

**NEW YORK ENERGY \$MARTSM PROGRAM
EVALUATION AND STATUS REPORT**

**FINAL REPORT
VOLUME 1
EXECUTIVE SUMMARY**

MAY 2004

**NEW YORK STATE
ENERGY RESEARCH AND
DEVELOPMENT AUTHORITY**



**NEW YORK ENERGY \$MARTSM PROGRAM
EVALUATION AND STATUS REPORT**

**REPORT TO THE SYSTEM BENEFITS CHARGE
ADVISORY GROUP**

FINAL REPORT

VOLUME 1

EXECUTIVE SUMMARY

May 2004

Volume 1 – Executive Summary

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PREFACE

1.1 INTRODUCTION

The *New York Energy SmartSM Program Evaluation and Status Report* presents results of the **New York Energy SmartSM** Public-Benefits Program (Program) for activities completed through December 31, 2003. The report was prepared jointly by staff of the New York State Energy Research and Development Authority (NYSERDA) and a team of evaluation assistance and specialty contractors in fulfillment of NYSERDA's responsibilities in agreement with the New York State Public Service Commission (PSC). This report describes the cumulative results of Program activities since 1998, and constitutes the most comprehensive evaluation to date of the Program.

New York's public benefits program was initiated in 1996 by Order of the PSC as a strategy for preserving, within the emerging competitive energy market, energy efficiency, renewable energy, low-income programs, research and development (R&D), and environmental protection programs previously offered by utilities. Funds for the Program are collected through a System Benefits Charge (SBC) on electric utilities and are used to further the PSC's public policy goals to: (1) Improve system-wide reliability and increase peak electricity reductions through end-user efficiency actions; (2) Improve energy efficiency and access to energy options for underserved customers; (3) Reduce the environmental impacts of energy production and use; and (4) Facilitate competition in the electricity markets to benefit end-users.

The **New York Energy SmartSM** Program portfolio consists of numerous program initiatives serving all of the State's end-use sectors, promoting energy efficiency and load management, providing energy efficiency services to low-income New Yorkers, disseminating information to increase consumer energy awareness, and conducting energy and technology research and development and environmental monitoring. Because of the magnitude of the Program, a major evaluation effort is necessary to provide comprehensive and rigorous reporting to NYSERDA's oversight and funding agencies and stakeholders on the Program's activities and accomplishments. An important secondary function is to provide feedback and insight to program managers to improve the administration and effectiveness of the programs.

Beginning in 2003, the evaluation function of the **New York Energy SmartSM** Program was dramatically expanded. Funds allocated for this purpose were increased from approximately 0.4 percent of the Program budget to two percent or approximately \$15 million, covering evaluation activities through the Program's funding period. Upon receipt of the expanded budget, NYSERDA contracted with nationally-recognized program evaluators to complement and extend the capabilities of its in-house staff. The expanded evaluation resources allowed NYSERDA to initiate a highly innovative and largely unprecedented approach to evaluating its portfolio of public benefits programs. Four specialty evaluation contractor teams were hired to carry out evaluation studies of the portfolio in four areas: program analysis; measurement and verification; process evaluation; and market characterization, assessment, and causality. In addition to the four specialty contractor teams, an overall evaluation assistance team was hired to coordinate the work of the specialty contractors and to complement the capabilities of the in-house NYSERDA evaluation staff. This approach stands in stark contrast to evaluating individual programs in isolation of one another and preparing stand-alone reports for each program.

1.2 EVALUATION FINDINGS SUMMARY

The overarching conclusion of the evaluation effort finds that the Program has fostered and accelerated market development in the areas of energy efficiency, peak load reduction, and renewable energy that would not have occurred absent the Program. Evaluation activities demonstrate that NYSERDA is administering a balanced portfolio of programs. And, at this point in the evaluation process, verified savings nearly equal the Program's claimed savings – differences, however, do exist within individual programs. The Program portfolio is helping improve the efficient use of energy, contributing to improved electric system reliability, furthering the State's energy diversity, lowering energy costs, improving environmental quality, and supporting economic development. Selected findings for the **New York Energy SmartSM** portfolio are presented below.

1. The investment of approximately \$350 million in the **New York Energy SmartSM** portfolio has brought about an estimated additional investment of \$850 million, for a total of \$1.2 billion, in public and private sector energy- and efficiency-related investment in the State as of December 31, 2003 – when fully implemented, the Program is expected to have resulted in a total of \$2.8 billion of new investment in the State. The Program has created an average of 3,500 jobs annually over the 1998 through December 31, 2003 period.¹ The Program is expected to create an average of 5,500 jobs annually over the full eight-year Program period (1998-2006).
2. The Program has reduced annual electricity use in the State by about 1,000 GWh as of year-end 2003, contributing to the State's standing as the most energy-efficient state in the nation on a per-capita basis in 2003. Annual savings is expected to reach 2,700 GWh annually when the Program is fully implemented.
3. The Program has enabled electricity customers to reduce their coincident peak demand by up to 880 megawatts (MW). These savings include peak demand reductions from implementing energy efficiency measures and callable reductions available when required by the New York Independent System Operator (NYISO) – enhancing the stability and reliability of the State's electricity grid, potentially shielding New York ratepayers from price increases associated with insufficient energy capacity and energy shortfalls at the time of peak demand.
4. The annual energy bill savings for participating customers is estimated to be \$140 million for Program activities through year-end 2003, including electricity, oil, and natural gas savings from energy efficiency and peak load management services provided. Assuming that the installed energy-efficiency measures will continue to save ratepayers money for an average of ten years, the \$1.4 billion in savings compares favorably to the \$350 million investment to date through the Program. Participating customers' bill savings is expected to increase to \$380 million annually when the Program is fully implemented. Total energy cost savings for all customers, including non-participating customers, is estimated to be \$196 million for Program activities through year-end 2003, increasing to \$420 million to \$435 million at full implementation.²
5. The Program has contributed to improving energy diversity in the State by reducing electricity use and peak demand, increasing the share of renewable-energy-based electricity generation and reducing the use of fuel oil and natural gas. The Program has assisted in the development of more than 40 MW of wind generation helping to expand the State's indigenous energy supplies,

¹ Jobs created are new jobs in the State over those that would have been created in the absence of the Program.

² This includes avoided energy cost savings, as well as estimated capacity cost savings that result from a lowering of energy and demand requirements from the energy efficiency and load management services provided through the Program. Some benefit accrues to nonparticipating customers as well, from the lowering of energy and demand requirements and the resultant lowering of load-based marginal prices and marginal capacity costs. While participating customers save considerably more on their electricity bills than non-participating customers because they reduce their energy use, all customers will benefit from lower average electricity rates due to the Program. Since energy supplies remain unchanged as overall energy demand decreases, competition among suppliers is expected to lead to lower market clearing prices.

and investments in infrastructure development have enabled the industry to respond to the public's growing demand for renewable power.

6. The Program is helping to improve the State's air quality by reducing air pollutant emissions from the combustion of fossil fuels. The Program has reduced nitrogen oxide (NO_x) emissions by 950 tons, sulfur-dioxide (SO₂) emissions by 1,700 tons, carbon dioxide (CO₂) emissions by 750,000 tons.
 - To date, NO_x reductions represent approximately 1.4 percent of the State's NO_x budget for electricity generation sources, creating allowances to support continued economic growth in the State. The Program is expected to reduce NO_x emissions by an amount equivalent to 3.7 percent of the statewide NO_x budget for electricity generation when fully implemented.
 - SO₂ reductions represent approximately 1.3 percent of the State's SO₂ cap, creating allowances to support continued economic growth in the State. The Program is expected to reduce SO₂ emissions by an amount equivalent to 3.5 percent of the statewide SO₂ cap for electricity generation when fully implemented.
 - CO₂ reductions represent a 1.1 percent reduction below 1990 level CO₂ emissions from electricity generation, helping contribute toward the statewide goal called for in the *State Energy Plan* of reducing CO₂ emissions five percent below 1990 levels by 2010. The Program is expected to reduce CO₂ emissions by an amount equivalent to 2.9 percent of the 1990 CO₂ emissions from electricity generation sources when fully implemented.³
7. The Program has begun to transform markets and end-use consumer decision-making in support of greater and sustainable levels of energy efficiency that would not have occurred absent the Program. The Program has helped to transform the market for residential ENERGY STAR[®] Appliances in New York. An extensive network of energy services companies, contractors, and service providers are implementing energy efficiency projects throughout the **New York Energy SmartSM** service area. The Program's marketing, consumer awareness, and deployment programs have contributed to greater knowledge and awareness of energy conservation and efficiency, and directly resulted in the increase of market-share for energy-efficient products across all end-use categories.

1.3 CONCLUSIONS

Evaluation activities to date demonstrate that NYSERDA is administering a balanced portfolio of programs.

- At this point in the evaluation process, verified gross energy savings⁴ equal the Program's claimed savings. Net energy savings⁵ are about eight percent less than gross savings⁶. In a few

³ The State Energy Plan goal for greenhouse gas (GHG) emission reduction is to reduce emissions for all sectors to a level that is five percent below the 1990 level by 2010. The **New York Energy SmartSM** Program's CO₂ reductions completed by 2003 have achieved about eight percent of the electricity sector's proportionate share of the total GHG reductions required to achieve this goal. The CO₂ reductions at full implementation of the Program are expected to achieve about 22 percent of the electricity sector's proportionate share of the total GHG reductions required to achieve the statewide goal.

⁴ Gross savings represent the change in energy and power requirements experienced by customers of the Program. Gross savings do not include secondary effects that occur outside of the Program (free-drivers and free-riders), which are investigated in separate studies and included elsewhere in this report, nor do they systematically evaluate the degradation and removal of equipment.

⁵ Net savings estimates are gross energy savings adjusted to subtract free-ridership (*i.e.*, actions funded by the Program that evaluators estimate would have been taken anyway) and to add market effects or spillover (*i.e.*, actions that were taken as a result of Program activities but did not receive Program funding). Net savings are the amount of energy savings attributable to the Program.

program areas, net savings exceed gross savings because of significant market spillover. Overall, the Program portfolio is achieving net savings consistent with expectations and prior reporting.

- The Program portfolio includes diverse programs that are designed to meet the specialized needs of the State’s numerous energy-using markets and sectors. Programs are designed to address different barriers and to work synergistically to achieve the State’s energy policy goals.
- NYSERDA staff, implementation contractors, and evaluators have established close working relationships that enable NYSERDA to respond quickly and flexibly to changes in technologies and markets. However, survey respondents have provided evidence that staff is stretched thin.

A common theme running through the evaluation contractors’ findings addresses opportunities for the Program to deliver additional services to customers and reduce the appearance of confusion among diverse programs and projects. Contractors’ findings also identify opportunities for improved data collection, storage, and retrieval, as well as opportunities to improve customer outreach and marketing.⁷ The program areas serve homeowners, large businesses and institutional customers, renewable energy generators, and researchers, among others. Serving this extremely varied audience requires that NYSERDA’s internal processes be tailored to each program sector. The current evaluation activities have helped identify opportunities to improve service to customers, most appropriately, by program area. Most customers surveyed by evaluation contractors see the Program as being useful in reducing energy costs and in producing non-energy benefits, and view NYSERDA’s activities as fair and objective.

In summary, the **New York Energy SmartSM** Program is making considerable progress in meeting its public policy goals. The remainder of this report provides more general as well as specific findings in support of this conclusion.

⁶ Some of the discrepancies in reported savings may be the result of data collection efforts designed to be program-driven rather than evaluation-driven.

⁷ Individual program specific findings and recommendations are provided throughout the Volume 2 report as each individual program is discussed. Portfolio-level recommendations resulting from the Gap/Opportunities Analysis are reported in this Executive Summary, Volume 1.

SECTION 1:

INTRODUCTION

This report updates evaluation results for the **New York Energy SmartSM** Public-Benefits Program (Program) for activities completed through December 31, 2003.¹ The report was prepared jointly by staff of the New York State Energy Research and Development Authority (NYSERDA) and a team of evaluation assistance and specialty contractors, consistent with the terms and conditions of the Memorandum of Understanding (MOU) between NYSEDA, the New York State Department of Public Service (DPS), and the New York State Public Service Commission (PSC).² This report was prepared for, and reviewed prior to being finalized by, the System Benefits Charge Advisory Group (Advisory Group), which serves as the Independent Program Evaluator in accordance with the MOU. The evaluation contractors worked closely with NYSEDA staff and NYSEDA's program implementation contractors, customers, market allies (including equipment and product wholesalers, distributors, and retailers), and trade allies to understand the full depth and complexity of the **New York Energy SmartSM** Program and to conduct independent assessments of the progress the Program has made toward its established public policy goals.

The Advisory Group submits this report to the PSC in fulfillment of its responsibilities under the terms of the above-referenced MOU. The Advisory Group consists of 24 individuals representing varied interests, including utilities, business and environmental groups, energy service companies, community organizations, professional and trade associations, government, and national energy efficiency and energy research and development (R&D) organizations.³ The Advisory Group was involved in developing the scope of work for the evaluation activities and selecting the evaluation contractors who were retained through NYSEDA's competitive solicitation process. The Advisory Group reviewed and commented on NYSEDA's recommendations, and based on those recommendations, helped determine the scope and tasks of the evaluation effort and helped apportion the budget among the contractors. It helped select the specific evaluation tasks to be completed and identified the programs to be included in this and future reports. The Advisory Group members and the DPS staff were represented on all Technical Evaluation Panels (TEPs) that were convened to review proposals and recommend contract awards.⁴ Advisory Group members reviewed and commented on individual evaluation contractor work plans and met with the members of each contractor's team before work commenced. The Advisory Group met twice early in 2004 to review then-current findings of the evaluation contractors and to provide feedback and comments on drafts of this report.

The evaluation and status updates in this report constitute the most comprehensive assessment to date of the **New York Energy SmartSM** Program. The report builds upon the evaluation framework and model used to guide prior evaluation efforts, which relies on the help of an evaluation team of contractors that conducted independent evaluations of various components of the Program and completed an assessment of the **New York Energy SmartSM** Program portfolio.

¹ Previous annual reports were issued in September 2000, January 2002, and May 2003. Each report presented cumulative results from the Program's inception on July 1, 1998. Annual reports and quarterly updates are available on NYSEDA's web site at www.nyserda.org.

² Memorandum of Understanding Between the New York State Public Service Commission, New York State Department of Public Service, and New York State Energy Research and Development Authority, March 11, 1998, revised December 6, 2001.

³ A list of Advisory Group members and their affiliations is included as Appendix A to Volume 1.

⁴ All evaluation contract awards were made through NYSEDA's competitive solicitation process whereby proposals were submitted in response to a Request for Proposals (RFP) that was developed and reviewed by the Technical Evaluation Panel (TEP).

SECTION 2:

PUBLIC POLICY CONTEXT

New York’s public benefits program was initiated in May 1996 by the New York State Public Service Commission (PSC) in Opinion No. 96-12⁵ to address the potential adverse environmental effects of electric industry restructuring. The PSC called for a System Benefits Charge (SBC) collected on electricity sales to fund the continuation of certain public benefit programs previously administered by utilities, that it believed would not be adequately provided for in a competitive energy marketplace. The State Energy Planning Board supported the creation of an SBC program in the 1998 *State Energy Plan* and continued to view the SBC program as an effective strategy in helping the State to achieve its energy efficiency and renewable energy goals, as well as its greenhouse gas reductions goals adopted in the 2002 *State Energy Plan*.⁶

The New York State Energy Planning Board⁷ identified the continuing challenges faced by New York in maintaining energy security, supporting sustainable economic growth, and increasing customer choices in energy decisions within a cleaner, healthier environment and in a fair and equitable manner. The Energy Planning Board recognized that achieving each of these goals presents different and sometimes conflicting challenges:

- Increasing energy security requires investment in energy diversity, which could include new fossil-fueled and renewable generation.
- Sustainable economic growth requires reducing energy costs and expanding employment opportunities.
- Environmental improvements require investments in technologies to mitigate or ameliorate the impact of energy use on the environment.

The 2002 *State Energy Plan* contained numerous recommendations for how New York could meet its energy goals, including: targeting a 25 percent reduction in primary energy use per unit of gross state product below 1990 levels by 2010; increasing renewable energy as a percentage of primary energy use to 15 percent by 2020; and reducing greenhouse gas emissions five and ten percent below 1990 levels by 2010 and 2020, respectively. The State has implemented numerous strategies to address these challenges, including passing the Clean Water/Clean Air Bond Act, implementing Executive Order No. 111 – the “Green and Clean State Buildings and Vehicles” program, enacting the Governor’s Acid Deposition Reduction Program, restructuring the utility industry, considering a Renewable Portfolio Standard for retail electricity, and, most pertinent to this report, creating the System Benefits Charge public benefits program.

Funds collected through the SBC are used to further the State’s energy policy goals by promoting energy efficiency and renewable energy development, improving load management, assisting low-income customers, encouraging research and development (R&D), and protecting the environment. The PSC recognized the necessity of providing public benefits programs beyond the scope of what competitive

⁵ Cases 94-E-0952 *et al.*, *In the Matter of Competitive Opportunities Regarding Electric Service*, Opinion No. 96-12, Opinion and Order Regarding Competitive Opportunities for Electric Service (issued and effective 20 May 1996).

⁶ *New York State Energy Plan and Final Environmental Impact Statement*, 1998, 2002.

⁷ The New York State Energy Planning Board is chaired by the President of NYSERDA and has as members the Commissioners of the New York State Departments of Transportation, Environmental Conservation, and Economic Development and the Chairman of the Public Service Commission.

markets might otherwise provide. By 2006, SBC funds will have provided almost \$1 billion to support a full range of programs to help the State meet its energy challenges.⁸

The SBC Advisory Group was given responsibility by the PSC for determining whether NYSERDA's efforts are meeting the PSC's public policy goals. The Advisory Group helped formulate the evaluation effort that is the subject of this report. The Advisory Group recognizes that the public benefits program must demonstrate progress toward the PSC's stated goals as well as support the State's achievement of its broader energy policy goals. The State's energy policy is based on the principle that increased economic activity, improved environmental quality, and increased energy efficiency can be achieved by promoting competition and relying on competitive markets to deliver energy services to consumers. This principle has remained a cornerstone of the **New York Energy SmartSM** Program since its inception. Meeting the State's energy policy goals requires implementing diverse programs to meet the needs of customers who pay into the SBC.

The **New York Energy SmartSM** Program portfolio consists of numerous program initiatives promoting energy efficiency and load management, providing services to low-income New Yorkers, and conducting research and development activities. The activities pursued by the Program include disseminating information to increase consumer energy awareness, marketing, providing subscription-based and co-funded financial incentives, product development and testing, technology commercialization, and data and information gathering.

The services provided are as different as the programs being offered. Energy efficiency (resource acquisition) programs are designed to identify energy savings opportunities and install energy-efficient products and technologies in buildings and process applications in industry. Market transformation programs, when offered as a strategy to promote energy efficiency, support developing markets and guiding market actors to permanently change their energy-related decisions. Load-management programs are designed to shift and reduce energy use from on-peak to off-peak periods, thereby improving system reliability and stability and saving customers money on their energy bills.⁹ Low-income services are designed to improve residential energy affordability by implementing energy efficiency improvements to energy systems and buildings and disseminating energy information.

Research and development (R&D) programs are designed to develop renewable energy resources and technologies, deploy distributed generation and combined heat and power systems, provide product development and testing, and collect and evaluate data for use in environmental policy decision making. R&D programs emphasize innovation and support projects and activities that provide opportunities for breakthroughs that may significantly improve existing technologies, products, and markets. Different methods and protocols must be applied in evaluating each of the program offerings because their purposes and services are designed to meet different goals.

This report describes how the **New York Energy SmartSM** Program is contributing to meeting New York's energy goals. The *New York Energy SmartSM Program Evaluation and Status Report* is presented in three parts:

1. Volume 1, the Executive Summary, presents a comprehensive overview of evaluation activities and findings.

⁸ In addition to NYSERDA's **New York Energy SmartSM** Program, funded through the SBC, the New York Power Authority (NYPA) and Long Island Power Authority (LIPA) each offer complementary public benefits programs of their own. The three authorities coordinate program design and service delivery wherever practicable to maximize the use of public funds for the programs and to ensure a coordinated statewide effort to meet public policy goals. The results of the NYPA and LIPA programs are not included in this report.

⁹ Reducing peak demand by shifting and reducing energy use from on-peak to off-peak periods increases energy reliability and stability but may not reduce energy use or improve energy efficiency. If the electric load is shifted to an off-peak period and the same overall amount of energy is used, costs to consumers may be less, but the total quantity of energy used will be unchanged.

2. Volume 2 presents an in-depth assessment of the evaluation findings and program status by major program area and by evaluation contractor activities.
3. Volume 3 is a compilation of individual evaluation contractor reports to NYSERDA detailing the activities undertaken in developing this report. Individual evaluation reports will be available upon request.¹⁰

The Program is more than a collection of services. The effects created by the Program are more than the total outcome of individual projects. Providing comprehensive benefits that exceed the benefits of individual projects requires coordination and cooperation among NYSERDA staff, implementation contractors, and the evaluation teams. The services delivered by the **New York Energy SmartSM** Program and how those services benefit New Yorkers are described within this report.

The **New York Energy SmartSM** Program is creating an environment in which the energy services industry and related product manufacturing can grow and prosper to ensure that competition and customer choice are enhanced. Extensive promotional campaigns are conducted by NYSERDA and in partnership with the U.S. Environmental Protection Agency (U.S. EPA) and U.S. Department of Energy (U.S. DOE) to inform the public about the value of energy efficiency and promote informed decision making. Numerous programs facilitate the deployment of new and renewable energy technologies and biofuels that promote power system reliability and fuel diversity, and move New York toward a cleaner, healthier environment.

¹⁰ Volume 3 is more of a “virtual” compilation of individual reports and is not a stand-alone volume in the traditional sense.

SECTION 3:

BROAD FINDINGS AND MAJOR THEMES

3.1 KEY FINDINGS

The **New York Energy SmartSM** Program portfolio, in coordination with numerous stakeholders participating in the Program, has helped the State make strides in achieving its energy policy goals. The Program portfolio is helping improve the efficient use of energy, contributing to improved electric system reliability, furthering the State's energy diversity, lowering energy costs, improving environmental quality, and supporting economic development.

1. The portfolio was developed to serve all energy-using sectors, and activities undertaken by programs in the portfolio have resulted in the investment of more than \$1.2 billion in public and private capital in the State. New York has reduced its electricity use by about 1,000 GWh per year through year-end 2003 and has maintained its standing as the most energy-efficient state in the nation on a per-capita basis.

In coordination with stakeholders and the New York Independent System Operator (NYISO) and through innovative, market-driven initiatives, the Program has enabled the State's electricity customers to reduce their coincident peak demand by up to 880 megawatts (MW). These savings include peak demand reductions from implementing energy efficiency measures and callable reductions available when required by the NYISO. As a result, the stability and reliability of the State's electricity grid has been enhanced, potentially shielding New York ratepayers from price increases associated with insufficient energy capacity and energy shortfalls.

Current statewide energy use per unit of Gross State Product (GSP) is approximately 17.5 percent below 1990 levels, indicating that the State has achieved approximately 70 percent of the reduction called for in the 2002 *State Energy Plan*. The Plan called for reducing primary energy use per unit of GSP to 25 percent below 1990 levels by 2010. The Program is one of several strategies helping meet this goal.

2. The annual energy bill savings for participating customers is estimated to be \$140 million for Program activities through year-end 2003, including electricity, oil, and natural gas savings from energy efficiency and peak load management services provided. Participating customers' bill savings increases to \$380 million annually when the Program is fully implemented. Total cost savings for all customers, including non-participating customers, is estimated to be \$196 million for Program activities through year-end 2003, increasing to \$420 million to \$435 million at full implementation.¹¹
3. The Program has committed more than \$697 million for capital investment through December 31, 2003. This figure is expected to exceed \$930 million through 2006. When combined with private co-funding, the Program will result in investment in the State's economy of more than \$2.8 billion to fund public benefit energy programs. The Program has created an average of

¹¹ This includes avoided energy cost savings, as well as estimated capacity cost savings that result from a lowering of energy and demand requirements from the energy efficiency and load management services provided. Some benefit accrues to nonparticipating customers as well, from the lowering of energy and demand requirements, and the resultant lowering of load-based marginal prices and marginal capacity costs. While participating customers save considerably more on their electricity bills than non-participating customers because they reduce their energy use, all customers will benefit from lower average electricity rates due to the Program. Since energy supplies remain unchanged as overall energy demand decreases, competition among supply bidders will increase leading to lower bid prices.

3,500 jobs annually from 1998 through 2003, and is expected to result in an average net gain of 5,500 jobs annually during the full eight years of Program implementation (1998 – 2006).¹²

4. The Program has contributed to improving energy diversity in the State by reducing electricity use and peak demand, by increasing the share of renewable-energy-based electricity generation, and by reducing the use of fuel oil and natural gas. The Program has stimulated the State's wholesale renewable electricity market, assisting in the development of more than 40 MW of wind generation. Investments in renewable generation capacity have helped expand the State's indigenous energy supplies while investments in the renewable energy industry's infrastructure, for example, by training and certifying photovoltaic (PV) system installers, have enabled the industry to respond to the public's growing demand for renewable power.
5. The Program is helping conserve the State's natural resources by reducing air polluting emissions and reducing water use. The Program has reduced nitrogen oxide (NO_x) emissions by 950 tons, sulfur-dioxide (SO₂) emissions by 1,700 tons, carbon dioxide (CO₂) emissions by 750,000 tons, and other related air-borne emissions from the combustion of fossil fuels.

To date, NO_x reductions represent approximately 1.4 percent of the State's NO_x budget for electricity generation sources, creating allowances to support continued economic growth in the State. The Program is expected to reduce NO_x emissions by an amount equivalent to 3.7 percent of the statewide NO_x budget for electricity generation when fully implemented.

SO₂ reductions represent approximately 1.3 percent of the State's SO₂ cap, creating allowances to support continued economic growth in the State. The Program is expected to reduce SO₂ emissions by an amount equivalent to 3.5 percent of the statewide SO₂ cap for electricity generation when fully implemented.

CO₂ reductions represent a 1.1 percent reduction below 1990 level CO₂ emissions from electricity generation, helping contribute toward the statewide goal called for in the *State Energy Plan* of reducing CO₂ emissions five percent below 1990 levels by 2010. The Program is expected to reduce CO₂ emissions by an amount equivalent to 2.9 percent of the 1990 CO₂ emissions from electricity generation sources¹³ when fully implemented.

3.2 SELECTED EVALUATION FINDINGS

The **New York Energy SmartSM** Program has fostered and accelerated market development in the areas of energy efficiency, peak load reductions, and renewable energy that would not have occurred otherwise. The Program has helped to transform the market for residential ENERGY STAR[®] Appliances in New York. An extensive network of energy services companies, contractors, and service providers are implementing energy efficiency projects throughout the **New York Energy SmartSM** service area. The Program's marketing, consumer awareness, and deployment programs have contributed to greater knowledge and awareness of energy conservation and efficiency, and directly resulted in the increase of market share for energy-efficient products across all end-use categories. The Program portfolio significantly penetrated New York's energy marketplace, and, with over \$350 million in public funding and another \$880 million in private co-funding spent for the 1998 to 2003 time period, is providing a substantial economic stimulus to the State's energy efficiency products and services markets.

¹² Jobs created are new jobs in the State over those that would have been created in the absence of the Program.

¹³ The State Energy Plan goal for greenhouse gas (GHG) emission reduction is to reduce emissions for all sectors to a level that is five percent below the 1990 level by 2010. The **New York Energy SmartSM** Program's CO₂ reductions completed by 2003 have achieved about eight percent of the electricity sector's proportionate share of the total GHG reductions required to achieve this goal. The CO₂ reductions at full implementation of the Program are expected to achieve about 22 percent of the electricity sector's proportionate share of the total GHG reductions required to achieve the statewide goal.

Evaluation activities to date demonstrate that NYSERDA is administering a balanced portfolio of programs.

- At this point in the evaluation process, verified gross energy savings¹⁴ equal the Program’s claimed savings. Net energy savings¹⁵ are about eight percent less than gross savings. In a few program areas, net savings exceed gross savings because of significant market spillover. Overall, the Program portfolio is achieving net savings consistent with expectations and prior reporting¹⁶.
- The Program portfolio includes diverse programs that are designed to meet the specialized needs of the State’s numerous energy-using markets and sectors. Programs are designed to address different barriers and to work synergistically to achieve the State’s energy policy goals.
- NYSERDA staff, implementation contractors, and evaluators have established close working relationships that enable NYSERDA to respond quickly and flexibly to changes in technologies and markets. However, survey respondents have provided evidence that staff is stretched thin.

A common theme running through the evaluation contractors’ findings addresses opportunities for the Program to deliver additional services to customers and reduce the appearance of confusion among diverse programs and projects. The program areas serve homeowners, large business and institutional customers, renewable energy generators, and researchers, among others. Serving this extremely varied audience requires that NYSERDA’s internal processes be tailored to each program sector. NYSERDA continually addresses this ongoing challenge and the current evaluation activities have helped identify additional opportunities. Most customers surveyed by the evaluation team identified the Program as useful in reducing energy costs and producing non-energy benefits. Most also described delivery and design of NYSERDA’s activities as fair and objective.

The introduction of enhanced evaluation activities has placed an added burden on NYSERDA staff and implementation contractors. Tracking of energy savings and project information necessary to produce consistent portfolio evaluations will require more consistency across programs such as systematic data gathering and centralized reporting. Databases and data management procedures that were originally designed for individual programs must be refined to meet the requirements for portfolio evaluations. Objectives will need to be consistently defined in measurable terms. The lack of utility customer data hinders the evaluation team’s ability to track specific customer information.

3.2.1 Portfolio Theory and Logic

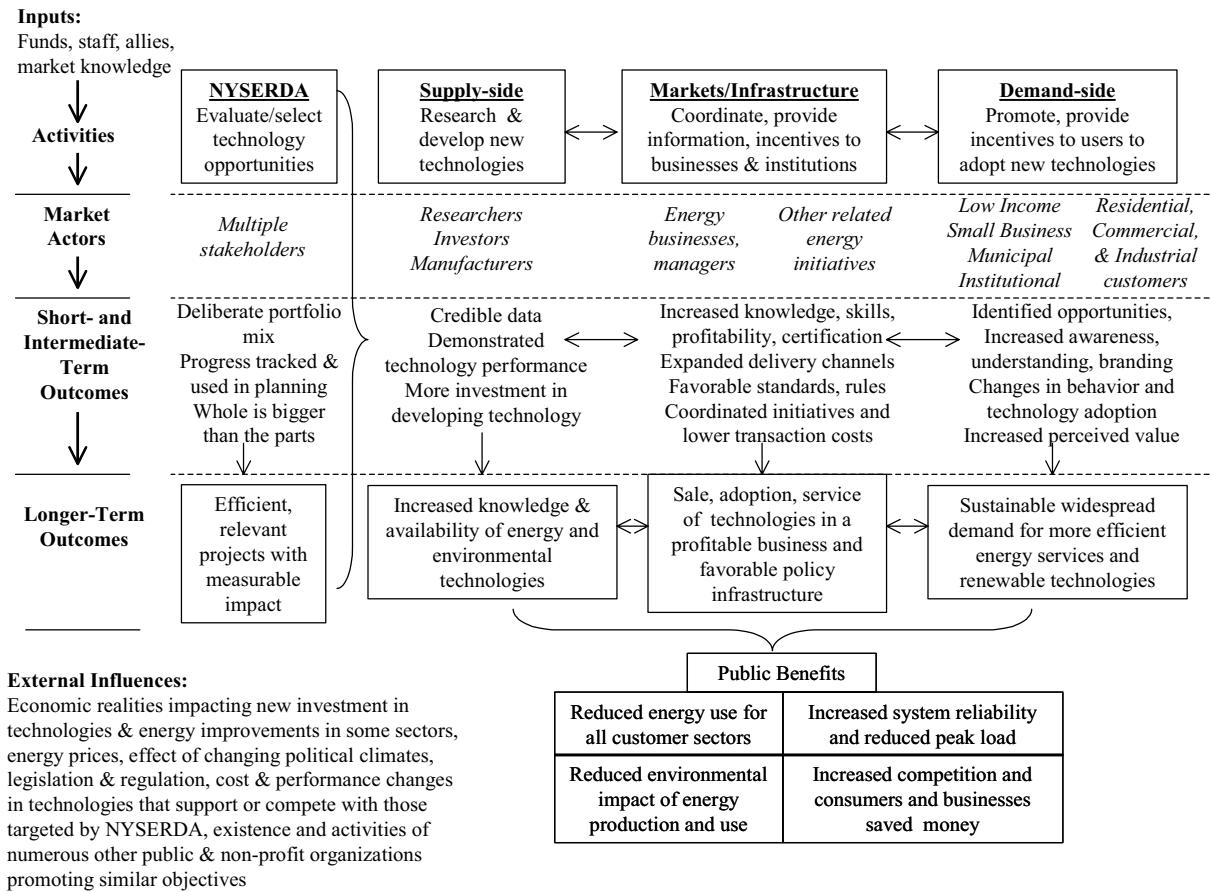
A preliminary portfolio-level logic diagram for the **New York Energy SmartSM** Program is shown in Figure 1. Activities are shown in boxes across the top and entries from top to bottom show how these activities work with market actors to achieve outputs and short-term outcomes. Intermediate and long-term goals are shown in text boxes at the bottom of the diagram. A logic chain for the Program evaluation, selection, and management activities is illustrated by the diagram. Inputs and potential external influences are also noted.

¹⁴ Gross savings represent the change in energy and power requirements experienced by customers of the Program. Gross savings do not include secondary effects that occur outside of the Program (free-riders and spillover), which are investigated in separate studies and included elsewhere in this report, nor do they systematically evaluate the degradation and removal of equipment.

¹⁵ Net savings estimates are gross energy savings adjusted to subtract free-ridership (*i.e.*, actions funded by the Program that evaluators estimate would have been taken anyway) and to add market effects or spillover (*i.e.*, actions that were taken as a result of Program activities but did not receive Program funding). Net savings are the amount of energy savings attributable to the Program.

¹⁶ Some of the discrepancies in reported savings are believed to be the result of data collection efforts designed to be program-driven rather than evaluation-driven.

Figure 1. New York Energy SmartSM Program Portfolio Basic Logic



The portfolio theory and logic evaluation conducted for the Program is described in detail in Volume 2. A key outcome of this activity was the identification of key researchable issues and a description of measurable indicators that can be used to assess how well the portfolio is succeeding over time. Measuring results over time is important because the overall objectives set by policymakers for the Program cannot be accomplished quickly, particularly initiatives targeting market transformation and market development. Such long-term accomplishments require the continual, concerted efforts of program planners, implementation contractors, trade allies, and customers. Technology advancement and economic development also provide new energy-related opportunities.

Table 1 lists the success indicators that were developed for the Program. Outcomes for market transformation programs are illustrated for the short-term (one to three years), intermediate-term (approximately three to five years), and long-term (five or more years). Many of the long-term outcomes, when achieved, will mark the points at which program interventions may no longer be necessary. Similarly, achieving certain short-term and intermediate outcomes could require program modifications and necessitate efforts to anticipate and develop program transition strategies.

Table 1. Table of Success Indicators for the New York Energy SmartSM Program

Outputs	Short-Term Outcomes	Intermediate Outcomes	Long-Term Outcomes
General			
Number of contractors selected Number of projects initiated Number of partnerships established Number of solicitations issued	Greater leveraging of funds Energy and cost savings Lower peak demand	Reduced barriers Increased sales of energy efficient equipment/products Meeting customer needs, customer satisfaction, loyalty Energy and cost savings Lower peak demand	Energy and cost savings Renewables larger share of market Lower peak demand Energy reliability Reduced environmental impact of energy production and use Increased customer choice and awareness of choices Non energy benefits Sustained change in behavior
Evaluate Energy Technologies and Effects			
Number of studies Number of technical reports/papers published Number of collaborations	Continued collection and credible reporting of base level environmental data on a regular basis Understanding of issues related to energy technologies and effects	Information available for policy makers Demonstrated data on performance/cost	Policies, environmental regulations impacted by evaluations/data Appropriate communities see benefits from renewable resource development
Develop and Demonstrate Energy Technologies			
Number of R&D projects (by technology area) Number of potential wind sites identified Number of PV or other technology demonstrations Number of completed projects (with allowance for drop-outs)	Offset equipment cost Product development progressing Lower perceived technical risk	New or improved products developed and tested More investment in supply	Accelerated use of new technologies by early adopters

Outputs	Short-Term Outcomes	Intermediate Outcomes	Long-Term Outcomes
Provide Technical and Financial Assistance to Energy Businesses			
Number of people trained Number of businesses supported/ active Number of audit tools developed/ provided Number of retailers active in program	Increased knowledge, skills, certification	Change in stocking & floor space Change in building equipment/product specifications, design & construction practices More financing available Market actors linked Incremental cost of energy efficient products/services reduced	Delivery channels established New, profitable energy services, business Increasing competition in energy supply and distribution Net jobs created in NY and other economic benefits to the state Cost savings
Provide Technical and Financial Incentives to Decision Makers and Related Support to Policy-Makers			
Number of collaborations with DOE, HUD, local governments, etc.	Partnering between lenders & customers Partnering between energy and low income initiatives Dollars leveraged	Lower transaction costs for implementing energy actions Rule changes on financing More financing available Increased use of life cycle costing, whole buildings approach	More favorable policies, rules, standards
Provide Technical Assistance, Coordination, and Financial Incentives to Underserved Populations			
Number of small businesses served Number of low income customers served Number of residential customers served Number of municipal/ institutional customers served	Financial packagers available More financing available	Buying groups established	Increased ability to afford energy bills
Provide Technical Assistance, Coordination, and Financial Incentives to End-Users			
Number of audits completed Number and dollar value of incentives	Greater awareness of energy use & savings alternatives Energy saving opportunities identified	Change in buying habits Increased purchase energy equipment/products Efficiency valued	See general indicators above
Promote Green Power and Efficient Use of Energy Generally			
Number of website user sessions (hits) Number of marketing media buys (by media type) Number of customer impressions	Change in energy awareness and assistance sought	Changed attitudes toward energy	Sustained change in buying habits and demand

The portfolio theory and logic contractor, GDS Associates (GDS), developed analyses that indicate, in general, that programs have been successfully designed and implemented to work together synergistically to achieve the PSC’s four public policy goals.¹⁷ GDS also found that the Program is playing an important role as part of a diverse mix of existing energy initiatives, including other state and utility programs, regional and federal programs, industry efforts, and the activities of non-government organizations. The Program supports research and pilot programs, provides primary funding for selected initiatives and acts as a catalyst and dealmaker by co-funding other projects, and supports established activities in underserved areas. NYSERDA designs, delivers, and monitors its individual programs with an eye toward balancing long-term goals with intermediate- and short-term targets. NYSERDA staff are positioned to realign program and portfolio activities to achieve the Program’s goals and have done so on numerous occasions when field measurements reveal that activities are not yielding anticipated results.

3.2.2 Measurement and Verification Evaluation Highlights

The goal of the Measurement and Verification (M&V) evaluation activity is to determine the extent to which processes for measuring, calculating, and reporting energy efficiency savings and renewable energy generation are sufficiently rigorous and accurate to be relied upon with confidence. The M&V specialty evaluation contractor, Nexant, Inc. (Nexant), verified and quantified gross energy savings estimates resulting from implementation activities supported by the Program. Nexant reviewed 27 programs representing 100 percent of the Program’s electricity savings claimed by NYSERDA in its various reports. Of these 27 programs, 11 represent more than 80 percent of the claimed savings. These 11 programs received a full M&V analysis which included checking file and engineering calculations of savings algorithms, reviewing individual program project records, identifying a random sample of program projects to receive on-site inspections, and conducting on-site inspections to verify equipment installation and operation.¹⁸ Among the 11 programs, Nexant conducted in excess of 120 individual on-site inspections that included projects in the commercial, industrial, residential, municipal, and institutional sectors.¹⁹

In conducting on-site M&V reviews, Nexant found that NYSERDA has positive name recognition in the marketplace and is well regarded by program participants. Nearly all of the Program’s business and institutional participants that were evaluated by Nexant were willing to cooperate with the evaluation effort once they understood the work was being conducted on NYSERDA’s behalf.

The remaining 16 programs reviewed by Nexant represent less than 20 percent of the electricity savings claimed for the portfolio and generally had smaller program budgets than the 11 programs receiving the full M&V review. The 16 programs received the same level of preliminary review as the previously-discussed programs except that on-site visits to verify equipment installations and operations were not conducted. The 16 programs²⁰ mostly install energy efficiency measures for which savings estimates are well established (*e.g.*, standard equipment replacements using ENERGY STAR[®] appliances) and

¹⁷ The PSC’s public policy goals for the Program are to: (1) Improve system-wide reliability and increase peak electricity reductions through end-user efficiency actions; (2) Improve energy efficiency and access to energy options for underserved customers; (3) Reduce the environmental impacts of energy production and use; and (4) Facilitate competition in the electricity markets to benefit end-users.

¹⁸ The eleven programs that received a full M&V review were the New Construction, Peak Load Reduction, ENERGY STAR[®] Homes, Commercial Industrial Performance, ENERGY STAR[®] Products and Marketing, Keep Cool, Technical Assistance, Home Performance with ENERGY STAR[®], FlexTech, Institutional Performance Contracting Assistance, and ENERGY STAR[®] Bulk Purchase programs.

¹⁹ While each of the programs mentioned in the previous footnote received a full M&V review, additional sampling is necessary to verify savings estimates for the Technical Assistance program. For that program, the sample size for field verification was not large enough, as a percentage of completed projects, to reliably adjust reported savings for this report.

²⁰ The sixteen programs reviewed by the M&V contractor through inspection of program files and records and reviews of savings algorithms and engineering estimates include: Assisted Multifamily Buildings, Distributed Generation and Combined Heat and Power, Premium Efficiency Motors, Loan Fund, Wholesale Renewables, End-Use Renewables, Assisted Home Performance with ENERGY STAR[®], Residential Comprehensive Energy Management, Enabling Technologies, Smart Equipment Choices, Low-Income Direct Installation, Small Commercial Lighting, Municipal Water and Wastewater, Energy Audit, Commercial HVAC, and Energy Smart Schools.

warranted less scrutiny than programs where savings estimates are not well established and where site visits were deemed necessary.

A realization rate²¹ was calculated to determine the gross electricity savings impacts for the portfolio of 27 programs. Based on file review, other program experience, and engineering judgment, Nexant found that energy savings estimates reported in earlier studies were reasonably accurate. For the **New York Energy SmartSM** portfolio, the realization rate for KWh savings is .92, and for MW reductions the rate is .90, indicating that the savings measured and verified by the evaluation contractor reduced estimated program savings by 8 to 10 percent. Therefore, the accuracy and confidence that can be placed in energy savings estimates varies among programs. Such variations are discussed more fully in Volume 2.

Nexant also extensively reviewed the stipulated electricity savings from pre-qualified energy efficiency measures. Pre-qualified energy efficiency equipment replacements include more than 400 individual energy efficiency measures and are integral to seven programs. Stipulated savings values for pre-qualified equipment for these programs were updated to reflect current engineering estimates. The reporting of stipulated electricity savings has been automated. Nexant developed a database that will allow savings values to be consistently applied by programs.

In conducting program-by-program engineering reviews, Nexant reviewed program databases and tracking procedures. This effort determined that program data tracking and internal reporting procedures do not align well with the needs of evaluation contractors. This issue cuts across all evaluation efforts. Program tracking databases were designed primarily for project management and not for tracking evaluation metrics; therefore, some disconnects were expected. In some cases, process and bookkeeping inconsistencies confounded the analyses. Efforts have been undertaken to improve this situation. Inconsistencies between program management and evaluation data are ameliorated somewhat due to active and immediate interactions among NYSERDA staff, evaluators, and implementation contractors, so that improvements are made as soon as practicable once problems are identified. Standardized data tracking and reporting have been instituted as a result of the M&V review for a number of programs.

In reviewing the 27 **New York Energy SmartSM** programs in depth, Nexant determined that additional field and on-site investigations are required to obtain needed statistical confidence levels for savings estimates for selected programs. In 2004 and 2005, Nexant will review in detail those programs that did not have a full on-site M&V analysis for the current year's evaluation. In addition, drawing project samples for evaluation will be conducted more rigorously to improve the confidence levels within which savings are reported.

3.2.3 Process Evaluation Highlights

Four programs in the **New York Energy SmartSM** portfolio were selected for partial and full process evaluations in 2003 by evaluation contractor Research Into Action, Inc. (RIA). The selected programs were the Distributed Generation-Combined Heat and Power, New Construction, Assisted Multifamily, and Technical Assistance programs. The goal of a process evaluation is to review how program activities and customers interact and to recommend ways to improve program processes to increase effectiveness. The findings from these evaluations are summarized below and thorough discussions of the process evaluations are presented in Volume 2.

²¹ The realization rate is the electricity savings measured and verified by the M&V contractor divided by the electricity savings being claimed by the Program. A rate of 1.0 means that the savings measured and verified by the contractor aligned exactly with the savings being claimed. A rate greater than 1.0 means that savings claimed are undervalued, while a rate less than 1.0 means savings claimed are overvalued. Volume 2 of this report defines realization rates more fully and presents the realization rate for each of the **New York Energy SmartSM** programs studied in detail.

Distributed Generation-Combined Heat and Power (DG-CHP)

The process evaluation for the DG-CHP program included interviews with program staff, program participants, and program non-participants. Staff and participants are enthusiastic about the program and many of the non-participants expressed positive attitudes toward the program. Participants value the support and technical competency that program staff provide. Participants and non-participants alike suggested that the language used in solicitations should be clarified to better define the term “innovative.” Interpretation of this term by applicants has varied widely and has led to misunderstandings. Applicants expressed the opinion that these misunderstandings have caused proposals to be rejected unnecessarily.

Regulatory requirements, *e.g.*, utility interconnection protocols and standby rates, and participant financing issues have led to early terminations of some projects. Continuing work with utilities to standardize interconnection requirements should reduce project attrition. Some respondents suggested that staff might consider offering a DG-CHP subscription program on a first-come, first-served basis rather than a project-based program. This change in the program’s structure has been explored in the past and will be periodically re-examined for future solicitations.

New Construction Program

The process evaluation conducted for the New Construction Program reflects interviews with internal stakeholders, including outreach project consultants (OPCs), technical assistance providers, and NYSERDA staff. Interviews with external stakeholders, including project designers and owners, are scheduled for 2004, and the results of those interviews will be included in a subsequent evaluation report.

Program staff, OPCs, and technical assistance providers made positive comments about the value and effectiveness of the program, emphasizing improvements in market awareness as a result of actions taken in the marketplace, the technical assistance and incentives provided, and influence on building quality. Interviewees stated that while the current “first-come, first-served” program approach is fair-minded, it contributes to heavy staff workloads and project processing times that are longer than they would prefer. Delays could result from what appears to be a cumbersome program delivery approach that includes multiple review steps with multiple reviewers. Staff cite flexibility of program delivery, *i.e.*, the ability to accommodate all sizes of projects at various stages of design, as adding to customer benefits. NYSERDA modified the program procedures in July 2003 to accelerate processing times, but adequate time has not elapsed to determine whether those changes have had the desired effects. The size and complexity of the New York City market poses many challenges to the program, but, by several accounts, this market is underserved in relation to the amount of building activity that occurs in the State – resulting in lost opportunities for significant gains in energy efficiency, market transformation, and program visibility. The program has recently taken other steps to address this issue, including having an OPC who operates solely in New York City.

Assisted Multifamily Program

The process evaluation of the Assisted Multifamily Program (AMP) included interviews with a sample of participating and non-participating building owners, program staff, implementation contractors, and staffs of regulatory agencies. Since AMP was introduced in June 2002 and was in its initial development phase for the current reporting period, some negative responses were expected. Some building owners were unequivocally positive about AMP, while others thought program improvements were needed. A particular concern expressed was the “last-in” approach for funding, which is an intentional program design feature to set an upper limit on costs paid by building owners while minimizing investment by the Program. Some interviewees reported positive responses with respect to unique aspects of the program, such as the building audit. Program staff and contractors acknowledged facing many challenges during start-up and early implementation, including expected as well as unexpected delays, the need to clarify policies and procedures, coordination with other agencies offering low-income program services, and

contractor training. These challenges have been discussed among program partners and have been or are being addressed. Participants and others showing interest in the program cited the importance of expected energy savings, the value of audits, and the availability of funding for implementation of energy efficiency improvements as their key motivators. Respondents stated that a lack of knowledge about energy efficiency options and difficulties obtaining financing are key barriers to making energy efficiency improvements in multifamily buildings, but they expect to find AMP useful in reducing these barriers.

Technical Assistance Program

The process evaluation of the Technical Assistance Program entailed interviews with NYSERDA staff and service providers. Surveys of customers who had participated in the program between September 1, 2002 and August 31, 2003 were conducted. Various reports, databases, and background materials were made available by NYSERDA staff for review. In general, the operation of the Technical Assistance program is smooth and its processes are efficiently managed from program application through delivery of the final assessment reports. Satisfaction with the program process is high among service providers and customers. With the exception of reducing review times for scoping studies, few changes to the program's processes are suggested by the findings of this evaluation. The existing Projects Database, however, appears to have limited utility as a project-tracking tool for evaluation. Development of a separate tracking database for evaluation purposes should be considered. Collapsing the three individual program components into a single-comprehensive program offering should be considered because the distinctions among program services are less clear in the marketplace than they are to staff.

3.2.4 Cycle Time Evaluation

Cycle time is the interval between the proposal due date and the date of contract signing that is spent reviewing proposals, selecting winning bidders, and reaching agreements with proposers on specific work scopes and contract terms. This interval is typically longer for PONs than for RFPs.²² PONs involve multiple proposals and as many as 70 may be received from a single PON. Furthermore, many of these proposals will be approved for funding at the same time with each one requiring contract agreements with multiple parties. The number of weeks between the proposal due date and contract signing is an important indicator of how well NYSERDA is functioning administratively in terms of actions that are under its control. Very often NYSERDA is forced to wait for responses from contractors with respect to, sometimes minor, unanticipated issues outside of NYSERDA's control. Such unforeseen circumstances can significantly delay contract execution. Cycle time analyses highlight the many causes of administrative delay. Other indicators that affect cycle time are:

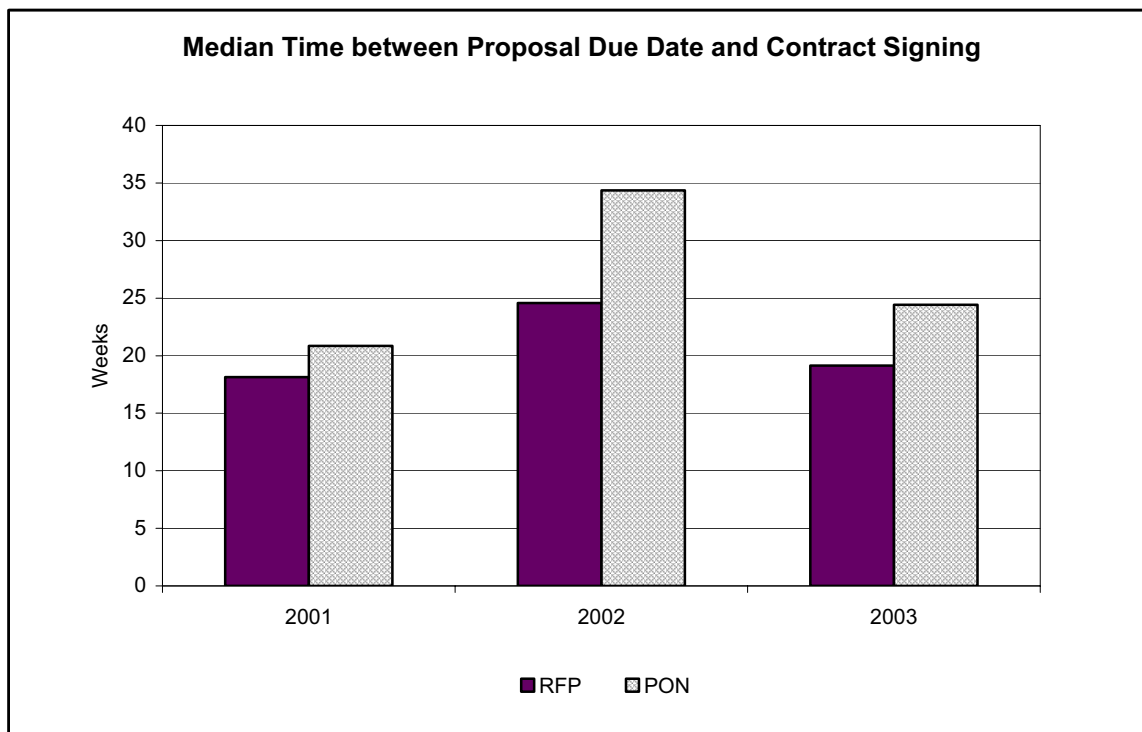
- Clarity of solicitations. Clearly written solicitations should produce quality proposals that require less work to bring to the contracting stage.
- Effectiveness of contract negotiations.
- Efficiency of the contracting process.

Median cycle times²³ for RFPs and PONs for the last three years are shown in Figure 2.

²² Requests for proposals (RFPs) are solicitations issued by NYSERDA for projects that represent a specific area of interest. RFPs include a detailed statement of the work contemplated and the evaluation criteria to be used. A single award with no cost-sharing is the norm. Program opportunity notices (PONs) are solicitations for projects that demonstrate technical, economic, and environmental characteristics in particular technology areas. Multiple awards are usually made and cost-sharing is the norm.

²³ Cycle time ranges in weeks: 2001 – 11.7-35.4 (RFP), 10.6-47.9 (PON); 2002 – 11.6-41.4 (RFP), 31.0-66.3 (PON); 2003 – 4.7-44.0 (RFP); 18.6-32.3 (PON).

Figure 2. Annual Cycle Times by Type of Solicitation



Cycle times were shorter in 2001 because fewer solicitations were issued and fewer contract actions were completed in that year while NYSERDA initiated the second phase of the **New York Energy SmartSM** Program. The large number of solicitations released in 2002 increased contracting activity and, thus, lengthened cycle time. Improvements in the content of solicitations and increased efficiency in contracting reduced cycle times in 2003.

Solicitations Released

During 2003, 33 solicitations representing 18 requests for proposals (RFPs) and 15 program opportunity notices (PONs) were issued to competitively select contractors for program design and implementation services. The number of solicitations released for each of the last three years is detailed in Table 2. For the past three years:

- RFPs resulted in 551 proposals being received, 118 (21%) of which were approved for funding.
- PONs resulted in 1,116 proposals being received, 402 (36%) of which were approved for funding.

A number of solicitations for financial incentive subscription programs were also issued and some remain open. Hundreds of solicitations and applications were received for these open enrollment incentives and are not presented here.

Table 2. Total Number of Solicitations Released per Year, through December 31, 2003

Year		Number Released / Received by Due Date	
		RFP	PON
2001	Solicitations	11	12
	Proposals Received	136	283
	Proposals Accepted	25	107
2002	Solicitations	24	18
	Proposals Received	183	512
	Proposals Accepted	35	179
2003	Solicitations	18	15
	Proposals Received	232	321
	Proposals Accepted	58	116
Total	Solicitations	53	45
	Proposals Received	551	1116
	Proposals Accepted	118	402

Evaluation of Cycle time Reporting System

The existing cycle time reporting system has become inflexible and time consuming to maintain as a result of the significant growth in the number and variety of contracts, the many different sources of cycle time information, and the lack of automated tracking and analysis procedures. RIA investigated the current cycle time reporting system and has identified significant ways in which the tracking and analysis of cycle time data can be improved. RIA's findings and recommendations are discussed in Section 5 of Volume 2.

3.2.5 Market Characterization, Assessment, and Causality Highlights (MCAC)

Market Characterization Findings

Major markets characterized in this phase of the MCAC work completed by the contractor, Summit Blue Consulting (Summit Blue), include commercial new construction, the motors market, most of the areas targeted by residential programs, the low-income assisted multifamily market, and both the wholesale and end-use renewable energy markets. Key findings of these characterizations are highlighted below.²⁴

- Approximately 12 percent of the non-residential new construction activity (in square feet) occurring in the State in 2003 benefited from the New Construction Program, and about half of the ten most active architects and engineers (A&Es) in the State have participated in the program. A&E activity is measured in terms of dollar value and number of projects.
- More than 500 retail stores were participating in the ENERGY STAR[®] Products Program at the end of 2003. The MCAC research team had difficulty finding non-participating retail stores for

²⁴ Detailed discussions of findings are reported in Volume 2.

interviews and on-site data collection, in part because many of the largest stores in key metropolitan areas are already participants in the program.

- Approximately 9 percent of the 18,780 new single family homes built in 2002 were participants in the ENERGY STAR[®] Homes Program. Five of the top ten builders in the State (as measured by number of homes) are participating in the program.
- Approximately 205,000 homes located in the **New York Energy SmartSM** area conduct significant remodeling or home performance work each year and could be eligible for the Home Performance with ENERGY STAR[®] Program. Approximately 2 percent of these potentially eligible projects are participating in the Home Performance with ENERGY STAR[®] Program.
- About 10.5 percent of the multifamily housing units that qualify for the Assisted Multifamily Program (AMP) are participants.
- In its short history, wholesale wind power in New York has demonstrated significant growth in both installed and planned capacity, going from zero MW prior to the **New York Energy SmartSM** wind program, to 41.5 MW in 2004. Ten wind developers and operators and 11 green power marketers and green power ESCOs are currently active in the State.
- As of December 2003, more than 600 KW of photovoltaic system capacity had been installed with assistance from the **New York Energy SmartSM** Program. Approximately 50 percent were residential applications and the remainder were for commercial and institutional buildings. Approximately fifty PV system installers are participating in the Program and 18 training programs have been conducted in New York for PV and small wind technicians. A certification program for installers is in operation and the first test was administered in Fall 2003.

Market Assessment Findings

Key market assessment findings are presented below.

- More than 90 percent of participating architects and engineers, 90 percent of participating building owners, and 40 percent of non-participating architects and engineers surveyed say that the New Construction Program has increased their knowledge of the benefits of energy efficiency improvements in buildings. Statewide, 60 percent of non-participating architects and engineers are aware of the program and the majority of those say they are familiar with the concepts and goals of the program.
- The Premium-Efficiency Motors Program has increased vendors' awareness and knowledge of National Electrical Manufacturers Association (NEMA) PremiumTM motors. For instance, 56 percent reported that they have excellent knowledge since joining the program, significantly more than the 15 percent who reported excellent knowledge prior to joining the program.
- Awareness of the ENERGY STAR[®] logo within the **New York Energy SmartSM** service area has increased from 34 percent in 1999 to 43 percent in 2001 and to 62 percent in 2003. More than half of the households responding to a random consumer mail survey in 2003 reported that they had seen advertising featuring the ENERGY STAR[®] logo. Recall of the **New York Energy SmartSM** brand is less – about eight percent – among those households, primarily because promoting ENERGY STAR[®], not the **New York Energy SmartSM** Program, is the major thrust of NYSERDA's marketing efforts.
- Market shares of ENERGY STAR[®] products have more than doubled for all appliances and increased somewhat for most lighting measures since 1999. ENERGY STAR[®] market shares reported in the 2003 consumer mail survey were 22 percent for refrigerators, 15 percent for dishwashers, 22 percent for clothes washers, 33 percent for room air conditioners, and 21 percent for compact fluorescent light bulbs (CFLs). Lighting fixtures lag behind other products with

market shares between three and seven percent, supporting the contention of non-participating retailers that consumers more readily associate the ENERGY STAR® logo with appliances than with lighting products.

- More than 70 percent of participating builders said that the New York ENERGY STAR® Homes Program was very important in increasing their familiarity with ENERGY STAR® labeled homes, while 30 percent of non-participating builders said the same.
- All of the participating contractors were familiar to very familiar with the Home Performance Program, and 95 percent of the participating contractors indicate that the Program has been very important (84 percent) or somewhat important (11 percent) in increasing their familiarity with home performance measures and practices.
- About 40 percent of participants in the AMP stated that the program has greatly increased their knowledge of the benefits of energy efficiency improvements.
- About 20 percent of residential consumers and a similar percentage of business consumers recall seeing information on green power. In 2000, no green power products were available in New York. At the end of 2003, all retail electricity customers had the option of purchasing a green power product. The currently available products display much greater variety than in earlier years; approximately six green power products with differing blends of renewable resources, ranging from a combination of biomass and wind to wind alone, are available for sale.
- In all cases, survey respondents indicated that non-energy benefits, *e.g.*, comfort, safety, and reduced maintenance costs, of acquiring and using energy efficiency products and services were significant.

Causality and Attribution Findings

The causality and attribution analysis involves examining free-ridership (or baselines) and spillover (or market effects) to determine a net-to-gross ratio that can be applied to the Program's energy savings. Free-riders are program participants that claim they would have undertaken the same or similar energy efficiency actions, or made the same energy efficiency purchases, whether or not the product or service was available through the Program.

Spillover refers to energy efficiency actions taken without the benefit of incentives but which participants maintain were influenced by the Program. Self-reported free-ridership and spillover figures are used to determine the savings that might reasonably be attributed to the Program; however, absent the infrastructure created by the Program – informing market actors of the benefits of energy efficiency, increasing stocking of products, training and certifying buildings professionals – customers would have lacked the information and ability to make energy efficiency decisions.²⁵ Findings from major areas examined in the causality and attribution evaluation are highlighted below. A complete discussion of findings is included in Volume 2.

- For the New Construction Program, spillover entirely offsets the impact of free-riders and could allow the program to count an additional 0.3 KWh of market effects for every KWh saved by program participants. This relationship results in a net-to-gross ratio of approximately 1.32.
- For the Premium-Efficiency Motors Program, spillover does not offset free-ridership, and the preliminary net-to-gross ratio is approximately 0.77. As additional research is conducted to better

²⁵ Free-ridership estimates must be used cautiously for market transformation programs. The current analysis treats free-riders in the conventional way, as a reduction in attribution, pending development of a more thorough methodology. Free-ridership and spillover rates should not be compared across programs, since some programs present opportunities for either while other programs do not. When tracked over time, free-ridership may also be used as an indicator that a market transformation program is succeeding and possibly signal an opportunity to consider a transition strategy away from current program activities.

assess spillover and to fully understand free ridership, this ratio may change. The MCAC team recommends using a range from 0.77 to 1.0 for net-to-gross ratios for benefit/cost analyses.

- The causality and attribution analysis for the ENERGY STAR® Products Program and marketing effort was particularly complex because this program is not incentive based. The analysis included surveys and other means of estimating the increases in market share of ENERGY STAR® products over time, subtracting the amount of increased market share due to national ENERGY STAR® program efforts, and subtracting the amount of increased market share that could occur naturally. The latter adjustment is similar to measuring the effect of free-riders in incentive-based programs. The portion of the increased market share that is due to the national program varied from 36 percent to 100 percent, depending on the product. The weighted average for naturally occurring adoption across many products was just under 20 percent. Adjusting for the effects of other residential programs, estimated net savings were 122.6 GWh and 22.7 MW from the ENERGY STAR® Products Program and marketing effort.
- For the Keep Cool Program, participant surveys and other sources indicated free-ridership of approximately 18 percent. Direct spillover was approximately 15 percent and could be substantially higher. More than 200,000 ENERGY STAR® room air conditioners are being credited to the ENERGY STAR® Products Program described above, presenting difficulties in identifying the effects of specific programs.
- For both small homes programs, ENERGY STAR® Homes and Home Performance with ENERGY STAR®, spillover completely offsets the impact of free-ridership. Net-to-gross ratios for these programs are 1.16 and 1.20, respectively.
- For the Assisted Multifamily Program, spillover does not offset free-ridership, and the net-to-gross ratio is approximately 0.84. The implications of this finding must be viewed in context. Incentives offered through this program are typically used to leverage approximately 79 percent of project funds from other sources.
- For both the Wholesale and End-Use Renewables energy programs, net-to-gross ratios are approximately 1.0, indicating that in all likelihood none of the wind and photovoltaic systems funded by the program would have occurred without program incentives.

3.3 PROGRAM SYNERGIES

This section presents the cumulative results of a multi-year assessment of the interrelationships among components of the **New York Energy SmartSM** Program. The assessment was conducted by Oak Ridge National Laboratory (ORNL) and NYSERDA to identify and quantify possible advantages of a single administrator for a full complement of energy efficiency and demand-reduction programs serving most of the State in lieu of numerous administrators serving multiple, potentially overlapping service areas.

This work was undertaken to test the hypothesis that deliberately-planned collaboration and information sharing among staff of a single program administrator can increase efficiencies and effectiveness in program design and delivery and, ultimately, increase the likelihood of success in achieving the program's goals. A systems-based approach to portfolio development and evaluation, such as the one taken by the **New York Energy SmartSM** Program can be expected to foster free and open communication among administrative staff, implementation contractors, and customers. The synergies identified within the portfolio, whether naturally occurring or deliberately planned, have positive and negative effects. Regardless of the causes or consequences, early findings from the systems-based assessment of the Program have provided useful information that has allowed NYSERDA management to quickly modify program designs and implementation and delivery mechanisms. Such rapid responsiveness would be almost impossible absent active management of the portfolio and without the

cooperation and collaboration of staff and the synergies such cooperation and collaboration represent. Results of this work have helped determine the most appropriate manner to view program activities and have helped guide development of outcome and impact reporting.²⁶ Overall, the findings of the assessment are encouraging, support the contention that synergies are present and identifiable in the Program portfolio and are contributing to the Program’s success.

Transforming and developing markets can be accelerated when programs work together to produce synergistic effects, meaning that the total measured benefits of the portfolio of programs are greater than the sum of benefits attributable to individual programs. ORNL is assisting NYSERDA in designing and implementing an evaluation of portfolio synergies. Three focus groups were held in October 2003 to conduct in-depth discussions with NYSERDA staff to measure, evaluate, and otherwise assess synergies exhibited among the portfolio of programs. These activities build upon previous focus groups held in January 2003 and use a framework that sets out ten conditions for organizational synergy and a methodology for measuring programmatic synergy at the program level.²⁷ Each focus group addressed a different technology area – energy-efficient lighting, photovoltaic (PV) systems, and peak load reductions.

Each focus group brought together NYSERDA staff who worked in different program areas but whose responsibilities involved one of the three technologies. The results of the focus groups suggest that a fair amount of synergy is taking place in the following areas: within the larger marketplace that includes market actors and **New York Energy SmartSM** programs; at the level of program participants, *i.e.*, customers who may take advantage of more than one program at a time; and within NYSERDA itself. However, opportunities to further increase synergy exist. In summary, the focus groups revealed that:

- The market systems and the programs associated with each of three broad program categories (*i.e.*, energy-efficient lighting, photovoltaic systems, and peak load reductions) are characterized by numerous types of financial influence and communication across market channels that have the potential to create substantial system synergies. This is especially pronounced with respect to the ability to create multiple influences upon customers and multiple opportunities for market actors and customers to purchase energy-efficient technologies either through and outside of the programs.
- A general consensus exists among focus group participants representing all three program categories that the lack of customer awareness is the most significant barrier inhibiting market penetration of energy-efficient technologies, suggesting that the focus group participants believe that the numerous channels of influence acting on customers are, as of yet, not having a major impact outside of NYSERDA programs.²⁸
- Numerous programs were deemed to be working together synergistically, but few examples were given in which lessons learned through trial and error were shared to improve organizational synergy and efficiency. The incidence of sharing was shown to differ among staff. Supervisory staff demonstrated greater understanding of program interactions and interrelationships than line staff.

²⁶ DeCotis, Paul A., Bruce Tonn, Lawrence J. Pakenas, and Joel Eisenberg, “Systems-Based Portfolio Evaluation: Diagnostic Benefits and Methodological Challenges,” *American Council for an Energy Efficient Economy Summer Study on Energy Efficiency in Buildings Conference Proceedings*, ACEEE, Washington, DC, 2000.

²⁷ Ibid.

²⁸ Market effects research under way to assess program spillover and progress in market transformation suggests that significant spillover is occurring in many programs, but free-ridership is present in many instances. Instances of free-ridership indicate that markets are being transformed and programs may not be required in their current form to move markets to higher levels of energy efficiency. As market effects become more transparent, programs may need to be transitioned and adapted to emerging market needs.

- Customers can take advantage of numerous programs at one time, especially incentive and technical assistance programs, but the focus group participants generally did not mention the potential for augmenting synergistic benefits through public awareness campaigns. As a result, additional benefits might be derived from bundling messaging with targeted marketing to selected customers in numerous program categories.
- Multiple incentive programs were found to influence a higher percentage of purchases in markets for less mature products (*e.g.*, photovoltaic systems) than in markets for more mature products (*e.g.*, energy-efficient lighting).
- Focus group participants believe that synergies will lead to increased market penetration rates and will accelerate market transformation. Participants' vision of the future adoption of the technologies supported by their programs and their vision of better synergistic relationships among programs and technologies appear limited in both scale and scope. The lack of vision may reflect inexperience on the part of some staff or the newness of programs. In either case, further work is needed to make opportunities available for additional collaboration and cooperation among programs.
- The Program offers a diverse portfolio of offerings and services, and, for the most part, this diversity is serving NYSERDA well and generally working as intended. The number of programs and the fact that several programs serve the same customers, however, causes some confusion. As a result, some customers may not take advantage of complementary programs or may simply refuse to participate.
- Few programmatic overlaps exist among the three program categories studied, leading to the conclusion that deliberate efforts to promote synergy are not adversely affecting program and administrative management.
- Improved methods are needed for providing information to customers and to NYSERDA staff, and more market information and penetration data should be collected about technologies to allow staff to better understand opportunities for synergy and how to measure the results of synergy.²⁹
- Comments about changing market circumstances and the Program's future direction identified many important issues for program staff to consider, but, in general, such comments did not address changes that would improve opportunities for synergy.

ORNL noted that the focus groups had value above and beyond their purpose of assessing synergy. Participants said they benefited from the extended discussions, which helped to build interpersonal relationships that either had not existed before or were not as strong as participants desired. Participants in at least one focus group agreed to reconvene periodically on their own to share information and ideas related to their common interest in a specific technology.

ORNL recommends the following steps and points for consideration based on the October 2003 focus groups:

- Better measurements of market penetration rates are needed, along with indicators of programmatic synergy that may be occurring at the level of program participants.
- Once current market penetration rates are better understood, focus groups addressing only future market penetration rates and time frames will help staff create more comprehensive visions of future markets in their program areas. The focus groups should include varied technologies so that synergies among technologies and programs can be explored.

²⁹ The results of market characterizations and assessments that are being conducted simultaneously with the effort to determine, identify, and quantify synergies will be available soon to strengthen that effort.

- Ways to make programs less confusing and more seamless to customers while maintaining internal program diversity need to be explored.
- Despite the delivery of a wide range of programs designed to influence customers, widespread awareness is lacking among targeted market actors. The reasons for the persistent lack of awareness among targeted market actors should be determined.
- An effort should be made to develop a metric to measure internal organizational synergy.
- Methods should be explored to help staff better identify and exploit synergies among NYSERDA's activities.

3.4 OPPORTUNITIES FOR PROGRAM IMPROVEMENT AND ENHANCEMENT

The following potential opportunities for enhancing and improving the **New York Energy SmartSM** Program were derived from the Opportunity Analysis Report prepared by the Heschong Mahone Group (HMG) contracting team, the general evaluation assistance contractor, with input from the specialty contractors. Energy efficiency programs operated by other agencies and utilities were examined in an effort to identify gaps in Program offerings and evaluation activities.

Important caveats must be kept in mind with respect to the opportunities for program improvement and enhancement summarized below. While the HMG team consists of seasoned, senior program evaluators with many years' experience working with energy efficiency programs, the team members are not engaged in day-to-day management of the **New York Energy SmartSM** programs. Consequently, the team was not privy to all the considerations affecting NYSERDA's selection of programs, implementation approaches, and resource allocations. Ideas that were successfully implemented in other regions of the country may not be applied with equal success in New York for reasons such as the State's unique institutional and business climate and market characteristics. Many of the recommendations summarized below would entail dramatic long-term shifts in NYSERDA's program design approach, budgets, and staffing

These caveats should be kept in mind as these recommendations are considered as potentially valuable ideas with inherent strengths and weaknesses requiring extensive evaluation prior to implementation. The Program is experiencing substantial success and, in some cases, is moving gradually in the suggested directions. Therefore, some of these recommendations may be safely ignored. However, as products of the HMG team's activities, they are presented as promising areas that could potentially enhance NYSERDA successes.

The Program provides a more comprehensive set of offerings than programs in other states. Although gaps in the offerings were not identified, the following implementation and evaluation opportunities are presented for consideration:

- **Program Consolidation.** Consolidating certain programs could improve market connections, leading to increased consistency and efficiencies in program delivery.
- **Differentiated Marketing.** Systematic experimentation with different marketing media and messages among a variety of media markets could lead to more effective ways to increase awareness of energy efficiency, alter consumer attitudes, and stimulate demand for energy-efficient products and services.
- **Utility Bill Financing.** A method of financing energy efficiency improvements should be explored in which improvements to buildings are repaid by the building's tenants through a line item on their utility bill. A financing mechanism of this type would address the "split incentives barrier," the circumstance in which the building owner is unwilling to invest in energy efficiency because only the tenants see the energy cost savings.

- **Improved Data Systems.** Standardizing data collection and tracking systems could result in easier cross-referencing between programs and more timely reporting of results.
- **Energy Center.** Creation of a New York Energy Center could provide increased public access to energy and technical information and practical demonstrations.
- **Tax Credits.** Linking program offerings with federal tax credits, if enacted, could provide leveraging opportunities.
- **Codes and Standards.** Greater linkage of program activities with building codes and standards may enhance progress toward market transformation.
- **Holistic Building Systems.** Penetration of the commercial building market by holistic building-wide energy efficiency systems could be tracked.
- **Industrial Process Energy.** Greater emphasis on industrial process improvements, targeting the most energy-intensive, small- to medium-sized facilities, may result in substantial energy savings.
- **Market Adoption of R&D.** Increased emphasis on accelerating the adoption of products developed through the R&D program may lead to increased energy savings.

3.5 COST EFFECTIVENESS OF PROGRAMS

In assessing the **New York Energy SmartSM** Program's cost-effectiveness, two methods are necessary. For deployment programs and market transformation programs for which energy and demand savings can be estimated, an economic benefit/cost (B/C) analysis is used that monetizes savings and compares them to costs. For research and development (R&D) programs, such as next-generation technologies, distributed generation, new product development, and strategic reliability technologies, the economic benefit-cost methodology is inappropriate because these programs are designed to accomplish a range of objectives, many of which cannot be monetized. For these programs, a value/cost (V/C) analysis – a modification and extension of economic benefit/cost analyses – is used. The B/C and V/C analyses were not completed in time for inclusion in this report. The evaluation team and NYSERDA will provide the results of the cost-effectiveness analyses in a separate report in fall 2004.

3.5.1 Benefit/Cost Analysis

The current B/C analysis builds upon work conducted in 2001 and 2002 in which B/C tests were applied to 70 measures in 11 of the largest **New York Energy SmartSM** programs. The number of measures, programs, and benefits included in the earlier B/C analysis were limited. The current analysis addresses a larger number of measures and programs, includes a wider array of benefits such as market effects, system reliability, and other non-energy benefits, and takes into account upstate and downstate differences in avoided costs. Benefit-cost tests will be conducted at the measures level, the program level, the market level (for residential, low-income residential, and business and institutional markets), and the portfolio level. The general framework for comparing cost and benefits is presented below:

- The Measure-Level Test compares incremental costs to avoided energy costs over the life of the measure.
- The Program-Efficiency Test compares Program spending to avoided energy costs over the life of the Program measures.
- Total-Market-Effects Test: compares Program costs and participant costs to total benefits over the life of the measure.

A complete description of the methods used in the B/C analysis is included in Volume 2.

3.5.2 Value/Cost Analysis

The goals of R&D programs are reductions in energy use, demand reductions, and economic benefits that occur in the long-term. The value-cost analysis effort will attempt to measure and value these long-term benefits. In addition to the long-term outcomes, leading indicators can show whether programs are on target for meeting long-term objectives. As a first step in the value-cost effort, a preliminary logic model was developed for a select group of R&D projects. Building on the logic model, the second phase of the value-cost work will occur in mid-2004. The goals of this phase will be to identify methods for measuring and tracking both the leading indicators and the long-term outcomes.

3.6 MACROECONOMIC IMPACT ANALYSIS

A complete discussion of the **New York Energy SmartSM** macroeconomic impact analysis is presented in Section 5 of Volume 2. Previous economic evaluations of the **New York Energy SmartSM** programs focused on tracking program costs and identifying direct benefits to program participants reported as energy bill savings. However, expenditures made by NYSERDA and program participants have substantial macroeconomic impacts that go far beyond direct benefits. Purchases of goods and services through the Program initiate a ripple effect as spending and respending influence various sectors of New York's economy and, in turn, affect the level and distribution of employment and income in the State.

The macroeconomic impact analysis of the programs undertaken for this report quantified the programs' net impacts by estimating the impacts of program expenditures and energy savings that would have resulted if the programs had not been implemented and if the system benefits charges had not been paid by ratepayers and comparing those estimates to spending resulting from program activities. The net macroeconomic impacts are expressed in terms of annual employment, labor income, total industry output, and value added. The analysis covered the eight years of Program implementation from 1999 to 2006 and the ten years following Program implementation, from 2007 to 2016.

The analysis used an input-output model³⁰ to characterize the myriad interdependencies in New York's economy and to describe how the expenditures of each group in the economy differ. An input-output model is a detailed representation of a pattern of transactions among industries in an economy and describes the interrelationships among these industries and the other sectors of the economy (*e.g.*, households and government entities). An input-output model allows the analyst to use the information in the model to estimate the total economic effects of a change in expenditures starting with decreased expenditures for electricity and extending to such consequences as decreased employment in industries that supply the electricity sector.

The first step in the analysis was to develop a Base Case to estimate the impact on the New York economy if public benefits funds had been retained by customers of participating utilities. The analysis then developed a Program Case to estimate the impact on the New York economy as funds allocated to the **New York Energy SmartSM** Program were spent on goods and services. By comparing the impacts of the Base Case and Program Case, the analysis provided a comprehensive assessment of the net macroeconomic impacts of the **New York Energy SmartSM** programs.

The analysis the estimated impacts of the following primary factors:

- **New York Energy SmartSM** Program expenditures.
- Co-funding expenditures by program participants.
- Stream of energy bill savings by program participants.

³⁰ The input-output model used the IMPLAN Pro software system (Version 2.0) developed by the Minnesota IMPLAN Group.

- Opportunity cost of **New York Energy SmartSM** Program expenditures (*i.e.*, the potential impacts of the amount of funds collected from customers if they were to be spent by the contributing customers in the absence of the **New York Energy SmartSM** Program).
- Opportunity cost of co-funding expenditures (*i.e.*, the potential impacts of the co-funding expenditures if they were spent in normal consumption and investment patterns in the absence of the **New York Energy SmartSM** Program).
- Impact of reduced economic activity in the energy-providing sector due to reduced purchases.

Table 3 summarizes the results of the analysis and illustrates the ultimate finding that the Program provides net macroeconomic benefits to New York in the form of increased employment, labor income, total output, and value added. Averaged over the 18-year analysis period, the Program creates and sustains more than 4,700 jobs, increases labor income by \$182 million per year, increases total output by \$224 million per year, and increases value added by \$103 million per year.

Table 3. Summary of Macroeconomic Impacts of New York Energy SmartSM Program

Economic Variable	Program Implementation Years (1999-2006)	Years Following Program Implementation (2007-2016)	Annual Average for 18-Year Analysis Period (1999-2016)
Jobs	5,492	4,201	4,774
Labor Income	\$236 million	\$138 million	\$182 million
Total Output	\$428 million	\$61 million	\$224 million
Value Added	\$221 million	\$9 million	\$103 million

Substantial net macroeconomic benefits to New York take the form of increased employment during the Program implementation years (1999-2006) and throughout the years following implementation (2007-2016) as energy efficiency measures implemented by the program continue to accrue annual energy savings. An estimated average net gain of more than 4,700 jobs was found in each year over the 18-year analysis period. The increase in jobs created during Program implementation years (1999-2006) largely reflects the impacts of Program expenditures as programs are developed. The impacts of energy savings increase each year during the implementation years as more energy efficiency and demand reduction measures are installed and begin operating. The jobs created and sustained in the years following Program implementation are a result of the continuing stream of energy bill savings that results from the measures installed under the Program.

The analysis also estimated net job impacts by individual industry sectors; during the Program implementation years (1999-2006), net job gains are concentrated in Personal and Business Services (2,464 jobs), Wholesale and Retail Trade (1,571 jobs), and Construction (936 jobs), with the largest net job loss occurs in the Electric Utilities sector (319 jobs) as a result of reduced electricity sales. During the years following Program implementation, net job gains are concentrated in Personal and Business Services (2,504 jobs) and Wholesale and Retail Trade (1,580 jobs), while the largest net job loss occurs in the Electric Utilities sector (624 jobs).

During the Program implementation years (1999-2006), the Program Case will create and sustain more than three times the number of jobs than the Base Case (a 218 percent increase). In the years following Program implementation, the Program Case will create and sustain more than 18 times the number of jobs than the Base Case (or 1,742 percent).

Increased labor income is another area in which the analysis indicates that the **New York Energy SmartSM** Program provides substantial net macroeconomic benefits to New York. The estimated result is an average net gain of over \$182 million in labor income in each year for the 18-year analysis period. During the Program implementation years (1999-2006), the Program Case will provide nearly three times

more labor income than the Base Case (174% increase). In the years following Program implementation, the Program Case will provide over three times (236% increase) more annual labor income than the Base Case.

3.7 PROGRAM ACCOMPLISHMENTS

3.7.1 Progress Toward Goals

The **New York Energy SmartSM** Program has made significant progress toward accomplishing the public policy goals established by the PSC and listed in Table 4. The PSC's public policy goals for the Program are to:

- Improve system-wide reliability and increase peak electricity reductions through end-user efficiency actions.
- Improve energy efficiency and access to energy options for underserved customers.
- Reduce the environmental impacts of energy production and use.
- Facilitate competition in the electricity markets to benefit end-users.

Six objectives define what the Program expects to accomplish by meeting these policy goals. These objectives are:

- Reduce peak electricity demand through improved energy management and load reduction.
- Improve energy efficiency and reduce electricity use by all end-use customer sectors.
- Save money for consumers, businesses, and institutions, considering both energy bills and the cost of energy management services and investments.
- Reduce the environmental impacts of energy use by promoting renewable energy and sustainable building practices and by monitoring and reducing emissions of criteria air pollutants and greenhouse gases.
- Foster long-term market changes so benefits will be sustained and grow over time.
- Develop next generation energy-efficient end-use renewable and clean energy technologies.

Table 4. Progress Toward Goals

Progress toward goals
<p>Goal 1: Improve system-wide reliability and increase peak electricity reductions through end-user efficiency actions</p> <ul style="list-style-type: none"> • Through December 31, 2003, the New York Energy SmartSM programs have reduced peak demand through installed energy efficiency measures by 270 MW and have enabled another 610 MW of callable load reduction projects to participate, if needed, in New York Independent System Operator (NYISO) emergency demand response programs. A number of the participants said that the Peak Load Reduction and Enabling Technologies programs increased the load that could be reduced, curtailed, or shifted by 10 percent to 25 percent, if called. The 880 MW of potential demand reduction (range of 850 to 1050 MW) represents 2.9 percent of the 2003 peak statewide energy demand of 30,333 MW. • As a result of the Keep Cool Tips marketing campaign, approximately 90 MW of load was shifted hourly in summer 2002 and approximately 35 MW in summer 2003 by residents using clothes washers and dishwashers during off-peak hours. • The DG-CHP program has approved 83 systems for funding representing 90 MW of peak demand reduction. • Through December 31, 2003, New York Energy SmartSM programs have reduced energy use in New York by approximately 1,000 GWh (range of 950 to 1200 GWh) annually, which is approximately 0.7 percent of the 150,000 GWh of 2003 electricity sales in the State. • The Commercial/Industrial Performance Program (CIPP), which supports the development and expansion of the energy services industry in New York is saving more than 1000 participants 280 GWh a year and has lowered peak demand by 40 MW.
<p>Goal 2: Improve energy efficiency and access to energy options for underserved customers.</p> <ul style="list-style-type: none"> • The Comprehensive Energy Management program has installed advanced metering and direct load control systems in 93 buildings representing more than 9,500 multifamily units. • The Low-Income Assisted Multifamily program has provided more than 1,000 multifamily units in 16 buildings with energy efficiency review and financing services, and 93,000 units in 333 buildings are ready to participate in the program. • The Business and Institutional Innovative Opportunities Program has promoted the use of light emitting diode (LED) traffic lights, which use 80 - 90 percent less energy than incandescent lights. A post program survey of municipalities revealed that 43 of 44, or 98 percent, were aware of LED traffic lights, 58 percent reported using at least one such light, and 20 percent of municipalities not using LED traffic lights had plans to do so within one year. If all traffic lights in New York were converted to LED, the energy savings would be more than 200 GWh per year. • Since the inception of the program, more than 100 Building Performance Institute (BPI)-accredited contractors have begun participating in the Home Performance with ENERGY STAR[®] program and have provided energy efficiency services to more than 3,800 households. • The Residential Technical Assistance program has conducted energy efficiency audits in more than 2,680 apartments in 150 multifamily buildings.

Progress toward goals
<p>Goal 3: Reduce environmental impacts of energy production and use.</p>
<ul style="list-style-type: none"> • Through December 31, 2003, the New York Energy SmartSM programs have enabled 41.5 MW of installed wind generation capacity and 500 KW of installed photovoltaic capacity. Renewable energy generation from these facilities totals about 100 GWh a year. Energy efficiency and renewable energy production projects have resulted in reducing NO_x emissions by 825 tons per year, SO₂ emissions by 1,650 tons per year, and CO₂ emissions by 600,000 tons per year. The Madison and Fenner wind projects were installed at a Program cost of \$170 per KW. • Research by the Environmental Monitoring, Evaluation, and Protection (EMEP) program has led the U.S. EPA to change its guidance for complying with ozone air quality standards. It was instrumental in the development of New York's Acid Deposition Reduction Program and contributed to the development of instruments that are manufactured in New York and are used worldwide to measure fine particles. EMEP is providing the scientific foundation to formulate effective strategies for meeting fine particle air quality standards. • The Wholesale Renewables Program is promoting wind development and working with communities to lay the groundwork for potential wind development in their localities. Another 267 MW of new wind generation installed capacity is in planning. The Program is responsible for nearly 90 percent of the wind energy development in New York. • Approximately 141,000 old room air conditioners were removed from residential households, recycled, and replaced with ENERGY STAR[®] models as a result of the Keep Cool bounty program and marketing campaign.
<p>Goal 4: Facilitate competition in the electricity markets to benefit end-users.</p>
<ul style="list-style-type: none"> • The annual energy bill savings for participating New York Energy SmartSM customers is estimated to be \$140 million for Program activities through year-end 2003, including electricity, oil, and natural gas savings from energy efficiency and peak load management services provided. Participating customers' bill savings increases to \$380 million annually when the Program is fully implemented. Total cost savings for all customers, including non-participating customers, is estimated to be \$196 million for Program activities through year-end 2003, increasing to \$420 million to \$435 million at full implementation. • Ten wind developers and operators and 11 green power marketers and green power ESCOs are currently active in the State. • Approximately 50 installers of PV systems are participating in the Program and 18 training programs have been conducted in New York for PV and small wind technicians, consumers, and others. • A survey of motor vendors in New York found that 56 percent of the participants in the Premium-Efficiency Motors Program now have an excellent knowledge about premium efficiency motors compared to 15 percent that had an excellent knowledge before entering the program. • The number of energy service companies operating in New York has increased from 13 in 1998 before the Program began to about 150 in 2003.

Progress toward goals

- ENERGY STAR[®] dishwashers and room air conditioners each account for more than 60 percent of the displays in New York ENERGY STAR[®] retail-partner stores, up from 18 and 26 percent, respectively, in 1999. ENERGY STAR[®] room air conditioners, promoted by the Keep Cool Program, are now one of the high-efficiency products specifically requested by consumers. ENERGY STAR[®] market shares are increasing for most appliances while incremental costs are decreasing. Agreements to participate in the ENERGY STAR[®] Products program have been signed by 576 retailer shops and 19 manufacturers.
- To date, more than 140 R&D projects have received funding for information dissemination, product development, and product demonstration to ensure that market penetration of existing, but underused, innovative technologies will increase .
- The New Construction Program (NCP) has increased knowledge about energy efficiency options for nearly 100 percent of the building owners and 92 percent of the architects and engineers that participated in the program, and for 40 percent of the non-participating architects and engineers. Between 40 and 60 percent of the largest architecture and engineering firms in New York have participated in the NCP. For all participants, 27 percent of those surveyed said the NCP increased their familiarity with building-integrated photovoltaic systems and 47 percent said the program increased their familiarity with green building strategies.

Electricity customers have more choices available today among electricity commodity providers and energy efficiency services than ever before. All customers can now choose among multiple energy services providers. Approximately 60 percent of large business and institutional electricity customers have selected alternative electric service providers; more than 250,000 residential customers receive electric commodity service from energy services companies.

Table 5 shows a summary of the energy savings and economic and environmental outcomes from the **New York Energy SmartSM** Program through year-end 2001, 2002, and 2003. As of December 31, 2003, annual electricity savings from installed measures is approximately 1,000 GWh. The peak demand reduction³¹ is 880 MW, with 270 MW resulting from permanent reductions available through energy efficiency improvements and the potential for another 610 MW available to be called upon when needed through load management programs. The ranges of energy benefits shown in Table 5 represent the approximate upper and lower bounds based on the variability of net-to-gross ratios calculated using currently available data and information, and an adjustment for potential double counting among selected programs that has yet to be confirmed.

Figure 3 depicts the CO₂ reductions that result from the Program's activities compared with projected emissions for selected years in the absence of the Program. The Program has helped reduce CO₂ emissions by an additional 1.6 percent in 2002 and is expected to contribute about 4.5 percent in additional reductions through 2010.³²

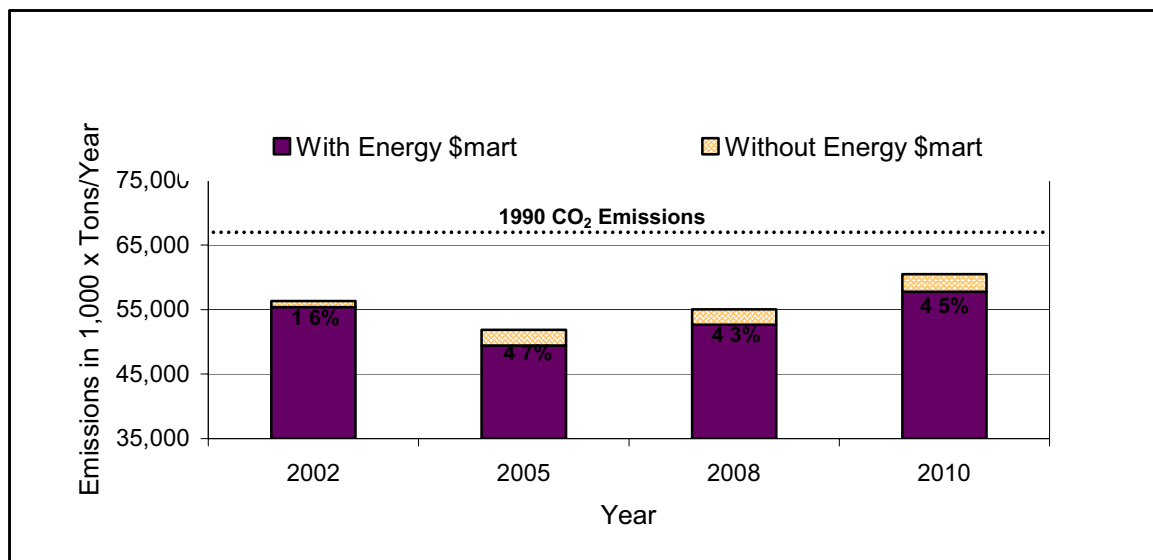
³¹ The peak demand period is the time when the demand for electricity is at its highest. In the New York Control Area, this usually occurs mid-to-late afternoon on a day when the temperature is high.

³² The *State Energy Plan and Final Environmental Impact Statement*, June 2002, recommends a statewide goal of reducing CO₂ emissions five percent below 1990 levels by 2010 and ten percent below 1990 levels by 2020.

Table 5. Cumulative Program Benefits from Installed Measures

Benefits	Through Year-End 2001	Through Year-End 2002	Through Year-End 2003
Electricity Savings From Energy Efficiency (Annual GWh)	400	690	1,000 (900-1,200)
Peak Demand Reduction (MW)	270	652	880 (850-1,050)
Permanent Measures (MW)	96	218	270
Potential/Curtailable (MW)	174	434	610
Annual Energy Bill Savings (\$ Million)	\$57	\$103	\$140
Renewable Energy Generation (Annual GWh)	28	103	103
Average Number of Jobs Created per Year because of Energy Bill Savings	2,800	3,200	3,500
NOx Emissions Reductions (Annual Tons)	77	790	950
SO ₂ Emissions Reductions (Annual Tons)	155	1,270	1,700
CO ₂ Emissions Reductions (Annual Tons)	560,000	640,000	750,000
Equivalent number of cars removed from New York roadways.	110,000	127,000	150,000

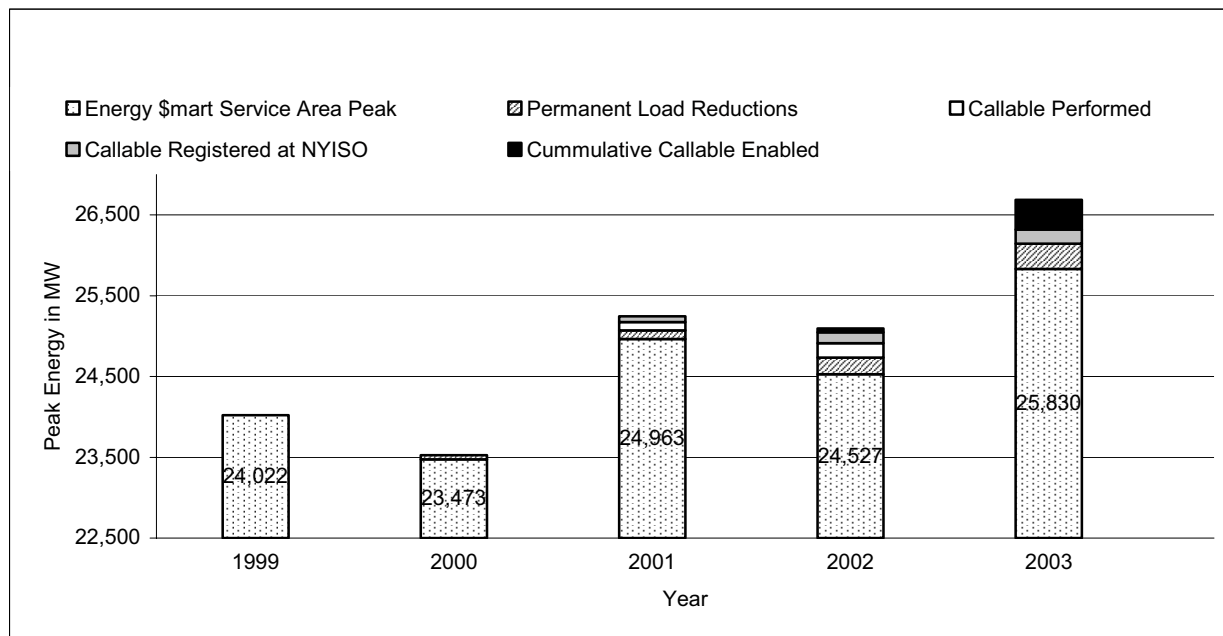
Figure 3. Estimated Annual CO₂ Emissions With and Without New York Energy SmartSM Programs



The Program’s impact on peak demand for the last five years is shown in Figure 4. Permanent demand reductions are achieved through energy efficiency measures. Callable demand reductions result from load curtailment. While the Program was initiated in 1998, two years of program implementation were necessary to bring about real, noticeable reductions in peak energy load. In 2000, the actual peak energy load was 23,473 MW, approximately 50 MW less than it could have been absent the Program. The peak-

energy load reduction as a result of Program services provided through December 31, 2003 was 270 MW in permanent load reductions and 610 MW in potential reductions callable, if needed, by the NYISO.

Figure 4. Comparison of New York State’s Energy SmartSM Program Permanent and Callable Peak Energy Demand Reductions



Permanent Load Reductions: Reductions achieved through energy efficiency measures.

Cumulative Callable Enabled: Potential short duration load curtailment that can be called by the NYISO to maintain system reliability when generation resources become scarce. The number shown for each year is the cumulative MW potential that programs supported at that point in time.

Callable Registered at NYISO: A subset of Cumulative Callable Enabled. The value represents the number of MW potential registered in a NYISO program by **New York Energy SmartSM**-supported customers during the summer of the particular year.

Callable Performed: A subset of Callable Registered at NYISO. Callable Performed is the average actual load curtailment per hour by **New York Energy SmartSM**-supported customers during emergency calls for the year. In 2003, the reliability programs were used after the August 14 blackout to facilitate recovering the electricity grid. The NYISO reliability programs were not used at any another time in 2003.

3.8 PROGRAM STATUS AND EVOLUTION

3.8.1 Budget Summary

Table 6 and Table 7 present information and data on the **New York Energy SmartSM** Program budget and updates the status of Program spending through December 31, 2003. The Program has an eight-year budget of approximately \$932.1 million, including interest earnings on unspent funds. The budget is allocated across the following four broad program areas: (1) Business and Institutional Energy Efficiency, (2) Residential Energy Efficiency, (3) Low-Income Energy Affordability, and (4) Research and Development (R&D).

Table 6. New York Energy SmartSM Program Funding Allocation Summary

Program Area	Eight-year Funding Allocation	Percent of Program Area Budget	Percent of Total SBC Funding
New York Energy SmartSM Program Areas			
Business and Institutional	\$355.4 million	41.8%	38.1%
Residential	\$165.2 million	19.4%	17.7%
Low-Income	\$119.6 million	14.0%	12.8%
Research and Development	\$210.8 million	24.8%	22.6%
Subtotal Program Areas	\$851.1 million	100%	91.3%
New York Energy SmartSM Program Administration, Evaluation, and Environmental Disclosure			
Administration	\$62.5 million	--	6.7%
Evaluation	\$15.6 million	--	1.7%
Subtotal Administration and Evaluation	\$78.2 million	--	8.4%
Environmental Disclosure	\$2.9 million	--	0.3%
Total Eight-year Budget	\$932.1 million^[a]	--	100%

Program budgets are exclusive of Evaluation and Administration. Totals may not add due to rounding.

^[a] Includes ratepayer contributions, interest earnings for the 8 year period, and unexpended funds from previous utility programs.

Table 7. Financial Status of New York Energy SmartSM Programs as of December 31, 2003

Program Area	Eight-year Budget (millions)	Funds Committed (millions)	Percent of Eight-year Budget Committed	Funds Encumbered ³³ (millions)	Percent of Eight-year Budget Encumbered
Business and Institutional	\$355.4	\$293.2	82.5%	\$261.9	73.7%
Residential	\$165.2	\$111.8	67.6%	\$103.1	62.4%
Low-Income	\$119.6	\$91.1	76.1%	\$62.8	52.5%
Research and Development	\$210.8	\$137.1	65%	\$106.2	50.4%
Environmental Disclosure	\$2.9	\$0.35	12.0%	\$0.35	12.0%
Evaluation	\$15.6	\$9.2	58.6%	\$9.2	58.6%
Administration	\$62.5	\$33.7	53.9%	\$33.7	53.9%
TOTAL	\$932.1	\$697.7	74.8%	\$605.7	65%

Program budgets are exclusive of Evaluation and Administration. Totals may not add due to rounding.

Source: NYSERDA. New York Energy SmartSM Program - Financial Status Report, as of December 31, 2003.

The spending status of the Program and Program funds committed, encumbered, and paid, relative to the cumulative amount of program funding, between program inception in July 1998 through June 2006 are

³³ Encumbered funds are funds associated with signed contracts and purchase orders.

shown in Figure 5. This historical representation of Program funds correlates to important milestones in design, implementation, evaluation, and administration of the Program.

June 1998 through June 2001 – During this time period, NYSERDA’s administration of SBC funding was initiated and the design, outreach, and deployment efforts were introduced that brought the program to fruition in New York’s energy services markets. NYSERDA administered approximately \$58 million a year for the design and implementation of energy efficiency, low-income, and research and development programs.

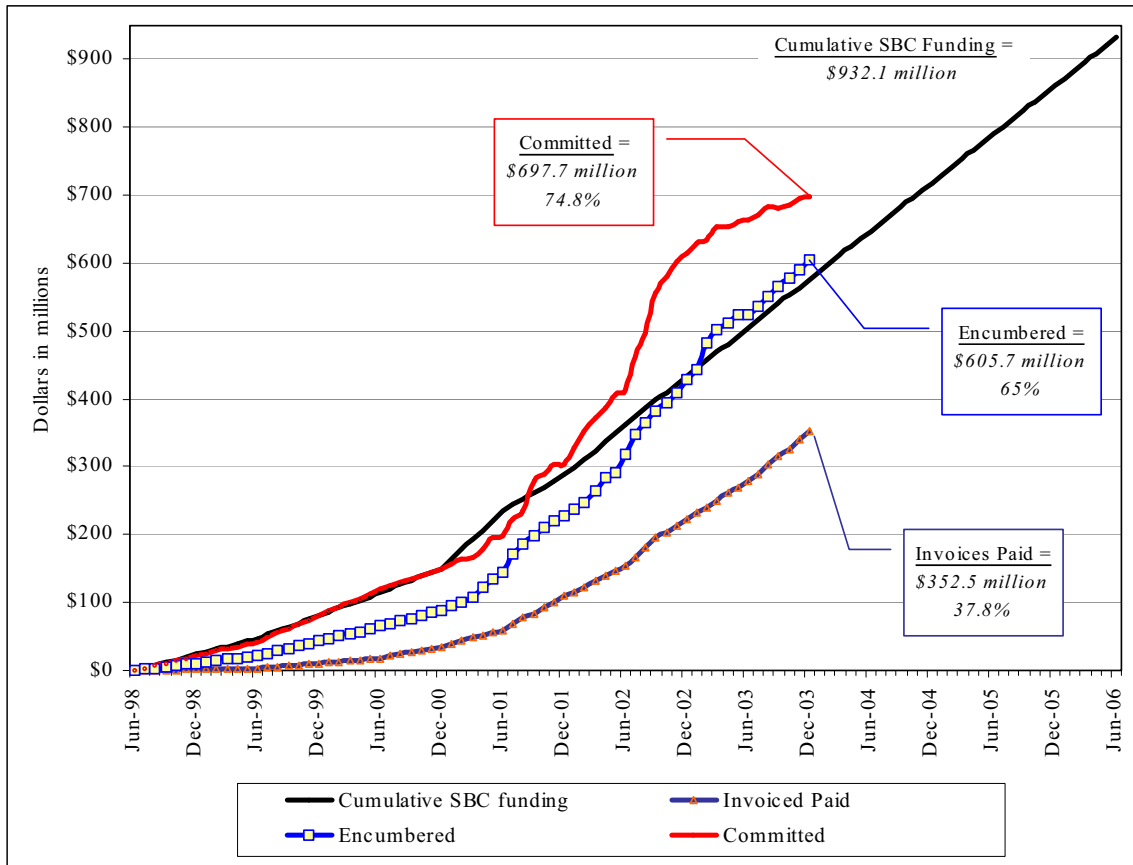
July 2001 through December 2002 – During this time period, NYSERDA received administrative responsibility from the PSC to begin implementation of a second round of SBC funding at \$150 million annually. The Program’s implementation activities were greatly accelerated as committed program funding more than doubled in the 18-month period, going from less than \$300 million to more than \$600 million. The rapid increase in program funding commitments was a result of positive program design and outreach and marketing efforts administered by NYSERDA during the first three years of the Program. The additional funding was instrumental in helping the Program meet the demand for its offerings and services.

January 2003 through December 2003 – During this time period, the Program’s funding commitments began to level off. As the Program changed and evolved, NYSERDA management introduced modifications. For example, some energy efficiency product markets (*e.g.*, residential room air conditioners) were becoming transformed and product incentives were reduced. Other program modifications were introduced in response to the size of energy markets and the substantial demand for energy efficiency services in New York. To meet current financial commitments and to preserve funds through June 2006, the Program accepted fewer applications for funding.

While the Program had been evaluated since 1998, this time period marked the introduction of substantial formal evaluation resources to NYSERDA’s evaluation team. These resources helped NYSERDA to better design and deliver programs and to better administer program funding as increasingly accurate intelligence was obtained about the participants, behaviors, and risks inherent in entering energy markets.

January 2004 through June 2006 – The time period that has just begun is dedicated to a rigorous evaluation of the Program. Staff anticipate that, by June 2006, committed program funds will have equaled program budgets. Since data collection activities are expected to continue beyond June 2006, NYSERDA will continue its program evaluation work after that point in time. At the present time, NYSERDA has begun assessing gaps and opportunities for energy efficiency, services to low-income consumers, development of renewable technologies and resources, and the appropriate scope and subject matter of Program-funded research and development. These evaluation activities and program management analyses will assist State policy makers in making decisions about continuing funding for energy-related public benefits programs in the State.

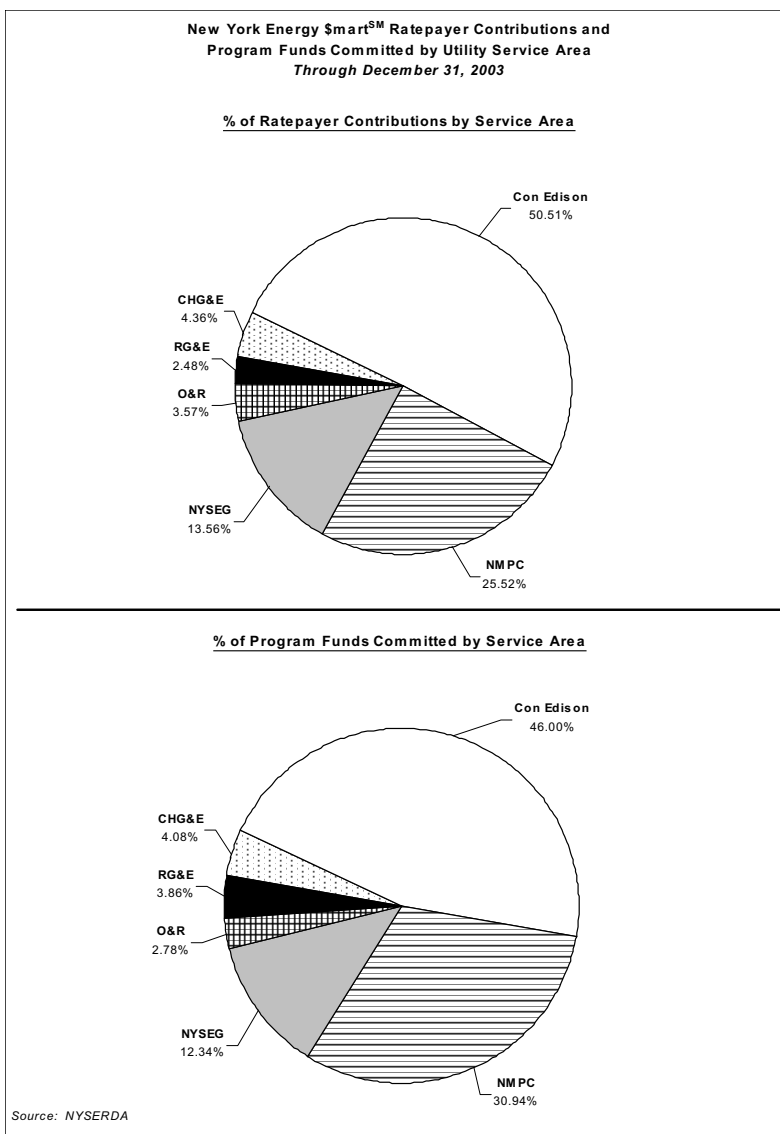
Figure 5. Cumulative SBC Funding Allocations



Other Budget Breakdowns

A comparison of the Program funds committed to contributions by utility ratepayers is shown in Figure 6. The top figure shows ratepayer contributions to the Program by utility service area, and the bottom figure indicates the funds committed by utility service area. As the figures clearly indicate, the proportion of funds received closely matches the proportion of funds committed by service area. This parity also is attributable to population density and other demographic and economic factors.

Figure 6. New York Energy SmartSM Ratepayer Contributions and Funds Committed by Utility Service Area through December 31, 2003



3.9 PROGRAM EVOLUTION

NYSERDA continues to assess the programs and services it offers and makes program modifications where necessary to respond to changing energy markets when new products and services become available to customers, when new challenges and opportunities emerge within markets, and as findings are made as a result of NYSERDA’s evaluation activities. NYSERDA is tracking market indicators to assess the progress being made by various Program initiatives and is regularly reallocating program funds to increase the value of these investments for all New Yorkers. NYSERDA continues to restate Program emphases as it seeks to transition programs and services to better meet customer needs and Program goals. While the **New York Energy SmartSM** Program strives to be comprehensive in its delivery of services, some market segments remain underserved and represent opportunities for investment. In

addition, as the Program makes progress in moving markets to higher levels of energy efficiency, some initiatives are curtailed and others are undertaken in response to new opportunities.

An important strategy for the Program to achieve its public policy goals is to provide New Yorkers with greater choices in meeting energy needs, making available greater numbers of energy-efficient products and service providers, building market capabilities and infrastructure to support a greater energy efficiency ethic among consumers, and improving energy awareness. As a result, the energy efficiency practices and behaviors of all market participants, including designers, manufacturers, vendors, retailers, and end-use consumers are expected to permanently change for the better.

Decisions to change programs are guided by the following considerations:

- The amount of progress a program has made in meeting near-, intermediate-, and long-term objectives. This information is used to assess the program’s success and to indicate whether the activities, practices, and behaviors supported by the program are resilient and sustainable.
- Feedback from customers and stakeholders. Feedback is used to help determine the extent to which services being offered by a program are still desired and needed and provides evidence to suggest whether program objectives need to be changed.
- Evidence indicating that a program is succeeding and should be accelerated and emulated. Like failure, success may point to a need for change.
- Evidence indicating that a program has failed to make sufficient progress toward its goals for various reasons. This evidence may include flawed program design or circumstances beyond the program’s influence such as changing market conditions, the emergence of unforeseen barriers, and changes in government policies.

Programs are continually being refined, modified, consolidated, realigned with other programs, and closed where necessary. Several major program changes are discussed below. For information on the evolution of other programs, see Volume 2, Appendix A.

3.10 MAJOR PROGRAM AREAS

The Program consists of four major program areas:

- Business and Institutional Energy Efficiency
- Residential Energy Efficiency
- Low-Income Energy Affordability
- Research and Development

Figure 7 through Figure 10 provide breakdowns of each program area budget by program type. Detailed discussions of the budgets for each program area are included in Volume 2.

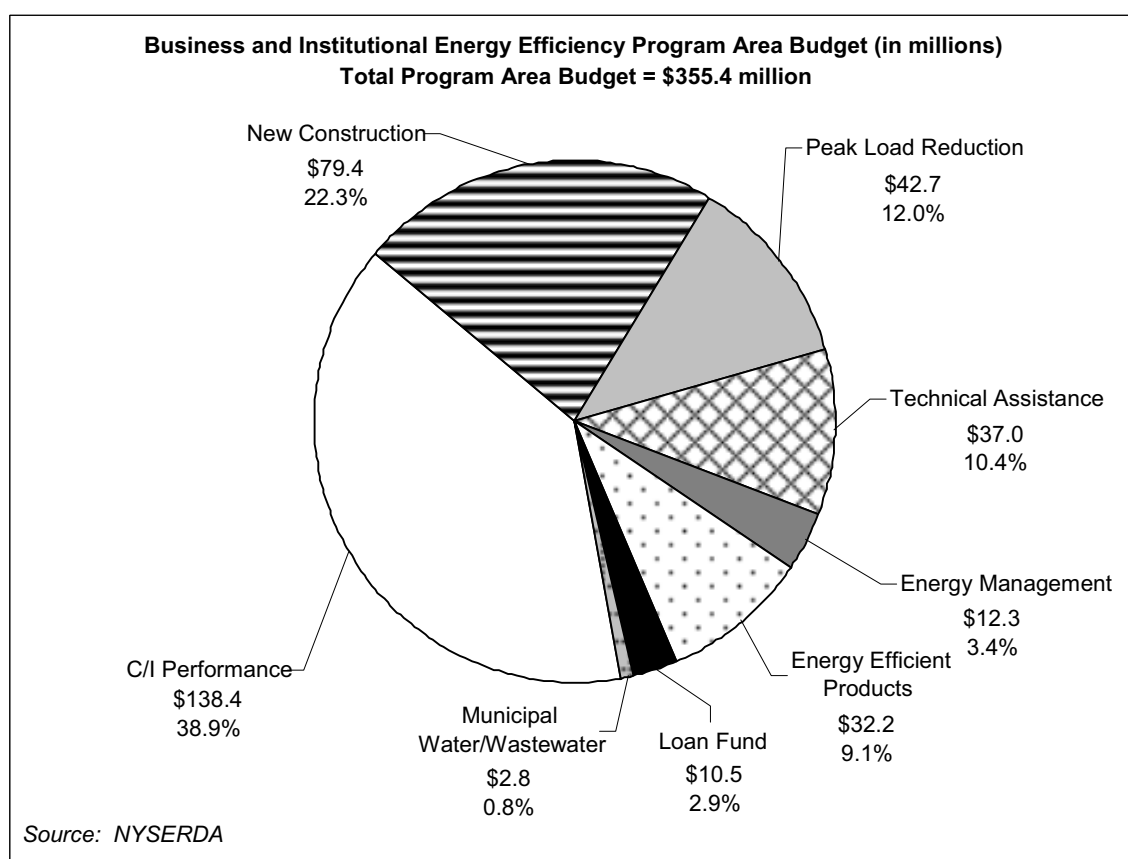
3.10.1 Business and Institutional Energy Efficiency Programs

Frequent adjustments have been made to the business and institutional program strategies to improve program performance and to respond to changing market conditions. For example, staff have focused increasingly on demand-response programs, particularly in the New York City area, addressing load pocket issues and power constraints. Financial incentives have been reduced in many programs as interest levels and program participation have increased and the programs have matured. Some technologies, such as T-8 lamps, have been removed from lists of eligible measures, once their market share grew as a result of the programs. New technologies, such as commercial refrigeration, have been

added to lists of eligible measures. Several earlier programs have been consolidated and terminated to concentrate resources and streamline program efforts as described below.

Technical assistance programs were among the first to be offered in 1998, and several individual program initiatives were merged into the Technical Assistance Program to coordinate the services offered by the program and reduce overhead. Performance-based incentives have replaced measure-based incentives in the New Construction Program. Performance-based incentives are given to reward the performance of systems and whole buildings, ensuring that energy savings continue beyond the life of the individual measures that comprise the systems. Participation of hard-to-reach, downstate customers has been encouraged, especially since September 11, 2001. NYSERDA staff have worked closely with New York City organizations to (1) foster demand reductions by participation in NYISO programs and (2) develop voluntary load reductions during critical demand periods.

Figure 7. Business and Institutional Energy Efficiency Program Area Budget (in millions)



The Business and Institutional energy efficiency programs are helping develop a viable energy services industry in New York and to ensure investment in energy efficiency. These programs encompass a variety of market-based activities designed to increase sales of energy-efficient equipment and products, provide information to consumers to facilitate informed energy choices, encourage customers to view energy efficiency as a value-added service, and improve the efficient use of electricity in ways that provide economic benefits to end users. These programs include initiatives to help consumers improve electric load management, enable customers to respond to price signals, and allow consumers take advantage of other market incentives to reduce peak electric demand. Additionally, petroleum and natural gas programs include technical and financial assistance for distributed generation technologies, such as

combined heat and power systems, and for renewable energy technologies that reduce electricity demand by end-use customers.

3.10.2 Residential and Low-Income Programs

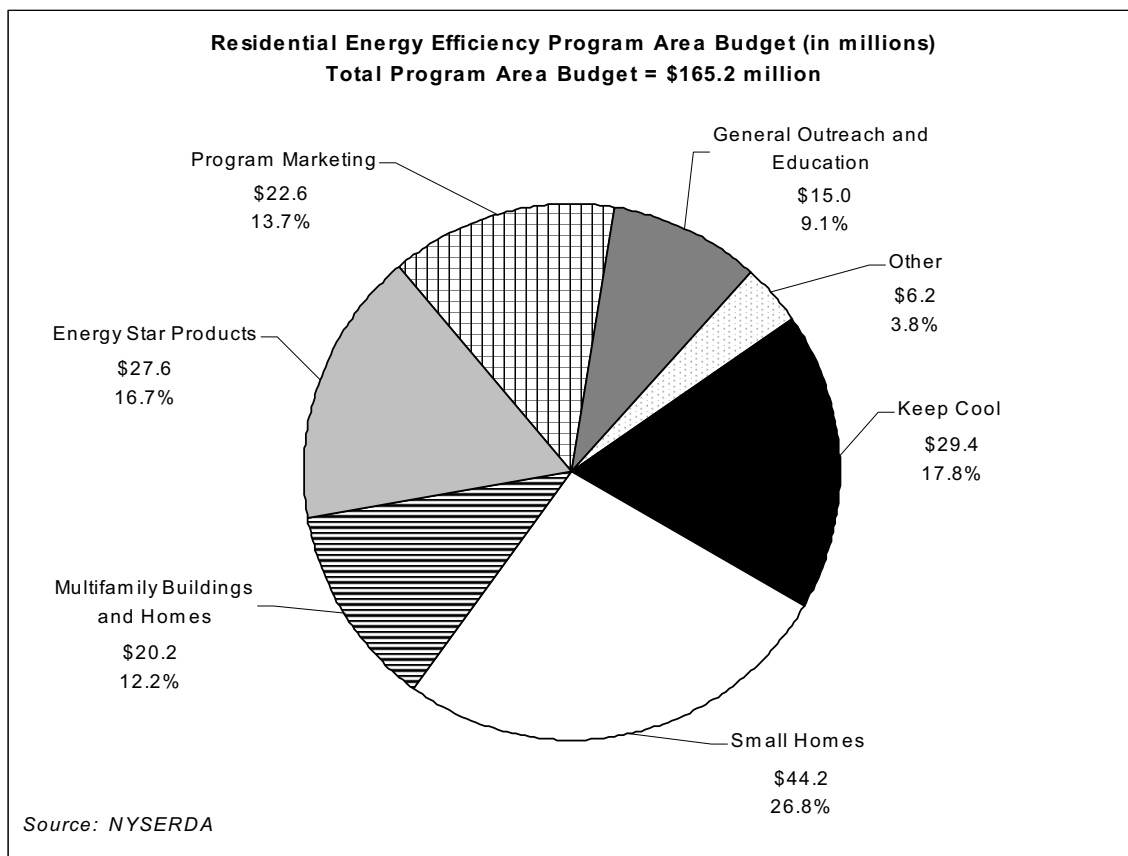
The Program has freely adapted its residential and low-income program areas as circumstances have changed and as markets have become more clearly understood. Originally, large-scale marketing to promote awareness of the benefits of ENERGY STAR[®] equipment and products was a major feature of the residential and low-income programs. Although the Program continues to provide marketing for other efforts, *e.g.*, the ENERGY STAR[®] Small Homes programs, large-scale marketing of ENERGY STAR[®] has been scaled back by the Program and cooperative advertising with retail partners is being increased.

Program incentives have been decreased as programs brought about significant increases in retailer and consumer awareness and increased stocking and sales of targeted energy-efficient appliances and equipment. For example, the bounties on room air conditioners through the Keep Cool Program were reduced in 2003 and discontinued in 2004. Marketing efforts will continue to encourage consumers to replace old air conditioners, shift energy intensive tasks such as dishwashing and laundry to off-peak hours, and purchase ENERGY STAR[®] products and appliances.

Several significant changes have been made to the Low-Income Affordability programs since 1998 when a few of the programs were introduced as pilot programs. For example, in mid-2002, elements of the Publicly Assisted Housing, Technical Assistance, Affordable Housing, Assisted Housing, and Direct Installation programs were consolidated and renamed the Assisted Multifamily Program. As a result, the Program is able to meet customers' needs more efficiently and effectively. Policies and procedures were developed to support large-scale deployment of the program to service as many as 40,000 units of low-income multifamily housing per year. The policies were developed to be flexible enough to accommodate changes in the multifamily market and to work within the rules and regulations of other housing organizations, such as the New York State Division of Housing and Community Renewal (DHCR), U.S. Department of Housing and Urban Development (U.S. HUD), and the New York City Department of Housing Preservation and Development (HPD).

Early on, the Program adopted the ENERGY STAR[®] platform of offerings, which included establishing a program for newly constructed one-to-four-family homes and a pilot program targeting the existing homes market in coordination with U.S. DOE and U.S. EPA. Both programs have continued a commitment to the logic of driving consumer demand through marketing and by building and supporting an infrastructure for the professional delivery of energy-efficient products and services. New York's new homes program previously adopted standards higher than the national ENERGY STAR[®] program and subsequently added standards relating to health and safety testing and requirements for additional KWh savings. Both programs have been expanded to include additional incentives for home buyers and home owners with incomes from sixty to eighty percent of the State median, thereby expanding the customer base eligible for low-income programs.

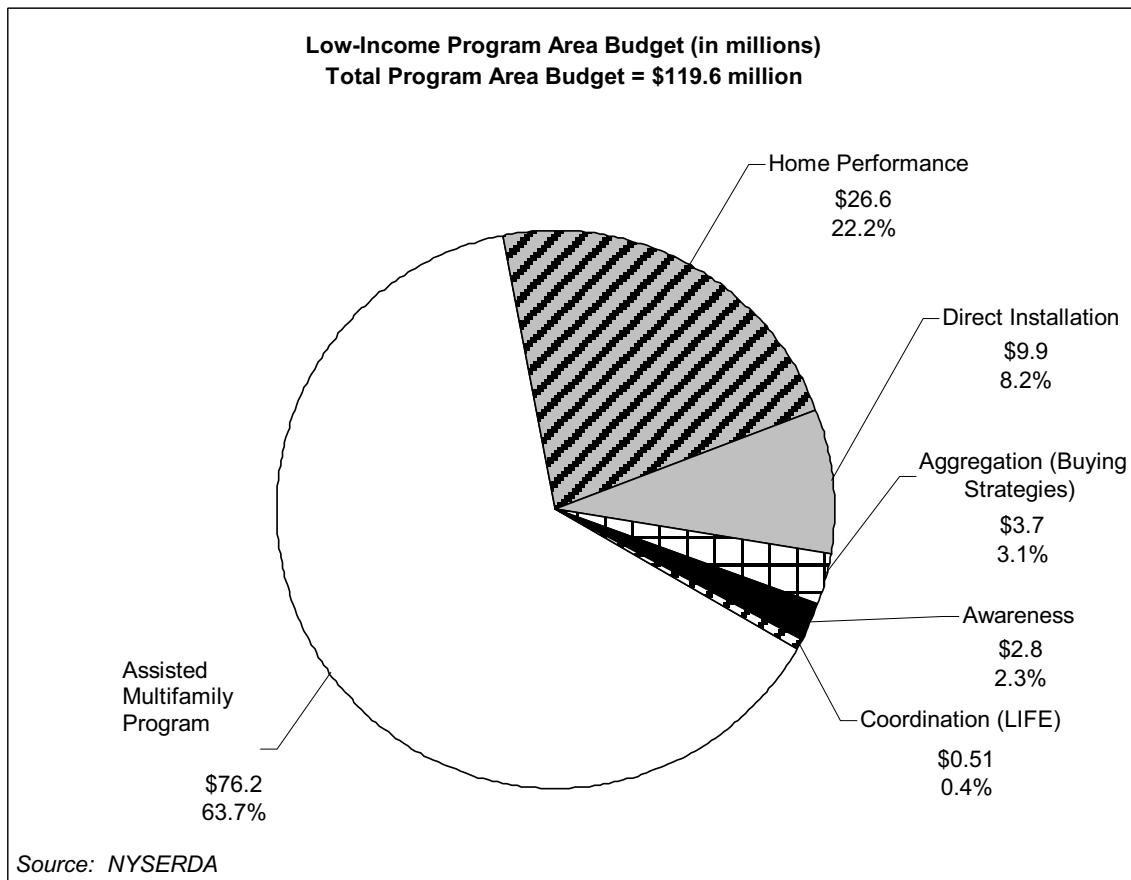
Figure 8. Residential Energy Efficiency Program Area Budget (in millions)



The Residential Energy Efficiency programs are specifically intended to identify and effectuate changes in decision making that will enable consumers to use electricity more efficiently. In addition to the efficient use of electricity, the programs address the efficient use of petroleum and natural gas and provide customers with comprehensive, attractive incentives and financing packages that promote fuel switching where it will reduce peak electric demand.

Low-Income programs are designed to improve the energy affordability of low-income households by improving energy decision making and investing in improving energy efficiency. These programs provide energy management and aggregated energy procurement services to improve the market position and self-sufficiency of low-income consumers. Initiatives in this program area include support for installing a broad range of energy-efficient electric end-use measures in low-income housing, paying a portion of the incremental cost of energy efficiency measures and electric heat conversions in publicly-assisted housing, helping low-income households aggregate energy purchases, incorporating energy-efficient equipment and design specifications into State- and federally-assisted housing, and informing customers about the benefits of energy efficiency.

Figure 9. Low Income Program Area Budget (in millions)



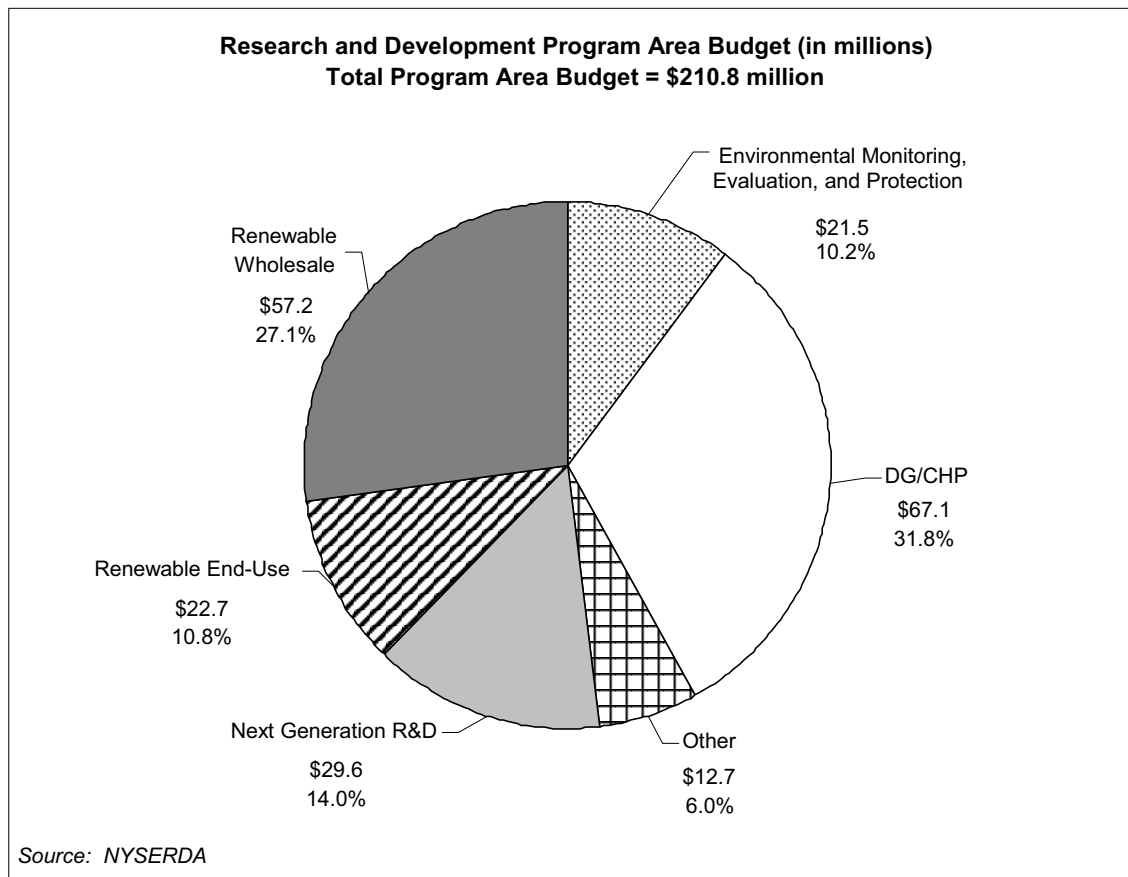
3.10.3 Research and Development Programs

The Program has continued to refine its research and development programs, especially its distributed generation and combined heat and power (DG-CHP) and time-sensitive pricing programs, in response to the need for more advanced technologies for peak load reduction. Several rounds of solicitations for DG-CHP projects were issued; in recognition of the diversity of distributed generation and combined heat and power technologies and applications, the types of eligible projects have been expanded. To make funds available for additional projects, the level of funding for individual feasibility studies and demonstration projects was decreased. The Program is seeking to broaden and diversify its portfolio of DG-CHP projects to emphasize those that can be more easily replicated.

With respect to time-sensitive electricity pricing, the Program has begun a series of multiyear demonstrations to enable consumers to take advantage of day-ahead and time-of-use rates. Web-based interface tools are being piloted for commercial, single-family, and multifamily residential customers. The time sensitive pricing program will complement the peak load reduction program delivered by the Business and Institutional program area, creating another opportunity for program synergy.

In the Environmental Monitoring, Evaluation, and Protection (EMEP) program, NYSERDA has conducted strategic planning meetings each year to revise and target solicitations on priority energy-related environmental issues.

Figure 10. Research and Development Program Area Budget (in millions)



The R&D programs are designed to develop and deploy renewable and clean energy resources, state-of-the-art energy efficiency technologies, and information to customers and policymakers. R&D programs emphasize developing and demonstrating new technologies and evaluating their performance, disseminating information on technology applications, collecting data and conducting analyses on the environmental impacts of energy-related decisions and policies, and developing strategies to promote widespread involvement by private-sector organizations in energy and environmental R&D.

APPENDIX A: SBC ADVISORY GROUP

Mr. Ruben S. Brown
The E Cubed Company

Ms. Elizabeth Donati
New York Energy Efficiency Council
c/o Science Applications International
Corporation

Mr. Gavin Donohue
Independent Power Producers of New York, Inc.

Ms. Anne Van Buren
Business Council of New York State

Mr. Donald Gilligan
National Association of Energy Service
Companies
c/o Predicate, LLC

Mr. Ashok Gupta
Natural Resources Defense Council

Dr. Mark Hanson
Association of State Energy Research &
Technology Transfer Institutions

Mr. David Hepinstall
Association for Energy Affordability

Mr. John Howard
New York State Assembly

Mr. Michael Kelleher
Niagara Mohawk Power Corporation

Mr. Robert M. Loughney
Multiple Intervenors
c/o Couch White, LLP

Mr. Philip LaRocque
NYSBA Research & Education Foundation

Mr. Bernie McGarry
New York State Senate

Mr. Michael Delaney
New York City Economic Development
Corporation

Mr. Steven M. Nadel
American Council for an Energy-Efficient
Economy

Mr. Tariq Niazi
New York State Consumer Protection Board

Mr. Stephen A. Pertusiello
Consolidated Edison Company of New York,
Inc.

Mr. Frank P. Ricci
Rent Stabilization Association

Mr. Anthony Schaffhauser
Distributed Energy Center
National Renewable Energy Laboratory

Mr. Michael Conroy
Rochester Gas & Electric Corporation

Mr. Ben Wiles
Public Utility Law Project

Ms. Valerie Strauss
American Wind Energy Association
C/O Young, Sommer, LLC

Mr. Fred Zalcman
Pace Energy Project
Pace University Law School

Mr. Daniel Zaweski
Long Island Power Authority

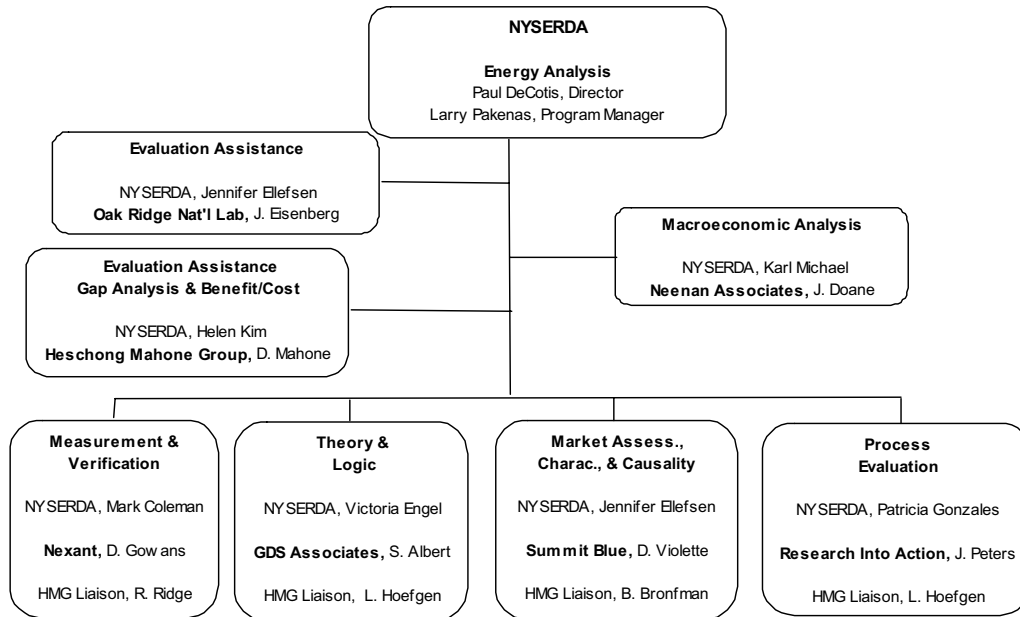
APPENDIX B: EVALUATION ACTIVITIES

Beginning in 2003, the program evaluation function at NYSERDA was dramatically expanded to provide comprehensive and rigorous reporting on **New York Energy SmartSM** Program activities and accomplishments. Information gathered through NYSERDA’s evaluation activities is used primarily for reporting to NYSERDA’s oversight and funding agencies and stakeholders; however, an important secondary function is to provide feedback and insight to program managers to assist them in improving the effectiveness of their programs. The expanded evaluation activity began when the funds allocated for this purpose were increased. Prior to 2001, funding for evaluation activities was approximately 0.4 percent of the Program budget. Beginning in 2001, the percentage for evaluation was expanded to two percent.³⁴ Prior evaluation work was largely done by NYSERDA’s in-house evaluation staff with assistance from implementation contractors, GDS Associates, and Oak Ridge National Laboratory. NYSERDA was also able to capitalize on evaluation activities such as those conducted by the Consortium for Energy Efficiency and other regional energy groups. Upon receipt of the expanded budget, NYSERDA was able to contract with nationally-recognized program evaluators to complement and extend the capabilities of the in-house staff.

The expanded evaluation resources allowed NYSERDA to initiate a highly innovative and largely unprecedented approach to evaluating its portfolio of efficiency programs. The traditional approach used in most other program portfolio evaluations has been to evaluate programs individually. An evaluation team is assigned to conduct evaluation activities that are appropriate to individual programs (*e.g.*, field verification, process evaluation, and market assessment). Under the NYSERDA model, four specialty evaluation teams, shown in Figure 11, were hired to carry out evaluation studies in four areas:

- **Theory and Logic** describes and refines the theoretical underpinnings of market transformation and resource acquisition programs for NYSERDA’s portfolio and individual programs, reviews the logic of the portfolio and programs’ approaches, and develops researchable issues and success indicators to assess progress toward goals.
- **Measurement and Verification** reviews the actual savings enjoyed by customers as a result of installed energy-efficient equipment, products, and services and provides assessments of the accuracy and reasonableness of estimated program savings.
- **Process Evaluation** reviews program procedures and processes to determine whether program services are being delivered effectively.
- **Market Characterization, Assessment, and Causality** evaluations describe the markets in which programs operate, assess the programs’ impacts on those markets, and identify changes in those markets caused by programs’ operations.

³⁴ Evaluation budgets for public benefits programs in the United States typically range from two to approximately seven percent of program budgets. Only Rhode Island, at 1.7%, is less than New York. Representative percentages for other states are: Maine, 2.0%, Connecticut 3.0%; Vermont 3.0%; Wisconsin 3.7%; California 4.6%; Massachusetts 3.0-5.0%; New Hampshire 5.0%; and the Northwest Energy Efficiency Alliance, representing Washington, Oregon, and Idaho, is 7.5%.

Figure 11. Evaluation Team

In addition to the four specialty contractor teams, an overall evaluation assistance team was hired to help coordinate the work of the specialty contractors and to complement the capabilities of the in-house NYSERDA evaluation staff. The evaluation assistance contractor assigned a liaison to work closely with each of the specialty contractors to ensure that information was shared and that the work of the specialty contractors did not interfere with the operations of individual programs or conflict with other specialty contractors. The evaluation assistance contractor also coordinated writing of evaluation reports.

An advantage of this model is that each of the evaluation contractors has crosscutting responsibilities for the entire **New York Energy SmartSM** portfolio rather than concentrating on evaluating a single program. Since the contractors have multi-year contracts with NYSERDA, continuity is gained as contractors develop broad familiarity with program activities and experience at first hand how programs are evolving. Coordination of evaluation contractors also means that evaluation activities are consistent for all the programs.

OVERVIEW OF EVALUATION ACTIVITIES

NYSERDA's portfolio of programs is designed to work synergistically to achieve the PSC's public policy goals. NYSERDA's goal is to position the portfolio for success by designing and delivering individual programs with specific short-, intermediate-, and long-term goals. NYSERDA's ongoing program evaluation activities look closely at individual and portfolio-level **New York Energy SmartSM** Program activities. They seek to make the programs' underlying logics and theories explicit so that program implementation staff and delivery contractors, NYSERDA management, evaluation staff, advisory group members, and public policy stakeholders can more easily assess whether the Program is positioned to achieve key goals. The following types of activities characterize the Program's offerings:

- Evaluate energy technologies, products, equipment, and services; develop and demonstrate promising energy efficiency, renewable energy, and environmental technologies.
- Provide technical and financial assistance and incentives to energy services companies, decision makers, policy makers, underserved populations, and energy consumers.
- Promote green power.

- Promote the efficient use of energy.

Some key indicators being tracked to assess progress toward goals include:

- Sales of energy-efficient equipment and products.
- Energy and cost savings and peak electricity demand reductions.
- Renewable energy generation.
- Non-energy benefits, including environmental benefits, sustainable changes in consumer and business energy decision making and practices.
- Job creation and economic development.

Specific activities within the programs currently being assessed that are critical for achieving key goals are being identified and tracked directly to help confirm program effectiveness and reveal potential flaws in the underlying theories and logic flows. If results from field tracking of key indicators show that activities are not yielding anticipated results in certain areas, NYSERDA is well positioned and is sufficiently flexible to make program-level and portfolio-wide modifications to align its activities for achieving goals. See also the Program Status and Evolution section above.

GENERAL EVALUATION ASSISTANCE

General evaluation assistance consists of myriad activities described more fully in Volume 2. Major activities include: general oversight and liaison with the specialty evaluation contractors, integrating the evaluation findings of the specialty contractors and preparing evaluation reports, conducting a gap analysis³⁵ of **New York Energy SmartSM** programs, and conducting benefit-cost analyses of individual programs and of the Program’s portfolio as a whole. Oak Ridge National Laboratory (ORNL) and the Hescong Mahone Group (HMG) are general evaluation assistance contractors for the Program and provide evaluation assistance on all facets of the comprehensive evaluation, advising NYSERDA staff, and extending NYSERDA’s staffing capabilities. In addition, ORNL completed an evaluation of synergies among the lighting, end-use renewables, and peak load reduction programs and prepared case studies of the five programs that were not targeted for specialty evaluations.

THEORY AND LOGIC

The design of each of NYSERDA’s energy efficiency, load management, low-income, and research and development public benefits programs is based on specific assumptions about how energy efficiency markets operate, the identities of the barriers that inhibit participation in the markets, and who are the market actors that occupy and influence the programs and the markets. Each program is designed according to a “logic” that dictates the path the program will take from inception to creating market effects to achieving public policy goals and objectives. The analyses, conducted by a team led by GDS Associates, Inc., include the development of program-specific theory and logic models and a preliminary portfolio logic model. A program logic model maps the inputs, activities, outputs, and outcomes that comprise a program and identifies key program-specific researchable issues and indicators for measuring a program’s success. In addition, a logic model identifies key external influences on a program.

A program theory uses multiple sources of information to identify assumptions underlying a program’s design and to describe how specific program activities are designed to work within their targeted markets. A theory demonstrates how a program works, identifies a program’s intended outcomes, and highlights

³⁵ A gap/opportunity analysis reviews the existing activities of programs in a portfolio, compares them with the activities of other portfolios, and identifies opportunities for improvements in program design, delivery, and services.

implicit indicators that must be measured and hypotheses that must be proved for the program to be deemed successful. Identifying researchable issues and market indicators reflects a market-wide perspective and is used to assess whether an activity is achieving its desired outcome.

Mapping and analyzing a program's logic and theory assists program staff in verifying program strengths, identifying risks, potential weaknesses, and potential opportunities, and facilitates modifying the program design appropriately. Program theory and logic modeling also identify relevant research activities that might be helpful in designing programs and indicate how evaluation results may be used for tracking progress toward goals. Identifying and tracking appropriate program outputs and outcome indicators can provide valid evidence of program success and causal relationships operating within a program.

A portfolio-level analysis describes the activities, outputs, and outcomes associated with a portfolio and identifies theories and implied logical links that are working together to achieve public policy goals. The analysis also identifies key measurement indicators, researchable issues, and potential external influences on the portfolio that can help to guide evaluation activities for tracking short-, intermediate, and long-term success.

MEASUREMENT AND VERIFICATION

Measurement and verification (M&V) activities are designed to verify and quantify estimates of the gross savings in energy and electric demand that result from the **New York Energy SmartSM** Program. Gross savings do not include the indirect effects that occur outside of the Program such as free riders and spillover. The M&V contractor, Nexant, Inc., verifies the annual energy and demand savings reported by NYSERDA and may recommend adjustments upward or downward. Savings data are necessary for judging the effectiveness and efficiency of the portfolio of programs in achieving their individual energy and peak load reduction goals and the PSC's public policy goals. NYSERDA program implementation staff will use the M&V data to adjust program design and deployment strategies, validate their existing savings methodologies, and set future incentive levels.

The M&V contractor reviewed the conversion factors that had been developed and used by NYSERDA to estimate economic, environmental, and secondary effects of the Program from estimated energy and demand savings. Secondary effects include reductions in emissions from electric generation facilities and jobs created and retained as a result of NYSERDA's programs. The M&V contractor reported gross savings at the customer meter for each program and for all programs combined. These savings figures were used by other evaluation contractors to estimate program impacts.

As the first evaluation contractor to begin in-depth program-level reviews, the M&V contractor brought to NYSERDA's attention inconsistencies and other issues with respect to data management, guiding other evaluation contractors to readily access information as needed. In conducting its reviews, the M&V contractor routinely fielded survey questions for other evaluation contractors. The M&V contractor also contributes data inputs for the benefit-cost modeling work being conducted by the general evaluation contractor team.

MARKET CHARACTERIZATION, ASSESSMENT AND CAUSALITY ANALYSIS

The objective of the Market Characterization, Assessment, and Causality (MCAC) analyses being performed by the Summit Blue team is to develop credible, defensible measurements of the impacts of the **New York Energy SmartSM** Program on key energy markets and identify specific short-, intermediate-, and long-term indicators of progress toward goals. The work includes characterizing targeted markets, tracking changes in the markets according to selected indicators, and determining whether such changes can be attributed to the activities of the Program. The MCAC analyses seek to quantify baseline activity (*i.e.*, free-ridership) and market effects (*i.e.*, spillover).

The MCAC analysis is designed to verify explicit program theories, determine the current return on the Program’s investments, identify how returns can be enhanced, and estimate reasonable future returns. The market assessment work is accomplished through large-scale surveys, small-scale surveys, interviews, panel surveys, in-field data collection (for shelf space, price information, and other items), and other activities that support estimating and tracking indicators for the programs. The analysis will generally address market sectors and program areas rather than individual programs. The market sectors and program areas addressed in this year’s evaluation were commercial and industrial new construction, residential, publicly assisted multifamily housing, and wholesale and end-use renewables.

PROCESS EVALUATION

Process evaluation analysis, being performed by the Research Into Action team, allows evaluators to explore how and why programs deliver or fail to deliver expected results and examines how specific program elements are integrated in the program implementation process. Elements of process evaluation are audience research, assessments of internal program processes, and assessments of program delivery and implementation methods. Process evaluation documents the program’s development and operation and provides information about relationships among program staff, contractors, trade allies, and end users. It provides managers with feedback on the effectiveness of their processes and helps them identify opportunities for improvement.

MACROECONOMIC IMPACT ANALYSIS

Neenan Associates is conducting an impact analysis to estimate the effects of the **New York Energy SmartSM** Program on statewide economic activity, including changes in employment, income, and Gross State Product. This work was requested by the System Benefits Charge Advisory Group. The work began by focusing largely on documenting direct economic benefits to program participants. The macroeconomic impact analysis then looked beyond the benefits to program participants and estimated the overall impact of the Program on New York’s economy. The estimated impacts are net impacts, in that they compare the impacts of the Program to the impacts that would have occurred in the absence of the Program. In other words, the analysis considers the impacts that would have occurred if the program funding had been retained by consumers rather than being spent on energy efficiency, renewable resources, and other public benefit programs. Macroeconomic impacts, in the form of jobs created, have been reported in earlier Program Evaluation and Status Reports; however, the earlier analyses used a less powerful methodology and, therefore, the resulting information was less precise.

The macroeconomic impact analysis estimates the impacts on New York’s economy of expenditures and streams of energy savings resulting from implementing new technologies. Expenditures include all program expenditures for equipment; short-term labor to implement the new technologies; expenditures for administration, marketing, and technical assistance; and incentives. The analysis also includes outside expenditures, *i.e.*, co-funding by program and market participants.

PROGRAM AREA EVALUATIONS BY TYPE

Table 8 through Table 11 list the programs evaluated in the current year’s comprehensive evaluation and identify the evaluation activities that were conducted for each. Evaluation activities represented by the symbol **◆** were, in most cases, completed for the 2004 evaluation report. Evaluation activities represented by the symbol **◎** will be completed for the 2005 evaluation report. Evaluation activities represented by both symbols are ongoing.

Table 8. Residential Program Area, Program Evaluation by Type

Residential Program Area	Specialty Evaluations				
	Theory and Logic	Measurement and Verification (M&V)	Process Analysis	Market Characterization, Assessment, and Causality (MCAC)	Synergy and Case Studies
ENERGY STAR® Products and Marketing	◇	◇◎	◎	◇◎	
ENERGY STAR® Homes	◎	◇◎	◎	◇◎	
Home Performance with ENERGY STAR®	◎	◇◎	◎	◇◎	
Keep Cool	◇	◇◎		◇◎	
Residential Comprehensive Energy Management		◇◎		◇◎	
ENERGY STAR® Products Bulk Purchase Program		◇◎		◇	
Residential Special Promotions					◇
Residential Program Area Evaluation		◇	◎	◇◎	

Table 9. Low-Income Program Area, Program Evaluations by Type

Low-Income Program Area	Theory and Logic	Measurement and Verification (M&V)	Process Analysis	Market Characterization, Assessment, and Causality (MCAC)	Synergy and Case Studies
Low-Income Assisted Multifamily Buildings	◇	◇◎	◇	◇	
Assisted Home Performance with ENERGY STAR® and Weatherization Network Initiative	◎	◇◎	◎	◇	
Low-Income Direct Installation		◇◎		◇	
Low-Income Aggregation					◇

Low-Income Program Area	Theory and Logic	Measurement and Verification (M&V)	Process Analysis	Market Characterization, Assessment, and Causality (MCAC)	Synergy and Case Studies
Low-Income Oil-Buying Strategies		◇◎			
Low-income Energy Awareness					
Low-income Forum on Energy					
Low-income Program Area Evaluation					

Table 10. Business and Institutional Program Area, Program Evaluations by Type

Business and Institutional Program Area	Theory and Logic	Measurement and Verification (M&V)	Process Analysis	Market Characterization, Assessment, and Causality (MCAC)	Synergy and Case Studies
New Construction Program	◇	◇◎	◇◎	◇◎	
Technical Assistance Program		◇◎	◇	◇◎	
Premium-Efficiency Motors	◎	◇◎	◇◎	◇◎	
Small Commercial Lighting	◎	◇◎	◎	◇◎	
Commercial HVAC		◇◎	◎	◇◎	
Loan Fund		◇◎			
C/I Innovative Opportunities				◇	◇
C/I Performance (CIPP)	◎	◇◎	◎	◇◎	
Peak Load Reduction and Enabling Technology	◎	◇◎		◇◎	
Smart Equipment Choices		◇◎		◇◎	
Water and Wastewater Programs		◇			
Business and Institutional Program Area Evaluation		◇◎			

Table 11. Research and Development Program Area, Program Evaluations by Type

Research and Development Program Area	Theory and Logic	Measurement and Verification (M&V)	Process Analysis	Market Characterization, Assessment, and Causality (MCAC)	Synergy and Case Studies
Distributed Generation and Combined Heat and Power (DG/CHP)	⊙	◇ ⊙	◇	⊙	
Environmental Monitoring, Evaluation, and Protection (EMEP)	⊙ ³⁶				◇
Wholesale Renewables	◇	◇ ⊙		◇ ⊙	
End-Use Renewables	◇	◇ ⊙	⊙	◇ ⊙	
Other R&D	⊙ ⁴⁰				

³⁶ As part of the Portfolio Level Model.

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NEW YORK ENERGY \$MARTSM PROGRAM EVALUATION AND STATUS REPORT
FINAL REPORT, VOLUME 1: EXECUTIVE SUMAMRY

MAY 2004

STATE OF NEW YORK
GEORGE E. PATAKI, GOVERNOR

NEW YORK STATE ENERGY RESEARCH AND DEVELOPMENT AUTHORITY
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