Home Performance with ENERGY STAR® Logic Model

Final Report

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Introduction

The Purpose of this document is to present the overarching logic model for Home Performance with ENERGY STAR® (HPwES).

Since 1998, New York's System Benefits Charge (SBC) 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 when in 2008, the New York Public Service Commission authorized the Energy Efficiency Portfolio Standard and in 2009, the Commission adopted a natural gas efficiency policy. In October 2011, the Commission issued an order reauthorizing the Energy Efficiency Portfolio Standard (EEPS) program through 2015. In addition to SBC funding, the Regional Greenhouse Gas Initiative (RGGI), begun in 2005, and Green Jobs Green New York (GJGNY) funding, using the New York State's RGGI funds as authorized by the GJGNY Act of 2009, are included in the HPwES program.

This document's organization is as following:

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.

2. **Program Objectives**: Describes, at a high level, the program's ultimate purpose and targets.

3. **Program Resources**: Identifies the funding, workforce, partnership, and other resources the program is providing.

4. **Program Activities**: Describes the program's various research, product development, demonstration and commercialization progress, and support activities.

5. **Program Outputs**: Describes the anticipated immediate results associated with program activities.

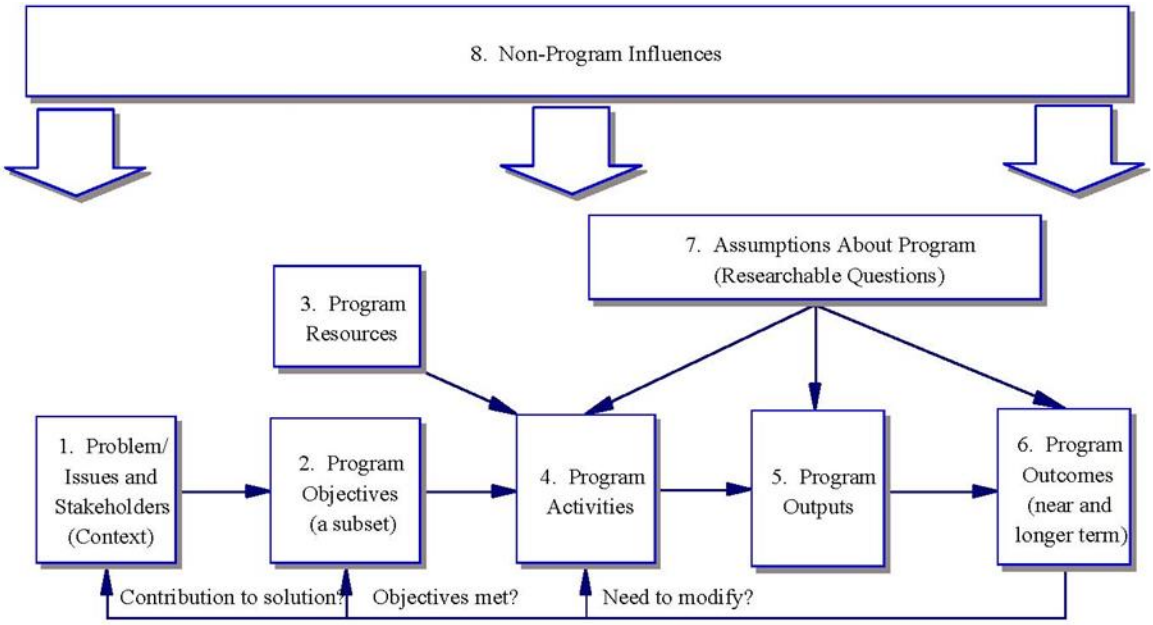
6. **Program Outcomes**: Describes expected achievements in the near, intermediate, and longer term.

7. **Assumptions about Program**: Describes assumptions about how program activities and outputs will lead to the desired near, intermediate, and longer-term outcomes.

8. **External Influences**: Describes factors outside the program that may drive or constrain the achievement of outcomes.

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

Figure I-1: Program Design Template



1 Program Context, Stakeholders, Intent, and Design

This section describes the design of the Home Performance with ENERGY STAR® (HPwES) Program, the goals of the program, and the market barriers the program was designed to address.

1.1 Program Description

New York State Energy Research and Development Authority's (NYSERDA's) HPwES Program is an integral part of NYSERDA's energy efficiency program portfolio and a key component of the residential Energy Efficiency Portfolio Standard (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 Green Jobs – Green New York (GJGNY) funding. HPwES can address homes with delivered fuels (oil, propane) using funds from the Regional Green House Gas Initiative (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.

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 income meets eligibility requirements. Households with income equal to or lower than 80% of state or 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 comprehensive home energy assessment, 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 comprehensive home energy assessment 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.[1] 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.

1.2 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 1-1).[2]

[1] 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.

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

Table 1-1: 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

1.3 Program Stakeholders

The stakeholders in the HPwES Program include a range of organizations, from trade allies and utilities to financial service providers:[3]

- NYSERDA's HPwES Program Implementation, Marketing, Quality Assurance Contractors
- NYSERDA's HPwES Contractors

[3] *Program Implementation Services for Residential Programs Request for Proposal 2470*.

- 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 $mart 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

2 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.

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 assessments and services that focus on increasing the health, safety, durability, comfort, and energy efficiency of existing one-to-four family homes.

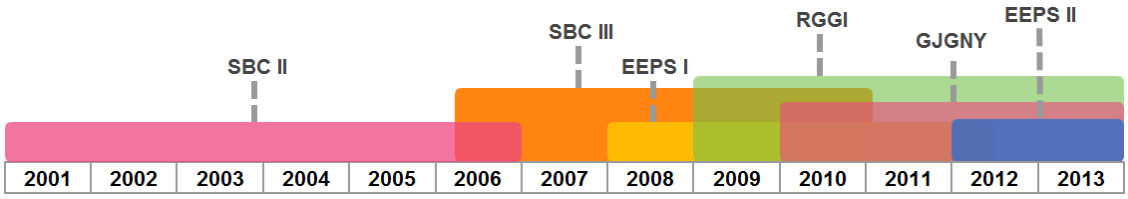
5. Lessen the burden imposed by energy consumption and other utility-related costs with a significant emphasis on providing this benefit for low- to moderate-income residents.

6. Create sustainable energy savings and environmental benefits.

2.1 Program Timeline and Status

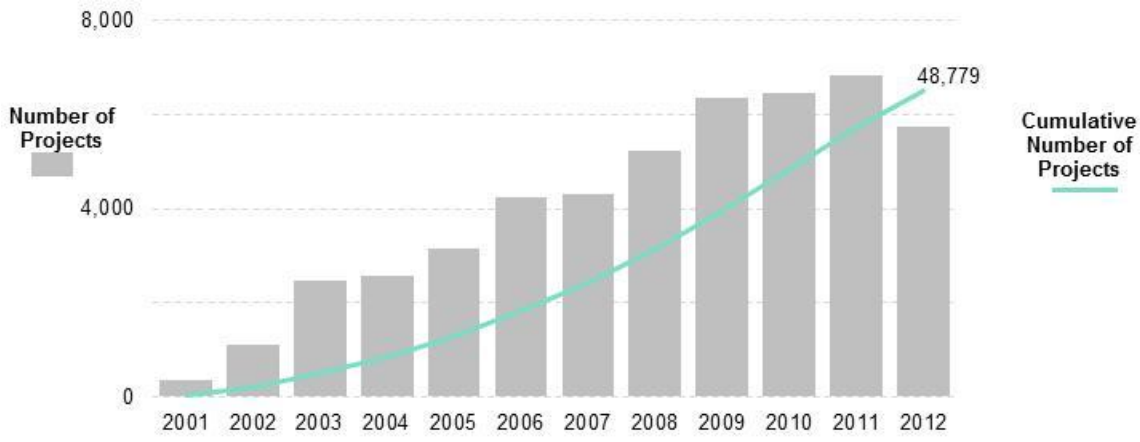
The following timeline displays primary funding sources over the 12 years that the HPwES program has operated (Figure 2-1). SBC II and III funding supported HPwES and AHPwES from program inception in 2001 through 2012. EEPS I and EEPS II funding has also funded the program since 2010. EEPS II is scheduled 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 assessments to homeowners in New York and financing to HPwES and AHPwES projects.

Figure 2-1: HPwES Timeline with Funding Sources[4]



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 2-2).

Figure 2-2: Number of Projects by Year



[4] 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.

3 Resources

The ability of the HPwES Program to accomplish the outputs and outcomes likely to result in the program reaching its ultimate goals is dependent on the level, quality, and effectiveness of inputs that go into these efforts. Program budget resources are presented in Table 3-1, while other program resources are presented in Table 3-2.

As visible in Table 3-1, the program budget for HPwES is comprised of 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 CHEA and low-interest financing to fund qualifying measures/projects.

See Table 3-1 for a detailed breakout of funding sources.

Table 3-1: Home Performance with ENERGY STAR® Program Budget Allocation ($ millions)

Sources: System Benefits Charge, Operating Plan for New York Energy $mart℠ 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 3-2: Program Resources

Funding
• SBC, EEPS, and RGGI funding for the incentive pool incentives, including HEMI incentives • RGGI funding for GJGNY CHEA and project financing
NYSERDA Staff Resources
• Staff experience and expertise • Experience of implementation contractor

Continued

External Resources
• 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, Creating an Industry Working Group
Intangible Resources
• 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

4 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 is intended to incentivize the installation of eligible energy efficiency measures designed to increase the energy efficiency of existing buildings. 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 cost-effectively reduce energy consumption, 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 4-1: Contractor Incentives and Reimbursements.

Table 4-1: Contractor Incentives and Reimbursements

Name	Rationale
Comprehensive Home Energy Assessment Reimbursement	Offsets the time required to conduct comprehensive assessments 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	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 to 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 meet 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 comprehensive home energy assessments 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 4-2: Activities of the Home Performance with ENERGY STAR Program[5]

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.
Continued

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

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.

5 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 time period being 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 5-1).

Table 5-1: Outputs, Indicators, and Potential Data Sources

Output	Potential Data Sources
Provision of Consumer Financial Incentives (Including Financing)	
• Number of projects accessing financing • Dollar value of financing provided	CRIS database
• Number of projects with HEMI • Type and value of projects with HEMI	CRIS database
• Number of AHPwES projects • Dollar value of AHP incentives paid • Characteristics of AHP projects	CRIS database
Marketing and Outreach	
• 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
• Number of marketing materials that promote HPwES • Diversity of promotional activities • Value or impressions linked to HPwES target market	NYSERDA marketing records
• Number of contractors included on program website list • Inquiries/web analytics for page	Program records
• Number of CBOs engaged to promote program • Audit-only and program participants affiliated with CBOs	Program records
	Continued

Output	Potential Data Sources
Provide Incentives and Other Trade Ally Support Activities	
• Number and dollar value of training, certification, accreditation, and renewal incentives	Program records
• Number and dollar value of financial assistance for diagnostic equipment • Type of equipment purchased	Program records
• Number and type of trade ally training and technical support activities provided by program field representatives	Program records
Conduct Comprehensive Home Energy Assessments (CHEA)	
• Number of CHEA	CRIS
• Number of CHEA reports • Measures/upgrades identified in CHEA • Health and safety issues identified • Estimated costs	Program records
Quality Control Activities	
• QC procedures documented	Program records
• Number of projects inspected • Findings of inspections	Program records

6 Outcomes and Logic Diagram

This section contains the table of outcomes (Table 6-1) 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 6-1) 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 in 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 6-1: 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	• Audit conversion rate • Increasing portion of New York housing stock receiving HPwES services	• Program records • Census • Industry reporting
2. Increased installation of qualified measures	• Market share of qualified measures	• Surveys or other data from equipment vendors
3. HPwES projects accessible to more households	• Diversity of applicants in income and education levels	• Program records • Participant, audit-only, and market surveys
Short-Term/Intermediate Outcomes from Marketing and Outreach Activities		
4. Program affiliated contractors reach prospective homeowners	• Number and value of projects • Referral rate for contractors that tap co-op dollars	• Interviews with participating contractors
5. New York homeowners aware of HPwES	• Awareness of program brand or service	• Surveys of participant and nonparticipant households

Continued

Outcomes	Indicators	Data Sources and Potential Collection Approaches
Short-Term/Intermediate Outcomes from Incentives and Other Trade Ally Support Activities		
6. Program affiliated contractors value their affiliation with HPwES	• Program affiliated contractor tenure • Project volume • Expectations for future participation	• Program records • Contractor surveys
7. Certified contractors value BPI certification	• Certification/accreditation status, intention to maintain certification • Profitability of HPwES projects • Increasing portion of accredited firms' technicians with certification	• Participating and nonparticipating contractor surveys
8. Increases in HPwES project volume demonstrates viability of services	• Affiliated contractors routinely offer HP; represent an increasing portion of business	• Surveys of participating contracting firms
9. Firms expand capacity or geography	• Firms accessing incentives to add capacity or expand into new geographic areas • Tenure of firms	• Program records • Surveys of participating contracting firms
Short-Term/Intermediate Outcomes from Comprehensive Home Energy Assessments		
10. Program-affiliated contractors increasingly use diagnostic equipment and apply building science principles	• Portion of all jobs or bids that include diagnostic equipment • Application of these approaches to nonparticipant homes • Use of equipment in overall sales	• Contractor surveys
11. HPwES projects are scoped appropriately and meet consumer needs	• Audit scope relative to project scope • Higher conversion rate • Level of homeowner satisfaction with audit, bid, and/or work completed	• Interviews with staff and contractors • Program records • Surveys with audit-only participants • Participant surveys
12. The program supports increasingly comprehensive projects	• Portion of projects with more than one measure • Portion of household energy savings expected or modeled.	• Program records
13. Increasing numbers of technicians & firms are certified to deliver multiple services	• Portion of firms with multiple certifications Increased portion of techs with multiple certifications	• BPI records Contractor surveys

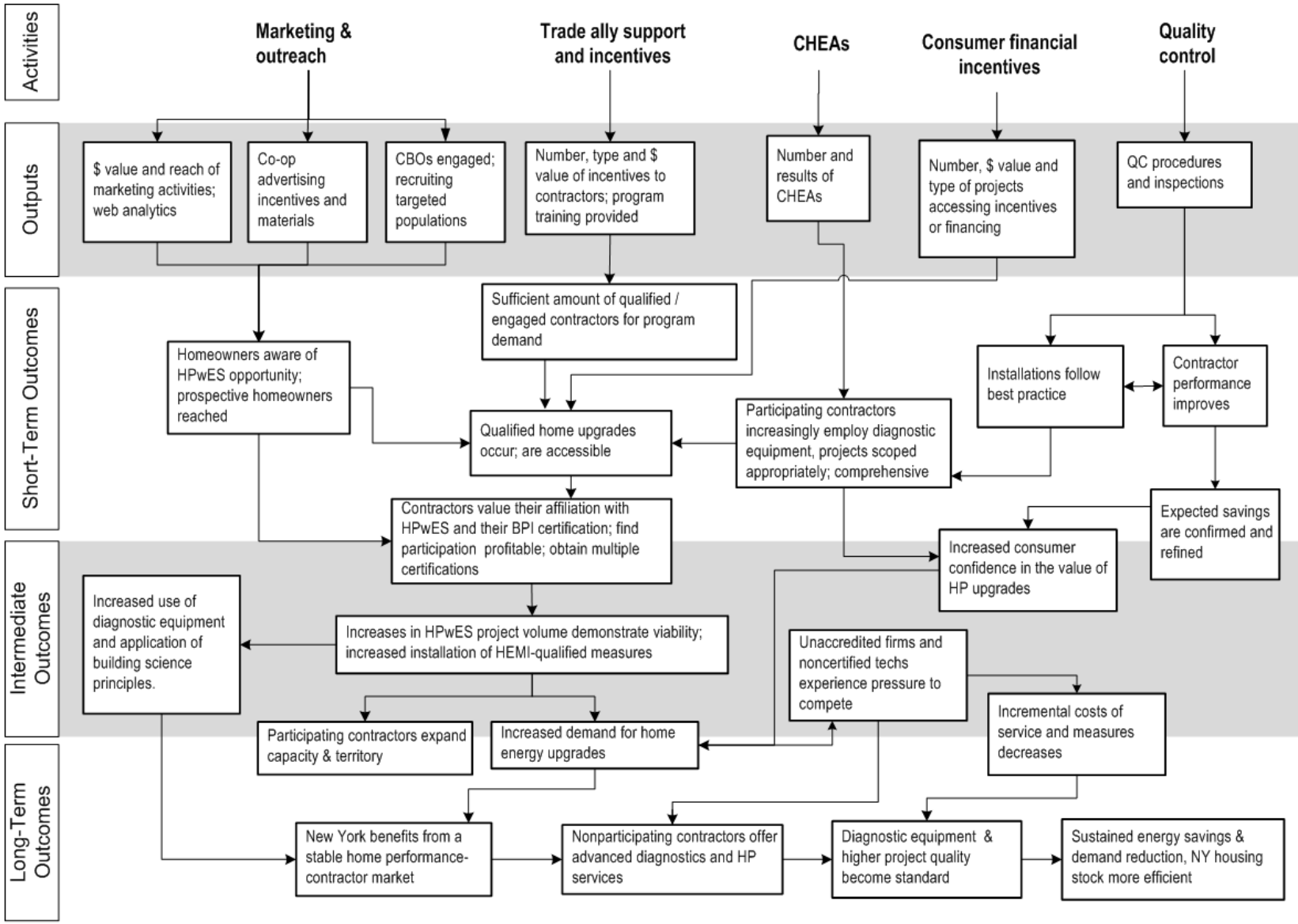
Continued

Outcomes	Indicators	Data Sources and Potential Collection Approaches
Short-Term/Intermediate Outcomes from Quality Control Activities		
14. Installations follow best practice	• Results from QC reviews	• Program records • Interviews with QC contractors
15. Contractor quality improves	• Level of disciplinary action	• Program records
16. Incremental costs associated with program-qualified measures or services decrease	• Project pricing, job costs, incremental costs of high efficiency measures promoted by the program	• 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	• Resident satisfaction; willingness to recommend HPwES services • Nonparticipant confidence that energy savings will be realized	• Participant surveys • Market/homeowner surveys
18. Increased consumer demand for or interest in energy-saving upgrades	• Value of energy-saving upgrades relative to other upgrades • Intention to pursue energy-saving upgrades	• Participant surveys • Market/homeowner surveys
19. Expected savings are confirmed and refined	• Realization rate	• Impact evaluations
Longer-Term Outcomes		
20. Unaccredited firms and noncertified techs experience pressure to compete	• Reported level of interest in obtaining BPI certification or accreditation • Pay or profitability differential among certified contractors and/or accredited firms	• Interviews with accredited firms • Surveys of certified and noncertified contractors • Prevailing wage data
21. New York benefits from a stable home performance contractor market	• Tenure of accredited firms • Expectations for the future	• BPI records • Surveys with participating firms and contractors
22. Nonparticipating contractors offer advanced diagnostics and HP services	• Familiarity with advanced diagnostic approaches • Rate at which nonparticipant firms possess diagnostic equipment • Familiarity with and intent to pursue BPI certification	• Nonparticipant contractor survey
23. Changes in standard practice increase project quality and energy savings attained	• Evidence of changes in diagnostic and installation practices that align with building science principles	• Nonparticipant contractor survey • Participant contractor survey

Continued

Outcomes	Indicators	Data Sources and Potential Collection Approaches
24. More efficient housing stock in New York	• Building science principles applied to increasing portion of HVAC replacements and other upgrades that affect energy use and building envelope	• Statewide residential housing stock studies • Nonparticipant contractor survey • Participant contractor survey
25. Sustained energy savings and demand reduction	• Upgraded homes consume less energy than comparison homes for 10 or more years	• Statewide residential housing stock studies • Impact evaluations

Figure 6-1: Initiative Logic Diagram



7 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.

7.1 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 CHEA and provision of multiple financing options. This section describes the key activities that are 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.

7.2 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 that 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, 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 first receive a CHEA
- 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 (in access to program resources and incentives) and hypothetical benefits (in 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 are expected to 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 7-1).

Table 7-1: Four Mid-Stream Populations

BPI Status	Indicators of Market Pressure
Accredited Firm	If successful, accredited firms should… • Maintain their accredited status • Be more profitable • Be able to sell HP-quality services Other evidence of differentiation… • 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… • 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… • 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
Continued	

BPI Status	Indicators of Market Pressure
Non-Certified Technicians	The success of certified technicians will… • 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 is fundamentally focused on supporting and promoting contractors with specific credentials, so it is important to verify that those credentials are valuable. If the diffusion of those credentials, pressure from competing contractors, and overall increased interest in obtaining energy efficiency creates pressure on the non-BPI market actors to adjust services or practices accordingly, 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, even though 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.

7.3 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 free or reduced-cost comprehensive home assessments
- 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 CHEA 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 CHEA and attractive financing options, both funded through GJGNY. These items have been fully embedded within the HPwES program and likely bolstered participating contractors during contractions in the residential contracting market after the housing market collapsed in 2007/2008.

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).

7.4 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 6-1 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 assessment 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)

8 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

9 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.
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- NYSERDA, 2014, *Home Performance with ENERGY STAR®*, http://www.nyserda.ny.gov/home-performance for webpage.
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- 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.*
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