

## SECTION 1:

### INTRODUCTION

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This report updates evaluation results for the **New York Energy \$mart<sup>SM</sup>** Public-Benefits Program (Program) for activities completed through December 31, 2004.<sup>1</sup> 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)<sup>2</sup> between NYSEDA, the New York State Department of Public Service (DPS), and the New York State Public Service Commission (PSC). This report was prepared for, and reviewed prior to being finalized by, the System Benefits Charge Advisory Group<sup>3</sup> (Advisory Group), which serves as the Independent Program Evaluator in accordance with the MOU. The Advisory Group submits this report to the PSC in fulfillment of its responsibilities under the terms of 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 \$mart<sup>SM</sup>** Program and to conduct independent assessments of the progress the Program has made toward its established public policy goals.

The Advisory Group was actively 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 helped determine the scope and tasks of the evaluation effort and helped apportion the budget among the contractors and identified the programs to be included in the evaluation.<sup>4</sup> The Advisory Group met in April 2005 to review current findings of the evaluation contractors and to provide feedback and comments on drafts of this report.

The report builds upon the evaluation framework and model used to guide prior evaluation efforts and relies on the help of an evaluation team of independent contractors that conducted independent evaluations of various components of the Program and completed an assessment of the **New York Energy \$mart<sup>SM</sup>** Program portfolio.<sup>5</sup> The evaluation and status updates in this report constitute the most comprehensive assessment to date of the **New York Energy \$mart<sup>SM</sup>** Program.

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<sup>1</sup> Previous annual reports were issued in September 2000, January 2002, May 2003, and May 2004. Each report presented cumulative results from the Program's inception on July 1, 1998.

<sup>2</sup> 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.

<sup>3</sup> 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, and national energy efficiency and energy research and development (R&D) organizations.

<sup>4</sup> 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 a Technical Evaluation Panel (TEP). The Advisory Group and DPS were represented on all TEPs that were convened to review proposals and recommend contract awards. 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.

<sup>5</sup> Annual reports for 2000, 2002, 2003, and 2004 and quarterly reports are available on NYSEDA's website at [www.nyserda.org](http://www.nyserda.org).

## 1.1 ORGANIZATION OF THE REPORT

This report describes how the **New York Energy \$mart<sup>SM</sup>** Program is contributing to meeting New York's energy goals. Individual evaluation contractor reports to NYSERDA detailing the activities undertaken in developing this report are available upon request.

The Program is more than a collection of evaluation activities. The effects created by the Program portfolio are more than the summed 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 \$mart<sup>SM</sup>** Program and how those services benefit New Yorkers are described in this report.

This report is divided into the following sections:

Executive Summary

Section 1 - Introduction

Section 2 - Public Policy Context

Section 3 - Budget and Spending Status

Section 4 - Portfolio-Level Evaluation Findings

Section 5 - Business and Institutional Programs

Section 6 - Residential Programs

Section 7 – Low-Income Programs

Section 8 - Research and Development Program Area

Individual program findings are found in Sections 5 through 7 for the Business/Institutional, Residential, and Low-Income sectors respectively, and in Section 8 for Research and Development (R&D) programs. At the beginning of these sections are sector summaries that include: overview of the program area; budget status; evaluation activities; evaluation findings; and energy, demand, and fuel savings. The sector-level and R&D findings are rolled-up to the portfolio level and are reported in Section 4, which also includes portfolio progress toward goals, macroeconomic impact, and cost effectiveness. Excerpts of higher-level findings from all sections are contained in the Executive Summary.

**SECTION 2:****PUBLIC POLICY CONTEXT**

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This section explains the public policies and their evaluation procedures that have been put in place to enable the **New York Energy \$mart<sup>SM</sup>** Program.

**2.1 ORIGIN OF PUBLIC BENEFITS PROGRAMS**

New York's public benefits program was initiated in 1998 by Order<sup>1</sup> of the New York State Public Service Commission (PSC) as a strategy for preserving, within the emerging competitive energy market, energy, environmental, and low-income programs previously offered by utilities. Justification for continuation of public benefits programs in a competitive market economy rests on the observation that important benefits are available that the private sector is not capturing fully. Public sector programs are able to serve unmet market needs that provide benefits for consumers that would otherwise not be realized.

The New York State Energy Planning Board<sup>2</sup> identified the continuing challenges faced by New York State 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 electricity generation.
- Sustainable economic growth requires reducing energy costs and expanding employment opportunities.
- Environmental improvements require investments in technologies and strategies to lessen the impact of energy use on the environment.

The *State Energy Plan*,<sup>3</sup> in 1998 and 2002, contained numerous recommendations for meeting the State's 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 percent below 1990 levels by 2010 and ten percent below 1990 by 2020. The State has implemented numerous strategies to address these challenges, including passage of the Clean Water/Clean Air Bond Act, implementation of Executive Order No. 111 – the “Green and Clean State Buildings and Vehicles” program, enactment of the Governor's Acid Deposition Reduction Program, participation in Regional Greenhouse Gas Initiative (RGGI),<sup>4</sup> a natural gas efficiency pilot program in New York City area (Con Edison utility territory),<sup>5</sup>

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<sup>1</sup> Cases 94-E-0952 et al., In the Matter of Competitive Opportunities Regarding Electric Service, Opinion No. 9612, issued May 20, 1996.

<sup>2</sup> The New York State Energy Planning Board is chaired by the President of NYSERDA and has as members the Commissioners of the Departments of Transportation, Environmental Conservation, and Economic Development and the Chairman of the Public Service Commission.

<sup>3</sup> New York State Energy Planning Board, New York State Energy Plan and Final Environmental Impact Statement, 1998, 2002.

<sup>4</sup> RGGI is a cooperative effort to implement a multi-state carbon cap-and-trade program for power plants with a market-based emissions trading. Participants -- Connecticut, Delaware, Maine, Massachusetts, New Hampshire, New Jersey, New York, Rhode Island, and Vermont -- plan to develop a regional strategy for controlling carbon emissions by requiring electric power generators in their states to reduce carbon dioxide emissions. Observers to the process are Maryland, the District of Columbia, Pennsylvania, and the Eastern Canadian Provinces.

utility industry restructuring, a Renewable Portfolio Standard for electricity retailed in New York, and, most pertinent to this report, introduction of the System Benefits Charge (SBC) public benefits program.

Funds collected through the SBC are used to further the State's energy policy goals by promoting energy efficiency, renewable energy, 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 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 these energy challenges.<sup>6</sup>

## 2.2 EVALUATION OF PROGRAM SUCCESS

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 \$mart<sup>SM</sup>** Program since its inception.

The **New York Energy \$mart<sup>SM</sup>** 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 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 the development of markets and provide energy efficiency capability throughout the marketplace to permanently change energy-related decision making. 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.<sup>7</sup> Low-income services are designed to improve residential energy affordability by implementing energy efficiency improvements to energy systems and buildings and by disseminating energy information.

R&D programs are designed to develop renewable energy resources and technologies, deploy distributed generation and combined heat and power systems, provide 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.

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<sup>5</sup> NYSEDA will be conducting two programs: the "Evaluation of Potential Natural Gas Efficiency Program in Con Edison Territory" and the pilot program "Consolidated Edison Gas Efficiency Program".

<sup>6</sup> In addition to NYSEDA's **New York Energy \$mart<sup>SM</sup>** 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.

<sup>7</sup> Reducing peak demand by shifting and reducing energy use from on-peak to off-peak periods increases energy productivity 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, thus improving energy productivity, but the total quantity of energy used will be unchanged.

**SECTION 3:****BUDGET AND SPENDING STATUS**

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This section presents the **New York Energy Smart<sup>SM</sup>** Program budget and provides the status of Program spending through December 31, 2004.

**3.1 BUDGET SUMMARY OF THE NEW YORK ENERGY SMART PROGRAM**

The **New York Energy Smart<sup>SM</sup>** Program has an 8-year budget of approximately \$961.8 million. The budget has been allocated across the following broad program areas: (1) Business and Institutional Energy Efficiency, (2) Residential Energy Efficiency, (3) Low Income Energy Affordability, and (4) Research and Development, including development and demonstration of renewable energy and energy-efficiency technologies. Figure 3-1 and Table 3-1 present the program area, administration, metrics and evaluation, and environmental disclosure budgets.

Business and Institutional program initiatives account for the largest share, 37.3% of the 8-year **New York Energy Smart<sup>SM</sup>** program budget, or \$359.1 million. Research and Development, including renewable technology deployment, accounts for 21.9% of the 8-year budget, or \$210.8 million. Residential Program initiatives account for 17.7% of the 8-year budget, or \$170.7 million. Funding for Low-Income Program initiatives accounts for 13.4% of the total 8-year budget, or \$128.4 million over this time period. In addition to these major program areas, the 8-year program also funds Environmental Disclosure of electricity generation attributes at \$2.9 million, representing 0.3% of the 8-year budget. Program administration at \$64.6 million and program evaluation at \$16.2 million represent 6.7% and 1.7% of the 8-year budget, respectively. The New York State Cost Recovery Fee<sup>1</sup> is \$9.0 million representing just under 1.0% of the 8-year budget.

The financial status of the major program areas and program evaluation and administration budgets are shown in Table 3-2. Also shown are the funds committed<sup>2</sup> and encumbered<sup>3</sup> as of December 31, 2004. Of the \$961.8 million 8-year **New York Energy Smart<sup>SM</sup>** Program budget:

Approximately \$817 million, representing nearly 85% of the total 8-year budget, has been committed.

- Over \$735 million, or 76% of the 8-year budget, has been encumbered.
- Approximately \$488 million, or 51% of the 8-year budget, has been invoiced through December 31, 2004.

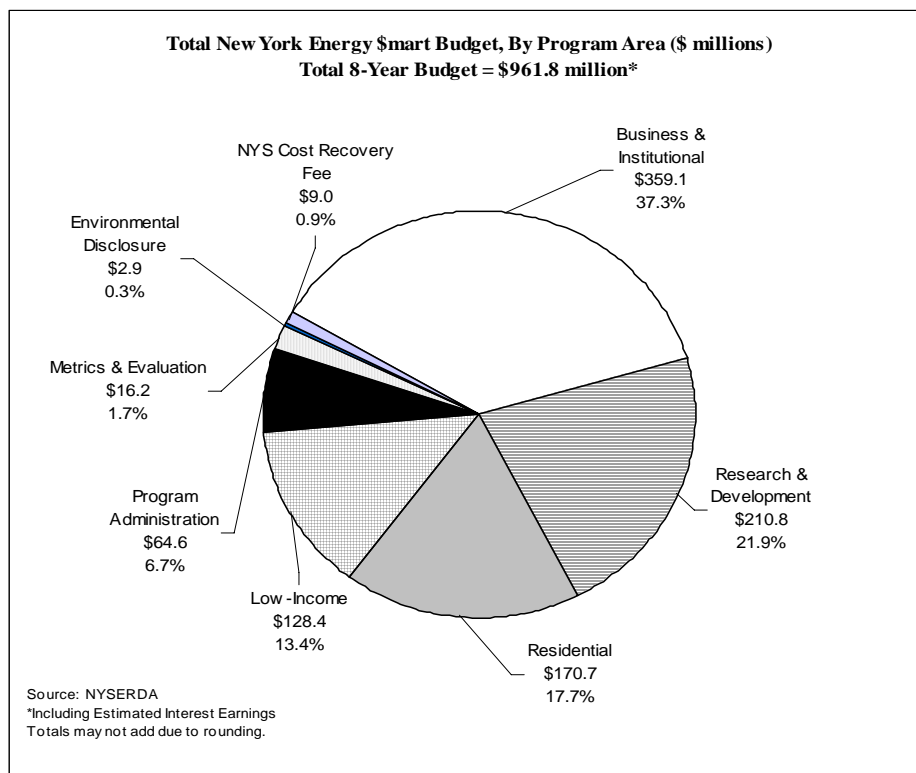
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<sup>1</sup> The Public Authorities Law establishes a cost recovery of central governmental services.

<sup>2</sup> For financial incentive programs administered through NYSERDA, *e.g.*, the New Construction Program, committed funds include (1) funds associated with signed and pending contracts and purchase orders and (2) funds set aside to meet applicants' incentive requests. For projects administered by NYSERDA through competitive solicitations, *e.g.*, the Distributed Generation-Combined Heat and Power Program, committed funds represent funds awarded to contractors. For programs administered by outside contractors, *e.g.*, the Direct Installation Program, committed funds represent the total amount awarded to contractors for implementation and participant incentives.

<sup>3</sup> Encumbered funds are funds associated with signed contracts and purchase orders.

**Figure 3-1. Total New York Energy Smart<sup>SM</sup> Budget by Program Area**



**Table 3-1. New York Energy Smart<sup>SM</sup> Program Funding Allocation Summary**

	8-Year Funding Allocation	Percent of Program Areas Budget	Percent of Total SBC Funding
<b>New York Energy Smart<sup>SM</sup> Program Areas</b>			
Business and Institutional	\$359.1 million	41.3%	37.3%
Residential	\$170.7 million	19.6%	17.7%
Low-Income	\$128.4 million	14.8%	13.4%
Research and Development	\$210.8 million	24.3%	21.9%
<i>Subtotal Program Areas</i>	<i>\$869.0 million</i>	<i>100%</i>	<i>90.4%</i>
<b>New York Energy Smart<sup>SM</sup> Other Costs</b>			
Administration	\$64.6 million	--	6.7%
Evaluation	\$16.2 million	--	1.7%
<i>Subtotal Administration &amp; Evaluation</i>	<i>\$80.8 million</i>	--	<i>8.4%</i>
Environmental Disclosure	\$2.9 million	--	0.3%
NYS Cost Recovery Fee	\$9.0 million	--	0.9%
<b>Total 8-Year Budget<sup>a</sup></b>	<b>\$961.8 million<sup>b</sup></b>	--	<b>100%</b>

a. Totals may not sum due to rounding.

b. Includes ratepayer contributions, interest earnings over the 8-year period, and unexpended funds from previous utility-run programs.

Source: **New York Energy Smart<sup>SM</sup> Program - Financial Status Report, as of December 31, 2004**

**Table 3-2. Financial Status of the New York Energy \$mart<sup>SM</sup> Program as of December 31, 2004**

Program Area	8-year Budget (millions)	Funds Committed (millions)	% of 8-year Budget Committed	Funds Encumbered (millions)	% of 8-year Budget Encumbered
Business/Institutional	\$359.1	\$328.5	91.5%	\$299.6	83.4%
Residential	\$170.7	\$157.2	92.1%	\$154.3	90.4%
Low-Income	\$128.4	\$111.3	86.7%	\$86.1	67.1%
Research and Development	\$210.8	\$160.7	76.2%	\$137.2	65.1%
Environmental Disclosure	\$2.9	\$1.1	35.9%	\$0.7	22.2%
Evaluation	\$16.2	\$10.8	66.5%	\$10.3	63.4%
Administration	\$64.6	\$43.2	67.0%	\$43.2	67.0%
NYS Cost Recovery Fee	\$9.0	\$4.1	45.1%	\$4.1	45.1%
<b>Total<sup>a</sup></b>	<b>\$961.8</b>	<b>\$816.9</b>	<b>84.9%</b>	<b>\$735.5</b>	<b>76.5%</b>

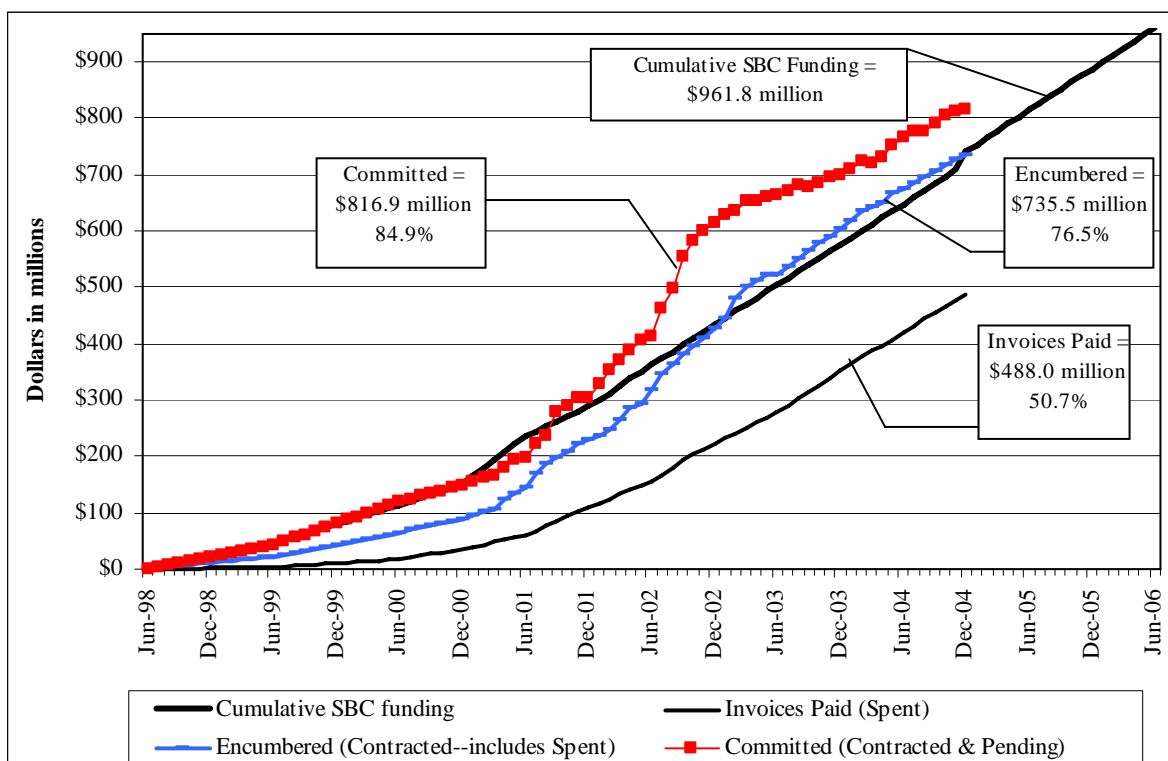
a. Totals may not sum due to rounding.

Source: **New York Energy \$mart<sup>SM</sup>** Program - Financial Status Report, as of December 31, 2004.

Figure 3-2 tracks the spending status of the **New York Energy \$mart<sup>SM</sup>** Program between June 1998 and December 2004 and includes funds invoiced, encumbered, and committed. Also shown are Program funds committed, encumbered, and paid relative to the cumulative SBC program funding between program inception in July 1998 through June 2006. This historical representation of **New York Energy \$mart<sup>SM</sup>** 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 introduced that brought the program to fruition in New York's energy services markets. During this period, NYSERDA administered approximately \$58 million a year for 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. Also during this period, the **New York Energy \$mart<sup>SM</sup>** 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 program design, outreach, and marketing efforts introduced by NYSERDA during the first three years of the Program.

**Figure 3-2. Funds Invoiced, Encumbered, and Committed to the New York Energy Smart<sup>SM</sup> Program between June 1998 and December 2004**

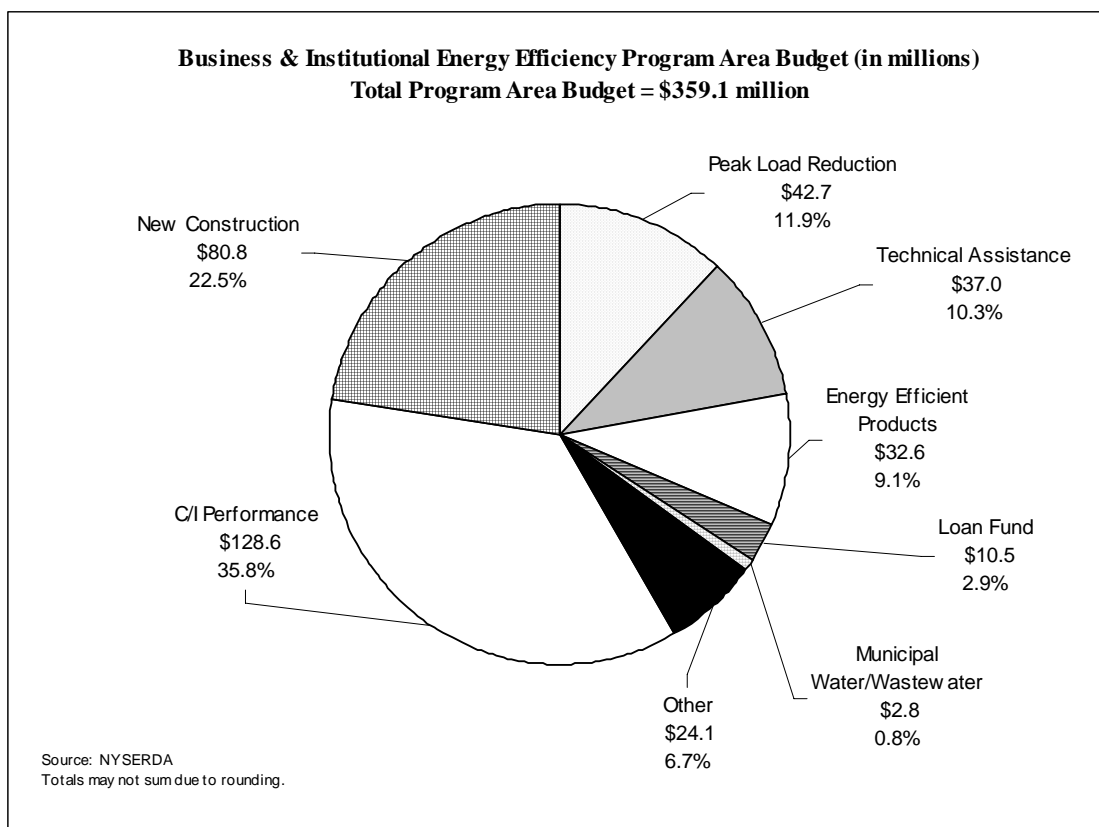


- January 2003 through December 2004. As **New York Energy Smart<sup>SM</sup>** programs evolved, NYSERDA administration began to selectively decrease funding commitments. For example, funding modifications were required because some energy efficiency product markets, such as residential room air conditioners, were being transformed, and product incentive offerings could be reduced. Also, because the market and demand for energy efficiency services in New York is extensive, the Program needed to accept fewer applications for funding to preserve funds through June 2006, when the current authorization for the **New York Energy Smart<sup>SM</sup>** Program ends.
- January 2005 through June 2006. Staff anticipate that, by June 2006, committed program funds will equal encumbered funds. Since payment of invoices is expected to continue beyond June 2006, NYSERDA will continue program evaluation activities beyond June 2006. NYSERDA continues to assess gaps and opportunities with respect to energy efficiency, low-income, renewable technologies development, and research and development programs as a means to assist policy makers in deciding the future of funding for energy-related public benefits programs in the State.

### 3.1.1 Energy Efficiency

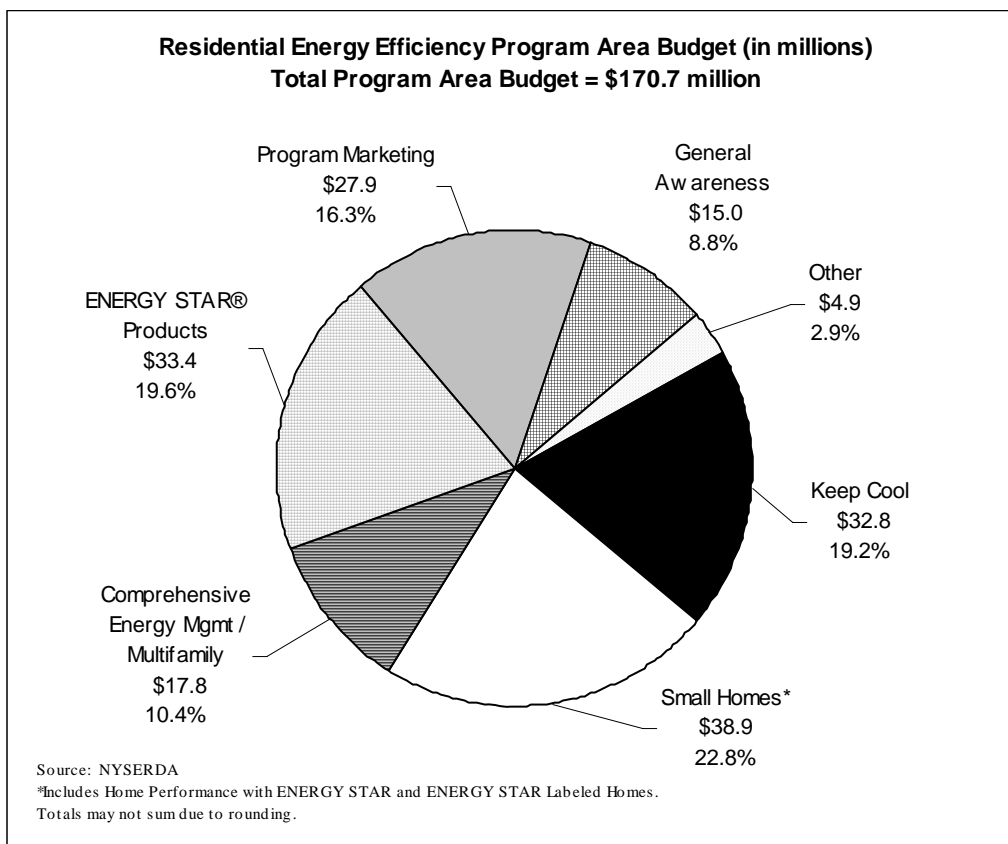
The Business and Institutional (B/I) Program Area budget is presented in Figure 3-3. Four programs, Commercial and Industrial Performance Program (CIPP), New Construction Program, Technical Assistance Program, and Peak-Load Reduction Program, represent approximately 80% of the B/I Program area 8-year budget.

**Figure 3-3. Business and Institutional Energy Efficiency Program Area Budget**



The Residential Program Area budget is shown in Figure 3-4. The B/I and Residential Program area budgets of \$359.1 million and \$170.7 million represent approximately 37% and 18%, respectively, of the total 8-year **New York Energy Smart<sup>SM</sup>** program area budgets. The B/I programs have committed \$328.5 million or 91.5%, and the Residential programs \$157.2 million or 92.1% of their 8-year budgets as of December 31, 2004. Of the B/I encumbered funds, \$174.4 million has been expended. Approximately \$30.7 million of the B/I funding remains available (not committed, encumbered, or spent). Approximately \$137.7 million of the encumbered Residential program area funds have been expended, and \$13.4 million in funding remains available in the Residential budget as of December 31, 2004.

**Figure 3-4. Residential Energy Efficiency Program Area Budget**



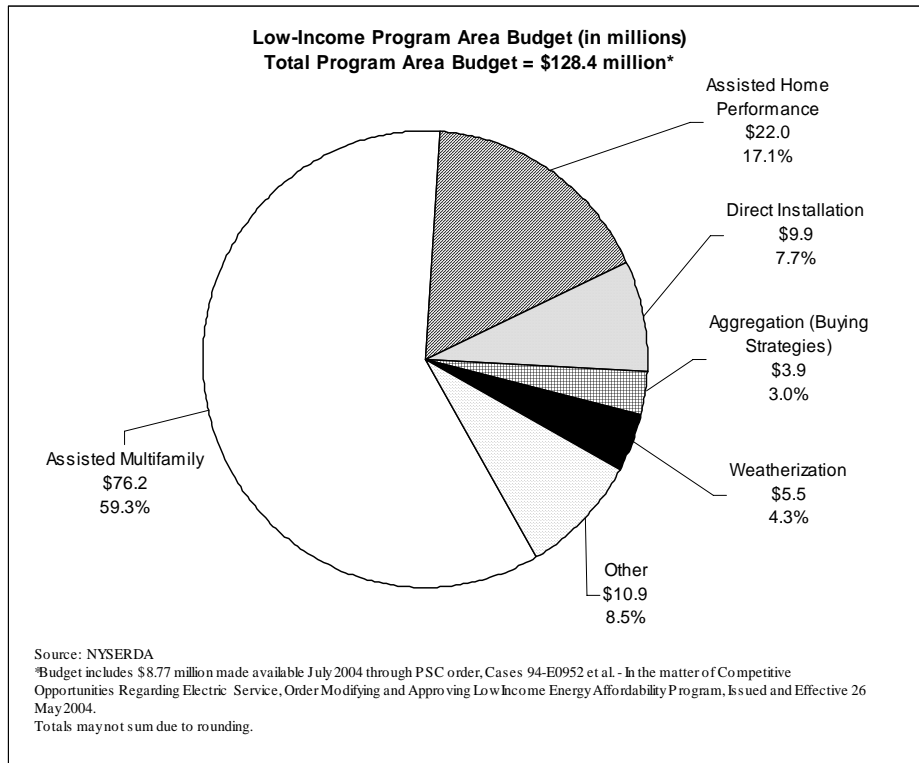
### 3.1.2 Low-Income Energy Affordability

The Low-Income Program area budget is presented in Figure 3-5. As shown, the Assisted Multifamily Program (AMP) and Assisted Home Performance (AHP) programs represent approximately 76% of the Low-Income Program area 8-year budget. The Low-Income Program area, funded at \$128.4 million over the 8-year period, represents 14.8% of the 8-year **New York Energy Smart<sup>SM</sup>** program area budget. As of December 31, 2004, 86.7% (\$111.3 million) of the total 8-year Low-Income Program budget has been committed. Approximately \$48 million of the Low-Income budget has been expended. The balance of funds available is \$17.1 million.

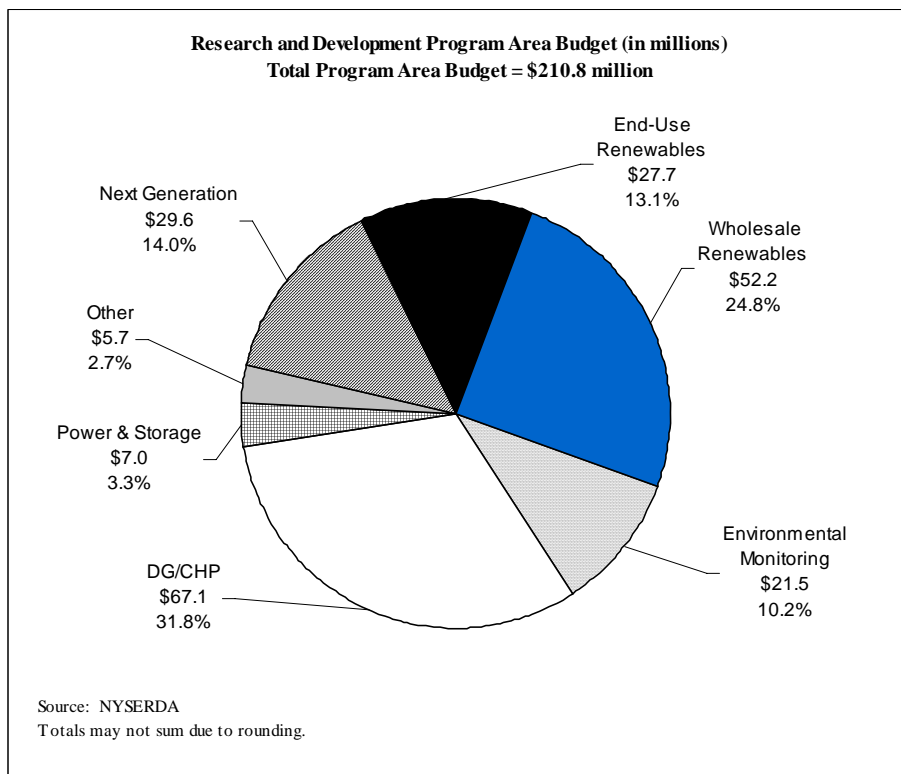
### 3.1.3 Research and Development

The Research and Development Program area budget summary is presented in Figure 3-6. As shown, the Wholesale Renewables Program, Distributed Generation-Combined Heat and Power (DG-CHP) Program, and Next Generation R&D initiatives represent approximately 70% of the R&D Program area 8-year budget. The Research and Development (R&D) Program area budget of \$210.8 million represents 24.3% of the 8-year **New York Energy Smart<sup>SM</sup>** program area budget. As of December 31, 2004, 76.2% (\$160.7 million) of the 8-year R&D program budget has been committed. Approximately \$72 million of the Research and Development budget has been expended. The balance of funds available is \$50.1 million.

**Figure 3-5. Low-Income Program Area Budget**



**Figure 3-6. Research and Development Program Area Budget**



### 3.1.4 Environmental Disclosure

Work in this area provides electricity commodity suppliers with data for informing customers about the fuel mix and associated environmental impacts of their electricity sources. Environmental labels depicting the environmental attributes of electricity are required at least twice yearly. As of December 31, 2004, \$650,000 (22.2%) of the \$2.9 million budget was encumbered.

### 3.1.5 Program Evaluation and Administration

Program administration and evaluation account for 8.4% of the total 8-year budget:

- 8-year funding for Program Evaluation is \$16.2 million or 1.7% of the total budget. As of December 31, 2004, \$8.7 million or 53.7% of the Evaluation budget was expended.
- 8-year funding for Administration is \$64.6 million or 6.7% of the total budget. As of December 31, 2004, \$43.1 million (66.8%) of the Administration funds were expended.

### 3.1.6 New York State Cost Recovery Fee

The Public Authorities Law establishes a cost recovery of central governmental services to various public authorities. The Division of Budget determines the amount to be assessed to each public authority and the State Treasurer imposes and collects the assessments which are deposited into the State's General Fund. NYSERDA, a public authority, administers the **New York Energy Smart<sup>SM</sup>** Program on behalf of the State. The cost recovery fee established for the **New York Energy Smart<sup>SM</sup>** Program by the Division of Budget is \$9.0 million.

## 3.2 NEW YORK ENERGY SMART PROGRAM SPENDING BY UTILITY SERVICE AREA<sup>4</sup>

The contributions through the SBC to the **New York Energy Smart Program<sup>SM</sup>** by utility service area and the estimated breakout by sector are presented in Figure 3-7 and Figure 3-8 respectively. Figure 3-9 represents the distribution of committed Program funds through December 31, 2004 by utility service area.

A comparison of the **New York Energy Smart<sup>SM</sup>** Program contributions with committed funds by utility service area can be seen in Figure 3-7 and Figure 3-9. The utility ratepayer contributions to the Program and the Program funding committed fairly well match in each utility service area.

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<sup>4</sup> The utility service areas in graphs are referred to by acronyms in this section: Central Hudson Gas and Electric, Inc. (CHG&E), Consolidated Edison Company of New York, Inc. (Con Edison), Niagara Mohawk Power Corporation (NMPC), New York State Electric and Gas Corporation (NYSEG), Orange and Rockland Utilities, Inc. (O&R), Rochester Gas and Electric Corporation (RG&E).

Figure 3-7. New York Energy Smart<sup>SM</sup> Ratepayer Contributions by Utility Service Area

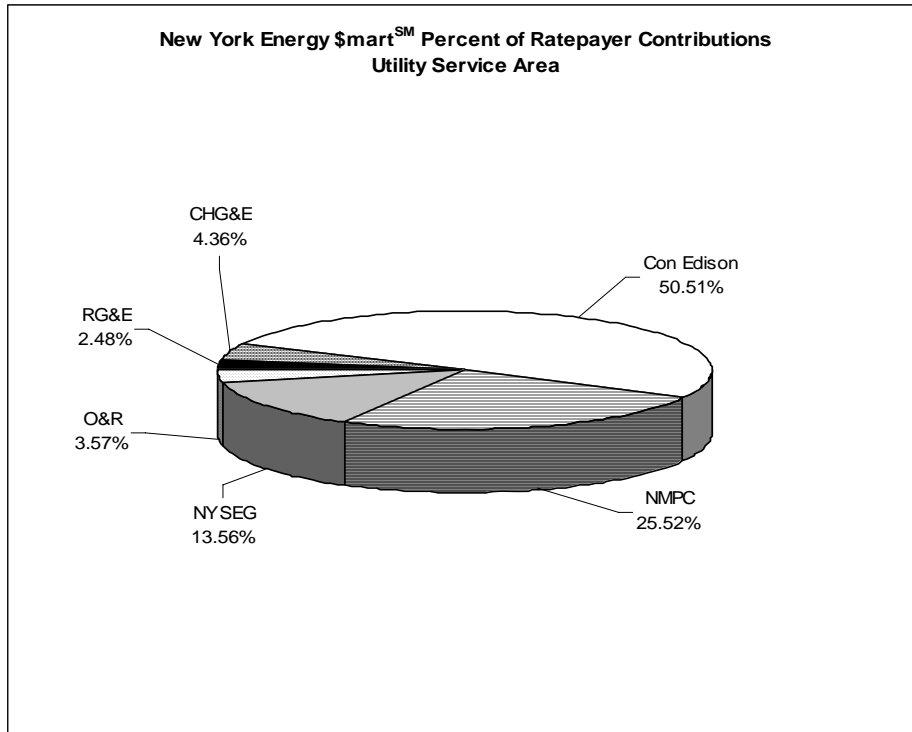
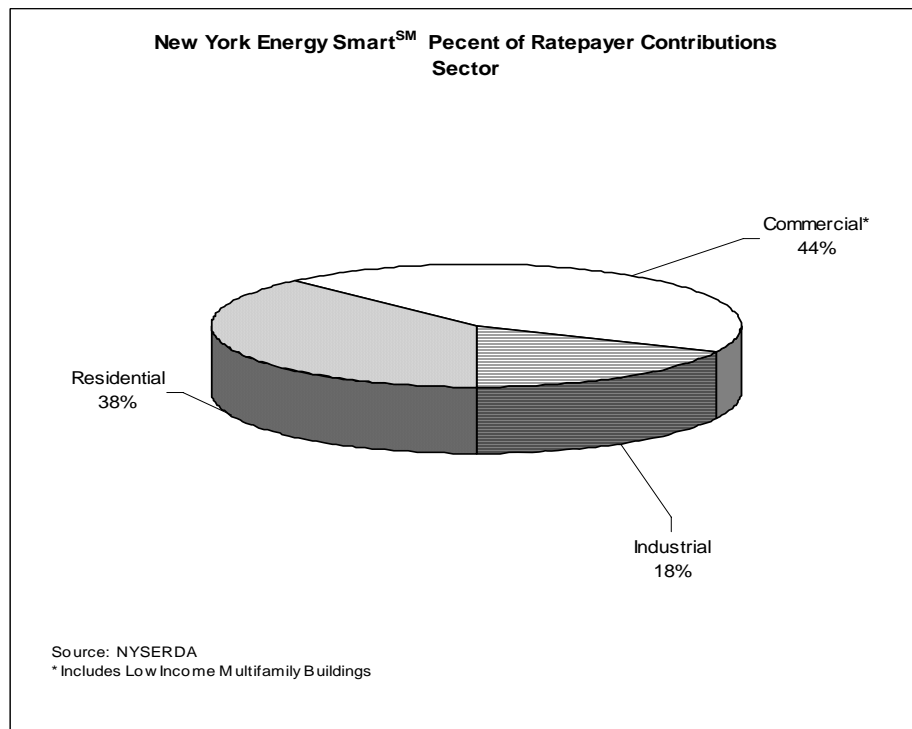
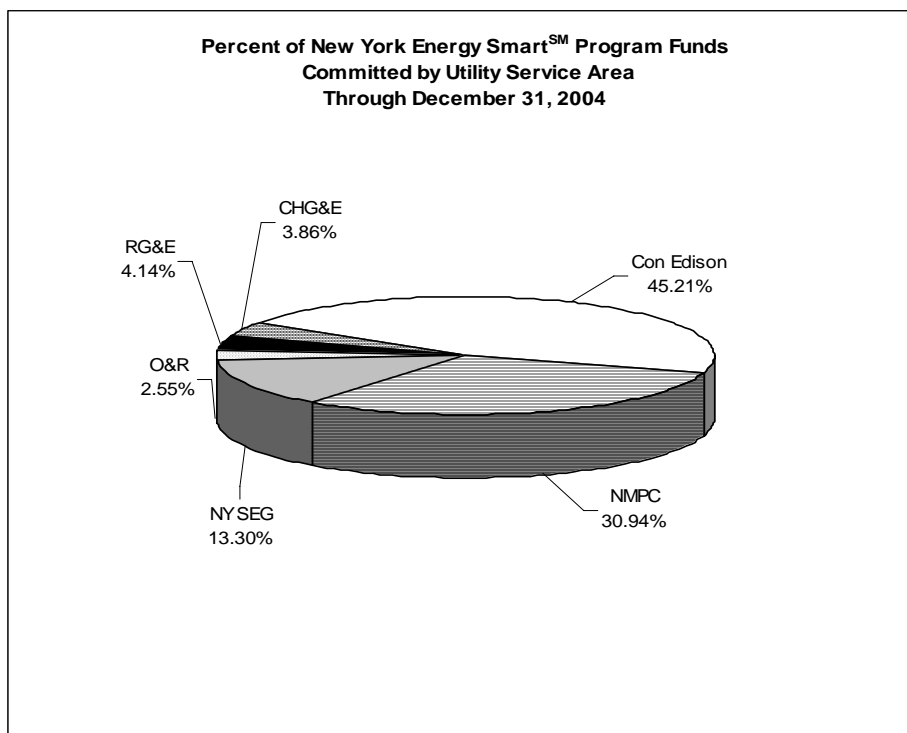


Figure 3-8. Estimated New York Energy Smart<sup>SM</sup> Ratepayer Contributions by Sector



**Figure 3-9. New York Energy Smart<sup>SM</sup> Program Funds Committed by Utility Service Area**

### 3.3 INCENTIVES AWARDED BY SECTOR AND BY UTILITY SERVICE AREA

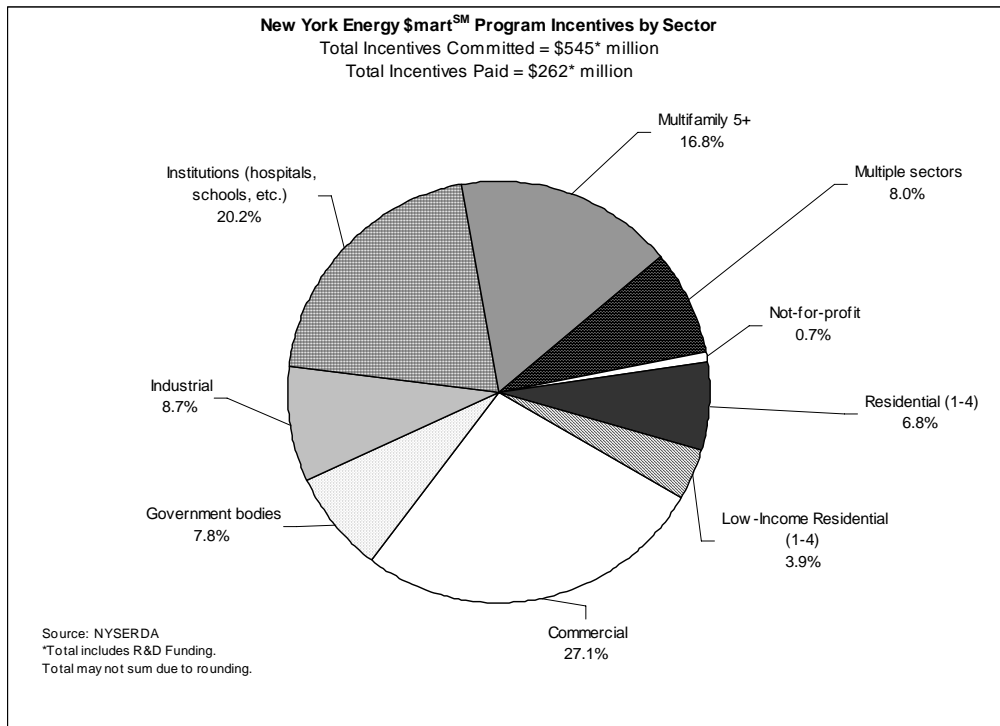
Through December 31, 2004, the **New York Energy Smart<sup>SM</sup>** Program has committed \$545 million and paid<sup>5</sup> \$262 million in incentives.<sup>6</sup> The distribution of funds by sector is shown in Figure 3-10, and the distribution of funds by utility service area is shown in Figure 3-11. The distribution of incentives for the B/I Program Area is shown in Figure 3-12 by sector and in Figure 3-13 by utility service area.

The distribution of incentives awarded to customers in the Residential Program Area is shown in Figure 3-14 by building type and in Figure 3-15 by utility service area. The distribution of incentives committed in the Low-Income Program Area is shown by household type in Figure 3-16 and by utility service area in Figure 3-17. In the R&D Program area, funding awarded is presented by technology in Figure 3-18 and by utility service area in Figure 3-19.

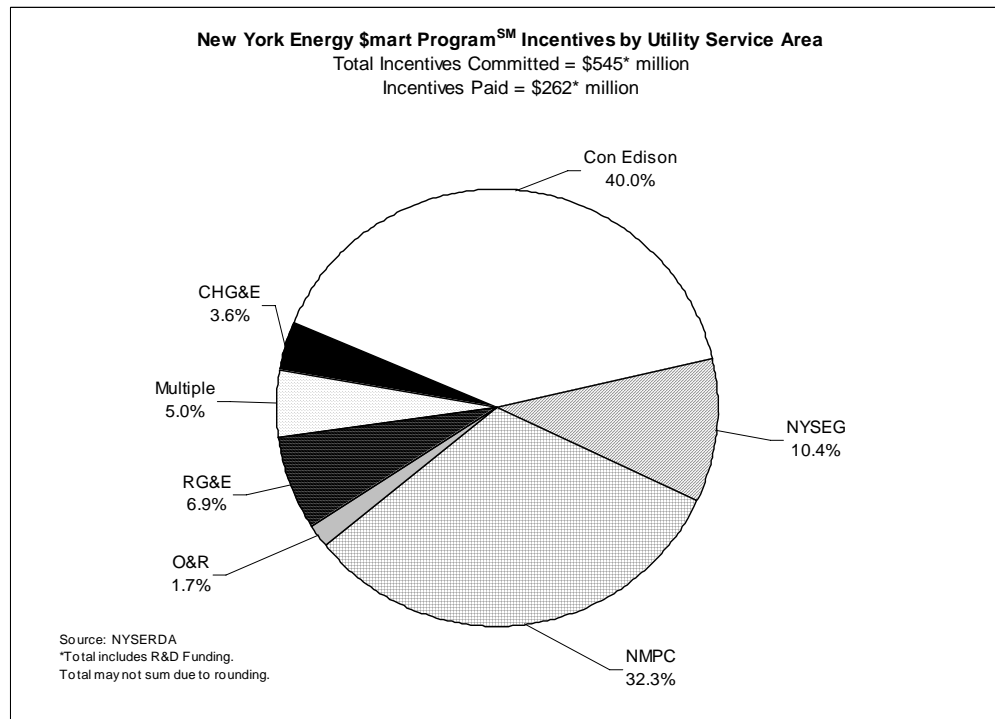
<sup>5</sup> Paid incentives are a component of committed incentives.

<sup>6</sup> Including \$161 million in funds committed and \$72 million in funds spent for R&D technologies but not allocated to specific sectors and utility service areas.

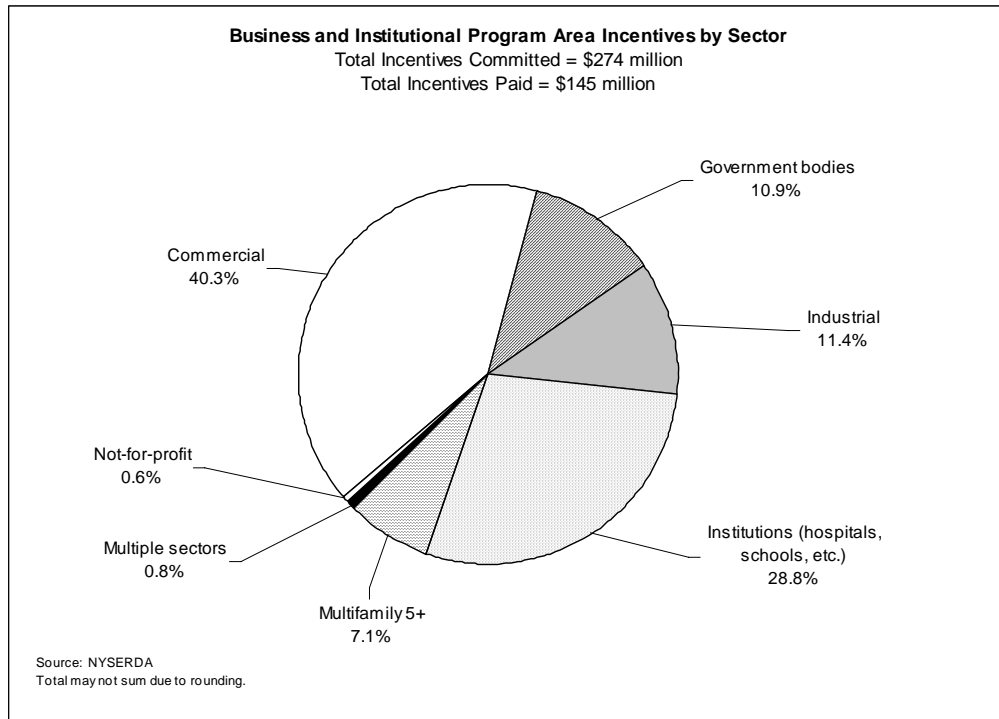
**Figure 3-10. New York Energy \$mart<sup>SM</sup> Incentives Committed by Sector**



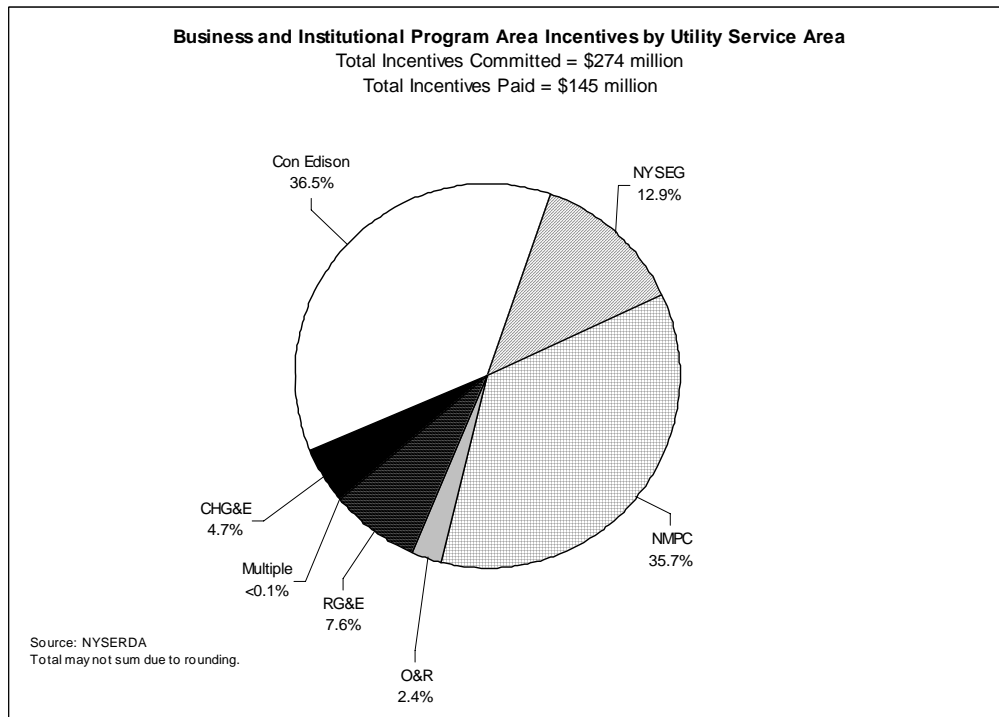
**Figure 3-11. New York Energy \$mart<sup>SM</sup> Incentives Committed by Utility Service Area**



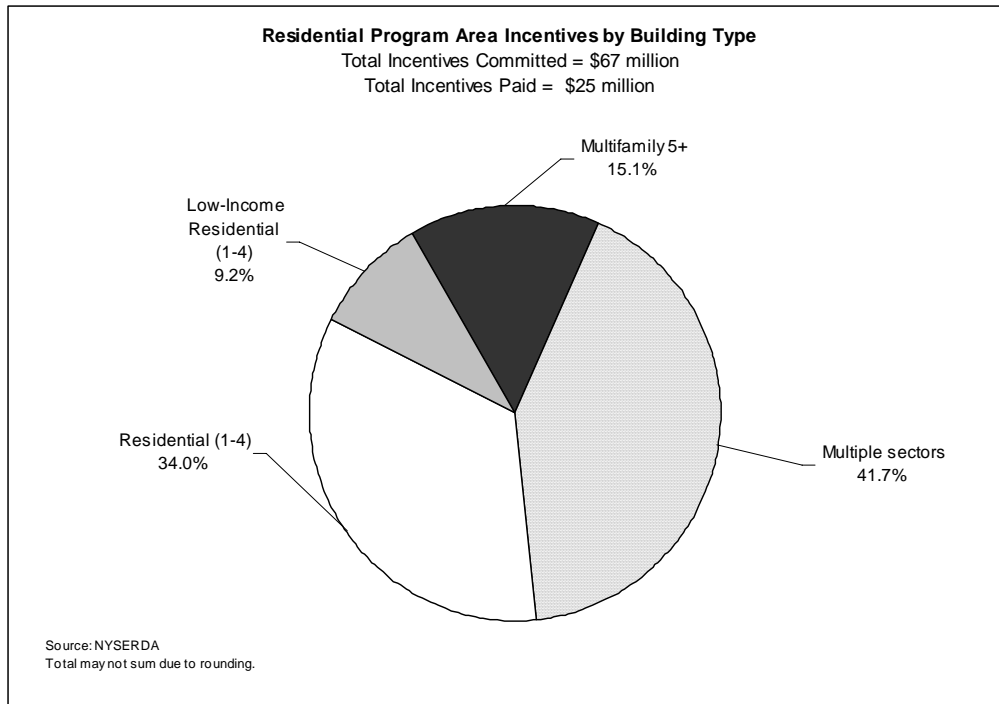
**Figure 3-12. Incentives Committed by Sector for Business and Institutional Programs**



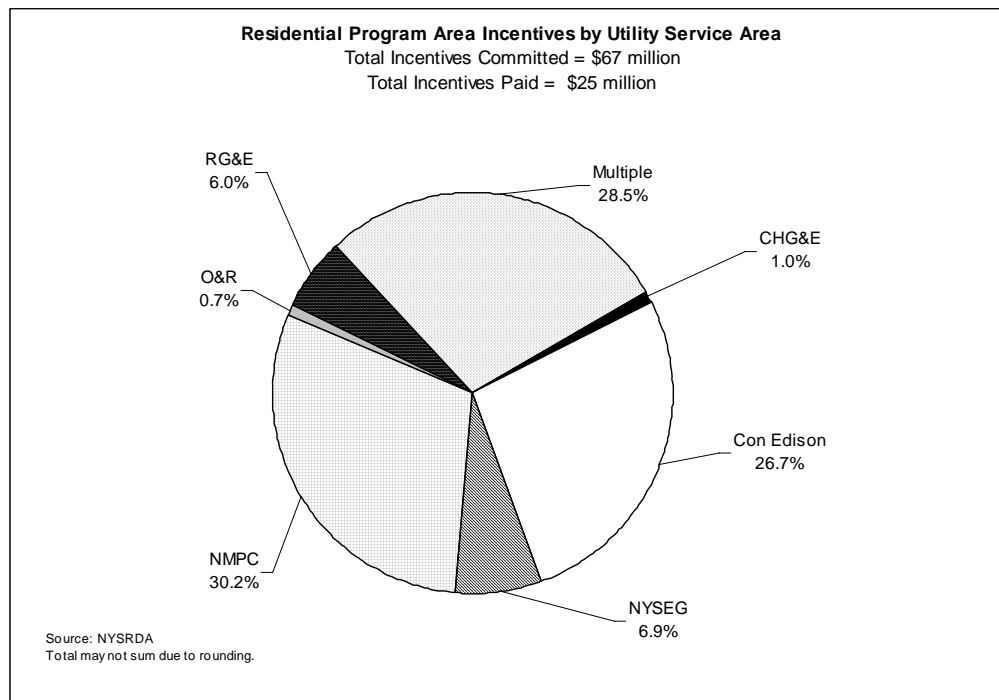
**Figure 3-13. Incentives Committed by Utility Service Area for Business and Institutional Programs**



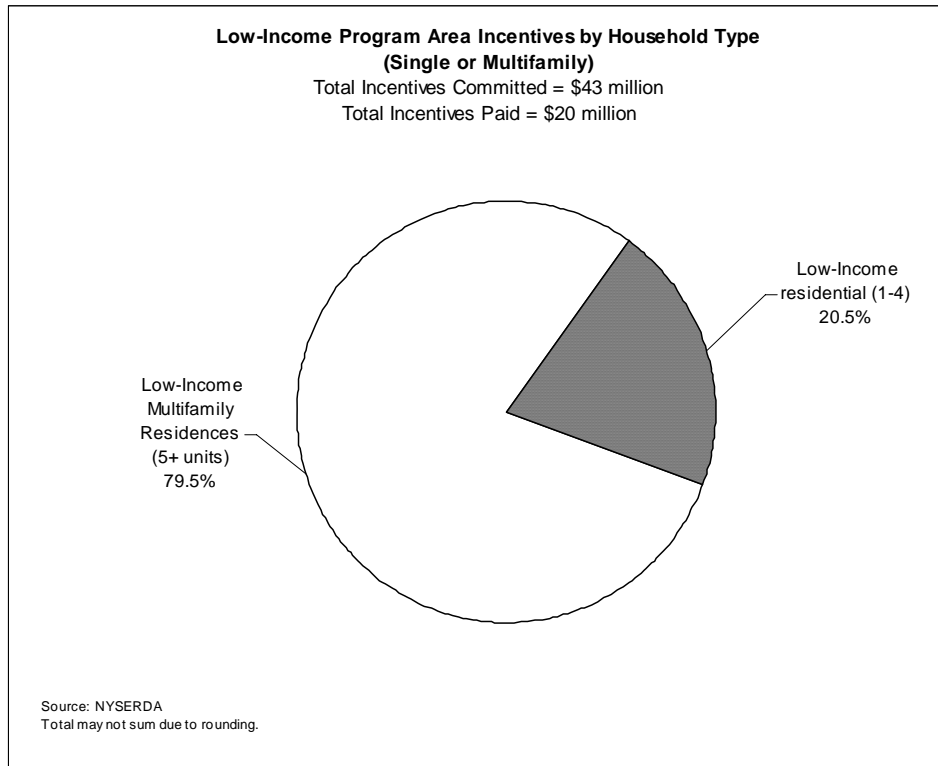
**Figure 3-14. Incentives Committed by Building Type for Residential Program Area**



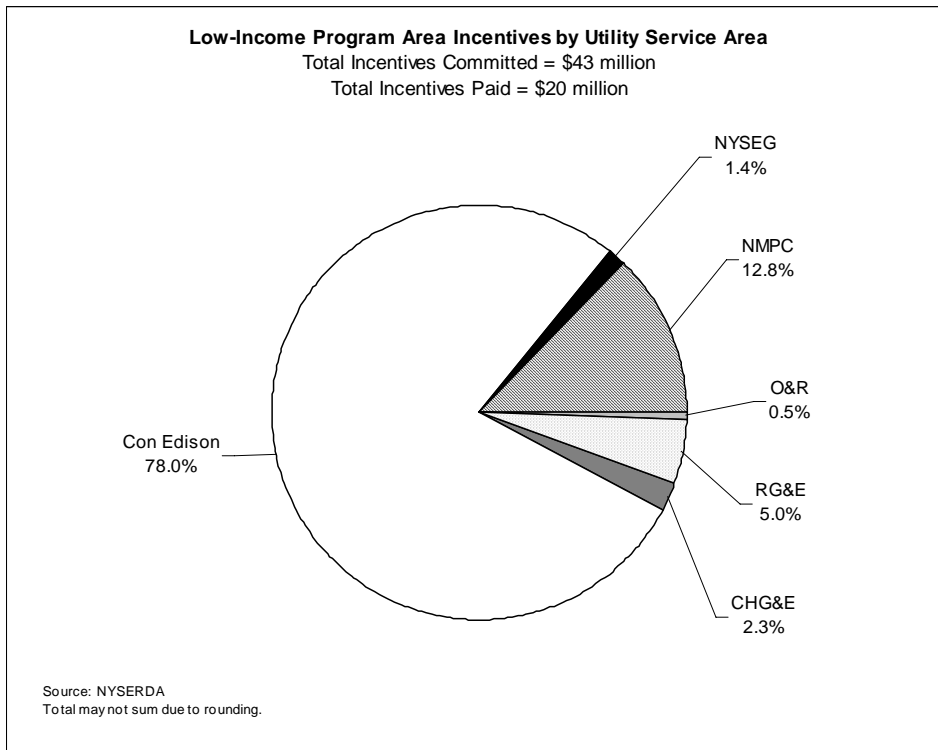
**Figure 3-15. Incentives Committed by Utility Service Area for Residential Program Area**



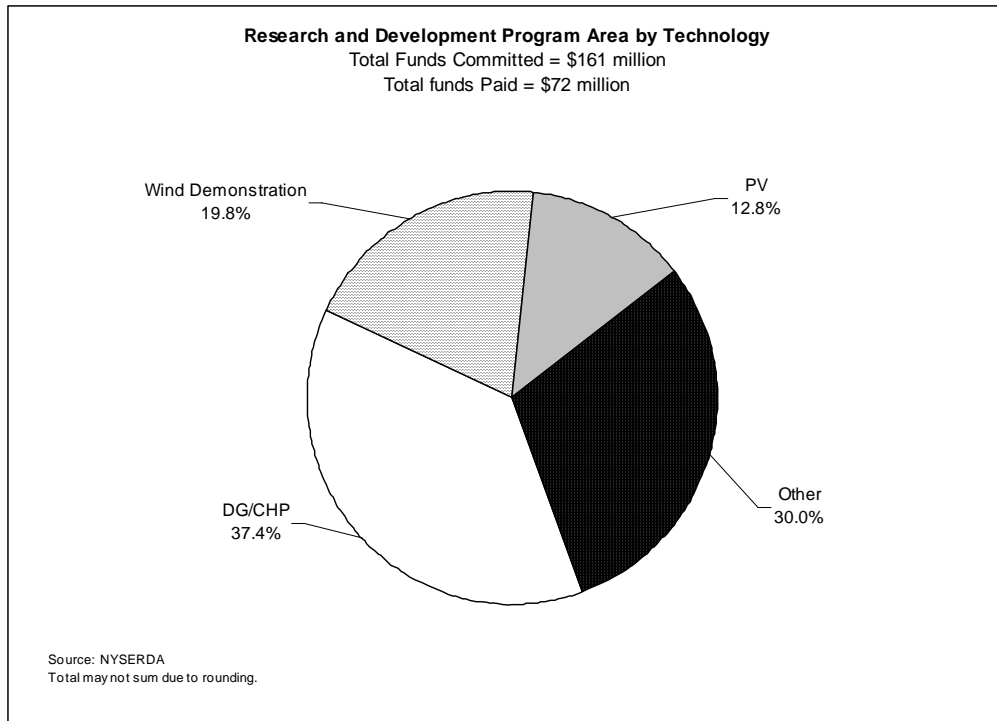
**Figure 3-16. Incentives Committed by Household Type (Single or Multifamily Residence) for Low-Income Programs**



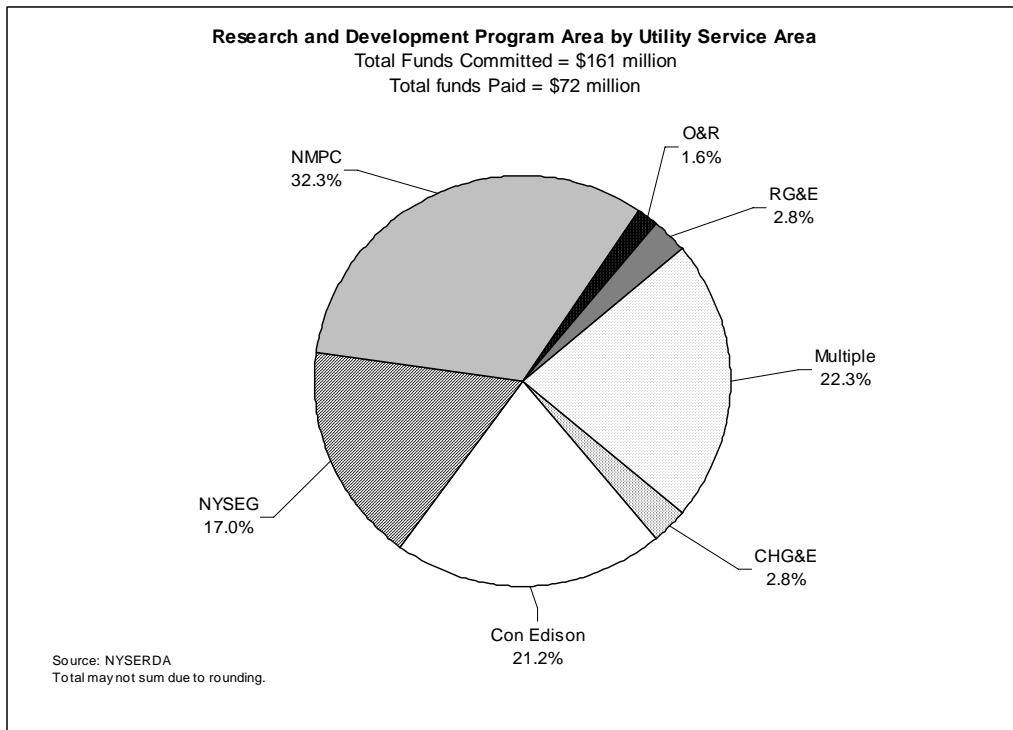
**Figure 3-17. Incentives Committed by Utility Service Area for Low-Income Programs**



**Figure 3-18. Funds Awarded by Technology for Research and Development Programs**



**Figure 3-19 Funds Awarded by Utility Service Area for Research and Development Programs**



**SECTION 4:**

**PORTFOLIO-LEVEL EVALUATION FINDINGS**

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**4.1 PROGRESS TOWARD GOALS**

The public policy goals set by the New York State Public Service Commission (PSC) for **New York Energy Smart<sup>SM</sup>** Program are to:

1. Improve system-wide reliability and peak reduction through end user efficiency actions.
2. Improve energy efficiency and access to energy options for underserved customers.
3. Reduce environmental impacts of energy production and use.
4. Facilitate retail electric competition to benefit end users.

Six objectives have been developed that describe what the program expects to accomplish in meeting these policy goals. These objectives are:

1. Reduce peak demand through improved energy management and load reduction.
2. Improve energy efficiency and reduce electricity use.
3. Save consumers, businesses and institutions money.
4. Reduce the environmental impacts of energy use by promoting renewable energy and sustainable building practices, and monitoring and reducing the emissions of criteria air pollutants and greenhouse gases.
5. Foster long-term market changes, so these benefits will be sustained.
6. Develop next generation technologies.

Table 4-1 provides evidence of how the portfolio of **New York Energy Smart<sup>SM</sup>** programs are demonstrating progress toward the PSC’s public policy goals.

**Table 4-1. Progress Toward Goals**

<p><b>Progress Toward Goals</b></p> <p><b>Goal 1: Improve system-wide reliability and peak reduction through end user efficiency actions</b></p> <ul style="list-style-type: none"> <li>• The <b>New York Energy Smart<sup>SM</sup></b> programs have reduced peak demand through installed efficiency measures by 325 MW and have enabled 535 MW of callable load reduction.</li> <li>• Two of the largest <b>New York Energy Smart<sup>SM</sup></b> programs – the Commercial/Industrial Performance Program (CIPP) and the Technical Assistance Program (TA) – are saving participating customers more than 830 GWh annually and have lowered peak demand by more than 135 MW.</li> <li>• The New Construction Program (NCP) has affected a significant percentage of non-residential new construction activity occurring in New York, increasing from slightly more than 1% in 2000 to a steady 10% to 11% per year from 2002 to 2004. When all new construction activity occurring during the five-year period 2000 to 2004 is considered, the Program’s penetration rate is nearly 10%.</li> <li>• Approximately 18% (526) of New York’s 2,900 unique architecture and engineering (A&amp;E) firms worked on <b>New York Energy Smart<sup>SM</sup></b> non-residential new construction projects in the past two years. Approximately 174 energy services companies (ESCOs), A&amp;E firms, contractors, and manufacturers and more than 1,000 end-use customers have participated in the CIPP Program. Approximately 2,300 customers have completed Technical Assistance studies and audits, and another 300 projects are pending.</li> </ul>
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<b>Progress Toward Goals</b>
<ul style="list-style-type: none"> <li>The percentage of residents in the <b>New York Energy Smart<sup>SM</sup></b> territory who shift their laundry and dishwashing tasks to off-peak hours has grown steadily between 2002 and 2004 due to the Keep Cool and Stay Cool marketing campaigns, increasing from 42% to 90% for laundry and from 57% to 84% for dishwashing. These activities have resulted in an average hourly load shift of over 100 MW.</li> </ul>
<p><b>Goal 2: Improve energy efficiency and access to energy options for underserved customers</b></p> <ul style="list-style-type: none"> <li>As of year-end 2004, the Assisted Multifamily program (AMP) has affected approximately 13% of eligible low-income apartment units; 6.8% of units installed energy efficiency measures and 6.2% received audits.</li> <li>Forty-seven percent of participants in the Smart Equipment Choices (SEC) program reported a significant increase in familiarity with energy efficiency over the past 5 years compared with 22% of non-participants. Nearly one-half (48%) of the contractors participating in the Technical Assistance Program stated that their familiarity with energy efficiency equipment has increased significantly in the past five years compared to 21% of the non-participating contractors. Awareness of the ENERGY STAR<sup>®</sup> label has increased steadily, from 34% in 1999 to 62% in 2003.</li> <li>More than 18% of new residential homes are being built to ENERGY STAR<sup>®</sup> specifications. In the Home Performance with ENERGY STAR<sup>®</sup> (HPwES) program, 20% of homeowners doing remodeling report awareness of the program. The proportion of the home improvement market installing measures through the program increased from 0.21 – 0.34% in 2001 to 1.65 – 2.86% in 2003 and was 1.69 – 2.74% in 2004.</li> <li>As of year-end 2004, nearly 9,000 advanced meters have been installed in apartments, primarily in Con Edison's service territory. Over 90% of consultants, contractors, and manufacturers say their promotion of advanced metering to multifamily buildings has increased in the past two years, and 42% of consultants, contractors, manufacturers, and participating building owners say the availability of advanced metering has improved in the past two years.</li> </ul>
<p><b>Goal 3: Reduce environmental impacts of energy use</b></p> <ul style="list-style-type: none"> <li>The <b>New York Energy Smart<sup>SM</sup></b> portfolio of energy efficiency and renewable energy projects reduced NOx emissions by 1,280 tons per year, SO<sub>2</sub> emissions by 2,320 tons per year, and CO<sub>2</sub> emissions by one million tons per year.</li> <li>The Wholesale and End-Use Renewables programs have delivered 102 GWh of clean generation. The programs have achieved a summer coincident peak demand reduction of about 7 MW from installation of small and large-scale wind and photovoltaic systems.</li> <li>Over 125 peer-reviewed journal articles have been published based on Environmental Monitoring, Evaluation, and Protection Program (EMEP) research. Several EMEP research projects are providing the scientific foundation for the development of a PM<sub>2.5</sub> State Implementation Plan, which will ultimately affect utilities and other fossil fuel combustion systems in New York. EMEP support of the two Mercury Deposition Network stations in New York, as well as mercury surveys on common loons and fish, are providing an environmental baseline that will be used to evaluate effectiveness of new mercury emission reductions affecting utilities.</li> </ul>
<p><b>Goal 4: Facilitate competition to benefit end users</b></p> <ul style="list-style-type: none"> <li>The annual energy bill savings for participating <b>New York Energy Smart<sup>SM</sup></b> customers is estimated to be nearly \$200 million through year-end 2004. In the business and institutional sectors, <b>New York Energy Smart<sup>SM</sup></b> programs directly influenced the installation of energy efficiency measures by consumers not directly participating in the program. These measures contributed an additional 15% savings to New York customers.</li> <li>Sixty-three percent (63%) of customers agree that ENERGY STAR<sup>®</sup> equipment is higher quality than standard equipment.</li> <li>The ENERGY STAR<sup>®</sup> Products program has resulted in sales of more than 800,000 energy efficient appliances and almost 1.4 million efficient lighting products. In the residential sector, NYSERDA's program efforts have helped increase the market penetration of ENERGY STAR<sup>®</sup> refrigerators among retail partners from 24% in 1999 to 44% in 2004; from 24% to 73% for dishwashers; from 13% to 37% for clothes washers; from 22% to 76% for room air conditioners; and from 39% to 49% for compact fluorescent lamps.</li> <li>ESCO activity in New York has increased during the past five years with nearly half of the participating and non-participating contractor respondents reporting increased activities by ESCOs and improved quality of work by ESCOs. More than half of the end-use customers (55%) and 41% of the ESCOs participating in the CIPP program stated that the availability of energy efficiency measures has become less of a market barrier in the past five years.</li> </ul>

<b>Progress Toward Goals</b>
<ul style="list-style-type: none"> <li>Nearly 84% of motor vendors in New York have participated in the Premium Efficiency Motors (PEM) program.</li> </ul>



NYSERDA's integrated evaluation framework is working well, providing benefits in its ability to demonstrate accomplishments, rationalize program approaches and implementation activities, and plan for program improvements and new programs. The approach adopted by NYSERDA remains the only example of such a comprehensive approach in the U.S. Additionally, the value/cost methodology for R&D programs represents a potential change in the paradigm for evaluating R&D programs prior to deployment.

NYSERDA has demonstrated leveraging national energy efficiency efforts – particularly ENERGY STAR in the residential sector – to brand and disseminate energy efficient products in New York. Results from the evaluations show awareness and penetration of these products in New York significantly higher than the national average.

NYSERDA has influenced some markets to the extent that efficient actions are being taken outside direct program participation but are directly attributable to program activities. NYSERDA is gradually becoming a trusted source of information about energy and efficient practices. However, while both the performance of the **New York Energy Smart<sup>SM</sup>** portfolio of programs and the trajectory toward market transformation can be demonstrated, more work clearly needs to be done.

In the Business and Institutional sectors, the significant improvements in efficiency and measured savings, while large in an absolute sense, represent only a small proportion of the potential market. In the Residential sector, new technologies and products are already exceeding national standards, offering opportunities for further savings and showing the need for an ongoing presence in the market.

Internally, NYSERDA's portfolio of programs presents difficulties in disentangling program effects from one another, and often presents consumers with conflicting options. The evaluation contractors recommend that the programs be consolidated, as much as possible, going forward.

Finally, the quality of program-level data remains a significant barrier to conducting evaluation and benefit/cost analysis. The evaluation contractors have spent significant resources working with program staff and implementation contractors to resolve these issues, but the existence of alternative databases with conflicting information still remains an issue. NYSERDA would be better served by instituting a major effort in program tracking and validation, going forward.

## 4.2 REPORTED AND ACHIEVED ENERGY, DEMAND, AND FUEL SAVINGS

The energy, demand, and fuel savings from the **New York Energy Smart<sup>SM</sup>** Program portfolio is presented in Table 4-2. Shown are the reported savings, savings after adjustments were applied for field-verified realization rates, and for freeridership and spillover. During 2004 the **New York Energy Smart<sup>SM</sup>** programs contributed 400 GWh in electric energy savings. This represents a 40 percent increase in savings beyond those achieved by the end of 2003. Permanent peak reduction savings increased by about 20 percent from 2003.

Also shown in Table 4-2 is the estimated overlap in savings across programs. An example of how overlap occurs is when a customer first participates in the Technical Assistance Program to obtain a detailed energy audit of a facility. This customer may then participate in the Commercial/Industrial Performance Program to access incentives that will be used for implementation of recommended measures. Customers were surveyed and asked if they had accessed more than one NYSERDA program to assist in implementing the same energy efficiency measure. When identified, overlap factors were

developed to account for the same savings claimed by more than one program. Since both technical assistance and incentives for measures are equally vital to convincing customers to take action, and there was no reliable way of allocating the savings based on a program's role in achieving these savings, the decision was made to make these adjustments only at the sector level.<sup>1</sup> In the case of the Distributed Generation/Combined Heat and Power Program where R&D savings overlap with programs in the Business and Institutional sector, savings were removed from the portfolio and are shown in the table as "Cross-Sector Overlap Removed." More detailed discussion on overlap is found in the Measurement and Verification reports for the Loan Fund, Technical Assistance, and Distributed Generation programs.

The reductions in energy used has saved New York consumers \$195 million in energy bills (electric, oil and natural gas) and reduced annual emissions by 1,280 tons of nitrogen oxide (NO<sub>x</sub>), 2,320 tons of sulfur dioxide (SO<sub>2</sub>), and 1,000,000 tons of carbon dioxide (CO<sub>2</sub>). The annual CO<sub>2</sub> reduction is equivalent to removing 200,000 automobiles from New York's roadways.

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<sup>1</sup> Work is continuing to better identify and adjust for savings overlap among the various programs.

**Table 4-2. Reported and Adjusted Energy, Demand, and Fuel Savings<sup>2</sup>**

Program	Energy Savings (GWh)			On-Peak Demand Reduction (MW) <sup>3</sup>			Fuel Savings (MMBtu)		
	Reported GWh	Adjusted GWh	% of Reported	Reported MW	Adjusted MW	% of Reported	Reported MMBtu	Adjusted MMBtu	% of Reported
New Construction Program	116	128	110.1	25	31	125.2	NA	NA	NA
C/I Performance Program	502	515	102.7	110	75	68.5	NA	NA	NA
Peak Load Reduction	67	69	103.0	431	419	97.2	NA	NA	NA
Enabling Technology	NA	NA	NA	206	136	65.9	NA	NA	NA
Technical Assistance	454	515	113.2	93	105	113.2	2,236,853	2,533,012	113.2
Smart Equipment Choices	48	53	110.3	29	11	38.6	NA	NA	NA
Energy Smart <sup>SM</sup> Loan Fund	25	29	112.8	4	9	229.7	167,616	267,011	159.3
Small Commercial Lighting	15	17	109.2	4	4	111.1	NA	NA	NA
Premium-Efficiency Motors	9	8	88.4	2	1	72.2	NA	NA	NA
HVAC <sup>4</sup>	NA	8	NA	NA	3	NA	NA	NA	NA
Overlap Removed <sup>5</sup>	-	-218	-	-	-41	-	-	-126,651	-
<b>Subtotal: B/I<sup>6</sup></b>	<b>1,238</b>	<b>1,124</b>	<b>90.8</b>	<b>903</b>	<b>753</b>	<b>83.4</b>	<b>2,404,469</b>	<b>2,674,417</b>	<b>111.2</b>
ENERGY STAR <sup>®</sup> Products	203	179	88.0	38	34	88.0	NA	NA	NA
Keep Cool	29	28	94.3	50	48	94.3	NA	NA	NA
ENERGY STAR <sup>®</sup> Labeled Homes	2	3	131.3	1	1	190.0	149,923	174,964	116.7

<sup>2</sup> The reported savings represent savings recorded in the program tracking databases. The adjusted savings have been adjusted by the Nexant realization rate and the MCAC freerider and spillover effects.

<sup>3</sup> These values contain both permanent and curtailable demand reduction.

<sup>4</sup> All numbers in this row were developed by the MCAC team. For the HVAC program “influence factors,” rather than net-to-gross ratios were developed.

<sup>5</sup> Overlap occurring within the Business and Institutional sector.

<sup>6</sup> Totals may not sum due to rounding.

Program	Energy Savings (GWh)			On-Peak Demand Reduction (MW) <sup>3</sup>			Fuel Savings (MMBtu)		
	Reported GWh	Adjusted GWh	% of Reported	Reported MW	Adjusted MW	% of Reported	Reported MMBtu	Adjusted MMBtu	% of Reported
Home Performance w/ENERGY STAR <sup>®7</sup>	5	6	118.8	1	2	150.0	240,563	288,641	120.0
ENERGY STAR <sup>®</sup> Bulk Purchase	19	37	191.4	4	6	153.4	24,307	16,292	67.0
Comprehensive Energy Management	4	3	66.4	3	3	94.4	NA	NA	NA
<b>Subtotal: Residential</b>	<b>264</b>	<b>249</b>	<b>94.4</b>	<b>97</b>	<b>93</b>	<b>95.5</b>	<b>414,793</b>	<b>479,897</b>	<b>115.7</b>
Assisted Multifamily Program	3	2	81.1	<1	<1	106.3	29	25	84.0
Weatherization Network Initiative	2	2	100.0	<1	<1	100.0	NA	NA	NA
Low-Income Direct Installation	11	11	100.0	2	2	100.0	NA	NA	NA
<b>Subtotal: Low Income</b>	<b>17</b>	<b>16</b>	<b>96.5</b>	<b>2</b>	<b>2</b>	<b>100.6</b>	<b>29</b>	<b>25</b>	<b>84.0</b>
Wholesale Renewables	100	100	100.0	6	6	100.0	NA	NA	NA
End-Use Renewables	2	2	104.1	1	1	85.2	NA	NA	NA
Distributed Generation/ CHP <sup>8</sup>	57	61	106.0	12	13	105.7	-536,618	-572,093	106.6
<b>Subtotal: R&amp;D</b>	<b>159</b>	<b>163</b>	<b>102.2</b>	<b>20</b>	<b>21</b>	<b>102.6</b>	<b>-536,618</b>	<b>-572,093</b>	<b>106.6</b>
Cross-Sector Overlap Removed <sup>9</sup>	-	-21	-	-	-4	-	-	195,084	-
<b>Portfolio Total</b>	<b>1,678</b>	<b>1,532</b>	<b>91.3</b>	<b>1,022</b>	<b>864</b>	<b>84.5</b>	<b>2,312,109</b>	<b>2,802,040</b>	<b>121.2</b>

<sup>7</sup> Includes Assisted Home Performance with ENERGY STAR.<sup>®</sup>

<sup>8</sup> The MMBtu savings figure is negative, reflecting a net increase in fuel usage at the facility.

<sup>9</sup> This overlap is attributed to energy savings that are shared by the DG/CHP Program and the B/I sector.

### 4.3 MACROECONOMIC IMPACT ANALYSIS

Expenditures made by NYSERDA and participants within the **New York Energy Smart<sup>SM</sup>** Program have substantial macroeconomic impacts. Purchases of goods and services through the Program set off a ripple effect of spending and re-spending that influences many sectors of the New York economy and the level and distribution of employment and income in the State. The macroeconomic impact analysis of the **New York Energy Smart<sup>SM</sup>** Program undertaken for this report was designed to quantify the net impacts of the programs by comparing the impacts of Program expenditures and energy savings (program case) to the impacts that would have resulted had the programs not been implemented and the money not been paid by ratepayers into the System Benefits Charge fund (base case). The net macroeconomic impacts are expressed in terms of annual employment,<sup>8</sup> labor income,<sup>9</sup> total industry output,<sup>10</sup> and value added.<sup>11</sup>

#### 4.3.1 Input-Output Model

An input-output model<sup>12</sup> is used to characterize the myriad of interdependencies in the New York economy and show how the expenditures within the State's economy differ between the program case and the base case. An input-output model embodies a detailed representation of the pattern of transactions among industries in an economy, and the interrelationships among these industries and the other sectors of the economy (such as households, government entities, and "the rest of the world"). Its analytical capacity lies in the ability to use this information to estimate the total economic effects of a change in expenditures. In this context, total means not just the immediate consequences of a decrease in expenditures for electricity (such as decreased sales, profits, and employment in the electricity sector), but also the changes elsewhere in the economy that occur as indirect consequences of the reduction in electricity sales (such as reduced sales, profits, and employment in supplier industries to the electricity sector, and decreased expenditure on consumer goods as the employment and profit effects result in reduced incomes for consumers).

The input-output model estimates three levels of economic impacts for each economic variable: direct impacts, indirect impacts, and induced impacts. Direct impacts include, for example, the effects of Program expenditures, such as equipment purchases, installation or construction labor, administrative costs, expenditures for incentives, promotional and informational activities, technical assistance, and co-funding expenditures by program participants. Indirect impacts reflect the effects of the economy-wide purchases of the intermediate inputs (labor and capital) needed to produce the final goods and services that comprise the direct impacts. A portion of the direct and indirect impacts is in the form of increased labor income generated by the increased economic activity. To the extent that this additional income is spent within the New York economy, there are further impacts commonly referred to as induced impacts.

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<sup>8</sup> Employment includes total wage and salary employees as well as self-employed jobs in a region. It includes both full-time and part-time workers and is measured in annual average jobs.

<sup>9</sup> Labor income includes both employee compensation and proprietor income.

<sup>10</sup> Total industry output is the value of total sales revenue, which includes both final and intermediate goods and services. It can be measured as either the total value of purchases by intermediate and final consumers, or by the sum of expenditures on intermediate goods plus value added.

<sup>11</sup> Value added includes the components of Labor Income (employee compensation and proprietor income) plus property income (interest, rental income, royalties, dividends, and profits) and indirect business taxes (primarily sales and excise taxes).

<sup>12</sup> The input-output model used was the IMPLAN Pro software system (Version 2.0), developed by Minnesota IMPLAN Group. The model includes the software, which provides the data management services and performs the calculations to create and analyze impact scenarios using input-output analysis, as well as the state databases that provide the information needed to create a New York-specific regional model.

The input-output model calculates the cumulative impact of direct, indirect, and induced impacts. The expenditure of one additional dollar on direct final purchases stimulates a cascading set of impacts in the economy. The model sums up the cumulative “multiplier” or “ripple” effects of the initial *direct* impacts throughout the various sectors of the economy.

#### 4.3.2 Base Case and Program Case

The first step of the analysis was to develop a base case to estimate the impact of the SBC funds on the New York economy had they been retained by the customers of the participating utilities. This case provides a frame of reference, with which to compare the impacts of the **New York Energy Smart<sup>SM</sup>** Program. The second step was to develop the program case to estimate the impact on the New York economy of the **New York Energy Smart<sup>SM</sup>** Program expenditures on goods and services. In each of these two cases, expenditure decisions are made by different entities, for different reasons, resulting in purchases of widely different combinations of goods and services from different sectors of the economy. By comparing the impacts of the base case and program case, the analysis provides a comprehensive assessment of the net macroeconomic impacts of the **New York Energy Smart<sup>SM</sup>** programs.

#### 4.3.3 Primary Factors Included

The analysis included estimating the impacts of the following primary factors:

- **New York Energy Smart<sup>SM</sup>** Program expenditures
- Co-funding expenditures by Program participants
- Stream of energy bill savings by program participants
- Opportunity cost of **New York Energy Smart<sup>SM</sup>** Program expenditures (*i.e.* potential impacts of the amount of SBC funds collected from customers if they were to be spent by the contributing customers in the absence of the **New York Energy Smart<sup>SM</sup>** Program)
- Opportunity cost of co-funding expenditures (*i.e.* potential impacts of the co-funding expenditures if spent in normal consumption and investment patterns in the absence of the **New York Energy Smart<sup>SM</sup>** Program)
- Impact of reduced economic activity in energy-providing sector due to reduced purchases

#### 4.3.4 Results of Analysis

Results of the macroeconomic analysis, encompassing the eight years of Program implementation (1999-2006) and ten years following Program implementation (2007-2016), indicate that the **New York Energy Smart<sup>SM</sup>** Program provides net macroeconomic benefits to New York in the form of increased employment, labor income, total output, and value added. Table 4-3 shows the increase in jobs, labor income, total output, and value added resulting from the **New York Energy Smart<sup>SM</sup>** Program. Last year’s analysis results are also included for reference and comparison purposes.

**Table 4-3. Summary of Macroeconomic Impacts of the New York Energy Smart<sup>SM</sup> Program**

Economic Variable	Program Implementation Years (1999-2006)		Years Following Program Implementation (2007-2016)		Annual Average over 18-Year Analysis Period (1999-2016)	
	2003	2004 Update	2003	2004 Update	2003	2004 Update
Jobs	5,492	4,779	4,201	4,109	4,774	4,407
Labor Income	\$236 million	\$211 million	\$138 million	\$134 million	\$182 million	\$168 million
Total Output	\$428 million	\$407 million	\$61 million	\$71 million	\$224 million	\$220 million
Value Added	\$221 million	\$205 million	\$9 million	\$5 million	\$103 million	\$94 million

*Employment.* Results of the analysis indicate that the **New York Energy Smart<sup>SM</sup>** Program provides substantial net macroeconomic benefits to New York in the form of increased employment, both during the Program implementation years (1999-2006) and throughout the years following implementation (2007-2016), during which the energy efficiency measures implemented by the program continue to accrue annual energy savings. As shown in Table 4-3, the Program is estimated to result in an average net gain of over 4,400 jobs in each year over the 18-year analysis period. Figure 4-1 shows net job creation by individual year, and shows that the Program is estimated to result in a net gain of between 1,876 and 6,323 jobs during the Program implementation years, and more than 4,100 jobs annually throughout the years following implementation. The average of net jobs estimated to be created over the eight years of Program implementation is nearly 4,800 jobs. These are jobs that are estimated to exist as a result of the Program, net of jobs that are lost in certain sectors as a result of the Program.

The ramping up of jobs created during the Program implementation years (1999-2006), as shown in Figure 4-1, largely reflects the impacts of the Program expenditures as programs are developed. The impacts of energy savings increase each year over the implementation years as more energy efficiency and demand reduction measures are installed and begin operation. The jobs created in the years following Program implementation are entirely driven by the continuing stream of energy bill savings that results from the measures installed under the Program.

Table 4-4 shows the estimated net job impacts of the Program disaggregated by individual industry sectors. During the Program implementation years (1999-2006), net job gains are concentrated in Personal and Business Services (1,996 jobs), Wholesale and Retail Trade (1,300 jobs), and Construction (950 jobs), while the only net job loss occurs in the Electric Utilities sector (301 jobs), due to the reduced electricity sales. During the years following Program implementation, net job gains are also concentrated in Personal and Business Services (2,466 jobs) and Wholesale and Retail Trade (1,533 jobs), while the only net job loss also occurs in the Electric Utilities sector (743 jobs).

Another way to express the results of this analysis is to directly compare the average jobs created per year for the Program Case to the Base Case (which estimates the impacts if the Program did not exist). This comparison is shown in the bottom line of Table 4-5. During the Program implementation years (1999-2006), the Program Case will create and sustain nearly two times the number of jobs than the Base Case (171% increase). In the years following Program implementation, the Program Case will create and sustain over 21 times the number of jobs than the Base Case (2,186%).

Figure 4-1. 2004 Update of Net Employment Impacts by Year

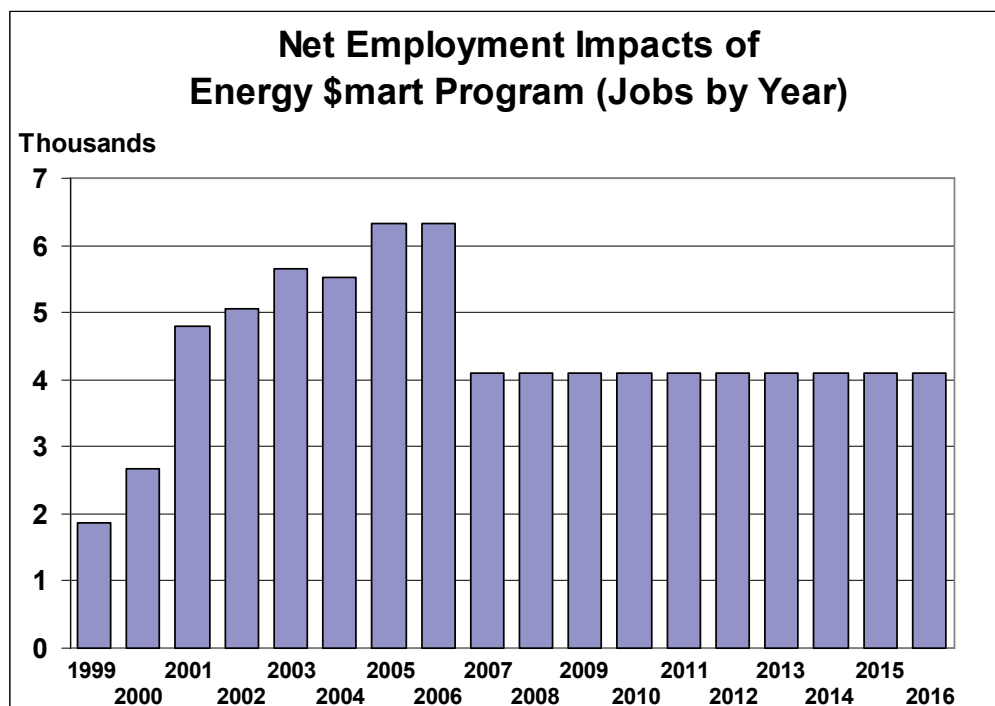


Table 4-4. 2004 Update of Net Employment Impacts of Energy Smart<sup>SM</sup> Program by Industry Sector

Economic Sector	Average Jobs per Year	
	Program Implementation Years 1999-2006	Years Following Implementation 2007-2016
Agriculture, Forestry, and Mining	17	31
Construction	950	311
Products Manufacturing	187	230
Equipment and Instrument Manufacturing	477	150
Transportation, Communication, and Other Public Services	154	132
Wholesale and Retail Trade	1,300	1,533
Personal and Business Services	1,996	2,466
Electric Utilities	(301)	(743)
<b>Total</b>	<b>4,779</b>	<b>4,110</b>

**Table 4-5. 2004 Update of the Macroeconomic Impact of the New York Energy Smart<sup>SM</sup> Program**

	Average Jobs per Year		Average Labor Income per Year (2000\$)		Average Total Output per Year (2000\$)		Average Value Added per Year (2000\$)	
	Program Implementation Years 1999-2006	Years Following Implementation 2007-2016	Program Implementation Years 1999-2006	Years Following Implementation 2007-2016	Program Implementation Years 1999-2006	Years Following Implementation 2007-2016	Program Implementation Years 1999-2006	Years Following Implementation 2007-2016
Program Case	7,580	4,298	\$353 million	\$189 million	\$840 million	\$444 million	\$488 million	\$274 million
Base Case (w/o Program)	2,800	188	\$142 million	\$56 million	\$432 million	\$373 million	\$283 million	\$269 million
<b>Net Impact</b>	<b>4,779</b>	<b>4,110</b>	<b>\$211 million</b>	<b>\$134 million</b>	<b>\$407 million</b>	<b>\$71 million</b>	<b>\$205 million</b>	<b>\$5 million</b>
Percent Increase from Base Case to Program Case	<b>171%</b>	<b>2,186%</b>	<b>149%</b>	<b>238%</b>	<b>94%</b>	<b>19%</b>	<b>72%</b>	<b>2%</b>

*Income.* Results indicate that the **New York Energy Smart** Program also provides substantial net macroeconomic benefits to New York in the form of increased labor income. Table 4-3 shows that the Program is estimated to result in an average net gain of over \$168 million in labor income in each year over the 18-year analysis period. The Program is estimated to provide a net gain in labor income of \$211 million per year during the Program implementation years (1999-2006) and \$134 million throughout the years following implementation (2007-2016). During the Program implementation years (1999-2006), the Program Case will provide two and one-half times the labor income than the Base Case (149% increase). In the years following Program implementation, the Program Case will provide over three times (238% increase) more annual labor income than the Base Case.

*Total Output and Value Added.* Table 4-3 shows that the Program is estimated to result in an average net gain of \$220 million in total output and \$94 million in value added in each year over the 18-year analysis period. During the Program implementation years (1999-2006), the Program is estimated to provide a net gain in total output of \$407 million per year and a net gain in value added of \$205 million per year. Throughout the years following implementation (2007-2016), the Program is estimated to result in a net gain in total output of \$71 million per year and a net gain in value added of \$5 million per year.

#### 4.4 COST-EFFECTIVENESS

A benefit/cost analysis was conducted for 18 **New York Energy Smart**<sup>SM</sup> deployment programs. The analysis included a wide array of benefits including avoided costs, market spillover effects, energy market price impacts, non-energy benefits, and macroeconomic benefits. Deployment programs received a traditional benefit/cost analysis in which both the benefits and costs could be translated in dollars with relative ease. R&D programs and their societal impacts are difficult to evaluate by their nature. GDS Associates, Inc. and the Heschong Mahone Group (HMG), evaluation contractors for NYSERDA, have pilot-tested an approach to assessing the value of NYSERDA's R&D programs area. The model developed and pilot tested was named the value/cost analysis to set it apart from the benefit/cost analysis. The benefit/cost and value/cost analyses are ongoing efforts that will be revised for various programs or measures over the coming years, as new data and information are made available. In the next section, the methods and results for the benefit/cost analysis and the pilot value/cost analysis are presented.

##### 4.4.1 Benefit/Cost Analysis

The benefit/cost analysis calculates both a Total Market Effects Test (TMET) and a Program Efficiency Test (PET). The TMET differs from the PET in that the former includes participant costs and the latter does not. Both tests include benefits from program participants and from spillover effects. A TMET ratio greater than 1 means that the monetary benefits exceed the costs incurred by both NYSERDA and program participants. PET compares the benefits against only NYSERDA's costs. A PET ratio greater than 1 means that the monetary benefits exceed only the costs incurred by NYSERDA. Four scenarios were constructed for each test with each successive scenario adding additional benefits that can be quantified and attributable to the **New York Energy Smart**<sup>SM</sup> Program. In Scenario #1, only the avoided costs associated with energy, capacity, natural gas, oil, propane, and water savings arising from participant actions and from market spillover are used as benefits.<sup>13</sup> In Scenario #2, the energy market price benefits that accrue to all ratepayers from lowering the requirements for energy given available supplies are added. In Scenario #3, non-energy benefits are added where available. In Scenario #4, macroeconomic benefits are added, but only at the portfolio level.

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<sup>13</sup> Scenario 1 TMET is similar to the Total Resource Cost Test that was used in the past by the utilities.

Environmental benefits such as reductions in emissions of sulfur dioxide, nitrogen oxides, and carbon dioxide were not included as a benefit primarily because the monetary value of these reductions are too uncertain at this time. Furthermore, with respect to sulfur dioxide and nitrogen oxides, since there are statewide regulatory emission caps as well as emission trading markets, emission credits may likely be sold in the marketplace, allowing generators to reduce operating costs (*e.g.*, through less stringent pollution controls) or expand generation (*e.g.*, to meet economic growth) without exceeding their caps. The net effect will be statewide emissions meeting the caps for sulfur dioxide and nitrogen oxides.

The following are differences between the current year's benefit/cost analysis and last year's analysis:

- Avoided energy and capacity cost forecasts were updated
- Natural gas price forecast was updated
- Non-energy benefits were calculated for five additional programs
- Transmission line losses were reduced from 11.5% to 9.9%
- Program crossover was estimated and used to decrease the energy savings at the sector and portfolio levels
- Program administration and evaluation costs (9% of program spending) were added at the program-level instead of at the sector-level

The benefit/cost ratios for the business/institutional, residential, and low-income sectors are presented in Table 4-6 for scenario #1, #2, and #3. The ratios are shown with two sets of calculations for each test: first, only the programs for which benefit/cost ratios were calculated are included; second, all programs are included, whether or not the programs track energy savings. In general, adding the additional programs did not significantly affect the TMET ratios. The reason for the slight effect on the TMET is that the additional program costs were small relative to the large co-funding amounts. The PET ratios were impacted more by the additional programs because co-funding is not included in the calculations. For the three scenarios, the sector-level TMET ratios without the additional programs ranged from 2.8 to 6.5 for the B/I sector, 1.3 to 2.6 for the residential sector, and 1.0 to 2.0 for the Low-Income sector. The sector-level TMET ratios with the additional programs ranged from 2.7 to 6.2 for the B/I sector, from 1.1 to 2.1 for the residential sector, and .9 to 1.7 for the low-income sector.

The portfolio-level benefit/cost ratios are shown in Table-4-7. The portfolio-level analysis combines the costs of all the programs regardless of sector. The portfolio-level ratios are shown for the first three scenarios and also for scenario #4 which adds the macroeconomic impacts. The TMET ratios without additional sector costs ranged from 2.3 for scenario #1 to 5.5 in scenario #4. The TMET ratios with the addition of sector costs ranged from 2.1 for scenario #1 to 5.0 for scenario #4.

**Table 4-6. Sector-Level Benefit/Cost Ratios**

		Total-Market-Effects Test <sup>14</sup>		Program-Efficiency Test <sup>15</sup>	
		Without Additional Sector Costs	With Additional Sector Costs	Without Additional Sector Costs	With Additional Sector Costs
<u>Scenario #1</u> Includes avoided costs and spillover	Business / Institutional	2.8	2.7	6.5	6.0
	Residential	1.3	1.1	3.4	2.2
	Low-Income	1.0	0.9	1.2	1.0
<u>Scenario #2</u> Includes #1 plus energy market price benefits	Business / Institutional	3.2	3.1	7.4	6.8
	Residential	1.5	1.2	3.7	2.4
	Low-Income	1.1	1.0	1.3	1.1
<u>Scenario #3</u> Includes #2 and non-energy benefits	Business / Institutional	4.8 – 6.5	4.6 – 6.2	11.0 – 14.9	10.1 – 13.7
	Residential	2.0 – 2.6	1.7 – 2.2	5.2 – 6.7	3.4 – 4.4
	Low-Income	1.6 – 2.0	1.3 – 1.7	1.8 – 2.2	1.5 – 1.9
<u>Portfolio</u> Includes macroeconomic benefits		5.9 – 7.2	5.4 – 6.6	13.5 – 16.4	11.0 – 13.4

<sup>a</sup>. The lower and upper bounds of the ratios are based on using the lower and upper bounds of the non-energy benefit estimated by the MCAC Team. The lower bound generally represents 50% of the non-energy benefits. The upper bound represents 100% of the non-energy benefits.

**Table-4-7. Portfolio-Level Benefit/Cost Ratios**

	TMET		PET	
	Without Additional Sector Costs	With Additional Sector Costs	Without Additional Sector Costs	With Additional Sector Costs
Scenario #1	2.3	2.1	5.1	4.3
Scenario #2	2.5	2.3	5.8	4.8
Scenario #3 <sup>1</sup>	3.8 – 5.0	3.4 – 4.6	8.5 – 11.4	7.1 – 9.5
Scenario #4 <sup>2</sup>	5.9 – 7.2	5.4 – 6.6	13.5 – 16.4	11.0 – 13.4

<sup>a</sup>. The lower and upper bounds of the ratios are based on using the lower and upper bounds of the non-energy benefit estimated by the MCAC Team. The lower bound generally represents 50% of the non-energy benefits. The upper bound represents 100% of the non-energy benefits.

<sup>14</sup> The Total-Market-Effects Test compares program costs and participant costs with total benefits over the average life of the program measures.

<sup>15</sup> The Program-Efficiency Test compares program costs with total benefits over the average life of the program measures.

**4.4.2 R&D Value/Cost Analysis**

An approach named the value/cost analysis was developed to assess the R&D program area. The value/cost approach is based on the premise that while most of the immediate and intermediate outputs and outcomes of R&D cannot be monetized, they can be documented and monitored over time to assess whether programs are on track to achieve their ultimate energy and economic impacts. A second premise of the model is that long-term impacts of R&D projects can eventually be monetized, thus allowing a more traditional benefit/cost analysis for some projects.

One of the methods developed for the value/cost analysis was to obtain value ratings from peer reviewers. Five projects were selected to pilot test the method. A key objective of the pilot effort was to test the appropriateness of the outcome indicators and to demonstrate that meaningful measurements can be made at a reasonable expenditure of time and cost. For the five projects, documented outcomes were compiled into peer review packets. The packets were sent to knowledgeable reviewers who provided 0 to 4 ratings on these outcomes for each project.<sup>16</sup> As shown in Table 4-8, the projects selected for the pilot test span multiple technology areas and represent different project types.<sup>17</sup> Evidence regarding the following outcomes were collected and used to assess the projects:

1. Knowledge Creation
2. Knowledge Dissemination
3. Commercialization Progress
4. Realized and Potential Energy Benefits
5. Realized and Potential Economic Benefits
6. Realized and Potential Environmental Benefits

Peer reviewers were also asked to assess the overall value of the benefits of each project relative to its costs.

**Table 4-8. Projects Selected for Pilot Test of Peer-Review Method**

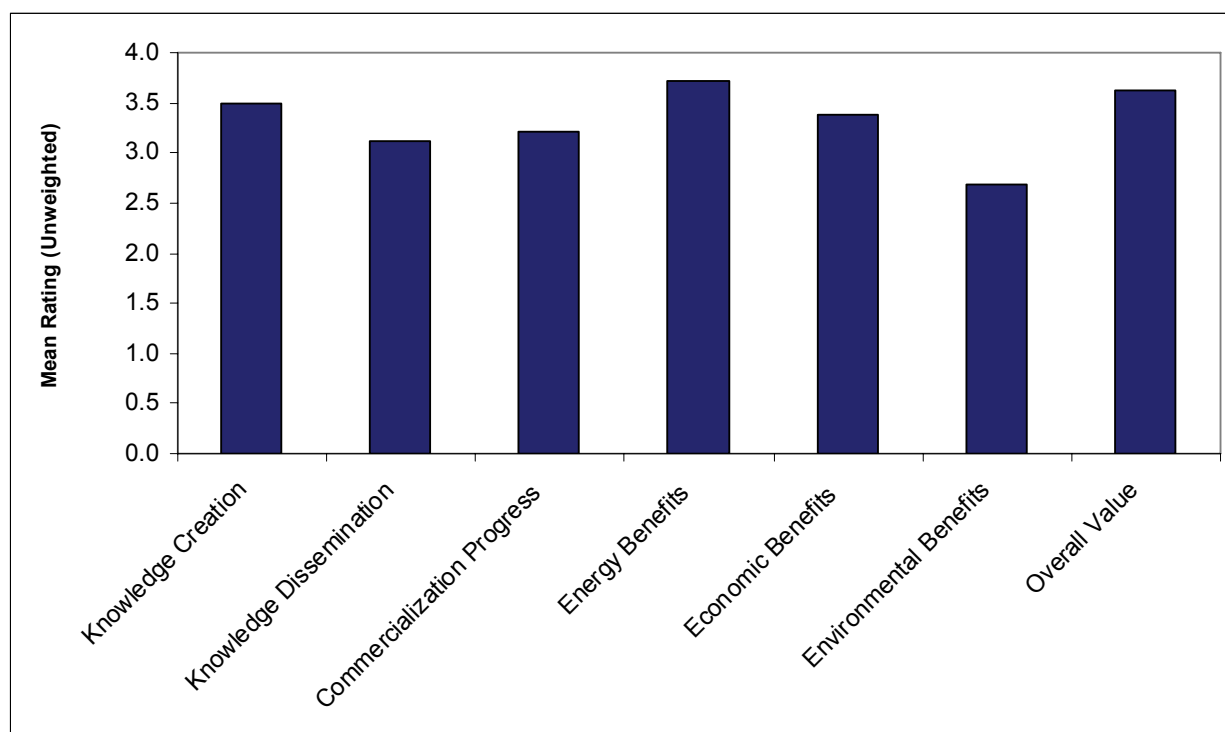
R&D Project Type	Technology Area
21 <sup>st</sup> Century HVAC Research Consortium	HVAC
Aggregating Distributed Generators	Demand Resposne
Environmental Monitoring, Evaluation, and Protection Program: Development of Continuous Ambient Paticulate Monitor	Environmental
Evaluation of Truck Stop Electrification for NYS	Transportation
Turnkey Pump and Compressed Air Program	Industrial

<sup>16</sup> A different set of raters assessed each project.

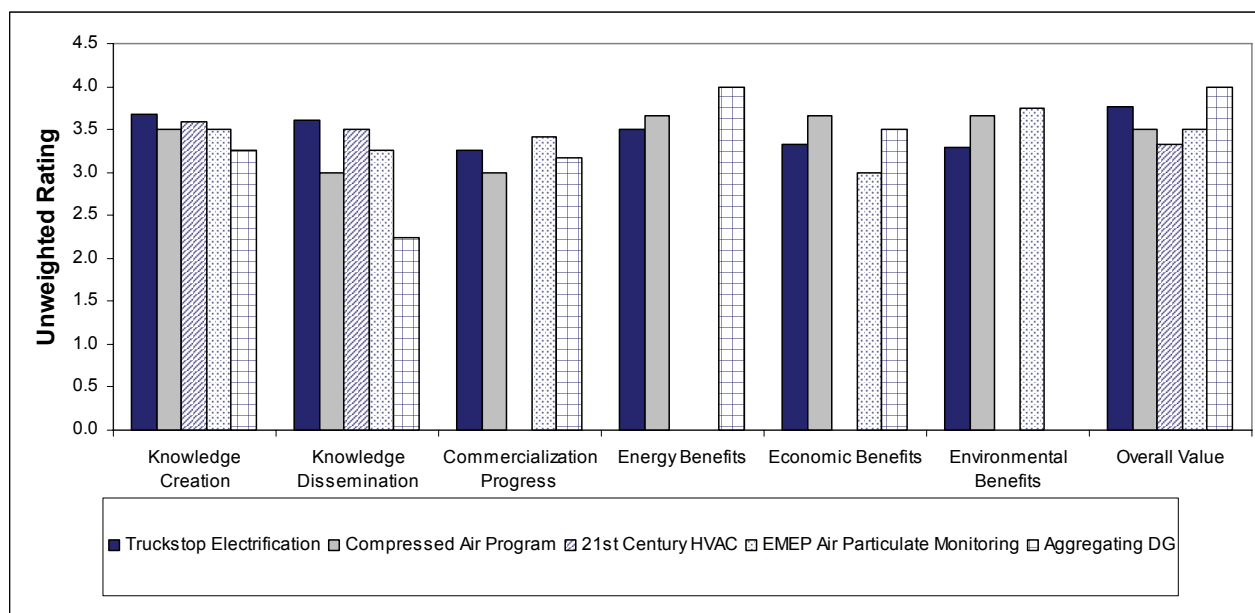
<sup>17</sup> The projects included in the pilot test were nominated by R&D program staff.

First, the scores for each of the six outcomes and overall value were averaged across all five projects and all raters. Figure 4-2 illustrates that the ratings exceed 3.0, with the exception of environmental benefits. Knowledge creation and energy benefits had the highest average scores, followed by economic benefits. Next, the ratings for the six outcomes and overall value were averaged across the raters for each of the five projects. The results are presented in Figure 4-3. All five projects performed very well with respect to the six outcomes and the overall value. Not all outcomes were applicable to all projects. For example, the 21<sup>st</sup> Century HVAC project, which provided information to other researchers and equipment developers, was not scored for commercialization progress and energy, economic, and environment benefits. The EMEP project, which resulted in the development and sale of an innovative environmental monitoring instrument, was not scored for energy savings. The aggregating distributed generation project, which resulted in the development of a business model for aggregated distributed generation capacity, was not scored for environmental benefits. In general, the results from the pilot test indicate that the peer review approach worked well and provided much useful information. Additional information on results and conclusions are presented in Section 8 of this report.

**Figure 4-2. Mean Outcome Rating Across All Five Projects**



**Figure 4-3. Mean Outcome Rating by Project**



In addition to the pilot test, an aggregate analysis was conducted on all 638 R&D projects funded since 1998. The following information was analyzed:

- Funding by external entities
- Project stage of development:
  - Information for policy makers and R&D community
  - Product development stage 1 – study and prove concepts
  - Product development stage 2 – develop new or improved products
  - Product development stage 3 – product testing
  - Demonstration
  - Pre-deployment
- Technology area such as:
  - Energy storage
  - Transportation
  - HVAC
  - Lighting
- Expected benefits from R&D Projects:
  - Commercial sales
  - Emissions reductions
  - NYS jobs
  - NYS investment

The aggregate analysis indicated that the NYSERDA R&D portfolio:

- Does a good job of balancing risk
- Covers a wide range of technologies that are aimed at creating and disseminating important knowledge, advancing progress toward commercialization and eventually achieving energy, economic and environmental benefits
- Leverages funds on a 4.3 to 1 ratio (*i.e.*, for every dollar NYSERDA spends, partners spend \$4.3)
- Engages a wide range of public and private organizations and institutions

#### 4.5 PORTFOLIO LOGIC MODEL

The **New York Energy Smart<sup>SM</sup>** Program represents a comprehensive approach to improving electric system reliability, reducing the environmental impacts of energy production and use, and at the same time, saving consumers and businesses money by:

- Accelerating the adoption of available cost-effective energy-efficient technologies and practices that reduce electricity use and environmental impacts resulting from energy use.
- Accelerating the adoption of renewable resources (clean energy) to replace traditional sources of energy, thus reducing environmental impacts of energy production and increasing energy diversity.
- Improving energy management choices (*e.g.*, reducing the demand for energy at peak periods of the day and lowering overall energy requirements) to reduce resources required for energy production and improve energy system reliability.
- Helping to develop next generation energy efficiency, renewable energy, and energy management technologies.

NYSERDA's portfolio of **New York Energy Smart<sup>SM</sup>** programs addresses the areas of efficiency, clean energy, and energy management by working with three key leverage points: upstream (supply side), midstream (supply chain/market infrastructure), and downstream (demand side) market actors.

NYSERDA's portfolio of "synergistic market transformation" programs target key leverage points in the market systems, including market channels and actors from researchers to wholesalers to retailers to customers in different sectors.<sup>18</sup> Addressing each of these leverage points simultaneously helps ensure that changes will be sustainable. It also means the portfolio has differing levels of risk, payoff, and timing of that pay off, from high risk strategic R&D that may result in a new technology with major impact on energy production, distribution, or use, to rebates for purchase of an existing technology that provide quick and certain reductions in energy use.

A recent National Bureau of Economic Research review of theories of new technology adoption concluded that "perhaps the most important factor is the need to develop complementary skills and capital goods, especially in the case of systemic or general purpose technologies such as electricity and information technology."<sup>19</sup> In the logic of NYSERDA's portfolio of programs, there is an implicit flow

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<sup>18</sup> DeCotis, Paul A., Bruce Tonn, Lawrence J. Pakenas, and Joel Eisenberg (2002) *Systems-Based Portfolio Evaluation: Diagnostic Benefits and Methodological Challenges*, Proceedings of the 2002 ACEEE Summer Study on Buildings, American Council for an Energy Efficient Economy. Asilomar: CA, pp. 10.57 - 10.67.

<sup>19</sup> Hall, Bronwyn H. and Beetchika Khan. (2003) *Adoption of New Technology*, NBER Working Paper Series, Working Paper 9730. National Bureau of Economic Research, Cambridge: MA, May, pp. 13.

from left to right (*i.e.*, from supply of energy through energy services and markets to use of that energy), recognizing the interconnectedness of these key leverage points.

Energy Supply ↔ Energy Markets ↔ Energy Demand

In each of these three areas, there is also logic flow from program activities to program outcomes. For each of the three areas (Energy Supply, Energy Markets, and Energy Demand), a brief discussion of the logic follows.

#### Energy Supply – Increasing the Availability of Clean Energy and Technologies that Lower or Manage Energy Use

The **New York Energy Smart<sup>SM</sup>** Program portfolio works with a broad suite of energy technologies including energy efficiency, renewable energy, demand reduction, load management, and distributed generation/combined heat and power technologies. In the area of energy production and supply, key portfolio objectives are to increase knowledge about pollutant emissions and related energy issues (fuel type, seasonal and time-of-day requirements, etc.) and technology performance to hasten the availability of new renewable/environmentally clean, demand reduction/energy-efficient and energy management technologies (consistent with Objective 6). As a result, energy efficiency technologies and renewable energy sources will be a larger share of the energy market and more and better technologies will be available for load management and transmission from producers and suppliers.

Program activities to accomplish these objectives – the “how” and “who” include: research and technology development (R&D) and deployment, working with researchers, energy resource developers, and manufacturers in the selected technology areas to lower barriers and accelerate availability.

#### Energy Markets – Building a Supporting Infrastructure for Clean and Energy-Efficient Technologies, Services, and Use

In this middle area of market and policy infrastructure, key **New York Energy Smart<sup>SM</sup>** portfolio objectives are to:

- Accelerate the development of supportive policy and business infrastructure so that there will be more favorable policies and rules and better equipped, profitable, and more numerous energy service businesses that will stock, sell and service the desired technologies (consistent with Objective 5).

Program activities to accomplish these objectives – the “how” and “who” include: providing technical assistance, training, tools, and financial and other incentives to energy services and businesses such as installers, architects, building designers and owners, commodity providers or aggregators, and other government agencies in order to change skills, attitudes, behaviors, product offerings, and policies.

#### Energy Demand – Increasing Demand for Renewable Energy, and Energy Efficient and Load Management Technologies and Practices

The **New York Energy Smart<sup>SM</sup>** Program portfolio works in all end-use sectors: commercial (small and large business), industrial, residential (all income levels, single and multiple family units), institutional (hospitals and schools), and government. Key portfolio objectives are to increase access to, affordability of, and demand for clean energy and energy efficiency technologies, so that peak load and electricity use are reduced (Objectives 1 and 2), energy efficiency is increased, and sales of renewable energy are increased (resulting in reduced environmental impacts – consistent with Objective 4). Therefore, electricity end users, including those that have previously been “under-served,” will save money (Objective 3) and experience energy and non-energy benefits, both individually and collectively.

Program activities to accomplish these objectives include promoting and providing information, financial, and other incentives to end users to adopt mature technologies and practices in order to build a sustainable increase in demand for clean, efficient energy technologies.

Market Issues/Barriers and Associated Market Actors Addressed

Table 4-9 shows the key issues and barriers, grouped to identify potentially relevant impacts by each of the three areas: supply, demand, and institutional/market arrangements. Key market actors within each area are listed in parentheses.

**Table 4-9. Market Barriers and Market Actors Addressed by the Theory and Logic Model**

Market area	Barriers	Market Actors
Supply side (upstream actors)	Technical risk and uncertainty of profit, cost, and performance in research and technology development initiatives Uncertain demand for new technologies Difficulty in financing new technologies High capital cost of developing renewable resources Not in my backyard (NIMBY) issues with siting renewable energy production facilities	R&D organizations Developers and manufacturers in the areas of efficiency, renewable energy resources, distributed generation and combined heat and power, load management, energy storage, transmission technologies
Market structure/policy (midstream actors)	Perception of risk Lack of awareness, knowledge, understanding Rules, regulations, standards, or rating methods may or may not favor new technologies Multiple stakeholders with differing policies and procedures Comfort with the old and reluctance to try something new Uncertainty of a competitive market and market actors Suppliers' motives are to sell product, not necessarily to promote efficiency Environmental permit hurdles that some market actors find too great	Wholesalers, distributors Installers, contractors Energy service companies Architects, engineers and designers Retailers, governmental units, building owners Commodity providers, aggregators
Demand side (downstream actors)	High information costs – lack of information on opportunities, technologies, energy supply issues High transaction costs - purchase requires dealing with multiple actors Undervaluing energy efficiency - <i>i.e.</i> , high first cost, not seeing life cycle costs and benefits Lack of whole systems approach Lack of available financing Split Incentives - those who pay the energy bill are not making decisions about building investments Social benefits not internalized in pricing structure Poor past experience with installation or service of energy efficiency or renewable energy technologies Aversion to risk – rapid obsolescence and high first cost	Consumers in the areas of commercial, industrial, residential, municipal, institutional, and other underserved populations Policy makers

External Influences

Key influences beyond the control of the Program include:

- Economic realities that might impact the level of new investment in technologies and energy improvements in some or all sectors.
- The impact of changes (up or down) on the price of electricity.
- The effect of changing political climates, legislation and regulation (either supporting or not supporting investment in energy efficiency, renewable energy, or load management).

Cost and performance changes in technologies that support or compete with technologies NYSERDA has targeted might also influence Program success positively or negatively. In addition, there are numerous other public and non-profit organizations working toward the same or similar objectives, and while NYSERDA is working with these organizations, the funding, priorities, and timing of their activities and results might not always occur as expected.

### **New York Energy Smart<sup>SM</sup> Logic Diagram<sup>20</sup>**

Figure 4-4 presents the **New York Energy Smart<sup>SM</sup>** portfolio-level logic diagram. In the diagram, **New York Energy Smart<sup>SM</sup>** Program activities are shown in boxes across the top. The logic diagram continues, from top to bottom, showing how these activities work with program inputs and market actors to achieve certain outputs and short-term outcomes for the purpose of achieving intermediate- and long-term goals (shown at the bottom of the diagram in text boxes). A logic chain for the **New York Energy Smart<sup>SM</sup>** Program evaluation effort, program selection and management activities, and inputs and potential external influences are also noted on the diagram

### **New York Energy Smart<sup>SM</sup> Program Indicators**

As individual and collective **New York Energy Smart<sup>SM</sup>** programs progress, indicators of program success are identified and measured using a variety of evaluation techniques. These indicators are translated into short-, intermediate-, and long-term outcomes. These outcomes can be realized, for example, through increased awareness (short-term), leading to increased demand and sales of energy-efficient equipment (intermediate-term), leading to sustained energy savings and demand reduction (long-term). Indicators for the **New York Energy Smart<sup>SM</sup>** Program are presented in Table 4-10 for portfolio-level outputs and then for a sequence of outcomes, from shorter-term (1-3 years), intermediate-term (about 3-5 years), and longer-term (5 and more years).

### **Researchable Issues**

Based on the logic model developed for the **New York Energy Smart<sup>SM</sup>** Program portfolio, a number of relevant hypotheses are evident. The following is a list of researchable issues for potential testing, which follow from the logic of the portfolio of programs in order to achieve long-term outcomes.

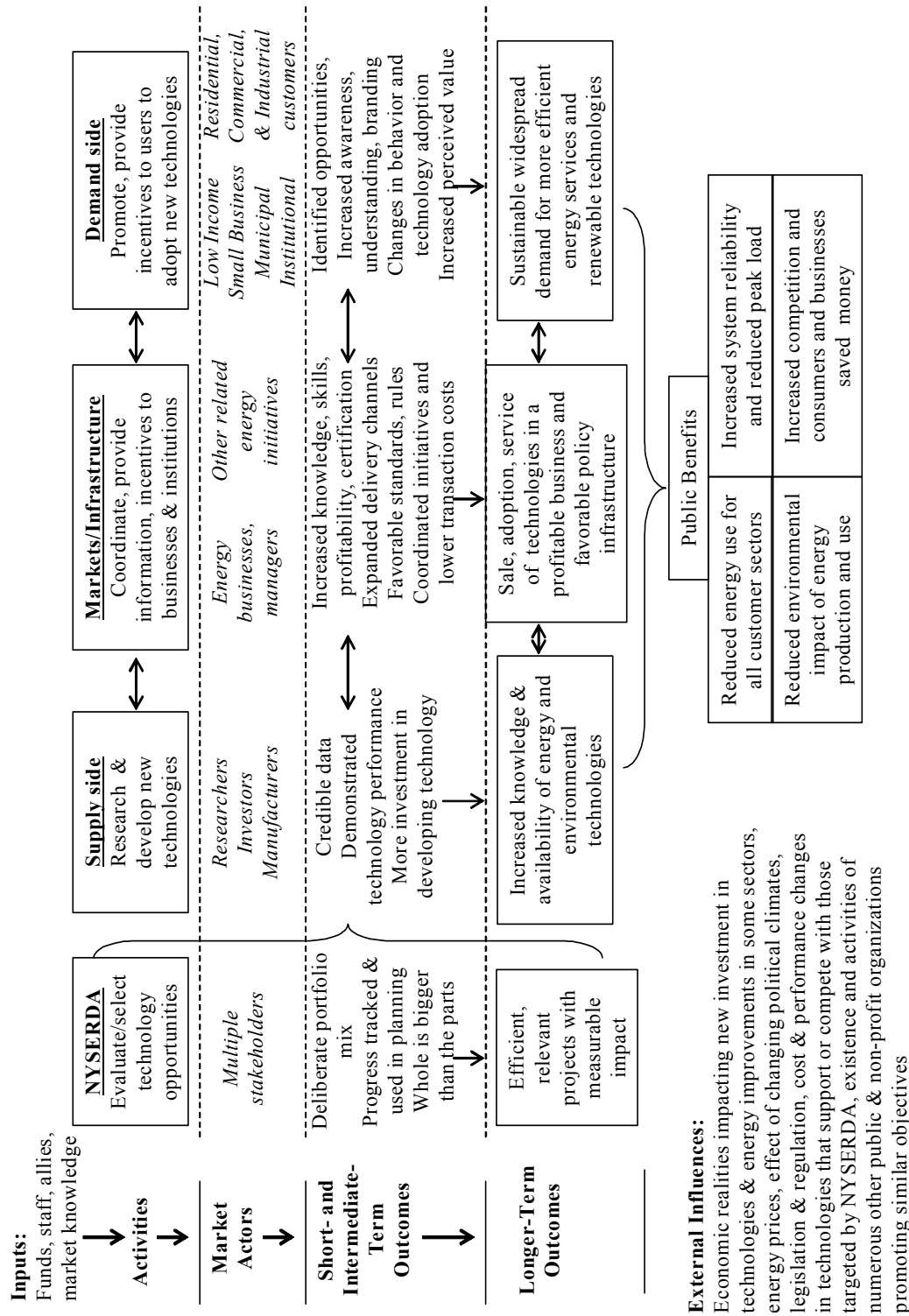
- NYSERDA's planning, implementation, and continuous improvement of these programs with a variety of stakeholders has led to a mixed portfolio of synergistic programs that are relevant to fulfilling energy policy and addressing energy challenges in New York, are managed efficiently, reach targeted participant groups, and have measurable impacts.

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<sup>20</sup> This model first appeared in the May 2004 **New York Energy Smart Program<sup>SM</sup>** Evaluation and Status Report. A review and update will be included in the May 2006 **New York Energy Smart Program<sup>SM</sup>** Evaluation and Status Report.

- Program activities to encourage and document demonstrations and development of new energy technologies have led to quicker development of new options, more private investment in these technologies because of the data and incentives, and increased supply of clean, efficient, renewable, energy-saving, and peak load managing technologies.
- Program collection of environmental and other energy-related data and policy studies have led to increased policy-maker and public knowledge and understanding of the issues concerning energy supply and use, and the demonstrated performance, costs, and benefits of renewable energy, energy efficiency, and energy management technologies.

Figure 4-4. New York Energy Smart<sup>SM</sup> Logic Diagram



**Table 4-10. New York Energy Smart<sup>SM</sup> Program Indicators**

Outputs	Shorter-Term Outcomes	Intermediate Outcomes	Longer-Term Outcomes
<b>General</b>			
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 Non-energy benefits Sustained change in behavior Increased customer choice and awareness of choices
<b>Evaluate Energy Technologies and Effects</b>			
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
<b>Develop and Demonstrate Energy Technologies</b>			
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
<b>Provide Technical and Financial Assistance to Energy Businesses</b>			
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

Outputs	Shorter-Term Outcomes	Intermediate Outcomes	Longer-Term Outcomes
<b>Provide Technical and Financial Incentives to Decision Makers and Related Support to Policy Makers</b>			
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
<b>Provide Technical Assistance, Coordination and Financial Incentives to Underserved Populations</b>			
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
<b>Provide Technical Assistance, Coordination and Financial Incentives to End Users</b>			
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
<b>Promote Green Power and Efficient Use of Energy Generally</b>			
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

- Program information and technical assistance activities have led to accelerated development of favorable, supportive government policies for developing and adopting renewable energy, energy efficiency, and load management technologies.
- Program information, technical assistance, certification, and financial incentive activities supporting energy markets (the supply/delivery chain) have increased the knowledge, skills and profitability and have encouraged the startup of energy service companies and businesses, thereby supporting a more competitive energy market (Table 4-1, Goal 4).
- Program activities, including coordinated initiatives with other government and public benefit programs, have led to increased access, affordability, and demand for clean, efficient technologies for all customers, including underserved customers (Table 4-1, Goal 2).
- The sum of the program’s demand, supply, and supply chain activities has led to greater supply, sales, and adoption of energy technologies that resulted in reduced energy use and costs, as well as non-energy benefits, for all consumers. These changes are sustainable.

- The sum of program activities in R&D, building supportive infrastructure, and increasing awareness and demand for load management and renewable energy technologies has led to improved system-wide reliability and peak reduction through energy efficiency and technology advances (Table 4-1, Goal 1).
- Program activities in areas of supply, infrastructure, and demand have together led to reduced use of energy from fossil fuels, improved load management, and increased market share of renewable energy and thus, reduced environmental impact of energy production, distribution, and use (Table 4-1, Goal 3).
- Influences external to the Program, such as cost and performance of existing technologies, changes in regulations and legislation, and the cost of electricity, have helped and/or hindered the success of the Program.

#### 4.6 PORTFOLIO PROCESS EVALUATION

The portfolio process assessment provides a compilation of observations made by the process evaluation team during the course of the two years spent conducting process evaluations of 19 **New York Energy Smart<sup>SM</sup>** programs.

The process evaluations included interviews with program staff, implementation contractors, program participants and nonparticipants, market actors and end users. The process team held periodic conference calls among the principal investigators of each program process evaluation to discuss key findings, share cross-program issues, and identify systemic versus unique findings that relate to the programs as a whole (or within each major market sector). The findings have been organized to provide NYSERDA staff and management with an opportunity to learn from the breadth of observations made by the process team.

The themes that reoccur can be divided into two groups: success themes and challenge themes. There are also many shades of gray relative to these themes. Some of the areas with challenges show evidence of successful approaches to resolving the challenges. Some of the successful areas are successful because they have emerged from the challenges of earlier years.

The key success themes that were observed are: capable staff, effective use of implementation contractors, sound program management for programs operated internally by NYSERDA staff, and satisfied program participants. These themes demonstrate that NYSERDA is evolving successful processes.

The key challenge themes that were observed are: policy issues, funding delays, slow processes, perceptions of complexity, limited use of feedback, and inadequate databases. These themes demonstrate that there remain opportunities to continue to improve the processes and the effectiveness of the programs.

What is evident from the process team investigations across the 19 programs is that NYSERDA program and project staff members have developed strong program management skills; they are creative and knowledgeable of the NYSERDA administrative processes, and of the skills needed to manage programs and program implementation contractors. These skills and the implementation of the **New York Energy Smart<sup>SM</sup>** programs have led to satisfied program participants.

What is also evident is that NYSERDA has established both internal administrative policies, in the form of contracting and communications oversight, and through agreements with the PSC and others that require steps to work within certain policy constraints that limit staff's ability to be fully responsive to the market. These constraints include a limit of 7% on administrative costs, a periodic renewal process that does not permit NYSERDA to maintain constant funding for all effective programs, and funding limitations that have constrained NYSERDA's ability to gather market intelligence and to conduct the full array, depth, and breadth of program evaluations.

The process team recognizes that program staff does not have the ability to directly counteract these policy and funding issues, and it is clear that program staff have managed to find ways to work around these hurdles. Nonetheless, it is also clearly evident in the process evaluation investigations that these challenges warrant attention and further consideration.

#### 4.6.1 Cycle Time Analysis

##### Solicitations Released

During 2004, 16 solicitations representing 5 requests for proposals (RFPs) and 11 program opportunity notices (PONs)<sup>21</sup> were issued to competitively select contractors for program design and implementation services. The number of solicitations released for each of the last four years is detailed in Table 4-11.

- RFPs resulted in 588 proposals being received, 140 (24%) of which were approved for funding.
- PONs resulted in 1,350 proposals being received, 534 (40%) of which were approved for funding.

**Table 4-11. Total Number of Solicitations Released, by Year, Through Year-End 2004**

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	208
2003	Solicitations	18	15
	Proposals Received	235	338
	Proposals Accepted	63	123
2004	Solicitations	5	11
	Proposals Received	34	217
	Proposals Accepted	17	96
<b>Total</b>	<b>Solicitations</b>	<b>58</b>	<b>56</b>
	<b>Proposals Received</b>	<b>588</b>	<b>1350</b>
	<b>Proposals Accepted</b>	<b>140</b>	<b>534</b>

<sup>21</sup> Requests for proposals (RFPs) are solicitations used for identifying and procuring projects that represent a specific area of interest and include a statement of work with a high degree of specificity describing the work contemplated and the evaluation criteria to be used. A single award with no cost-sharing is usually the norm. Program opportunity notices (PONs) are solicitations used for identifying and procuring projects that demonstrate technical, economic, and environmental characteristics in particular technology areas. Multiple awards are usually made and cost-sharing is the norm.

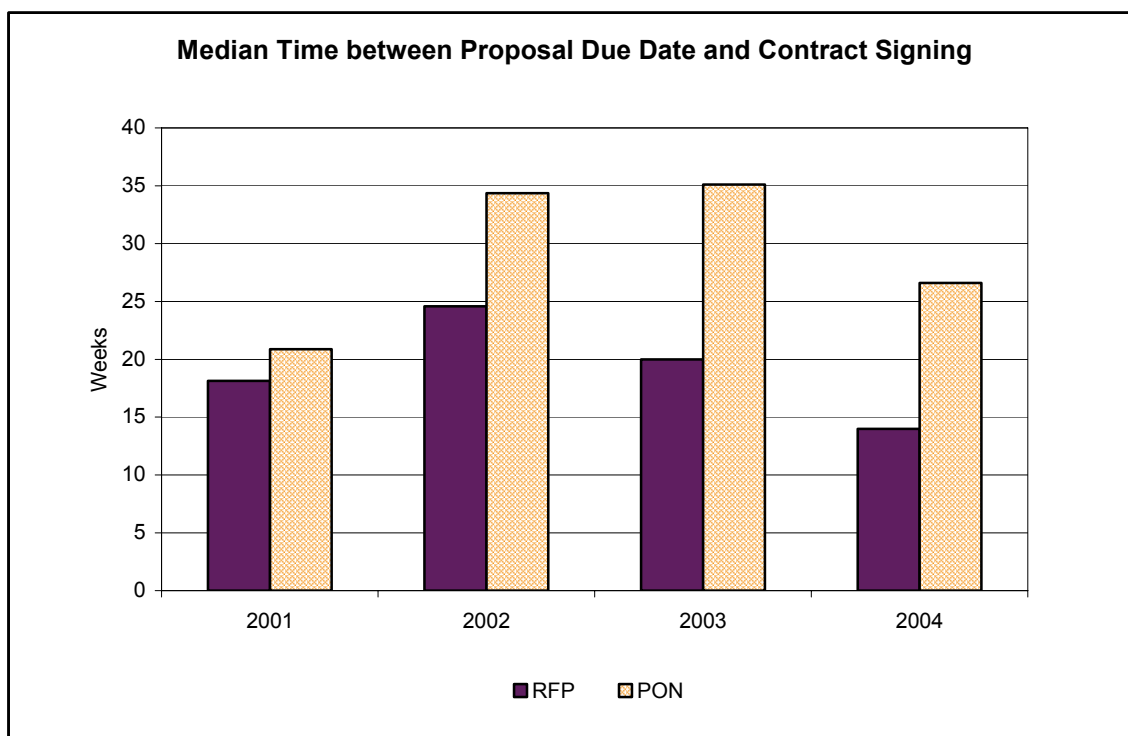
A number of solicitations for financial incentive subscription programs were also issued and some remain open. The number of solicitations and applications received for these open enrollment incentives are not presented here due to the number of individual projects (in the hundreds) that are on different time lines for contracting.

Program Process Cycle Times

The interval between the proposal due date and the date of contract signing, *i.e.*, the cycle time, 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. PONs involve multiple proposals; 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. Other indicators are listed below.

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

**Figure 4-5. Median Time between Proposal Due Date and Contract Signing**



Median cycle times for RFPs and PONs (excluding open enrollment subscription programs) for the last four years are shown in Figure 4-5.<sup>22</sup> 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 Smart<sup>SM</sup>** 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 allowed cycle times to remain the same and thus not increase in 2003 even though contractor activity was 25% greater than in 2001. In 2004, with the number of proposals received decreasing and better alignment with staff resources to process these proposals, cycle times for RFPs and PONs improved by 30% and 25% respectively.

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<sup>22</sup> The ranges in weeks for 2001 are 11.7-35.4 (RFP), 10.6-47.9 (PON); for 2002 are 11.6-41.4 (RFP), 31.0-66.3 (PON); for 2003 are 4.7-44.0 (RFP), 18.6-32.3 (PON); for 2004 are 14.0-21.1 (RFP), 26.6 (PON).