Table IV-55. EmPower Program: Cumulative Annual Savings

	Program Years	Average Life of Electric/Gas Measures (Years)	Cumulative Annual GWh/Year	Cumulative MW	Cumulative Annual Fuel Savings (MMBtu)	% Downstate (Con Edison)
With Electric and Gas Funding	2009-2011	13/18	29.4	4.5	274,300	30%

Table IV-56. EmPower Program: Program and Participant Costs ($2008)

	Present Value of Program Administrator Cost ($Millions)	Present Value of Program and Participant Costs ($Millions)	Present Value of Resource Benefits ($Millions)
With Electric and Gas Funding	$50.5	$50.5	$84.2

Table IV-57. EmPower Program: Benefit-Cost Ratios

	Program Administrator Cost (PAC) Test	Total Resource Cost (TRC) Test
With Electric and Gas Funding	1.7	1.7

Total Resource Cost Test Benefit-Cost Ratio with Carbon Externality (Screening Metric 8)

Table 4 shows the PAC and TRC test results when the estimated benefits of carbon reduction are included. Carbon was valued at $15 per ton, resulting in a total present value of carbon benefits of $4.9 Million.

Table IV-58. EmPower Program: Benefit-Cost Ratios with Carbon

	Program Administrator Cost (PAC) Test	Total Resource Cost (TRC) Test
With Electric and Gas Funding	1.8	1.8

MWh Saved in 2015 (Screening Metric 5b)

Assuming the program functions only for as long as proposed, the Program is expected to achieve 29,300 MWh (cumulative annual) in 2015.

MW of Coincident NYISO Peak Saved in 2015 (Screening Metric 6b)

Assuming the program functions only for as long as proposed, the Program is expected to achieve 4.5 MW (cumulative) of coincident peak reduction in 2015.[74]

Peak Coincidence Factor of MWh Saved in 2015 (Screening Metric 7)

The peak coincidence factor is a measure of the extent to which the MWh savings is concentrated at the time of system peak. The peak coincidence factor for the program is 0.74.[75]

Number of Participants as a Percentage of the Number of Customers in the Class (Screening Metric 9)

Table 5 shows the number of expected program participants as a percentage of the number of customers in the class. The number of expected program participants represents NYSERDA's best estimate of participation for the current funding request through 2011.

Table IV-59. EmPower Program: Participants as a Percentage of Customers in Class

Customer Class	Number of Customers in Class[1]	Number of Anticipated Program Participants	Participants as a Percentage of Number of Customers in Class
Residential – Natural Gas	4,095,085	6,858	0.2%

Sources: DPS Five Year Index Book of Files and DPS Electricity and Natural Gas Retail Access Migration Reports. Electricity figures do not include LIPA, municipal electric utility, rural electric cooperative, or NYPA customers. Gas figures do not include Keyspan/Long Island customers. Retail Access Migration Reports do not separate commercial and industrial customers and label all-such customers as "non-residential". Commercial and industrial customers estimated by NYSERDA.

[74] NYSERDA defines coincident on-peak period as being between 12:00 noon to 6:00 PM on summer non-holiday week days.

[75] Peak coincidence factor = annual MWh saved/(MW saved on peak)(8,760 hours). For this equation, annual MWh saved is the cumulative annual savings expected in 2015 if the program is offered only as long as proposed, i.e., Screening Metric 5b.

10. HOME PERFORMANCE WITH ENERGY STAR® (NATURAL GAS)

10.1. PROGRAM ELEMENTS

Program Description. The Home Performance with ENERGY STAR (HPwES) Program is the largest of its kind in the United States and an integral element in NYSERDA's program portfolio.[76] The Program has been the recipient of numerous national awards and has been recognized as an Exemplary Program by ACEEE. The Program is a market transformation program that uses Building Performance Institute (BPI)- accredited contracting firms to install comprehensive energy efficiency-related improvements and technologies in 1- 4 family homes and low-rise residential buildings.

The program increased the capacity and expertise of more than 140 home improvement contracting firms through classroom training, in-field technical assistance, software seminars, certification of individual technicians, and accreditation of firms. Targeted incentives to decrease barriers to entry are available for contractors to help offset the cost of home assessment equipment, marketing and business accreditation. To encourage customer demand, financial incentives such as low-interest financing and financing incentives are available to help pay for the cost of the installed measures.

Home Performance with ENERGY STAR is an all-fuels program that uses a building science and a whole-house approach to energy efficiency. The program was designed under the electric distribution SBC to target the energy consumption of the State's existing 1-4 family housing stock. Capturing high electric savings is challenging without also addressing heating-related energy saving opportunities. Improvements in the shell and heating systems are typically needed and result in significant fossil fuel savings. Energy efficiency improvements will be comprehensive and include building shell measures, high efficiency heating and cooling measures, ENERGY STAR appliances and lighting, EPA Phase II certified pellet and wood stoves, and health and safety features. Participating homes typically reduce their total energy use by 25-30%.

Additional gas funding is necessary to encourage the gas saving measures offered through the program. This enables SBC funds to be concentrated on electricity saving measures and cost effective renewable technologies, and increase participation from more than 2,960 homes (excluding Assisted Home Performance homes) in 2007 to 7,900 home completions annually by 2011. To further encourage growth, NYSERDA has streamlined the program for contractors and consumers. The program will devote substantial resources to increasing the number of contractors operating Downstate, considered an area with the greatest opportunity for program expansion, and will implement additional guidance enabling work to include low-rise housing of more than four units.

Demand Reduction and System Benefits. Ancillary peak demand savings in 2011 attributed to installation of gas measures are estimated to be approximately 329 kW, with total cumulative MWh reductions of 969 MWh and 693,968 MMBtu.

[76] Through August 31, 2008, work was completed for over 13,824 households (not including the Assisted HPwES component) with energy efficiency improvements totaling nearly $100 million.

Table IV-60. Home Performance with ENERGY STAR: Total Gas Program Expenditures (Projected) 2009-2015 [net of administration and evaluation]

	2009	2010	2011	2012	2013	2014	2015	Total
Annual EEPS Spending	$13.27M	$14.35M	$15.52M	0	0	0	0	$43.14M
Projected Outreach/Marketing costs: $2,070,000 in 2009, 2010 and 2011.								

Table IV-61. Home Performance with ENERGY STAR: Total MMBtu Impacts (Projected) 2009-2015

	2009	2010	2011	2012	2013	2014	2015
Annual Savings installed in the current year	210,471	230,676	252,821	0	0	0	0
Annual Savings installed in prior years	n/a	210,471	441,147	693,968	693,968	693,968	693,968
Cumulative Annual Savings	210,471	441,147	693,968	693,968	693,968	693,968	693,968

Table IV-62. Home Performance with ENERGY STAR: Ancillary MWh Impacts (Projected) 2009-2015

	2009	2010	2011	2012	2013	2014	2015
Annual Savings installed in the current year	294	322	353	0	0	0	0
Annual Savings installed in prior years	n/a	294	616	969	969	969	969
Cumulative Annual Savings	294	616	969	969	969	969	969

NYSERDA has developed initial evaluation plans with the intention of providing the rigor and reliability necessary for metrics to be used by the NYISO and transmission and distribution system planners. NYSERDA will continue to work with DPS Staff and the EEPS Evaluation Advisory Group to devise final evaluation plans that meet established protocols and produce results that can be used as inputs for system planning and forecasting.

Market Segment Need. In cooperation with BPI, participating lenders, and the U.S. EPA, NYSERDA is offering a comprehensive assistance package to both consumers and participating contractors designed to increase awareness of, and demand for, building performance services while simultaneously building an infrastructure of trained and certified technicians and accredited contractors to deliver such services.

The success of the Program has resulted in increased consumer demand in most areas of the State and an increased number of mid-stream participants. With the rapidly escalating cost of home heating fuels expected for the upcoming heating season, it is expected that consumer demand will increase significantly. The program will rely, in part, on the Workforce Development Initiative to ensure an adequate number of BPI-certified technicians and skilled installers are available in high-demand regions.

Coordination. NYSERDA will work closely with the natural gas utility service companies to maximize their customer offerings and programs, while reducing customer confusion, duplication of services, and administrative expenses. Participating contractors will be educated about other available programs for their customers. NYSERDA will co-market programs with the utilities.

Co-Benefits. In addition to the cost-effective energy savings offered, the Program simultaneously addresses residential health issues pertaining to indoor air pollutants, focusing on carbon monoxide and other pollutants associated with combustion appliances, ventilation, and moisture control.

This effort increases the long-term durability of New York's housing stock by addressing such problems as ice-damming, mold and mildew. This effort increases local private contractor capacity for delivering high-quality comprehensive services, through training, certification of contractors, and accreditation of firms through BPI and the regionally established Centers for Energy Efficiency and Building Science (CEEBS). This wholesale enhancement of contractor skills and business practices supported by market-based workforce education and development ensures continuing energy efficiency capabilities long into the future.

Portfolio Balance. The Program will coordinate with energy-efficient mortgage programs now emerging in the market, as an alternative to low-interest financing offered through the program.

Other complementary programs include NYSERDA's proposed Remodel with ENERGY STAR® Program that will provide electric reduction packages for remodelers specializing in kitchen and bath remodeling, and homeowners seeking to incorporate energy savings appliances into their home improvement projects; and NYSERDA's Power Management Program that will provide tips for homeowners or renters to save money by reducing phantom loads from electronic appliances, and reducing peak demand. The programs are designed to encourage referrals between participating remodelers and home performance contractors, or to encourage remodelers to expand their business model to include certain home performance work.

Depth of Savings. This Program comprehensively addresses building shell, heating and cooling systems, lighting and appliances, making achieved natural gas and electric savings extensive and long-lasting.

Contractors complete comprehensive home assessments (CHA) for all homes submitted through the Program. When conducting a CHA, the 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. The CHA allows the contractor to recommend improvements that are comprehensive, and that maximize the energy savings achieved in every home.

Underserved Markets. This Program is a Statewide effort that provides significant energy savings to one-to-four family homes whether rental properties or owner-occupied with the intention to ensure an integrated, all-fuels approach that can be continued and expanded Statewide.

Commitment. The HPwES Program was first implemented in 2001, and while this effort has grown some time (about 6-8 months) will be needed to ramp up contractor capacity especially in the Downstate

region, as contractors require training and certification. This Program will rely on the Workforce Development initiative to develop this capacity.

Customer Outreach. NYSERDA maintains an extensive website dedicated to its residential efficiency programs, including the HPwES program, to provide a "one-stop shopping" experience for customers to find information about the program, participating contractors by geographic region, as well as financing options. NYSERDA's marketing campaign includes television, print ads, and radio spots. Participating contractors will be encouraged to market themselves as "Home Performance Contractors" through a co-operative advertising incentive. Further, regional implementation contractors such as the **New York Energy $mart**[SM] Communities Coordinators will provide program outreach services, attend local trade fairs, and generally assist in contractor and customer recruiting into the Program.

NYSERDA's established contacts and relationships with trade associations, key stakeholders and contractor groups, such as US EPA, BPI, Building Performance Contractors Association, Affordable Comfort Institute, US Department of Housing and Urban Development, National Association of Home Builders, as well as an extensive list of community-based organizations across the State, and others will market the program to their membership. NYSERDA will continue to coordinate with utilities to market and provide outreach for their respective programs.

Collaborative Approach. The Program was designed through the collaborative effort of NYSERDA staff, industry experts, trade associations, key stakeholders, and environmental groups. Since 2001, NYSERDA has actively performed program evaluations by third-party reviewers to address customer concerns, contractor interests, and program implementation obstacles. The program has benefited from over seven years of experience in New York contractor and consumer markets. NYSERDA continues to use a Project Advisory Committee made up of participating contractors and key stakeholders to review program status and suggest improvements.

Fuel Integration. By design, a comprehensive, whole-house approach to residential contracting will result in a complementary focus on fossil fuels and electricity and effectively be a "one stop shop" for the consumer. The recommended measures are prioritized by the software purely on a cost-effective scale. The end result is a single contract that aims to reduce the overall energy use of the home, both in fossil fuels, and electricity.

Transparency. All information regarding the program, including program design, benefit/cost analysis, and supporting data will be made available by NYSERDA on its website. NYSERDA is also working with DPS Staff toward development of a uniform database to further increase transparency with regard to program results.

Procurement. Implementation, marketing and other program services contractors are chosen through NYSERDA's competitive procurement process. The opportunity for energy services providers to become participating contractors are posted on www.nyserda.org and www.GetEnergySmart.org.

10.2. EVALUATION.

Evaluation Goals

Primary goals to evaluate the natural gas component of the HPwES Program include verifying reported program savings; determining if implemented improvements to the program are successful (e.g., reducing participation "bottlenecks," increasing the number of partners, etc); and conducting a comprehensive statewide baseline for existing one- to four-unit residential buildings.

Brief Overview of the Evaluation Approach

The evaluation approach presented in this section was designed based on NYSERDA's current plans for the design and administration of the natural gas component of the Home Performance with ENERGY STAR Program, and in the absence of complete knowledge about final evaluation protocols, and potential funding set-asides and plans for overarching evaluation projects that would serve the needs of all EEPS program administrators. Thus, these plans have been prepared in order to afford NYSERDA and its independent contractors flexibility to adapt the evaluation approaches that best suit the program as implemented once a greater understanding is in place regarding final evaluation protocols and funding. NYSERDA's estimated evaluation budget for this program includes a set-aside for developing a full evaluation plan, an effort that will involve DPS Staff and the EEPS Evaluation Advisory Group. At this point, NYSERDA will work with its independent evaluation contractors to determine the optimal approach for conducting this comprehensive evaluation of the various program components.

The natural gas efficiency component of the HPwES Program described in this plan is an extension of the existing SBC program. To the extent that NYSERDA's original and ongoing SBC-funded Home Performance with ENERGY STAR Program can be evaluated using the same approaches and time lines outlined in this section, NYSERDA will supplement this plan to include additional resources from the enhanced SBC3 evaluation funding. Furthermore, the HPwES Program evaluation effort will likely also include assessing impacts related to the additional gas funding being requested for the ongoing SBC-funded Assisted Home Performance with ENERGY STAR Program (AHP). AHP is a component of the core program, which offers additional incentives to households with income levels below 80% of State Median Income (SMI) or 80% of the Area Median Income (AMI), whichever is higher for their county. Benefits of pooling evaluation resources for the existing and proposed components of the market-rate and assisted Home Performance programs include a more comprehensive evaluation effort, availability of larger samples, increased rigor, and greater cost-effectiveness of the evaluation.

Evaluation Budget

NYSERDA expects the evaluation budget for the additional natural gas funding requested for the Home Performance with ENERGY STAR Program to be approximately equal to 5% of the program funding level, less yet-to-be determined funds set aside for Statewide studes and other overarching costs borne by program administrators. In order to effectively evaluate the Home Performance with ENERGY STAR Program, including the natural gas efficiency component, it is anticipated that approximately 50% of the program's evaluation funding will be allocated to impact evaluation; 20% to process evaluation and 30% to market evaluation.

Evaluation Schedule

The following table shows major studies that are planned for the Home Performance with ENERGY STAR Program evaluation and the time frame for their completion. The plan includes initial measurement and verification and net-to-gross studies, and follow up studies in these same areas in 2012. The plan also includes an early process evaluation in 2010 and a baseline market evaluation effort in 2009.

Table IV-63. Home Performance with ENERGY STAR: Evaluation Schedule 2009-2012

Evaluation Element	Expected Completion			
	2009	2010	2011	2012
M&V (Impact)		X		X
Net-to-Gross (Impact)		X		X
Process Evaluation		X		
Market Evaluation	X			

Impact Evaluation

Measurement and Verification

One of the most reliable impact evaluation methods for energy efficiency programs targeting existing buildings is using pre- and post-energy use data to statistically analyze average energy savings, referred to as billing analysis. NYSERDA plans to use billing analysis to obtain reliable savings estimates at a high rigor level. In order to conduct this analysis, NYSERDA will require utility account numbers and then pre- and post-energy use data (kWh, kW, therms and interval/advanced meter data), for participants and non-participants, to be automatically provided in easily readable electronic formats. NYSERDA currently obtains account information and permission from the participant to obtain energy use data from the utility and recognizes the importance of protecting confidentiality of the consumer's data. From the larger set of nonparticipant data, NYSERDA will select a group of nonparticipants whose energy use matches that of participants in the pre-installation period.

If the energy use data are not available, NYSERDA would likely conduct site visits and metering within participating homes in order to verify the estimate of program savings. However, this would involve pre/post metering, increasing the cost of the evaluation, delaying services to customers until after the pre-period metering is complete, and potentially impacting the customer's and contractor's willingness or ability to participate in the program. NYSERDA may need to offer financial incentives to help reduce this significant negative impact to customers and contractors. If this fall-back option must be implemented, NYSERDA will attempt to meter and use the most rigorous impact evaluation method that can be obtained within budget given the inability to do large-scale billing analysis. This approach would also require reallocation of the evaluation budget and changes to plans for the market and process evaluation components.

For the proposed billing analysis, NYSERDA will rely on program data for participants and utility data for nonparticipants; results should meet the 90/10 confidence/precision criterion both statewide and within each utility service area. Should site visits be required, NYSERDA will attempt to complete a sufficient number of site visits with metering to meet 90/10 confidence and precision statewide as well as on an upstate vs. downstate regional basis. However, it should be noted that failure to obtain utility data leading to data collection-related project delays could have serious implications on program participation by the selected customer as well as the impacted contractor(s). If funding were added from elsewhere within NYSERDA's evaluation budget, 90/10 confidence and precision could be attained at the utility level. Data will be collected and analyzed by NYSERDA's independent contractors following established evaluation protocols.

In an effort to align with the timing of expected savings, this impact evaluation effort is planned to take place in 2010, and be repeated for later participants in 2012. This timing will allow for at least 12 months pre- and post-installation energy use data (24 months of data) to be available.

Net-to-Gross

NYSERDA intends to explore participant and non-participant spillover and participant freeridership by using an enhanced self-report survey process with multiple decision-makers including homeowners and contractors involved in promoting and installing energy-efficient measures. Because participating homeowners may not be aware of the influence of the program on the availability of energy-efficiency services, the evaluation effort will involve review of and potential adjustments to their responses about freeridership based on participating contractors' judgments about the program's influence on their offering of such services. Among participating homeowners and contractors, NYSERDA will also examine inside spillover (participating homeowners who install additional measures that are not included in program records), outside spillover (participating contractors who install measures at nonparticipating homes because of the influence of the program), and partial participant spillover (homeowners receiving a home energy assessment who installed recommended measures, but not through the program). NYSERDA will also examine nonparticipant spillover among contractors (measures installed by nonparticipating contractors because of the influence of the program). Because the incidence is likely to be low, which will make it difficult to attain the desired confidence/precision levels, NYSERDA will not examine nonparticipant spillover among homeowners (measures installed by nonparticipating homeowners because of the influence of the program). These methods will be used to derive a final triangulated net-to-gross (NTG) ratio which will provide a high level of construct validity for the net savings estimates.

Sample sizes will be calculated to meet 90% confidence and 10% precision statewide as well as on an upstate/downstate regional basis. If budget permits, 90/10 confidence and precision could be achieved at the utility territory level. Data collection may be conducted by NYSERDA's independent contractor and will follow established evaluation protocols for such data collection. Analysis will likely be conducted by NYSERDA's independent contractor and will follow established evaluation protocols in analyzing data.

The attribution analyses will occur in tandem with M&V activities. Thus, attribution analyses are planned in 2010 as well as 2012 for subsequent participants.

Process Evaluation

Previous process evaluations on the SBC-funded HPwES Program have found that the program has expanded contractors' capabilities to provide high-quality comprehensive home energy efficiency services and that substantial numbers of households have taken advantage of these services and installed recommended measures since the program's inception. Process evaluation recommendations included:

- focusing greater attention on production tasks while reducing administrative tasks so that existing program targets and expansions into new markets can be more easily accomplished;
- being more responsive to the needs of underrepresented and low performing contractor segments (small firms, community based organizations, and independent contractors) in order to recruit and retain more qualified firms for the program; and
- ensuring that input is obtained from a broad range of contractors before making program adjustments.

A comprehensive future process evaluation conducted in conjunction with the SBC-funded program will re-assess these issues using larger samples and greater rigor than the prior study and will address the

effects of including gas funding in the program. The process evaluation will also address design and implementation issues associated with rapid program expansion and will explore the changing market in relation to the program's higher savings goals and, potentially, new program partners or choices among programs for potential participants.

Planned activities will likely include interviews with NYSERDA Staff and program implementation contractors, and surveys of participating and nonparticipating contractors and homeowners. Samples will be drawn from sources such as program databases, program records, etc. As appropriate, all quantitative data will achieve 90/10 confidence and precision statewide and for the upstate/downstate regions. A census of program staff and implementation contracting staff will also be included. Data collection and analysis will be conducted by NYSERDA's independent contractors following established data collection evaluation protocols. Issues identified during the process evaluation will be generated into actionable recommendations and provided to NYSERDA. Follow-up will occur with program staff to address the recommendations.

The initial process evaluation will be conducted in 2010. Should energy efficiency program funding continue beyond 2011, NYSERDA would recommend repeating the study in 2011 (although this is not included in the current budget).

Market Evaluation

The first task for this evaluation area will involve NYSERDA's independent evaluation contractors working with program staff to develop a new program theory and logic model to ensure that expected program outputs and outcomes and associated measurement indicators are clearly defined. The final program theory and logic model will then guide subsequent evaluation efforts.

An important part of any program evaluation is a thorough understanding of the market environment in which the program is operating. NYSERDA believes that the best approach to fully characterize the target market for this program includes a large-scale baseline and measure saturation study, coupled with market characterization surveys of various market actors such as contractors, homeowners, distributors, retailers and manufacturers.

The large-scale baseline and measure saturation study should be conducted through site visits to fully characterize existing one- to four-unit homes, identify measures installed and replaced, including vintage and efficiency levels, and other factors. In addition, the program database containing information on more than 13,000 homes that have already participated in the program will be used. If unavailable from other sources, the analysis should include quantification of technically achievable savings potential by end use, as well as economic potential and market potential, based on a range of assumptions about future natural gas prices.

Although existing housing has been a difficult sector to characterize given its size, NYSERDA believes this type of study would benefit all EEPS program administrators, and therefore proposes that it be jointly funded with all program administrators contributing. The full statewide study, including both the site visit and survey components, probably could not be conducted by NYSERDA alone within the evaluation budget for the HPwES Program. However, if it is decided that this type of joint study is not worthy of support by all potential program administrators, NYSERDA will allocate approximately 15% of the overall evaluation budget for the Home Performance with ENERGY STAR Program to develop the program theory and logic model, evaluate the existing database information, and conduct the survey component of the market evaluation effort in 2009. Although the full value of this effort will be highly diminished, the market characterization survey component could still provide valuable information to assist NYSERDA in targeting this program to better serve the home renovation market and meet overall electricity and gas savings goals. Evaluation funding provided through SBC funds would further

supplement this NYSERDA-only approach and result in a more comprehensive evaluation for the Home Performance Program.

Surveys with market actors would meet 90/10 confidence/precision statewide level as well as on an upstate/downstate regional basis. If budget permits, the sample could be increased to meet 90/10 confidence/precision at the utility territory level. Data collection and analysis will be conducted according to established data collection protocols.

NYSERDA recommends conducting the proposed baseline and measure saturation study in 2009. Should energy efficiency program funding continue beyond 2011, NYSERDA would recommend repeating the study in 2012 (although this is not included in the current budget).

Evaluation Plan Variations

Given the level of uncertainty regarding final evaluation protocols, statewide studies to be conducted by all program administrators, and funding levels needed to support overarching evaluation studies and activities, the evaluation plan presented in this section should be viewed as scalable and flexible. With reduced evaluation funds, the evaluation would achieve 90/10 confidence/precision statewide only and the level of detail sought through the interviews and surveys would be reduced. With increased funds, the evaluation could achieve 90/10 confidence/precision at the utility territory level.

10.3. PROGRAM SELECTION CRITERIA

This section provides screening metrics for the Home Performance with ENERGY STAR (Home Performance) Program required per Appendix 3 of the Commission's June 23, 2008 EEPS Order. As discussed earlier, NYSERDA intends to provide screening metrics related to electric and gas rate impacts (Screening Metrics 2, 3, 4, 8, 10, 11, and for the suite of programs Screening Metrics 1 and 2) in a separate supplemental filing. Also, for reasons described earlier, estimated MWh and coincident peak MW reductions in 2015 if the program continues to expand and extends through 2015 (Screening Metrics 5a and 6a) are not included.

Total Resource Cost Test Benefit/Cost Ratio (Screening Metric 1)

The Tables below show the resource savings and average measure life used as inputs for the benefit/cost analysis, the present value of the costs and benefits used in the analysis, the Program Administrator Cost (PAC) and Total Resource Cost (TRC) results. Appendix A provides additional information on benefit/cost definitions and inputs. The Home Performance Program benefit/cost analysis was based on combining the unexpended SBC funding with the gas funding requested in this proposal.

Table IV-64. Home Performance with ENERGY STAR: Program Cumulative Annual Savings

	Program Years	Average Life of Electric/Gas Measures (Years)	Cumulative Annual GWh/Year	Cumulative MW	Cumulative Annual Fuel Savings (MMBtu)	% Downstate (Con Edison)
With Electric and Gas Funding	2009-2011	13/18	19.4	6.6	694,000	2%

Table IV-65. Home Performance with ENERGY STAR: Program and Participant Costs ($2008)

	Present Value of Program Administrator Cost ($Millions)	Present Value of Program and Participant Costs ($Millions)	Present Value of Resource Benefits ($Millions)
With Electric and Gas Funding	$52.3	$121.0	$154.4

Table IV-66. Home Performance with ENERGY STAR: Program Benefit-Cost Ratios

	Program Administrator Cost (PAC) Test	Total Resource Cost (TRC) Test
With Electric and Gas Funding	3.0	1.3

Total Resource Cost Test Benefit-Cost Ratio with Carbon Externality (Screening Metric 8)

The table below shows the PAC and TRC test results when the estimated benefits of carbon reduction are included. Carbon was valued at $15 per ton, resulting in a total present value of carbon benefits of $8.3 Million.

Table IV-67. Home Performance with ENERGY STAR: Program Benefit-Cost Ratios with Carbon

	Program Administrator Cost (PAC) Test	Total Resource Cost (TRC) Test
With Electric and Gas Funding	3.1	1.3

MWh Saved in 2015 (Screening Metric 5b)

Assuming the program functions only for as long as proposed, the Program is expected to achieve 19,400 MWh (cumulative annual) in 2015.

MW of Coincident NYISO Peak Saved in 2015 (Screening Metric 6b)

Assuming the program functions only for as long as proposed, the Program is expected to achieve 6.6 MW (cumulative) of coincident peak reduction in 2015.[77]

Peak Coincidence Factor of MWh Saved in 2015 (Screening Metric 7)

The peak coincidence factor is a measure of the extent to which the MWh savings is concentrated at the time of system peak. The peak coincidence factor for the program is 0.34.[78]

[77] NYSERDA defines coincident on-peak period as being between 12:00 noon to 6:00 PM on summer non-holiday week days.

[78] Peak coincidence factor = annual MWh saved/(MW saved on peak)(8,760 hours). For this equation, annual MWh saved is the cumulative annual savings expected in 2015 if the program is offered only as long as proposed, i.e., Screening Metric 5b.

Number of Participants as a Percentage of Customers in the Class (Screening Metric 9)

The following table shows the number of expected program participants as a percentage of the number of customers in the class. The number of expected program participants represents NYSERDA's best estimate of participation for the current funding request through 2011. It is assumed that 80% of customers will heat with natural gas, these are inclusive of the electricity only customers.

Table IV-68. Home Performance Program Participants as a Percentage of Customers in Class

Customer Class	Number of Customers in Class[1]	Number of Anticipated Program Participants	Participants as a Percentage of Number of Customers in Class
Residential - Electricity	6,240,788	19,848	0.3%
Residential – Natural Gas	4,095,085	15,878	0.4%

[1] Sources: DPS Five Year Index Book of Files and DPS Electricity and Natural Gas Retail Access Migration Reports. Electricity figures do not include LIPA, municipal electric utility, rural electric cooperative, or NYPA customers. Gas figures do not include Keyspan/Long Island customers. Retail Access Migration Reports do not separate commercial and industrial customers and label all-such customers as "non-residential". Commercial and industrial customers estimated by NYSERDA.

11. ASSISTED HOME PERFORMANCE WITH ENERGY STAR (NATURAL GAS)

11.1. PROGRAM ELEMENTS

Program Description. The Assisted Home Performance with ENERGY STAR® (AHPwES) Program, an income eligible component of the core Home Performance with ENERGY STAR® program, is designed to reduce the energy burden on low-income households. In each county, eligibility is defined by comparing 80% of State Median Income (SMI) with 80% of the Area Median Income (AMI) and choosing whichever is higher. A household meeting this income criteria is eligible for a subsidy of 50% of the project cost, maximized at a subsidy of up to $5,000. For 2-4 family buildings, the maximum is $10,000 per building and the percentage of project costs (up to 50%) is derived from the income eligibility of the tenants. In both instances, the balance of the work may be eligible for reduced interest-rate financing through the **New York Energy $mart**[SM] Loan Fund.

Only cost-effective projects with a savings-to-investment ratio (SIR) of 1.1 or greater are eligible. Through August 2008, work has been successfully completed on over 7,400 income eligible households. This represents over $62.2 million in energy efficiency upgrades. This effort will couple additional gas funds with SBC funds, to increase the current program funding available for contractor incentives, homeowner incentives, implementation, quality assurance and administration. It is expected that the Program will nearly double savings achievements over a three-year period. Should energy prices continue to climb, NYSERDA may raise the ceiling of income eligibility and increase incentives for lower-income households.

Demand Reduction and System Benefits. Ancillary peak demand savings in 2011 attributable to installation of gas measures are estimated to be approximately 112 kW, with total cumulative MWh reductions of 480 MWh and 442,194 MMBtu.

Table IV-69. Assisted Home Performance with ENERGY STAR: Total Gas Program Expenditures (Projected) 2009-2015 [net of administration and evaluation]

	2009	2010	2011	2012	2013	2014	2015	Total
Annual EEPS Spending	$14.97M	$16.20M	$17.55M	0	0	0	0	$48.72M
Projected Outreach/Marketing costs: $2.09M in 2009, 2010 and 2011.								

Table IV-70. Assisted Home Performance with ENERGY STAR: Installed MMBtu Impacts (Projected) 2009-2015

	2009	2010	2011	2012	2013	2014	2015
Annual Savings installed in the current year	134,111	146,986	161,097	0	0	0	0
Annual Savings installed in prior years	n/a	134,111	281,097	442,194	442,194	442,194	442,194
Cumulative Annual Savings	134,111	281,097	442,194	442,194	442,194	442,194	442,194

Table IV-71. Assisted Home Performance with ENERGY STAR: Ancillary MWh Impacts (Projected) 2009-2015

	2009	2010	2011	2012	2013	2014	2015
Annual Savings installed in the current year	145	159	175	0	0	0	0
Annual Savings installed in prior years	n/a	145	304	479	479	479	479
Cumulative Annual Savings	145	304	479	479	479	479	479

NYSERDA has developed initial evaluation plans with the intention of providing the rigor and reliability necessary for metrics to be used by the NYISO and transmission and distribution system planners. NYSERDA will continue to work with DPS Staff and the EEPS Evaluation Advisory Group to devise final evaluation plans that meet established protocols and produce results that can be used as inputs for system planning and forecasting.

Market Segment Need. The Program addresses the portion of the population with incomes over the threshold for other low-income energy efficiency or assistance programs that will be impacted the most from high energy prices, as well as high transportation and grocery prices. Current participation levels are near one-third of the total program. Additional gas funding will expand the Program to reach a larger number of participants and address an increasing societal need.

Coordination. NYSERDA continues to work closely with the natural gas utilities to maximize their customer offerings and programs, while reducing customer confusion, duplication of services, and administrative expenses. NYSERDA continues to work with and recruit new community-based organizations, municipalities, and community development agencies to market, deliver, and supplement the Program to low-to-moderate income homeowners and landlords.

Co-Benefits. As the income-eligible portion of the Home Performance with ENERGY STAR Program, AHPwES seeks to reduce the burden placed on the low-to-moderate income population of New York State. An unfortunate phenomenon has been described of income-limited households that are forced to choose whether to pay their winter heating bills or to buy groceries, known as "heat or eat." This Program is designed to address this dilemma by increasing the all-fuels energy efficiency of such households, while keeping those improvements affordable for the homeowner. In addition to improving the energy efficiency for these homes, health and safety issues are also addressed. These potential health risks are not likely to be identified by contractors working outside of the Home Performance Program.

This effort increases the long-term durability of New York's existing housing-stock. Ensuring quality workmanship within the Program also allows for homeowners to budget accordingly for future upgrades, and decreases worries of failing equipment or unexpected problems. This effort increases the capacity of local contractors to deliver high-quality comprehensive services to segments of the population that otherwise could not afford to make such improvements to their homes, including senior citizens and working families.

Portfolio Balance. NYSERDA also offers low-interest financing through its **New York Energy $mart**^{SM} Loan Fund Program, and ENERGY STAR® Financing, to maximize customer financial assistance and implement strategies to maximize MMBtu savings in existing homes. NYSERDA's

proposed Power Management Program is also complimentary and provides tips for homeowners or renters to save money by reducing phantom loads from electronic appliances, and reducing peak demand.

Through NYSERDA's EmPower New York[SM] program, energy efficiency tips and budget management workshops are offered throughout the State and are open to the public.

Depth of Savings. This comprehensive effort addresses envelope, HVAC systems, appliances, lighting and domestic hot water, saving fossil fuels and electricity. Contractors complete Comprehensive Home Assessments (CHA) for all homes submitted through the Program. Contractors complete comprehensive home assessments (CHA) for all homes submitted through the Program. When conducting a CHA, the 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. The CHA allows the contractor to recommend improvements that are comprehensive, and that maximize the energy savings achieved in every home.

As a program requirement for the Assisted Home Performance Program, work scopes are required to reach a savings to investment ratio (SIR) of 1.1. This prerequisite makes certain is that the homeowner will be able to pay for the energy efficiency improvements with the money they are saving on their energy costs (based on a ten year pay back term) and maximizes ratepayer investment.

Underserved Markets. Traditional low-income weatherization programs provide benefits to individuals and families earning 60% of the State Median Income or less. This Program targets the portion of the population above traditional weatherization program income limits yet still below the 80% SMI/AMI threshold. Households in this market segment are traditionally the hardest hit by increased energy costs and are typically not eligible for larger social service opportunities. The Program reaches an underserved audience and provides energy efficiency benefits with a greatly reduced homeowner investment.

Commitment. Although the Program has grown significantly since its inception in 2001, it will require some time (about 6-8 months) to ramp up contractor capacity particularly in the Downstate region, as technicians will require training certification and contracting firms will required BPI accreditation. Additional funding enables increased participation, a wider range of income eligibility, and increased financing incentives that will increase contractor participation and consumer demand in the program.

Customer Outreach. NYSERDA maintains an extensive website dedicated to its residential efficiency programs, including the HPwES program, to provide a "one-stop shopping" experience for customers to find information about the program, participating contractors by geographic region, as well as financing options. Through its contacts and relationships with trade associations, key stakeholders and contractor groups, housing agencies, neighborhood development corporations, and community-based organizations, NYSERDA will encourage the marketing of the program to their memberships. NYSERDA will collaborate with utilities to market the Program.

Collaborative Approach. The Program was designed through collaboration between NYSERDA, industry experts, trade associations, key stakeholders, and environmental groups. NYSERDA continues to work with utilities to collaborate on potential utility-sponsored programs. Third party reviewers conduct program evaluations on behalf of NYSERDA to address customer concerns, contractor interests, and program implementation issues. The program has benefited from over seven years of experience in New York contractor and consumer markets.

Fuel Integration. By design, a comprehensive, whole-house approach to residential contracting will result in a complementary focus on fossil fuels and electricity and effectively be a "one stop shop" for the consumer. The recommended measures are prioritized by the software purely on a cost-effective scale.

The end result is a single contract that aims to reduce the overall energy use of the home, both in fossil fuels, and electricity.

Transparency. All information regarding the program, including program design, benefit/cost analysis, and supporting data will be made available by NYSERDA on its website. NYSERDA is also working with DPS Staff toward development of a uniform database to further increase transparency with regard to program results.

Procurement. Implementation, marketing and other program services contractors are chosen through NYSERDA's competitive procurement process. The opportunity for energy services providers to become participating contractors are posted on www.nyserda.org and www.GetEnergySmart.org.

11.2. EVALUATION.

Evaluation Goals

As described in the evaluation plan for the market-rate Home Performance with ENERGY STAR Program, the primary evaluation goals for the Assisted Home Performance program will also include verifying reported program savings; determining if anticipated improvements to the programs are successful (e.g., reducing participation "bottlenecks," increasing the number of partners, etc); and conducting a comprehensive statewide baseline for residential existing buildings.

Brief Overview of the Evaluation Approach

NYSERDA expects the evaluation of the Assisted Home Performance with ENERGY STAR Program to be conducted as a coordinated effort with the market-rate Home Performance with ENERGY STAR Program evaluation. Refer to the Home Performance with ENERGY STAR evaluation plan for details and the evaluation schedule.

Evaluation Budget

NYSERDA expects evaluation budget for the Home Performance with ENERGY STAR Gas Program to be approximately equal to 5% of the program funding level, less yet-to-be determined funds set aside for Statewide studies and other overarching costs borne by program administrators. Similar to the market-rate Home Performance with ENERGY STAR Program evaluation plan, it is anticipated that approximately 50% of evaluation funding will be allocated to impact evaluation; 20% to process evaluation and 30% to market evaluation.

Evaluation Schedule

Refer to the Home Performance with ENERGY STAR evaluation plan for details.

Impact Evaluation

Measurement and Verification

NYSERDA will explore possibly 90/10 confidence and precision levels for the statewide Assisted Home Performance effort. Depending on funding levels, attaining 90/10 confidence and precision for upstate/downstate or the utility territory level might also be possible.

Net-to-Gross

With the addition of Assisted Home Performance evaluation funds, sample sizes will be increased for freeridership and spillover surveys, and possible differentiation between Assisted Home Performance and market-rate Home Performance program participants will be explored.

Process and Market Evaluations

Refer to the Home Performance with ENERGY STAR evaluation plan for details. With the addition of Assisted Home Performance evaluation funds, sample sizes will be increased resulting in a more defensible reassessment of the issues raised in the last process evaluation and an ability to identify unique program effects relative to gas measures.

Evaluation Plan Variations

Given the level of uncertainty regarding final evaluation protocols, statewide studies to be conducted by all program administrators, and funding levels needed to support overarching evaluation studies and activities, the evaluation plan presented in this section should be viewed as scalable and flexible. With reduced evaluation funds, NYSERDA would achieve 90/10 confidence/precision only at the program level and the level of detail sought through the interviews and surveys would be reduced.. With increased funds, NYSERDA would achieve 90/10 confidence/precision at the utility territory level.

11.3. PROGRAM SELECTION CRITERIA

This section provides screening metrics for the Assisted Home Performance (AHP) Program required per Appendix 3 of the Commission's June 23, 2008 EEPS Order. As discussed earlier, NYSERDA intends to provide screening metrics related to electric and gas rate impacts (Screening Metrics 2, 3, 4, 8, 10, 11, and for the suite of programs Screening Metrics 1 and 2) in a separate supplemental filing. Also, for reasons described earlier, estimated MWh and coincident peak MW reductions in 2015 if the program continues to expand and extends through 2015 (Screening Metrics 5a and 6a) are not included.

Total Resource Cost Test Benefit/Cost Ratio (Screening Metric 1)

The tables below show the resource savings and average measure life used as inputs for the benefit/cost analysis, the present value of the costs and benefits used in the analysis, the Program Administrator Cost (PAC) and Total Resource Cost (TRC) results. Appendix A provides additional information on benefit/cost definitions and inputs. The benefit/cost analysis was based on combining the unexpended SBC funding with the gas funding requested in this proposal.

Table IV-72. Assisted Home Performance Program: Cumulative Annual Savings

	Program Years	Average Life of Electric/Gas Measures (Years)	Cumulative Annual GWh/Year	Cumulative MW	Cumulative Annual Fuel Savings (MMBtu)	% Downstate (Con Edison)
With Electric and Gas Funding	2009-2011	13/18	9.6	2.2	442,200	2%

Table IV-73. Assisted Home Performance Program: Program and Participant Costs ($2008)

	Present Value of Program Administrator Cost ($Millions)	Present Value of Program and Participant Costs ($Millions)	Present Value of Resource Benefits ($Millions)
With Electric and Gas Funding	$54.8	$75.8	$94.2

Table IV-74. Assisted Home Performance Program: Benefit-Cost Ratios

	Program Administrator Cost (PAC) Test	Total Resource Cost (TRC) Test
With Electric and Gas Funding	1.7	1.2

Total Resource Cost Test Benefit-Cost Ratio with Carbon Externality (Screening Metric 8)

The table below shows the PAC and TRC test results when the estimated benefits of carbon reduction are included. Carbon was valued at $15 per ton, resulting in a total present value of carbon benefits of $5.1 Million.

Table IV-75. Assisted Home Performance Program: Benefit-Cost Ratios with Carbon

	Program Administrator Cost (PAC) Test	Total Resource Cost (TRC) Test
With Electric and Gas Funding	1.8	1.3

MWh Saved in 2015 (Screening Metric 5b)

Assuming the program functions only for as long as proposed, the Program is expected to achieve 9,600 MWh (cumulative annual) in 2015.

MW of Coincident NYISO Peak Saved in 2015 (Screening Metric 6b)

Assuming the program functions only for as long as proposed, the Program is expected to achieve 2.2 MW (cumulative) of coincident peak reduction in 2015.[79]

Peak Coincidence Factor of MWh Saved in 2015 (Screening Metric 7)

The peak coincidence factor is a measure of the extent to which the MWh savings is concentrated at the time of system peak. The peak coincidence factor for the program is 0.5.[80]

[79] NYSERDA defines coincident on-peak period as being between 12:00 noon to 6:00 PM on summer non-holiday week days.

[80] Peak coincidence factor = annual MWh saved/(MW saved on peak)(8,760 hours). For this equation, annual MWh saved is the cumulative annual savings expected in 2015 if the program is offered only as long as proposed, i.e., Screening Metric 5b.

Number of Participants as a Percentage of Customers in the Class (Screening Metric 9)

The table below shows the number of expected program participants as a percentage of the number of customers in the class. The number of expected program participants represents NYSERDA's best estimate of participation for the current funding request through 2011.

Table IV-76. Assisted Home Performance Program: Participants as a Percentage of Customers in Class

Customer Class	Number of Customers in Class[1]	Number of Anticipated Program Participants	Participants as a Percentage of Number of Customers in Class
Residential – Natural Gas	4,095,085	9,030	0.2%

Sources: DPS Five Year Index Book of Files and DPS Electricity and Natural Gas Retail Access Migration Reports. Electricity figures do not include LIPA, municipal electric utility, rural electric cooperative, or NYPA customers. Gas figures do not include Keyspan/Long Island customers. Retail Access Migration Reports do not separate commercial and industrial customers and label all-such customers as "non-residential". Commercial and industrial customers estimated by NYSERDA.

12. NEW YORK ENERGY STAR® HOMES (NATURAL GAS)

12.1. PROGRAM ELEMENTS

Program Description. New York ENERGY STAR® Homes (NYESH) program is an enhanced version of the US EPA ENERGY STAR® Qualified New Homes program. The New York program provides technical assistance and financial incentives to 1-4 family and low-rise residential home builders and Home Energy Rating System (HERS) Rater Providers. The program encourages the adoption of energy-efficient construction techniques and requires the installation of high efficiency HVAC equipment. A minimum kWh usage reduction is also required, and is obtained through the installation of ENERGY STAR qualified appliances, electronically commutated motors in HVAC equipment and advanced lighting. Homes that successfully earn ENERGY STAR designation use approximately 30% less energy than conventionally-built homes.

This effort is designed to increase the market penetration of NYSERDA's existing program, currently funded with SBC funds. In 2007, penetration rates of individual regions were as high as 29.1% in the Finger Lakes region and 28.6% in the Western region, with an overall average participation rate of 13.1% across the entire **New York Energy $mart**[SM] program area. This proposal will also enable builders to pursue higher efficiency gas equipment. In addition, builder incentives will be enhanced for homes that incorporate proven, cost-effective renewable technologies such as solar hot water systems.

Demand Reduction and System Benefits. Ancillary peak demand savings in 2011 attributable to installation of gas measures are estimated to be approximately 246 kW, with total cumulative MWh reductions of 1,725 MWh and 907,968 MMBtu.

Table IV-77. New York ENERGY STAR® Homes: Total Gas Program Expenditures (Projected) 2009-2015 [net of administration and evaluation]

	2009	2010	2011	2012	2013	2014	2015	Total
Annual EEPS Spending	$7.04M	$7.69M	$9.38M	0	0	0	0	$24.11M
Projected Outreach/Marketing costs: $940,000 in 2009, 2010, and 2011.								

Table IV-78. New York ENERGY STAR Homes: Installed MMBtu Impacts (Projected) 2009-2015

	2009	2010	2011	2012	2013	2014	2015
Annual Savings installed in the current year	259,605	288,162	360,202	0	0	0	0
Annual Savings installed in prior years	n/a	259,605	547,767	907,969	907,969	907,969	907,969
Cumulative Annual Savings	259,605	547,767	907,969	907,969	907,969	907,969	907,969

Table IV-79. New York ENERGY STAR® Homes: Ancillary MWh Savings (Projected) 2009-2015

	2009	2010	2011	2012	2013	2014	2015
Annual Savings installed in the current year	496	546	682	0	0	0	0
Annual Savings installed in prior years	n/a	496	1,042	1,724	1,724	1,724	1,724
Cumulative Annual Savings	496	1,042	1,724	1,724	1,724	1,724	1,724

NYSERDA has developed initial evaluation plans with the intention of providing the rigor and reliability necessary for metrics to be used by the NYISO and transmission and distribution system planners. NYSERDA will continue to work with DPS Staff and the EEPS Evaluation Advisory Group to devise final evaluation plans that meet established protocols and produce results that can be used as inputs for system planning and forecasting.

Market Segment Need. In cooperation the U.S. EPA and the Residential Services Network (RESNET), NYSERDA offers a comprehensive assistance package including a tiered cash incentive and cooperative advertising, to participating home Builders and Raters, which is designed to increase awareness of, and participation in the New York ENERGY STAR Homes Program.

The success of the Program has resulted in increased consumer demand in many areas of the State and an increased number of participating home builders. As new home starts have declined across the State since 2004, New York ENERGY STAR Home production has increased from 1,743 completions in 2005 to 2,427 in 2007. This further underscores the consumer awareness and demand for high efficiency housing.

Coordination. NYSERDA will continue working with the natural gas utility service companies operating across the State to maximize their customer offerings and programs, while reducing customer confusion, duplication of services, and administrative expenses. NYSERDA consults regularly with the New York State Builders Association Research and Education Foundation for input on program improvements, ensuring that Programs properly designed and decrease barriers to entry.

The Program Implementation Contractor works with participating builders to quickly and effectively effectuate program changes. The Contractor also assists builders and HERS raters with technical updates to the program, aiding the ramp-up stages of this program and allowing for comprehensive savings as the program expands.

Co-Benefits. In addition to the cost-effective energy savings offered, the Program addresses residential health issues pertaining to indoor air pollutants (focusing on carbon monoxide and other pollutants associated with combustion appliances), ventilation, and moisture control. Homes built to the Program's standard are also less likely to have problems with ice damming, mold or air leakage, resulting in a longer lasting, more durable structure.

The Program's primary goal is to educate home builders and customers while transforming the market to produce substantial improvements in the overall energy efficiency in new construction projects through diverse education opportunities, targeted marketing, and changes in building technology and design

practices. Builder and HERS raters participating in this program advance their skills and use new technologies to improve the overall sustainability and long-term energy savings of homes built today.

Portfolio Balance. The NYESH Program will coordinate with other existing and proposed NYSERDA programs to further enhance KWh savings, and identify opportunities for installation of solar hot water and geothermal heat pump systems. This effort will complement the proposed Green Homes Program.

Depth of Savings. The Program provides opportunities to implement permanent energy efficiency and load management improvements in building envelopes, HVAC systems, lighting, home appliances and domestic hot water production. A New York ENERGY STAR home must be built by a participating builder, have a qualified heating system, contain electrical measures that produce annual electricity savings of at least 500 KWh, fulfill minimum ventilation requirements and attain a Home Energy Rating System (HERS) score of 84 or higher, indicating the home uses at least 30% less energy than a conventionally built home. Homes built through the Program have achieved tested energy savings and greater durability than nonparticipating homes.

Underserved Markets. While traditional energy efficiency programs focus on high profile projects and are limited to large-scale users or geographic boundaries, this Program is a Statewide effort providing significant energy savings to new construction or significantly renovated 1-4 family homes; rental or owner-occupied; and in all geographic locations. There are over 600 participating builders, ranging from large production builders to custom owner-builders. The Program targets households with income levels below 80% of State Median Income (SMI) or 80% of the Area Median Income (AMI); whichever is higher for their county, are eligible for an incentive of $500 toward the purchase of their home.

Commitment. NYSERDA has a network of over 600 builders participating in the Program throughout the State. With additional gas funds NYSERDA will expand the Program to achieve increased MMBtu savings through technical assistance, targeted financial incentives, additional training, and demonstrations for home builders and buyers. While the structure of the program will not significantly change, program participation levels should reach expected levels within 8-10 months

Customer Outreach. NYSERDA maintains an extensive website dedicated to its residential efficiency programs, including the New Homes program, providing a one-stop shopping experience for customers to find information about the program, and participating builders by geographic region.

Participating builders are encouraged to market themselves as New York ENERGY STAR Home Builders through a cooperative advertising incentive. Regional implementation contractors such as the **New York Energy $mart**[SM] Communities Coordinators will provide program outreach services, attend local trade fairs, and generally assist in builder and customer recruiting into the NYESH program.

NYSERDA's established contacts and relationships with trade associations, key stakeholders and contractor groups, such as U.S. EPA, Building Performance Institute, Building Performance Contractors Association, Affordable Comfort Institute, US Department of Housing and Urban Development, National Association of Home Builders, NYS Builders Association, New York State Building Officials Conference, New York State Realtors Association, as well as an extensive list of community-based organizations across the State, and other groups will be used to market the program to these groups and their membership. NYSERDA will coordinate with utilities to market and provide outreach.

Collaborative Approach. The Program was designed through the collaborative effort of NYSERDA staff, industry experts, trade associations, key stakeholders, and environmental groups. NYSERDA actively performs program evaluations from third-party reviewers to address customer concerns, builder interests, and participation and program implementation issues. The program has benefited from over eight years of experience in New York's home building industry.

Fuel Integration. The HERS Scoring system used in the Program does not focus on one fuel type. The scoring methodology examines the whole-building and compares it to an accepted baseline. The technologies incorporated and building techniques used result in overall home energy use reductions.

Transparency. All information regarding the program, including program design, benefit/cost analysis, and supporting data will be made available by NYSERDA on its website. NYSERDA is also working with DPS Staff toward development of a uniform database to further increase transparency with regard to program results.

Procurement. Implementation, marketing and other program service contractors are chosen through NYSERDA's competitive procurement process. The opportunity for builders t become participating builders are posted on www.nyserda.org and www.GetEnergySmart.org.

12.2. EVALUATION

Evaluation Goals

The primary goal of the natural gas component of the NYESH Program evaluation will be verifying reported natural gas savings. Secondary goals include reassessing issues identified in previous process evaluations and conducting a comprehensive baseline study of residential new construction practices.

Brief Overview of the Evaluation Approach

The evaluation approach presented in this section was designed based on NYSERDA's current plans for the design and administration of the natural gas component of the NYESH Program and in the absence of complete knowledge about final evaluation protocols, and potential funding set-asides and plans for overarching evaluation projects that would serve the needs of all EEPS program administrators. Thus, these plans have been prepared in order to afford NYSERDA and its independent contractors flexibility to adapt the evaluation approaches that best suit the program as implemented once a greater understanding is in place regarding final evaluation protocols and funding. NYSERDA's estimated evaluation budget for this program includes a set-aside for developing a full evaluation plan, an effort that will involve DPS Staff and the EEPS Evaluation Advisory Group.

The natural gas component of the NYESH Program described in this plan is an extension of the existing SBC program; thus, in order to maximize cost-effective use of evaluation funds, NYSERDA recommends conducting program evaluations for this proposed natural gas component of the NYESH Program at the same time evaluations are conducted on the SBC element of the program. This plan presents anticipated evaluation activities that, when conducted in a coordinated fashion with the enhanced SBC program evaluation efforts, would result in a more comprehensive evaluation, availability of larger samples, and increased rigor.

Evaluation Budget

NYSERDA expects the evaluation budget for the natural gas component of the NYESH Program to be approximately equal to 5% of the program funding level, less yet-to-be determined funds set aside for Statewide studies and other overarching costs borne by program administrators. The gas portion of the program will be evaluated simultaneously with the electric portion, for which additional enhanced evaluation funding will be available, thus allowing a comprehensive evaluation. This plan describes the anticipated approach for the comprehensive evaluation assuming additional funding. In order to effectively evaluate the NYESH Program, including the natural gas efficiency component, it is anticipated that approximately 50% of evaluation funding will be allocated to impact evaluation; 20% to process evaluation and 30% to market evaluation.

Evaluation Schedule

The table below shows major evaluation studies that are planned for the NYESH Program and the time frame for their expected completion. Early on in 2009, process and market evaluations will be completed in order to provide a solid basis upon which to ramp up the natural gas efficiency program element. Measurement and verification and net-to-gross studies will be completed in 2010 and 2012. The later years of the program will also include updates to process and market studies.

Table IV-80. New York ENERGY STAR® Homes: Evaluation Schedule 2009-2012

Evaluation Element	Expected Completion			
	2009	2010	2011	2012
M&V (Impact)		X		X
Net-to-Gross (Impact)		X		X
Process Evaluation	X		X	
Market Evaluation	X			X

Impact Evaluation

Measurement and Verification

M&V activities are expected to involve analysis of the detailed project files already available through the program, and use savings values derived from a baseline study of existing homes (if such a study is supported as a statewide effort by all EEPS program administrators). The M&V evaluation is expected to involve billing analysis using one year of billing data from participant homes to adjust program estimates derived from DOE-2 files; this adjustment will account for occupant behavior. Then models will be rerun substituting values for key measures (HVAC, shell, etc.) derived from the as-built baseline; the difference will be the gross savings from the program. If the as-built baseline data are not available, NYSERDA will instead use the Energy Conservation Construction Code of New York State as the baseline in this analysis. Enhanced evaluation funding provided for the SBC NYESH Program would further supplement this proposed approach and result in a more comprehensive evaluation, including electric savings.

Efficient sample sizes will be chosen to meet a 90/10 confidence/precision level statewide. If budget permits, the sample could be expanded to meet 90/10 at the utility territory level. Data will be collected and analyzed by NYSERDA's independent contractors following established evaluation protocols. Billing analysis will occur in 2010 and again in 2012.

Net-to-Gross

NYSERDA intends to explore participant and nonparticipant spillover and participant freeridership using an enhanced self-report survey process with multiple decision-makers including participating, partial participating, and nonparticipating homeowners, builders, subcontractors, and distributors. These alternative methods will be used to derive a final triangulated net-to-gross (NTG) ratio estimate that will offer a high level of construct validity. Enhanced evaluation funding available for the SBC NYESH Program would further supplement this proposed approach and result in a more comprehensive evaluation, including electric savings.

Sample sizes will be calculated to meet 90/10 confidence and precision statewide. Should additional funds be available, 90/10 confidence and precision at the utility level may be possible. Examinations will be made to assess self-selection bias between the participating and nonparticipating matched groups. Data will be collected and analyzed by NYSERDA's independent contractors following established evaluation protocols. Net-to-gross analysis will occur in 2010 and again in 2012.

Process Evaluation

Previous process evaluations of the SBC-funded NYESH Program have found that implementers believe ENERGY STAR® homes are more energy-efficient, comfortable, and durable; participating builders believe the program has helped them differentiate themselves in the marketplace; and most home buyers have been very satisfied with their homes. In addition, some recommendations were highlighted, including a recommendation to ensure effective communication among all parties, especially when program changes are made, and how to expand the pool of HERS raters. Finally, prior evaluations found that implementers, builders, and home buyers all could benefit from having more feedback about the actual performance of ENERGY STAR® labeled homes. A process evaluation conducted in conjunction with the SBC-funded program will re-assess these issues using larger samples and greater rigor than previous studies.

Planned activities will likely include interviews with NYSERDA staff and program implementers, and participating and nonparticipating builders and homeowners. To the extent possible, the results will be differentiated by downstate and upstate activities. Enhanced evaluation funding available for the SBC NYESH Program would further supplement this proposed approach and result in a more comprehensive evaluation.

Samples for this process evaluation effort will be drawn from sources such as program databases, program records, etc. As appropriate, all quantitative data will achieve 90/10 confidence and precision. Data will be collected and analyzed by NYSERDA's independent contractors following established evaluation protocols. Issues identified during the process evaluation will be generated into actionable recommendations and provided to NYSERDA staff and program implementers. Follow-up will occur with program staff and implementers to address the recommendations.

The initial process evaluation will be conducted approximately six months following the implementation of gas EEPS funds (2009). A second process evaluation could be performed in 2011 to further assess highlighted issues and recommendations.

Market Evaluation

An initial task in the market evaluation is to develop a program theory and logic model that will take into account the changing market in relation to the program's higher savings goals and, potentially, new program partners or choices among programs for potential participants. NYSERDA's independent evaluation contractors will work with program staff to identify expected program outputs and outcomes and the indicators through which they can be measured, which will guide future evaluation efforts.

Another important evaluation element for the NYESH Program, supporting both market and impact evaluation efforts, is a baseline study of current residential new construction practices in New York for non-participants, given that the program already has information on building practices for participants. With a program goal of increasing market penetration of the program in advance of revised codes and standards, an accurate baseline of the residential new construction market should be established. Interviews could then be done with a sample of participating and nonparticipating builders to assess common practices on a number of specific energy measures (e.g., high-efficiency insulation and sealing, ENERGY STAR windows, doors, and appliances, etc.) and examine progress made toward achieving the

expected outputs and outcomes specified in the program theory and logic model. Then, a sample of those interviewed could be selected to conduct site visits and assess whether the homes are performing as expected.

NYSERDA believes this type of baseline study would benefit all EEPS program administrators and therefore proposes that it be undertaken in a jointly funded manner with all program administrators contributing. The full study, including both the site visit and survey components, cannot be conducted by NYSERDA alone within the evaluation budget for the NYESH Program. If the residential new construction baseline is not ultimately selected as one of the statewide studies to be funded by all program administrators, then NYSERDA will conduct the telephone interview component described above, but not the site visits.

Approximately 30% of the overall evaluation budget for the NYESH Program will be allocated to the basic telephone interview activities and analysis. Additional funding from NYSERDA's set aside for overarching evaluation studies could be used to support a statewide baseline study. In addition, evaluation funding provided through SBC funds could further supplement this NYSERDA-only approach and result in a more comprehensive evaluation for the New York ENERGY STAR Homes Program as a whole.

Surveys with market actors would meet 90/10 confidence/precision statewide. If budget permits, the sample could be increased to meet 90/10 confidence/precision at the utility level and/or on an upstate/downstate regional basis. Data will be collected and analyzed by NYSERDA's independent contractors following established evaluation protocols.

NYSERDA recommends developing the revised program theory and logic model as well as conducting the proposed baseline study in 2009. A follow-up study could then be conducted in 2012 to determine any changes in the residential new construction market, to examine progress made toward achieving the expected outputs and outcomes specified in the program theory and logic model, and to provide as-built baseline values that would support the impact analysis.

Evaluation Plan Variations

Given the level of uncertainty regarding final evaluation protocols, statewide studies to be conducted by all program administrators, and funding levels needed to support overarching evaluation studies and activities, the evaluation plan presented in this section should be viewed as scalable and flexible. If evaluation funding needed to be reduced for this particular program, 90/10 confidence and precision would not be attained at the utility level and the depth of questions in surveys and interviews would likely be reduced. With increased funds, NYSERDA would achieve 90/10 confidence/precision at the utility territory level and/or on an upstate/downstate regional basis.

12.3. Program Selection Criteria

This section provides screening metrics for the ENERGY STAR Homes Program required per Appendix 3 of the Commission's June 23, 2008 EEPS Order. As discussed earlier, NYSERDA intends to provide screening metrics related to electric and gas rate impacts (Screening Metrics 2, 3, 4, 8, 10, 11, and for the suite of programs Screening Metrics 1 and 2) in a separate supplemental filing. Also, for reasons described earlier, estimated MWh and coincident peak MW reductions in 2015 if the program continues to expand and extends through 2015 (Screening Metrics 5a and 6a) are not included.

Total Resource Cost Test Benefit/Cost Ratio (Screening Metric 1)

The tables below show the resource savings and average measure life used as inputs for the benefit/cost analysis, the present value of the costs and benefits used in the analysis, and the Program Administrator Cost (PAC) and Total Resource Cost (TRC) results. Appendix A provides additional information on benefit/cost definitions and inputs. The ENERGY STAR Homes Program benefit/cost analysis was based on combining the unexpended SBC funding with the gas funding requested in this proposal.

Table IV-81. ENERGY STAR Homes Program: Cumulative Annual Savings

	Program Years	Average Life of Electric/Gas Measures (Years)	Cumulative Annual GWh/Year	Cumulative MW	Cumulative Annual Fuel Savings (MMBtu)	% Downstate (Con Edison)
With Electric and Gas Funding	2009-2011	13/18	17.3	2.5	908,000	5%

Table IV-82. ENERGY STAR Homes Program: Program and Participant Costs ($2008)

	Present Value of Program Administrator Cost ($Millions)	Present Value of Program and Participant Costs ($Millions)	Present Value of Resource Benefits ($Millions)
With Electric and Gas Funding	$33.4	$65.8	$193.5

Table IV-83. ENERGY STAR Homes Program: Benefit-Cost Ratios

	Program Administrator Cost (PAC) Test	Total Resource Cost (TRC) Test
With Electric and Gas Funding	5.8	2.9

Total Resource Cost Test Benefit-Cost Ratio with Carbon Externality (Screening Metric 8)

The table below shows the PAC and TRC test results when the estimated benefits of carbon reduction are included. Carbon was valued at $15 per ton, resulting in a total present value of carbon benefits of $10.3 million.

Table IV-84. ENERGY STAR Homes Program: Benefit-Cost Ratios with Carbon

	Program Administrator Cost (PAC) Test	Total Resource Cost (TRC) Test
With Electric and Gas Funding	6.1	3.1

MWh Saved in 2015 (Screening Metric 5b)

Assuming the program functions only for as long as proposed, the Program is expected to achieve 17,300 MWh (cumulative annual) in 2015.

MW of Coincident NYISO Peak Saved in 2015 (Screening Metric 6b)

Assuming the program functions only for as long as proposed, the Program is expected to achieve 2.5 MW (cumulative) of coincident peak reduction in 2015.[81]

Peak Coincidence Factor of MWh Saved in 2015 (Screening Metric 7)

The peak coincidence factor is a measure of the extent to which the MWh savings is concentrated at the time of system peak. The peak coincidence factor for the program is 0.79.[82]

Number of Participants as a Percentage of Customers in the Class (Screening Metric 9)

The table below shows the number of expected program participants as a percentage of the number of customers in the class, although a much smaller population is expected to be building a home in any given year. The number of expected program participants represents NYSERDA's best estimate of participation for the current additional gas funding request through 2011.

Table IV-85. ENERGY STAR Homes Program: Participants as a Percentage of Customers in Class

Customer Class	Number of Customers in Class[1]	Number of Anticipated Program Participants	Participants as a Percentage of Number of Customers in Class
Residential - Electricity	6,240,788	15,039	0.2%
Residential – Natural Gas	4,095,085	15,039	0.4%

Sources: DPS Five Year Index Book of Files and DPS Electricity and Natural Gas Retail Access Migration Reports. Electricity figures do not include LIPA, municipal electric utility, rural electric cooperative, or NYPA customers. Gas figures do not include Keyspan/Long Island customers. Retail Access Migration Reports do not separate commercial and industrial customers and label all-such customers as "non-residential". Commercial and industrial customers estimated by NYSERDA.

[81] NYSERDA defines coincident on-peak period as being between 12:00 noon to 6:00 PM on summer non-holiday week days.

[82] Peak coincidence factor = annual MWh saved/(MW saved on peak)(8,760 hours). For this equation, annual MWh saved is the cumulative annual savings expected in 2015 if the program is offered only as long as proposed, i.e., Screening Metric 5b.

V. CROSS-SECTOR PROGRAM PORTFOLIO

1. OVERVIEW

The programs in this section cut across sectors, providing reductions in electricity consumption and demand through more efficient electric transportation systems, improved control over energy demand through "Smart Grid" applications, and the development of a trained and competent workforce to deliver energy savings for all program administrators, Statewide.

The goals of the EEPS are more likely to be achieved with an adequate, readily-available pool of qualified workers to properly install, operate and maintain energy efficiency measures. It is well-understood that to realize the expected savings associated with installed equipment and efficiency measures, installation must be done properly and systems must be properly maintained. An energy efficiency training network is addressing this need, and the consensus of the Workforce Development Working Group and the Governor's Renewable Energy Task Force is that efforts must be expanded to fulfill the EEPS requirements. Eventually, the market forces of supply and demand will drive and sustain workforce development efforts; yet there is a near-term need to ramp up levels of skilled workers until market forces are in effect. The Workforce Development proposal presents a leveraged, comprehensive plan, meeting the workforce needs of all sectors, created with stakeholder input, and which sets the stage for a transition to a market-driven model in the near future.

Management of energy consumption through an automated communication infrastructure also holds much promise for delivering savings. The Smart Grid End-Use Efficiency Program , or "Smart Grid" Program, will incorporate information and analysis from the utility-side of the meter to plan and implement improvements in end-use efficiency and control on the customer-side of the meter. "Smart Grid", or T&D optimization, includes integrated applications on both sides of the meter that rely on robust two-way communications, advanced sensors and information technology to improve the efficiency, reliability and safety of electric power delivery and use.

Electric transportation makes up a sizable portion of New York City's electric load – while providing economical and efficient movement of people and goods. However, the systems are based on old technology and provide significant opportunity for efficiency improvements. Upgrading of systems is considered one of the single largest potential opportunities for electric efficiency improvements in the NYC metropolitan area. The Enhanced Electrified Rail program will support permanent installation of equipment for demonstration purposes, and development and qualification of additional advanced technologies for the electrified rail system. This is expected to lead to full-scale investment in these technologies by the NYC Metropolitan Transportation Authority and New York Power Authority.

2. WORKFORCE DEVELOPMENT

2.1. PROGRAM DESCRIPTION

The aggressive goals of the EEPS will benefit from a readily-available pool of qualified workers to install, operate, and maintain energy efficiency measures. This workforce can minimize barriers to program implementation are minimized and further ensure that sustained, long-term energy savings gained through the EEPS programs are realized. An energy efficiency training network has begun to address this need, however the consensus of the Workforce Development Working Group (convened by the Department of Public Service) and the Governor's Renewable Energy Task Force is that efforts must be rapidly expanded to adequately fulfill the EEPS requirements.

The energy efficiency industry is facing with a shortage of competent and certified workers across the job spectrum. There is limited access to on-the-job training opportunities and accredited training facilities to provide initial and continuing education courses in energy systems and efficiency practices. Workers, particularly those just entering the field, often lack the financial resources to pursue the training and certification opportunities needed to move along the training continuum that provides the assurance of the ability to earn a living wage through participation in the energy efficiency job market. Discussions at Working Group meetings suggest that, while market forces will begin to address the need for qualified workers as the demand grows, the goals of the EEPS require some level of interim initiative. Resources to develop the infrastructure and encourage larger numbers of candidates are needed immediately to "jump start" these efforts so they coincide with the ramp up of efficiency programs.

NYSERDA has joined with the New York State Department of Labor (DOL) to develop this comprehensive workforce development (WFD) proposal that will enable the strategic expansion of a qualified energy efficiency workforce, drawing from existing workers, emerging workers, and underemployed or idle workers, that will be trained and deployed to help meet the EEPS goals.

At approximately $5.4 million per year (about 1.5% of overall EEPS funding), this Program budget is approximately $16,255,050 for the 2009-2011 period. This level of investment to support workforce development strategies will leverage an additional $11 million of funding being provided by the DOL that will help identify, screen, recruit, and place trained workers in jobs that follow clear career pathways and will strengthen the ability to develop and retain these workers in New York State. The potential workforce need created by the EEPS can be illustrated by U.S. DOE research which estimates that 52 jobs are created for every $1 million invested in weatherization programs. While only illustrative, this result would extrapolate to the creation of a skilled workforce of approximately 17,000 jobs per year to support a $330 million annual investment in energy efficiency.

There is a distinction between program the training outlined under the utility EEPS proposals and the Workforce Development training now proposed. Utilities participating on the DPS Workforce Development Working Group have expressed that the Program Marketing and Trade Ally component of their program proposals represent only a minimum level of programmatic and trade ally training necessary to support program implementation.

Comprehensive Training Initiatives. This proposal seeks to establish a comprehensive training agenda for New York State, supporting energy efficiency programs already approved by DPS, while building in the flexibility to support additional approved programs. In addition to the strategies described below, NYSERDA will issue an open solicitation through which projects and partnerships that respond to specific market needs will be supported.

NYSERDA will work closely with all EEPS program implementers and the DPS Workforce Development Working Group to identify opportunities to expand training and provide training subsidies where appropriate. NYSERDA plans to immediately:

- Expand the Hudson Valley Community College (HVCC) Center for Energy Efficiency and Building Science (CEEBS) training network which currently comprises 10 learning centers by adding several more training locations - especially in New York City, and develop additional training courses and curriculum;
- Work closely with partners such as the City University of New York, Lighting Research Center (LRC), and others to expand the commercial and industrial efficiency training for contractors, providers, architects and engineers, building operators, and facility managers;
- Develop and launch on-line courses and distance learning offered through training partnerships with colleges and universities and other third-party providers;
- Collaborate with the U.S. EPA and other partners to deploy "train-the-trainer" programs to support statewide building performance benchmarking, and new residential energy efficiency technology-based training; and
- Work with manufacturers to develop supplemental curriculum to enhance existing customer training programs, and emphasize energy efficiency, quality installation, and efficient operations and maintenance practices.

Internships and Apprenticeships. On-the-job training will be supported through a significant expansion of internship and apprenticeship programs. NYSERDA will work with colleges, universities, community colleges, labor unions, energy service companies, and others to promote internships within the energy efficiency industry and private sector.[83] These internship and apprenticeship programs give newcomers to the energy efficiency job market the opportunity to work with experienced energy professionals, and obtain "real life" experience. Internships serve as a job-placement mechanism giving energy firms and private-sector businesses the opportunity to hire experienced and trained workers who can quickly help the organizations be more productive and effective.

NYSERDA will build on its work with NYSDOL and the Workforce Development Institute to develop and implement new internships, apprenticeships, and job placement initiatives, particularly through the New York State Apprenticeship program. This program is a national training system administered by NYSDOL that combines paid on-the-job learning and related technical and theoretical instruction in a skilled occupation.

Professional Development and Continuing Education. Continued professional training is needed to support those already in the workforce, increase awareness of new technologies, and support the development of marketable skill sets in a wide variety of new technologies. Expanded technical skills in building systems that affect energy use (heating, cooling, lighting, and ventilation) and tenant comfort (temperature, air quality and illumination) are necessary. As a registered provider under the American Institute of Architects Continuing Education System, NYSERDA administers Continuing Education Units (CEU) credit for courses in high performance design, effective lighting, green building operations and maintenance, classes taught at CEEBS learning centers, and other energy efficiency (and renewable energy) technologies. To further expand career development efforts, NYSERDA will support curriculum development for courses offered through AEE, AIA, BOMA/BOMI, and others, and is working with the

[83] For example, NYSERDA has funded the development of the CUNY Building Performance Laboratory internship program to support the development of a skilled workforce for the building performance sector. Students learn to tailor technical solutions to individual buildings and equipment, determine and document optimum building and energy-system performance, monitor ongoing operations, and analyze data to maintain optimum building and systems performance.

Practicing Engineers Institute (PIE) to secure CEUs for the classes currently taught at CEEBS learning centers.

Promoting National Certifications and Standards. The workforce development initiatives described in this proposal will promote a standard level of competency to achieve the level of quality installation, operation, and maintenance of energy efficiency measures likely needed to support EEPS. Certification programs requiring written and field performance tests ensure quality assurance of the performance capability of industry professionals. Many EEPS-funded programs will require that individuals are able to demonstrate a specific competency level and will require minimum levels of quality assurance to ensure that installed measures perform as expected. NYSERDA will work with the DPS Workforce Development Working Group and other parties to determine the areas where certification is needed, and consider certification strategies that facilitate required levels of quality assurance without limiting the number of available workers supporting new programs. The cost of pursuing certification is a significant barrier to expanding the base of qualified professionals that pursue standard certification. Cost-sharing for training and certification will be provided to encourage a greater number of practitioners to participate.[84] NYSERDA will collaborate with professors and other professional trainers interested in pursuing certification or accreditation to quickly establish trainers to support specific EEPS programs.[85]

NYSERDA will work with the DPS Workforce Development Working Group and others to evaluate existing certifications and develop new certifications as needed. NYSERDA will collaborate with the NYC Office of Long Term Planning and Sustainability, and other entities around the State to evaluate and determine certification needs that support green and energy efficiency policy objectives. For example, NYSERDA has identified the need for development of two new certifications: Quality Building Modeler and Quality Energy Auditor to support high efficiency buildings for new construction and energy auditing, respectively.

Career Pathways in Energy Efficiency. The EEPS provides a unique opportunity to align the activities designed to achieve energy efficiency targets, with the mission of DOL to provide opportunities for New York's existing and emerging workforce, as well as the unemployed and underemployed workers. In particular, DOL's One-Stop Workforce Development System will be used to target workers to participate in the training and certification programs defined in this proposal.[86]

[84] Examples include BPI certification, Association Energy Engineers (AEE) Certified Energy Manager, NCQLP Lighting Certification, USGBC Leadership in Energy and Environmental Design Accredited Professional (LEED AP), North American Technician Excellence (NATE) HVAC certification, and National Association Energy Service Companies (NAESCO) certifications in HVAC and building envelope.

[85] For example, USGBC LEED Accredited Professional training is currently being cost-shared for students and educators in a pilot with Rensselaer Polytechnic Institute (RPI) and will be expanded under this proposal to a network of colleges and universities that have strong building science and engineering programs. Trained students will be placed on internships with contractors, technical assistance providers, and customers working with NYSERDA to implement new construction projects. Another example of effective train-the-trainer efforts to promote national standards in building science for building operators has been NYSERDA's sponsorship of CUNY as an approved provider for Building Operator Certification (BOC) training developed by the Northwest Energy Efficiency Council. As an approved provider, CUNY is able to reach out to local government staff, trade unions, and commercial building owners and managers to deliver BOC training for building operators.

[86] The DOL System currently includes: 33 Local Workforce Investment Areas aligned with the State's 10 economic development regions. Each area is overseen by a Local Workforce Investment Board; 79 One-Stop Centers; a customer base of over 600,000 individuals a year (about 7% of the State's workforce) possessing a wide range of occupational skills across most industries in the state; a statewide web-based inventory of training programs to enhance and develop occupational skills of the State's workforce (encompassing 1,329 training locations and 13,033

The programs administered by DOL through the One-Stop System largely provide skills development and occupational training services to individuals to meet the demand of businesses. DOL has identified renewable energy, energy efficiency and weatherization, as a priority, and directs resources to address the these workforce development. Up to $9 million in One-Stop resources would be directed at serving this sector over the next three years, with an additional $2 million directed to address specific workforce development needs associated with implementing EEPS workforce training initiatives.

DOL, in collaboration the New York State Division of Housing and Community Renewal and NYSERDA, will work with Local Workforce Investment Areas to develop entry level training initiatives. Potential trainees will be screened for skill, proficiency and interest, and then assessed for program readiness (including math ability, knowledge of basic carpentry, etc.). Strong candidates would be recruited and provided training at CEEBS, with the goal of producing 1,000 certified Bachelor of Arts degrees over a three-year period. At the same time, the One-Stop Workforce Development System would provide training in the entry level skills necessary for entry level employment in the energy efficiency sector, and as a beginning for a career pathway to higher skilled employment. This training will be developed to assist individuals with limited energy efficiency experience or training get the basic skills support needed to obtain entry level positions, as well as providing basic efficiency training to skilled practitioners such as carpenters, electricians, window installers, heating and air conditioning technicians.

2.2. DEMAND REDUCTION AND SYSTEM BENEFITS.

Workforce development and training will ensure systems are designed, operated and maintained properly and will contribute to the EEPS program impacts as designed and estimated. As indicated in several studies and reports, there is a significant potential to increase energy savings with training that addresses proper system sizing, installation, and proper matching of components.[87]

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training courses); and the New York State Apprenticeship Program, a national training system that combines paid on-the-job learning and related technical and theoretical instruction in a skilled occupation.

[87] As early as 1999, program evaluators examining the energy savings potential associated with proper installation of energy efficiency equipment have associated quality installation practices and training with greater operating efficiency and performance. The US EPA commissioned a report (Neme, Proctor, and Nadel, 1999) looking at the *"Energy Savings Potential From Addressing Residential Air Conditioner and Heat Pump Installation Problems"*. The report demonstrated that equipment installed by properly-trained HVAC technicians could save an average of 24 percent of energy use in existing homes and 35 percent in new construction. The report also states that the manner in whieh equipment is installed may have a much greater impact on actual operating efficiency that whether or not it has a high-efficiency rating. Further, Neme, Proctor and Nadel point out that studies conducted in 10 different states or regions of the U.S. have found that the average air conditioner or heat pump is oversized by about 50% and nearly one ton of capacity compared to properly-sized systems.

A TXU Electric Delivery Study (Stockard, Audet, Zarnikau, 2007) of installation practices of air conditioner installers between the years 2004-2006 demonstrates that significant savings can be obtained by promoting better installation and sizing practices. This report quantifies the impacts training has on proper duct sealing, attributing deemed energy savings of 17,129 MWh and 11.6 MW in demand savings with proper sealing techniques in 126,500 installations.

A report commissioned by the New York City Mayor's Energy Conservation Steering notes that quality assurance at installation and at regular intervals facilitates the sustainability in savings of energy efficiency measures. The report asserts that training of existing and newly-hired maintenance and facility management personnel on how to recognize and address energy-related equipment and maintenance needs is necessary and that training should address topics such as energy consumption monitoring, and proper operation and maintenance of particular pieces of equipment.

2.3. MARKET SEGMENT NEED

Collaboration with the New York City Office of Long Term Planning and Sustainability and the New York City Economic Development Council has identified a great need to support benchmarking and audit and retrofit legislation.[88] That legislation will affect over 9,000 multifamily buildings representing over 1.4 billion square feet, and 2,100 commercial buildings representing over 600 million square feet. There will be a substantial impact the energy efficiency community in New York City and has the potential to establish a replicable model for enactment throughout New York State.

Expansion of low-income and weatherization programs will require thousands of new practitioners. New programs aimed at increasing the efficiency of new and existing homes and multifamily buildings will require training for new contractors, continuing education for existing contractors, training for building operators, training for code officials and home energy raters.

2.4. COORDINATION

NYSERDA works closely with the Governor's Task Force on Renewable Energy and its Green Jobs initiatives, the DPS Working Group on Workforce Development and many others in identifying workforce training needs and developing the workforce training infrastructure needed to meet these needs.

NYSERDA leveraged millions of dollars in training partner co-funding. Current energy efficiency training partners include Onondaga-Cortland-Madison County BOCES, Broome Community College, Erie Community College, Bronx Community College, Fulton-Montgomery Community College, the Association for Energy Affordability, Westchester Community College, Onondaga Community College, and SUNY Canton. The existing residential energy efficiency training supported by NYSERDA takes place at educational institutions that have quality building trades programs and utilizes existing technical instructional staff to deliver the energy efficiency classes. This arrangement also provides the opportunity for matriculated students to take advantage of these classes. For example, NYSERDA is working with the Center for Sustainable Energy at Bronx Community College to provide a hub for energy efficiency training activities in the metro-New York area using the City University of New York system as a training platform. The training activities will include not only the delivery of energy efficiency training, but also instructor development activities to increase the number of qualified energy efficiency instructors in the region.

NYSERDA also established a partnership with the New York State Weatherization Directors' Association (NYSWDA). Many technicians working for weatherization agencies enroll in NYSERDA-funded energy efficiency classes. This partnership ensures that efforts are not duplicated and that resources are leveraged. It also provides an opportunity for other building technicians to improve their skills at NYSWDA's training facility that includes a classroom, heating lab, and laboratory house. The LRC, headquartered at RPI, provides technical instruction to contractors in the Multifamily Partner Program as well as contractors in NYSERDA commercial programs. Erie Community College (ECC) has applied to have BPI-recognized energy efficiency classes approved at the DOL's One-Stop Center at ECC. If approved, students enrolling in energy efficiency classes will have access to tuition support and job placement assistance.

[88] Proposed Local Law Int. No. 476-A to amend Chapter One of Title 27 the administrative code of the City of New York, in relation to benchmarking the energy and water efficiency of buildings.

2.5. CO-BENEFITS

Economic development is a significant co-benefit of new investment in workforce development. For example, some participating contractors in the Home Performance with ENERGY STAR® Program have grown their businesses significantly, adding both technicians and office staff. Also, a large number of BPI-certified technicians support NYSERDA's low-income programs, such as Assisted Home Performance with ENERGY STAR and EmPower New York℠, as they require certified technicians. In particular, EmPower New York℠, has seen a large increase in demand for its services and more certified technicians are needed to accommodate the demand.

Training centers have realized economic development benefits as they attract new students to participate in new workforce training and certification programs, and several institutions have reported waiting lists for their training and continuing education initiatives. BPI, located in New York, has seen significant growth as it develops new certifications and certifies more practitioners.

2.6. PORTFOLIO BALANCE

All programs, regardless of program administrator or source of funding, will benefit from an expanding and qualified workforce. This component is necessary to achieve a complete program portfolio and the level of funding requested (1.5% of total EEPS funds) is appropriate.

NYSERDA will continue to work with its training and business partners to ensure a balanced portfolio of training across all sectors. In areas where there is a need for additional training areas, NYSERDA can use the annual solicitation to meet those needs. Tuition and certification reimbursements can be adjusted to ensure that the portfolio of training options is balanced to meet the needs of the EEPS. Finally, marketing strategies, placement, and frequency can be adjusted as needed.

2.7. DEPTH OF SAVINGS

Properly trained technicians specify higher efficiency equipment, promote efficiency standards, maximize operations and equipment performance, and facilitate long-term accruals of energy savings. With proper training, practitioners will be better prepared to properly design, install, operate and maintain energy efficiency measures to help ensure that that energy savings are realized. By properly training practitioners how to design, build, or evaluate the "whole building", opportunities will be identified and measures recommended or implemented to improve the performance of the entire home, building, or facility as opposed to looking at single measures. Without proper training, these savings will be lost.

2.8. UNDERSERVED MARKETS

NYSERDA's workforce development plan will address issues of social and environmental justice, in that the jobs created by advancing the goals of the EEPS will clear career pathways out of poverty for low-income individuals and communities of color, from low-skill entry level positions into family-sustaining wage positions.

NYSERDA is working closely with DOL, New York City Economic Development Corporation (NYCEDC), CEEBS, the Association for Energy Affordability and others to ensure that training is available to dislocated workers as well as disadvantaged adults and youths. NYSERDA will also align its programs with the DOL's One-Stop System Workforce Development System to build upon the success of this program in targeting underserved populations. Market needs will be better assessed when the Commission approves the full portfolio of Fast Track Proposals.

2.9. COMMITMENT

Using its existing workforce development programs as a foundation, NYSERDA will ramp up its expanded workforce development programs immediately upon approval and expects to continue these activities through 2011. It is anticipated that the number of students will increase over the entire three-

year period and that the need for a trained qualified workforce to meet EPS goals will continue to drive training for existing contractors. The expanded energy efficiency programs will create a need for more trained building trades' technicians providing strong job opportunities for those students and workers seeking to enter the energy conservation field. This emerging workforce will provide large numbers of students seeking quality energy efficiency training. Based on the infrastructure developed for its existing workforce development programs, NYSERDA will quickly and appropriately respond to meet increased student demand for this technical training.

2.10. CUSTOMER OUTREACH

NYSERDA marketing efforts for workforce training will be significantly ramped up to promote workforce training initiatives and opportunities. NYSERDA will work closely with its partners, such as DPS Staff, the Department of Labor, and others, to market the EEPS training programs and will be a multi-media approach.

A comprehensive workforce training and education web portal will be developed to serve as a central location for information on all residential and commercial training programs and job opportunities within the State. The portal will link to resources offered through the www.GetEnergySmart.org website to recruit students, market training programs, market partnerships with colleges, universities and private companies participating in the internship and apprenticeship programs, and coordinate with entities such as the NYC EDC to educate consumers about the benefits of working with nationally certified contractors and other trained providers.

NYSERDA plans to coordinate with New York City's marketing and customer outreach efforts underway associated with its plaNYC to address energy efficiency workforce issues. The Mayor's Office of Long Term Planning and Sustainability, NYC & Company and the Economic Development Corporation's Energy Policy Department will work with NYSERDA to incorporate workforce issues in their ongoing energy efficiency campaign.

2.11. COLLABORATIVE APPROACH

. NYSERDA works closely with the members of the Governor's Renewable Energy Task Force and the EEPS Workforce Development Working Group and relied on their input in developing this Program. Representatives of the EEPS Workforce Working Group have provided information on training needs, available resources, job placement, student population issues, and funding needs. NYSERDA is a Co-Convener of the EEPS Workforce Working Group.[89]

2.12. FUEL INTEGRATION

. Much of the training for this Program supports a comprehensive, whole- building approach. As students learn to identify and address energy conservation opportunities for both electric and gas utilities, benefits accrue across customer classes and fuel sources.

2.13. TRANSPARENCY

Training evaluation reports, including attendee lists, training schedules, instructor performance evaluations, and other supporting data are available for public review and accessible to other program administrators.

[89] The EEPS Working Group VII members are: the New York State Department of Labor, SUNY Alfred, New York State Department of Public Service, Hudson Valley Community College, Association for Energy Affordability, New York Energy Consumers Council, investor-owned utilities, Siemens, ACE-NY, Conservation Services Group, New York City Economic Development Corporation, and NYSERDA.

2.14. PROCUREMENT

. Workforce development tasks described in this proposal will primarily be implemented by third-party providers that are competitively procured by NYSERDA. New training programs and initiatives that meet new or changing EEPS needs will also be competitively procured.

2.15. BUDGET.

The table below shows the projected Workforce Development Program budget for 2009-2011.

Table V-1. Workforce Development: Budget (Projected) 2009-2011

EEPS	2009	2010	2011	Total
Workforce Development	$6,176,919	$5,526,717	$4,551,414	$16,255,050

	2009	2010	2011	Total
Marketing	710,619	635,817	523,614	1,870,050
Implementer	1,857,411	1,661,894	1,368,619	4,887,924
Incentives	3,537,069	3,164,746	2,606,261	9,308,076

2.16. EVALUATION.

Evaluation Goals: Evaluation goals related to this effort include conducting a joint process and market study to assess awareness of trainings, perceptions of trainings by training participants as well as employers, program penetration, number of jobs created, satisfaction and barriers to participation. An impact evaluation is not planned with evaluation funds set aside for this program, but energy savings impacts resulting from work force training efforts can be examined through evaluations conducted on the associated end-use programs (e.g., Home Performance, Multifamily Performance, etc).

Brief Overview of the Evaluation Approach: The evaluation approach presented in this section was designed based on NYSERDA's current plans for the design and implementation of the Workforce Development Program, and in the absence of complete knowledge about final evaluation protocols, and potential funding set-asides and plans for overarching evaluation projects that would serve the needs of all EEPS program administrators. Thus, these plans have been prepared in order to afford NYSERDA and its independent contractors flexibility to adapt the evaluation approaches that best suit the program as implemented once a greater understanding is in place regarding final evaluation protocols and funding. NYSERDA's estimated evaluation budget for this program includes a set-aside for developing a full evaluation plan, an effort that will involve DPS Staff and the EEPS Evaluation Advisory Group.

Evaluation Budget: NYSERDA expects the evaluation budget for the Work Force Development Program to be approximately equal to 5% of the program funding level, less yet-to-be determined funds set aside for Statewide studies and other overarching costs borne by program administrators. As the Work Force Development Program is not expected to separately count direct energy savings, evaluation funding will be designed to account for the specific needs of the program, and allocated roughly equally to process and market evaluation. Should funding be provided by the NYS Department of Labor, discussions should determine what portion, if any, will be allocated to evaluation. If funds are added for evaluation, they could be used to supplement the proposed activities presented in this plan.

Evaluation Schedule: Process evaluation is expected to occur during each year that the program is operating. During 2009 and 2010, NYSERDA's independent evaluation contractors will work with

NYSERDA evaluation and program staff to develop post-training survey questions for assessing curriculum usefulness and effectiveness for each training program funded by NYSERDA. These surveys will be implemented at the close of each training effort. The evaluation will likely also involve phone interviews with a sample of training participants each year to assess response to the training and assess the level of learning. In 2011, NYSERDA's independent evaluation contractors will conduct a full evaluation of the training effort, including interviews with program staff, trainers, and surveys of a sample of participants and their employers regarding their post-training experience.

Market evaluation is expected to occur in 2009 and again in 2011. In 2009, NYSERDA's independent evaluation contractors will conduct an initial assessment of market needs among energy efficiency services industry employers exploring topics related to staffing needs, required skillsets, availability of skilled labor, and anticipated evolution of the marketplace. In 2011, a follow-up study is expected to assess the degree to which the training efforts have affected the market needs of energy efficiency services industry employers examining time-series trends in the data collected during the first year evaluation effort as well as additional researchable issues identified by earlier evaluation work.

Table V-2. Workforce Development: Evaluation Schedule

Evaluation Element	Expected Completion		
	2009	2010	2011
Process Evaluation	X	X	X
Market Evaluation	X		X

Measurement and Verification and Net-to-Gross: Impact evaluations are not planned for this program. Energy savings impacts resulting from work force training efforts can be assessed through evaluations conducted on the associated end-use programs (e.g., Home Performance, Multifamily Performance, etc). Interviews with market actors who participated in the workforce development training and with those who did not can be used to estimate energy savings impacts due to these efforts.

Process and Market Evaluation. Evaluations of work force training efforts should be grounded in Kirkpatrick's four levels of evaluation for assessing training effectiveness[90]. The four levels address response of the trainee to the training, assessing what was learned, assessing performance in the workplace and estimating the effects of the training on the work place. Addressing these four levels requires both process and market evaluation activities such as surveys and interviews with program implementation staff, NYSERDA program staff, trainers, participating and nonparticipating technicians, and actual and potential employers in the market place and broadly examining the market response to the efforts.

The planned evaluation efforts will assess awareness and knowledge of NYSERDA and other related training efforts in New York, perceptions of the NYSERDA-funded training effectiveness and usefulness, recruitment vs. certification rates, and participant and employer satisfaction. A key component of the

[90] Kirkpatrick. D. *Techniques for Evaluating Training Programs*. Journal for the American Society of Training Directors, 13. 21-26, (1959b).

efforts will be to assess the first year for each training effort and provide feedback to the trainers on student response to the curriculum. As each training effort matures, the evaluation efforts will shift toward examining market response to the training, exploring topics related to employer staffing needs, availability of skilled labor, and anticipated evolution of the marketplace.

The breadth of impact anticipated from workforce training requires a variety of data collection efforts. Sampling strategies will be developed for each training activity to ensure that sufficient feedback is provided such that the program curriculum can evolve effectively. Timing is also critical in that input should be provided to trainers as soon as possible after training efforts are initiated so trainers can improve their curricula based on initial market feedback and also develop a mindset founded on the concept of continual improvement. As the workforce training effort grows, sampling of participants and targeted employers can be conducted at the 90/10 confidence/precision level. Information will be collected from market actor surveys and interviews by NYSERDA's independent evaluation contractors. Data analysis will be conducted by NYSERDA's evaluation contractors following established protocols.

The process evaluation will be conducted at a modest level for 2009 and 2010 to provide on-going feedback regarding the curriculum and training effort implementation and associated participant response. A full scale process evaluation will be completed in 2011. A baseline market study with energy efficiency services industry employers will be conducted in 2009 with a follow-up study conducted in 2011 to examine the effects of the training efforts on the energy efficiency services industry needs and examine longitudinal trends in the baseline parameter measurements.

Evaluation Plan Variations. Given the level of uncertainty regarding final evaluation protocols, statewide studies to be conducted by all program administrators, and funding levels needed to support overarching evaluation studies and activities, the evaluation plan presented in this section should be viewed as scalable and flexible. With reduced funds, NYSERDA would likely reduce the number of evaluation cycles. With enhanced funds, the market assessment anticipated for this project could be conducted at a much broader level to include traditional, non-energy efficiency services industry employers (e.g., architects, engineers, contractors, unions, etc.), but such a study would require statewide participation.

3. ENHANCED ELECTRIFIED RAIL PROGRAM

3.1. PROGRAM ELEMENTS

Program Description

The Enhanced Electrified Rail Program (Program) will achieve savings of grid-supplied electric energy (MWh). A recent assessment of the energy efficiency potential associated with introduction of new technology and advanced energy controls in the New York City rail system indicates that over 500,000 MWh in annual energy savings could be cost effectively achieved. This represents one of the single largest potential opportunities for electric efficiency improvements in the NYC metropolitan area.

This Program will sponsor permanent installation of equipment developed in the program (for example, energy-efficient track de-icing, a technology previously developed through the SBC program). The Program will also develop and qualify additional advanced technologies for the electrified rail system (examples include more efficient electrical conductors and electric insulators). In addition to the immediate benefits derived from installed measures, The Program will deliver "real world" experience with systems in an effort to inspire wide-scale adoption by the Metropolitan Transit Authority (MTA), or confirm payback period aspects as a means of attracting New York Power Authority (NYPA) financing.

It is anticipated that after a few years of simultaneously installing equipment, such as track de-icers and additional technologies, track de-icers subsidies will no longer be necessary and the newly-qualified technologies will be appropriate for permanent installations.

Program Goals and Objectives .

The Program will deliver permanent installation of energy-efficient equipment with an anticipated lifespan of 20 years. Electric savings attributable to The Program will also assist with alleviating grid constraints and preventing electric losses otherwise attributable to transmission and distribution (T&D) resistance in the highly constrained New York City T&D load pocket. Each year The Program will install a limited number of systems in the MTA electrified rail network.

Program Theory.

The Program will use an annual competitive solicitation, allowing NYSERDA to select the most promising projects to deliver the expected savings and additional technologies for development and qualification. Milestone-based contracts will be issued, and for those projects involving permanently-installed equipment, the majority payment will be tied to the installation and commissioning of the equipment. Contracts will include rigorous measurement, verification, and data reporting requirements. Program design and administration will be subject to change contingent upon marketplace response (for example, the quantity and quality of proposals received).

Anticipated Spending and Savings.

With an annual program budget of $5,376,344 (electric funds), approximately $5,000,000 will be earmarked for incentives. Annually, The Program will install a limited number of systems with collective savings of approximately 20,000 MWh/yr. Approximately half of the program budget will be used to permanently install equipment (and may be pursued as a single contract); the other half will be used to develop/qualify additional technologies. Projects permanently installing equipment will be eligible to receive up to 50% of the overall cost of the project. Projects developing/qualifying additional technologies will be eligible to receive $500,000 or 50% of the overall cost of the project, whichever is less.

Table V-3. Enhanced Electrified Rail Program: Total Expenditures (Projected) 2009-2015 [net of administration and evaluation]

	2009	2010	2011	2012	2013	2014	2015	Total
Annual EEPS Spending	$5.0M	$5.0M	$5.0M	0	0	0	0	$15.0 M
Note: There is no marketing budget for this program.								

Table V-4. Enhanced Electrified Rail Program: Installed MWh Impacts (Projected) 2009-2015

	2009	2010	2011	2012	2013	2014	2015
Annual Savings installed in the current year	0	20,000	20,000	20,000	0	0	0
Annual Savings installed in prior years		n/a	20,000	40,000	60,000	60,000	60,000
Cumulative Annual Savings		20,000	40,000	60,000	60,000	60,000	60,000

NYSERDA has developed initial evaluation plans with the intention of providing the rigor and reliability necessary for metrics to be used by the NYISO and transmission and distribution system planners. NYSERDA will continue to work with DPS Staff and the EEPS Evaluation Advisory Group to devise final evaluation plans that meet established protocols and produce results that can be used as inputs for system planning and forecasting.

Program Schedule.

Program launch in Q1 2009 with one-year lagtime before permanently-installed equipment is installed/operational. Operate the program for three (3) years (CY 2009 – CY 2011).

3.2. DEMAND REDUCTION AND SYSTEM BENEFITS:

It is anticipated that the measures developed and deployed in this program will result in permanent verifiable load reductions to the Con Edison distribution system. Thus the impact on peak load and system load factor, including metrics can be relied on by the New York Independent System Operator.

3.3. MARKET SEGMENT NEED.

The MTA's subway and commuter rail system is a 1,100 MW load served by the Con Edison distribution system, and annually consumes over 2 billion kilowatt-hours of electricity in the New York Metropolitan load pocket. There are no other programs focused on reducing this extremely large load.

3.4. COORDINATION.

There are no programs in New York focused on introducing new energy efficient technologies for the MTA's electrified rail system. Neither the MTA nor NYPA (the MTA's primary electric provider) have programs focused on innovative ways to reduce this large load. NYPA is prepared to finance energy efficiency measures based on shared savings, however these measures must first be developed and

verified. This program provides that technology verification and initial financial incentive necessary for early stage products to meet the return on investment criteria required by NYPA. Given the limited funding requested here, this program will not finance full build-out of the measures. Rather, it will characterize risk, demonstrate technology, and enable MTA and/or NYPA to make subsequent investments needed to achieve what is estimated to be a 500,000 MWh per year efficiency savings in New York City.

3.5. CO-BENEFITS.

Load reductions in the J and K areas improve reliability and reduce cost for all customers in those areas. Cost reductions and improvements to the performance of public transit systems benefit New York tax payers that subsidize the system and all residents. New York State business will be utilized to develop and manufacture the products deployed in the program creating employment and increased economic activity in the State.

3.6. PORTFOLIO BALANCE.

Not applicable.

3.7. DEPTH OF SAVINGS.

Not applicable.

3.8. UNDERSERVED MARKETS.

Refer to Coordination discussion above.

3.9. COMMITMENT.

A minimum of a five year commitment is necessary to develop and deploy a technology within the electrified rail system.

3.10. CUSTOMER OUTREACH.

Participation in the program will be encouraged through the marketing of competitive solicitations to stakeholders.

3.11. COLLABORATIVE APPROACH:

The program has been developed in consultation and in conjunction with the MTA, NYPA and potential technology providers.

3.12. FUEL INTEGRATION.

Not applicable.

3.13. TRANSPARENCY.

The program will be transparent regarding the program, including program design, benefit/cost analysis, and supporting data, are available for public review and accessible to other program administrators.

3.14. PROCUREMENT.

Each activity will be procured through competitive processes except to the extent they are performed directly by the program administrator.

3.15. EVALUATION.

The evaluation approach for early demonstrations of technologies necessitates flexibility; work varies with the technology and project types/stages such as product development/qualification, demonstration, and business development. This program will demonstrate products developed under SBC (such as a

"track de-icing" product) with energy savings; the demonstration is expected to motivate the Metropolitan Tranist Authority (MTA) to widely deploy the technology and evaluation will verify the project's capabilities.

Subsequent project technologies in earlier stages of development, selected through annual competitive solicitations, may not produce near-term savings and some projects may not prove successful. An evaluation will be conducted for each technology, with evaluation plans being tailored for the individual technologies as they are selected; consequently, the proposed evaluation plan presented here is general in nature and will evolve as the program develops.

Evaluation Goals

The evaluation goals for permanently installed energy efficient technologies are two fold: (1) to ensure rigorous impact evaluation of the claimed electricity (MWh) and associated demand (MW) savings, and (2) to collect feedback from MTA employees on their perceptions of and satisfaction with the technology's performance. The evaluation goals of the technologies yet-to-be-chosen will be determined based on the technology and its stage of development.

Brief Overview of the Evaluation Approach

The evaluation approach presented in this section was designed based on NYSERDA's current plans for the Enhanced Electrified Rail Program, and in the absence of complete knowledge about final evaluation protocols, and potential funding set-asides and plans for overarching evaluation projects that would serve the needs of all EEPS program administrators. Thus, these plans have been prepared in order to afford NYSERDA and its independent contractors flexibility to adapt the evaluation approaches that best suit the program as implemented once a greater understanding is in place regarding final evaluation protocols and funding. NYSERDA's estimated evaluation budget for this program includes a set-aside for developing a full evaluation plan, an effort that will involve DPS Staff and the EEPS Evaluation Advisory Group.

Permanently installed technologies will undergo impact evaluation to verify the claimed annual electricity (MWh) and associated demand (MW) savings. Additionally, the process evaluation will assess the technology and possible further adoption as judged by MTA employees. The evaluation approach for the new technologies will be determined once the technologies are selected. As the MTA is expected to be the only customer, these will be census evaluations.

Evaluation Budget

NYSERDA expects the evaluation budget for the Enhanced Electrified Rail Program to be approximately 5% of the program funding level, less yet-to-be-determined funds set aside for statewide studies and other overarching costs borne by program administrators. It is expected that the Enhanced Electrified Rail Program evaluation budget will be designed to account for the specific needs of the program, and allocated primarily to impact evaluation (65%) with the remainder to process evaluation.

Evaluation Schedule

Installed equipment needs to be in operation for a minimum of one full year to assess its performance, reliability, and operations and maintenance (O&M). Scheduling must take into consideration if a technology is operational only part of year, *i.e.* seasonal. For example, the performance of the de-icer must be evaluated during extreme cold and snow; necessitating the time frame be late 2010 and early 2011, with commencement of any necessary pre-installation visits in winter 2009. The table below shows the main evaluation components and the expected timing of their completion.

Table V-5. Enhanced Electrified Rail Program: Evaluation Schedule

Evaluation Element	Expected Completion		
	2009	2010	2011
M&V (Impact)	X		X
Process Evaluation	X	X	X

Impact Evaluation

Impact evaluation of the Enhanced Electrified Rail will consist of measurement and verification only. Net-to-gross analysis will not be performed for reasons cited below.

Measurement and Verification

The de-icer requires pre and post site visits with extensive long-term energy use or metered data both before and after installation. The specificity of energy use data that might already be available needs to be assessed. This would be used to further develop the impact evaluation plan and to determine what extent energy use data (along with weather and operating data) could be used to conduct the impact evaluation versus the need and extent of metering data. Consistency and reliability of equipment performance under varied conditions may also be assessed.

Energy use data must first be assessed for its appropriateness in the development of calibrated engineering. The evaluation plan development will likely involve such an assessment. Evaluation of this program could require long-term metering/data collection at the site both before and after installation. Data to be collected and the methodology will be determined with NYSERDA's independent contractors using established evaluation protocols as applicable to evaluating this specialized technology and circumstances.

Analysis may include research to estimate impacts on the specific transmission congestion points targeted and MW impacts. NYSERDA and its independent evaluation contractors will include the EEPS Evaluation Advisory Group (EAG) and the DPS evaluation advisors in the evaluation plan development to the extent these specialized technologies and circumstances require specialized evaluation designs and analysis and to ensure that the evaluation needs for the EEPS are met.

Net-to-Gross

Here, as in most circumstances of early demonstrations of technologies, net-to-gross does not apply. Freeridership does not occur for technologies that would not exist or would not be accepted into commercial applications without investments in technology development and early demonstration. Also, while the concept is similar to spillover, technology replication is more limited and part of program design and intent; consequently, replication will be assessed in the impact evaluation.

Process Evaluation

The process evaluation will involve working with employees at the site before installation (such as MTA employees for the de-icing technology) to establish a process to provide ongoing feedback so that real time concerns/points of interest can be incorporated in the process analysis.

A primary goal of early demonstration of technologies programs is to assess a technology and to identify lessons learned. Feedback in these areas will be an important part of this continual process evaluation effort.

The evaluations will also include interviews with program staff, the product developer, as well as test site contacts. These site contacts are those who are regularly in a position to assess the day-to-day operation of the equipment, training to operate the technology, O&M, reliability, and impact on other equipment.

The process evaluations will: identify issues of data reliability for the impact evaluation; develop a program theory and logic model for the program as implemented; and provide actionable recommendations on the feasibility of the technology and will incorporate lessons learned to inform future program development efforts.

Data collection and analysis will be conducted by NYSERDA's independent contractors based on established evaluation protocols and approved evaluation plans. With pre-installation contacts beginning in 2009 and new technologies yet to be solicited, process evaluations are anticipated to occur in 2009, 2010, and 2011.

Evaluation Plan Variations

Given the level of uncertainty regarding final evaluation protocols, statewide studies to be conducted by all program administrators, and funding levels needed to support overarching evaluation studies and activities, the evaluation plan presented in this section should be viewed as scalable and flexible. Although measurement and verification of electric savings is critical, the evaluation could also examine each technology's viability for potential for commercialization. If NYSERDA's evaluation funding for this program were reduced, the process evaluation would be scaled back by limiting the number of interviews. Conversely, if this program were to be allocated more of NYSERDA's evaluation funding, process evaluation could be expanded to capture quantitative data.

3.16. PROGRAM SELECTION CRITERIA

This section provides screening metrics for the Enhanced Electrified Rail Program required per Appendix 3 of the Commission's June 23, 2008 EEPS Order. As discussed earlier, NYSERDA intends to provide screening metrics related to electric and gas rate impacts (Screening Metrics 2, 3, 4, 8, 10, 11, and for the suite of programs Screening Metrics 1 and 2) in a separate supplemental filing. Also, for reasons described earlier, estimated MWh and coincident peak MW reductions in 2015 if the program continues to expand and extends through 2015 (Screening Metrics 5a and 6a) are not included.

Total Resource Cost Test Benefit/Cost Ratio (Screening Metric 1)

The tables below show the resource savings and average measure life used as inputs for the benefit/cost analysis, the present value of the costs and benefits used in the analysis, and the Program Administrator Cost (PAC) and Total Resource Cost (TRC) results. Appendix A provides additional information on benefit/cost definitions and inputs.

Table V-6. Enhanced Electrified Rail Program: Cumulative Annual Savings

	Program Years	Average Life of Electric/Gas Measures (Years)	Cumulative Annual GWh/Year	Cumulative MW	Cumulative Annual Fuel Savings (MMBtu)	% Downstate (Con Edison)
Electric Funding Only	2009-2011	20	60.0	--	--	100%

Table V-7. Enhanced Electrified Rail Program: Program and Participant Costs ($2008)

	Present Value of Program Administrator Cost ($Millions)	Present Value of Program and Participant Costs ($Millions)	Present Value of Resource Benefits ($Millions)
Electric Funding Only	$15.4	$28.9	$80.5

Table V-8. Enhanced Electrified Rail Program: Benefit-Cost Ratios

	Program Administrator Cost (PAC) Test	Total Resource Cost (TRC) Test
Electric Funding Only	5.2	2.8

Total Resource Cost Test Benefit-Cost Ratio with Carbon Externality (Screening Metric 8)

The table below shows the PAC and TRC test results when the estimated benefits of carbon reduction are included. Carbon was valued at $15 per ton, resulting in a total present value of carbon benefits of $5.9 Million.

Table V-9. Enhanced Electrified Rail Program: Benefit-Cost Ratios with Carbon

	Program Administrator Cost (PAC) Test	Total Resource Cost (TRC) Test
Electric Funding Only	5.6	3.0

MWh Saved in 2015 (Screening Metric 5b)

Assuming the program functions only for as long as proposed, the Program is expected to achieve 60,000 MWh (cumulative annual) in 2015.

MW of Coincident NYISO Peak Saved in 2015 (Screening Metric 6b)

Some projects funded through the program will provide savings only in the winter. Therefore, coincident savings were not estimated.[91]

Peak Coincidence Factor of MWh Saved in 2015 (Screening Metric 7)

See above.

Number of Participants as a Percentage of Customers in the Class (Screening Metric 9)

The Enhanced Electrified Rail Program is intended to assist a single customer – the Metropolitan Transportation Authority.

[91] NYSERDA defines coincident on-peak period as being between 12:00 noon and 6:00 PM on summer non-holiday week days.

4. SMART GRID END USE EFFICIENCY

4.1. PROGRAM ELEMENTS

Program Description.

"Smart Grid" end-use efficiency improvements address the challenges and opportunities that flow from an optimized transmission and distribution (T&D) system.[92] In the program, end-user improvements will be chosen that incorporate information and analyses from the utility-side of the meter to allow enhanced control of electricity use on the customer-side of the meter. Smart Grid and T&D optimization include integrated applications that rely on robust two-way communications, advanced sensors, and information technologies to improve the efficiency, reliability, and safety of power delivery and use. The June 23, 2008 Order assigns utilities the task of investigating sources of system losses and identifying potential measures to reduce system losses and optimize system operations.[93] The Order states that some solutions to ameliorate system loss may involve installation of equipment by end users.

The utility T&D loss efffort will result in individual utility reports to the Commision this December. A technical conference, held in July, scoped out a strategy for the proceeding and included reports by DPS Staff, utilities, NYISO and others providing an overview of system operations and the current state of knowledge. Presentations also included the customer perspective as well as local load factor considerations. Consolidated Edison provided information showing overall system efficiency for each component of the overall electric power sector: generation (33%), T&D (93%) and customer end-use (15-45%); as well as the seasonal and non-linear nature of T&D losses demonstrating disproportionate losses during summer and on-peak periods.

This Progam addresses the nexus where significant end-use opportunities intersect with the time and location of high T&D system losses. This program will result in installations of technical options such as enhanced building management systems and controllable ballasts for the commerical and industrial sector that deliver both kWH and kW savings. For the residential sector, options include controllable thermostats for central and for room air conditioners, electric domestic hot water, pool pumps and home energy management systems to deliver both kWh and kW savings. The program design is intended to address direction provided in the Order that both efficiency and demand reduction are critical objectives, with impacts demand, particulaly in constrained areas, as an important criterion.

Final program design will encompass input from stakeholders, including DPS, utilities, EPRI and NYISO; and be informed by the utility reports provided in December. Stakeholder discussions and reports will focus aggregated end-use efficiency and control projects on the time frames and in the locations of maximum benefit.

4.2. DEMAND RESPONSE AND SYSTEM BENEFITS

Project installations will be targeted based on information provided by utilities regarding constrained areas. The program will target these areas for energy efficiency measures that result in approximately 1,600 kW of peak load reduction. When efficiency measures are installed, controls and communications equipment will also be installed to enable curtailment of an additional 8,000 kW of peak load. Advanced

[92] Deploying the Smart Grid became the policy of the United States with passage of Title 13 of the Energy Independence and Security Act of 2007.

[93] Case 08-E-0751 Proceeding on Motion of the Commission to Identify the Sources of Electric System Losses and Means of Reducing Them.

communication capabilities will equip contractors and customers to exploit real-time electricity pricing, incentive-based or emergency load reduction signals.

Table V-10. Smart Grid End-Use Efficiency: Total Program Expenditures (Projected) 2009-2015

Annual EEPS Spending	2009	2010	2011	2012	2013	2014	2015	Total
	$.34M	$4.37M	$6.64M	$0	$0	$0	$0	$11.35M
Projected Outreach/Marketing costs: $0.25M in 2009; $0.25M in year 2010; $0.67M in 2011.								

Table V-11. Smart Grid End-Use Efficiency: Installed MWh Impacts (Projected) 2009-2015

	2009	2010	2011	2012	2013	2014	2015
Annual Savings Installed in the Current Year	0	6,500	10,000	0	0	0	0
Annual Savings Installed in Prior Years	0	0	6,500	16,500	16,500	16,500	16,500
Cumulative Annual Savings	0	6,500	16,500	16,500	16,500	16,500	16,500

NYSERDA has developed initial evaluation plans with the intention of providing the rigor and reliability necessary for metrics to be used by the NYISO and transmission and distribution system planners. NYSERDA will continue to work with DPS Staff and the EEPS Evaluation Advisory Group to devise final evaluation plans that meet established protocols and produce results that can be used as inputs for system planning and forecasting.

4.3. MARKET SEGMENT NEED

Customers indicate a growing interest in gaining control of their energy consumption and cost, reliability of supply, reducing associated environmental impacts, and are increasingly savvy with information technology. The detailed utility T&D information to be provided later this year will further define the extent and locations where this effort will be of the greatest benefit.

4.4. COORDINATION

Coordination with utilities is important to the success of the Program and NYSERDA will build on previous successful efforts in this area such as the many demand response programs and projects and the implementation of Consolidated Edison's controllable thermostat program for central air conditioning. Complimentary utility resources as well as the identification and details regarding load-constrained areas, and if cost-effective, performance payments similar to distribution and load relief programs. Should similar programs be proposed or approved, more extensive coordination will be undertaken.

4.5. CO-BENEFITS

Smart Grid technologies incorporate consumer equipment and behavior in the design, operation, and communications protocols in the Grid. Implementing Smart Grid technologies enables consumers to

control "smart appliances" and "intelligent equipment" in homes and businesses, permits interconnecting energy management systems in "smart buildings," and enables consumers to improvement energy use management and, thus, reduce energy costs. Appropriately targeted installations support reliability and help defer the need for additional T&D infrastructure.

4.6. PORTFOLIO BALANCE

NYSERDA offers a portfolio of complementary programs providing customers with a holistic approach to energy projects, enabling all customer sectors to identify opportunities to meet their specific needs. This Program is a key component of that portfolio.

4.7. DEPTH OF SAVINGS

Significant untapped energy efficiency opportunities could be realized in implementing grid-integrated technology solutions. By providing incentives for end-use measures with rigorous efficiency requirements, and by requiring installation of communication technologies that enable aggregation and control of energy efficiency measures from remote sources, energy efficiency is achieved and curtailment is possible from remote locations. The program attribute is less depth of savings in a sector, but rather depth of savings where savings provide the greatest societal benefit.

4.8. UNDERSERVED MARKETS

To date, there are relatively few installations of high efficiency and grid-integrated equipment and technologies that achieve energy savings and kW reductions. The small-to-mid-sized commercial and residential markets have contributed relatively little in the way of demand response participation.

4.9. COMMITMENT

Sufficient time, a commitment to funding, clear terms, conditions, milestones, deliverables and payment schedules will all be critical to program success.

4.10. CUSTOMER OUTREACH

Marketing, outreach, and education are important components of the Program. Staff will build upon their strong alliances with energy service providers and contractors, including outreach that targets appropriate sectors. NYSERDA also anticipates working closely with the utilities to most effectively integrate and implement projects.

4.11. COLLABORATIVE APPROACH

NYSERDA has conducted numerous meetings with service providers working to develop business models and identify customers to incorporate Smart Grid concepts in demand response applications. NYSERDA discussed Smart Grid concepts with representatives of Energy East with regard to that Company's plans to implement a widespread Advanced Metering Infrastructure (AMI) program. NYSERDA researched Smart Grid technology solutions to integrate energy efficiency and demand response efforts into a program offering. NYSERDA is an active party and has provided input into the Commission's ongoing AMI proceeding.

4.12. FUEL INTEGRATION

While this Program will focus on electric savings and potential demand reductions, the technology program and communications platform used to generate electric energy savings could be transferable to end uses beyond those that that are electric.

4.13. TRANSPARENCY

Program development will be based on significant planning and coordination in late 2008, early 2009. This process will be open to input from all interested stakeholders and will include, at a minimum, the

utilities, DPS, NYISO and NYSERDA Staff. This will result in the release of a competitive solicitation in 2009. Program savings and costs will be available for public consumption through the detailed reports developed by NYSERDA and external evaluators.

4.14. PROCUREMENT

Final program design and solicitation release is planned for 2009 based on research described above, as well as input from stakeholders, utilities, the Commission and DPS Staff. It is anticipated that contractors will be invited to compete for performance-based energy funding. Contractors will be required to specify the amount of funding needed to implement specific projects, within the bounds of decisions made with regard to the instant proceeding and the subsequent set of program guidelines to be designed. Procurement will be based on one or more open and competitive solicitations.

4.15. EVALUATION PLAN

Evaluation Goals

The primary goal of the evaluation is to assess the energy and demand savings attributable to program activities. A secondary goal will be to provide feedback to support an efficient delivery mechanism.

Brief Overview of the Evaluation Approach

The evaluation approach presented in this section was designed based on NYSERDA's current plans for the design and administration of the Smart Grid End-Use Program, and in the absence of complete knowledge about final evaluation protocols, and potential funding set-asides and plans for overarching evaluation projects that would serve the needs of all EEPS program administrators. Thus, these plans have been prepared in order to afford NYSERDA and its independent contractors flexibility to adapt the evaluation approaches that best suit the program as implemented once a greater understanding is in place regarding final evaluation protocols and funding. NYSERDA's estimated evaluation budget for this program includes a set-aside for developing a full evaluation plan, an effort that will involve DPS Staff and the EEPS Evaluation Advisory Group.

Evaluation Budget

NYSERDA expects the evaluation budget for the Smart Grid End-Use Program to be approximately equal to 5% of the program funding level, less yet-to-be determined funds set aside for statewide studies and other overarching costs borne by program administrators. It is expected that the Smart Grid End-Use evaluation budget will be designed to account for the specific needs of the program, and allocated primarily to impact evaluation (80%) and the remainder for process evaluation.

Evaluation Schedule

Evaluation studies included as part of the Smart Grid End Use Program evaluation plan are shown in the table below along with the time frame for their anticipated completion. The evaluation plan is expected to include multiple measurement and verification, net-to-gross, and process evaluation studies.

Table V-12. Smart Grid End-Use Efficiency: Evaluation Schedule

Evaluation Element	Expected Completion			
	2009	2010	2011	2012
Impact - M&V				X
Impact - Net-to-Gross		FR, MT	FR, SO, MT	
Process Evaluation	X			

FR = Freeridership examination SO = Spillover examination MT = Market transformation, top-down examination

Impact Evaluation

Measurement and Verification

Several of NYSERDA's programs promoting newer technologies have included significant pre-post metering data requirements, with twelve months of post-retrofit monitoring / metering, and independent quality assurance (QA) efforts. The evaluation team will recommend a similar data collection effort for the Smart Grid End-Use program for the large commercial projects, at a minimum. Logging of operating hours for individual measures pre and post can be substituted if the controlled appliance represents a small percentage of total load. Deemed savings may be used for smaller commercial and residential projects. Given the diverse sectors and technologies that will likely be addressed by this program, having this level of program data can allow for high quality impact evaluation methods within the limited evaluation budget.

Initially, the impact evaluation will involve review and assessment of the quality and comprehensiveness of the metering and monitoring data. If the data sets are complete, there may be little value gained in performing additional near-term metering. Therefore, M&V work will focus on the baseline assumptions for each project. If needed, strategies will be developed for addressing gaps in the data, including additional data logging and on-site data collection. For example, interviews with participants may shed light on the reasons for variations in measured data.

Participants will be put into homogenous groups. The detailed evaluation plan will be developed based upon the availability of quality pre-post metering data, the number of participants and expected savings per homogenous group. The initial evaluation plan for this program is to conduct analysis on electricity use by means of this data. With this evaluation method, billing analysis will be conducted on all participant electricity use data and efforts will be made to assess potential bias for those where data is not available or adequate for evaluation. Alternative evaluation methods will be explored if the pre-post metering data is not available or appears to be potentially biased.

The M&V evaluation is scheduled to be completed in 2012. This timing is based on the need for twelve months of post-retrofit use, metering, and monitoring data from all participants.

Net-to-Gross

This program generates direct savings and is also capable of operating as a market transformation effort. Given this, a combined approach of enhanced self-report and top-down market inquiry will be pursued for the largest expected savings sector or market niches to assess attribution.

The sampling procedures for the enhanced self-report methods will be representative of all participants in the program. The enhanced self-report method will survey multiple decision-makers including building owners, vendors, technical assistance providers, residents, etc. involved in adopting energy efficiency and controls. Proper examination of the multiple decision-makers, their level of influence and when decisions occur can provide higher quality free ridership estimates. The surveys will include alternative inquiries to test and provide construct validity for the net to gross (NTG) estimates. Sample sizes will be calculated to target 90% confidence and 10% sampling precision at the program level.

Inquiries related to influences in the decision-making process generally produce the most reliable results when they are conducted closer to the point of the decision. No completes are expected in 2009. The free ridership inquiries will, therefore, be completed in 2010 and 2011 for projects completed in each of those two years. Spillover decisions, however, are made after project implementation. Thus, the spillover inquiry is planned for 2011 in order to allow sufficient time for these effects to occur.

To supplement the self-report survey approach to assessing NTG, a top-down approach, also referred to as the market transformation (MT) examination, will be employed. For the largest expected savings sectors or market niches the evaluation will examine the market chain pre and post implementation. The approach for this area of the NTG analysis will be further developed in the detailed evaluation plan. In general, the sector, technology, market niche will be examined through interviews with multiple market actor groups concerning how these technologies are currently being distributed, installed and used, and how these factors will be changing over time. The MT research is expected to occur in 2010 and 2011.

Process Evaluation

Process evaluation activities will focus on the participation and decision-making process in the program. The implementation team will track contractors who are contacted for participation or who request information about the program services. Those who do not participate in the program will form the partial participant and non-participant population. Areas of inquiry expected for the process evaluation work will likely include:

- Barriers to participation
- Barriers to full-scale implementation
- Value of services provided to homes and business (non-energy and monetary)
- Benefits of participation and the equipment
- Overall customer satisfaction with the program services and the equipment
- Examination of customer decision-making, including roles of people involved and factors influencing the decision

The process evaluation work will generate actionable recommendations for improvements to the program. It is expected that process evaluation will be conducted approximately a year after the program start date so as to provide early feedback regarding the program processes and participation rates.

As the process evaluation will be in the field a year before the impact evaluation starts, the process evaluation will also involve an "evaluability assessment" and data review for the Smart Grid End-Use Program, which will ensure that the needed data are available for impact evaluation. Recommendations for data collection, validation and organization will be included as part of the process evaluation report and feedback to NYSERDA will be transmitted as findings and recommendations are available.

Market Evaluation. A separate market evaluation will not be conducted. However, specific small market niche studies are planned within the impact evaluation, discussed above, for the market niches with the largest expected savings.

Evaluation Plan Variations. Given the level of uncertainty regarding final evaluation protocols, statewide studies to be conducted by all program administrators, and funding levels needed to support overarching evaluation studies and activities, the evaluation plan presented in this section should be viewed as scalable and flexible. Specifically, if the total evaluation budget for this program needs to be reduced, impact evaluation would not be able to meet 90% confidence for 10% sampling precision. Conversely, if more of NYSERDA's total evaluation funding could be allocated to this program, the additional funds would allow for more site-specific data collection as part of the impact evaluation and larger sample sizes, e.g., by utility service territory and technology.

4.16. PROGRAM SELECTION CRITERIA

This section provides screening metrics for the Smart Grid End Use Efficiency Program required per Appendix 3 of the Commission's June 23, 2008 EEPS Order. As discussed earlier, NYSERDA intends to provide screening metrics related to electric and gas rate impacts (Screening Metrics 2, 3, 4, 8, 10, 11, and for the suite of programs Screening Metrics 1 and 2) in a separate supplemental filing. Also, for reasons described earlier, estimated MWh and coincident peak MW reductions in 2015 if the program continues to expand and extends through 2015 (Screening Metrics 5a and 6a) are not included.

Total Resource Cost Test Benefit/Cost Ratio (Screening Metric 1)

The tables below show the resource savings and average measure life used as inputs for the benefit/cost analysis, the present value of the costs and benefits used in the analysis, and the Program Administrator Cost (PAC) and Total Resource Cost (TRC) results. Appendix A provides additional information on benefit/cost definitions and inputs.

Table V-13. Smart Grid End-Use Efficiency Program: Cumulative Annual Savings

	Program Years	Average Life of Electric/Gas Measures (Years)	Cumulative Annual GWh/Year	Cumulative MW	Callable Load MW[94]	Cumulative Annual Fuel Savings (MMBtu)	% Downstate (Con Edison)
Electric Funding Only	2009-2011	12	16.5	4.8	8.0	--	38%

[94] The market price effect for the call-able load attributable to this Program is $7.3 million (present value, 2008$).

Table V-14. Smart Grid End-Use Efficiency Program: Program and Participant Costs ($2008)

	Present Value of Program Administrator Cost ($Millions)	Present Value of Program and Participant Costs ($Millions)	Present Value of Resource Benefits ($Millions)
Electric Funding Only	$11.7	$25.1	$41.0

Table V-15. Smart Grid End-Use Efficiency Program: Benefit-Cost Ratios

	Program Administrator Cost (PAC) Test	Total Resource Cost (TRC) Test
Electric Funding Only	3.5	1.6

Total Resource Cost Test Benefit-Cost Ratio with Carbon Externality (Screening Metric 8)

The table below shows the PAC and TRC test results when the estimated benefits of carbon reduction are included. Carbon was valued at $15 per ton, resulting in a total present value of carbon benefits of $2.4 Million.

Table V-16. Smart Grid End-Use Efficiency Program Benefit-Cost Ratios with Carbon

	Program Administrator Cost (PAC) Test	Total Resource Cost (TRC) Test
Electric Funding Only	3.6	1.7

MWh Saved in 2015 (Screening Metric 5b)

Assuming the program functions only for as long as proposed, the Program is expected to achieve 16,500 MWh (cumulative annual) in 2015.

MW of Coincident NYISO Peak Saved in 2015 (Screening Metric 6b)

Assuming the program functions only for as long as proposed, the Program is expected to achieve 4.8 MW (cumulative) of coincident peak reduction in 2015, based on increased end-use efficiency.[95]

Peak Coincidence Factor of MWh Saved in 2015 (Screening Metric 7)

The peak coincidence factor is a measure of the extent to which the MWh savings from efficiency measures is concentrated at the time of system peak. The peak coincidence factor for the program is 0.39.[96]

[95] NYSERDA defines coincident on-peak period as being between 12:00 noon to 6:00 PM on summer non-holiday week days.

[96] Peak coincidence factor = annual MWh saved/(MW saved on peak)(8,760 hours). For this equation, annual MWh saved is the cumulative annual savings expected in 2015 if the program is offered only as long as proposed, i.e., Screening Metric 5b.

Number of Participants as a Percentage of Customers in the Class (Screening Metric 9)

The table below shows the number of expected program participants as a percentage of the number of customers in the class. The number of expected program participants represents NYSERDA's best estimate of participation for the current funding request through 2011.

Table V-17. Smart Grid End-Use Efficiency Program Participants as a Percentage of Customers in Class

Customer Class	Number of Customers in Class[1]	Number of Anticipated Program Participants	Participants as a Percentage of Number of Customers in Class
Residential - Electricity	6,240,788	6,750	0.1%
Commercial - Electricity	1,002,856	250	0.02%

[1] Sources: DPS Five Year Index Book of Files and DPS Electricity and Natural Gas Retail Access Migration Reports. Electricity figures do not include LIPA, municipal electric utility, rural electric cooperative, or NYPA customers. Gas figures do not include Keyspan/Long Island customers. Retail Access Migration Reports do not separate commercial and industrial customers and label all-such customers as "non-residential". Commercial and industrial customers estimated by NYSERDA.

VI. INDEPENDENT PROGRAM PROPOSALS SUBMITTED FOR CONSIDERATION BY NYSERDA

1. BACKGROUND

The June 23, 2008 Order invited the submission of innovative proposals by independent program administrators to NYSERDA or to a utility company to expand the range of program proposals, help achieve the 15% energy reduction by the year 2015, and encourage innovation.[97] Independent program administrators could submit proposals for programs to be implemented within the 2009-2011 time period. The Order further required that any proposal received by NYSERDA, or the utilities, must be considered for inclusion in the entity's 90-day submission, and its inclusion or omission must be explained. In response to the Order, NYSERDA established a process for independent program administrators to submit their proposals to NYSERDA and for NYSERDA to evaluate any submitted proposals.

2. NYSERDA'S PROCESS FOR INDEPENDENT PROGRAM PROPOSAL SUBMISSIONS

On July 14, 2008, NYSERDA issued Program Opportunity Notice (PON) 1259 to provide a vehicle for independent program administrators to submit proposals and for NYSERDA to evaluate any such proposals. The PON was a competitive solicitation that sought proposals for innovative programs that would not duplicate programs currently being offered by NYSERDA, or the utilities, or assigned to NYSERDA or utilities in the June 23, 2008 Order. The selection criteria stated in the PON were adopted from the June 23, 2008 Order contained in Appendix 3.

In response to the PON, twelve proposals were submitted to NYSERDA and reviewed by a Technical Evaluation Panel (TEP) consisting of both internal NYSERDA staff and external members. The TEP recommendations were submitted to NYSERDA's Management Review Process and two proposals were found to merit further investigation. NYSERDA has notified all proposers as to their status of inclusion in or omission from this filing. Upon request, NYSERDA will provide each proposer with a full debriefing regarding the evaluation of their proposal. NYSERDA will also, upon request, provide a more detailed explanation to the Commission or DPS Staff regarding the process undertaken or the resulting recommendations.

No funding has been included in this Program Proposal to accommodate the two proposals found to merit further investigation.

3. INDEPENDENT PROGRAM ADMINISTRATOR PROPOSALS RECOMMENDED FOR FURTHER INVESTIGATION

NYSERDA recommends that proposals submitted by EnerNOC, Inc. and EnSave, Inc. (both proposals are attached as appendices) be further investigated and have highlighted specific recommendations regarding these proposals.

EnerNOC, Inc. — EnerNOC proposes a Monitoring-Based Commissioning Program to assist commercial customers in better understanding their energy use and identifying strategies to reduce consumption. The proposed program offers potential to provide valuable information related to this program design and technical approach. NYSERDA recommends that the program be considered on a more limited basis of $5 million and using a recognized regional or national benchmarking scorecard rather than a proprietary approach. The program would also benefit by closer coordination with NYSERDA and utility programs, clarification of its payment and deliverables schedule (including

[97] Order at page 59.

reducing front-loading and linking payments to energy savings performance), and increased goals for market penetration.

EnSave, Inc. — EnSave proposes to implement projects at farms sites and to work with upstream markets to expand the energy efficiency options available from equipment manufacturers and dealers. EnSave's experience with the agricultural sector and key partners, its comprehensive approach, and the needs of this sector warrant support and further investigation of this proposal. NYSERDA recommends that the proposer designate a greater proportion of program funding for incentives to end-use or midstream market players. It would also benefit the program to reduce redundancy and provide closer coordination with NYSERDA and utility programs (leading to a greater understanding of existing programs and processes available for this sector). EnSave needs to clarify payment and deliverables schedule, coordination on measurement and verification with NYSERDA programs, and how therms savings incentives were derived.

4. INDEPENDENT PROGRAM ADMINISTRATOR PROPOSALS NOT RECOMMENDED FOR FURTHER INVESTIGATION

Based on the established selection criteria and policy issues, the remaining proposals are not recommended for further investigation. The following in intended to provide a brief summary of the proposals received and identify the primary factors for NYSERDA's determination to omit the proposals from this filing.

Air Power USA, Inc. - Air Power USA proposes to provide air compression audits, implementation support and monitoring for twenty-five large industrial customers.

American Wind Power &Hydrogen, LLC (AWP&H) – AWP&H proposes the installation of an energy efficiency project that would provide base load and peak power production through the use of hydrogen-powered fuel cells.

City University of New York (CUNY) Institute for Urban Systems - CUNY proposes to establish a New York City Retro-Commissioning Center tasked at retro-commissioning and enhanced building operations potential in New York City buildings. The main objective of this proposal is to accelerate the adoption rate of retro-commissioning. This Center proposes to work with the utilities and NYSERDA.

Consumer Powerline, Inc. - Consumer Powerline proposes to create an energy efficiency cap and trade market. This system would be based on the purchase and sale of "white certificates" representing energy efficiency achieved by the end user. By implementing energy efficiency measures any consumer in New York could obtain white certificates which could be sold, thereby giving the end user greater incentive to install energy efficient measures.

CoolNRG USA, Inc. - CoolNRG proposes to target residential customers in Con Edison territory to distribute 2.7 million free CFLs in March 2009. CoolNRG proposes to work in partnership with a single retail chain in New York City with roughly 220 stores.

EarthKind Energy, Inc. – EarthKind proposes a program to provide solar thermal technologies to electric hot water customers across the State. Note, this Proposal was marked 'Confidential'.

Matrix Energy Services, Inc - Matrix Energy Services proposes to provide demand control ventilation (DCV) and other low-cost/no cost measures for 120 entertainment complexes such as movie theaters in New York. The proposed program would also provide a site energy audit to identify other energy efficient and demand response measure opportunities.

Nexant, Inc. - Nexant proposes to design and implement a Data Center Energy Management Program. The program focuses on existing buildings although it is potentially applicable to new construction.

SAIC - SAIC proposes an enhanced version of NYSERDA's New Construction Program delivery model for existing Healthcare Facilities in Consolidated Edison territory. SAIC proposes to create a Healthcare Advisory Board that would be the recipient of funds and provide advice and consent to SAIC for the administration of the funds.

State University of New York (SUNY) - SUNY proposes the installation of energy efficient projects, primarily combined heat and power projects and lighting retrofits, at 26 upstate SUNY campuses.

5. BASIS FOR RECOMMENDATION

The recommendation to not pursue further investigation of the remaining proposals is based on the established selection criteria and policy issues summarized below.

- The extent to which resource acquisition benefits (MWh reduction) are not achieved within the timeframe outlined in the June 23, 2008 Order: Air Power USA, AWP&H, CUNY, Consumer Powerline, and Earthkind Energy.

- Insufficient alignment of payment and deliverables schedule: AirPower, AWP&H, CUNY, Consumer Powerline, Earthkind Energy, Matrix, Nexant, SAIC and SUNY.

- The potential for unfair competitive advantage: AWP&H, CoolNRG, CUNY, EarthKind Energy, Matrix, Nexant, and SAIC.

- Equity and rate impact concerns associated with programs paying a high proportion (as much as 100%) of measure cost: AWP&H, CoolNRG, and SUNY.

- The redundancy or conflict with NYSERDA programs: Air Power, CoolNRG, Consumer Powerline, CUNY, EarthKind Energy, Matrix, Nexant, SAIC, and SUNY.

- Did not distinguish project development and management versus program development and management, and are more appropriately considered individual projects eligible to participate in NYSERDA or utility programs. In such cases, NYSERDA will encourage each proposer to submit their proposed projects to the appropriate NYSERDA programs: AWP&H, Air Power, Matrix, SAIC and SUNY.

APPENDIX A: BENEFIT/COST DEFINITIONS AND INPUTS

This Appendix provides definitions of benefit/cost terms, describes how certain concepts were applied to the Total Resource Cost analysis, and presents tables showing the key inputs to the benefit/cost analysis.

Avoided Electric Energy, Capacity, and Distribution Costs.

Energy - Historical New York Independent System Operator (NYISO) day-ahead (DA) clearing prices were used to estimate avoided energy costs in six time periods categorized as summer on-peak, summer off-peak, summer shoulder, winter on-peak, winter off-peak, and winter shoulder. For each period, a three-year average price from 2005 through 2007 was used as the starting point and future prices were indexed to the natural gas price forecast. Avoided electric energy costs used in the analysis are shown in Table A-1. These prices reflect the 7.2% line loss factor.

Capacity - Average historical clearing prices in the NYISO capacity auctions from 2005 to 2207 were used to estimate capacity costs for two regions: downstate (Consolidated Edison Service area) and upstate. Future prices were indexed to the natural gas price forecast. The avoided capacity costs are shown in Table A-1. These prices reflect the 15% reserve margin requirement, 7.2% line loss factor, and the avoided distribution costs estimated to be $55 per kW-year upstate and $110 per kW-year downstate.[98]

Discount Rate. A real discount rate of 5.5% was used.

Focal Year. The focal year of analysis was 2008 and all values are shown in 2008$.

Gross Measure Cost. This is the estimate of the full or incremental cost of equipment. For retrofit programs, measure costs include cost of design, installation, and full cost of equipment. For new construction programs and programs designed for normal replacement, incremental cost (difference in cost between high- and standard-efficiency equipment) is used.

Line Loss Factor. Line loss was estimated to be 7.2% of the energy and capacity savings.

Avoided Natural Gas Cost. The basis of the avoided natural gas cost was Energy and Environmental Analysis, Inc.'s forecast of prices conducted in mid-2008. Adjustments were made to this forecast to reflect heating, water heating, and baseload use and to reflect avoided peaking and T&D costs. The forecast is shown in Table A-2.

Net-to-Gross Ratio. Assumed to be 1.0 for this analysis.

Program Administrator Costs. These costs include program implementation costs, incentives paid to customers, marketing, and NYSERDA administration and evaluation costs. For all

[98] CASE 07-M-0548, Staff's January 9, 2008 IR Response to the Joint Utilities' Questions on the "Revised Proposal for Energy Efficiency Design and Delivery and Reply Comments of the Staff of the Department of Public Service" Dated November 26, 2007, and the "Staff Revised Proposal for Energy Efficiency Design and Delivery and Reply Comments" Dated December 3, 2007.

programs, NYSERDA administration costs were set to equal 7% of total program budget and evaluation costs were set to equal 5% of total program budget.[99]

Program and Participant Costs. The sum of the Program Administrator Cost and the participants' share of cost.

Program Administrator Cost (PAC) Test. This test divides the present value of the benefits by the present value of the Program Administrator Costs. A benefit-cost ratio greater than 1 indicates benefits exceed NYSERDA costs.

Total Resource Cost (TRC) Test. This test divides the present value of the benefits by the present value of Program and Participant Costs. A benefit-cost ratio greater than 1 indicates benefits exceed NYSERDA and participant costs.

[99] Total program budget includes administration and evaluation costs.

Table A-0-1. Avoided Electric Energy and Capacity Cost Forecast

	Summer on-peak	Summer off-peak	Summer shoulder	Winter peak	Winter off peak	Winter shoulder	Summer Capacity	Winter Capacity
	$/kWh	$/kWh	$/kWh	$/kWh	$/kWh	$/kWh	$/kW-yr	$/kW-yr
Upstate								
2007	0.10	0.07	0.08	0.09	0.07	0.08	42.04	35.11
2008	0.12	0.08	0.10	0.10	0.08	0.09	49.64	41.45
2009	0.13	0.09	0.10	0.11	0.09	0.10	53.24	44.46
2010	0.13	0.09	0.11	0.12	0.09	0.11	55.90	46.69
2011	0.14	0.10	0.11	0.12	0.09	0.11	57.72	48.21
2012	0.14	0.10	0.11	0.12	0.09	0.11	58.79	49.10
2013	0.14	0.10	0.11	0.12	0.10	0.11	59.21	49.45
2014	0.14	0.10	0.11	0.12	0.10	0.11	59.07	49.33
2015	0.14	0.10	0.11	0.12	0.09	0.11	58.47	48.83
2016	0.14	0.09	0.11	0.12	0.09	0.11	57.50	48.02
2017	0.13	0.09	0.11	0.12	0.09	0.11	56.25	46.98
2018	0.13	0.09	0.11	0.11	0.09	0.10	54.83	45.79
2019	0.13	0.09	0.10	0.11	0.09	0.10	53.32	44.53
2020	0.12	0.09	0.10	0.11	0.08	0.10	51.82	43.28
2021	0.12	0.08	0.10	0.11	0.08	0.09	50.43	42.12
2022	0.12	0.08	0.09	0.10	0.08	0.09	49.25	41.13
2023	0.12	0.08	0.09	0.10	0.08	0.09	48.36	40.38
2024	0.11	0.08	0.09	0.10	0.08	0.09	47.86	39.97
2025	0.11	0.08	0.09	0.10	0.08	0.09	47.84	39.95
2026	0.11	0.08	0.09	0.10	0.08	0.09	47.83	39.94
2027	0.11	0.08	0.09	0.10	0.08	0.09	47.82	39.93
2028	0.11	0.08	0.09	0.10	0.08	0.09	47.81	39.92
2029	0.11	0.08	0.09	0.10	0.08	0.09	47.79	39.91
2030	0.11	0.08	0.09	0.10	0.08	0.09	47.78	39.90
2031	0.11	0.08	0.09	0.10	0.08	0.09	47.77	39.89
Downstate								
2007	0.15	0.09	0.11	0.11	0.08	0.10	116.65	87.27
2008	0.18	0.10	0.13	0.13	0.10	0.12	137.72	103.03
2009	0.19	0.11	0.14	0.14	0.11	0.13	147.72	110.51
2010	0.20	0.12	0.15	0.15	0.11	0.13	155.11	116.03
2011	0.21	0.12	0.15	0.15	0.12	0.14	160.16	119.81
2012	0.21	0.12	0.15	0.16	0.12	0.14	163.13	122.04

	Summer on-peak	Summer off-peak	Summer shoulder	Winter peak	Winter off peak	Winter shoulder	Summer Capacity	Winter Capacity
2013	0.21	0.12	0.15	0.16	0.12	0.14	164.29	122.90
2014	0.21	0.12	0.15	0.16	0.12	0.14	163.90	122.61
2015	0.21	0.12	0.15	0.15	0.12	0.14	162.22	121.36
2016	0.21	0.12	0.15	0.15	0.12	0.14	159.53	119.34
2017	0.20	0.12	0.15	0.15	0.11	0.13	156.07	116.76
2018	0.20	0.11	0.14	0.14	0.11	0.13	152.12	113.80
2019	0.19	0.11	0.14	0.14	0.11	0.13	147.94	110.67
2020	0.19	0.11	0.14	0.14	0.10	0.12	143.79	107.57
2021	0.18	0.11	0.13	0.13	0.10	0.12	139.93	104.68
2022	0.18	0.10	0.13	0.13	0.10	0.12	136.64	102.22
2023	0.17	0.10	0.13	0.13	0.10	0.11	134.16	100.37
2024	0.17	0.10	0.13	0.13	0.10	0.11	132.78	99.33
2025	0.17	0.10	0.13	0.13	0.10	0.11	132.74	99.30
2026	0.17	0.10	0.13	0.13	0.10	0.11	132.71	99.28
2027	0.17	0.10	0.13	0.13	0.10	0.11	132.67	99.25
2028	0.17	0.10	0.12	0.13	0.10	0.11	132.64	99.23
2029	0.17	0.10	0.12	0.13	0.10	0.11	132.60	99.20
2030	0.17	0.10	0.12	0.13	0.10	0.11	132.57	99.17
2031	0.17	0.10	0.12	0.13	0.10	0.11	132.53	99.15

Note: Electric energy prices for 2007 reflect average load-weighted hourly day-ahead NYISO clearing prices from 2005 to 2007, adjusted for line loss. Forecasted prices (2008 to 2031) reflect the pattern of prices in the Henry Hub natural gas price forecast developed by Energy and Environmental Analysis, Inc., in 2008. Capacity prices for 2007 is the average capacity auction clearing prices from 2005 to 2007, adjusted for a 15% reserve margin requirement, 7.2% line loss, and avoided distribution costs of $50 per kW upstate and $110 per kW downstate. The "upstate" capacity price is a weighted clearing price from all zones except "J" & "K" for all auctions. The "downstate" capacity price is a weighted average of the New York City Total Cost and the "Upstate" prices applicable to zones "H" and "I".

Table A-2. Natural Gas Price Forecast

Year	Upstate $/MMBtu				Downstate $/MMBtu			
	Heating C/I	Heating Residential	Base-load	Water Heating	Heating C/I	Heating Residential	Base-load	Water Heating
2007	11.63	14.41	8.64	9.38	12.19	15.26	9.50	10.17
2008	13.56	16.67	10.22	11.05	13.66	16.87	10.83	11.54
2009	14.49	17.78	10.99	11.87	14.40	17.68	11.50	12.23
2010	15.19	18.60	11.57	12.47	14.95	18.28	11.99	12.73
2011	15.68	19.17	11.97	12.89	15.31	18.68	12.32	13.07
2012	15.97	19.51	12.21	13.15	15.52	18.90	12.51	13.26
2013	16.10	19.66	12.31	13.26	15.59	18.98	12.57	13.33
2014	16.08	19.64	12.30	13.24	15.54	18.93	12.53	13.28
2015	15.95	19.49	12.19	13.13	15.40	18.77	12.40	13.15
2016	15.73	19.23	12.01	12.94	15.17	18.52	12.19	12.94
2017	15.44	18.88	11.77	12.68	14.89	18.21	11.94	12.68
2018	15.10	18.49	11.49	12.39	14.57	17.86	11.65	12.38
2019	14.74	18.07	11.20	12.08	14.23	17.49	11.34	12.06
2020	14.39	17.65	10.91	11.77	13.93	17.17	11.07	11.79
2021	14.06	17.27	10.64	11.49	13.64	16.85	10.81	11.52
2022	13.79	16.95	10.41	11.26	13.39	16.58	10.59	11.29
2023	13.60	16.72	10.26	11.09	13.22	16.39	10.43	11.13
2024	13.51	16.62	10.18	11.01	13.14	16.30	10.35	11.05
2025	13.54	16.66	10.21	11.04	13.17	16.33	10.38	11.08
2026	13.72	16.87	10.36	11.20	13.33	16.51	10.53	11.23

Note: Natural gas prices are based on the most recent Energy and Environmental Analysis, Inc.'s forecast of Upstate and Downstate prices, adjusted for end-use type and avoided peaking and T&D costs.

APPENDIX B. ENERNOC, INC. PROPOSAL