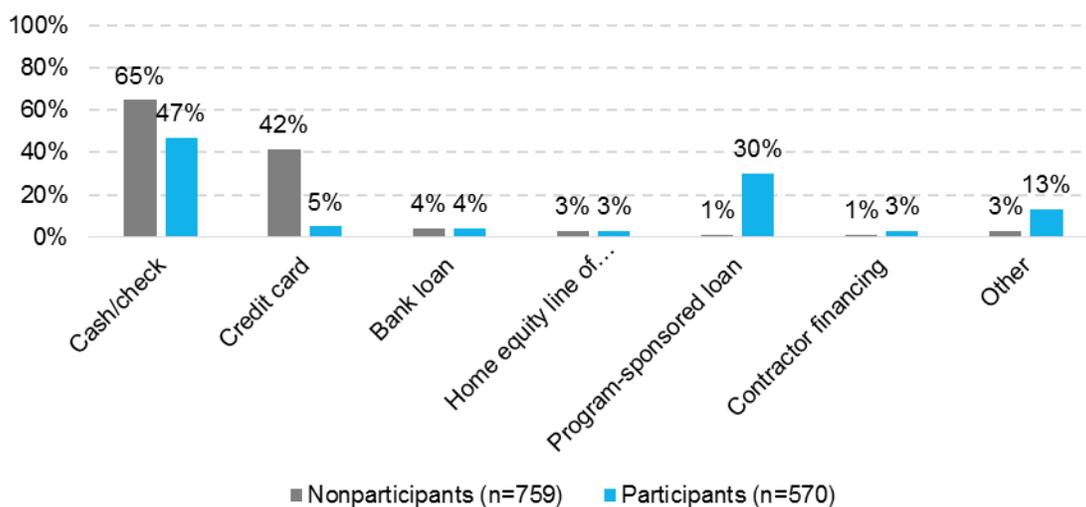
Figure F-28. Percentage of NYS Nonparticipant Home Energy Upgraders Who Ranked as Important or Extremely Important Items that Would Help Them Purchase Energy Efficient Upgrades in the Future



F.6 Project Funding and Awareness of Programs

Most NYS nonparticipant home energy upgraders reported paying for their project with cash/check and/or with a credit card (Figure F-29). In contrast, more than three-fourths of HPwES participating households reported paying with cash/check or a program-sponsored loan, while a lot fewer reported paying with a credit card, indicating that the credit terms for program-sponsored and other loans may be more beneficial.

Figure F-29. Percentage of NYS Nonparticipant Home Energy Upgraders and Participating Households Who Paid for their Home Improvement Project with Different Payment Methods*

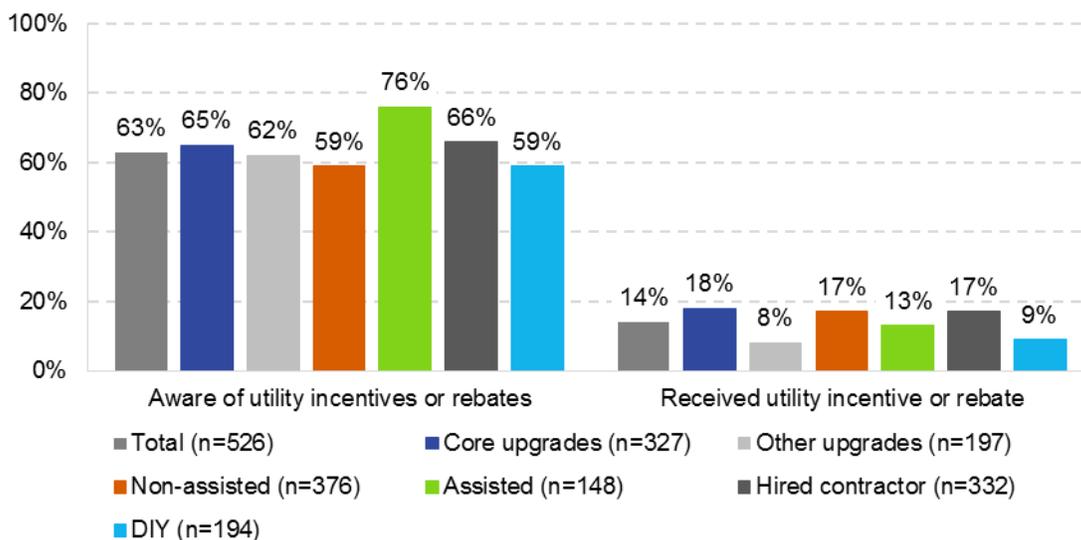


* Respondents could select more than one payment method.

** "Other payment method" includes home equity line of credit, contractor financing, and other unspecified payment method.

Nearly two-thirds of NYS nonparticipant home energy upgraders who spent \$2,000 in the past two years on a project that included a home upgrade (63%, 26% of panel) reported awareness of utility incentives or rebates, and this was significantly higher for assisted home energy upgraders (Figure F-30). In addition, a small percentage of home energy upgraders (14%, 6% of panel) reported that they received a utility incentive or rebate for their home improvement project.

Figure F-30. Percentage of NYS Nonparticipant Home Energy Upgraders Who Reported Awareness of and Received Utility Rebates or Incentives



A much smaller percentage of NYS nonparticipant home energy upgraders reported awareness of NYSERDA programs that provide rebates and incentives (compared to those aware of utility programs). About one-third reported awareness of NYSERDA programs (31%, 14% of panel), 21% reported awareness of HPwES specifically (9% of panel), and 12% considered using HPwES for their home improvement project (57% of those aware, 5% of panel) (Figure F-31). In contrast, in 2004, 20% of nonparticipant respondents who upgraded HVAC or insulation in the previous two years reported awareness of HPwES. Among nonparticipant home energy upgraders who considered using HPwES, the most frequently mentioned reasons for why they didn't use it were that they were ineligible, especially the assisted respondents (Figure F-32). Other reasons reported include the program was too expensive or incentives were not large enough, the needed incentives expired, the process was too burdensome or took too long, they had participated previously, or they did not want to use a NYSERDA contractor.

Figure F-31. Percentage of NYS Nonparticipant Home Energy Upgraders Who Reported Awareness of NYSERDA Programs and HPwES, and Who Considered Using HPwES (n=770)

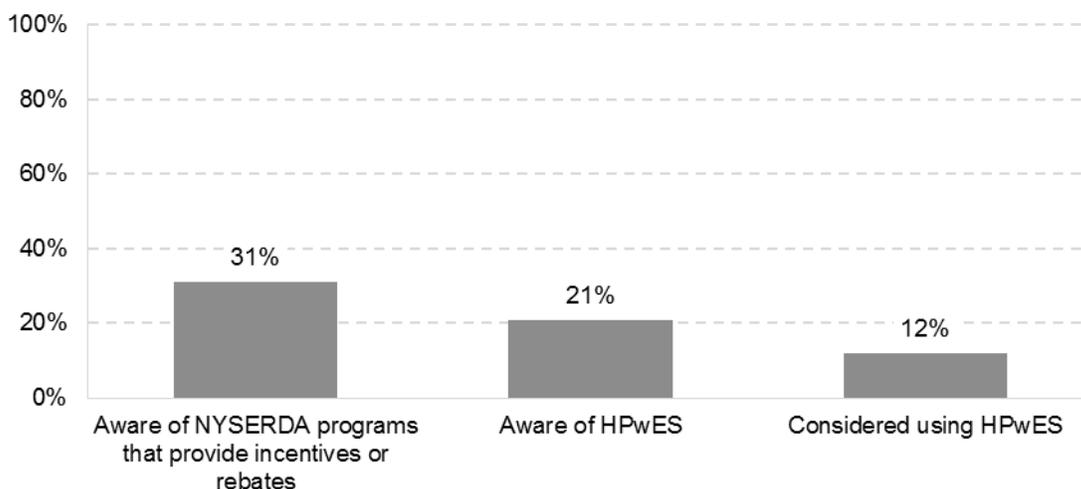
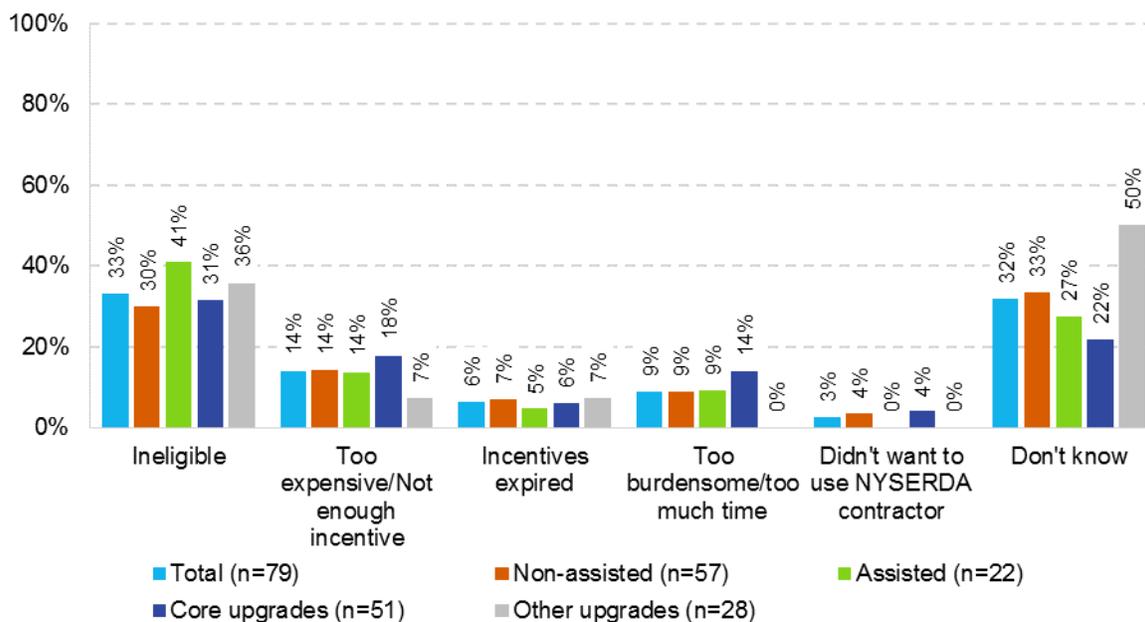


Figure F-32. Percentage of NYS Nonparticipant Home Energy Upgraders Who Cited Reasons for Not Participating in HPwES



Overall, 12% of NYS nonparticipant home energy upgraders reported receiving grants, non-utility or non-NYSERDA incentives, or tax credits (Figure F-33). A higher percentage of assisted home energy upgraders, home energy upgraders who reported installing core upgrades, and home energy upgraders who reported hiring a contractor reported receiving funds from these sources than did non-assisted home energy upgraders, home energy upgraders who reported installing other upgrades, and home energy upgraders who reported not hiring a contractor. The most frequently mentioned source of these funds was the IRS or federal government, followed by the NYS government, other source, or the city or town government (Figure F-34).

Figure F-33. Percentage of NYS Nonparticipant Home Energy Upgraders Who Received Grants, Non-Utility or Non-NYSERDA Incentives, or Tax Credits for the Equipment Installed, by Respondent Type (n=770)

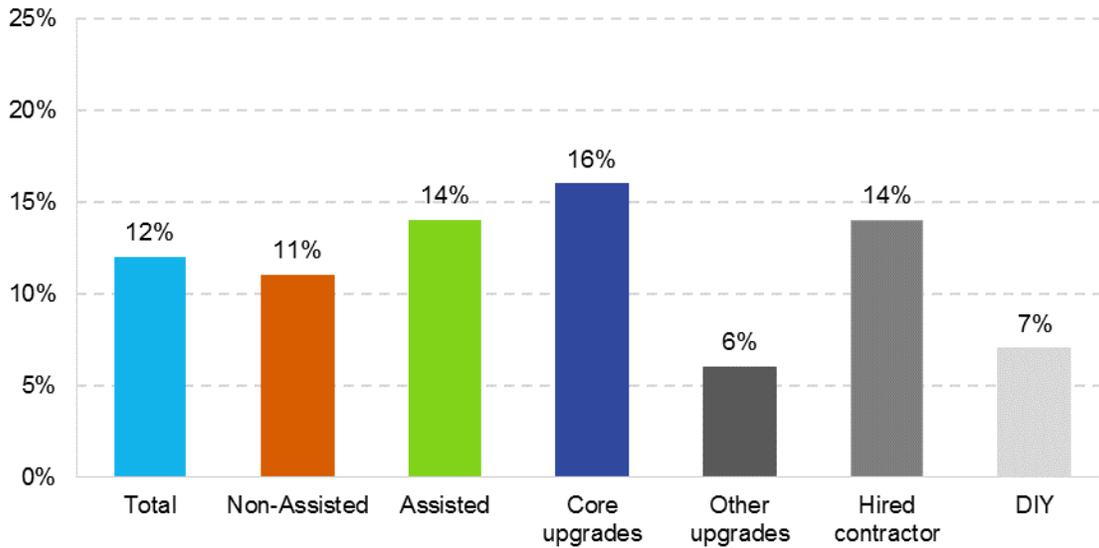
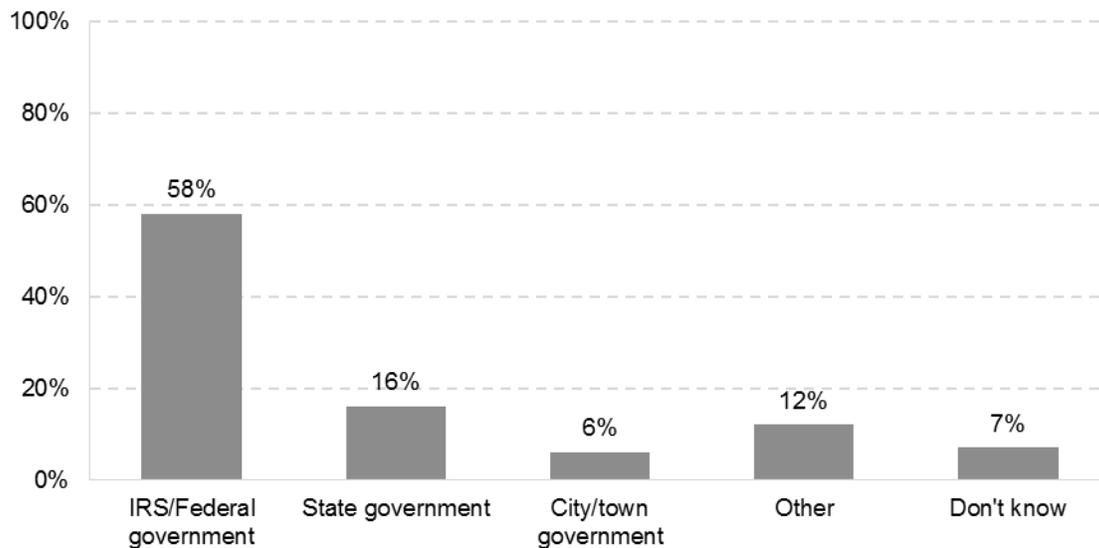


Figure F-34. Percentage of NYS Nonparticipant Home Energy Upgraders Who Reported the Source of their Grant, Non-Utility or Non-NYSERDA Incentive, or Tax Credit for the Equipment Installed (n=69)



F.7 Survey Questionnaires

F.7.1 Incidence Test Web Survey Instrument

Q1. In which state do you reside? __ (IF ≠ NY, THANK AND TERMINATE)

Q2. Are you the person who makes decisions regarding your home?

1. Yes
2. No → THANK AND TERMINATE

Q3. Do you own or rent your home?

1. Own
2. Rent

Q4. How would you describe your home, is it a ...?

1. Freestanding single-family home
2. Single-family attached home like a townhouse or duplex or triplex
3. Condominium or apartment → THANK AND TERMINATE
4. Manufactured or mobile home
5. Other (please specify): _____
98. Don't know → THANK AND TERMINATE
99. Refused → THANK AND TERMINATE

Q5. In the past two years, have you made any home improvements or additions totaling \$2,000 or more?

1. Yes
2. No → THANK AND TERMINATE

Q6. Did your home improvements or additions include any of the following?

1. Insulation in attic, floors, or walls
2. Air sealing to reduce drafts
3. New windows
4. Programmable thermostat
5. New water heating equipment
6. New heating system (such as a furnace, heat pump, or boiler)
7. New central air conditioner
8. New appliances (like your refrigerator or laundry machines)
9. Other (please specify): _____
10. None of the above

F.7.2 Nonparticipant Consumer Web Survey Instrument

F.7.2.1 Screening

- S1. Do you own or rent your home?
1. Own
 2. Rent
- S2. How would you describe your home, is it a...?
11. Freestanding single-family home
 12. Single-family attached home like a townhouse or duplex or triplex
 13. Condominium or apartment → THANK AND TERMINATE
 14. Manufactured or mobile home
 15. Other (please specify): _____
 98. Don't know → THANK AND TERMINATE
 99. Refused → THANK AND TERMINATE
- S3. In the past two years have you completed renovations to your home that involved any of the following? [Read List, Randomize, Multiple Responses Allowed] [YES=1, NO=2, DK=98, REF = 99]
1. Breaking through an outside wall to add rooms, extend a room, or raise part of the roof?
 2. Adding insulation in attic, floors, or walls?
 3. Air sealing to reduce drafts?
 4. Replacing windows?
 5. Adding or replacing water heating equipment?
 6. Installing a new heat pump or heating system, like a furnace or boiler?
 7. Adding a new central air conditioner?
 8. New appliances (like your refrigerator or laundry machines)?
 9. Remodeling or upgrading a kitchen?
 10. Adding or updating a bathroom?
 11. Finishing a basement?
 12. None of these → Thank and terminate.
- [IF S3 = 2, 3, 6, or 7 → Respondent = Group 2; IF S3 = 4, 5, or 8 and NOT 2, 3, 6, or 7 Respondent = Group 1; IF S3 = 1, 9, 10, or 11 and NOT 2, 3, 4, 5, 6, 7, or 8 → THANK & TERMINATE]
- S4. Did these renovations cost \$2,000 or more?
1. Yes
 2. No → THANK AND TERMINATE
 98. Don't know → THANK AND TERMINATE
 99. Refused → THANK AND TERMINATE
- S5. What was the main purpose for this project? [WEB VERSION SHOULD BE AN OPEN-END. FOR PHONE VERSION, SHOW CODES BUT DO NOT READ AND ALLOW SINGLE RESPONSE.]
1. Replace old or failing equipment

2. Modernize kitchen and/or bath
 3. Add or reconfigure living space
 4. Reduce household energy use or costs
 5. Repair or replace exterior of the house
 6. Repair or replace interior elements of the house
 7. Repair due to damage, natural disaster,
 8. Improve comfort [e.g. stop drafts; keep cooler in the summer or warmer in the winter]
 9. Access funding to help offset the cost of the project
 10. Improve indoor air quality
 11. Protect the value of my home
 12. Some other reason? _____
 98. Don't know
 99. Refused
- S6. What were some of the other purposes of the project? [WEB VERSION SHOULD BE AN OPEN-END. FOR PHONE VERSION, SHOW CODES BUT DO NOT READ AND ALLOW SINGLE RESPONSE.]
1. Replace old or failing equipment
 2. Modernize kitchen and/or bath
 3. Add or reconfigure living space
 4. Reduce household energy use or costs
 5. Repair or replace exterior of the house
 6. Repair or replace interior elements of the house
 7. Repair due to damage, natural disaster,
 8. Improve comfort [e.g. stop drafts; keep cooler in the summer or warmer in the winter]
 9. Access funding to help offset the cost of the project
 10. Improve indoor air quality
 11. Protect the value of my home
 12. Some other reason? _____
 13. No other reasons
 98. Don't know
 99. Refused
- S7. In approximately what month and year did you complete this project? Record as verbatim response. 98 DK 99 Ref
- S8. Next, so I can be sure to ask the right questions, in the past year has your household received Social Security or disability income, or any public assistance such as Home Energy Assistance, Lifeline telephone service assistance, healthcare assistance like Medicaid, or nutrition assistance like food stamps?
1. Yes → ASSIGN QUOTA GROUP 3
 2. No → ASSIGN QUOTA GROUP 1 OR 2 (determined by S3)

98. Don't know

99. Refused

F.7.2.2 Project Funding and Program Awareness

Q1. [ASK ALL] Does your local electric or natural gas utility provide incentives or rebates to offset the cost of making energy efficient home improvements?

1. Yes

2. No

98. Don't know

99. Refused

Q2. [IF Q1=YES] Did you receive incentives from your utility to offset the cost of your home improvement project?

1. Yes

2. No

98. Don't know

99. Refused

Q3. Before today, had you heard of any programs offered by NYSERDA, the New York State Energy Research and Development Authority, that provides incentives for energy-efficiency improvements?

1. Yes → Q3a. Which (what type of) programs? (RECORD) 98 DK 99 REF

2. No

98. Don't know

99. Refused

Q4. [IF Q3=YES AND "Home Performance" is not mentioned in Q3a.] Had you heard of NYSERDA's Home Performance with ENERGY STAR program?

1. Yes

2. No

98. Don't know

99. Refused

Q5. [IF Q4=YES] Did you receive incentives or other support from NYSERDA's Home Performance with ENERGY STAR program for this project?

1. Yes → Thank and terminate

2. No

98. Don't know

99. Refused

Q6. Did you consider participating in NYSERDA's Home Performance program before making the energy-savings upgrades in your home?

1. Yes

2. No

98. Don't know

99. Refused

Q7. [IF Q6=YES] Why did you decide to not participate in NYSERDA's Home Performance program? _____ (RECORD RESPONSE) 98 DK 99 Ref

Q8. [ASK ALL] Did you receive any [INSERT "other" IF Q2=YES] grants, incentives or tax credits for the equipment you installed?

[SINGLE RESPONSE]

1. Yes
2. No
98. Don't know
99. Refused

Q9. [IF Q8=YES] From whom? RECORD RESPONSE 98 Dk 99 Ref

Q10. [ASK ALL] How did you pay for your project? [DISPLAY; SELECT MULTIPLE]

1. Cash/Check
2. Credit card
3. Loan
4. Other:
98. Don't know

Q10A. [IF Q10 = Loan (3)] What type of loan did you use? [DISPLAY]

1. HELOC (Home Equity Line of Credit)
2. Bank loan
3. Program-sponsored loan
4. Contractor financing

Q11. [IF Q10A=3 (Program-sponsored loan) IS NOT SELECTED] Did you *apply for* a program-sponsored loan to pay for your project?

1. Yes
2. No
98. Don't know
99. Refused

Q12. [IF Q11=YES] From which program? RECORD RESPONSE 98 Dk 99 Ref

F.7.2.3 Energy Audits

Reviewer note: we expect that most respondents will skip all questions in this audit section, assuming that energy audits are rare outside of the program.

Q13. Home energy audits involve a contractor or professional who tests different parts of your home that use energy to identify energy-savings opportunities and recommend energy-saving upgrades or improvements. Have you had a home energy audit performed on your house in the past two years?

1. Yes
2. No [SKIP TO Q26]
98. Don't know [SKIP TO Q26]
99. Refused [SKIP TO Q26]

Q14. [IF Q13=YES] How did you find your energy auditor? [DISPLAY]

1. Contacted directly (by firm or auditor)
2. Advertisement
3. Event (home show, community event, street fair)
4. Referral from friend/family/other
5. Contacted a contractor with whom you had an existing relationship
6. Community-based organization or a non-profit group
7. Other, specify: _____
98. Don't know

Q14A. [IF Q14=2] What type of advertisement? [DISPLAY]

1. Yellow pages
2. Online search
3. Radio
4. TV
5. Other, specify:
98. Don't know

Q15. [IF Q13=YES] Did you receive a discount or incentive to offset the cost of your energy audit?

1. Yes: Q15a. What type of discount did you receive? RECORD
RESPONSE _____ 98 DK 99 Ref
2. No
98. Don't know

Q16. [IF Q13=YES] Thinking about the audit's recommendations and savings estimates, please rate the following statements using a five-point scale where 1 means 'Strongly Disagree' and 5 means 'Strongly Agree.' To what extent do you agree that...[CODE 1-5 AND 97= NA 98 =DK. DO NOT RANDOMIZE.]

1. You understood the audit results
2. You learned valuable things about your home from the audit
3. The recommended work seemed appropriate
4. The estimated energy savings seemed reasonable

Q17. [IF Q13=YES] Before your audit, were you considering any energy efficiency upgrades to your home?

[SINGLE RESPONSE]

1. Yes [IF YES] Q17a. What upgrades were you considering? 98 DK 99 Ref
2. No
98. Don't know
99. Refused

Q18. [IF Q13 = YES AND Q17=YES] Did your audit report identify energy efficiency upgrades you hadn't previously considered?

1. Yes
2. No
98. Don't know
99. Refused

- Q6A. (IF Q18 = 1) What upgrades were identified? RECORD 98 DK 99 Ref
Q6B (IF Q18 = 1) Did you complete these upgrades? RECORD 98 DK 99 Ref
- Q19. [IF Q13=YES] Did your auditor emphasize the upgrades that would save you the most energy?
1. Yes
 2. No
 98. Don't know
 99. Refused
- Q20. [IF Q13=YES] Did your auditor indicate the upgrades most likely to improve the comfort of your home?
1. Yes
 2. No
 98. Don't know
 99. Refused
- Q21. [IF Q13=YES] How much did you pay for your audit?
- Record numeric _____ [RANGE: \$0 to \$1,000]
9998. Don't know
 9999. Refused
- Q22. [IF Q13=YES] Did you receive any incentives from your utility, NYSERDA, or other organization to offset the cost of your audit?
1. Yes
 2. No
 98. Don't know
 99. Refused
- Q23. [IF Q22=NO] Were you aware of incentives available to offset the costs of your audit?
1. Yes
 2. No
 98. Don't know
 99. Refused
- Q24. [IF Q13=YES] Did you hire the firm that completed your energy audit to also install your energy efficiency upgrades?
1. Yes [Skip Q18]
 2. No
 98. Don't know
 99. Refused
- Q25. [IF Q13=YES AND Q24=NO] Why not? [WEB VERSION: DISPLAY ANSWER CHOICES. PHONE VERSION: DO NOT READ AND PROBE TO CODE. BOTH VERSIONS: MULTIPLE RESPONSES ALLOWED]
1. You installed the upgrades yourself
 2. The auditor was unable to perform the work
 3. The bid was too expensive
 4. The auditor did not seem to value your preferences

- 5. The auditor referred you to another contractor
- 6. You wanted a second opinion/bid
- 7. You had an existing relationship with another contractor
- 8. Something else [Specify]:
- 98. Don't know
- 99. Refused

Q26. [IF Q13=NO] On a scale of 1 to 5, where 1 means “not at all interested” and 5 means “very interested,” please tell me how interested you would be in having a home energy audit performed before your next home improvement project to identify energy saving opportunities in your home. 1 2 3 4 5 98 DK 99 Ref

Q27. IF Q26=1, 2, or 3] What if the cost of the audit was offset by financial incentives from your local utility or other organization, what would be your level of interest? Again, please use a scale of 1 to 5, where 1 means “not at all interested” and 5 means “very interested” 1 2 3 4 5 98 DK 99 Ref

F.7.2.4 Upgrades

F.7.2.5 Motivation

We are getting fairly close to the end but I want to learn a little about your satisfaction with and motivation for your home improvement project...

Q58. [ASK ALL] On a scale of one to five with ‘1’ being very dissatisfied, ‘2’ being somewhat dissatisfied, ‘3’ being neither satisfied nor dissatisfied, ‘4’ being somewhat satisfied, and ‘5’ being very satisfied, please indicate your level of satisfaction with the following. If something is not applicable, please indicate. DO NOT RANDOMIZE.
Interviewer: do not read 97-99

[MATRIX QUESTION: SCALE]

	1 Very Dissatisfied	2 Somewhat Dissatisfied	3 Neither Satisfied nor Dissatisfied	4 Somewhat Satisfied	5 Very Satisfied	97 NA	98 DK	99 RF
a. Quality of your contractor's work								
b. Energy savings obtained so far from the upgrades you installed								
c. Ease with which you were able to get your questions answered.								
d. Resolution of any issues that emerged (No issues=NA)								
e. Overall satisfaction with your home's upgrades								

Q59. [IF ANY ASPECT IN Q58<3] You reported some dissatisfaction with [READ ITEM] Please explain why you gave that rating?

Reviewer note: Q43-44 could be combined into a matrix questions for web deployment that will simplify the respondents experience. These questions combine to understand what motivated them and then the extent to which they realized their objectives.

Q60. Thinking about why you did your home improvement project, please rate the importance of the following reasons using a five point scale where 1 means “not at all important” and 5 means “very important.” If an item is not applicable, please indicate. [DO NOT RANDOMIZE> READ]How important was

[MATRIX QUESTION: SCALE]

Item	1	2	3	4	5	97 NA	98 DK	99 RF
a. Improving the comfort of your home								
b. Protecting the value of your home								
c. Increasing the value of your home								
e. Adding living space								
f. Helping the environment								
g. Improving the indoor air quality of your home								
h. Reducing household energy use or costs								
i. Updating features of the home								

Q61. Q43a. Which of the following reasons was most important to you in undertaking your home improvement project? (Display only reasons rated 1 to 5 in Q43) [IF Q60.a-h>2] Next, using a five-point scale where 1 means you ‘Strongly Disagree’ and 5 means you ‘Strongly Agree’ please tell me to what extent do you agree that this project..... *DO NOT RANDOMIZE. If an item is not applicable, please indicate. Do not read 97-99.]*

[MATRIX QUESTION: SCALE]

[LOGIC] Item	1	2	3	4	5	97 NA	98 DK	99 RF
a. Improved the comfort of your home								
b. Protected the value of your home								
c. Increased the value of your home								
e. Made your home more sustainable								
f. Helped the environment								
g. Improved the indoor air quality of your home								
h. Reduced your home’s energy use								

F.7.2.6 Demographics

I have a few more questions to help us understand the characteristics of households with completed projects.

Q62. Including all adults and children, how many people currently live in your household more than nine months out of the year?

1. [Open-ended response] Range = 1 to 10, where 10 = 10 or more
98. Don't know
99. Refused

Q63. How long have you lived in your current home?

1. Number of years: Range = 1 to 50, where 50 = 50 or more
98. Don't know
99. Refused

Q64. How much longer do you intend to live in your current home? Would you say

1. 5 years or less
2. 6 to 10 years
3. More than 10 years
98. Don't know
99. Refused

Q65. Approximately when was your home built?

1. RECORD: _____ [YEAR, RANGE: 1850 to 2014]

[Do not read:]

2098. Don't know
2099. Refused

Q66. What is the highest level of education you have completed so far? Is it ...[READ RESPONSES]

1. Less than high school
2. High school graduate (or GED)
3. Some college/vocational or technical school (including Associate's degree)
4. College graduate (Bachelor's degree)
5. Some graduate school
6. Post graduate school
99. Refused

Q67. In what year were you born?

1. [OPEN-ENDED RESPONSE] [YEAR OF BIRTH] Range 1900 to 1996
9998. Don't know
9999. Refused

Q68. Do you consider yourself to be Spanish, Hispanic, or Latino?

1. Yes
2. No

99. Refused

Q69. Do you consider yourself to be ...?

1. White
2. Black or African-American
3. American Indian, Native Hawaiian, Pacific Islander, or Alaska Native
4. Asian
5. Something else
99. Refused

Q70. I'm going to read a list of options. Please stop me when I reach the range that includes your annual household income. [READ LIST]

1. Up to \$20,000
2. \$20,000 up to \$30,000
3. \$30,000 up to \$40,000
4. \$40,000 up to \$50,000
5. \$50,000 up to \$60,000
6. \$60,000 up to \$75,000
7. \$75,000 up to \$100,000
8. \$100,000 up to \$150,000
9. \$150,000 up to \$200,000
10. \$200,000 or more
98. Don't know
99. Refused

Thank you very much for your time.

Appendix G Participating Contractors Memorandum

G.1 Summary

In order to document participating contractor experiences with the HPwES offered by the NYSERDA, the evaluation team conducted interview-surveys with a sample of 52 contractors who had completed energy audits and upgrade projects for homeowners in the HPwES program. Interview-survey data reveals that many participating contractors specifically focus their business around HPwES, as about two-thirds of interviewed contractors estimated that half or more of their work in existing homes receives incentives or financing through HPwES. They also are highly trained in energy efficiency contracting services; substantial portions of their staff have various BPI certifications. In addition, interviewees demonstrated strong support for the value of BPI certification and accreditation. Analysis of matched contractor data from NYSERDA's CRIS demonstrates that larger contracting firms tend to complete significantly more projects than smaller firms. These findings support the program's model of contractors serving as key delivery mechanisms.

Contractors engage in substantial self-promotion in order to generate audit leads for the program, but the majority reported that NYSERDA's marketing activities and affiliated contacts are also effective in cultivating leads. Further, interviewed contractors indicated that NYSERDA financing helps them sell jobs; though they expressed some frustrations with the process, particularly the complexity of the paperwork and the time required for approval. Interviewees report that their home performance customers are primarily motivated by monetary savings, program incentives, and comfort; participating contractors frame their sales and advertising approaches accordingly. Most interviewed firms do not have dedicated sales staff, so many companies rely on their auditors to generate sales and engage customers in virtually all parts of the program.

Participating contractors reported conducting comprehensive audits and demonstrated strong support for the diagnostic audit approach to home performance. The great majority of respondents indicating they always *recommend* a diagnostic audit and half of the sample reporting they will not *provide* simple walk-through audits. Further, contractors reported significantly higher rates of diagnostic audits in their HPwES work as compared to their total work in residential homes. While most participating contractors reported that audit modeling software gives their firm a competitive advantage, they also revealed that modeling has its disadvantages. Moreover, nearly half of the sample expressed frustrations with being delivered fuel consumption data for modeling. Participating contractors reported installing a variety of energy efficiency measures based on the results of their audit reports; however, many firms specialize in one or two measure areas; accordingly, most contractors indicated they often hire subcontractors to implement some of the upgrades in their HPwES projects.

Satisfaction with HPwES was mixed, with contractors demonstrating moderate to low satisfaction on various elements of the program. Nevertheless, most participating contractors reported their association with the program has been beneficial to their firm in a variety of ways. Further, contractors offered few suggestions for improving the program.

G.2 Methods

Between September 23 and October 23 of 2014, the evaluation team conducted telephone interview-surveys with participating contractors from NYSERDA's HPwES program about their experiences with the program and the services they provide to homeowners. Prior to conducting the interview-surveys, the evaluation team used NYSERDA's CRIS to develop the participating contractor sample frame and call list.⁷² Of the 163 contacts attempted, the evaluation team ultimately completed interview-surveys with 52 participating contractors, demonstrating a response rate of 32%; however, due to missing responses on some items, sample sizes reported throughout this memo may vary.⁷³ Table G-1 presents the disposition from these interview-surveys. The sample included a broad range of contractor specializations (such as shell, HVAC, and plumbing) and firm sizes; 42% were from small firms of 10 or fewer employees, 37% were from medium-sized organizations of 11-24 employees, and 21% were from large companies with 25 or more staff persons.⁷⁴ The following memo presents the analysis of the participating contractor interview-survey data. Statistically significant ($p < .05$) differences are noted when applicable.

Table G-1. Participating Contractor Interview Dispositions

Disposition	Number	Percent
Sample frame / call list	231	100%
Attempted	163	71%
Complete	52	32%
Partial	1	1%
Refused	10	6%
Not completed	100	61%
Unused sample	68	29%

G.3 Results

Results of the participating contractor interview-surveys are presented below.

⁷² The CRIS query was performed in January of 2014, and reflects all HPwES activity prior to January 1, 2014.

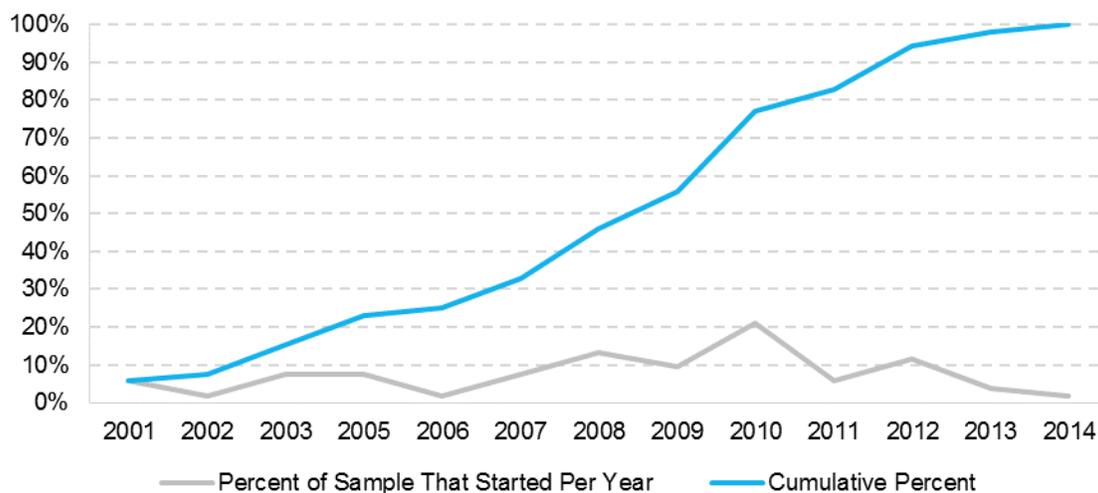
⁷³ The team completed the goal of 50 contractor interviews before completing a census.

⁷⁴ See the contractor MCA memo for more participating contractor firmographic information,

G.3.1 HPwES Work

Figure G-1 shows the years in which interviewed contractors joined the HPwES program. In addition to the percent of the sample that started per year, the figure exhibits cumulative percentages. Cumulative percentages are helpful when interpreting figures and tables that exhibit numerical items, as they help the reader see the percent of respondents that are above or below a certain threshold. As seen in Figure G-1, interviewed contractors varied in their history of involvement in HPwES. While about one-quarter of the sample began participating in the first five years of the program’s inception, nearly half (44%) of interviewed contractors began working with HPwES in the last five years.⁷⁵ Moreover, 2010 constitutes the year in which the highest proportion of interviewed contractors joined HPwES, which was the same year in which NYSERDA received \$40 million in federal funding through the Better Buildings Neighborhood Program (BBNP) and began ramping up the Green Jobs Green New York (GJGNY) program. This spike in participating contractor activity is not surprising, as NYSERDA used BBNP and GJGNY funding to subsidize audits and contractor training. Additionally, the evaluation team also asked participating contractors how long they had been working in the home repair/improvement trade (see MCA section). Statistical analysis demonstrates that the year in which contractors started in the home repair/improvement trade is positively correlated ($p < .05$; $r = .28$) with their firm’s participation start year. This finding suggests that newcomers to the program are often new to the home improvement industry in general.

Figure G-1. Participation Start Year* (n = 52)



* Source: CRIS

In order to gauge how active the participating contractor sample was in recent years, the evaluation team analyzed the number of HPwES projects completed by interview contractors between program years 2012

⁷⁵ NYSERDA began incenting HPwES projects in 2001.

and 2013 (Table G-2). The sample's level of activity varied widely: interviewed contractors completed between zero and 642 projects during 2012-2013. Two-fifths of the sample completed more than 50 projects during this three-year time period. Further analysis indicates firm size is positively correlated with the number of HPwES projects completed during 2012-2013, revealing that larger firms tend to complete more HPwES projects than smaller ones. The number of New York locations ($p < .01$; $r = .44$) and the number of employees working at the respondent's location ($p < .01$; $r = .40$) were both positively correlated with the total number of projects completed in 2012-2014.

Table G-2. Number of HPwES Projects Completed in 2012-2013*

	<i>n</i> = 52	
	Percent of Sample	Cumulative Percent
None	10%	10%
Less than 10	19%	29%
11 to 25	17%	46%
26 to 50	13%	60%
51 to 100	17%	77%
More than 100	23%	100%
Total	100%	

* Source: CRIS.

Since the number of employees working on HPwES projects is a function of staff size, the evaluation team calculated the percent of staff working on HPwES projects for a fairer comparison. The results demonstrate that most (60%) participating contractors reported that 100% of their staff work on HPwES projects (Table G-3); however, the percent of staff working on HPwES projects was negatively correlated ($p < .001$; $r = -.62$) with the size of said staff, suggesting that firms with smaller staff sizes typically rely on most to all of their staff to help with HPwES projects.

Table G-3. Percent of Staff at Respondent's Location that Work on HPwES Projects

	<i>n</i> = 52	
	Percent of Sample	Cumulative Percent
10% or less	8%	8%
11 to 25%	12%	19%
26 to 50%	10%	29%
51 to 99%	10%	38%
100%	60%	98%
Missing answer needed for calculation	2%	100%
Total	100%	

Interview-survey data reveals that the bulk of participating contractors' work in existing homes (60% average) receives incentives or financing through HPwES, with about two-thirds (67%) estimating that at least half of their projects in existing homes are financed or incented through HPwES (Table G-4). Further analysis reveals that a significantly ($p < .01$) smaller proportion of HVAC contractors' work as compared to non-HVAC contractors is incented or financed through HPwES: HVAC contractors estimated an average of 48% of their work goes through HPwES, compared to an average of 79% among contractors who don't specialize in HVAC services.

Table G-4. Percentage of Contractor's Existing Home Work Receiving HPwES Incentives or Financing

	<i>n</i> = 52	
	Percent of Sample	Cumulative Percent
20% or less	25%	25%
21 to 49%	8%	33%
50 to 74%	13%	46%
75% or more	54%	100%
Total	100%	

G.3.2 Training

Nearly all (94%) interviewed contractors reported that at least some of their staff had taken training on energy efficiency improvements for existing homes. Of the 49 respondents who reported having trained staff, most (92%) indicated their staff had taken training from the Building Performance Institute (BPI) (Table G-5).⁷⁶ "Other" sources varied, and included such examples as NYSERDA and Affordable Comfort, Inc. (ACI).

Table G-5. Sources of Training (Multiple Responses Allowed)

	<i>n</i> = 49
Building Performance Institute	92%
Local college or junior college	29%
State or local government agency	29%
Equipment or materials manufacturer	12%
Utility program	8%
Other	45%

⁷⁶ However, it is possible that some of those that mentioned local or junior colleges may have been referencing BPI training courses, as BPI training is often offered at these sites.

More than half (62%) of participating contractors reported there were currently gaps in staff training opportunities. Reported issues varied, with the most common suggestions being: additional training on insulation and air sealing (five mentions), more convenient locations and times for training (five mentions), and better training on modeling software (four mentions).

G.3.3 Value of Building Performance Institute Accreditation and Certification

Participating contractor firms are required to be accredited by BPI in order to perform work for HPwES. Most (85%) interview respondents indicated that they themselves either were currently or had previously been BPI certified. Of the 43 respondents who reported having past or current BPI certifications, most mentioned building analyst, envelope, and heating certifications (Table G-6).

Table G-6. Respondent BPI Certifications (Multiple Responses Allowed)

	<i>n</i> = 43	
	Count	Percent
Building Analyst	38	88%
Envelope	35	81%
Heating	31	72%
Air Conditioning/Heat Pump	6	14%
Multifamily	4	9%
Manufactured Homes	1	2%
Other	9	21%

The evaluation team asked participating contractors how many of their staff perform certain duties (such as conducting energy audits), and then how many of those specific staff persons are BPI certified. The evaluation team used these responses to calculate the percent of auditors, installers, and crew supervisors with BPI certification. The results indicate that nearly all auditors working for participating contracting firms hold BPI certification (Table G-7).

Table G-7. Percent of Auditors with BPI Certification

	<i>n</i> = 52
None	2%
50%	6%
100%	92%
Total	100%

Considerably smaller proportions of installers working for participating contracting firms hold BPI certification, with respondents most frequently indicating that none of their installers holds certification

(Table G-8). Interestingly, about one-tenth (12%) of participating contractors indicated that their firm had no installers or technicians on staff.

Table G-8. Percent of Installers/Technicians with BPI Certification

	<i>n</i> = 52
None	44%
1 to 25%	8%
26 to 50%	27%
51 to 99%	0%
100%	6%
Don't know how many are certified	4%
N/A (no installers on staff)	12%
Total	100%

The proportion of crew supervisors holding BPI certification exhibited a nearly bimodal distribution; most contractors reported either all or none of their crew supervisors were BPI certified (Table G-9).

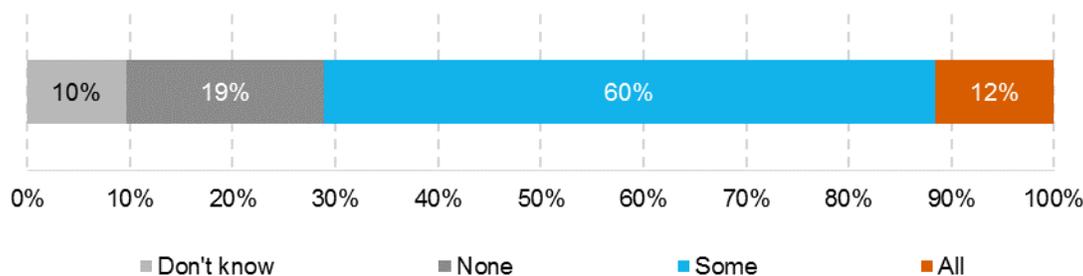
Table G-9. Percent of Crew Supervisors with BPI Certification

	<i>n</i> = 52
None	27%
1 to 25%	4%
26 to 50%	8%
51 to 99%	2%
100%	37%
Don't know how many are certified	2%
N/A (no crew supervisors on staff)	21%
Total	100%

When asked how many staff members were currently pursuing new BPI certification, participating contractors typically (44%) said none were in this process. Additionally, most (62%) respondents indicated their company prefers hiring new employees who hold BPI certification. One-third of participating contractors reported that BPI certified employees earn a higher wage than non-certified employees with similar responsibilities. These participating contractors reported BPI certified employees make \$0.50 to \$5 more an hour, with most (8 of 17) indicating \$3-5 more.

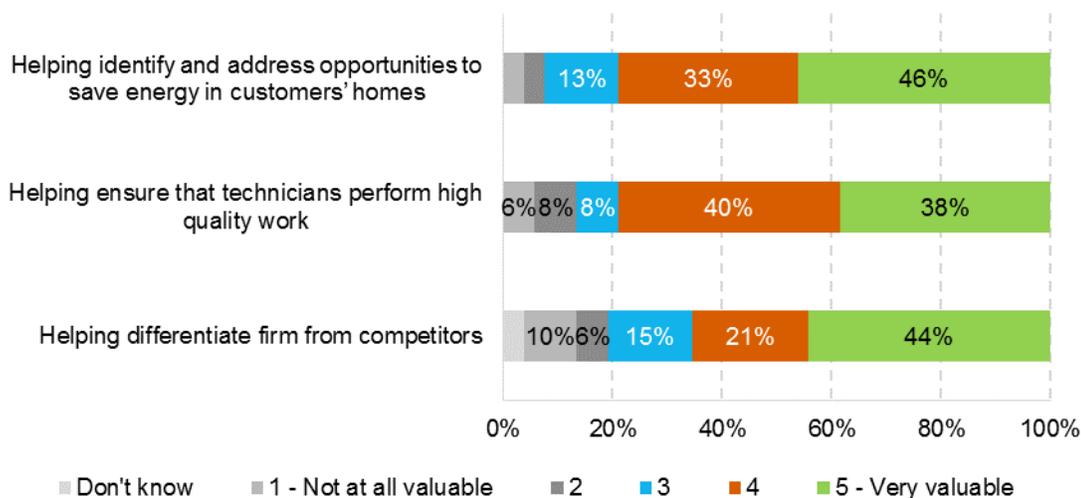
Nearly all (92%) contractors reported their customers have typically *not* heard of BPI, but most of the sample (90%) reported they explain their BPI accreditation to their customers. Further, most (60%) contractors reported that some of their customers think BPI accreditation is important (Figure G-2).

Figure G-2. Proportion of Customers that Think BPI Accreditation is Important (n = 52)



Interviewed contractors reported BPI accreditation is generally valuable to their firm, with nearly four-fifths (79%) giving “highly valuable” ratings (a rating of a “4” or “5”) to BPI’s help in ensuring technicians perform high-quality work and in identifying and addressing energy savings opportunities (Figure G-3). Contractors, however, reported comparatively less value from BPI’s help in differentiating their firm from competitors, as less than two-thirds (65%) gave highly valuable ratings on that item.

Figure G-3. Rated Value of BPI Accreditation (n = 52)



Contractors gave similar ratings to the value of program support for BPI certification and accreditation activities, with about two-thirds (67%) rating program support as highly valuable. Similarly, about two-thirds (69%) reported they would renew their BPI accreditation if it was not required by HPwES.

G.3.4 Marketing, Leads, and Making the Sale

Interviewed contractors reported garnering HPwES audit leads from a variety of sources, with nearly all (96%) indicating getting leads from their firm's own direct marketing activities (Table G-10). While about three-fourths indicated they get leads from either NYSERDA's marketing activities (79%), adding to the scope of more typical projects (77%), or NYSERDA-affiliated contacts (75%), about half (52%) reported acquiring leads from equipment failure or emergency calls. Of those who reported getting leads from NYSERDA-affiliated contacts, most (74%, or 26 of 35) mentioned constituency-based organizations.

Table G-10. Sources of HPwES Audit Leads (Multiple Responses Allowed)

	n = 52
Direct marketing activities	96%
Interest generated by NYSERDA marketing activities	79%
Adding to the scope of more typical projects	77%
NYSERDA-affiliated contacts	75%
Constituency-based organizations	74%
NYSERDA website	23%
Trade allies / other contractors	23%
Program staff	11%
Other	9%
Equipment failures / emergencies	52%

Participating contractors reported actively promoting their home performance activities, most of which (98%) involved employing multiple promotional methods. Respondents described an assortment of methods for promoting their home performance services, with maintaining a website being the most commonly (94%) mentioned (Table G-11). Additionally, the majority (88%) of participating contractors said they advertise their BPI accreditation in order to promote their home performance services.

Table G-11. General Promotion Activities (Multiple Responses Allowed)

	n = 52
Maintain a website	94%
Attend home shows	75%
Pay for advertising	73%
Attend public events	71%
Work with local nonprofits or constituency-based organizations	65%
Maintain an email list serve or access email lists to promote HP services	37%

Of the 38 (73% of the sample) who reported paying for advertising, printed materials, such as newspapers and circulars, were the most popular media (Table G-12).

Table G-12. Paid Advertising Activities (Multiple Responses Allowed)

	<i>n</i> = 38
Newspapers, circulars, or flyers	58%
Radio	42%
TV	32%
Internet	29%
Yellow pages	16%
Trade / home shows	11%
Other	26%

About half (52%) of interviewed contractors reported receiving NYSERDA co-op marketing funds in 2013 or 2014. Contractors used these funds in a variety of ways, most typically to pay for print advertising (Table G-13). When asked how their home performance marketing activities would change if they lacked access to co-op funds, most (11 of 27) said they would reduce or eliminate selected types of marketing, and six said they would reduce all marketing efforts. Seven said termination of co-op marketing funds would have no effect on their marketing strategy.

Table G-13. Use of NYSERDA Co-op Marketing Funds (Multiple Responses Allowed)

Advertising Medium	<i>n</i> = 27
Newspapers, circulars or flyers	10
Radio	8
TV	7
Billboards/signage	7
Internet	5
Other	2

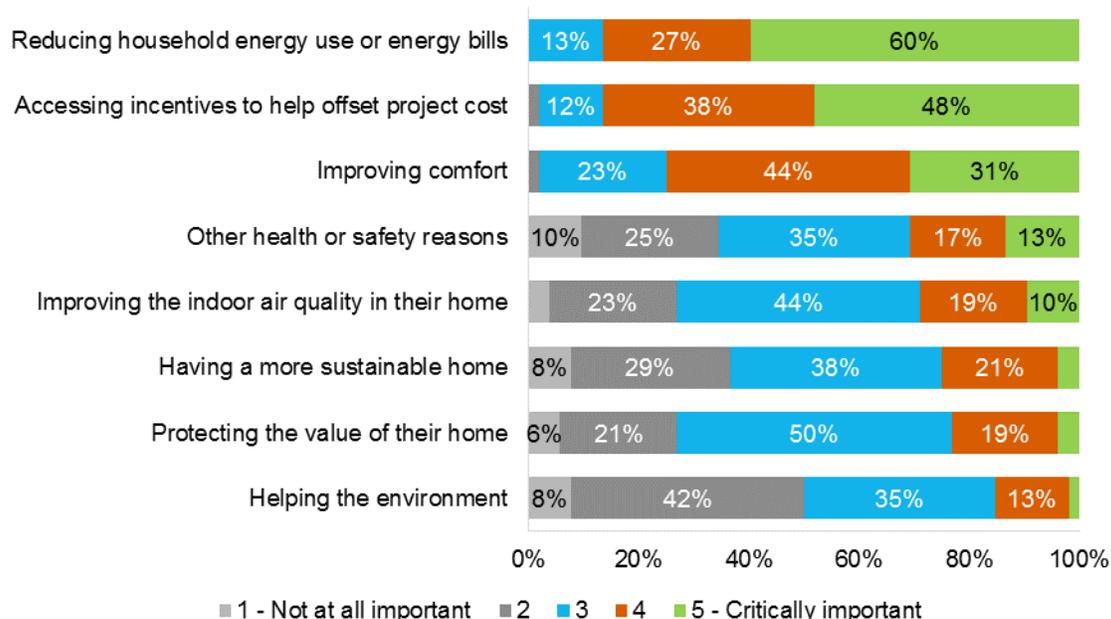
When asked how they describe the benefits of the whole-house approach to their customers, contractors most commonly (63%) reported explaining the “home as an integrated system” concept to homeowners (Table G-14). Further analysis reveals that “HPwES-focused contractors” – or those that reported that 75% or more of their jobs in existing homes receive incentives or financing through HPwES – were significantly ($p < .05$) more likely to report using the “home as an integrated system” concept and significantly ($p < .05$) less likely to report using “energy savings” when describing the benefits of the whole house approach to customers than contractors with lower percentages of jobs that go through HPwES.

Table G-14. How Participating Contractors Describe the Benefits of the Whole House Approach (Multiple Responses Allowed)

	<i>n</i> = 52
Home as an integrated system	63%
Energy savings	37%
Health and safety	23%
Comfort of home	23%
Varies by project	6%
Other	17%

When asked about which factors motivate their customers to pursue upgrades, participating contractors overwhelmingly indicated that customers are motivated by monetary savings, program incentives, and improving the comfort of their home (Figure G-4). Contractors deemed other items as considerably less important to their customers; most contractors indicated that their customers are not strongly motivated by health and safety improvements, protecting the value of their home, or environmental causes.

Figure G-4. Rated Importance on Customer Motivation to Pursue Upgrades (n = 52)



When asked why some of their customers may have chosen to complete a qualifying project without HPwES incentives or financing, most contractors indicated these customers wanted to avoid the increased timeframe or paperwork associated with participating in the program (Table G-15). “Other” reported reasons varied widely, such as “some customers wanted to perform the upgrades themselves.”

Table G-15. Reasons Homeowners Completed Qualifying Projects without HPwES Incentives or Financing (Multiple Responses Allowed)

	<i>n</i> = 52
Save time	45%
Avoid paperwork	33%
Do not like government programs	8%
Using utility program	6%
Do not know	8%
Other	31%

About half (54%) of participating contractors reported having had customers who chose to access utility incentives, rather than completing their project through HPwES. Contractors said these homeowners used utility incentives instead of HPwES due to higher utility incentive offerings (14 of 28), simpler program processes (10 of 28), or various other reasons (8 of 28).

Less than half (44%) of interviewed contractors reported having dedicated sales staff at their firm. Further statistical analysis suggests that dedicated sales staff may be highly beneficial towards securing HPwES jobs, as those with dedicated sales staff completed significantly ($p < .001$) more HPwES projects in 2012-2013, as compared to contractors without dedicated sales staff. Echoing the lack of dedicated sales staff among participating contractor firms, many contractors reported that their individual staff members have multiple roles and responsibilities. For example, participating contractor interviews demonstrate that office staff, auditors, and installers all may be involved in scoping projects and developing bids (Table G-16).

Table G-16. Specific Staff Members Involved in Project Scoping and Bid Development

	<i>n</i> = 52		
	Yes	Sometimes	No
Auditors / assessors	98%	0%	2%
Office / admin staff	79%	4%	17%
Installers / technicians	40%	6%	54%

G.3.5 Audits

Participating contractors reported that their firms have a variety of diagnostic equipment used for conducting HPwES audits; with all reporting their firm owns a blower door, combustion analyzer, and a combustible gas leak detector (Table G-17). Additionally, more than half (62%) of participating contractors reported providing audits to customers outside of the program.

Table G-17. Participating Contractors' Diagnostic Audit Equipment

	<i>n</i> = 52		
	Yes	No	Don't know
Blower door	100%	0%	0%
Combustion analyzer	100%	0%	0%
Combustible gas leak detector	100%	0%	0%
Infrared camera	94%	6%	0%
Exhaust fan flow meter	88%	10%	2%
Pressure pan test equipment	88%	10%	2%
Duct blaster fan with fan speed controller	79%	21%	0%
Digital pressure and flow gauge	79%	13%	8%

To gauge HPwES's influence on the use of diagnostic audits, the evaluation team asked participating contractors to estimate the percent of all existing home jobs that included specific elements of a diagnostic audit and then asked them to estimate the percent of HPwES jobs that included these elements. Table G-18 exhibits the mean occurrence percentages for each diagnostic audit element, and demonstrates that HPwES was extremely influential on the use of diagnostic audit approaches. With the exception of radon testing, contractors reported significantly ($p < .05$) higher rates of conducting each specific element of diagnostic audits in their HPwES jobs as compared to all of their residential jobs as a whole. The difference in the use of energy audits highlights these dissimilarities; contractors reported conducting audits in an average of 49% of all residential jobs, a difference that highlights the effect of HPwES's audit requirement.

Table G-18. Average Percent of Jobs with Various Diagnostic Audit Elements

	<i>n</i> = 52*	
	Average percent of HPwES jobs	Average percent of all residential jobs
Energy audits	99%	49%
Combustion Appliance Zone (CAZ) test	98%	74%
Combustion efficiency for heating equipment	98%	71%
Blower door test for infiltration	97%	61%
Infrared inspection of insulation	71%	54%
Duct leakage testing	36%	24%
Refrigeration diagnostics for air conditioning equipment (for homes with central air conditioning)	32%	19%
Radon test	4%	1%

* *n* values range from 50-52 due to don't know responses.

Interview-survey data demonstrates that participating contractors strongly embrace the building science approach to home improvement, as the great majority (81%) of respondents indicated they always *recommend* a diagnostic audit, and half of the sample reported they will not *provide* simple walk-through audits. Of those who said they sometimes will provide a walk through audit, they primarily indicated these cases are reserved for homeowners who had an audit recently or if they were called to a home to address a single, specific issue. Most (67%) contractors said they are able to identify upgrade opportunities without conducting a full diagnostic audit, but many volunteered that such an approach would be inaccurate in comparison to a modeled audit. Further, about one-third (33%) of contractors simply said they always conduct diagnostic audits, and did not explain whether or not they are able to identify savings opportunities without a diagnostic audit.

Most (81%) contractors said they use TREAT software to model energy savings estimates, with a minority mentioning Real Home Analyzer (15%) or other software packages (14%) such as Optimizer or Snugg Pro. The majority (90%) of contractors indicated modeling gives their firm an advantage over contractors who do not use modeling software, with about two-thirds (67%) of the sample mentioning that being able to demonstrate savings and/or payback was a unique advantage. Other contractors mentioned that modeling software is advantageous because it validates the accuracy of their audit (19%) or enhances the credibility of their recommendations (13%); however, most (85%) contractors noted that HPwES's modeling requirement also has its disadvantages, with about half (52%) of the sample, noting modeling takes too much time. Other reported disadvantages were modeled results can be inaccurate (25%), the software is too complex (13%), and modeling can be a staff training burden (12%).

Participating contractors mostly reported requesting past consumption data from the homeowner prior to conducting the audit (52%), but some said they collect consumption data from the homeowner during the audit (29%). A minority (19%) of participating contractors complete this step for the homeowner by requesting the consumption data directly from the utility. The majority (88%) of contractors reported difficulties with acquiring the consumption data needed to calibrate the model, with more than two-fifths (42%) of the sample mentioning difficulties getting delivered fuel consumption data (Table G-19). About one-fifth of the sample reported challenges with getting delivered fuel consumption data from either homeowners (21%) or suppliers (19%), and about one-tenth (13%) noted it is difficult to calculate usage based on delivered fuel data. As seen in Table G-19, other challenges varied.

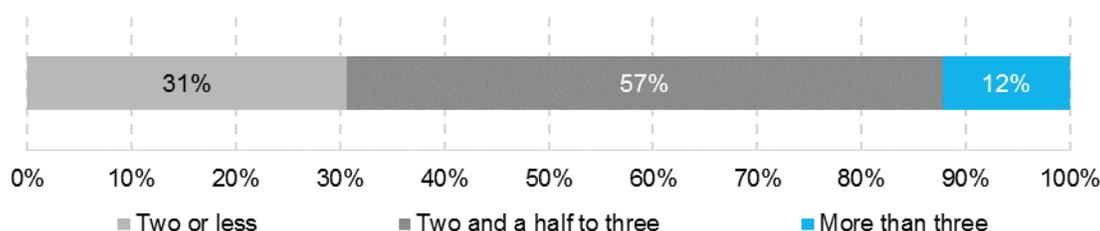
Table G-19. Challenges in Getting Consumption Data (Multiple Responses Allowed)

	n = 52
Getting delivered fuel consumption data	42%
Time consuming	23%
Confidentiality / privacy concerns	19%
Providing data not a homeowner priority	17%
Customers not internet savvy	13%
New homeowners cannot get two years of utility bills	10%
Other	10%
None	12%

Interviewed contractors offered various suggestions for improving the HPwES modeling process; most suggested either changing the software used (27%) or improving/simplifying TREAT. Additionally, a minority requested easier access to prior consumption data (15%). Conversely, almost one-fifth (17%) indicated no changes are needed.

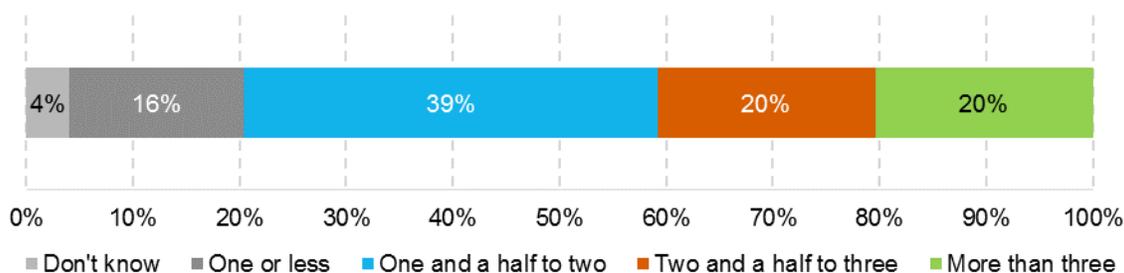
Participating contractors reported varying lengths of time to complete the stages of the audit process. Actually conducting the diagnostic audit in the home appears to be the longest part of the audit process, with contractors reporting an average of 2.6 hours to complete the in-home portion of the audit (excluding the associated modeling). Of the 49 contractors asked, most (57%) reported that the in-home portion of the audit takes two and a half to three hours (Figure G-5).

Figure G-5. Estimated Number of Hours Needed to Conduct Audit in Home (n = 49)



Contractors gave mixed reports on the length of time it takes to complete the modeling associated with the audit; most frequently, contractors reported that modeling takes one and a half to two hours (Figure G-6). Overall, contractors estimated that modeling HPwES projects takes an average of 2.4 hours. Further analysis demonstrates that the more active HPwES contractors take significantly ($p < .05$; $r = -.35$) less time to complete the modeling associated with an assessment, as demonstrated by a negative correlation between the number of projects completed in 2012-2013 and the estimated number of hours needed to complete modeling.

Figure G-6. Estimated Number of Hours Needed to Complete Modeling (n = 49)



Most (96%) participating contractors indicated that certain types of home scenarios take substantially more time to model, with complex homes or homes with additions being the most commonly mentioned (Table G-20). “Other” comments varied, and included such examples as homes heated by delivered fuels or homes with multiple unconditioned spaces.

Table G-20. Types of Homes that Tend to Require Substantially More Modeling Time (Multiple Responses Allowed)

	n = 52
Complex homes / homes with additions	60%
Older homes	27%
Larger homes	25%
Homes with dormers / attics / crawl spaces	21%
Cape Cods	17%
Homes with multiple heating systems	12%
Other	37%
None	4%

Participating contractors most commonly reported they submit their audit results to the program within one week (48%) or two weeks (31%) of completing the audit. A minority (8%) indicated taking longer than the typical two-week or less turnaround time, and reported submitting the results within a month of the audit. About one-tenth (13%) of respondents did not provide a specific turnaround timeframe. HPwES-focused contractors (the contractors who reported that 75% or more of their jobs in existing homes receive incentives or financing through HPwES) reported significantly ($p < .05$) quicker audit report delivery turnaround times than contractors with lower percentages of jobs that go through HPwES. More than three-fifths (61%) of HPwES-focused contractors reported they submit their audit results within one week of completing the audit, compared to only one-third of other contractors. All but two contractors reported submitting their results through the NY HP Portal; however, less than one-third (29%) of contractors said

they had used the “what if” mode in the Portal’s Eligibility Screening Tool in the last year (48% said they had not used it at all and 23% said they did not know).⁷⁷

More experienced contractors were significantly more likely to indicate the audit results submission process could benefit from improvement; 89% of HPwES-focused contractors said the process could be improved (compared to 54% of other contractors; $p < .001$). Contractors with suggestions for improvement had completed significantly ($p < .01$) more projects in 2012-2013 than contractors who said no improvements were needed. In total, about two-thirds (69%) of interviewed contractors offered suggestions for improving the audit results submittal process (Table G-21). Contractors most frequently suggested user experience improvements or to quicken the process (27%).

Table G-21. Suggestions for Improving the Audit Results Submittal Process (Multiple Responses Allowed)

	<i>n</i> = 52
Improve process / make aspects of process more user friendly	27%
Reduce approval times / streamline aspects of process	27%
Changes made to portal too frequently	8%
Change program software	6%
Program/customers should provide usage data	6%
Other	13%
None	31%

Nearly all (96%) contractors said they always provide a copy of the audit results to the homeowner. Further, all but three interviewed contractors said they review the audit results with the homeowner, most of whom (61%) said this occurs in the customer’s home. A minority said the review method varies from project to project (20%) or they review the audit results over the phone (10%). Respondents mostly said the auditor typically reviews the audit results with the homeowner (84%), but a minority indicated their firm’s owner (10%) or a dedicated salesperson (10%) may review the results with the customer. Contractors mostly said this review occurs within a week (43%) or two weeks (33%) of the audit, and one-fifth reported taking up to a month after the audit before reviewing the results with the customer.

⁷⁷ What-if mode, a mode within the Eligibility Screening Tool (EST), has been available since August 1, 2013. Contractors use the EST to screen projects for incentives and financing in the process of developing a project scope. In what-if mode, contractors can experiment with different costs and measures to see what combinations would be approved before submitting the work scope to the program for approval. During the mid-2014 internal process improvements, program staff emphasized the use of what-if mode to facilitate accurate project modeling.

Participating contractors reported customers take varying lengths of time from reviewing the audit results to deciding to move forward with an upgrade project; however, more than half (58%) of the sample indicated it typically takes one month or less (Table G-22).

Table G-22. Typical Length of Time it Takes Customers to Decide to Go Forward

	<i>n</i> = 52	
	Percent of Sample	Cumulative Percent
Up to one week	27%	27%
Up to one month	31%	58%
Up to six months	19%	77%
Up to one year	6%	83%
Varies widely	15%	98%
No timeframe offered	2%	100%
Total	100%	

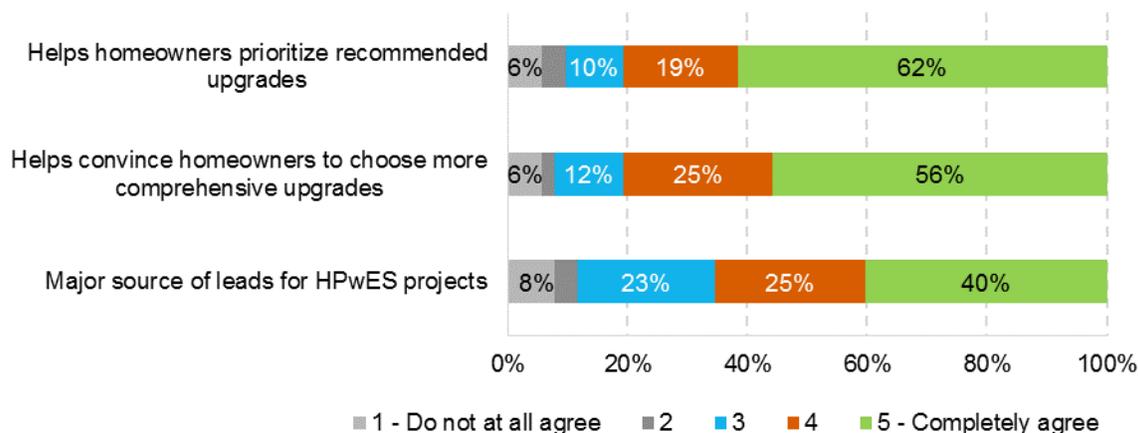
Interviewed contractors typically said that cost (38%) or financing (33%) concerns were common factors contributing to slow decision making among homeowners (Table G-23). “Other” reported contributing factors varied; examples include family disagreements over whether or not to pursue upgrades and contractor salesmanship skills.

Table G-23. Common Factors Contributing to Slow Decision Making (Multiple Responses Allowed)

	<i>n</i> = 52
Cost / affordability	38%
Financing	33%
Not a priority	17%
Time of year	13%
Customers want multiple quotes	13%
Lack of understanding of audit	10%
Other	29%

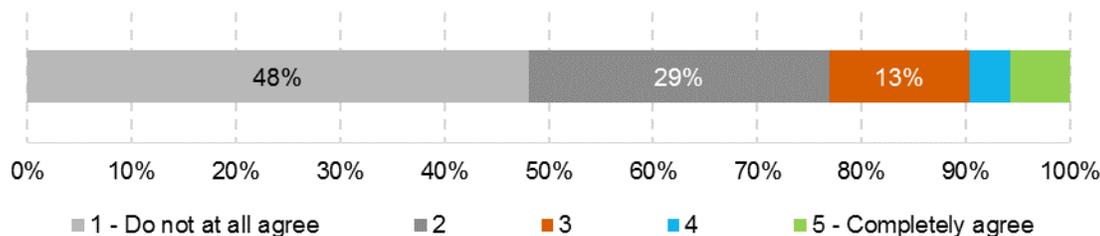
Interview-survey results indicate that participating contractors perceive HPwES audits as valuable, particularly in terms of helping homeowners prioritize recommended upgrades and increasing the comprehensiveness of projects (Figure G-7). Contractors, however, found less value in audits as a major source of leads, giving significantly ($p < .05$) lower ratings to that item as compared to the other two listed in Figure G-7.

Figure G-7. Rated Value of HPwES Audits (n = 52)



Participating contractors were largely dissatisfied with the program reimbursement rate for the audit, with more than three-quarters indicating the reimbursement did not cover their firm’s cost (as evidenced by the 77% who gave a “1” or “2” rating; Figure G-8).

Figure G-8. Participating Contractor Agreement with: “The program’s reimbursement rate for the audit covers my firm’s cost” (n = 52)



G.3.6 Financing

Most (62%) contractors said they always encourage their customers to consider NYSERDA financing options. Others said they encourage NYSERDA financing most of the time (15%) or only some of the time (23%). Additional statistical analysis reveals that HPwES-focused contractors encouraged their customers to consider NYSERDA financing significantly ($p < .01$) more often than less active contractors. About two-thirds (65%) of participating contractors indicated they do not offer any non-NYSERDA financing to their customers. A minority of contractors reported offering other financing mechanisms, specifically: financing from GE Capital (13%), manufacturers (10%), distributors (4%), or other varied sources (21%).

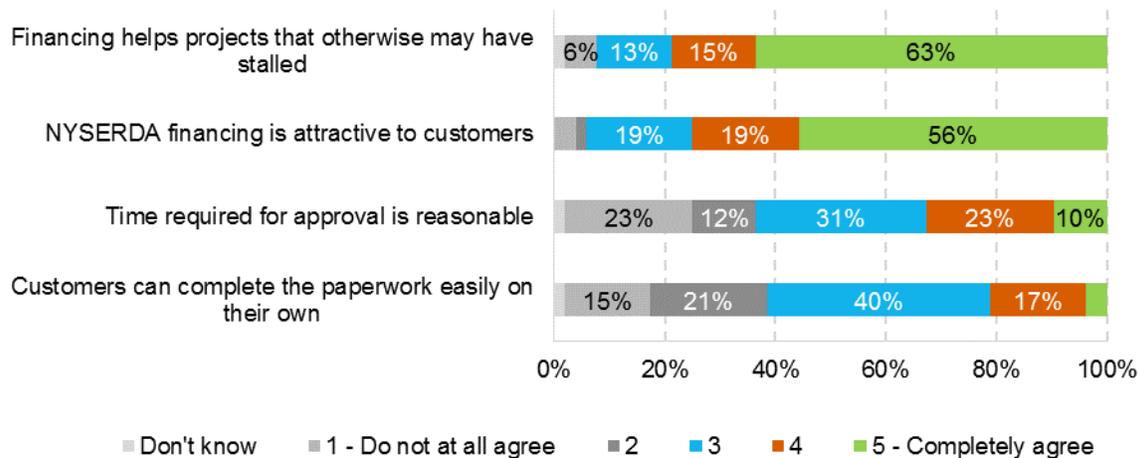
Interview-survey data reveals that NYSERDA financing options are typically brought up during the audit process, either before the audit takes place (38%), during the audit itself (38%), or at the time of the audit report review (37%). Accordingly, most (85%) contractors reported that the auditor often presents financing options to the homeowner. A minority mentioned that a salesperson (25%) or an office staff person or a business manager (13%) may [also] present this information. Contractors offered varied estimates on how long it typically takes to arrange NYSERDA financing, with close to half (44%) indicating it typically takes two weeks or less (Table G-24).

Table G-24. How Long Financing Typically Takes to Arrange

	n = 52	
	Percent of Sample	Cumulative Percent
One week or less	15%	15%
Two weeks or less	29%	44%
One month or less	17%	62%
More than one month	23%	85%
No estimate offered	15%	100%
Total	100%	

Contractors reported moderately high satisfaction with some aspects of NYSERDA’s financing options, with contractors noting that financing was particularly helpful in pushing projects forward that otherwise may have stalled (Figure G-9). They largely disagreed, however, that the time required for approval is reasonable or that their customers can complete the paperwork easily on their own.

Figure G-9. Participating Satisfaction with NYSERDA Financing (n = 52)



When asked what they like best about program financing, contractors typically mentioned the interest rate (Table G-25).

Table G-25. Benefits of NYSERDA Financing (Multiple Responses Allowed)

	<i>n</i> = 52
Interest rate	50%
Help sell/implement projects	23%
Ease of use	21%
Loan term	12%
On bill financing	8%
Other	21%

G.3.7 Assisted HPwES

The majority (87%) of interviewed contractors reported they had completed at least one Assisted HPwES project in the 12 months prior to their interview date. Participating contractors reported several differences between Assisted and market-rate HPwES projects, with the approval process and the types of homes that qualify constituting the largest differences (Table G-26). In terms of the types of homes that qualify, contractors mostly noted they may not be as well maintained (38%) or are often older homes (22%). In regards to the approval process, contractors typically mentioned that the approval process takes longer for assisted projects.

Table G-26. Differences between Assisted and Market-rate HPwES Projects

How Assisted projects differ from market-rate projects in terms of:		<i>n</i> = 52
The types of homes that qualify	No difference	44%
	Less well maintained	38%
	Homes older	22%
	Elderly owners	9%
	Other	20%
Measures typically installed	No difference	73%
	More measures required	11%
	Focus on insulation/air sealing	7%
	Other	9%
Approval process	No difference	40%
	Longer approval process	47%
	Faster approval process	7%
	Other	7%
Financing options	No difference	64%
	Difficult to get through process	16%
	Longer approval process	4%
	Other	16%
Does anything else differ?	No difference	68%
	Projects easier to sell	11%
	Homeowners more in need	7%
	Other	16%

G.3.8 Installation

G.3.8.1 Contractor Installation Experience

Contractors reported that their firms install a variety of measures in HPwES projects (Table G-27). The majority of participating contractors reported offering shell services, such as air sealing (98%) and insulation (94%). HVAC equipment, on the other hand, is installed by a smaller proportion of program contractors.

Table G-27. Measures Installed by Participating Contractors

	<i>n</i> = 52
Air sealing	98%
Duct sealing	96%
Programmable thermostats	96%
Attic insulation	94%
Wall insulation	94%
Floor or sill insulation	94%
Energy efficient water heaters	90%
Hot water pipe insulation	85%
ENERGY STAR furnaces or boilers	79%
ENERGY STAR central air conditioners or heat pumps	65%
Energy efficient windows	56%
Whole house fans	25%

The 38 contractors who reported installing ENERGY STAR HVAC measures were also asked to estimate the percent of HPwES projects involving HVAC system upgrades that included the specific services listed in Table G-28. This table exhibits the mean percent of jobs that included each service. As seen in the table, installing ENERGY STAR-labeled heating or cooling units was the most common service (79% of jobs, on average), followed by calculating the recommended amount of mechanical ventilation (75%) and installing programmable thermostats (73%). Few jobs (16% on average) included the installation of advanced heating or cooling controls.

Table G-28. Mean Percent of HPwES Projects Including Specific HVAC Services

	Mean percent of jobs (<i>n</i> = 38*)
Install ENERGY STAR-labeled heating or cooling units	79%
Calculate the recommended amount of mechanical ventilation	75%
Install programmable thermostats	73%
Seal ducts	56%
Test ducts for leakage	39%
Insulate circulation ducts or pipes	39%
Install or rework distribution systems such as ducts or heat pipes	26%
Check charge levels and air flow over condenser coils	25%
Install advanced heating or cooling controls	16%

* *n* values range from 36-38 due to don't know responses.

Most (87%) of the 38 contractors with experience installing ENERGY STAR HVAC measures indicated they use the same approach to sizing HVAC equipment in both HPwES and non-HPwES jobs. Contractors typically (66%) reported usually using Manual J calculations to size HVAC equipment. Other common methods for sizing HVAC equipment included: TREAT software (15%), heat load calculations (12%), or other various methods (29%).

G.3.8.2 Use of Subcontractors

About three-quarters (38 of 52, or 73%) of participating contractors said they sometimes hire subcontractors for their HPwES jobs. Of the 38 who said they hire subcontractors, nearly half (48%) estimated hiring subcontractors for 25% or less of their HPwES projects (Table G-29). On average, participating contractors hired subcontractors for 38% of their jobs.

Table G-29. Estimated Percent of HPwES Jobs with Subcontracted Work

	<i>n</i> = 38
Less than 10%	11%
10 to 25%	37%
26 to 50%	26%
51 to 99%	21%
100%	5%

Most (71%) of the 38 contractors who rely on subcontractors for HPwES projects reported subcontracting out HVAC installation services (Table G-30). Other than insulation and air sealing (47%), use of subcontractors from other specialties were mentioned by less than one-third of contractors who rely on subcontractors. Most (22 of 26) of these participating contractors said they are able to find subcontractors with the BPI certifications they desire.⁷⁸

⁷⁸ The evaluation team asked all 38 contractors who reported using sub-contractors on HPwES jobs this question. However, since 12 interviewees said this question was “not applicable” to them as they hire sub-contractors that specialize in trades for which no corresponding BPI certification exists, the evaluation team excluded “not applicable” responses from the frequency reported above.

Table G-30. Types of Sub-Contractors Typically Used (Multiple Responses Allowed)

	<i>n</i> = 38
HVAC installation	71%
Insulation and air sealing	47%
Window or door installation	32%
Plumbing	29%
Electrical	21%
Controls	18%
Duct and sheet metal work	18%
Carpentry	13%
Other	13%

G.3.9 Quality Assurance

Most (81%) participating contractors reported making additional quality assurance (QA) efforts (in addition to the program required test-out), indicating they conduct independent general inspections of the completed work. Few (17%) contractors indicated that there are specific types of projects or measures that seem to trigger complaints or QA issues, noting examples such as attics, crawlspaces, or Cape Code style homes. The 45 contractors who reported making additional QA efforts rarely have to return to a customer's home to address a complaint, as nearly half (49%) reported that they return to the home in five percent or less of their HPwES projects (Table G-31).

Table G-31. Estimated Percent of HPwES Jobs That Require Returning to the Home to Address a Customer Complaint

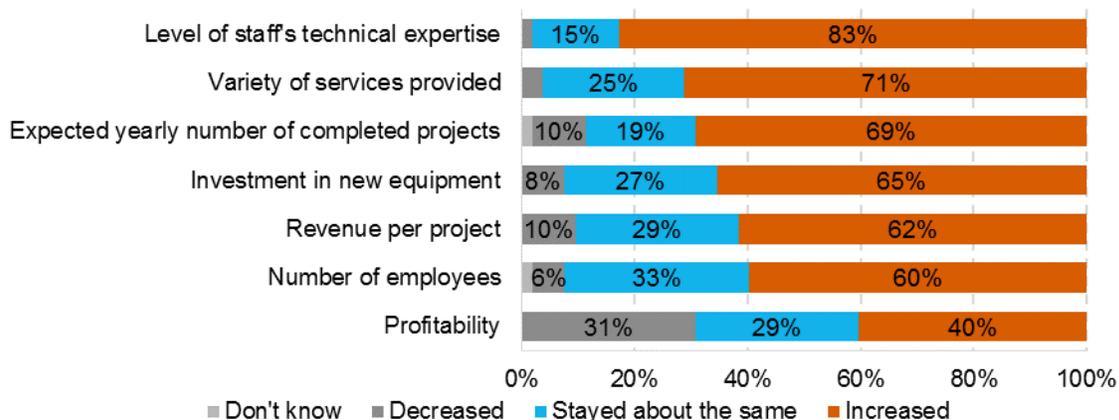
	<i>n</i> = 45	
	Percent of Sample	Cumulative Percent
0%	2%	2%
1 to 5%	47%	49%
6 to 10%	29%	78%
11 to 25%	18%	96%
26% or more	4%	100%
Total	100%	

G.3.10 HPwES Effects on Participating Contractor Businesses

Participating contractors attributed a variety of business benefits to their participation in HPwES (Figure G-10). The largest reported benefit was increases in the level of staff's technical expertise, with more than four-fifths (83%) indicating that staff technical expertise had increased as a result of working

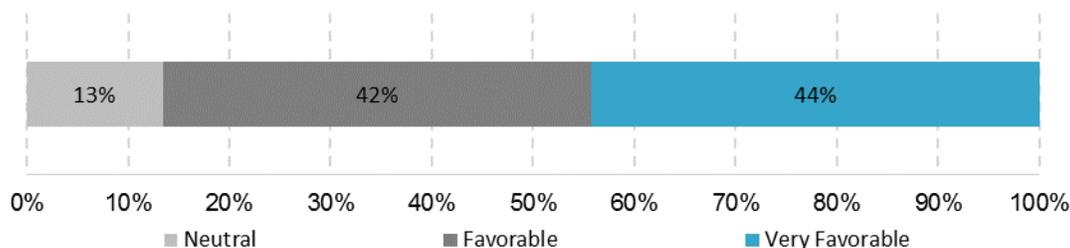
with HPwES. Participating contractors were split, however, as to HPwES’s effect on their business’s profitability; roughly equal proportions said their profitability had increased (40%), decreased (31%), or stayed about the same (29%) as a result of participating in the program. Additional statistical analysis reveals that newer contractors were significantly more likely to indicate their profitability had increased, as evidenced by a positive correlation ($p < .05$; $r = .31$) between rated changes in profitability and participation start year. These results suggest that newcomers to the program may quickly experience a boost in profitability, as they are able to use the program to acquire additional work that they previously were not getting; however, this finding also reveals that this increased profitability likely has a ceiling; as participating contractors gain more experience with the program, their profitability increases may eventually level off as they distance themselves from their preliminary years in the program that initially offered them a new revenue source.

Figure G-10. How HPwES Has Changed Participating Contractor Businesses (n = 52)



Nonetheless, the majority (79%) of interviewees said their company planned to grow the Home Performance component of their firm. Further, participating contractors overwhelmingly indicated their current overall business outlook was positive, with 87% reporting their business outlook was “highly favorable” (as indicated by a “4” or “5” rating; Figure G-11).

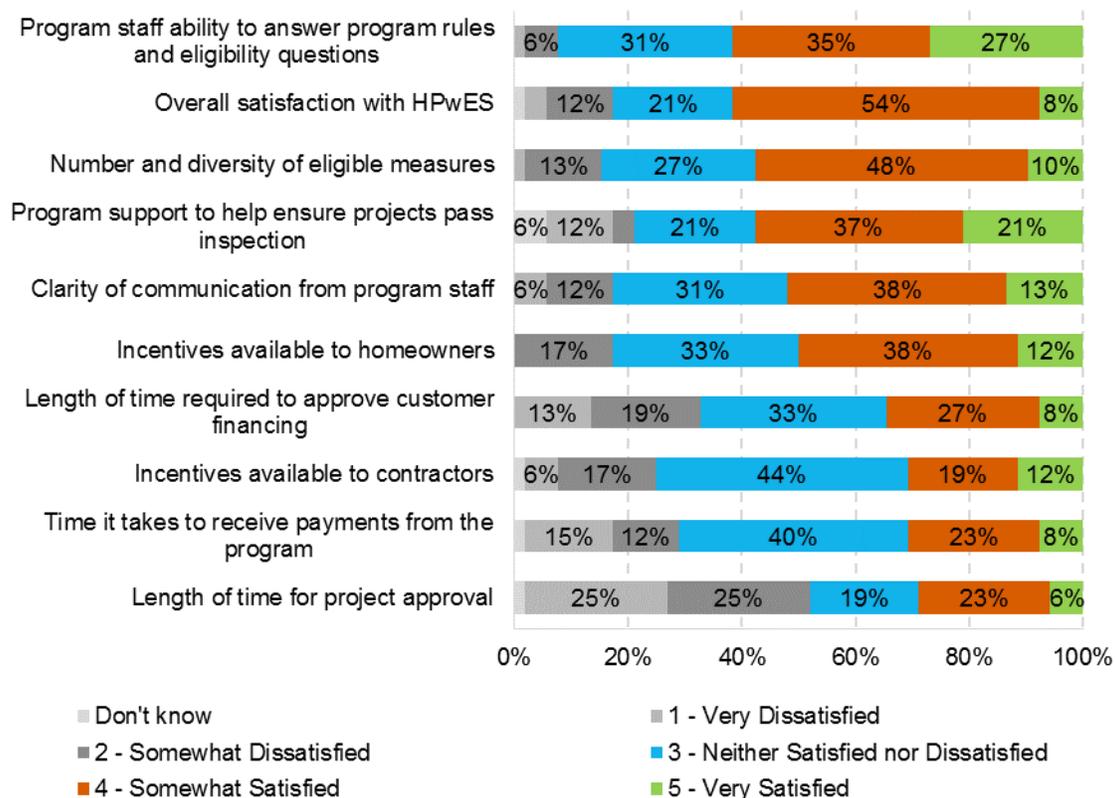
Figure G-11. Current Overall Business Outlook (n = 52)



G.3.11 Satisfaction with HPwES and Suggestions for Improvement

Participating contractor satisfaction with HPwES was mixed (Figure G-12). Contractors reported moderate satisfaction with program support to help ensure projects pass inspection, the number and diversity of eligible measures, overall satisfaction, and the program staff’s ability to answer program rules and eligibility questions; however, contractor satisfaction with contractor incentive offerings, the time it takes to receive payment from the program, and the length of time for project approval was low. Contractors reported mostly predictable reasons for dissatisfaction with various program elements: those who were dissatisfied with timing elements said the processes took too long and those who were dissatisfied with incentive levels said incentives were too low.

Figure G-12. Satisfaction with Various Elements of HPwES (n = 52)



When asked what would increase the number of HPwES projects their firm does each year, contractors typically suggested simplifying the program processes or increasing incentive amounts (Table G-32). “Other” suggestions widely varied, including such suggestions as eliminating the TRC requirement, increased co-op marketing funds, and yearly surveys of participating contractors in order to continually get contractor feedback.

Table G-32. What Would Increase the Number of HPwES Projects Your Firm Does Each Year? (Multiple Responses Allowed)

	n = 52
Improve / simplify program processes	31%
Higher incentives	21%
More program marketing / education	17%
Expedite program processes / contractor payments	15%
Other	40%

Contractors were divided on the longest delays in program processes, with about one-third (29%) indicating that project modeling reviews and eligibility/work scope approval constituted the longest review submittal delays (Table G-33). Interview data reveals that the new Portal system has mitigated submittal- and review-related delays, as 63% of contractors reported the Portal has helped streamline submissions and reviews as compared to the previous HUB system.

Table G-33. Longest Delays in Program Processes

	n = 52
Project modeling reviews	29%
Eligibility / work scope approval	29%
Financing	17%
Contract review / approval	10%
Other	23%

G.4 Survey Instrument

G.4.1 Introduction

Hello, my name is _____, may I please speak with [pipe in contact's name] [If no contact information: "the person who oversees the operations for your home performance business."] I'm calling on behalf of NYSERDA, the New York State Energy Research and Development Authority, from Research Into Action to evaluate NYSERDA's Home Performance with Energy Star program.

S1. Are you the best person to talk to about your organization's experience and interactions with NYSERDA's HPwES program?

As part of our evaluation, NYSERDA has asked us to talk with their contractors involved with the Home Performance with Energy Star program in order to understand benefits and challenges you're experiencing working with that program. Your opinions are very important to NYSERDA, and your suggestions may help improve the program. We will likely need about 45 minutes to get through the questions I have about the HPwES program, depending on how much you have to say.

Is this a convenient time for us to talk? [If not, schedule another time; if so, continue]

Please know that we will keep your responses confidential to the full extent of the law; nothing you say will be identified with you in our reports. If it is okay with you, I'd like to record this interview to ensure the accuracy of my notes. The recording will only be used by research staff and will not be provided to NYSERDA.

Do you have any questions before we get started?

G.4.2 Respondent Role [ASK ALL]

We have a few questions to help us understand your experience, and give us context for your perspective, so let's start with some information about you.

[Reviewer note: we will have firm tenure with the program; the questions below help us understand respondent perspective and expertise.]

Q1. [P/NP] For how many years have you been involved in home repair or home improvement contracting? years

Q2. [P/NP] Are you currently or have you ever been personally BPI certified?

- 1. Yes
- 2. No
- 98. DK

Q2A. [P/NP] [IF Q2=YES] Which certifications?

Q3. [P] And, for how many years have you been involved with the Home Performance with Energy Star program? years

Q4. [P/NP] Does your firm provide...? *[Read all]*

Expertise	Mark if yes
a. Heating or air conditioning for homes	
b. Electrical contracting	
c. Siding, window or door installation	
d. Insulation	
e. Renovation or general contracting	
f. Home building	
g. Plumbing	
h. Other (specify)	

G.4.3 Program Experience [ASK ALL]

[Interviewer note: We are interested in jobs that either accessed HPwES program incentives or those that could have (were potentially qualified upgrades) but that didn't go through the NYSERDA program. For any unclear response, clarify if response applies to program jobs, potentially qualified but out-of-program jobs, or standard projects.]

Now let's turn to your interaction with the Home Performance with Energy Star program.

- Q5. [P/NP] About what percentage of your organization's work is in residential buildings (excluding large multifamily)? %
- Q6. [P] And about what portion of your jobs in existing homes (as opposed to new construction) involved installing equipment or providing services similar to those encouraged by NYSERDA's HPwES program? Could include both program projects and those similar to program projects.
%
- Q7. [P] About what percentage of your jobs in existing homes received incentives or financing through NYSERDA's HPwES program? %

G.4.4 Marketing and Leads [ASK ALL]

- Q8. [P] Do you get HPwES audit leads from...
- a...your own direct marketing activities? Yes/no/DK
 - b...from interest generated by NYSERDA marketing activities? Yes/no/DK
 - c...from equipment failures / emergencies? Yes/no/DK
 - d... adding to the scope of more typical projects? Yes/no/DK
- Q9. [P] And, do you get referrals from NYSERDA-affiliated contacts [IF NEEDED: such as program staff, trade allies, community based organizations, other NYSERDA programs]?
- 1. Yes
 - 2. No
 - 98. DK
- Q10. [P] Where do **most** of your Home Performance job leads come from?

G.4.4.1 Marketing Activities:

- Q11. [P] To promote your home performance services does your organization [RANDOMIZE]:
(interviewer note: cluster of services, not specifically the program alone)
- a. Pay for advertising? 1. Yes 2. No 98. DK

Q11A1. [If Q11a=YES] What type?

- b. Maintain a website? 1. Yes 2. No 98. DK
- c. Maintain an email list serve or access email lists to promote your HP services? 1. Yes 2. No 98. DK
- d. Attend public events like street fairs? 1. Yes 2. No 98. DK
- e. Attend home shows? 1. Yes 2. No 98. DK
- f. Advertise your BPI accreditation? 1. Yes 2. No 98. DK
- g. Work with local nonprofits or constituency-based organizations affiliated with NYSERDA? 1. Yes 2. No 98. DK

G.4.4.2 Co-op Marketing Activities:

Q12. Did your firm receive any NYSERDA co-op marketing funds in 2013 or 2014? (Yes/No/Don't know)

[Ask if Q12 = Yes; Else skip to Q14] Q12A. [P] How did you use NYSERDA's co-op marketing funds?

Q13. [Ask if Q12 = Yes; Else skip to Q14] [P] How would your HP marketing activities change if you didn't have access to the co-op marketing funds?

G.4.5 CBO Experience/CBO Question Battery [Using previously reviewed CBO-specific question set]

G.4.5.1 Block 1: CBO Sample [Aggregation No + Yes]

Q14. [P] In some areas of the state, NYSERDA has contracted community-based organizations (or CBOs for short) to conduct outreach to enroll homeowners in the Home Performance program. This is separate from the low-income Empower program. According to our records, your firm completed Home Performance projects that were affiliated with a CBO. Are you aware of this CBO outreach?

- a. Yes
- b. No

[ASK IF Aggregation = YES]

Q15. [P] [moved to just before Q35].

[If Q14 = Yes]

Q16. [P] Are you the best person to speak to about how your firm worked with the CBO?

- a. Yes
- b. No

[ASK IF Q14 = No or Q16= No]

Q17. [P] Is there someone else at your firm we could talk to specifically about program projects where CBOs were involved? Who?

- a. Name: _____
- b. No

[IF contact info collected, skip to end of CBO block, resume HPwES questions. If no one at firm is able to speak to CBO involvement, skip to Non-CBO Affiliated block (starting at Q38)]

Q18. [P] What CBOs have you interacted with?

- a. [RESPONSE]
- 98. Don't know

Q19. [P] How did your firm initially connect with these CBOs? [Do not read responses, probe to code, record additional detail]

- a. Program staff connected us with a local CBO
- b. The CBO approached us
- c. The CBO referred a homeowner to us
- d. Home show or other event
- e. We had an existing relationship with the CBO. Please describe: _____
- 96. Other, specify: _____

Q20. [P] Has your firm ever attended an outreach event with a CBO to promote the HPwES program? [If needed: For example, have you attended a home show or meeting with a CBO to answer questions about the program?]

- a. Yes
- b. No
- 98. Don't know

Q21. [P] I'm going to list several potential services CBOs may have provided. Thinking about your projects with a CBO involved, how often did the CBO provide these services (never, sometimes, or frequently) and then how helpful that service was or would be to your firm (not at all helpful, somewhat helpful, or very helpful). On your CBO-affiliated projects, how often did the CBO ...

Item	1 Never	2 Sometimes	3 Frequently	[Optional comment]	98 DK
Send your firm referrals					
Screen referrals for EmPower and Assisted Home Performance eligibility					
Provide program application paperwork assistance to referrals					
Provide financing information or application assistance to referrals					
Provide supplemental funding that allowed the project to move forward					
[deleted]					
Follow up with your “stalled” leads to reengage them					
Bundle retrofit projects to reduce overhead					

Q22. Q21B – incorporated into Q21 matrix

[LOGIC] Item	1 Not at all helpful	2 Somewhat helpful	3 Very helpful	[Optional comment]	98 DK
Attend marketing events with your firm to promote the program					
Send your firm referrals					
Screen referrals for EmPower and Assisted Home Performance eligibility					
Provide program application paperwork assistance to referrals					
Provide financing information or application assistance to referrals					
Provide supplemental funding that allowed the project to move forward					
[deleted]					
Follow up with your “stalled” leads to reengage them					
Bundle retrofit projects to reduce overhead					

I’d like to know more about how these CBO-affiliated projects work.

Q23. [P] Please describe how your firm typically interacts with these CBOs (in terms of communication, coordination, or any other assistance you might have received from them).

a. [RESPONSE]

98. Don’t know

Q24. [P] [deleted]

Q25. [P] What are the differences, if any, in CBO involvement between Assisted and Market rate Home Performance projects?

a. [RESPONSE]

98. Don't know

Q26. [P] How do CBO-affiliated projects differ from your other Home Performance with ENERGY STAR projects?

a. [deleted]

b. How about differences in your interaction with the homeowner and the level of support the homeowners need from you? _____

c. Any other differences? _____

Q27. [P] I'm interested in how CBOs might have benefited your Home Performance program work. To what extent have CBOs... (Not at all / Somewhat / A lot; add optional OE box) ... How?

Item	Not at all	Somewhat	A lot	How? [OE]	98 DK
Decreased marketing and administration costs on these projects					
Increased the volume of Home Performance work you do					
Increased the number of audit recipients who complete retrofits [conversion rate]					
Decreased the duration of projects (start to finish time)					
Increased the number of measures installed in Home Performance projects					
Decreased the "handholding" you must do with homeowners on Home Performance projects					
Increased the number of customers accessing NYSERDA financing.					

[ASK IF CBO AGGREGATION = NO ONLY]

Q28. [P] What kinds of challenges, if any, have you encountered in working with CBOs?

a. [RESPONSE]

98. Don't know

Q29. [ASK IF CBO AGGREGATION = NO ONLY][P] How have you addressed these challenges?

a. [RESPONSE]

98. Don't know

- Q30. [P] Is there anything more the CBOs could do to help your firm's work on Home Performance projects?
- a. [RESPONSE]
98. Don't know

G.4.5.2 Block 2: CBO Sample Yes Aggregation Only

- Q31. [P] [deleted]
- Q32. [P] [deleted]
- Q33. [P] [deleted]
- Q34. [P] [deleted]
- Q15. Our records show your firm has been part of an aggregation pilot with a CBO. Aggregation involved an agreement with NYSERDA and a community organization to conduct Home Performance program retrofits with clusters of homes, giving each a small discount. Are you aware of your firm's involvement in the aggregation pilot?
- a. Yes
- b. No
98. Don't know

[IF Q15 = NO/DK, SKIP TO Q41]

- Q35. [P] What types of challenges, if any, have you encountered in recruiting, scoping, or completing retrofit jobs through the aggregation pilot?
- a. [RESPONSE]
98. Don't know
- Q35A. How have you addressed these challenges?
- b. [RESPONSE]
98. Don't know
- Q36. [P] How has clustering projects in the same area at the same time worked for you... [IF NEEDED]: That is, completing groups of jobs in an area at the same time. [READ EACH; ALLOW OPEN-ENDED RESPONSE]
- a. In terms of reducing project costs?
- b. In terms of the ease of closing projects?
- c. In terms of scheduling the audits and upgrades?
- d. In terms of promoting financing?

Q37. [P] In providing a consistent stream of Home Performance work, how, if at all, has this aggregation work affected your staffing?

G.4.5.3 Block 3: Non-CBO Affiliated HP Contractor Sample

Q38. [P] In some areas of the state, NYSERDA has contracted community-based organizations (or CBOs) to conduct outreach to enroll homeowners in the Home Performance program. Prior to today, had you heard about this CBO outreach for the Home Performance program?

- a. Yes
- b. No
- 98. Don't know

[ASK IF Q38 = 1 Yes]

Q39. [P] To your knowledge, since 2012, has your firm worked on an audit or retrofit project where one of these CBOs was involved?

- a. Yes
- b. No
- 98. Don't know

Q40. [P] I'm going to read a list of several services that these CBOs might provide. For each, please tell me if it would be not at all helpful, somewhat helpful, or very helpful to your NYSERDA Home Performance activities.

[LOGIC] What if a CBO were to...	1 Not at all helpful	2 Somewhat helpful	3 Very helpful	[Optional comment]	98 DK
Attend marketing events with your firm to promote the program					
Send your firm referrals					
Screen customers for EmPower and Assisted Home Performance eligibility					
Provide program application paperwork assistance to homeowner					
Provide financing information or application assistance to homeowner					
Provide project planning support to homeowner					
Follow up with your "stalled" leads to reengage them					
Work with you to bundle groups of projects in one region to reduce your overhead					
Any other support that would be helpful?	Open end:				

G.4.6 Selling HP [ASK ALL]

Now let's turn to how you promote the whole house/home performance approach to customers.

Interviewer note: We are interested in what the firm is doing to help convince customers to pursue more efficient or comprehensive upgrade projects.

Q41. [P/NP] Briefly, how do you describe the benefits of the whole house approach to customers?

G.4.6.1 Audits and Assessments [ASK ALL]

I have a few questions about the home energy assessments you provide...

Q42. [P] In the past two years, have you provided audits to customers outside of the program?

1. Yes

2. No

98. DK

Q43. [P/NP] Are there certain types of homes or homeowners for which you always recommend a diagnostic audit?

Which ones typically?

Q44. [P/NP] Are there certain types of homeowners you are more likely to provide a simpler, walk-through audit? [Describe difference.]

Q45. [P/NP] What software are you using to model energy savings estimates? [TREAT or other software?]

Q45A. [P/NP] What advantages does using modeling software give your company compared to companies that don't model savings for their customers?

Q45B. [P] What, if any, disadvantages come along with the program requirement that you use modeling software?

Q46. [P] How do you go about getting the prior consumption information required to calibrate the model?

Q46A. [P] What challenges do you encounter getting consumption data?

Q46B. [P] [deleted]

Q46C. [P] [IF DELIVERED FUELS NOT MENTIONED] How does this process differ for homes with delivered fuels?

Q47. [P] What would help to improve the modeling process going forward?

Thinking about the full, diagnostic comprehensive home energy assessment....

Q48. [P/NP] How often are you able to identify upgrade opportunities without conducting a full diagnostic audit?

Q49. [P/NP] We're interested in learning about how long it takes to complete the various stages of the assessment.

About how many hours does it take to conduct the audit? [*Range of time needed.*]

And how long to complete the modeling associated with these assessments? [*Range of time needed.*]

And how long does it typically take to generate an audit report? [*Range of time needed.*]

Q50. [P/NP] Are there certain types of homes or performance problems that tend to require substantially more time with modeling? [Describe.]

Q51. [P] [moved to Q49]

Q51A. [P] When do you submit the audit results to the program?

Q51B. [P] How do you submit audit results to the program?

Q51C. [P] Do you have any suggestions for improving this process?

Q51D. [P] Over the past year, about how many times have you used the "what if" mode in the Eligibility Screening Tool of the NY HP Portal?

Q52. [P/NP] How often do you provide a copy of the assessment results to the homeowner? [Always, usually, sometimes, rarely, never, DK.]

Q53. [P/NP] [IF Q52 ≠ "NEVER"] Do you typically review the document with them?

1. Yes
2. No
98. DK

Q53A. [P] [IF Q53=YES] Is this typically done at their home, over the phone, or electronically?

Q53B. [IF Q53=YES] [P] And who typically does this?

Q53C. [IF Q53=YES] [P] About how long after the audit does this typically occur?

- Q54. [P/NP] How long does it typically take for your customers to decide to go forward?
- Q54A. [P/NP] In your experience, what factors most often contribute slow decision-making?
- Q55. [P] I'm going to read a few statements about the program's Comprehensive Home Energy Audit. Please use a scale from 1 to 5 where '1' means you 'do not at all agree' and '5' means you 'completely agree' with the statement.
- The audit helps homeowners prioritize recommended upgrades.
 - The audit helps convince homeowners to choose more comprehensive upgrades.
 - The comprehensive audits are a major source of leads for HPwES projects.
 - The program's reimbursement rate for the audit covers my cost.
- Q56. [P/NP] I'm going to list several factors that might motivate your customers to upgrade their energy using equipment. Thinking about your typical customer, please rate how important each is using a 1-5 scale where "1" means "not at all important" and "5" means "critically important." How would you rate the importance of...
- Reducing household energy use or energy bills
 - Improving comfort
 - Protecting the value of their home
 - Having a more sustainable home
 - Helping the environment
 - Accessing incentives to help offset the cost of their project
 - Improving the indoor air quality in their home
 - Other health or safety reasons

G.4.6.2 Work Scope Development [ASK ALL]

- Q57. Thinking about how projects are scoped and bids developed at your organization...
- Are office/admin staff involved? (yes/no/sometimes)
 - What about the auditor or assessor? (yes/no/sometimes)
 - Are installers or technicians involved? (yes/no/sometimes)
 - [P] Does your organization have dedicated sales staff? (yes/no)
- Q58. [P] Why do customers typically choose to complete their project without NYSEERDA HP incentives or financing, even though the project would otherwise qualify for incentives?
- Q59. [P] Have you had customers choose to access utility incentives rather than pursuing HPwES?
- Q59A. [P] If yes: Why does this occur?

Q60. [P] Based on your experience, what would increase the number of HPwES projects your firm does each year?

G.4.6.3 Financing [ALL]

We'd also like to know when and how you discuss project financing with homeowners.

Q61. [P] Do you encourage customers to consider financing options available through NYSERDA all the time, most of the time, some of the time or rarely?

Q62. [P/NP] Do you offer any other financing to your customers, such as distributor or manufacturer financing?

1. Yes, distributor financing
2. Yes, manufacturer financing
3. Yes, other financing (specify): [OPEN-ENDED RESPONSE]
4. No, only financing available through NYSERDA
5. Don't know

Q63. [P] When do program-provided financing options typically come up?

- a. [P] And who presents the financing options for HPwES projects to customers?

Q64. [P] In your experience, how long does it typically take for program financing to be arranged?

Q65. [P] I'm going to read a few statements about the program's financing options. Please use a scale from 1 to 5 where '1' means you 'do not at all agree' and '5' means you 'completely agree' with the statement.

- a. Financing helps projects that otherwise may have stalled.
- b. The financing options available through NYSERDA are attractive to my customers
- c. Customers can complete the paperwork easily on their own.
- d. The time required for approval is reasonable.

Q66. [P] What do you like best about program financing?

G.4.6.4 Assisted Home Performance

Q67. [P] In the last twelve months, has your firm completed any projects that qualified for assisted home performance? (Y/N/DK)

[IF NO ASSISTED PROJECT IN PAST 12 MONTHS IN CRIS]

Q67A. [P] Why do you suppose your firm has not completed any assisted rate projects through the program over the past year?

[ASK Q68-69 ONLY IF COMPLETED 1 OR MORE ASSISTED PROJECTS IN PAST YEAR]

- Q68. [P] How do Assisted (or limited income) projects differ from market-rate projects in terms of...
- The types of homes that qualify.
 - The measures typically installed.
 - The approval process. [*Length of time, verifying income, anything else?*]
 - Financing options.
 - Does anything else differ?
- Q69. [P] What is your firm's role in getting the financing process started for these projects? [*Any difference in the level or type of information you get from customers, anything else?*]

G.4.7 Construction and Installation [ALL]

[If Q67 = YES, Display: "Now let's focus on all HP jobs- including both assisted and market rate"]

I have a few questions about how the equipment installations and upgrades get done.

- Q70. [P] Do you hire subcontractors for your HPwES projects? Y/N/DK
- Q70a. [If Q70=YES] For what percentage of your HPwES projects do you hire sub-contractors? %
- Q71. [P] [IF Q70 = Yes; Else skip to Q73] What type of subcontractors do you typically use? (Type or specialty)

[MULTIPLE RESPONSE]

- Insulation and air sealing
- Controls
- Electrical [including lighting]
- Plumbing
- HVAC installation
- Duct and sheet metal work
- Carpentry
- Window or door installation

[Do not read:]

- Other, please specify: [OPEN-ENDED RESPONSE]
- Not applicable
- Don't know

Q71A. [P] And how often are your subs for these projects BPI certified? [added to matrix above]

- 1. Always
- 2. Sometimes
- 3. Never
- 4. N/A
- 98. Don't know

Q71B. [P] Do they hold types of BPI certifications that your company doesn't maintain on staff?
[added to matrix above]

- 1. Yes
- 2. No
- 97. N/A
- 98. Don't know

Q72. [P] Are you able to find the subs with certifications you want?

- 1. Yes
- 2. No
- 97. N/A
- 98. Don't know

Q72A. [P] [IF Q72 = NO] Why not?

Q73. [P/NP] Does your organization have a...?

- | | | | |
|---|--------|-------|--------|
| a. Blower door | 1. Yes | 2. No | 98. DK |
| b. Duct blaster fan with fan speed controller | 1. Yes | 2. No | 98. DK |
| c. Infrared camera | 1. Yes | 2. No | 98. DK |
| d. Combustion analyzer | 1. Yes | 2. No | 98. DK |
| e. Combustible gas leak detector | 1. Yes | 2. No | 98. DK |
| f. Exhaust fan flow meter | 1. Yes | 2. No | 98. DK |
| g. Pressure pan test equipment (for duct leakage diagnostics) | 1. Yes | 2. No | 98. DK |
| h. Digital pressure and flow gauge (simultaneous display of both duct pressure and Duct Blaster® fan flow readings) | 1. Yes | 2. No | 98. DK |

[ASK ALL]

Q74. [P/NP] Does your organization install?

- a. [Display insulation items if Q4d=Yes]
- | | | | |
|------------------------------|--------|-------|--------|
| 1) Attic insulation? | 1. Yes | 2. No | 98. DK |
| 2) Wall insulation? | 1. Yes | 2. No | 98. DK |
| 3) Floor or sill insulation? | 1. Yes | 2. No | 98. DK |
- b. Air sealing 1. Yes 2. No 98. DK
- c. Duct sealing 1. Yes 2. No 98. DK
- d. [Display if Q4c=Yes] Energy efficient windows 1. Yes 2. No 98. DK
- e. [Display if Q4a=Yes] ENERGY STAR furnaces or boilers 1. Yes 2. No 98. DK
- f. [Display if Q4a=Yes] ENERGY STAR central air conditioners or heat pumps 1. Yes 2. No 98. DK
- g. Programmable thermostats 1. Yes 2. No 98. DK
- h. Energy efficient water heaters 1. Yes 2. No 98. DK
- i. Hot water pipe insulation 1. Yes 2. No 98. DK
- j. Whole house fans 1. Yes 2. No 98. DK

Q75. [P/NP] [If Q74= “ENERGY STAR furnace or boiler” or “ENERGY STAR central air conditioner or heat pump.”; Else skip to Q78] How do you usually size HVAC equipment?

- a. Matching the size of the unit being replaced
- b. Heat load calculations based on home measurements
- c. Manual J calculations
- d. Manufacturer’s computer model
- e. Other [Specify:]

Q76. [P] Is your approach to sizing different for non HPwES jobs? [If yes: How so?]

Q77. [P/NP] Thinking about all of your residential HVAC projects over a typical year, in what percent of residential HVAC installation projects in existing homes do you typically

- a. Install Energy Star-labeled heating or cooling units %
- b. Install programmable thermostats %
- c. Install advanced heating or cooling controls such as: zone controls, NEST or similar “smart” thermostats, or thermostats that can be controlled remotely through cell phones or computers %
- d. Install or rework distribution systems such as ducts or heat pipes %
- e. Seal ducts %

- f. Insulate circulation ducts or pipes %
- g. Test ducts for leakage %
- h. Check charge levels and air flow over condenser coils %
- i. Calculate the recommended amount of mechanical ventilation

Q78. [P/NP] About what percent of your residential jobs in existing homes include X service? And, what percent of all of your HP jobs include X service? [*Interviewer, probe to get percentages or ranges of percentages. I.e.: "Most of the time" is not an acceptable answer. Continue with other services using same framework.*]

	[P/NP] Percent of all res jobs	[P] Percent of HP jobs
a. Energy audits		
b. Infrared inspection of insulation		
c. Blower door test for infiltration		
d. Duct leakage testing		
e. Combustion efficiency for heating equipment		
f. Refrigeration diagnostics for air conditioning equipment (for homes with central air conditioning)		
g. Radon test		
h. Combustion Appliance Zone (CAZ) test		

G.4.8 Assuring Quality

Q79. [P] Other than the required test-out, are there things your firm does to ensure the quality of completed projects?

- a. Yes
- b. No
- c. Don't know

Q79A. [P] [IF Q79=YES] What are those things?

Q79B. On what percentage of your residential projects do you return to the home to address a customer complaint?

Q80. [P] Are there specific types of projects or measures that seem to cause issues?

- a. How have you been addressing these issues?

G.4.8.1 Training [ALL]

We have a few questions about the training available for you or your employees.

Q81. [P/NP] Has anyone in your firm taken any training on energy efficiency improvements for existing homes?

1. Yes
2. No
98. Don't know

Q81A. [P/NP] [IF Q81=YES] What organization(s) provided the training?

1. Building Performance Institute
2. Local college or junior college
3. Utility program
4. State or local government agency
5. Equipment or materials manufacturer
6. Other: (Specify)

Q82. [P/NP] Are there gaps in training opportunities that you'd like to see addressed?

G.4.9 Contractor view of BPI

Q83. [P/NP] Have your customers typically heard of BPI?

1. Yes
2. No
98. Don't know

Q84. [P/NP] Do you explain BPI accreditation to customers?

1. Yes
2. No
98. Don't know

Q85. [P/NP] What proportion of your customers think BPI accreditation is important?

1. All
2. Some
3. None
98. Don't know

Q86. [P/NP] In terms of helping differentiate you from competitors, how valuable is BPI accreditation to your firm? Please give your response on a 1 to 5 scale, where 1 is not at all valuable and 5 is very valuable

- 1. Not at all valuable
- 2.
- 3.
- 4.
- 5. Very valuable
- 98. Don't know

Q86A. [P/NP] In terms of helping ensure that your technicians perform high quality work, how valuable is BPI accreditation to your firm? Please give your response on a 1 to 5 scale, where 1 is not at all valuable and 5 is very valuable

- 1. Not at all valuable
- 2.
- 3.
- 4.
- 5. Very valuable
- 98. Don't know

Q86B. [P/NP] In terms of helping identify and address opportunities to save energy in customers' homes, how valuable is BPI accreditation to your firm? Please give your response on a 1 to 5 scale, where 1 is not at all valuable and 5 is very valuable

- 1. Not at all valuable
- 2.
- 3.
- 4.
- 5. Very valuable
- 98. Don't know

Q86C. [P] And how valuable is the program support for BPI certification and accreditation activities to your organization? Please give your response on a 1 to 5 scale, where 1 is not at all valuable and 5 is very valuable

- 1. Not at all valuable
- 2.
- 3.

- 4.
- 5. Very valuable
- 98. Don't know

Q87. [P] Would you renew your accreditation if it were not required by the program?

- 1. Yes
- 2. No
- 98. Don't know

G.4.10 Program Experiences

We'd also like to understand the effects of the program on organizations like yours. [Interviewer note: these are open ended questions, probe to understand decreases or increases attributed to the program.]

Q88. [P] Has your association with NYSERDA's HPwES program led to an increase in the services your company provides, a decrease, or have the services you offer stayed the same?

- 1. Increase
- 2. Stayed about the same
- 3. Decrease
- 98. DK

Q88A. [P] Has your association with NYSERDA's HPwES program increased the number of projects your company expects to complete each year, decreased, or has it stayed the same?

- 1. Increase
- 2. Stayed about the same
- 3. Decrease
- 98. DK

Q88B. [P] What about revenue per project? Would you say it's increased, decreased or stayed the same?

- 1. Increase
- 2. Stayed about the same
- 3. Decrease
- 98. DK

Q88C. [P] Has the program caused an increase in profitability, a decrease, or has it stayed the same?

1. Increase
2. Stayed about the same
3. Decrease
98. DK

Q88D. [P] What about investments in new equipment, such as diagnostic equipment or trucks? Has the level of investment increased, decreased or stayed the same?

1. Increase
2. Stayed about the same
3. Decrease
98. DK

Q88E. [P] What about the level of technical expertise among your staff? Would you say that your involvement with the program has led to an increase in the level of technical expertise, a decrease, or would you say it's about the same?

1. Increase
2. Stayed about the same
3. Decrease
98. DK

Q88F. [P] And, number of employees? Has your involvement with the program led to an increase in the number of employees, a decrease, or has it had no effect on the number of employees?

1. Increase
2. Stayed about the same
3. Decrease
98. DK

Thinking about your expectations for the next two years...

Q89. [P] Does your company expect to grow the Home Performance component in your organization?

1. Yes
2. No
98. DK

Q90. [P/NP] On a scale of 1-5, where 1 is very unfavorable and 5 is very favorable, how would you describe the current overall outlook for your business?

G.4.11 Satisfaction [ALL]

I have a few questions about your satisfaction with the HPwES program.

Q91. [P] On a scale of one to five where ‘1’ means Very Dissatisfied, ‘2’ means Somewhat Dissatisfied, ‘3’ means Neither Satisfied nor Dissatisfied, ‘4’ means Somewhat Satisfied, and ‘5’ means Very Satisfied, please indicate your level of satisfaction with the following HPwES program elements:

Interviewer: do not read 97-99

[MATRIX QUESTION: SCALE]

	1 Very Dissatisfied	2 Somewhat Dissatisfied	3 Neither Satisfied nor Dissatisfied	4 Somewhat Satisfied	5 Very Satisfied	97 NA	98 DK	99 RF
Length of time for project approval								
Length of time required to approve customer financing								
The incentives available to contractors								
The incentives available to homeowners								
The number and diversity of eligible measures								
Time it takes to receive payments from the program								
The clarity of communication from program staff, including CSG								
Extent to which program staff are able to answer questions about program rules and eligibility								
Support provided by the program to help ensure projects pass inspection								
Overall satisfaction with the HPwES program								

For any topic with a 1’ or a ‘2’, ask a follow up question.

Q91A. [P] What about (XX - indicated by a ‘1’ or a ‘2’) are you dissatisfied with?

- Q92. [P] When it comes to review of your submittals, where are the longest delays? [*PROBES: perhaps the audit review, the financing process, jobs with fuel-switching, other areas?*]
- a. Has the Portal helped to streamline your submittals and program reviews compared to projects reviewed through the HUB system? Why or why not?

G.4.12 Firmographics – MCA / ME [ASK ALL]

Finally, I have some questions about your company, staffing levels, and the home performance market in New York. Mostly I'll be asking for numbers so we'll be wrapping up soon.

- Q93. [P/NP] About how many staff do you have that conduct energy audits? [IF ANSWER = 'DEPENDS' ASK "DEPENDS ON WHAT?" Seasonality, market conditions, etc.]

Q93A. [P/NP] And, how many of those are BPI certified?

- Q94. [P/NP] How many technicians/installers does your firm have?

Q94A. [P/NP] How many are BPI certified?

- Q95. [P/NP] [deleted]

- Q96. [P/NP] How many crew supervisors do you have?

Q96A. [P/NP] And how many are BPI certified?

Q96B. How many staff do you have that are pursuing new BPI certification?

- Q97. [P/NP] When hiring staff, does your company prefer candidates with BPI certification(s)?

- Q98. [P/NP] Do BPI certified employees earn a higher wage than employees with similar responsibilities who have not been certified?

a. Yes

b. No

[Do not read:]

98. Don't know

[IF Q98= YES]

Q98A [P/NP] In general, how much more are they paid per hour?

G.4.12.1 Business Type [ALL]

These last questions will help us understand the home improvement market in New York.

Q99. [P/NP] Including your location, how many separate locations does your company have in the state of New York?

[Do not read:]

98. Don't know

Q100. [P/NP] Including yourself, how many employees work at your location?

[Do not read:]

98. Don't know

Q101. [P] And how many of them work on HPwES jobs?

[Do not read:]

98. Don't know

Those are all my questions—thank you so much for your time today.

Appendix H Participant Homeowners Survey Results Memorandum

H.1 Summary

The evaluation team surveyed 638 randomly selected homeowners who had participated in the NYSERDA HPwES program between January 2012 and December 2013 to gauge their experiences with various program components. This memorandum reports the results from 570 respondents who were unaffiliated with constituent-based organizations.

A majority of the participant respondents live in single-family detached homes built before 1980. They commonly have lived in their home more than 10 years and plan to live in the same home more than 10 years, but one-fifth of the respondents purchased their home more recently in the last five years. The socio-economic status of participant varies widely in terms of educational background, age, and household income. The top three problems reported in these participants' homes prior to participating in HPwES were air leakage, aging, or malfunctioning heating systems, and ice dams.

Data indicate the auditors and contractors played significant roles in disseminating program information and helping participants identify with whom to work. Most commonly, participants learned about the program from contractor firms with whom participants had existing relationships. They hired these firms as their auditors, and continued working with them as their contractor. Some participants took advantage of program's information sources to navigate the program process, but about two-thirds of the participants did not.

A majority of the participants reported high satisfaction with the audit they received. The audit results were influential in persuading many participants who had not considered upgrades previously to conduct upgrades and in convincing those who were previously considering upgrades to install measures they had not considered prior to the audit. Most participants, particularly among assisted participants, also reported that the availability of program incentives and financing options played an important role in their decision to complete upgrades. Overall, about half of the participants reported installing all of the measures recommended by their auditors. The majority were completed through HPwES, installing about three measures on average, most commonly: air sealing, insulation, and heating and cooling systems.

Most participants were aware of the availability of a program-sponsored loan; however, less than half of the participants reported applying for it, and less than a-third (30%) received a loan through the program. Though awareness of the program loan was high, significantly smaller proportions of participants knew about the details such as the on-bill payment option and alternative approval criteria.

Although a majority of the participants rated the overall program experience to be satisfactory, about one quarter suggested the energy savings they obtained were not satisfactory. Nearly one quarter of those who received a post-installation inspection also suggested some issues emerged related to poor installation quality, but some of them reported that their contractors later addressed these issues in their verbatim responses.

H.2 Introduction and Methodology

In November and December 2014, Research Into Action deployed telephone surveys of NYSERDA HPwES program participant homeowners who completed projects between January 2012 and December 2013. Respondents to this survey included both market-rate and assisted participants and were either affiliated with constituent-based organizations (CBO) or CBO-unaffiliated participants. This memorandum provides survey findings focused on the CBO-unaffiliated participants.⁷⁹

H.2.1 Sampling and Fielding

The research team (the team) divided all HPwES participating homeowners into the following groups and drew a random sample from each group:

- Market-rate participants who were affiliated with a CBO
- Assisted participants who were affiliated with a CBO
- Market-rate participants who were not affiliated with a CBO
- Assisted participants who were not affiliated with a CBO

Table H-1 summarizes the sampling approach. The team designed the sampling within each sampling group by assuring the minimum of 90% confidence +/- 10% precision, and overall sample to meet 95% +/- 5% requirement. By randomly drawing the sample within each sampling group, the team assured this sample accurately represents the entire population of HPwES participant homeowners.

⁷⁹ The result of CBO-affiliated respondents is reported in Appendix J.

Table H-1. Summary of Sampling Approach

Sampling Group	Population		Completed Sample		
	Count	Percent	Count	Percent	Confidence Precision
Market-rate participants – CBO affiliated	402	3%	41	6%	90%+/-10%
Assisted participants – CBO affiliated	303	3%	27	4%	
Market-rate participants – CBO unaffiliated	7,116	61%	400	63%	95%+/-5%
Assisted participants – CBO unaffiliated	3,805	33%	170	27%	95%+/-7%
Total	11,626	100%	638	100%	95%+/-4%

Abt SRBI fielded the phone surveys between November 20 and December 11, 2014. To minimize non-response bias, Abt SRBI made up to six attempts per telephone number and used the fewest contacts possible to attain the target number of completes. The team completed surveys with 638 respondents, and the total response rate was 24%.⁸⁰ On average, the respondents took 25 minutes to complete the survey. The survey instrument and detail survey dispositions are located in section *H.4 Survey Instrument* and *H.5 Survey Disposition*.

H.3 Findings of HPwES Participant Homeowners

The following section presents the results of the HPwES participant homeowner survey among the respondents who were unaffiliated with CBO. The survey assessed their experiences with their auditors and contractors, and project scope, motivations for participation, financing, and perceived values of various program service components. Where appropriate, the team compared responses of the market-rate and assisted participants, but such comparisons appear in this section only when the difference is statistically notable.

H.3.1 Respondents' Characteristics

Table H-2 summarizes HPwES participant homeowners' demographic and housing characteristics. Though participant homeowner respondents come from a wide variety of housing types, their homes are heavily concentrated in older single-family detached housing stock. Ninety percent of the respondents live in a single-family home, and 84% of their homes were built before 1980. The majority of the participants had lived in the current homes more than 10 years (64%), and they plan to live in their current homes more than

⁸⁰ Applying weights to correct for the small disproportions between the groups' completed samples did not yield meaningful differences compared to the unweighted results.

10 years (69%). Socio-economic statuses of these participants also vary widely, represented by a wide spectrum of educational background, age, and household income. Comparing assisted and market-rate participants, significantly higher proportions of the assisted participants live in single-family attached homes (15% vs. 7%) and in homes built before 1940 (40% vs. 25%), have high school or less education (24% vs. 10%), and make less than \$30,000 in annual household income (31% vs. 3%).⁸¹

Table H-2. Demographic and Housing Characteristics

	Market-Rate (n=400)		Assisted (n=170)		Total (n=570)	
	Count	Percent	Count	Percent	Count	Percent
Housing Type*						
Single-family detached	369	92%	141	83%	510	90%
Single-family attached	27	7%	25	15%	52	9%
Other types	4	1%	3	2%	7	1%
Year Built*						
Before 1940	98	25%	64	40%	162	30%
1940 – 1959	104	27%	39	24%	143	26%
1960 – 1979	111	29%	45	28%	156	28%
1980 – 1999	65	17%	12	7%	77	14%
After 2000	10	3%	1	1%	11	2%
Years Lived in Current Home						
Less than 5 years	85	21%	37	22%	122	22%
5 – 9 years	58	15%	21	13%	79	14%
10 – 19 years	100	25%	43	26%	143	25%
20 years or longer	157	39%	66	40%	223	39%
Years Planned to Live in Current Home						
0 – 5 years	51	13%	33	21%	84	15%
6 – 10 years	64	17%	22	14%	86	16%
More than 10 years	272	70%	105	66%	377	69%
Respondent's Education Achievement *						
High school or less	40	10%	41	24%	81	14%
Some college	67	17%	60	36%	127	22%
4-year college	156	39%	47	28%	203	36%
Post graduate	134	34%	21	12%	155	27%
Continued						

⁸¹ The sample of the CBO participants are excluded from this analysis, however their characteristics were very similar to the assisted participants'.

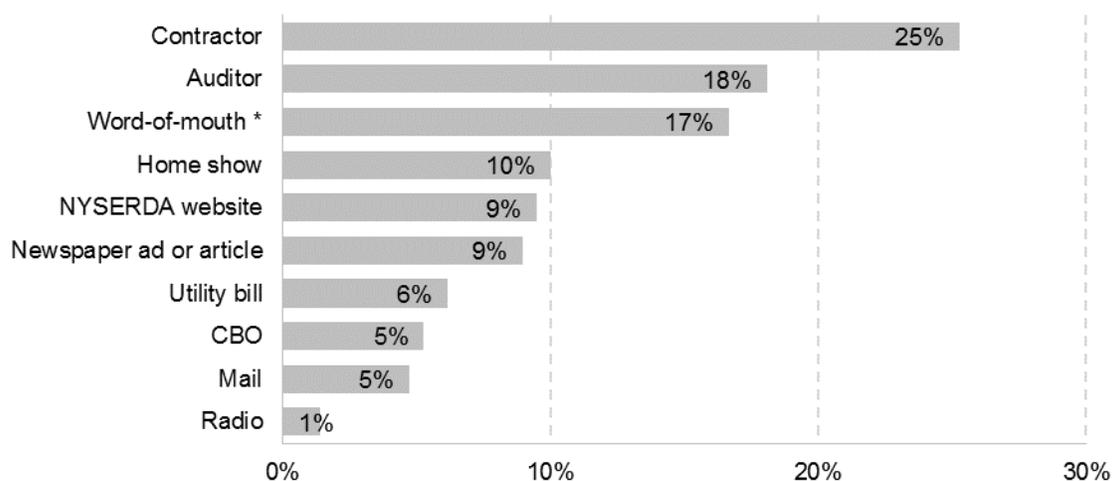
	Market-Rate (n=400)		Assisted (n=170)		Total (n=570)	
	Count	Percent	Count	Percent	Count	Percent
Respondent's Age						
Younger than 40 years-old	42	11%	23	14%	65	12%
40 – 49 years-old	50	13%	21	13%	71	13%
50 – 59 years-old	90	23%	47	29%	137	25%
60 – 69 years-old	129	33%	41	25%	170	31%
70 years-old or above	79	20%	32	20%	111	20%
Respondent's Race						
White	347	91%	151	90%	498	90%
Black	17	4%	6	4%	23	4%
Asian	8	2%	2	1%	10	2%
Other	11	3%	9	5%	20	4%
Household Income *						
Under \$30,000	9	3%	48	31%	57	11%
\$30,000 to under \$50,000	58	17%	55	35%	113	23%
\$50,000 to under \$75,000	63	18%	29	19%	92	18%
\$75,000 to under \$100,000	77	22%	17	11%	94	19%
\$100,000 or higher	138	40%	6	4%	144	29%

Note: An asterisk denotes statistical significance between market-rate and assisted participants. Respondents who said, "Don't know" or refused to answer are excluded. Single-family attached housing type includes townhouses, row houses, and duplexes, apartment buildings with two or more units. Other housing types include mobile homes, trailer homes, and other unusual housing units.

H.3.2 Program Information

Figure H-1 shows how participant homeowners heard about HPwES. Most commonly, participants reported hearing from their contractors (25%) or auditors (18%). Word-of-mouth (in other words, hearing from their friends, family, and co-workers) also traveled quite far (17%), especially among the assisted participants (25% vs. 13% among the market-rate participants). Program information also gained notable tractions through home or trade shows (10%), NYSERDA website (9%), and newspaper ads and articles (9%).

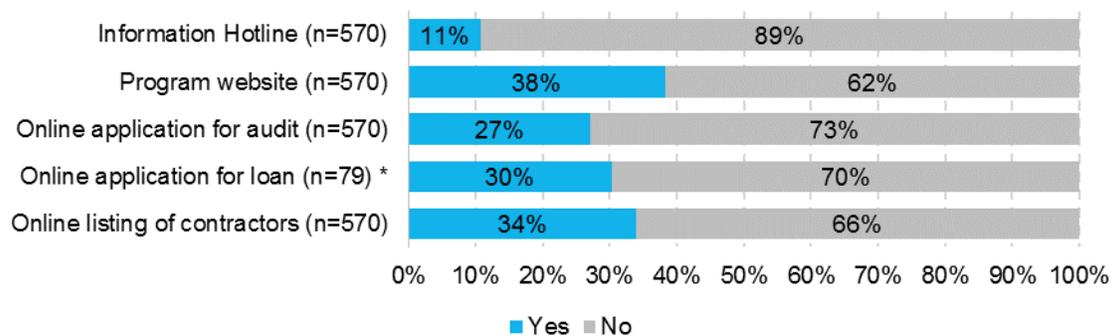
Figure H-1. Sources of Program Information, multiple responses allowed (n=570)



* A significantly higher proportion of the assisted participants reported word-of-mouth compared with the market-rate participants.

The team assessed whether the participants took advantage of the program’s Information Hotline and other online information sources (Figure H-2). A small percent of the participant respondents (11%) reported accessing the Information Hotline. Slightly more than a third of participants (38%) reported accessing the program’s website. Among several features of the program website, the contractor listing was the most common feature used (34%, 89% of the website users), followed by the loan application feature (30% of those applied for program loan), and the audit application feature (27%, 71% of the website users).

Figure H-2. Use of Program Information



* The result is shown only among those reported applying for the program-sponsored loan.

The majority of those who used the Information Hotline (77%) and the website (79%) found these services provide valuable information.

H.3.3 Audit Contractor Interaction

Ninety-five percent of the participant homeowners reported they received a home energy audit as part of their HPwES project. Figure H-3 shows how the participants reported selecting their auditors. The participants most commonly reported they contacted a contractor with whom they had worked before (29%) or an auditor firm made direct contact with them (20%). Some participants used the NYSERDA website to identify an auditor (15%) or heard about it through word-of-mouth (15%). Overall, only a few of the participants (2%) reported they had a difficulty in identifying an auditor.

Figure H-3. How Participants Identified Auditors (n=529)

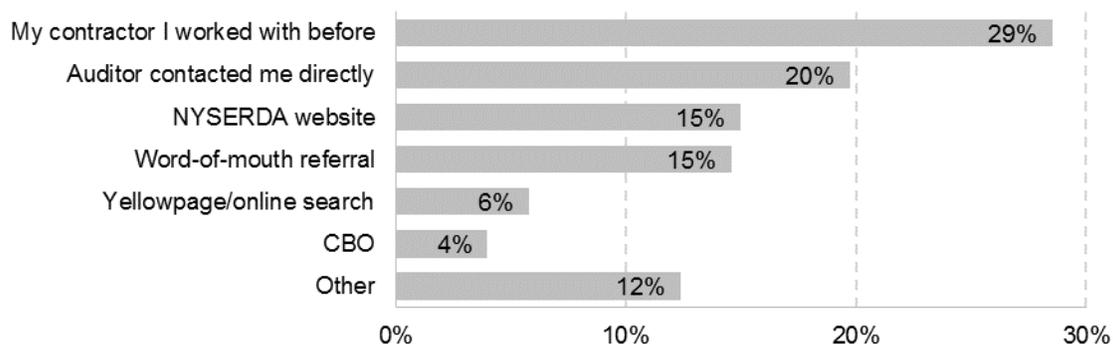


Table H-3 shows the number of weeks the participants reported it took to receive an audit after requesting it, as well as the amount of time from the audit completion to receiving an audit report. It took three weeks or less for the majority of the participants (82% and 86% respectively) to complete an audit and receive a report. For some participants, it took almost a month or longer to have an audit done and receive an audit report (18% and 10% respectively). A small but notable percent of the participants (4%) reported they never received an audit report.

Table H-3. Number of Weeks to Complete an Audit and Receive an Audit Report

	Request to Completion of an Audit		Completion of an Audit to Receiving an Audit Report	
	Count	Percent	Count	Percent
1 week or less	78	20%	209	46%
2 weeks	161	41%	149	33%
3 weeks	86	22%	29	6%
4 weeks	42	11%	26	6%
5 weeks or more	29	7%	17	4%
Did not receive a report	-	-	20	4%
Total	396	100%	450	100%

Note: Respondents who reported they did not receive an audit or said, "Don't know" are excluded.

Figure H-4 and Figure H-5 show proportions of the participants who reported satisfaction with various components of the audit process and results. When asked about their satisfaction with the audit process, a large majority (more than 86%) of the participants reported satisfaction with all audit components, from scheduling to completion of an audit. Eighty-eight percent of the participants reported their overall audit experiences met their expectations. The participants who recalled going over the audit results with their auditor (91%) also were highly satisfied with most areas of the audit results they received; however, a notable proportion (14%) did not agree with the statement “estimated energy savings seemed reasonable.”

Figure H-4. Satisfaction with Audit Process (% “agree”) (n=529)

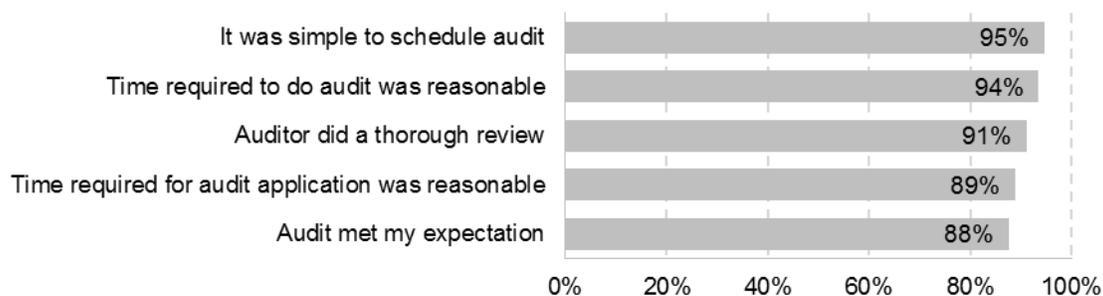
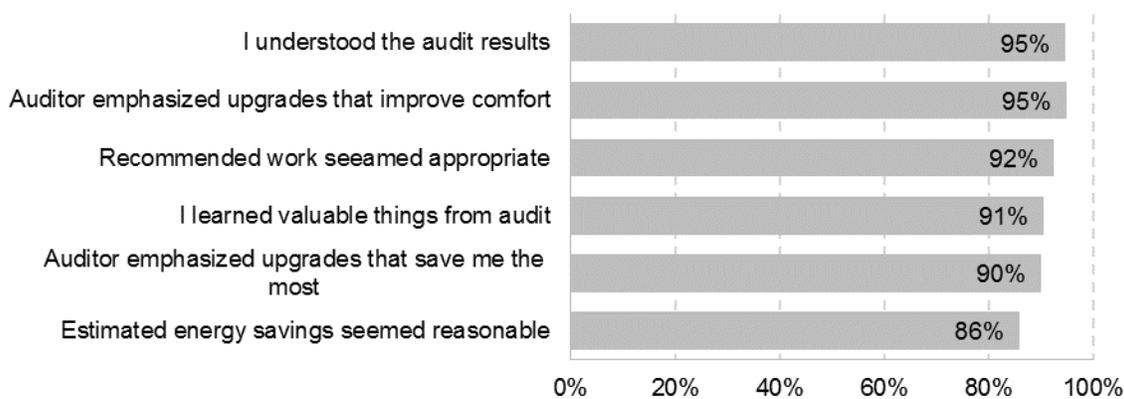
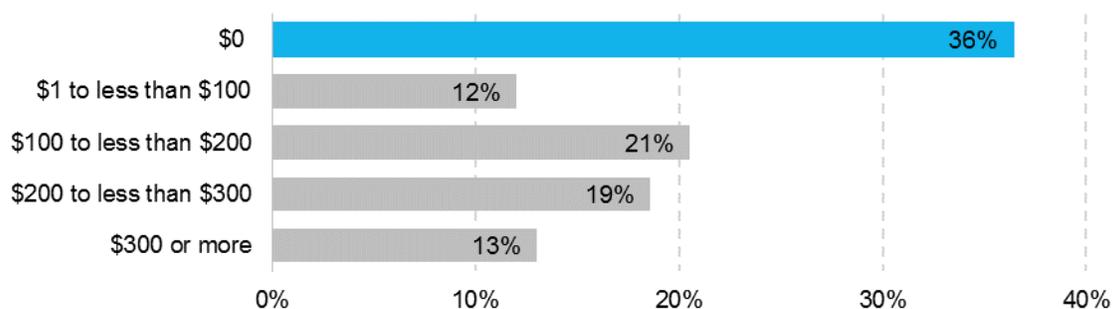


Figure H-5. Satisfaction with Audit Result (% agree) (n=479)



The participants reported how much they would pay for a similar home energy audit service they received in the future (Figure H-6). More than a third said they would not pay for the service (36%), but two-thirds (64%) said they would pay for a similar service. The range of dollar amount suggested varied widely, but most commonly, the participants reported they would be willing to pay between \$100 and \$200 (21%).

Figure H-6. Audit Cost Willing to Pay in the Future (n=442)



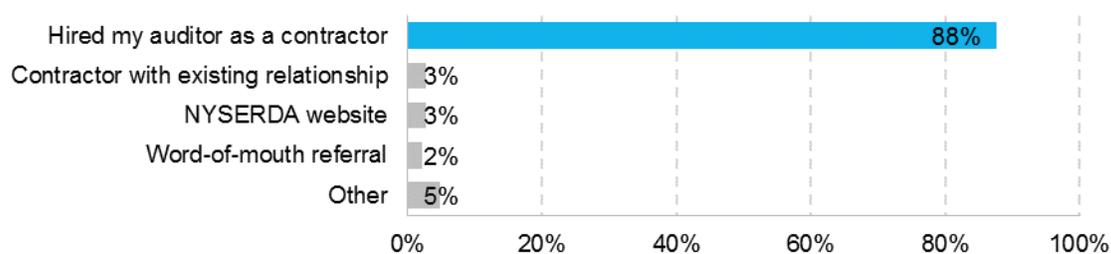
Note: “Don’t know” and refused responses are excluded.

Furthermore, among the participants who remembered completing an audit as part of HPwES (95%), about a quarter (27%) reported they were not considering energy efficiency upgrades before an audit. Among the respondents who were considering upgrades before an audit, about two-thirds (63%) reported the audit convinced them to install upgrades that had not been previously considered.

H.3.4 Contractor Interaction

Most participants (88%) reported they hired their auditor as a contractor (Figure H-7). About a quarter (26%) reported it took more than one bid in the process of deciding on a contractor, but only a few (6%) said they had a difficulty finding a contractor.

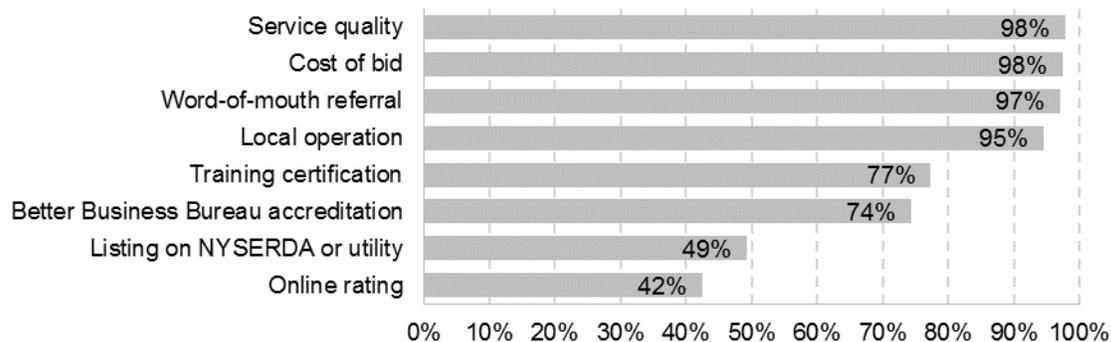
Figure H-7. How Participants Identified a Contractor (n=373)



“Don’t know” or refused responses are excluded.

When asked about factors the participants considered when hiring a contractor (Figure H-8), almost all reported *sometimes or always* having considered their service quality (98%), cost of bid (98%), word-of-mouth referral (97%), and locally operating contractors (95%). About three-fourths reported considering contractors’ training certifications (77%) and Better Business Bureau accreditation (74%). Less than half reported considering whether their contractors were on the list of NYSERDA’s or their utility’s website (49%) or ratings of such online sources as Angie’s list or Yelp (42%).

Figure H-8. Factors Considered When Hiring Contractors, % ‘sometimes’ or ‘always’ (n=570)



Note: ‘Sometimes’ and ‘Always’ responses are combined. The questions were asked with 3-point scale ‘never’, ‘sometimes’, and ‘always’. “Don’t know” responses are excluded.

When asked whether they were aware that contracting firms that work with HPwES must receive the Building Performance Institute’s (BPI) accreditation, 43% of the participants reported they were aware of this requirement. The assisted participants were significantly more likely to be aware of the BPI requirement than the market-rate participants were (51% vs. 40%, respectively).

H.3.5 Project Scope

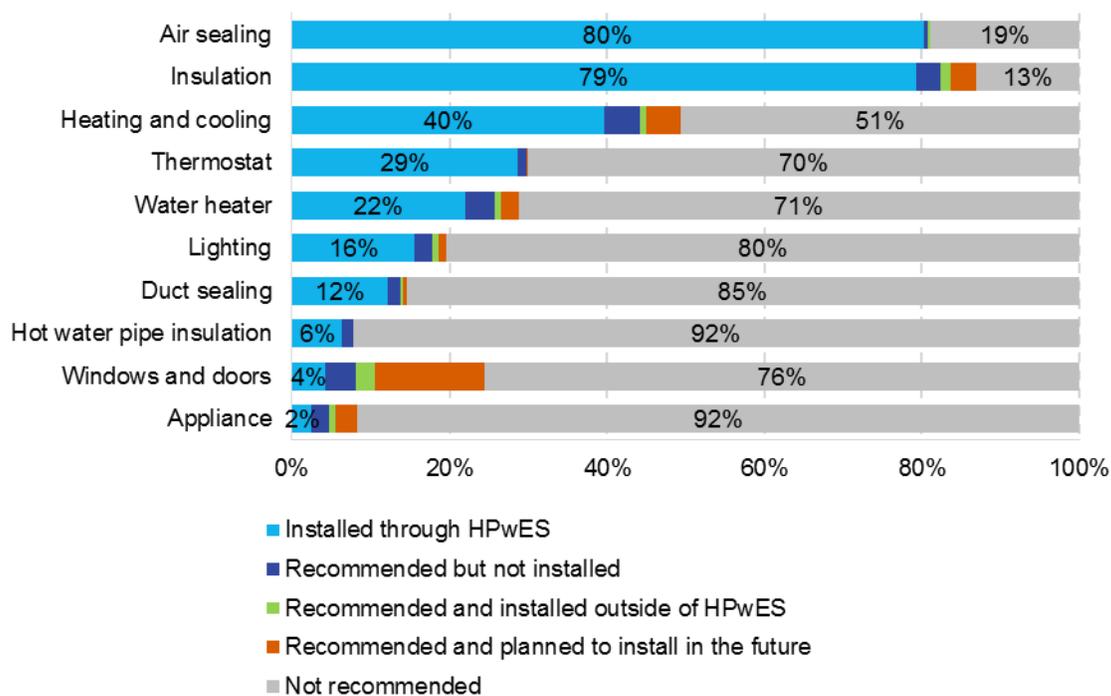
About half of the participants (51%) reported they ended up deciding to install all of the upgrades recommended by their contractors, and the other half (49%) said they installed only some of them. A majority of the participants (87%) reported they completed all the upgrades through HPwES.

Figure H-9 shows proportions of the participants for each of the ten HPwES measure categories, including: 1) those who installed the measure as part of HPwES; 2) those who reported not installing the recommended measure; 3) those who reported installing the recommended measure outside of HPwES; 4) those who reported planning to install the recommended measure; and 5) those whose auditor did not recommend the measure.⁸² Air sealing and insulation measures were by far the most commonly recommended (81% and 87% respectively) and installed (80% and 79% respectively) through HPwES. Heating and cooling equipment-related measures also were commonly recommended (49%) and installed (40%), followed by thermostat (30%, 29%), water heaters (29%, 22%), lighting (20%, 16%), and duct

⁸² Installed measure data (Installed through HPwES) is sourced from the program’s database. Other data points are self-report in the survey. Air sealing include heat recovery vent; appliance includes clothes washer, dehumidifier, dishwasher, freezer, refrigerator, and room air conditioner; heating and cooling includes air-source and ground-source heat pump, boiler, central air conditioning, furnace; lighting includes fixtures; water heater includes storage, tankless, and solar water heater; window and door includes exterior door, skylight, and windows.

sealing (15%, 12%). The program database indicates these participants on average installed 2.9 measures out of the ten measure categories shown in the Figure H-9.

Figure H-9. Measures Installed through HPwES, not Installed, Installed Outside of HPwES, Planned to Install in the Future, and not Recommended (n=570)

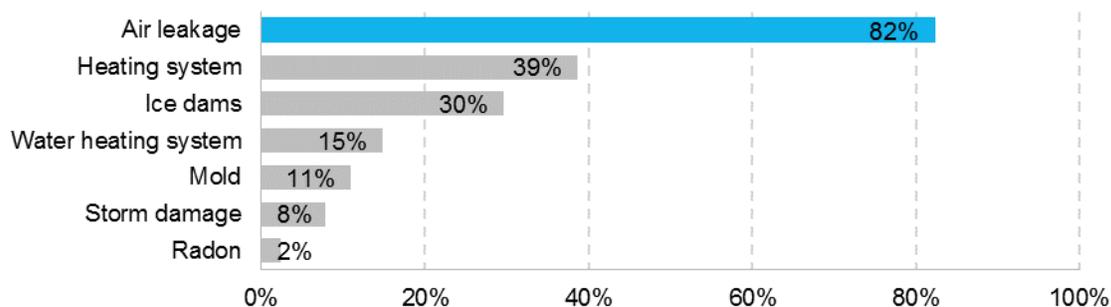


Note: “Not recommended” category is a sum of the respondents with whom the team could not verify in the program’s database or in the survey. The team did not explicitly ask whether their auditor did or did not recommend each measure.

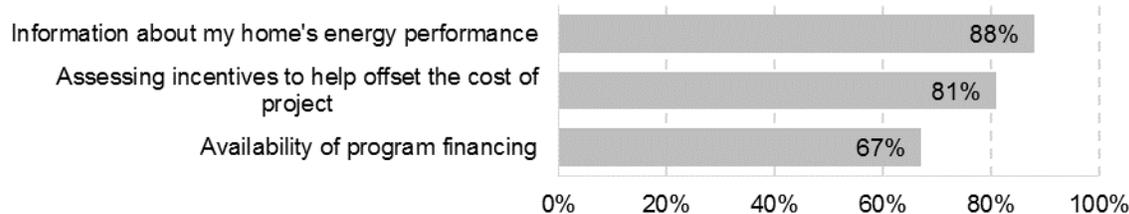
H.3.6 Motivation

Figure H-10 shows proportions of the participants who reported having had problems with various elements of their homes prior to their HPwES project. The most common problem reported among the participants’ homes was air leakage (82%), followed by their aging or malfunctioning heating system (39%), and ice dam⁸³ (30%). Smaller, but notable proportions of the participants reported problems with their water heating system (15%), mold (11%), and storm damage (8%).

⁸³ Warm air inside the home leaks into the attic and will warm the underside of the roof causing snow and ice on the roof to melt. The melted water will drain along the roof, under the snow, until it reaches the cold overhang. The overhang tends to be at the same temperature as the outdoors and the melted water will refreeze and form an ice dam and icicles. The ice dam can cause damage to the roof, which will result in water leakage inside.

Figure H-10. Problems before HPwES, multiple responses allowed (n=570)

The team presented three program features that may have had an influence on the participants' decision to complete their projects (Figure H-11). Overall, the audit report information about their home's energy performance was the most influential feature, reported by 88% of the participants. Incentives that offset the project cost (81%) and the availability of the program financing (67%) followed. Significantly higher proportions of the assisted participants, compared with the market-rate participants, reported the availability of incentive (92% vs. 76% respectively) and the program financing (86% vs. 59% respectively) were influential features.

Figure H-11. Influential Program Features, % 'influential' (n=570)

Note: The questions were asked with 5-point scale where 1 means 'not at all influential' and 5 means 'very influential.' 4 and 5 responses are combined. "Don't know" responses are excluded.

H.3.7 Financing

The participants reported how they paid for their HPwES projects (Figure H-12); about half reported they paid in full or partially with cash (47%) and/or a credit card (5%). About a third (30%) used the program's loan mechanism to pay back, though 45% of the participants said they applied for this loan. A small percent of the participants reported using other types of loans including their bank's loan (4%), their home equity line of credit (3%), and a financing option provided by their contractor (3%).⁸⁴

⁸⁴ A notable percent of the participants reported receiving utility incentives (19%) and other grants and incentives (15%) to pay for some upgrades. However, these respondents likely had confusion about

Continued...

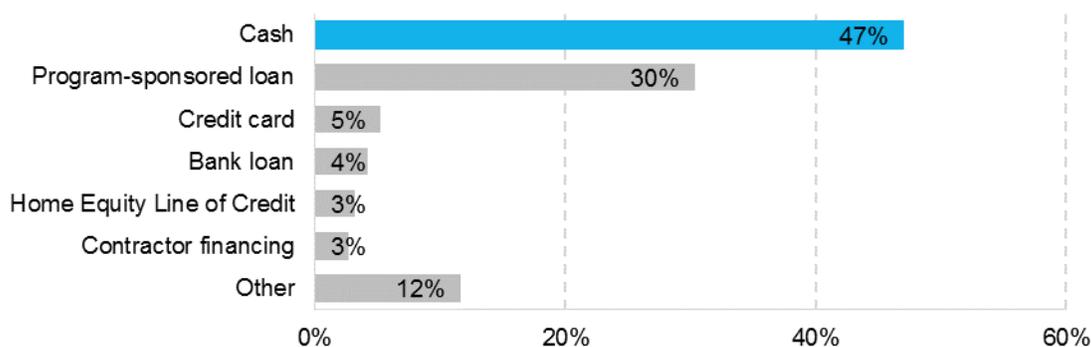
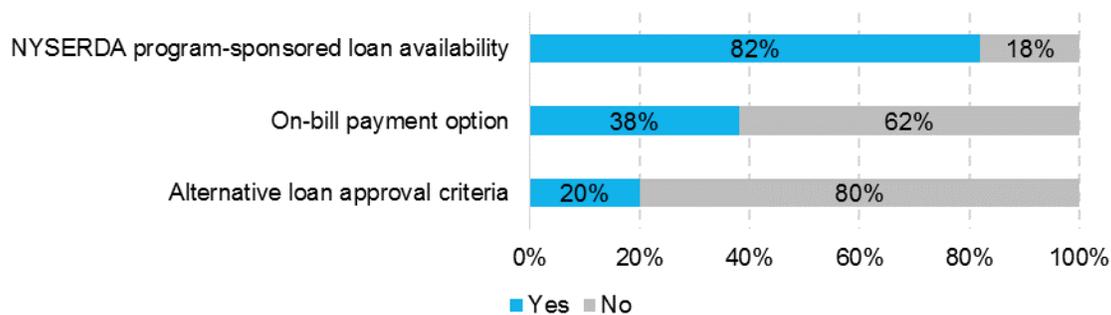
Figure H-12. Payment Method, multiple responses allowed (n=570)

Figure H-13 shows the participants' awareness of various loan payment systems established by the HPwES program. A majority (82%) reported they knew about the NYSERDA-sponsored financing available for the measures recommended by their auditors or contractors; however, significantly smaller proportions were aware of the availability of the financing through their utility bill (38%) and the alternative loan approval criteria for borrowers with less than perfect credit score (20%).

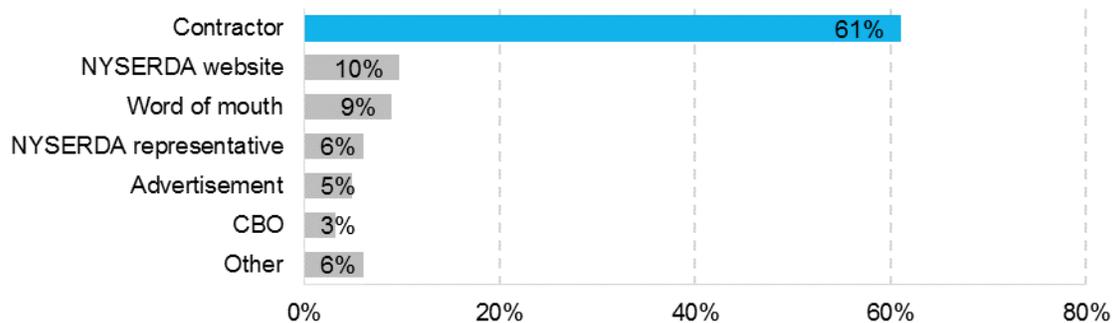
Figure H-13. Awareness of Payment Systems (n=570)

Note: "Don't know" or refused responses are excluded.

When asked, participants who knew about the availability of the NYSERDA's program-sponsored loan said they first learned about the opportunity (Figure H-14) from their contractors (61%). Sixteen percent of the participants heard about it from NYSERDA sources, including the NYSERDA website (10%) and representatives (6%), as well as through other word-of-mouth referrals (9%). Advertisements had a limited reach (5%).

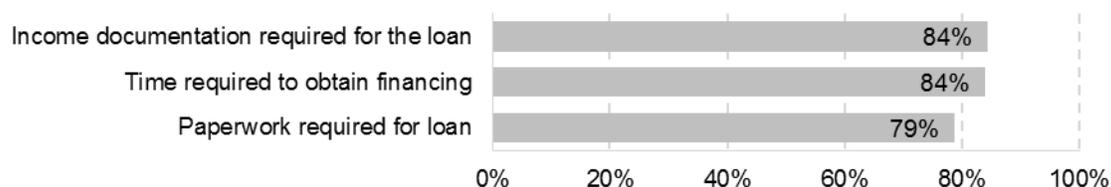
NYSERDA with their utility. It is possible they reported receiving a utility incentive for measures that their auditor recommended but not installed through HPwES and later installed outside of the program.

Figure H-14. Information Sources of NYSERDA Program-Sponsored Loan, multiple responses allowed (n=246)



Among the participants who received or applied for a program-sponsored loan, the majority reported generally being satisfied with the process of obtaining the program loan (Figure H-15). A notable proportion, however, indicated they were not satisfied with the amount of paperwork required for the loan application (21%). Verbatim responses also suggested these dissatisfied customers thought the paperwork was lengthy and the approval process was overly complex.

Figure H-15. Satisfaction with Program-Sponsored Loan, % “Satisfied” (n=250)

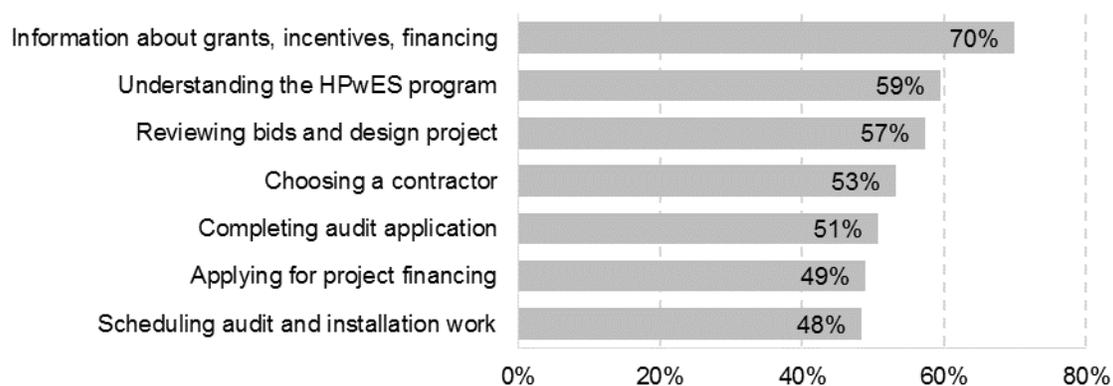


Note: Each statement was read and asked to rate using a 5-point scale, where 1 is “not at all satisfied” and 5 is “very satisfied.” Don’t know” or refused responses are excluded.

H.3.8 Awareness of CBO Services

About one-quarter of the participants (24%) reported they were aware of their local CBOs providing services to help homeowners access HPwES. The market-rate participants were more likely to be aware of CBO services compared with the assisted participants (26% and 18% respectively). When asked if they had used any of the CBO assistance during the process of receiving an audit, 9% reported they used a CBO.

Figure H-16 shows proportions of the participants who reported various types of CBO services would be *valuable* if they are provided at no cost. Half or more of the participants reported almost all areas of CBO supports to be *valuable*, but in particular they thought receiving help to “find information about grants, incentives and other financing opportunities” would be a *valuable* service.

Figure H-16. Valuable CBO Services, % “Valuable” (n=570)

Note: The team read each item and asked to rate using a 5-point scale, where 1 is “not at all valuable” and 5 is “extremely valuable.” “Don’t know” or refused responses are excluded.

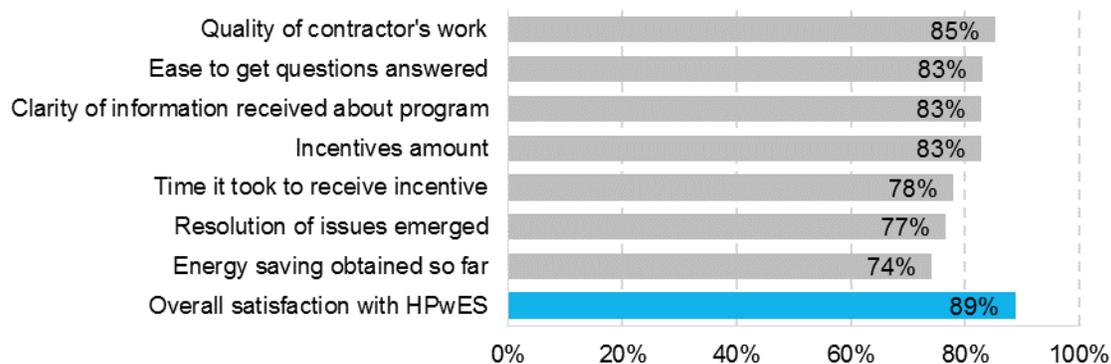
H.3.9 Inspection

Two-thirds of the participants (66%) reported receiving the program’s post-installation inspection. Among the participants who received an inspection, 22% reported at least one issue emerged during the inspection. Though respondents reported a wide range of problems, a majority of the issues related to incomplete or poor installation work (75% of those reported issues), such as gas leakage from the new furnace, insufficient R value in insulation, and unresolved air leakages. Other issues related to malfunctioning equipment and safety. In their verbatim responses, almost one-fifth (22%) of these participants reporting issues found during the inspection said their contractors later corrected them.

H.3.10 Program Satisfaction

Figure H-17 shows participants’ satisfaction with various program elements. A majority of the participants reported they were satisfied with HPwES overall (89%) and other program elements, including the quality of contractor’s work (85%), ease of getting questions answered (83%), clarity of information received (83%), and their incentive amounts (83%). The program elements rated unsatisfactory by a notably high proportion were the time it took to receive an incentive (22%), resolutions of issues (23%), and energy savings obtained so far (26%). A significantly higher proportion of the assisted participants reported satisfaction with the incentive amount they received (92% vs. 79% respectively), compared with the market-rate participants.

Figure H-17. Satisfaction with Program Elements, % “Satisfied” (n=570)

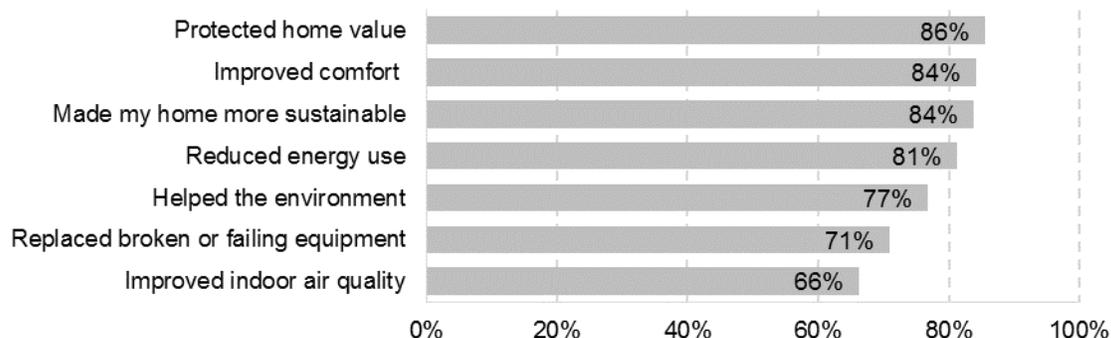


Note: The team read each item and asked to rate using a 5-point scale, where 1 is “very dissatisfied”, 2 is “somewhat dissatisfied,” 3 is “neither satisfied nor dissatisfied,” 4 is “somewhat satisfied,” and 5 is “very satisfied.” “Don’t know” or refused responses are excluded. ‘Time it took to receive incentive’ was asked only among those reported receiving the program incentive (n=368).

Finally, the team asked the participants to rate their perceived value of HPwES in responding to their various needs (Figure H-18). More than 80% of the participants reported their HPwES projects helped them protect the value of their home (86%), improve the comfort of their home (84%), make their home more sustainable (84%), and reduce their home’s energy use (81%). Notable proportions of the participants did not agree that their HPwES projects helped improve the indoor air quality of their home (34%), replace broken or failing equipment (29%), and the environment (27%). A significantly higher proportion of the assisted participants, compared with the market-rate participants, reported their HPwES projects provided value in two areas: replacing broken or failing equipment (80% vs. 66%, respectively) and improving the indoor air quality (74% vs. 63%, respectively).

When asked the most important reason for participation, the top three reasons were reducing their home’s energy use (47%), improving their home’s comfort (29%), and replacing broken or failing equipment (10%).

Figure H-18. Perceived Value of HPwES, % “Agreed” (n=570)



Note: The team read each item and asked to rate using a 5-point scale, where 1 is “strongly disagree” and 5 is “strongly agree.” “Don’t know” or refused responses are excluded.

H.4 Survey Instrument

H.4.1 Introduction

Hello, my name is _____. I'm calling on behalf of NYSERDA, the New York State Energy Research and Development Authority, from Abt/SRBI to evaluate NYSERDA's Home Performance with ENERGY STAR program. Our records show that you completed a home energy improvement project at some point during the past three years and have received an incentive from NYSERDA for that project.

Is that correct?

[IF NO] NYSERDA's Home Performance with Energy Star program provides detailed home energy audits and financial incentives to offset the costs of completing energy efficiency upgrades in New York homes.

[IF STILL NO] terminate.

Your opinions will help improve energy efficiency programs offered in New York. Would you be willing to answer questions about your experience? Please know that we will keep your responses confidential to the full extent of the law; nothing you say will be identified with you in our reports.

Is this a convenient time for us to talk? [If not, reschedule]

Do you have any questions for me before we get started?

H.4.2 Awareness [ASK ALL]

Q1. How did you hear about NYSERDA's Home Performance with ENERGY STAR Program? Did you hear about it from...? [MULTIPLE RESPONSES ALLOWED; PROBE TO CODE]

1. The auditor that completed your home assessment
2. The NYSERDA website
3. Through a constituency based organization or a non-profit group
4. From family member /friend/ or coworker
5. Through a contractor [IF YES: Was this the contractor who installed your energy efficiency upgrades?]
6. Something in the mail
7. Newspaper ad or article
8. Radio
9. Information provided in a utility bill
10. Home show/trade show

[ASK ALL]

Q2. During the course of your project did you access the program's ...? [do not randomize]

[SINGLE RESPONSE]

[Do not read:]

- a. Information Hotline: 1. Yes 2. No 98. Don't know 99. Refused
 b. Website: 1. Yes 2. No 98. Don't know 99. Refused

Q3. Did you access online applications for ...? [do not randomize]

[SINGLE RESPONSE]

[Do not read:]

- c. The audit: 1. Yes 2. No 98. Don't know 99. Refused
 d. Loans 1. Yes 2. No 98. Don't know 99. Refused

Q4. Did you use the online listing of program-approved contractors operating in your area?

[SINGLE RESPONSE]

1. Yes
 2. No

[Do not read:]

98. Don't know
 99. Refused

Q5. How useful was the [INSERT ITEM] as a source of program information? Please use a 1-to-5 scale where 1="not at all valuable" and 5="very valuable." [randomization not necessary]

- e. [IF Q2a=YES] The program's information hotline
 f. [IF Q2b=YES] The program's website
 g. [IF Q4=YES] The list of program-approved contractors operating in your area

H.4.2.1 CBO Sample Awareness [IF CBO Sample = Yes]

Q6. The program records indicate that you had contact with [Pipe in CBO name], a constituency-based organization (or CBO) while completing your retrofit project. Is that correct?

1. Yes
 2. No, had contact with a different organization: _____
 3. No, did not have contact with a CBO
 98. Don't know

[IF Q6 = 3 or 98]

Q7. Just to confirm, you did not speak with anyone from a CBO about NYSERDA's Home Performance program?

1. Yes, did not speak with anyone from a CBO

2. No, respondent DID speak with someone from a CBO [SKIP TO Q12]
98. Don't know

[IF Q7 = YES or DK, skip to Q12]

Q8. How did you first learn about the assistance this CBO offers? [OPEN-ENDED RESPONSE]

1. [RESPONSE]
98. Don't know

Q9. Were you familiar with the CBO prior to your participation in this program?

1. Yes
2. No
98. Don't know

Q10. Were you aware of NYSERDA's Home Performance program before hearing about it from the CBO?

1. Yes
2. No
98. Don't know

[IF Q10 = Yes]

Q11. Had you considered participating in NYSERDA's Home Performance program before hearing about it from the CBO?

1. Yes
2. No
98. Don't know

H.4.3 Audit Contractor Interaction

Q12. As part of your Home Performance project did you get a home energy audit? [If yes, continue. If no, skip to section 4.]

Q13. How did you find your energy auditor? [DO NOT READ, PROBE TO CODE]

1. Contacted directly (by firm or auditor)
2. NYSERDA website
3. Yellow pages/online search
4. Referral from friend/family/other
5. Contacted a contractor with whom you had an existing relationship
6. Community-based organization or a non-profit group

7. Other: _____

98. Don't know

99. Refused

Q14. Did you have any trouble finding someone to do your energy audit?

1. Yes, can you tell me more about the trouble you had? _____

2. No

98. Don't know

[READ FOR FIRST QUESTION, AS NEEDED FOR SUBSEQUENT QUESTIONS] Thinking about your energy audit, please rate the following statements using a five-point scale where 1 means you 'Strongly Disagree' and 5 means you 'Strongly Agree.' First, to what extent do you agree that...? (Code 1-5 ADDING 97= Not applicable AND 98 =DK) [Randomization not necessary, in sequential order]

Q15. The time required to complete the audit application was reasonable

Q16. It was simple to schedule my home energy audit

Q17. The time required to do my audit was reasonable

Q18. My auditor did a thorough review of my home

Q19. The audit met my expectations

[ITERATE UP TO 5 QUESTION AS NEEDED FOLLOW-UP Q FOR EACH STATEMENT WITH A RATING <3]

Q20. [IF Q15 RATING <3] You didn't agree with the statement [pipe in statement] Please tell me about any issues you had.

Q21. [IF Q16 RATING <3] You didn't agree with the statement [pipe in statement] Please tell me about any issues you had.

Q22. [IF Q6 RATING <3] You didn't agree with the statement [pipe in statement] Please tell me about any issues you had.

Q23. [IF Q17 RATING <3] You didn't agree with the statement [pipe in statement] Please tell me about any issues you had.

Q24. [IF Q19 RATING <3] You didn't agree with the statement [pipe in statement] Please tell me about any issues you had.

Q25. About how many weeks after requesting your audit was it conducted?

1. Response: [RANGE: 1 to 52 weeks, where 1 = 1 week or less]

98. Don't know

Q26. About how many weeks after your audit was completed did you receive a written audit report with recommended upgrades?

Response: [RANGE: 1 to 52 weeks, where 1 = 1 week or less]

97. *[Do not read]* Did not receive a written report

98. *[Do not read]* Don't know

Q27. Did your auditor... [Yes=1, No=2, 97= NA 98 =DK] [do not randomize]

a. Explain the audit process

b. Suggest home improvements to you while they were doing the audit? [IF YES] Were any of the improvements things you could do yourself, without a contractor?

Q28. Did someone go over the audit results with you, including recommended upgrades and provide estimated energy savings? *[IF NECESSARY: With you or others in your household?]*

1. Yes

2. No [How did you receive the results?]

98. Don't know/remember

99. Refused

Q29. [IF Q28=YES] When during the audit process did the auditor discuss the results with you [IF NECESSARY: or others in your household]? _____

[IF Q28=YES] [READ FOR FIRST QUESTION, AS NEEDED FOR SUBSEQUENT QUESTIONS]

Thinking about the audit's recommendations and savings estimates, please rate the following statements using a five-point scale where 1 means 'Strongly Disagree' and 5 means 'Strongly Agree.' To what extent do you agree that... (CODE 1-5 AND 97= NA 98 =DK) [do not randomize]

Q30. I understood the audit results

Q31. I learned valuable things about my home from the audit

Q32. The recommended work seemed appropriate

Q33. The estimated energy savings seemed reasonable

[ASK ALL]

Q34. Before your audit were you considering any energy efficiency upgrades?

[SINGLE RESPONSE]

1. Yes [IF YES] What? _____
2. No

[Do not read:]

98. Don't know
99. Refused

[IF Q34=YES]

Q35. Did your audit report convince you to install energy efficiency upgrades you hadn't previously considered?

1. Yes [What extra upgrades did you install? _____]
2. No
98. Don't know

Q36. Did your auditor emphasize the upgrades that would save you the most?

1. Yes
2. No
98. Don't know

Q37. Did your auditor indicate the upgrades most likely to improve the comfort of your home?

1. Yes
2. No
98. Don't know

Q38. Given what you learned from the audit, would you be willing to pay for a similar service in the future?

1. Yes
2. No
98. Don't Know

Q38a. [IF Q38=YES] How much would you be willing to pay?

1. Nothing
2. Record verbatim: _____ [RANGE: \$1 to \$250,000]

[Do not read:]

98. Don't know
99. Refused

Q39. Did you hire the firm that completed your energy audit to also install your energy efficiency upgrades?

1. Yes
2. No
98. Don't know

[IF Q39=NO]

Q40. Why did you use a different contractor or contractors to complete your energy upgrade project?

[DO NOT READ; PROBE TO CODE; MULTIPLE RESPONSES ALLOWED]

1. The bid was too expensive
2. The auditor did not seem to value my preferences
3. The auditor referred me to another contractor
4. Wanted a second opinion/bid
5. Had an existing relationship with another contractor
97. Something else [Specify]:

H.4.4 Contractor Interaction

Now let's talk about the upgrades you made...

[IF Q12 OR Q39=NO]

Q41. How did you find the contractor who installed your energy upgrades? [DO NOT READ, PROBE TO CODE]

1. My auditor
2. The contractor contacted me
3. NYSERDA website
4. Advertisement in yellow pages/online search
5. Referral from friend/family/other
6. I already knew the contractor
7. Community-based organization or a non-profit group
8. Homeshow/event
9. Other: _____
10. Don't know
11. Refused

[ASK ALL]

Q42. Did you get more than one bid in the process of deciding on an installation contractor?

1. Yes [IF YES] How many bids did you get? [RANGE: 1 to 25]
2. No
98. Don't know

[IF Q39=No]

Q43. Did you have any trouble finding a contractor to complete the work?

1. Yes: [IF YES] what sort of trouble did you have? _____
2. No
98. Don't know

Q44. When you need to hire a contractor, do you "Never, Sometimes, or Always consider... [READ ALL: 1=Never, 2=Sometimes, 3=Always; 98=DK]) [Randomize, except item i. Keep item i last.]

- a. Training certifications
- b. Service quality
- c. The cost of the bid
- d. Referrals from friends/colleagues
- e. Listings on NYSERDA or utility websites
- f. Ratings on Angie's List, Yelp or other Internet referral sources
- g. Better Business Bureau accreditation
- h. Whether or not the firm is a locally operated business
- i. Anything else?

Q45. Have you heard of the following organizations or agencies that certify contractors... [READ ALL. 1=YES, 2=NO; 98=DK] Randomize, hold item "f" for end.

- a. The Building Performance Institute, or BPI
- b. ENERGY STAR
- c. RESNET
- d. NATE (North American Technician Excellence)
- e. NY Department of Consumer Affairs
- f. Is there any other type of technical certification that you look for? [IF YES] Which one(s) _____

- Q46. Before today, were you aware that contracting firms that work with NYSERDA's Home Performance program must be accredited by the Building Performance Institute?
1. Yes
 2. No
 98. Don't know
- Q47. Using a scale of 1-to-5, where one means "not at all important," and five means "very important," how important is it to you to have a contractor who is able to assess different parts of your home such as lighting, heating and air conditioning within your home?
1. Response:___
 98. Don't know
- Q48. How important is it to you to have a contractor who is able to use diagnostic equipment and software to estimate energy savings potential? [If needed: Please use the same 1-to-5 scale, where one means "not at all important," and five means "very important."]
1. Response:___
 98. Don't know

H.4.5 Project Scope [ALL]

- Q49. Did you end up deciding to complete all or some of the upgrades your contractor recommended?
1. All [SKIP TO Q52]
 2. Some
 98. Don't know

[IF Q49 =2 (Some)]

- Q50. Which of the recommended energy efficiency upgrades did you not install? [Probe to code]
3. Insulation [if insulation selected ask: Q50_1a Was attic insulation recommended but not installed? Y/N, Q50_1b wall insulation recommended but not installed? Y/N, Q50_1c floor insulation recommended but not installed? Y/N]
Attic insulation
Wall insulation
Floor insulation
 4. Air sealing
 5. Energy-efficient windows
 6. New furnace or boiler
 7. New central air conditioner

8. New heat pump
9. Programmable thermostat or other heating/cooling controls
10. Efficient water heater
11. Tankless water heater
12. Duct sealing
13. Hot water pipe insulation
14. Whole house fan
15. Energy-efficient lighting
16. Lighting controls
17. Appliances (like your refrigerator, laundry machines)
18. Something else? _____
98. Don't know

Q51. Why didn't you install all of the measures recommended by your audit?

[MULTIPLE RESPONSE]

1. The total estimated costs of the project were too high
2. It was difficult to prioritize upgrades
3. A desire to do work yourself
4. The estimated energy savings did not justify the cost
5. Competing priorities for home improvement dollars

[Do not read:]

96. Other, please specify: [OPEN-ENDED RESPONSE]
98. Don't know
99. Refused

Q52. Did your contractor estimate the dollar value of NYSERDA incentives available for the upgrades you did?

1. Yes
2. No
98. Don't know

Q53. Did you complete all your upgrades through the Home Performance program contract? [IF needed: rather than installing them yourself or upgrading without incentives]

1. Yes
2. No
98. Don't know

[IF Q53=NO]

Q54. What upgrades did you complete outside the program?

[Probe to code]

1. Insulation [if yes to insulation ask: Q54_1a did you install attic insulation? Y/N, Q54_1b wall insulation Y/N, Q54_1c floor insulation Y/N]
 - Attic insulation
 - Wall insulation
 - Floor insulation
2. Air sealing
3. Energy-efficient windows
4. New furnace or boiler
5. New central air conditioner
6. New heat pump
7. Programmable thermostat or other heating/cooling controls
8. Efficient water heater
9. Tankless water heater
10. Duct sealing
11. Hot water pipe insulation
12. Whole house fan
13. Energy-efficient lighting
14. Lighting controls
15. Appliances (like your refrigerator, laundry machines)
16. Something else? _____
98. Don't know

Q55. [IF Q53=NO] Who installed these upgrades? Was it..

1. You
2. Your program contractor
3. Another contractor
4. A combination of the above
96. Someone else: [specify] _____
98. Don't know

H.4.6 Motivation [ASK ALL]

Q56. Prior to completing your project, did your home have problems with... [1=YES; 2=NO; DK 98; 99 REF] Randomize, keep item h last.

- a. Mold

- b. Storm damage
 - c. Ice dams
 - d. Radon
 - e. Air leakage/drafty rooms
 - f. Heating system
 - g. Water heating
 - h. Any others problems that I haven't mentioned? _____
- Q57. I'm going to list several features of this program. Please tell me how important each feature was in your decision to complete your upgrade project, where 1 means "not at all influential" and 5 means "very influential"? How influential was ... [RANDOMIZE]
- a. The information you received about your home's energy performance
 - b. Accessing incentives to help offset the cost of your project
 - c. The availability of program financing
 - d. [IF CBO Sample= YES and Q7= No] The assistance of the community-based organization (CBO)

H.4.7 Financing and Savings

Now I have a few questions about financing ...

- Q58. How did you pay for your project? [DO NOT READ; select multiple]
- 1. Cash/Check
 - 2. Credit card
 - 3. HELOC (Home Equity Line of Credit)
 - 4. Bank loan
 - 5. Program-sponsored loan
 - 6. Contractor financing
 - 96. Other (specify):
 - 98. Don't know

[IF Q58_5 (Program-sponsored loan) IS NOT SELECTED]

- Q59. Did you *apply for* a program-sponsored loan to pay for your project?
- 1. Yes
 - 2. No
 - 98. Don't know

Q60. [IF Q58_5 (Program loan) IS SELECTED OR Q59=YES] How did you first learn about the opportunity to get a program-sponsored loan for your project? [DO NOT READ, PROBE TO CODE]

1. Contractor
2. NYSERDA representative
3. NYSERDA website
4. Constituency-based organization or non-profit group
5. Other, specify: _____
98. Don't know

[IF Q58_5 (PROGRAM LOAN) IS NOT SELECTED AND q59=NO]

Q61. Did you know that financing was available through NYSERDA for the measures recommended by the auditor or contractor?

[SINGLE RESPONSE]

1. Yes
2. No

[Do not read:]

98. Don't know
99. Refused

[IF Q61≠NO]

Q62. Before today, did you know that NYSERDA offered... [READ EACH; 1= YES 2 = NO 98 = Don't know] do not randomize

- a. Financing you can pay back on your utility bill
- b. Alternative approval criteria for borrowers with less than perfect credit

[IF q59=No and Q61=YES]

Q63. What stopped you from pursuing program financing? [DO NOT READ, PROBE TO CODE]

1. I did not know financing was offered through the program
2. I did not need financing
3. The paperwork required
4. I didn't want to take on debt
5. I did not think I would qualify for a loan
96. Other: _____
98. Don't know

[IF q58_5=YES OR Q59 = YES]

Q64. On a scale of one to five with '1' means not at all satisfied and '5' means very satisfied, please indicate your level of satisfaction with ...Randomize

- a. The income documentation required for the program-sponsored loans
- b. The paperwork required for the program-sponsored loans
- c. The time required to obtain program-sponsored financing

Q65. [IF ANY ASPECT <3] You reported some dissatisfaction with [READ ITEM] Please explain why you gave that rating?

Q66. Does your local electric or gas utility provide incentives or rebates to offset the cost of purchasing energy efficient equipment?

1. Yes
2. No

[Do not read:]

97. Not applicable
98. Don't know

[IF Q66=YES]

Q67. Did you receive incentives from your utility for equipment installed since you received your audit?

1. Yes
2. No

[Do not read:]

97. Not applicable
98. Don't know

Q68. Did you receive any other grants or incentives for the equipment you installed through the Home Performance program?

[SINGLE RESPONSE]

1. Yes
2. No
98. Don't know
99. Refused

[IF Q68=1 Yes]

Q69. What funding did you receive?

1. [OPEN-ENDED Response]

H.4.8 CBO Awareness and Interaction [Independent GJGNY CBO Questions – already reviewed and approved for households known to be affiliated with a CBO.]

HP Sample [ASK IF HP Sample = Yes, CBO Sample = NO]

Q70. In some regions of the state, community-based organizations, or CBOs for short, help homeowners wanting to complete energy efficiency upgrades in their homes. Before today, had you heard of this option?

- 1. Yes
- 2. No
- 98. [Do not read] Don't know

[ASK IF Q70=YES]

Q71. Did you receive any assistance from a CBO during the process of receiving your audit?

- 1. Yes
- 2. No
- 98. Don't know

Q72. CBOs provide a variety of services at no cost to the homeowner. Based on your experience, using a one-to-five scale, where 1= not at all valuable and 5= extremely valuable, how valuable would it be to you to have someone to help you] ...[RANDOMIZE]

[LOGIC] Item	1 Not at all valuable	2	3	4	5 Extremely valuable	98 DK
Understand the NYSERDA Home Performance program						
Choose a contractor						
Complete audit application paperwork						
Review bids and design your project						
Schedule audit and installation work with your contractor						
Find information about grants, incentives or financing for energy efficiency upgrades						
Apply for project financing						

H.4.8.1CBO Sample [ASK IF CBO Sample = YES, otherwise skip to Inspection block]

I have a few more questions about how the constituency-based organization supported your project.

Q73. I'm going to read several types of support you may have received from the CBO in completing your Home Performance project. For each, rate the value of this support from 1, not at all valuable to 5, extremely valuable, or if you didn't receive that support. Do not randomize.

[LOGIC] Item	1 Not at all valuable	2	3	4	5 Extremely valuable	97 Didn't receive	98 DK
Help you understand the NYSERDA Home Performance program,							
Help you choose the right NYSERDA program for your income							
Help you choose a contractor							
Help you complete audit paperwork							
Help you review bids and design your project							
Help you schedule audit and installation work with your contractor							
Give you information about grants, incentives, or financing for energy efficiency upgrades							
Help you apply for project financing							
Anything else this CBO helped you with? [SPECIFY:]							

[If Q73g (Give you information about grants, etc.) OR Q73h (Help you apply for project financing) ≠ 97 or 98]

Q74. There are a variety of funding sources available to New York households to install energy efficient measures. Did [CBO name] mention the possibility that you might be eligible for... [READ ALL, SELECT MULTIPLE]

1. NYSERDA 10% cash-back incentives
2. NYSERDA 50% Assisted Home Performance grant
3. NYSERDA Smart Energy Loan
4. NYSERDA On-Bill Recovery Loan
5. Super storm Sandy Relief funding
6. A matching grant
7. A utility rebate
8. Anything else? [SPECIFY:]
97. [EXCLUSIVE] None of the above
98. [DO NOT READ] Don't recall

[If Q73g (Give you information about grants...) OR Q73h (Help you apply for project financing) ≠ 97 or 98]

Q75. At what point in the process did you discuss financing with the [CBO name]? Was it before or after you received your audit? [DO NOT READ, SELECT ONE]

1. Before
2. After
96. Some other time

97. Did not discuss financing
98. Don't know
- Q76. In total, about how many times would you say you communicated with the [CBO name] during the course of your project? [RANGE: 1 to 10, where 10 = 10 or more]
1. [NUMERIC RESPONSE]
98. Don't know
- Q77. If you had not had any contact with the [CBO name], would you have... [READ, SELECT ONE]
1. Not completed your project
2. Postponed your project for more than a year
3. Installed fewer pieces of equipment retrofit
4. Installed less expensive equipment
5. Completed the same project in the same timeframe
6. Or, done something else? [SPECIFY:] _____
98. [DO NOT READ] Don't know
- Q78. Do you have any suggestions for how CBOs could better help homeowners like yourself complete retrofits through NYSERDA's program?
1. [OE Response]
98. Don't know

H.4.9 Inspection

- Q79. After your project was completed, did anyone from the program come to your home to inspect the completed work? [Interviewer note: exclude permit officials or building inspectors.]
1. Yes
2. No
3. Don't know
4. Refused
- Q80. [IF Q79=YES] Did any issues emerge during inspection?
1. Yes, please specify: _____
2. No
3. Don't know
4. Refused

H.4.10 Satisfaction

We are getting fairly close to the end...

Q81. On a scale of one to five with ‘1’ being very dissatisfied, ‘2’ being somewhat dissatisfied, ‘3’ being neither satisfied nor dissatisfied, ‘4’ being somewhat satisfied, and ‘5’ being very satisfied, please indicate your level of satisfaction with the following NYSERDA program elements:

Interviewer: do not read 97-99 do not randomize

[MATRIX QUESTION: SCALE]

	1 Very Dissatisfied	2 Somewhat Dissatisfied	3 Neither Satisfied nor Dissatisfied	4 Somewhat Satisfied	5 Very Satisfied	97 NA	98 DK	99 RF
Quality of your contractor’s work								
The incentives you received [Didn’t receive incentive = NA; Don’t know = DK]								
Energy savings obtained so far from the upgrades you installed through the Home Performance program								
[IF NOT ASSISTED OR IF Q81b=97 or 98] The time it took to receive your incentive 85								
Clarity of information you received about the program.								
Ease with which you were able to get your questions answered.								
Resolution of any issues that emerged (No issues=NA)								
Overall satisfaction with the Home Performance Program								

Q82. [IF ANY ASPECT IN Q81<3] You reported some dissatisfaction with [READ ITEM] Please explain why you gave that rating?

Q83. Thinking about your Home Performance project, please rate the following statements using a five-point scale where 1 means you ‘Strongly Disagree’ and 5 means you ‘Strongly Agree.’ First, to what extent do you agree that the project..... *Do not read 97-99.] Randomize*

[Matrix Question: Scale]

⁸⁵ According to program staff, about 60% of market-rate participants choose to have incentive sent to contractor instead of their home; all assisted participants incentives go to contractors.

[LOGIC] Item	1	2	3	4	5	97 NA	98 DK	99 RF
Improved the comfort of your home								
Protected the value of your home								
Replaced broken or failing equipment								
Made your home more sustainable								
Helped the environment								
Improved the indoor air quality of your home								
Reduced your home's energy use								

Q84. Which reason was most important to you? [READ AS NEEDED, CHOOSE ONE]

1. Reducing my household energy use
2. Improving comfort
3. Protecting the value of my home
4. Helping the environment
5. making my home more sustainable
6. Improving the indoor air quality in my home
7. Replacing broken or failing equipment

H.4.11 Other Actions [ASK ALL]

Q85. In the next two years, what other upgrades do you expect to do to reduce your home's energy use?
[DO NOT READ; PROBE TO CODE]

1. Insulation [if yes to insulation ask: Q85_1a Will you install attic insulation? Y/N, Q85_1b wall insulation Y/N, Q85_1c floor insulation Y/N]
 - a. Attic insulation
 - b. Wall insulation
 - c. Floor insulation
2. Weatherized or addressed air infiltration
3. Energy-efficient windows or doors
4. A new furnace or boiler
5. New central air conditioner
6. A new heat pump
7. Programmable thermostat or other heating/cooling controls
8. A new water heater [if yes to a new water heater ask Q85_8a: Will that new water heater be a traditional efficient storage water heater or a tankless or on demand water heater.

9. Efficient storage
10. Tankless or on-demand water heater
11. Sealing heating or cooling ducts
12. Insulating hot water pipes
13. A whole house fan
14. Energy-efficient lighting
15. Energy-efficient appliances (like a refrigerator, laundry machines)
16. Something else: _____
17. Nothing
98. Don't know

H.4.12 Demographics [ASK ALL]

I have a few more questions to help us understand the characteristics of households with completed projects.

Q86. Including all adults and children, how many people currently live in your household more than nine months out of the year?

1. [Open-ended response]

[Do not read:]

98. Don't know
99. Refused

Q87. How long have you lived in your current home? [RANGE: 1 to 97]

1. Number of years:
98. Don't know
99. Refused

Q88. How long do you intend to live in your current home?

1. 0 to 5 years
2. 6 to 10 years
3. More than 10 years
98. Don't know
99. Refused

Q89. What type of home do you live in? Is it a... [READ LIST, stop at correct response]

1. Single-family detached house,
2. Single-family attached house (like a townhouse, row house, or duplex),
3. Apartment building with 2-4 units,

4. Apartment building with 5 or more units,
 5. Mobile home or house trailer,
 6. Or something else? (SPECIFY)
 98. DON'T KNOW
- Q90. Approximately when was your home built?
1. RECORD: _____ [YEAR, RANGE: 1850 to 2014;, RANGE: Less than 1 to 164]
 98. DON'T KNOW
- Q91. What is the highest level of education you have completed so far? [DO NOT READ; PROBE TO CODE]
1. Less than high school
 2. High school graduate (or GED)
 3. Some college/vocational or technical school (including Associate's degree)
 4. College graduate (Bachelor's degree)
 5. Some graduate school
 6. Post graduate school
 99. Refused
- Q92. In what year were you born? [RANGE: 1900 to 1996]
1. [Open-ended response] [YEAR OF BIRTH: YYYY]
- [Do not read:]
98. Don't know
 99. Refused
- Q93. Do you consider yourself to be Spanish, Hispanic, or Latino?
1. Yes
 2. No
 99. Refused
- Q94. Do you consider yourself to be ...?
1. White
 2. Black or African-American
 3. American Indian, Native Hawaiian, Pacific Islander, or Alaska Native
 4. Asian
 96. Something else [SPECIFY:]
 99. Refused

Q95. I'm going to read a list of options. Please stop me when I reach the range that includes your annual household income. [READ LIST]

1. Under \$20,000
2. \$20,000 to under \$30,000
3. \$30,000 to under \$40,000
4. \$40,000 to under \$50,000
5. \$50,000 to under \$60,000
6. \$60,000 to under \$75,000
7. \$75,000 to under \$100,000
8. \$100,000 to under \$150,000
9. \$150,000 to under \$200,000
10. Over \$200,000
98. Don't know
99. Refused

COMM1: Is there anything else you would like to tell us about the NYSERDA Home Performance with Energy Star audit program?

1. Gave response
2. No additional comments
8. Don't know
9. Refused

That's all the questions we have for you, thank you very much for your participation, it was very helpful. Also, before you go, we wanted to let you know that a second NYSERDA research project is currently in progress. While it is unlikely there is a chance you may be contacted by another research team in the near future, and we want to alert you to this should that happen. Have a great rest of your day.

(INTERVIEWER NOTE: If respondent states that they do not want to be contacted for other studies, report key number to your supervisor.

H.5 Survey Disposition



	Total	Group%
TOTAL NUMBERS DIALED	3091	
BAD NUMBERS (out of frame)	411	100.0%
BUSINESS/GOVERNMENT NUMBER/NON-RESIDENT	64	15.6%
Cell Phone	1	0.2%
Fax/Modem Number/Computer Tone	4	1.0%
Incomplete Call/Line Problems (Temporary)	26	6.3%
Not In Service / Disconnected	93	22.6%
WRONG NUMBER - PERSON	70	17.0%
WRONG NUMBER - RECORDING	5	1.2%
Dialer - bad number syntax	42	10.2%
Dialer - incomplete	1	0.2%
Dialer - new number dropped	1	0.2%
Dialer - site out of service	85	20.7%
Dialer - site unknown error	1	0.2%
Dialer - unknown error	3	0.7%
Possible Unassigned Number/No Answer All Attempts	15	3.6%
TOTAL GOOD NUMBERS (total sample frame)	2680	
<u>NO CONTACT</u>	<u>198</u>	
Live Non-Contacts	198	100.0%
Busy	2	1.0%
Fax/Modem/Computer tone (live)	8	4.0%
No answer	89	44.9%
Dialer - busy	2	1.0%
Dialer - no answer	54	27.3%
Live Non Contacts - OVER MAX (max set to 5)	43	21.7%
TOTAL CONTACTS	2482	
<u>CONTACTS - NOT SCREENED</u>	<u>1843</u>	
Dead - Not Screened	35	100.0%
Away for duration	9	25.7%
CHILD/TEEN PHONE	2	5.7%
Foreign Language - NON-SPANISH	8	22.9%
Health Problems – LONG-TERM	8	22.9%
Hearing Problems	3	8.6%
RESPONDENT DECEASED	5	14.3%
Live - Not Screened	902	100.0%
Answering Machine/Voice Mail	588	65.2%
CallBack - CALL BLOCKING	1	0.1%
Live Not Screened - OVER MAX (max set to 5)	313	34.7%
Callback - Not Screened	677	100.0%
Callback - APPOINTMENTS	26	3.8%
Callback - UNSPECIFIED	232	34.3%
Hung-up -	88	13.0%

	Total	Group%
Health Problems - SHORT TERM	6	0.9%
Foreign Language - SPANISH	8	1.2%
Dialer - nuisance hang-up	1	0.1%
Callback - CALL BLOCKING (over max)	0	0.0%
Hung-up CB - OVER MAX	16	2.4%
Callbacks Not Screened - OVER MAX (max set to 5)	300	44.3%
Refusals - Not Screened	229	100.0%
Refusal - CALL BLOCKING	0	0.0%
Refusal - SOFT	123	53.7%
Second Soft Refusal	0	0.0%
Refusal - HARD (Do Not Callback)	82	35.8%
Hung-up REF - OVER MAX	3	1.3%
Refusals Not Screened- OVER MAX (max set to 5)	21	9.2%
CONTACTS - SCREENED	639	
Screen-Outs	0	#DIV/0!
SCREEN-OUT	0	#DIV/0!
Quota-Outs	0	#DIV/0!
Q/O (OVER QUOTA TERMINATE)	0	#DIV/0!
Qualified Refusals	0	#DIV/0!
Mid-Interview Term	0	#DIV/0!
Qualified Soft Refusal - 1	0	#DIV/0!
Qualified Refusals - OVER MAX (max set to 5)	0	#DIV/0!
Qualified Callbacks	1	100.0%
Abandoned Interview	1	100.0%
Qualified Callback - 1	0	0.0%
Qualified Callbacks - OVER MAX (max set to 5)	0	0.0%
Total Completes	638	100.0%
Proceed with interview/Completed Interview	638	100.0%
Survey Incidence (Screening Incidence)	100.0%	
List Incidence (Dialing Incidence)	20.7%	
Cooperation Rate 1	73.6%	
Cooperation Rate 2	73.5%	
Totals Refusals	8.5%	
Response Rate 1	23.8%	
Response Rate 2	26.1%	

Appendix I Audit-only Participants Memorandum

I.1 Summary

The PE/MCA team surveyed households in New York State (NYS) that received a home energy audit in 2012 or 2013, but did not perform any upgrades (audit-only respondents) through HPwES program. The team surveyed two groups of audit-only households: those that use natural gas and those that use delivered fuels (for example, oil, propane, wood, pellets) as the primary heating fuel. Audit-only respondents provided information on their experience with the audit process, how they selected their auditor and contractor, what upgrades they made and/or plan to make, and reasons for why they did not perform upgrades through HPwES.

More than half of NYS audit-only respondents (54%) reported learning about the audit through an advertisement or media, or through NYSERDA or their utility. A third of respondents found their home energy auditor through a contractor, and nearly a third found their auditor through a NYSERDA representative or website.

Most NYS audit-only respondents “agreed” that the audit process was simple and the time required was reasonable, but a substantial percentage did not think the auditor did a thorough review of their home (22%) or that the audit process met their expectations (34%). Most respondents also reported understanding the audit results, but about a third reported not learning valuable things about their home or that the recommended work did not seem appropriate. Two-thirds of audit-only respondents reported that they would not pay for a similar service in the future.

Nearly two-thirds of audit-only respondents reported installing an energy efficiency upgrade since they received their audit. The most commonly reported upgrades include insulation (66%), air sealing (57%), lighting (46%), programmable thermostats (33%), windows or doors (28%), and/or heating systems (27%). Less than half of the respondents reported hiring a contractor to install the upgrade(s), and reported paying for their upgrade(s) with cash or credit card, or using a home equity, bank, or NYSERDA loan.

NYS audit-only respondents reported several reasons for not installing all the upgrades recommended in their audit. About half (49%) reported that the recommended work was too expensive and nearly one-fourth (23%) reported that they had other priorities for their home improvement dollars. Some also mentioned they have plans to participate, but have not yet participated (17%); they were waiting on existing equipment to need replacement (13%); they wanted to do the work themselves (11%); and/or the energy savings were not worth the cost (11%).

Audit-only respondents also mentioned several reasons for not participating in the HPwES program. Slightly less than one-third (30%) reported that the costs were too high to participate. Ten percent or less mentioned, in order of most to least common:

- there were no recommendations or recommendations were unclear from the audit,
- there were issues with qualifying for program financing,
- there were issues with the perceived lack of comprehensiveness of the audit or with an unfriendly auditor, minimal or no upgrades were needed,
- they thought they did participate,
- they thought they did not qualify to participate,
- they were unaware of the program,
- they had other priorities,
- they had timing issues, and/or
- they are still considering participating.

1.2 Methods

The PE/MCA team conducted telephone or web surveys of households that received a home energy audit through NYSERDA in 2012-2013, but did not participate in HPwES (audit-only households). The team established quotas for two audit-only household groups: households that use natural gas and households that use delivered fuels (for example, oil, propane, wood, pellets) as the primary heating fuel (Table I-1). The team acquired the samples for both groups from NYSERDA’s Comprehensive Residential Information System (CRIS) database.

Table I-1. Quotas for NYS HPwES Audit-Only Household Survey, by Quota Group

Quota Group	Quota
Natural gas households	68
Delivered fuels households	68

The PE/MCA team conducted surveys of the two audit-only groups separately, and worked with the Impact team on the survey of audit-only natural gas households since the Impact team was conducting a separate billing analysis of this group. All audit-only natural gas households in the sample were first mailed a pre-notification letter informing them to expect a telephone call to request participation in a survey in the near

future, and nonrespondents received up to six follow-up calls. In addition, households with an e-mail address listed in the CRIS database were sent a pre-notification e-mail after the pre-notification postal letter was mailed, and nonrespondents were sent up to two follow-up e-mails, as well as the follow-up phone calls. Households reached via phone were asked to complete a phone survey, but were given the option to complete the survey online. Households reached via e-mail were asked to complete the survey online, but nonrespondents were called and asked to complete the survey via phone.

Beginning September 19, 2014, letters were mailed and e-mails were sent in eight successive batches to about 2,500 audit-only natural gas households in each batch, and calling began approximately one week after the letters were mailed (Table I-2). Data collection for natural gas households ended on December 15, 2014.

Table I-2. NYS Audit-Only Natural Gas Household Survey Contact and Data Collection Schedule

Batch	Letter Mail Date	E-mail Send Date
Batch 1	September 19, 2014	September 22, 2014
Batch 2	October 8, 2014	October 14, 2014
Batch 3	October 14, 2014	October 17, 2014
Batch 4	October 16, 2014	October 20, 2014
Batch 5	October 20, 2014	October 22, 2014
Batch 6	October 21, 2014	October 31, 2014
Batch 7	November 4, 2014	November 6, 2014
Batch 8	November 18, 2014	November 21, 2014
End of data collection	December 15, 2014	

The teams used screening questions to determine if the audit-only natural gas households were eligible for the Impact evaluation billing analysis effort. Households were eligible for billing analysis if they made at least one of four upgrades that cost \$2,000 or more (insulation, air sealing, window or door replacement, and/or heating system replacement), lived in their home at least one year before making the upgrades, and made the upgrades before the winter of 2013/2014. The survey firm directed eligible households to the Impact team's survey questions and directed ineligible households that had an audit in 2012-2013 to the PE/MCA team's process questions. Due to difficulties in reaching audit-only natural gas households for the billing analysis, however, the Impact team changed the eligibility requirements so that respondents who reported making any upgrades since their audit became eligible for the billing analysis. Thus, none of the audit-only natural gas respondents who completed the process survey questions had made any upgrades following their audit.

Nearly 19,000 audit-only natural gas households were included in the sample and, of these, nearly 2,000 used a Constituency-Based Organization (CBO), while more than 17,000 did not (Table I-3). The team excluded the audit-only with natural gas households that used a CBO since they are the topics of another analysis (Appendix J). More than one-quarter of sampled households responded to the survey and nearly all of these were eligible for the Impact evaluation billing analysis effort, and thus went to the Impact team, were screened-out, or were excluded because they used a CBO. The remaining 202 audit-only natural gas respondents were asked the process survey questions until quotas were met, but the quotas were exceeded due to the fielding of successive batches of surveys over the course of the data collection period.

Table I-3. NYS Audit-Only Natural Gas Household Survey Disposition

Disposition	Count
Audit-only natural gas households sample	18,823
CBO*	1,781
Non-CBO	17,422
Respondents	5,333 (28%)
Eligible for billing analysis, screened-out, or used CBO	5,131
Process survey respondents	202

* Excluded from analyses.

The impact team did not include audit-only delivered fuels households in their analysis, and the PE/MCA team used a slightly different methodology for collecting data from this group. The team conducted a web-only survey, similar to the one for audit-only natural gas respondents, and employed less stringent screening criteria since respondents did not need to qualify for the Impact team's billing analysis. Researcher screened out audit-only delivered fuels respondents if they did not know or refused to answer whether they installed any energy efficiency upgrades since their audit, or if they reported their primary heating fuel as natural gas at the time of the audit. All other questions in the survey were the same as those asked of audit-only natural gas households.

Beginning December 18, 2014, the team mailed pre-notification letters to the sample of audit-only delivered fuels households, followed by an e-mail invitation, and then two e-mail reminders to nonrespondents. Data collection for audit-only delivered fuels households ended on January 7, 2015.

Since the team conducted a web-only survey, the team excluded 45 respondents whose e-mail address was unavailable in CRIS from the total sample of 680 (Table I-4). Of the remaining 635 households in the sample, 23% started the survey, and 37 of these were screened out as ineligible. The team exceeded the quota of 68 respondents, with 110 completed surveys. The team was unable to determine the representativeness of the sample of natural gas and delivered fuels audit-only respondents due to a lack of

comparison data about the population, but the team obtained sufficient sample size to achieve 90/10 confidence/precision.

Table I-4. NYS Audit-Only Delivered Fuels Household Survey Disposition

Disposition	Count
Audit-only delivered fuels households sample	680
E-mail address available	635
Respondents	147 (23%)
Screened-out	37
Process survey respondents	110

The PE/MCA team conducted statistical analyses with the survey data using SPSS and Excel, and compared respondents, when applicable, based on whether they used natural gas or delivered fuels as their primary heating fuel, whether they installed energy efficiency upgrades after their audit, and whether they hired a contractor to install the upgrades. The team notes statistically significant differences at the $p \leq .05$ level between each of the respondent comparisons, and omitted “Don’t knows” and “Refused” responses from analyses in the report below unless otherwise indicated.

I.3 Respondent and Household Characteristics

The majority of NYS audit-only respondents reported being a male. Slightly less than half of respondents reported that they are between the ages of 35 and 54 years or 55 and older (Table I-5). The average household size, including children, is three people, but the majority of respondents (44%) reported a household size of two.

Nearly three-quarters of audit-only respondents have a Bachelor’s degree or higher, while about 15% report having a high school diploma or less (Table I-5). Forty percent of audit-only respondents report a household income of \$100,000 or more, with a little more than one-third reporting a household income between \$50,000 and \$99,999. The remaining 23% of audit-only respondents earn less than \$50,000 per year. In addition, half of audit-only respondents reported that their home was built between 1960 and 1999, and nearly half reported that their home was built before 1960.

Table I-5. NYS Audit-Only Respondent and Household Characteristics

Characteristics	Percent
Gender (n=312)	
Male	62%
Female	38%
Age (n=305)	
25 – 34 years-old	7%
35 – 54 years-old	47%
55 – 64 years-old	25%
65 years old or above	22%
Education (n=292)	
High School or less	14%
Some college	14%
Bachelor's degree or higher	72%
Household Income (n=243)	
Less than \$50,000	23%
\$50,000 to less than \$100,000	37%
\$100,000 or more	40%
Year Home Was Built (n=308)	
1930s or earlier	25%
1940s or 1950s	18%
1960 through 1999	50%
2000 or later	8%

I.4 Program Awareness and Experience

To understand and document the experience and expectations of consumers, the evaluation team asked HPwES audit-only participants about their knowledge and understanding of the HPwES program, their audit experiences, and their awareness of possible CBO assistance for the completion of energy efficiency projects in their homes.

I.4.1 HPwES Audit Program Awareness and Auditor Selection

NYS audit-only respondents reported learning of the HPwES audit services from a variety of different sources, including advertising, through NYSERDA or their utility company, word of mouth, a home or trade show, a contractor, and/or a CBO or non-profit organization (Table I-6). About 10% of respondents were unable to recall how they learned of the audit services provided by HPwES. In addition, more delivered fuels respondents reported that they learned of the HPwES audit services from the NYSERDA

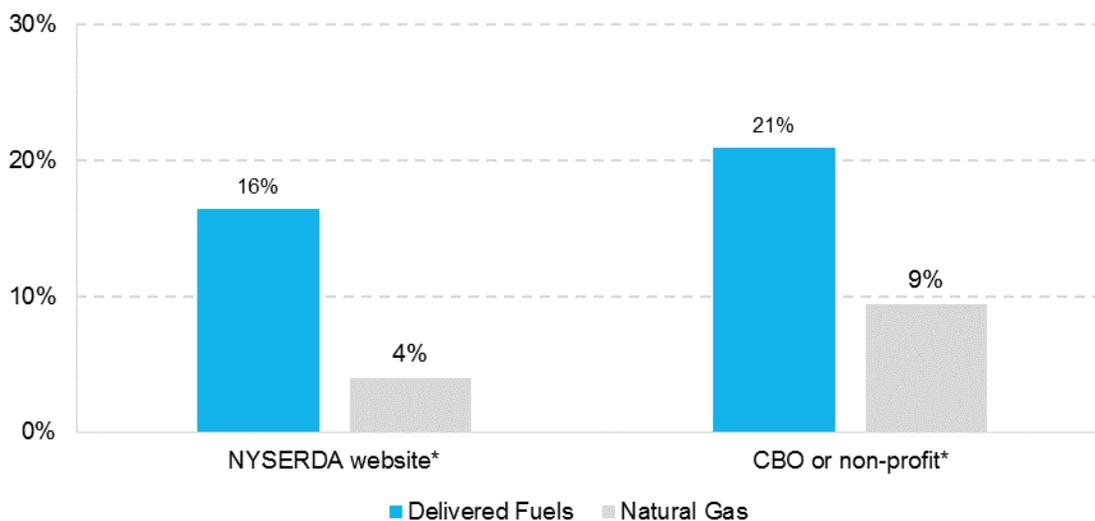
website (16%) and from a CBO or nonprofit organization (21%) compared to natural gas households (4% and 9%, respectively) (Figure I-1).

Table I-6. Sources of Audit Program Awareness*

Sources of Audit Awareness	Percent (n=312)
Advertisement or Media	24%
NYSERDA or Utility	20%
Word of mouth	16%
Community event (home/trade show, fair, etc.)	13%
Contractor	13%
CBO or non-profit	8%
Other	6%

* Multiple responses allowed.

Figure I-1. Statistically Significant Differences in Reported Sources of Audit Program Awareness, by Fuel Type



* Statistically significant at $p \leq .05$.

Similarly, NYS audit-only respondents reported a number of different ways of selecting the contractor who provided the audit (Table I-7). One-third of respondents reported that they found their auditor through a contractor and of these, 19% indicated that they had been contacted directly by the contractor and 10% had contacted a contractor that they know. About one-third (31%) of respondents reported that they found their auditor through the NYSERDA website or a NYSERDA representative. The remaining third reported finding their auditor from a referral from friends or family (15%), the Yellow pages or an online search (5%), a home or trade show (8%), and a CBO or non-profit organization (5%).

Table I-7. Sources of Auditor Selection*

Sources for Auditor Selection	Percent of Respondents (n=283)
Through a contractor	33%
Contacted directly by contractor	19%
Contacted a known contractor	10%
Contractor – contact unspecified	4%
NYSERDA website or representative	31%
Referral (friend/family)	15%
Home or Trade Show	8%
CBO or non-profit	5%
Yellow pages/online search	5%
Other** media	3%

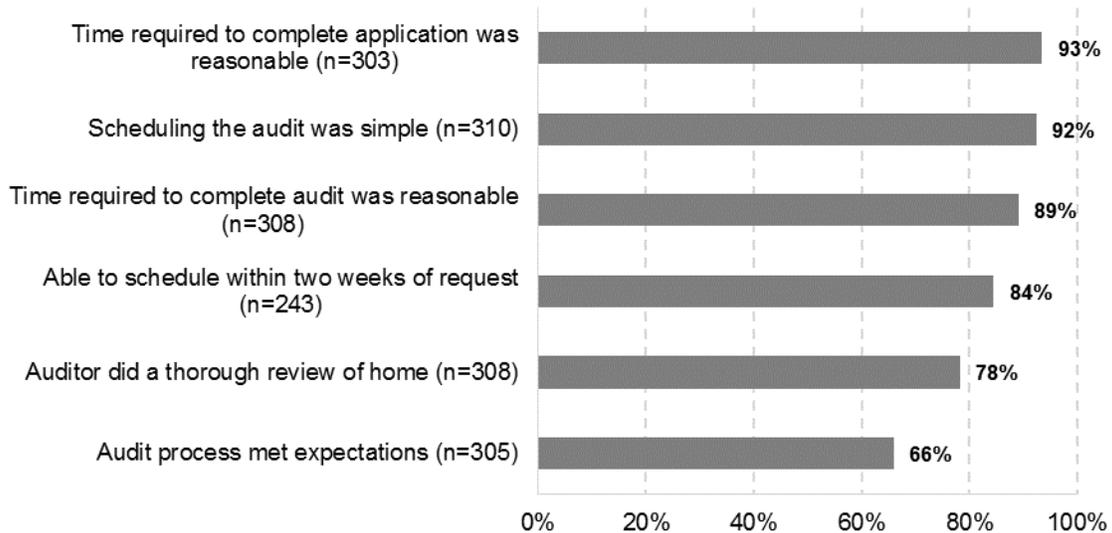
* Multiple responses allowed.

** Other includes radio, television, and newspaper advertising.

I.4.2 Audit Process and Results

Nearly all of NYS audit-only respondents agreed (a “4” or a “5” on a five-point scale) that the time to complete the audit application and the audit was reasonable (93%), as well as that the scheduling of the audit was simple (92%) (Figure I-2). Significantly more respondents who use natural gas (97%) agreed that the time to complete the application was reasonable compared to respondents who use delivered-fuels (88%). Most respondents also “agreed” that they were able schedule the audit within two weeks of the request (84%) and that their auditor did a thorough review of their home (78%), but substantially fewer agreed that the audit process met their expectations (66%).

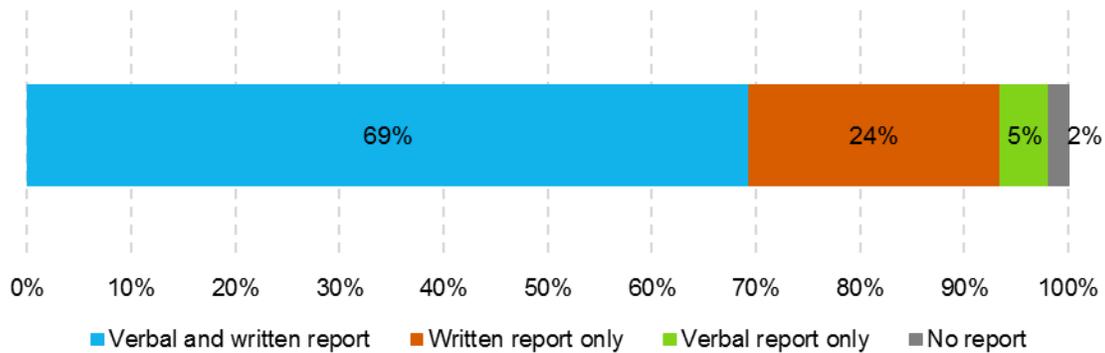
Figure I-2. Percentage of NYS Audit-only Respondents Who Agreed with Aspects of the Audit Experience



NYS audit-only respondents who did not agree (a “3” or less on a five-point scale) that the audit process met their expectations or that their audit was thorough (34% and 22%, respectively) reported an incomplete audit and issues with the report or recommendations as the most common reasons for their disagreement. Respondents who did not agree that scheduling the audit was simple (8%), that it was possible to schedule within two weeks of their request (16%), or that the time it took to complete the audit (11%) and associated application (7%) was reasonable reported that they had experienced problems that included difficulty reaching the contractor, scheduling conflicts, and that the actual audit took too long or was never fully completed.

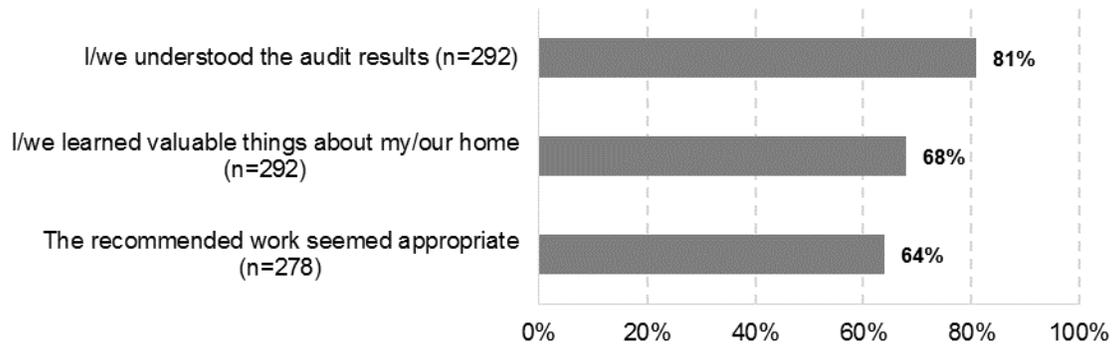
More than two-thirds of audit-only respondents (70%) reported that they received an explanation of their audit results. About three-quarters of these respondents reported that their auditor made upgrade recommendations verbally, at the time of the audit, and nearly all respondents reported receiving a written or electronic report containing recommended upgrades (Figure I-3).

Figure I-3. Percentage of NYS Audit-only Respondents Who Received Verbal and/or Written Audit Report



More than three-fourths (81%) of NYS audit-only respondents agreed (‘4’ or ‘5’ on a 5-point scale) that they understood the audit results and recommendations, and more than two-thirds (68%) agreed that they learned something valuable about their home (Figure I-4). In addition, about two-thirds (64%) of respondents agreed that the recommended upgrades seemed appropriate.

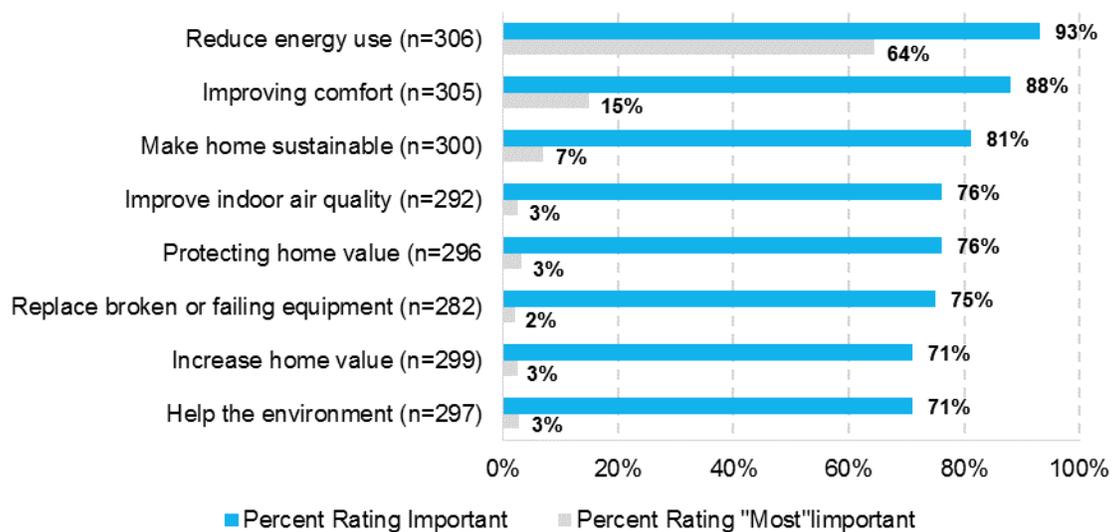
Figure I-4. Percentage of NYS Audit-only Respondents Who Agree with Audit Results Processes



I.4.3 Motivation and Audit Outcomes

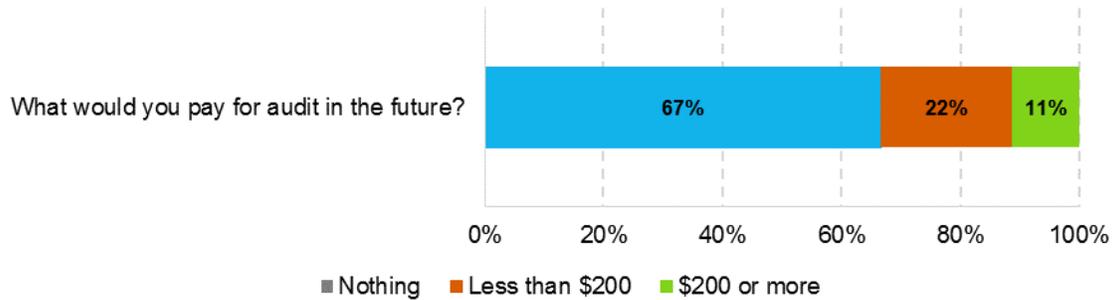
Nearly all NYS audit-only respondents reported that it was important (‘4’ or ‘5’ on a 5-point scale) that the HPwES audit identify ways of reducing energy use and improving comfort (Figure I-5). Three-fourths or more ranked as important making the home more sustainable (81%), identifying ways of protecting home value (76%), improving indoor air quality (76%), and replacing broken or failing equipment (75%). About two-thirds of respondents (64%) reported that finding ways of reducing energy use was the most important outcome of the HPwES energy efficiency audit. A few respondents ranked identifying ways of improving comfort (15%) and making their home more sustainable (7%) as the most important outcome of their audit.

Figure I-5. Percentage of NYS Audit-only Respondents Who Agree with Audit Results Processes



Two-thirds of all audit-only respondents reported that they would not pay for a similar service if they had the opportunity in the future, nearly one-fourth reported they would pay less than \$200 (Figure I-6). A few respondents (11%) reported that they would pay \$200 or more for a similar service in the future.

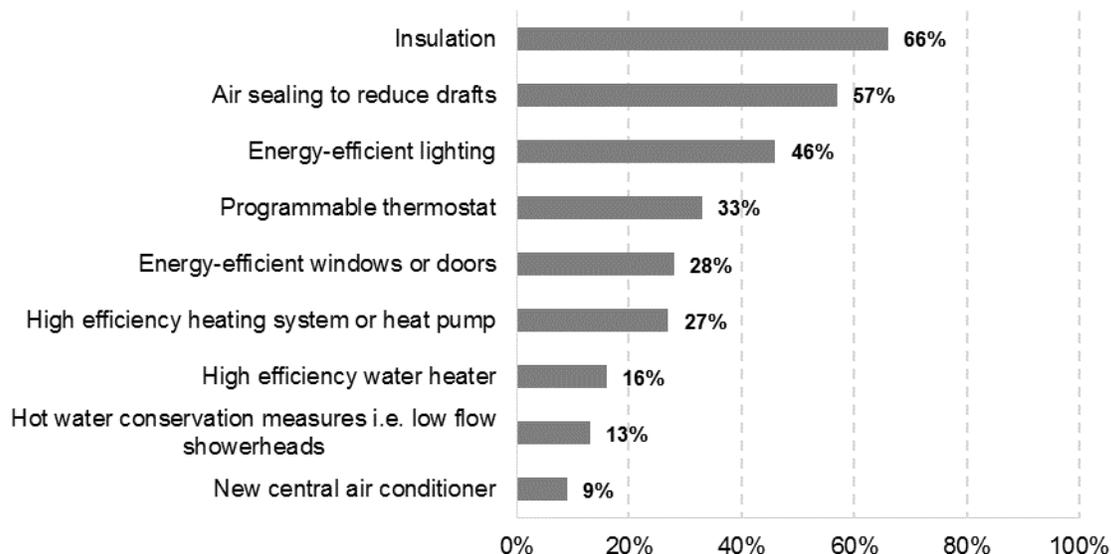
Figure I-6. Percentage of NYS Audit-only Respondents Willing to Pay for Future Audit (n=150)



I.5 Project Completion and Funding

Since audit-only natural gas households who made energy efficiency upgrades after their audit were systematically excluded from the process survey questions, the PE/MCA team included only the audit-only delivered fuels respondents in analyses regarding what upgrades were made since the audit. Nearly two-thirds (61%) of NYS audit-only delivered fuels respondents reported that they had completed some of the upgrades recommended in the HPwES energy audit. Of these, 16% reported that they had installed all recommended upgrades. Insulation (66%), air sealing for draft reduction (57%), and energy-efficient lighting (46%) were the most frequently reported installed upgrades reported by respondents, followed by energy-efficient windows and doors (28%), programmable thermostats (33%), high-efficiency heating systems or heat pumps (27%), high-efficiency water heaters (16%), hot water conservation measures (13%), and central air conditioning (9%) (Figure I-7).

Figure I-7. Percentage of Audit-only Delivered Fuels Respondents Who Reported Equipment Upgrades since their Audit (n=67)*



* Multiple responses allowed.

About three-fourths of audit-only delivered fuels respondents who reported the completion of an upgrade since their audit paid for the project using cash (48%) and/or a credit card (27%) (Table I-8). Fewer respondents reported paying for the project using a home equity line of credit (HELOC) or bank loan (8%), loans through NYSERDA (8%), contractor financing (5%), or a utility incentive (1%). Eleven percent of audit-only respondents reported using “other” methods of payment, but did not specify the method. In addition, more than one-third (38%) of respondents did not know that project financing was available through the HPwES program.

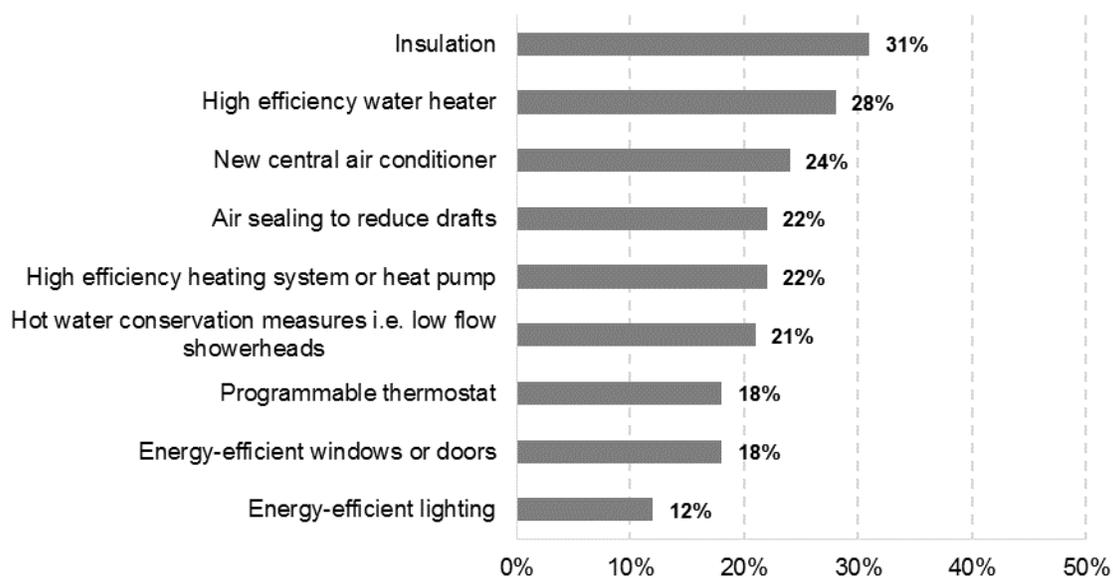
Table I-8. Percentage of Audit-only Delivered Fuels Respondents’ Payment Method for Completed Upgrade Project*

Payment method for completed project	Percent (n=67)
Cash	48%
Credit card	27%
HELOC or bank loan	8%
Loan through NYSERDA	8%
Contractor financing	5%
Utility incentive/rebate	1%
Other – unspecified	11%

* Multiple responses allowed.

NYS audit-only delivered fuels respondents most frequently reported insulation (31%) or high-efficiency water heaters (28%) as a recommended upgrade that had not been installed since the audit (Figure I-8). Nearly one-fourth reported that they had not installed recommended energy-efficient heating systems (22%) or central air conditioning (24%), or air sealing (22%), while fewer respondents reported that they had not installed recommended hot water conservation measures (21%), programmable thermostats (18%), energy-efficient windows and doors (18%), and energy-efficient lighting (12%).

Figure I-8. Percentage of Audit-only Delivered Fuels Respondents Who Received an Equipment Upgrade Recommendation but did not Install the Upgrade (n=67)*



* Multiple responses allowed.

About half of audit-only delivered fuels respondents who did not install recommended upgrades reported that the reason they did not install all of the upgrades was that they were too expensive (49%) and nearly one-quarter of respondents reported that they had other priorities for their home improvement dollars (23%) (Table I-9). Other reasons given by respondents for not completing all recommended upgrades included waiting for existing equipment to need replacement (13%), the energy savings weren't worth the cost (11%), they wanted to do the work themselves (11%), and/or they were planning to make the upgrades but had not yet (17%).

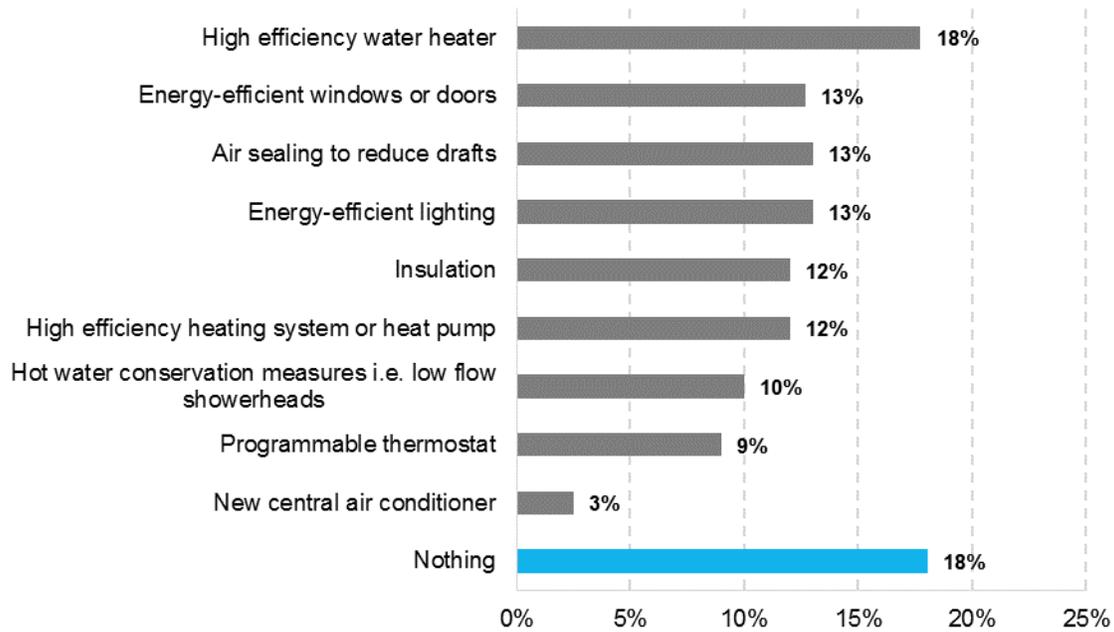
Table I-9. Reasons Reported by NYS Audit-Only Delivered Fuels Respondents for Not Installing All Recommended Upgrades*

Reasons for not installing all upgrades	Percent (n=67)
Recommended upgrades were too expensive	49%
Other priorities for home improvement dollars	23%
Planning to install, just haven't gotten to it yet	17%
Waiting for existing equipment to need replacing	13%
Wanted to do the work themselves	11%
Energy savings were not worth the cost	11%
Concern for comfort	2%

* Multiple responses allowed.

NYS audit-only delivered fuels respondents identified upgrade recommendations that they planned to install within the next two years (Figure I-9). Some respondents indicated that they were planning to install a high-efficiency water heater (18%), insulation (12%), energy-efficient windows and doors (13%), a high-efficiency heating system (12%), air sealing (13%), and/or energy-efficient lighting (13%) in the next two years. Fewer respondents indicated that, in the next two years, they planned to install hot water conservation measures (10%), a programmable thermostat (9%), and/or a central air condition (3%). Eighteen percent, however, reported that they did not plan to install any additional recommended upgrades in the next two years.

Figure I-9. Percentage of NYS Audit-only Delivered Fuels Respondents Who Received an Equipment Upgrade Recommendation and Plan to Install Upgrades in the Next Two Years (n=67)*



* Multiple responses allowed.

Nearly one-third (30%) of *all* NYS audit-only respondents reported that they did not participate in the HPwES program because the cost of the recommended work was too high (Table I-10). A few respondents also indicated unclear or no upgrade recommendations (9%), issues with the audit or auditor (8%), and/or financing (8%), and only needing minimal upgrades (7%) as reasons for not participating. Other audit-only respondents reported that the payback was too low (5%), that they were unaware of the program (5%), that they did not qualify for the program (6%), or that they thought they had participated in the program (7%). Finally, some audit-only respondents reported that they did not participate in the HPwES program because they had other priorities that interfered (4%) or that there were issues with timing (3%), and a few indicated that they were still considering participation (2%).

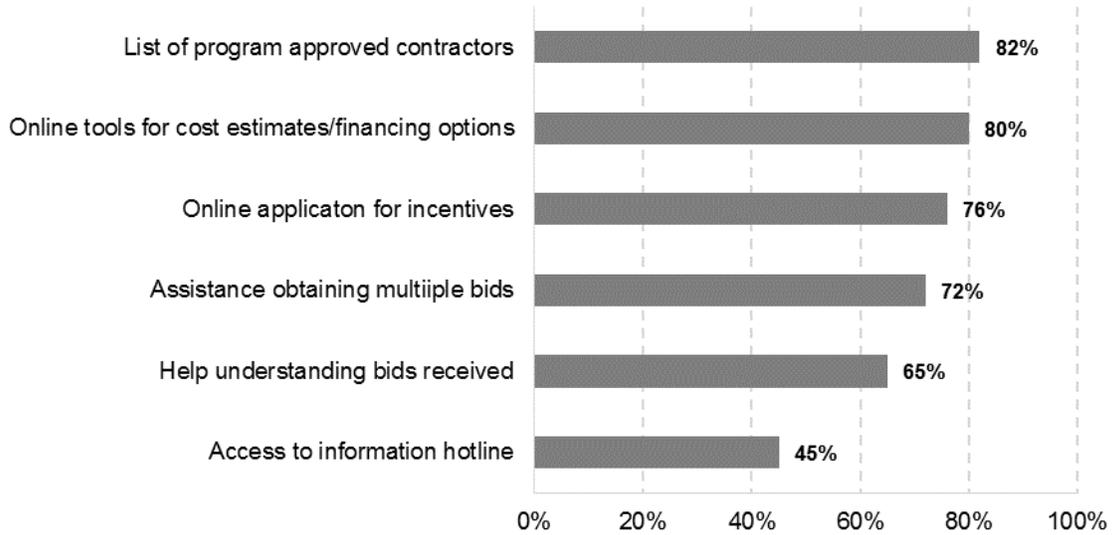
Table I-10. NYS Audit-Only Respondents’ Reported Reasons for Not Participating in HPwES Program

Reasons for not participating in HPwES	Percent (n=218)
Cost of recommended work was too high	30%
Unclear or no recommendations in audit	9%
Program financing issues	8%
Issues with the audit or auditor	8%
Minimal or no upgrades recommended in audit	7%
Thought they participated	7%
Did not qualify for program	6%
Payback too low	5%
Unaware of the program	5%
Other priorities	4%
Timing issues	3%
Still considering participation	2%
Other* reason	6%

* “Other” includes project completed through county program; respondent had problems with their home that created barriers to installing upgrades, etc.

A large majority of *all* NYS audit-only respondents who had not completed any upgrades rated having a list of program-approved contractors (82%) and having online tools for cost estimates and financing options (80%) as valuable (‘4’ or ‘5’ on a 5-point scale) when assessing the value of a program like HPwES (Figure I-10). About three-fourths of respondents rated having access to an online application for incentives (76%), receiving assistance obtaining multiple bids as valuable (72%), while about two-thirds (65%) rated help with understanding bids valuable. Less than half of respondents rated access to an information hotline as valuable. In addition, significantly more respondents who did not make any upgrades after their audit rated having a list of approved contractors as valuable, compared to respondents who did make upgrades after their audit.

Figure I-10. Percentage of Audit-Only Respondents Who rated HPwES Program Benefits “Valuable” (n=300)



I.6 Contractor Selection

More than one-third (41%) of the NYS audit-only delivered fuels respondents who completed one or more of the upgrades recommended by their auditor reported hiring a contractor to complete the upgrade(s) (Figure I-11). More than half (54%) of the respondents who used a contractor for the completion of their upgrade reported that they were ‘very satisfied’ with the work that the contractor had done, and more than one-third (38%) additional respondents reported that they were ‘somewhat satisfied’ with their contractor’s work (Figure I-12).

Figure I-11. Percentage of Audit-only Delivered Fuels Respondents Using a Contractor to Complete Upgrades (n=67)

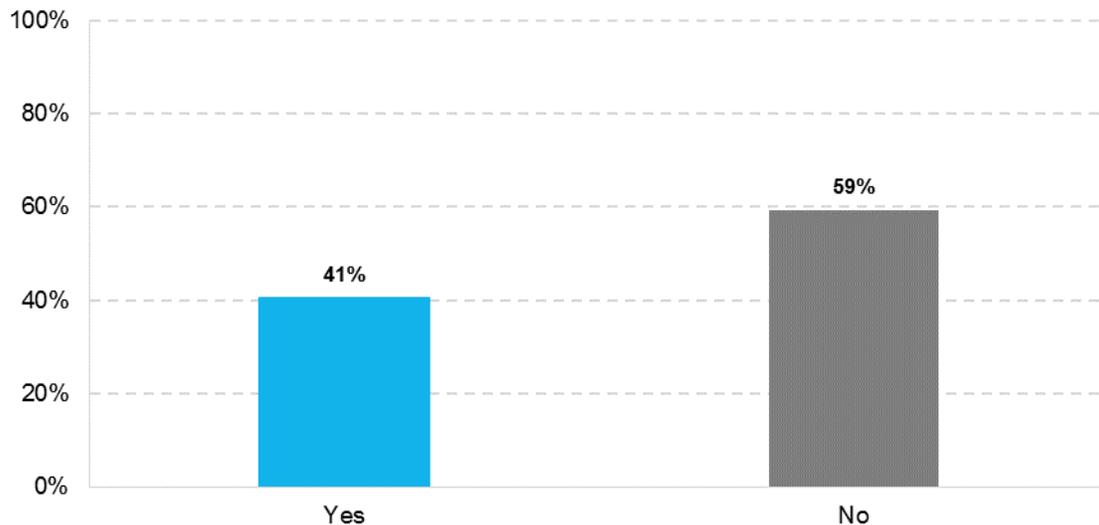
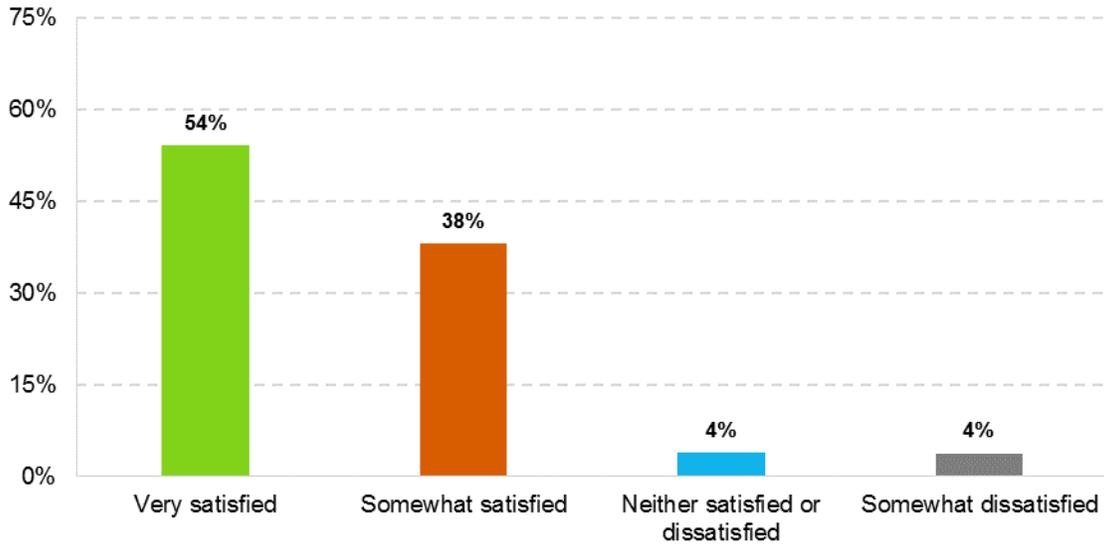
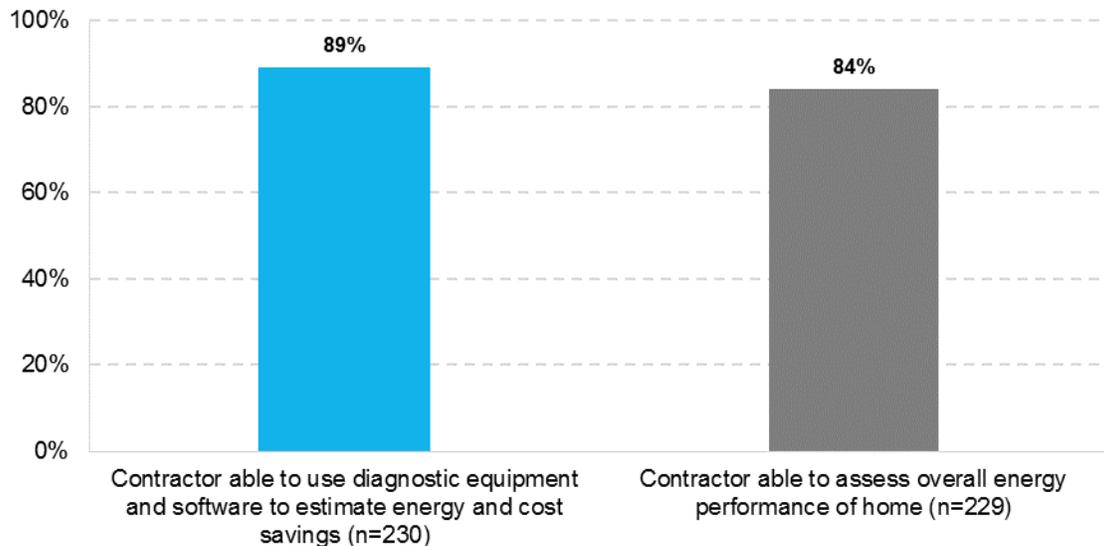


Figure I-12. Audit-only Delivered Fuels Respondents' Level of Satisfaction with Contractor's Work (n=24)



In general, when looking for a contractor, more than three-fourths (89%) of *all* NYS audit-only respondents rated a contractor's ability use diagnostic equipment or software to estimate energy and cost savings potential as important ('4' or '5' on a 5-point scale) (Figure I-13). In addition, more than three-quarters (84%) of respondents rated as important the contractor's ability to assess the overall energy performance of their home.

Figure I-13. Percentage of Audit-only Respondents Rating Contractor Services as "Important"



About one-third of the audit-only delivered fuels respondents who did hire a contractor to install the recommended upgrades reported finding their contractor through friends, family, or others (35%), or hired a contractor with whom they had a previous relationship (28%) (Table I-6). A few respondents reported finding their contractor online (3%), in the Yellow Pages (7%), or through a rating source such as Angie’s List or Facebook (7%), and 20% hired the contractor who performed their audit.

Similarly, the majority of all audit-only respondents who did not hire a contractor reported that they typically find a contractor when needed through a referral from friends, family, or others (75%), and about one-fourth reported choosing a contractor who is already known to them (21%) (Table I-11). Unlike the few respondents who used an online search to hire a contractor to complete their audit upgrades, however, 24% of respondents who did not hire a contractor reported that they use an online search to find a contractor when they need one.

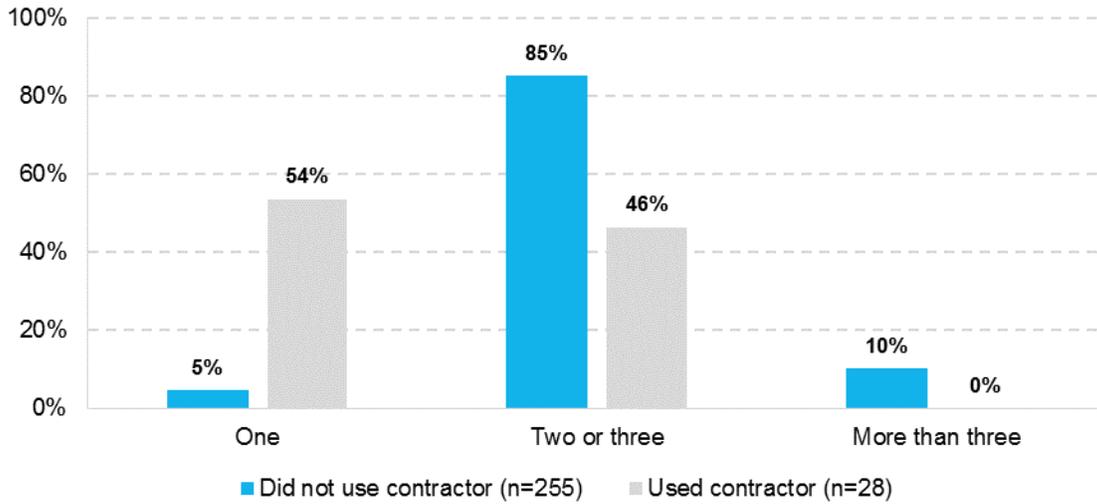
Table I-11. Audit-Only Respondents’ Reported Sources of Contractor Selection

Source of contractor selection	Percent of respondents using a contractor (n=29)	Percent of respondents not using a contractor (n=283)
Referral from friend/family/other	35%	75%
Choose known contractor	28%	21%
Online search	3%	24%
Rating source i.e. Angie’s List, Facebook	7%	12%
Yellow Pages (incl. Internet Yellow Pages)	7%	6%
Used the contractor who did the audit	20%	NA

* Percentages sum to other than 100% because multiple responses were allowed.

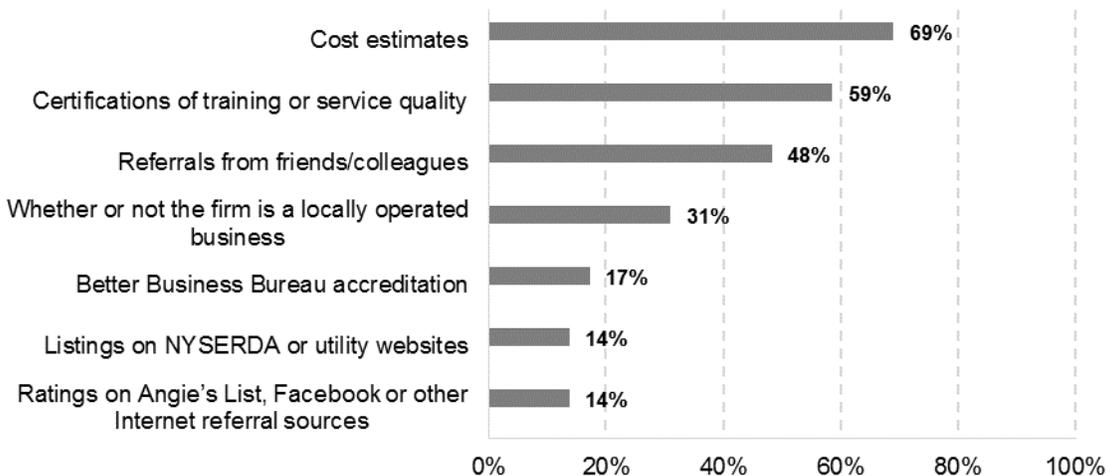
A majority of NYS audit-only delivered fuels respondents who hired a contractor to complete the recommended audit upgrades (54%) reported that they received one bid for the project and 46% reported that they received two or three bids (Figure I-14). A large majority (85%) of all audit-only respondents who did not hire a contractor reported that, when they need a contractor, they typically receive two or three bids for a project; 10% reported that they usually get more than three bids, and 5% reported that they typically get only one bid (Figure I-14).

Figure I-14. Percentage of Audit-only Respondents Who Receive Multiple Contractor Bids



The majority of NYS audit-only delivered fuels respondents who hired a contractor to complete one or more of the upgrades recommended in the HPwES energy audit reported that they considered cost estimates (69%) and certifications (59%) when choosing a contractor for the project (Figure I-15). Nearly half (48%) said that they considered referrals from friends or colleagues, while nearly one-third (31%) considered whether the firm was locally operated when hiring their contractor. A smaller number of respondents reported that they considered the contractor’s Better Business Bureau accreditation (17%), listing on the NYSERDA or utility website (14%), or ratings on Angie’s List or other online rating sources (14%) when hiring the contractor that completed the upgrade recommendations resulting from the HPwES audit.

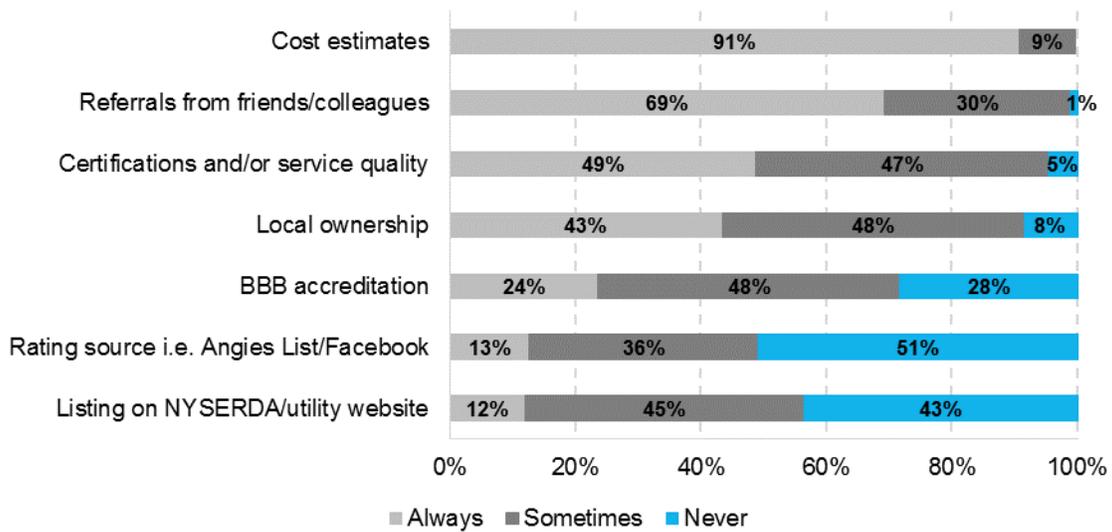
Figure I-15. Percentage of Audit-Only Delivered Fuels Respondents Who Considered Various Contractor Qualities When They Looked for their Contractor (n=27)*



* Multiple responses allowed.

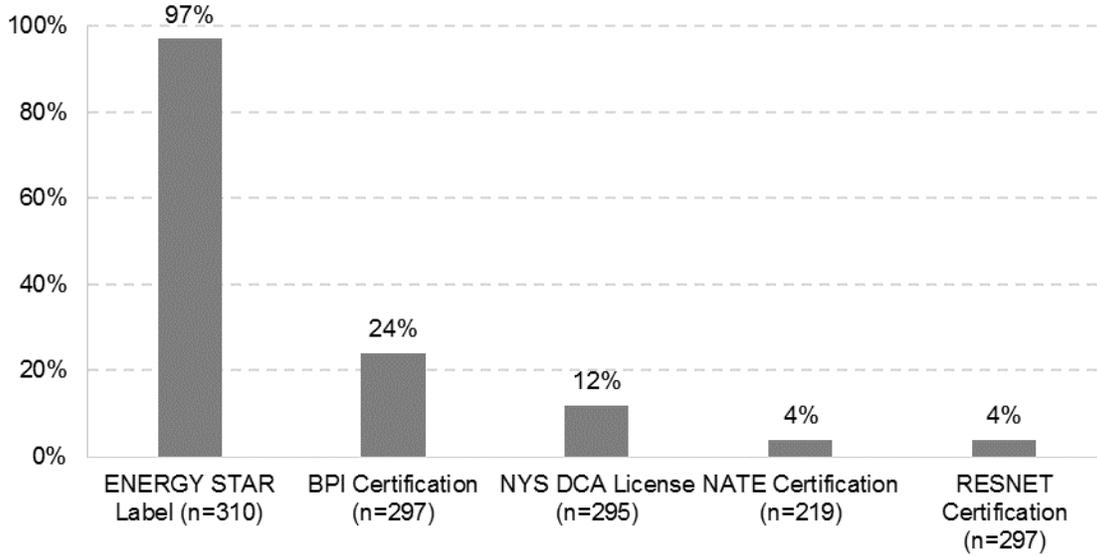
In contrast, nearly all NYS audit-only respondents who did not hire a contractor reported that, when they generally need a contractor, they ‘always’ or ‘sometimes’ consider the contractor’s cost estimates (100%) and certifications (96%), referrals from friends, family, or others (99%), and local location (91%) (Figure I-16). Nearly three-quarters (72%) of respondents always or sometimes consider the contractor’s Better Business Bureau ratings, while about half rely on a rating source like Angie’s List, Facebook (49%), or their listing on the NYSERDA or utility website (47%).

Figure I-16. Percentage of Audit-Only Respondents Who Consider Various Contractor Qualities When They Generally Look for a Contractor (n=283)



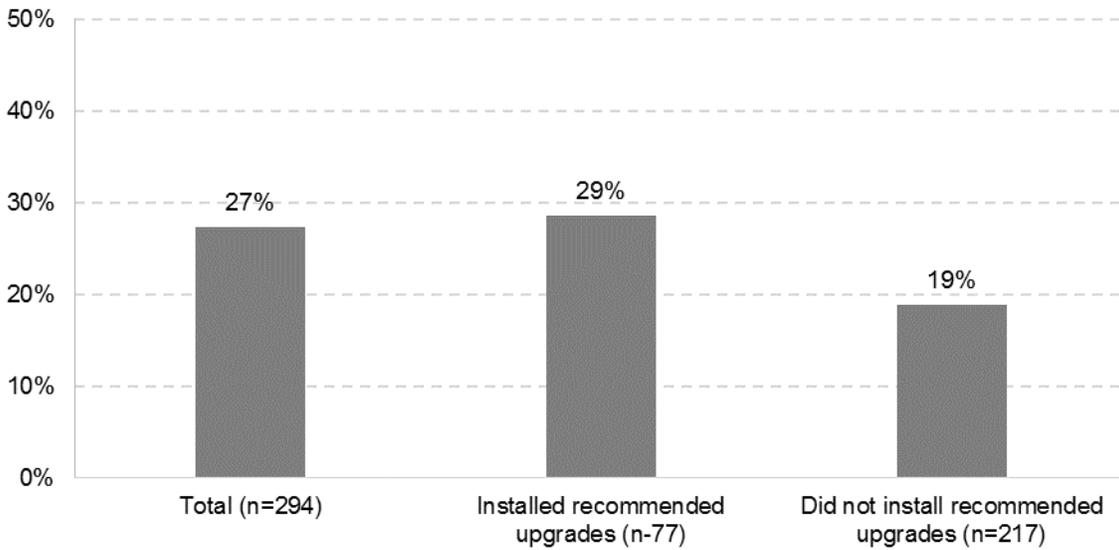
A large majority (97%) of *all* NYS audit-only respondents reported awareness of the ENERGY STAR label (Figure I-17). About one-quarter (24%) of all audit-only respondents reported that they were aware of contractor certification through the Building Performance Institute (BPI), while about 10% reported that they had heard of the NYS Department of Consumer Affairs (NYS DCA) certification. A few respondents (4%) reported awareness of other certifying organizations including North American Technician Excellence (NATE) or the Residential Energy Services Network (RESNET).

Figure I-17. Percentage of Audit-only Respondents Aware of Energy Efficiency Labels and Contractor Certifications



Nearly one-third (29%) of NYS audit-only delivered fuels respondents who completed one or more of the upgrade recommendations from their audit reported that they were aware that all contractors working with NYSERDA’s HPwES program must be accredited by BPI (Figure I-18). Significantly fewer (19%) of the audit-only respondents who had not done upgrades were aware of this requirement.

Figure I-18. Percentage of Audit-only Respondents Aware of NYSERDA Requirement for Contractor BPI Accreditation, by Whether Respondent Installed Upgrades Recommended from their Audit



I.7 Survey Questionnaires

I.7.1 Introduction

May I speak to **[NAME]**?

Hello my name is _____ and I'm calling on behalf of the New York State Energy Research and Development Authority or NYSERDA.

We're calling households that received a home energy audit through NYSERDA's Home Performance with ENERGY STAR Program. We're calling today with a survey about your experience with this Program and your answers will help us evaluate how NYSERDA might serve people better. We sent you a letter recently telling you that we would be calling and explaining the research we are doing.

[IF ASKED] Your responses to this survey will be kept confidential to the extent permitted by law.

[IF NECESSARY:] As you may recall, the Home Performance with ENERGY STAR home energy audit involves a contractor coming to your home and inspecting the living space, attic, and basement or crawl space. The contractor also performs a number of tests using special equipment, possibly including a blower door. The assessment typically takes one to three hours. At the end of the assessment, the contractor makes recommendations about things that you could do to improve the energy efficiency, comfort, and safety of your home.

Our records show that you received a Home Performance with ENERGY STAR home audit sometime in **[AUDITYEAR]** **[IF NECESSARY:]** You were selected as part of a random sample of participants and your feedback about how this audit influenced your decisions is very important to future planning for energy efficiency programs in the State.

I.7.1.1 Screening Questions for Contact

SCR1. I have your name down as the contact for the home audit. Do you recall receiving a Home Performance with ENERGY STAR home energy audit?

1. YES **[GO TO PR1]**
2. NO
- 96 REFUSED **[THANK AND TERMINATE]**
- 97 DON'T KNOW

SCR2. Is there someone else in your household who may be able to help me?

1. YES **[ASK TO SPEAK TO NEW CONTACT, RESTART AT INTRO]**
2. NO **[THANK AND TERMINATE]**
- 96 REFUSED **[THANK AND TERMINATE]**
- 97 DON'T KNOW **[THANK AND TERMINATE]**

[SCHEDULE ANOTHER TIME FOR INTERVIEW IF NECESSARY]

The first questions I have will take less than 5 minutes to complete, depending upon your responses.

GENERAL INSTRUCTIONS

Your opinions about NYSERDA’s Home Performance with ENERGY STAR home energy audit program are important to this research effort. If we ask you a question you aren’t sure you can answer, your best guess or even a rough judgment is fine. If you have no idea whatsoever, that’s OK too: just indicate that you don’t know and we will move on.

PROGRAM RECALL

First, I would like to confirm the accuracy of our records.

PR1. Was the home energy audit conducted in [AUDITMONTH] of [AUDITYEAR]?

- 1. YES [GO TO PR3]
- 2. NO
- 96 REFUSED [GO TO PR3]
- 97 DON'T KNOW [GO TO PR3]

PR2Y. (IF PR1 = 2) What year was the audit done?

- 10 - 2010
- 11 - 2011
- 12 - 2012
- 13 - 2013
- 14 - 2014
- 96 - REFUSED
- 97 - DON'T KNOW

PR2S. [IF PR1 = 2] What season was the audit done?

- 01 - Winter
- 02 - Spring
- 03 - Summer
- 04 - Fall
- 05 - Other, Please specify: _____
- 96 - REFUSED
- 97 - DON'T KNOW

PR3. According to our records, [AUDITCONTRACTOR] conducted the audit. Is this correct?

- 1. YES, IS CORRECT [GO TO PR5]
- 2. NO, IS NOT CORRECT
- 96 REFUSED [GO TO PR5]
- 97 DON'T KNOW [GO TO PR5]

PR4. Who was the contractor who conducted the audit?

- 1. RECORD CONTRACTOR NAME: _____
- 96 REFUSED
- 97 DON'T KNOW

PR5. [NatGas HHs ONLY] Do you recall receiving an audit report with recommendations?

- 1. YES, DO RECALL
- 2. NO, DON'T RECALL
- 96 REFUSED
- 97 DON'T KNOW

(PR1 = 96 or 97) and (PR3 = 96 or 97) and PR5 = 96 or 97)) THEN THANK AND TERMINATE.

PR6. Our records show that the home audit was conducted at [ADDRESS]. Is this correct?

- 1. YES [GO TO PR8]
- 2. NO
- 96 REFUSED [THANK AND TERMINATE]
- 97 DON'T KNOW [THANK AND TERMINATE]

PR7. Where was the audit conducted?

- RECORD ADDRESS: _____
- 96 REFUSED [THANK AND TERMINATE]
 - 97 DON'T KNOW [THANK AND TERMINATE]

PR8. Are you still living at this address?

- 1. YES
- 2. NO [THANK AND TERMINATE]
- 96 REFUSED [THANK AND TERMINATE]
- 97 DON'T KNOW [THANK AND TERMINATE]

[IF PR1, PR3 AND PR5 = DK OR REF, OR IF PR8 <> YES, THANK AND TERMINATE.]

I.7.1.2 Detailed Screening Questions

[SET BILLING ANALYSIS FLAG (BAFLAG) TO 1.]

DS1. Since the audit, have you installed any energy efficiency upgrades?

- 1. YES
- 2. NO [SET BAFLAG TO ZERO; GO TO DS10]
- 96 REFUSED [THANK AND TERMINATE]
- 97 DON'T KNOW [THANK AND TERMINATE]

We are mainly interested in four upgrades: insulation, air sealing, window or door replacement and heating system replacement.

DS2. [NatGas HHs ONLY] Did you install one or more of these four upgrades?

- 1. YES
- 2. NO [SET BAFLAG TO ZERO; GO TO DS10]
- 96 REFUSED [THANK AND TERMINATE]
- 97 DON'T KNOW [THANK AND TERMINATE]

DS3. Did the total cost of this work come to more than \$2,000?

- 1. YES
- 2. NO [SET BAFLAG TO ZERO; GO TO DS10]
- 96 REFUSED [SET BAFLAG TO ZERO; GO TO DS10]
- 97 DON'T KNOW [SET BAFLAG TO ZERO; GO TO DS10]

DS3a. [NatGas HHs ONLY] (IF DS3=1) Did you spend more than \$3,000 on this work?

- 1. YES
- 2. NO
- 96. REFUSED
- 97. DON'T KNOW

DS4. [NatGas HHs ONLY] Thinking about these major efficiency upgrades, did you live in your home for at least one year before the work on the first efficiency upgrade began?

1. YES
2. NO [SET BAFLAG TO ZERO; GO TO DS10]
- 96 REFUSED [SET BAFLAG TO ZERO; GO TO DS10]
- 97 DON'T KNOW [SET BAFLAG TO ZERO; GO TO DS10]

DS5. [NatGas HHs ONLY] Was work on the last efficiency upgrade completed before February of 2014?

1. YES
2. NO [SET BAFLAG TO ZERO; GO TO DS10]
- 96 REFUSED [SET BAFLAG TO ZERO; GO TO DS10]
- 97 DON'T KNOW [SET BAFLAG TO ZERO; GO TO DS10]

DS6. [NatGas HHs] Do you heat your home with natural gas? **[IF NECESSARY, CLARIFY THAT WE ARE ASKING ABOUT NATURAL GAS, NOT PROPANE.** “Natural gas is provided by the gas utility and you receive monthly bills. Propane is delivered by a fuel dealer on a set schedule or on request.”]

1. YES
2. NO [SET BAFLAG TO ZERO; GO TO DS10]
- 96 REFUSED [SET BAFLAG TO ZERO; GO TO DS10]
- 97 DON'T KNOW [SET BAFLAG TO ZERO; GO TO DS10]

DS6. [DelFuels HHs] Do you heat your home with natural gas? **[IF NECESSARY, CLARIFY THAT WE ARE ASKING ABOUT NATURAL GAS, NOT PROPANE.** “Natural gas is provided by the gas utility and you receive monthly bills. Propane is delivered by a fuel dealer on a set schedule or on request.”]

3. YES → **THANK & TERMINATE**
4. NO
- 96 REFUSED
- 97 DON'T KNOW

DS6a. [DelFuels HHs ONLY] [IF DS6 = NO] Which of the following sources do you use for your primary heating?

1. Oil
2. Propane
3. Electricity
4. Wood
5. Other (please specify):

DS7. [Nat Gas HHs ONLY] Did you heat your home with natural gas before you installed the energy efficiency upgrades?

1. YES
2. NO [SET BAFLAG TO ZERO; GO TO DS10]
- 96 REFUSED [SET BAFLAG TO ZERO; GO TO DS10]
- 97 DON'T KNOW [SET BAFLAG TO ZERO; GO TO DS10]

DS8. [Nat Gas HHs ONLY] Did you receive rebates or obtain a loan for these energy efficiency upgrades through NYSERDA's Home Performance with Energy Star program?

1. YES [SET BAFLAG TO ZERO; THANK AND TERMINATE]
2. NO

- 96 REFUSED
- 97 DON'T KNOW

[IF BILLING ANALYSIS BAFLAG=1, THEN ASK DS9; OTW, GO TO DS10.]

DS9. Congratulations. You have qualified to participate in our study. We have some additional questions that may take up to 15 minutes, depending on your answers. We will also need written permission to request usage history from your natural gas and electric utilities. Are you willing to participate by signing and returning the permission form?

[IF NEEDED: Your usage information will be kept confidential. It will be used only to estimate the savings from Home Performance efficiency upgrades. IF MORE IS NEEDED: Only the aggregated results of the analysis will be available to the public.]

- 1. YES [GO TO MEASURES SECTION]
- 2. NO [SET BILLING BAFLAG TO ZERO, GO TO MEASURES SECTION]
- 96 REFUSED [SET BILLING BAFLAG TO ZERO, GO TO MEASURES SECTION]
- 97 DON'T KNOW [SET BILLING BAFLAG TO ZERO, GO TO MEASURES SECTION]

DS10. OK. I have a few additional questions for you. It should not take more than five minutes.

I.7.2 Measures

[IF DS1=YES] I'm going to read you a list of possible energy efficiency upgrades and ask a few questions about each one.

Survey Measures [MEAS]	Description [SMDESC]
SM1. [INSULATION]	SMDESC1. Insulation
SM2. [AIR SEALING]	SMDESC2. air sealing
SM3. [REPLACEMENT WINDOWS OR DOORS]	SMDESC3. high efficiency windows or doors
SM4. [HEATING SYSTEM]	SMDESC4. a high efficiency heating system
SM5. [PROGRAMMABLE THERMOSTAT]	SMDESC5. a programmable thermostat
SM6. [WATER HEATER]	SMDESC6. a high efficiency water heater
SM7. [CFLs OR HIGH EFFICIENCY LIGHTING FIXTURES]	SMDESC7. CFL's or high efficiency lighting fixtures
SM8. [CENTRAL AIR CONDITIONING SYSTEM]	SMDESC8. high efficiency central air conditioning system
SM9. [HOT WATER CONSERVATION MEASURES] (e.g., low flow showerhead, tank wrap, or pipe insulation)	SMDESC9. hot water conservation measures

M1a. Did you install any of the following energy efficiency upgrades after you received the home energy audit? **[IF DS3=NO, START READING AT NUMBER 5. RECORD AS MANY AS APPLY.]**

- 1. Insulation [SM1=1]
- 2. Air sealing to reduce drafts [SM2=1]
- 3. Energy-efficient windows or doors [SM3=1]
- 4. High efficiency heating system or heat pump [SM4=1]
- 5. Programmable thermostat [SM5=1]

- 6. High efficiency water heater [SM6=1]
- 7. Energy-efficient lighting [SM7=1]
- 8. New central air conditioner [SM8=1]
- 9. Hot water conservation measures such as low flow showerheads [SM9=1]
- 96 REFUSED
- 97 DON'T KNOW

[LOOP FOR EACH MEASURES IDENTIFIED IN M1a. X=1 TO 9 FOR SM[X]=1.]

M1b. Was SMDESC[X] recommended by the Home Performance with ENERGY STAR auditor?

- 1. YES
- 2. NO
- 96 REFUSED
- 97 DON'T KNOW

M1c. Were you planning to install this high efficiency upgrade before receiving the audit?

- 1. YES
- 2. NO
- 96 REFUSED
- 97 DON'T KNOW

[END LOOP]

M2a. [IF BAFLAG=1] Thinking about all of the efficiency upgrades you did, when did the work on the first efficiency project begin?

RECORD YEAR: _____

RECORD MONTH OR SEASON: _____ **[PROMPT FOR SEASON IF RESPONDENT DOESN'T REMEMBER THE MONTH; RESPONSE IS NEEDED FOR THE BILLING ANALYSIS, BUT IT DOESN'T HAVE TO BE 100% ACCURATE – ROUGHLY ACCURATE IS SUFFICIENT. TRY TO PROMPT THEM IF THE INSTALLATION WAS DONE EARLY OR LATE IN THE YEAR AND WORK FROM THERE. IF THEY CAN'T PROVIDE A MONTH OR SEASON AT ALL, WE WILL ASSUME THE INSTALLATION STARTED THE FIRST DAY OF THE YEAR.]**

- 96 REFUSED MONTH/SEASON
- 97 DON'T KNOW MONTH/SEASON

M2b. [IF BAFLAG=1] When was work on the last efficiency upgrade completed?

RECORD YEAR: _____

RECORD MONTH OR SEASON: _____ **RESPONSE IS NEEDED FOR THE BILLING ANALYSIS, BUT IT DOESN'T HAVE TO BE 100% ACCURATE – ROUGHLY ACCURATE IS SUFFICIENT. TRY TO PROMPT THEM IF THE INSTALLATION WAS DONE EARLY OR LATE IN THE YEAR AND WORK FROM THERE. IF THEY CAN'T PROVIDE A MONTH OR SEASON AT ALL, WE WILL ASSUME THE INSTALLATION WAS COMPLETED ON THE LAST DAY OF THE YEAR. HOWEVER, THIS COULD BE A PROBLEM IF THE INSTALLATION WAS DONE IN 2014.]**

M3a. Did you receive any rebates, tax credits or other incentives to help pay for any of the efficiency upgrades?

- 1. YES
- 2. NO [GO TO M4]
- 96 REFUSED [GO TO M4]
- 97 DON'T KNOW [GO TO M4]

M3b. **[IF QM3a = 1] Who provided the rebate, tax credit or other incentive? [READ IF NECESSARY; MULTIPLE RESPONSES ALLOWED]**

- 1. NYSERDA
- 2. UTILITY COMPANY
- 3. STATE GOVERNMENT
- 4. FEDERAL GOVERNMENT
- 5. OTHER (SPECIFY): _____
- 96 REFUSED
- 97 DON'T KNOW

M4. Did you install any other energy efficiency upgrades recommended in the home audit?

- 1. YES (SPECIFY) _____
- 2. NO
- 96 REFUSED
- 97 DON'T KNOW

I.7.3 No Installations

NA1. **[IF NO MEASURES SM1 THROUGH SM4 INSTALLED, SET BAFLAG TO ZERO] [ASK IF (SM1 THROUGH SM9=0 AND M4=NO, DK OR Ref) OR DS1=NO] Why did you decide not to install the recommended upgrades? Was it because ... [READ OPTIONS, SELECT ALL THAT APPLY, RANDOMIZE OPTIONS 1 THROUGH 7]**

- 1. The recommended upgrades were too expensive
- 2. You were waiting for existing equipment to need replacement
- 3. The energy savings were not worth the cost
- 4. You were concerned about the comfort of your home
- 5. You are planning to install them, just haven't gotten to it
- 6. You had other priorities for home improvement dollars
- 7. You wanted to do the work yourself
- 8. SOMETHING ELSE [SPECIFY]: _____
- 96 REFUSED [GO TO DEMOGRAPHICS]
- 97 DON'T KNOW [GO TO DEMOGRAPHICS]

[IF NA1 IS ASKED, GO TO DEMOGRAPHICS.]

I.7.4 Customer Awareness and Experience

Q1. How did you hear about the opportunity to receive an audit through NYSERDA? [DO NOT READ; PROBE TO CODE; MULTIPLE RESPONSES ALLOWED. 97 = NA; 98=DK]

- 1. The NYSERDA website
- 2. Through a constituency based organization or a non-profit group
- 3. From family member /friend/ or coworker
- 4. Through a contractor
- 5. Something in the mail
- 6. Newspaper ad or article
- 7. Radio
- 8. Information provided in a utility bill

- 9. A home show or trade show
- 10. Some other way? _____

Q2. How did you find the auditor who performed your energy audit? [DO NOT READ, PROBE TO CODE]

- 1. I was contacted directly (by firm or auditor)
- 2. NYSERDA website
- 3. Yellow pages/online search
- 4. Referral from friend/family/other
- 5. Contacted a contractor I knew of
- 6. Community-based organization or a non-profit group
- 7. A home show or trade show
- 8. Other:_____
- 98. Don't know
- 99. Refused

Q3. Did you have any trouble finding someone to do your energy audit?

- 1. Yes, [IF YES] What difficulty did you have? _____
- 2. No
- 98. Don't know

[READ] Thinking about your audit, please rate the following statements using a five-point scale where 1 means you 'do not at all agree' and 5 means you 'completely agree.' First, to what extent do you agree that...(CODE 1-5 ADDING 97= NOT APPLICABLE AND 98 =DK)

- Q4. It was simple to schedule my home energy audit
- Q5. The time required to complete the application was reasonable
- Q6. I was able to schedule an audit within two weeks of requesting one
- Q7. My auditor did a thorough review of my home
- Q8. The time required to do my audit was reasonable
- Q9. The audit process met my expectations

[ITERATE UP TO 6 QUESTION AS NEEDED FOLLOW-UP Q FOR EACH STATEMENT WITH A RATING <3]

- Q10. [IF Q4 RATING <3] You didn't agree with the statement [pipe in Q4 Statement] Please tell me about any issues you had.
- Q11. [IF Q5 RATING <3] You didn't agree with the statement [pipe in Q5 Statement] Please tell me about any issues you had.
- Q12. [IF Q6 RATING <3] You didn't agree with the statement [pipe in Q6 Statement] Please tell me about any issues you had.
- Q13. [IF Q7 RATING <3] You didn't agree with the statement [pipe in Q7 Statement] Please tell me about any issues you had.
- Q14. [IF Q8 RATING <3] You didn't agree with the statement [pipe in Q8 Statement] Please tell me about any issues you had.
- Q15. [IF Q9 RATING <3] You didn't agree with the statement [pipe in Q9 Statement] Please tell me about any issues you had.

Q16. Did the energy audit you received include... [READ LIST. CODE 1=YES; 2=NO; 98 DON'T KNOW, 99 = REFUSED]

1. In-person inspection of your home
2. Blower door test with a large fan to measure air leakage
3. Tests to measure leaks in heating and air conditioning ducts, sometimes known as “Duct Blaster”
4. Testing of the combustion efficiency of your furnace or boiler
5. Projected energy savings from possible upgrades
6. Anything else? _____

Q17. Did your auditor... [Yes=1, No=2, 98=DON'T KNOW]

1. Suggest home improvements to you while they were doing the audit?
2. Give you a written report with recommended upgrades?
3. Provide audit results in any other way? [IF YES] How? [SPECIFY]

Q18. Did anyone go over the energy audit results with you, including recommended retrofits and their estimated savings? [With you or others in your household?]

1. Yes
2. No
98. Don't know
99. Refused

Thinking about the audit's recommendations, please rate the following statements using a five-point scale where 1 means 'do not agree' and 5 means 'completely agree.' First, to what extent do you agree that...[CODE 1-5 AND 97= NA 98 =DK]

Q19. I/we understood the audit results

Q20. I/we learned valuable things about my/our home from the audit

Q21. The recommended work seemed appropriate

Q22. Given what you learned from the audit, how much might you pay for a similar service in the future?

1. Nothing
2. Record verbatim: _____

[Do not read:]

98. Don't know
99. Refused

Q23. Did your auditor or contractor tell you about NYSERDA's Home Performance with Energy Star program? [If needed: a program that provides incentives or financing to help New York homeowners complete energy upgrades in their homes.]

1. Yes
2. No
98. Don't know

Q24. Does your local electric or gas utility provide incentives or rebates to offset the cost of purchasing energy efficient equipment?

1. Yes
2. No
98. Don't know

Q25. Using a 1-to-5 scale, where 1 = not at all important and 5=very important, how important was it to you that your audit help you identify ways to...[...][RANDOMIZE]

[MATRIX QUESTION: SCALE]

[LOGIC] Item	1	2	3	4	5	97 NA	98 DK	99 RF
Improve the comfort of your home								
Protect the value of your home								
Increase the value of your home								
Make your home more sustainable								
Help the environment								
Improve the indoor air quality of your home								
Reduced your home's energy use								
Replace broken or failing equipment								

Q26. Which reason was most important? [CHOOSE ONE]

1. Improving comfort
2. Protecting the value of my home
3. Increase the value of my home
4. Make my home more sustainable
5. Helping the environment
6. Improving the indoor air quality in my home
7. Reducing my household energy use
8. Replace broken or failing equipment

I.7.4.1 CBO Awareness

Q27. In some regions of the state, community-based organizations, or CBOs for short, help homeowners wanting to complete energy efficiency upgrades in their homes. Before today, had you heard of this option?

1. Yes
2. No
98. Don't know

[ASK IF Q70 = Yes]

Q28. Did you receive any assistance from a CBO during the process of receiving your audit?

1. Yes
2. No
98. Don't know

Q29. CBOs provide a variety of services at no cost to the homeowner. Based on your experience, using a one-to-five scale, where 1= not at all valuable and 5= extremely valuable, how valuable would be to you to have someone to help you]...[RANDOMIZE]

[LOGIC] Item	1 Not at all valuable	2	3	4	5 Extremely valuable	98 DK
Understand the NYSERDA Home Performance program						
Choose a contractor						
Complete audit application paperwork						
Review bids and design your project						
Schedule audit and installation work with your contractor						
Find information about grants, incentives or financing for energy efficiency upgrades						
Apply for project financing						

[IF YES TO DS1]

Since receiving your audit...

Q30. Since receiving your audit, have you installed...? [RANDOMIZE; READ NUMBERED ITEMS; MULTIPLE RESPONSES ALLOWED.]

1. Insulation
2. Air sealing to reduce drafts
3. Energy-efficient windows or doors
4. High efficiency heating system or heat pump
5. Programmable thermostat
6. High efficiency water heater
7. Energy-efficient lighting
8. New central air conditioner
9. Hot water conservation measures such as low flow showerheads
10. Something else mentioned: _____
98. Don't know

Q31. And, what, if any, of the recommended energy efficiency measures did you not install? [DO NOT READ unless respondent requests]

1. None, we installed all upgrades recommended in audit
2. Insulation
3. Air sealing to reduce drafts
4. Energy-efficient windows or doors
5. High efficiency heating system or heat pump
6. Programmable thermostat
7. High efficiency water heater
8. Energy-efficient lighting
9. New central air conditioner
10. Hot water conservation measures such as low flow showerheads
11. Something else mentioned: _____
98. Don't know

Q32. What, if any, additional energy upgrades do you plan to install in the next two years?

[MULTIPLE RESPONSE; DO NOT READ UNLESS RESPONDENT REQUESTS; IF IT WOULD HELP SURVEY TEAM, CAN CONSIDER PROGRAMMING OPTIONS THAT WOULD REMOVE MEASURES ALREADY REPORTED AS INSTALLED]

1. None
2. Insulation
3. Air sealing to reduce drafts
4. Energy-efficient windows or doors

5. High efficiency heating system or heat pump
6. Programmable thermostat
7. High efficiency water heater
8. Energy-efficient lighting
9. New central air conditioner
10. Hot water conservation measures such as low flow showerheads
11. Something else mentioned: _____
98. Don't know

Q33. [If Q31 Does Not Equal 0] What stopped you from installing all of the measures recommended by your audit? What it because [READ OPTIONS, RANDOMIZE OPTIONS, ALLOW MULTIPLE]

[MULTIPLE RESPONSE]

1. *The recommended upgrades were too expensive*
2. *You were waiting for existing equipment to need replacement*
3. *The energy savings were not worth the cost*
4. *You were concerned about the comfort of your home*
5. *You are planning to install them, just haven't gotten to it*
6. *Other priorities for home improvement dollars*
7. *You wanted to do the work yourself*

[Do not read:]

96. *Other, please specify: [OPEN-ENDED RESPONSE]*
98. *Don't know*
99. *Refused*

[If DS1 = Yes]

Q34. How did you pay for your project? [DO NOT READ; select multiple]

1. Cash
2. Credit card
3. HELOC (Home Equity Line of Credit)
4. Bank loan
5. Loan through NYSERDA
6. Contractor financing
7. Utility incentive
8. Other
98. Don't know
99. Prefer not to say

Q35. Did you know that financing was available through the Home Performance program?

[SINGLE RESPONSE]

1. Yes
2. No

[Do not read:]

98. Don't know
99. Refused

[ASK ALL]

Q36. Why did you decide not to participate in NYSERDA's Home Performance with Energy Star program?

1. [OPEN-ENDED Response]

I.7.5 Motivations/Benefits/Intention

- Q37. In the past two years, have you completed **any** project in your home costing more than \$3,000?
1. Yes
 2. No
 98. Don't know
 99. Refused
- Q38. What was the main purpose for this project? [DO NOT READ; SINGLE RESPONSE FROM LIST BELOW]
- Q39. What were some of the other purposes of the project? [DO NOT READ; ALLOW MULTIPLE RESPONSES]
1. Replace old or failing equipment
 2. Modernize kitchen and/or bath
 3. Add or reconfigure living space
 4. Reduce household energy use or costs
 5. Repair or replace exterior of the house
 6. Repair or replace interior elements of the house
 7. Repair due to damage, natural disaster,
 8. Improve comfort [e.g. stop drafts; keep cooler in the summer or warmer in the winter]
 9. Access funding to help offset the cost of the project
 10. Improve indoor air quality
 11. Protect the value of my home
 12. Some other reason? _____
 98. Don't know

I.7.6 Contractor Selection Considerations

[IF DS1 = NO]

- Q40. If you were to decide to use a program like NYSEERDA's to help you complete additional energy upgrades in your home, how valuable would it be for you to have... [Please use a 1-to-5 scale where 1="not at all valuable" and 5 = "very valuable."]
1. Access to an information hotline
 2. Online applications for incentives
 3. Online tools for estimating costs and identifying financing options
 4. Assistance obtaining multiple bids for your project
 5. Help understanding the bids you've received
 6. A list of program-approved contractors operating in your area
- Q41. How do you typically find a contractor when you need one? [DO NOT READ, PROBE TO CODE; ALLOW MULTIPLE RESPONSES]
1. Yellow Pages (including Internet Yellow Pages)
 2. Online search
 3. Referral from friend/family/other
 4. Choose someone I know
 5. Yelp/Angie's List or other rating site
 6. Other: _____
 7. Don't know
 8. Refused

- Q42. When you need to hire a contractor, how many bids do you typically get?
1. One
 2. Two or Three
 3. More than three
 4. Other:_____
 98. Not applicable
 98. Don't know
- Q43. When you need to hire a contractor, do you sometimes, always, or never consider... [READ ALL; 1 Never 2 Sometimes 3 Always]
1. Certifications of training or service quality
 2. Cost estimates
 3. Referrals from friends/colleagues
 4. Listings on NYSERDA or utility websites
 5. Ratings on Angie's List, Facebook or other Internet referral sources
 6. Better Business Bureau accreditation
 7. Whether or not the firm is a locally operated business
 8. Other:_____
 98. Not applicable
 98. Don't know
- Q44. Have you heard of the following certifications... [READ ALL. ALLOW 98 =DK]
1. The Building Performance Institute [Y/N]
 2. ENERGY STAR [Y/N]
 3. RESNET [Y/N]
 4. NATE (North American Technician Excellence) Certification [Y/N]
 5. NY DCA (Department of Consumer Affairs' Home Improvement Contractor License) [Y/N]
 6. Is there another certification you look for? _____
- Q45. Before today, were you aware that contracting firms that work with NYSERDA's Home Performance program must be accredited by the Building Performance Institute?
1. Yes
 2. No
 98. Don't know
- Q46. Using a scale of 1-to-5, where one means "not at all important," and five means "very important," how important is it to you to have a contractor able to assess your home's overall performance?
1. Response:_____
 98. Don't know
- Q47. How important is it to you to have a contractor able to use diagnostic equipment and software to estimate energy savings potential? [If needed: Please use the same 1-to-5 scale, where one means "not at all important," and five means "very important."]
1. Response:_____
 98. Don't know
- [IF DS1 = YES]**
- Q48. If you were to decide to use a program like NYSERDA's to help you complete additional energy upgrades in your home, how valuable would it be for you to have... [Please use a 1-to-5 scale where 1="not at all valuable" and 5 = "very valuable."]
1. Access to an information hotline
 2. Online applications for incentives

3. Online tools for estimating costs and identifying financing options
4. Assistance obtaining multiple bids for your project
5. Help understanding the bids you've received
6. A list of program-approved contractors operating in your area

Q49. Did you use a contractor to complete the [Upgrade reported in Q31] project you described?

1. Yes
2. No
98. Don't know

Q50. [If yes to Q49] How did you find your contractor? [DO NOT READ, PROBE TO CODE; ALLOW MULTIPLE RESPONSES]

1. Used same firm that did the audit
2. Yellow Pages (including Internet Yellow Pages)
3. Online search
4. Referral from friend/family/other
5. Choose someone I know
6. Yelp/Angie's List or other rating site
7. Other: _____
8. Don't know
9. Refused

Q51. [If yes to Q49] Did you get multiple bids? If yes: how many?

1. One
2. Two or Three
3. More than three
4. Other: _____
98. Don't know

Q52. [If yes to Q49] When you chose your contractor did you consider...

1. Certifications of training or service quality
2. Cost estimates
3. Referrals from friends/colleagues
4. Listings on NYSERDA or utility websites
5. Ratings on Angie's List, Facebook or other Internet referral sources
6. Better Business Bureau accreditation
7. Whether or not the firm is a locally operated business
8. Other: _____
98. Don't know

Q53. [IF YES to Q49] Think of the work done by the contractor who installed those measures, on a scale of one to five with '1' being very dissatisfied, '2' being somewhat dissatisfied, '3' being neither satisfied nor dissatisfied, '4' being somewhat satisfied, and '5' being very satisfied, please indicate your level of satisfaction with the quality of the contractor's work.

1. Very dissatisfied
2. Somewhat dissatisfied
3. Neither satisfied nor dissatisfied
4. Somewhat satisfied
5. Very satisfied
97. N/A
98. Don't know
99. Refused

- Q54. [IF Q55<3] You reported some dissatisfaction with the quality of your contractor's work. Please explain why you gave that rating?
- Q55. [If no to Q49] How do you typically find a contractor when you need one? [DO NOT READ, PROBE TO CODE; ALLOW MULTIPLE RESPONSES]
1. Yellow Pages (including Internet Yellow Pages)
 2. Online search
 3. Referral from friend/family/other
 4. Choose someone I know
 5. Yelp/Angie's List or other rating site
 6. Other: _____
 98. Don't know
 99. Refused
- Q56. [If no to Q49] When you need to hire a contractor, how many bids do you typically get?
1. One
 2. Two or Three
 3. More than three
 4. Other: _____
 98. Don't know
- Q57. [If no to Q49] When you need to hire a contractor, do you sometimes, always, or never consider... [READ ALL; 1 Never 2 Sometimes 3 Always]
1. Certifications of training or service quality
 2. Cost estimates
 3. Referrals from friends/colleagues
 4. Listings on NYSERDA or utility websites
 5. Ratings on Angie's List, Facebook or other Internet referral sources
 6. Better Business Bureau accreditation
 7. Whether or not the firm is a locally operated business
 8. Other: _____
 98. Don't know
- Q58. Have you heard of the following certifications... [READ ALL. ALLOW 98 =DK]
1. The Building Performance Institute [Y/N] [if Yes and IF Q49 = YES: Did you use a BPI affiliated firm to do [pipe in Q31 Responses]]
 2. ENERGY STAR [Y/N]
 3. Resnet [Y/N]
 4. NATE (North American Technician Excellence) Certification [Y/N]
 5. NY DCA (Department of Consumer Affairs' Home Improvement Contractor License) [Y/N]
 6. Is there another certification you look for? _____
- Q59. Before today, were you aware that contracting firms that work with NYSERDA's Home Performance program must be accredited by the Building Performance Institute?
1. Yes
 2. No
 98. Don't know
- Q60. Using a scale of 1-to-5, where one means "not at all important," and five means "very important," how important is it to you to have a contractor able to assess your home's overall performance?
1. Response: _____
 98. Don't know

Q61. How important is it to you to have a contractor able to use diagnostic equipment and software to estimate energy savings potential? [If needed: Please use the same 1-to-5 scale, where one means “not at all important,” and five means “very important.”]

- 1. Response:___
- 98. Don't know

I.7.7 Contractor Information

[IF NO MEASURES SM1 THROUGH SM4 INSTALLED, SET BAFLAG TO ZERO. ONLY ASK THE CONTRACTOR SERIES FOR MEASURES SM1 THROUGH SM4. IF ONLY MEASURES > SM4 WERE INSTALLED, GO TO THE EARLY REPLACEMENT SECTION.]

CON1. Did you hire one or more contractors to perform the work?

- 1. YES
- 2. NO [IF BAFLAG=1, GO TO MD1; IF BAFLAG=0, GO TO DEMOGRAPHICS]
- 96 REFUSED [IF BAFLAG=1, GO TO MD1; IF BAFLAG=0, GO TO DEMOGRAPHICS]
- 97 DON'T KNOW [IF BAFLAG=1, GO TO MD1; IF BAFLAG=0, GO TO DEMOGRAPHICS]

CON2. Do you recall the name of the company that did all or most of the work?

- ENTER NAME: _____
- 96 REFUSED
- 97 DON'T KNOW

CON3. Did you hire a second contractor?

- 1. YES
- 2. NO [GO TO CON6]
- 96 REFUSED [GO TO CON6]
- 97 DON'T KNOW [GO TO CON6]

CON4. Do you recall the name of the second company?

- ENTER NAME: _____
- 96 REFUSED
- 97 DON'T KNOW

CON5. Which efficiency upgrades did the second contractor install?

- ENTER RESPONSE: _____
- 96 REFUSED
- 97 DON'T KNOW

CON6. Have you heard of Building Performance Institute?

- 1. YES
- 2. NO [IF BAFLAG=1, GO TO MD1; IF BAFLAG=0, GO TO DEMOGRAPHICS]
- 96 REFUSED [IF BAFLAG=1, GO TO MD1; IF BAFLAG=0, GO TO DEMOGRAPHICS]

97 DON'T KNOW [IF BAFLAG=1, GO TO MD1; IF BAFLAG=0, GO TO DEMOGRAPHICS]

CON7. In selecting the contractor, did you look for a BPI contractor?

1. YES
2. NO
- 96 REFUSED
- 97 DON'T KNOW

CON8. Did you use a BPI contractor for this work?

1. YES
2. NO
- 96 REFUSED
- 97 DON'T KNOW

I.7.8 CBO Sample

(Previously approved CBO questions for audit only sample. Asked only of those with CBO flag on record.

68 Completes. Independent Sample, asked a limited set of embedded process questions to facilitate comparison.)

Q62. Our program records indicate that you had contact with [CBO], a constituency-based organization (or CBO) while completing your energy audit. Is that correct?

1. Yes
2. No, had contact with a different organization: _____
3. No, did not have contact with a CBO
98. Don't know

[IF Q62 = 3, No CBO contact]

Q63. Just to confirm, you do not recall talking with anyone from a CBO about NYSERDA's Home Performance program?

1. Correct, I do not recall talking to a CBO
2. Not correct, I did talk with a CBO
98. Don't know

[IF Q63= 1, skip to end of block]

Q64. How did you learn about the Home Performance services this CBO offers? [OPEN-ENDED RESPONSE]

1. [RESPONSE]
98. Don't know

Q65. Were you familiar with this organization before this energy audit?

1. Yes
2. No
98. Don't know

Q66. How did you hear about the opportunity to receive an audit through NYSERDA? [DO NOT READ; PROBE TO CODE; MULTIPLE RESPONSES ALLOWED. 97 = NA; 98=DK]

1. The NYSERDA website
2. Through a constituency based organization or a non-profit group
3. From family member /friend/ or coworker

- 4. Through a contractor
- 5. Something in the mail
- 6. Newspaper ad or article
- 7. Radio
- 8. Information provided in a utility bill
- 9. A home show or trade show
- 10. Some other way? _____

Q67. Had you considered receiving an audit through NYSERDA’s Home Performance program before hearing about it from the CBO?

- 1. Yes
- 2. No
- 98. Don’t know

[READ] Thinking about your energy audit, please rate the following statements using a five-point scale where 1 means you ‘do not at all agree’ and 5 means you ‘completely agree.’ To what extent do you agree that...(CODE 1-5 ADDING 97= NOT APPLICABLE AND 98 =DK)

- Q68. It was simple to schedule my home energy audit
- Q69. The time required to complete the application was reasonable
- Q70. The audit process met my expectations
- Q71. I/we understood the audit results
- Q72. I/we learned valuable things about my/our home from the audit
- Q73. The recommended work seemed appropriate
- Q74. I’m going to read several types of support you may have received from [CBO name] in completing your Home Performance audit. For each, rate the value of this support from 1, not at all valuable to 5, extremely valuable, or let me know if you didn’t receive that support.

[LOGIC] Item	1 Not at all valuable	2	3	4	5 Extremely valuable	97 Didn’t receive	98 DK
Help you understand the NYSERDA Home Performance program							
Help you choose the right NYSERDA program for your income							
Help you choose a contractor							
Help you complete audit paperwork							
Help you schedule with your contractor							
Give you information about grants, incentives, or financing for energy efficiency upgrades							
Help you apply for project financing							
Anything else this CBO helped you with? [SPECIFY:]							

[If Q74 6 (information about grants) or 7 (apply for financing) option 97 is NOT selected]

Q75. There are a variety of funding sources available to eligible New York households to help them install energy efficient measures. Did [CBO name] mention the possibility that you might be eligible for... [READ; SELECT MULTIPLE]

- 1. NYSERDA 10% cash-back incentives
- 2. NYSERDA 50% Assisted Home Performance grant

- 3. NYSERDA Smart Energy Loan
- 4. NYSERDA On-Bill Recovery Loan
- 5. Super storm Sandy Relief funding
- 6. A matching grant
- 7. A utility rebate
- 8. Anything else? [SPECIFY:]
- 97. [EXCLUSIVE] None of the above
- 98. [DO NOT READ] Don't recall

[If Q74 6 (information about grants) or 7 (apply for financing) option 97 is NOT selected]

Q76. Did you discuss financing with [CBO name] before or after you received your audit? [DO NOT READ; SELECT ONE]

- 1. Before
- 2. After
- 96. Some other time

Q77. In total, about how many times would you say you communicated with the CBO during the course of your audit?

- 1. [NUMERIC RESPONSE]
- 98. Don't know

Q78. After completing your audit, did this organization contact you about moving forward to complete a retrofit?

- 1. Yes
- 2. No
- 98. Don't know

Q79. Since receiving your audit, have you installed...? [RANDOMIZE; READ NUMBERED ITEMS; MULTIPLE RESPONSES ALLOWED.]

- 1. Insulation
- 2. Air sealing to reduce drafts
- 3. Energy-efficient windows or doors
- 4. High efficiency heating system or heat pump
- 5. Programmable thermostat
- 6. High efficiency water heater
- 7. Energy-efficient lighting
- 8. New central air conditioner
- 9. Hot water conservation measures such as low flow showerheads
- 10. Something else mentioned: _____
- 98. Don't know

Q80. And, what, if any, of the recommended energy efficiency measures did you not install?

- 1. Insulation
- 2. Air sealing to reduce drafts
- 3. Energy-efficient windows or doors
- 4. High efficiency heating system or heat pump
- 5. Programmable thermostat
- 6. High efficiency water heater
- 7. Energy-efficient lighting
- 8. New central air conditioner
- 9. Hot water conservation measures such as low flow showerheads
- 10. Something else mentioned: _____

98. Don't know

Q81. What, if any, additional energy upgrades do you plan to install in the next two years?

[MULTIPLE RESPONSE; DO NOT READ UNLESS RESPONDENT REQUESTS; CONSIDER PROGRAMMING OPTIONS THAT WOULD REMOVE MEASURES ALREADY REPORTED AS INSTALLED]

1. None
 2. Insulation
 3. Air sealing to reduce drafts
 4. Energy-efficient windows or doors
 5. High efficiency heating system or heat pump
 6. Programmable thermostat
 7. High efficiency water heater
 8. Energy-efficient lighting
 9. New central air conditioner
 10. Hot water conservation measures such as low flow showerheads
 11. Something else mentioned: _____
98. Don't know

Q82. [If 0 Does Not Equal 0] What stopped you from installing all of the measures recommended by your audit? What it because [READ OPTIONS, RANDOMIZE OPTIONS, ALLOW MULTIPLE]

[MULTIPLE RESPONSE]

1. *The recommended upgrades were too expensive*
2. *You were waiting for existing equipment to need replacement*
3. *The energy savings were not worth the cost*
4. *You were concerned about the comfort of your home*
5. *You are planning to install them, just haven't gotten to it*
6. *Other priorities for home improvement dollars*
7. *You wanted to do the work yourself*

[Do not read:]

96. *Other, please specify: [OPEN-ENDED RESPONSE]*
98. *Don't know*
99. *Refused*

Q83. In the past two years, have you completed **any** project in your home costing more than \$3,000?

1. Yes
2. No
98. *Don't know*
99. *Refused*

Q84. What was the main purpose for this project? [SINGLE RESPONSE FROM LIST BELOW]

Q85. What were some of the other purposes of the project? [ALLOW MULTIPLE RESPONSES]

1. Replace old or failing equipment
2. Modernize kitchen and/or bath
3. Add or reconfigure living space
4. Reduce household energy use or costs
5. Repair or replace exterior of the house
6. Repair or replace interior elements of the house
7. Repair due to damage, natural disaster, vector infiltration
8. Improve comfort [e.g. stop drafts; keep cooler in the summer or warmer in the winter]
9. Accessing incentives to help offset the cost of the project

10. Help the environment
11. Improve indoor air quality
12. Protect the value of my home
13. Increase the value of my home
14. Some other reason? _____
98. *Don't know*

[IF DS1 = Yes]

Q86. How did you pay for your project? [DO NOT READ; select multiple]

1. Cash
2. Credit card
3. HELOC (Home Equity Line of Credit)
4. Bank loan
5. Contractor financing
6. Utility incentive
96. Other:
98. *Don't know*
99. Prefer not to say

Q87. Did you know that financing was available through the Home Performance program?

[SINGLE RESPONSE]

1. Yes
2. No

[Do not read:]

98. *Don't know*
99. Refused

[ASK ALL]

Q88. Why did you decide not to participate in NYSEERDA's Home Performance with Energy Star program?

1. [OPEN-ENDED Response]

[ASK IF DS1 = Yes, installed some upgrades]

Q89. If you had not had any contact with the CBO, would you have... [READ, SELECT ONE]

1. Not completed any upgrades
2. Postponed your upgrades for more than a year
3. Completed a smaller number of upgrades
4. Completed the same upgrades
5. Or, done something else? [SPECIFY:]
98. *Don't know*

Q90. Using a 1-to-5 scale, where 1 = not at all important and 5=very important, how important was it to you that your audit help you identify ways to...[RANDOMIZE]

[MATRIX QUESTION: SCALE]

[LOGIC] Item	1	2	3	4	5	97 NA	98 DK	99 RF
Improve the comfort of your home								
Protect the value of your home								
Increase the value of your home								
Make your home more sustainable								
Help the environment								
Improve the indoor air quality of your home								
Reduced your home's energy use								
Replace broken or failing equipment								

Q91. Which reason was most important? [CHOOSE ONE]

1. Improving comfort
2. Protecting the value of my home
3. Increase the value of my home
4. Make my home more sustainable
5. Helping the environment
6. Improving the indoor air quality in my home
7. Reducing my household energy use
8. Replace broken or failing equipment

Q92. Do you have any suggestions for how these CBOs could better help homeowners like yourself complete retrofits through NYSERDA's Home Performance program?

1. [Response]
98. *Don't know*

I.7.9 Demographics

Finally, I have a few general questions for statistical purposes. This information will be combined across all participants and will not be shared with anyone outside of the evaluation team in any way that identifies you or your household.

D1. What is your age? Is it...

1. 18 TO 24
2. 25 TO 34
3. 35 TO 44
4. 45 TO 54
5. 55 TO 64
6. 65 OR OVER
- 96 REFUSED

D2. Counting yourself, how many people normally live in this household on a full time basis? Please include everyone who lives in your home whether or not they are related to you and exclude anyone who is just visiting or children who may be away at college or in the military.

RECORD NUMBER: _____ Range 1 to 10, where 10 = 10 or more

- 96 REFUSED

D3. Please stop me when I read the range that contains the total combined income of all members of your household over the past 12 months. **[READ LIST, RECORD ONE]**

1. Less than \$25,000
2. \$25,000 to less than \$50,000
3. \$50,000 to less than \$75,000
4. \$75,000 to less than \$100,000
5. \$100,000 to less than \$150,000
6. \$150,000 to less than \$200,000
7. \$200,000 or more
- 96 REFUSED
- 97 DON'T KNOW

D4. When was your home built? Please stop me when I get to the right category.

1. 1930's or earlier
2. 1940's or 1950's
3. 1960's or 1970's
4. 1980's or 1990's
5. 2000 or later
- 96 REFUSED
- 97 DON'T KNOW

D5. What is the highest grade of schooling you have completed so far? **[DO NOT READ]**

1. NO HIGH SCHOOL DIPLOMA OR GED
2. HIGH SCHOOL GRADUATE (INCLUDES GED)
3. ASSOCIATES DEGREE
4. BACHELORS DEGREE (4-YEAR DEGREE)
5. GRADUATE OR PROFESSIONAL DEGREE
- 96 REFUSED
- 97 DON'T KNOW

D6. **[DO NOT ASK. RESPONDENT IS]**

1. MALE
2. FEMALE

Appendix J GJGNY CBO Outreach Program PE/MCA: Phase II Evaluation Summary

J.1 Program Summary

The Green Jobs - Green New York (GJGNY) Outreach program, administered by NYSERDA, recruited CBOs to conduct outreach with priority communities to encourage residential, small business/not-for profit, and multifamily energy efficiency projects, as well as workforce development training and accreditation. CBOs allocated a majority of their resources to residential outreach, where they recruited households to participate in NYSERDA's HPwES program.

J.2 Evaluation Objectives and High Level Findings

This second phase of the GJGNY Outreach PE/MCA studied the 2012-2013 program cycle, documenting the experiences of GJGNY audit recipients, HPwES program participants, and installation contractors working with CBOs through the HPwES program. It addressed three evaluation objectives: investigate awareness of and interest in CBO services, document the experience and expectations of homeowners and contractors interacting with the CBO activities, and explore any differences between CBO-affiliated and unaffiliated HPwES participants and projects.

This evaluation found that CBOs are recruiting contacts who had not heard of or considered HPwES before, and who would not have moved forward with the project without CBO support. Homeowners and contractors reported positive experiences with CBOs, and homeowners and contractors not currently affiliated with CBOs were interested in CBO services. Consistent with the program's goals, the participants who CBOs recruited were often members of targeted populations: their homes were somewhat older and respondents had less education, they were more likely to be non-Caucasian, and they had lower incomes than the overall HPwES population. CBO-recruited HPwES projects also included a larger proportion of assisted projects and GJGNY-financed projects than HPwES projects overall.

J.2.1 Awareness of and Interest in CBO Services

- **Participants, particularly audit-only participants, had mixed awareness of their work with CBOs.** While a large majority of CBO-affiliated HPwES participants (82%) recalled working with their CBO, just half of CBO-affiliated audit-only participants recalled working with their CBO. Not all CBO engagement begins at the audit phase, however, which may explain this lower awareness among audit-only participants; nearly half of CBO-affiliated contractors reported they had sent previously unaffiliated stalled leads to CBOs to help reengage the customer with the HPwES process.

- **Unaffiliated participants reported some awareness of CBOs, and interest in CBO services.** Although CBO outreach closely targeted specific regions and populations, these statewide samples of CBO-unaffiliated HPwES participants and audit-only participants reported some awareness of the availability of CBO services (24% and 9%, respectively), indicating outreach effects. These respondents reported that CBO services would have been valuable in completing their projects.
- **Most contractors were generally aware of CBOs, but demonstrated confusion between GJGNY Outreach and NYSEDA's low-income program, EmPower New York.** A majority of both CBO-affiliated and unaffiliated contractor respondents (24 of 26 and 20 of 27, respectively) reported awareness of GJGNY Outreach program CBO services, but contractors demonstrated some confusion between the GJGNY Outreach program and the EmPower program: some CBO-affiliated contractors (6 of 26) reported working with CBOs that appeared to be affiliated with EmPower rather than GJGNY Outreach.
- **CBO-unaffiliated contractors were interested in CBO services.** Those contractors with limited or no CBO experience reported that some CBO services could be helpful to their program work, particularly referrals, financing information and application assistance, screening for Assisted Home Performance with ENERGY STAR (AHPwES) program eligibility, and application paperwork assistance.

J.2.1.1 Evidence of CBO Influence

- **CBOs are using community ties and outreach to reach new constituents.** Relatively few CBO-affiliated HPwES participants and audit-only participants reported familiarity with their CBO prior to participating (13% and 35%, respectively). Nevertheless, CBO outreach strategies (especially word of mouth, events, and advertising) are reaching these contacts.

J.2.2 Experience with CBOs

- **CBO support was most valuable to Assisted Home Performance participants.** CBO-affiliated HPwES participants reported receiving support from CBOs throughout the HPwES process, but particularly in the audit phase. Except with regard to understanding and choosing a program and selecting a contractor, significantly more AHPwES participants than market-rate participants rated the CBO support as valuable.
- **Few audit-only participants recalled post-audit contact by their CBO about HPwES.** A majority of audit-only respondents who recalled working with a CBO reported receiving valuable assistance from CBOs throughout the audit process, but just more than one-third (38%) of these respondents recalled being contacted by their CBO about moving forward to complete a retrofit.

- **CBOs had little influence on audit-only participants' subsequent upgrades.** One-third of CBO-aware respondents (32%) reported they had considered an energy audit before hearing about it from their CBO, but CBOs appeared to have less influence on projects completed outside HPwES: 51% of respondents reported they would have completed the same upgrades without the CBO. Consistent with this evidence of lower CBO involvement, 46% of CBO-affiliated audit-only respondents reported awareness of program-sponsored loans, compared with 88% of HPwES participants.
- **CBOs are approaching and working actively with contractors.** Most commonly (11 of 24 respondents), contractors began working with CBOs because the CBO approached them. A majority (17 of 24) of CBO-affiliated contractors had attended an outreach event with a CBO, and CBOs most commonly sent referrals, provided paperwork assistance, screened referrals for EmPower New York (NYSERDA's low-income program) and AHPwES eligibility, and provided financing information or assistance. Fewer contractors reported that CBOs had followed up with stalled leads, provided supplemental funding, or bundled projects.
- **Although most experience was positive, some CBO-affiliated contractors had negative experiences with CBOs.** Although nearly all contractors (21 of 24) reported that CBO involvement has a positive effect on those projects, a notable minority (7 of 24) reported that at times, CBO involvement had a negative effect, such as redundant communication and confusion.

J.2.2.1 Evidence of CBO Influence

- **CBOs had a large influence in motivating HPwES participation.** Most (81%) CBO-affiliated HPwES participants reported having considered home upgrades before participating, but very few (9%) had considered participation in HPwES before hearing from a CBO, and just one-third (36%) had heard of HPwES prior to learning about it from a CBO. Few market rate HPwES participants (24%) and no AHPwES participants reported they would have completed the same project without their CBO.
- **CBOs had multiple benefits for contractors' project work.** A majority of contractors reported that CBOs had increased the volume of HPwES work, increased conversion rate from audit to retrofit, decreased homeowner handholding, and increased financing uptake. Contractors reported CBOs had a smaller effect on administrative costs, project duration, and the number of measures installed.

J.2.3 CBO-affiliated and Unaffiliated Population and Project Differences

- **CBO-affiliated and unaffiliated HPwES participants generally reported similar HPwES program experiences.** CBO-affiliated HPwES participants and unaffiliated participants reported similar motivations for entering the HPwES program, reported similar project scopes, and similar

levels of program satisfaction. CBO-affiliated respondents were more aware of the On-Bill Recovery Financing option than non CBO-affiliated respondents.

- **Overall, both CBO-affiliated and unaffiliated audit-only participants reported similar, relatively high levels of satisfaction with the audit process.**

J.2.3.1 Evidence of CBO Influence

- **CBOs recruited AHPwES participants and promoted GJGNY financing.** Overall, CBO projects included a higher proportion of AHPwES projects than the non-affiliated projects (43% versus 35%), and 12% more CBO projects used GJGNY financing.
- **CBOs recruited participants from underrepresented populations to HPwES.** CBO-affiliated HPwES participants had somewhat different demographic and housing characteristics than unaffiliated participants. CBO-affiliated participants' homes were significantly older, and respondents had less education, were more likely to be non-Caucasian, and had lower incomes than non CBO-affiliated HPwES participant respondents.

J.2.4 Considerations for Changing Program Landscape

The Clean Energy Fund will likely shift NYSERDA priorities toward lower-income populations. There are opportunities for refocusing the GJGNY CBO program on low- to moderate-income populations. Cost remains a large barrier to HPwES and AHPwES participation. Current CBO project recruitment casts a wide net. As expected, although CBOs target priority communities and focus on recruiting AHPwES projects, 56% of CBO projects were market rate projects. On the other hand, the phase 1 research suggested that many CBO constituencies included consumers with incomes that are more in alignment with EmPower than with the AHPwES eligibility threshold. Most effectively using CBO outreach to reach low- and moderate-income households will require coordination and lead-sharing between different low-income programs, as well as between low- and moderate-income programs offered by other administrators. Since this research also found continuing confusion between EmPower and GJGNY Outreach among contractors, it is not clear whether segregation of program offers by income level can be fully effective.

J.3 Evaluation Considerations and program Administrator response

The evaluators conducting this study made the following recommendations. NYSERDA's initial response to these recommendations also is summarized below and will be tracked over time.

- **Recommendation 1:** To increase retrofits, CBO outreach activities should more actively conduct post-audit follow-up in addition to providing support during the audit process. Survey findings suggest that this outreach is not conducted uniformly.

- **Response to Recommendation 1:** [INSERT RESPONSE – i.e., is the recommendation actionable, if so when what changes are under consideration and when might they be made.]
- **Recommendation 2:** Working with CBOs can be valuable to future program administrators seeking to serve hard-to-reach populations. Generating projects requires consistent and repeated messaging to increase awareness and develop community trust and infrastructure. Retrofit volume, a long-term indicator of success, does not fully capture CBO incremental and growing influence on target markets. Define a set of short- and medium-term indicators (such as community events conducted, leads generated, or audits completed) to complement long-term indicators to quantify and contextualize CBO program outcomes.
 - **Response to Recommendation 2:** [INSERT RESPONSE – i.e., is the recommendation actionable, if so when what changes are under consideration and when might they be made.]
- **Recommendation 3:** For future evaluations, consider targeted, real-time evaluation methods. To better understand participant attitudes and recall of such details as the type of financing discussed with CBOs and aggregation pilot experiences, use short, ongoing surveys focused on evaluating specific performance indicators, conducted with a sample of participants.
 - **Response to Recommendation 3:** [INSERT RESPONSE – i.e., is the recommendation actionable, if so when what changes are under consideration and when might they be made.]

J.4 Evaluation Methods and Sampling

To inform this study, the evaluation team completed a program database analysis and surveyed three populations. For each of the three populations, the evaluation team surveyed a sample of individuals who had worked with a CBO (“CBO-affiliated”) and of individuals who had not worked with a CBO (“unaffiliated”) according to the program database (for contractors, CBO-affiliated firms were those that had completed three or more CBO-affiliated projects):

- Audit only participants: those who completed GJGNY audits but not HPwES retrofits (n=75 CBO/ n=202 non-CBO)
- HPwES participants: both Assisted and market rate participants who had completed GJGNY audits and HPwES retrofits (n=68 CBO/ n=570 non-CBO)
- Participating contractors: survey-interviews with HPwES participating contracting firms (n=26 CBO/ n=27 non-CBO)

The evaluation team completed data collection for this GJGNY Outreach PE/MCA as part of the concurrent HPwES PE/MCA. GJGNY Outreach samples, drawn from the population of CBO-affiliated contacts, were defined as sub-samples within the broader HPwES data collection sample frames. The evaluation team analyzed all data using *SPSS* and *Microsoft Excel*. All samples were drawn from the population of HPwES audits and retrofits completed between January 1, 2012 and December 31, 2013.