

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

YEAR ENDING DECEMBER 31, 2008

REPORT TO PUBLIC SERVICE COMMISSION

FINAL REPORT

MARCH 2009

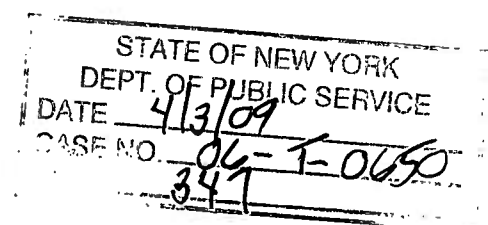
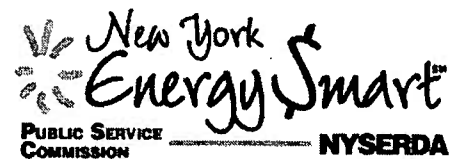


Table of Contents

ACRONYMS AND ABBREVIATIONS	AA-1
EXECUTIVE SUMMARY	ES-1
Program Administration	ES-2
New York Energy \$mart SM Budget and Spending Status	ES-3
Portfolio-Level Findings	ES-5
Macroeconomic Impact Analysis	ES-9
Commercial/Industrial Programs	ES-10
Residential and Low-Income Programs	ES-11
Research and Development Programs	ES-12
Follow Up on Evaluation Recommendations	ES-13
1 INTRODUCTION AND PUBLIC POLICY CONTEXT	1-1
1.1 Introduction	1-1
1.2 Public Policy Context	1-1
1.3 Design and Conduct of the New York Energy \$mart SM Program	1-3
1.4 Organization of the Report	1-4
2 PORTFOLIO-LEVEL REPORTING	2-1
2.1 Budget and Spending Status	2-1
2.2 Portfolio-Level Findings	2-14
2.3 Largest Energy Savers Impact Evaluation	2-27
2.4 Portfolio Process Evaluation	2-35
2.5 Marketing and Outreach Process Evaluation	2-36
2.6 New York City/Westchester Process and Market Study Results	2-38
3 COMMERCIAL/INDUSTRIAL PROGRAMS	3-1
3.1 Overview of Commercial/Industrial Programs	3-1
3.2 Commercial/Industrial Evaluation Activities	3-3
3.3 Key Commercial/Industrial Evaluation Findings	3-5
3.4 Existing Facilities Program	3-9
3.5 New York Energy \$mart SM Business Partners	3-13
3.6 New York Energy \$mart SM Loan Fund and Financing Program	3-18
3.7 Energy Smart Focus Program	3-23
3.8 New Construction Program	3-27
3.9 FlexTech Technical Assistance Program	3-38
4 RESIDENTIAL AND LOW-INCOME PROGRAMS	4-1
4.1 Overview of the Residential and Low-Income Programs	4-1
4.2 Residential and Low-Income Evaluation Activities	4-3
4.3 Residential and Low-Income Evaluation Findings	4-4
4.4 Home Performance Program	4-16
4.5 Multifamily Performance Program	4-32
4.6 Market Support Program	4-36
4.7 Communities and Education Program	4-47
4.8 EmPower New York SM	4-54
4.9 Buying Strategies and Energy Awareness Program	4-65

5 RESEARCH AND DEVELOPMENT PROGRAMS	5-1
5.1 Overview of the Research and Development Programs	5-1
5.2 R&D Program Evaluation Activities	5-3
5.3 Program Results Summary	5-4
5.4 Public Benefit Power Transmission and Distribution Research	5-17
5.5 Clean Energy Infrastructure	5-24
5.6 Power Systems Product Development	5-27
5.7 DG-CHP Demonstration	5-32
5.8 Demand Response and Innovative Rate Research	5-37
5.9 Electric Transportation	5-40
5.10 Environmental Monitoring, Evaluation, and Protection	5-42
5.11 Industrial Process & Product Innovation Program	5-46
5.12 Next Generation and Emerging Technologies	5-52
 APPENDIX A: BENEFIT/COST ANALYSIS INPUTS	 A-1

Tables

Table ES-1. New York Energy Smart SM Program Budget (\$ million)	ES-3
Table ES-2. Financial Status of New York Energy Smart SM Program (\$ million) through 2008	ES-4
Table ES-3. New York Energy Smart SM Program Goals and Progress through December 31, 2008 ..	ES-5
Table ES-4. Cumulative Program Benefits from Installed Measure	ES-7
Table ES-5. Benefit-Cost Ratios for the New York Energy Smart SM Portfolio through 2008	ES-9
Table 2-1. New York Energy Smart SM Program Budget (\$ million)	2-2
Table 2-2. Financial Status of New York Energy Smart SM Program (\$ million) through 2008	2-4
Table 2-3. Commercial/Industrial Programs – Financial Status (\$ million) through 2008	2-7
Table 2-4. Residential & Low-Income Programs - Financial Status (\$ million) through 2008	2-9
Table 2-5. Research & Development Programs – Financial Status (\$ million) through 2008	2-12
Table 2-6. New York Energy Smart SM Goals and Progress through December 31, 2008	2-15
Table 2-7. Cumulative Benefits from Installed Measures through December 2008	2-17
Table 2-8. Adjusted Cumulative Annual Savings by Program through December 2008	2-19
Table 2-9. Summary of Macroeconomic Impacts of the New York Energy Smart SM Program (Constant 2008\$)	2-21
Table 2-10. 2008 Net Job Additions by Aggregated Sector	2-23
Table 2-11. Cumulative Savings Through Year-End 2008	2-26
Table 2-12. Cumulative Spending Through Year-End 2008	2-26
Table 2-13. Cumulative Benefits Summary	2-26
Table 2-14. Gross Savings Realization Rates	2-31
Table 2-15. Phase I Project Free-Ridership Estimates	2-32
Table 2-16. NYSERDA-induced Participant Spillover	2-34
Table 2-17. Phase I Net Impact Rate, by Program	2-34
Table 2-18. Solicitations Released Through Year-End 2008	2-35
Table 2-19. Incentive Solicitations Released Through Year-End 2008	2-36
Table 2-20. Total Building Area (thousand square feet) by Major Sector and Downstate County	2-44
Table 2-21. Average Building Size by County and Major Sector	2-44
Table 2-22. Residential Sub-Metering in Con Edison Service Territory	2-45
Table 3-1. C/I Program Evaluation Activities	3-4
Table 3-2. C/I Program Electricity Savings through December 31, 2008 and Progress toward Five-Year Goal	3-6

Table 3-3. C/I Program Peak Demand Savings through December 31, 2008 and Progress toward Five-Year Goal	3-7
Table 3-4. C/I Program Fuel Savings through December 31, 2008	3-8
Table 3-5. Existing Facilities Program – Program Outputs	3-10
Table 3-6. Existing Facilities Program Cumulative Annual Energy and Peak Demand Savings (through December 2008)	3-11
Table 3-7. New York Energy \$mart SM Business Partners Program – Long-Term Goals and Achievements	3-14
Table 3-8. New York Energy \$mart SM Business Partners Program – Key Program Outputs	3-15
Table 3-9. New York Energy \$mart SM Business Partners Cumulative Annual Energy and Peak Demand Savings (through December 2008)	3-17
Table 3-10. Business Partners NEI Results	3-18
Table 3-11. New York Energy \$mart SM Loan Fund and Financing Program – Long-Term Goals and Achievements for Commercial/Industrial Projects	3-19
Table 3-12. Loan Fund and Financing Program – Key Program Outputs for Commercial/Industrial Projects	3-19
Table 3-13. Loan Fund and Financing Program – Key Market Indicators and Program Cumulative Progress	3-20
Table 3-14. Loan Fund Cumulative Annual Energy and Peak Demand Savings (Through December 2008)	3-21
Table 3-15. Energy Smart Focus Program – Long-Term Goals and Achievements	3-24
Table 3-16. New Construction Program – Long-Term Goals and Achievements	3-28
Table 3-17. New Construction Program– Key Program Outputs	3-28
Table 3-18. New Construction Program – Key Market Indicators and Program Cumulative Progress	3-29
Table 3-19. New Construction Program Cumulative Annual Energy and Peak Demand Savings (through December 2008)	3-32
Table 3-20. Summary of Prospective Benefits Results	3-34
Table 3-21. FlexTech TA Program – Long-Term Goals and Achievements	3-39
Table 3-22. FlexTech TA Program – Key Program Outputs	3-39
Table 3-23. FlexTech TA Program Cumulative Annual Energy and Peak Demand Savings (through December 2008)	3-40
Table 4-1. 2008 Residential and Low-Income Program Evaluation Activities	4-3
Table 4-2. Residential and Low-Income Program Electricity Savings through December 31, 2008 and Progress toward Five-Year Goals	4-5
Table 4-3. Residential and Low-Income Program Peak Demand Reductions through December 31, 2008	4-6
Table 4-4. Residential and Low-Income Program Fuel Savings through December 31, 2008 and Progress toward Five-Year Goals	4-7
Table 4-5. Number of Low-Income Households Served by Program and Utility Area through December 2008	4-9
Table 4-6. ENERGY STAR Label Recognition	4-10
Table 4-7. For any ENERGY STAR-labeled product(s) you purchased, how much did the presence or absence of the ENERGY STAR label influence your purchasing decision?	4-12
Table 4-8. Home Performance Program – Long-Term Goals and Achievements	4-18
Table 4-9. Home Performance Program – Key Program Outputs	4-18
Table 4-10. New York ENERGY STAR Homes Program – Key Market Indicators and Program Cumulative Progress	4-20
Table 4-11. Home Performance with ENERGY STAR Program – Key Market Indicators and Program Cumulative Progress	4-22
Table 4-12. Home Performance Program Cumulative Annual Energy and Peak Demand Savings (Through December 2008)	4-24
Table 4-13. Home Performance NEI Results	4-24

Table of Contents

Table 4-14. Multifamily Performance Program – Long-Term Goals and Achievements.....	4-33
Table 4-15. Multifamily Performance Program Cumulative Annual Energy and Peak Demand Savings (Through December 2008).....	4-35
Table 4-16. Multifamily Performance NEI Results	4-36
Table 4-17. Market Support Program – Near-Term Goals and Achievements.....	4-37
Table 4-18. Market Support Program – Key Program Outputs	4-39
Table 4-19. Market Support Program – Key Market Indicators and Program Cumulative Progress	4-39
Table 4-20. Market Support Program Cumulative Annual Energy and Peak Demand Savings (Through December 2008 unless noted)	4-42
Table 4-21. Market Support Program NEI Results	4-42
Table 4-22. 2007 ENERGY STAR Appliance Sales Attributable to the NYESP Program.....	4-46
Table 4-23. 2007 Net Appliance Sales and Measure Savings Estimates for NYESP Program	4-47
Table 4-24. Communities and Education Program – Long-Term Goals and Achievements.....	4-49
Table 4-25. Communities and Education Program – Key Program Outputs	4-50
Table 4-26. Non-SBC Funds Leveraged.....	4-55
Table 4-27. EmPower New York SM Program – Near-Term Goals and Achievements.....	4-56
Table 4-28. EmPower New York SM Program – Key Market Indicators and Program Cumulative Progress (SBC-funded only)	4-57
Table 4-29. EmPower New York SM Program Cumulative Annual Energy and Peak Demand Savings (Through December 2008).....	4-58
Table 4-30. Buying Strategies Program Evolution	4-65
Table 4-31. Buying Strategies and Energy Awareness Program – Long-Term Goals and Achievements	4-67
Table 4-32. Buying Strategies and Energy Awareness Program – Key Program Outputs	4- 68
Table 5-1. R&D Program Evaluation Activities	5-3
Table 5-2. Estimated Sales Revenue from 2005 through 2007 for all Active Program Participants.....	5-9
Table 5-3. NYSERDA Spending on Product Development and Macroeconomic Impact of Product Sales.....	5-13
Table 5-4. R&D Program Electricity Savings through December 31, 2008.....	5- 15
Table 5-5. R&D Program Peak Demand Reductions through December 31, 2008.....	5-15
Table 5-6. R&D Program Natural Gas Impacts through December 31, 2008	5-16
Table 5-7. Public Benefit Power Transmission and Distribution Research Program Goals achieved from July 1, 2006 through December 31, 2008	5-19
Table 5-8. Co-Funding of T&D Projects Awarded (PONS 1102 and 1208 As of December 2008).....	5-20
Table 5-9. Clean Energy Infrastructure Program Goals achieved from July 1, 2006 through December 31, 2008.....	5-25
Table 5-10. Clean Energy Infrastructure – Key Market Indicators and Program Cumulative Progress.	5-26
Table 5-11. Clean Energy Infrastructure Program Cumulative Annual Clean Generation (through December 2007 when Program moved to RPS).....	5-26
Table 5-12. Power Systems Product Development Program Goals achieved from July 1, 2006 through December 31, 2008	5-28
Table 5-13. Cumulative Power Systems Results from Program Inception through Year-end 2008.....	5-29
Table 5-14. Power Systems Commercialization Progress Since 2000	5-31
Table 5-15. DG-CHP Demonstration Program.....	5-33
Table 5-16. DG-CHP Demonstration Program – Key Program Outputs.....	5-34
Table 5-17. CHP Cumulative Annual Energy and Peak Demand Savings (Through December 2008)	5-37
Table 5-18. Demand Response and Innovative Rate Research Program Goals achieved from July 1, 2006 through December 31, 2008.....	5- 39
Table 5-19. Demand Response and Innovative Rate Research Program Cumulative Annual Energy and Peak Demand Savings (Through December 2008).....	5-40
Table 5-20. Electric Transportation Program Goals achieved from July 1, 2006 through December 31, 2008.....	5-41

Table 5-21. Environmental Monitoring, Evaluation, and Protection Program Goals achieved from July 1, 2006 through December 31, 2008	5-42
Table 5-22. Industrial Process & Product Innovation Program – Near-Term Goals and Achievements	5-47
Table 5-23. IPPI – Key Program Outputs	5-48
Table 5-24. IPPI Contracts by Project Type Through December 2008	5-49
Table 5-25. Municipal Water and Wastewater Efficiency Program Goals achieved from July 1, 2006 through December 31, 2008	5-50
Table 5-26. Project and Funding Status through December 2008	5-52
Table 5-27. Next Generation and Emerging Technologies Program – Long-Term Goals and Achievements through December 31, 2008	5-54
Table 5-28. Next Generation and Emerging Technologies New Product Development	5-57
Table 5-29. Examples of New Product Development Efforts Underway	5-59

Figures

Figure ES-1. Program Spending and Savings (2004-2008) ¹	ES-8
Figure 2-1. New York Energy Smart SM Ratepayer Contributions by Utility Service Area	2-3
Figure 2-2. New York Energy Smart SM Ratepayer Contributions by Sector	2-3
Figure 2-3. New York Energy Smart SM Program Funding History and Activity December 1998 through December 2008	2-5
Figure 2-4. Total SBC Expenditures by Utility	2-6
Figure 2-5. C/I Funds Spent by Utility Service Area	2-8
Figure 2-6. C/I Funds Spent by Sector	2-8
Figure 2-7. Residential Funds Spent by Utility Service Area	2-10
Figure 2-8. Residential Funds Spent by Housing Type	2-10
Figure 2-9. Low-Income Funds Spent by Utility Service Area	2-11
Figure 2-10. Low-Income Funds Spent by Housing Type	2-11
Figure 2-11. R&D Funds Spent by Utility Service Area	2-13
Figure 2-12. R&D Funds Spent by Technology	2-13
Figure 2-13. Electricity Savings by Utility through December 2008	2-18
Figure 2-14. Demand Savings by Utility (includes callable MW) through December 2008	2-18
Figure 2-15. 2008 Update – Net Employment Impacts by Year	2-22
Figure 2-16. The In-Depth Largest Savers Impact Evaluation Salad Bar Approach to NTG	2-30
Figure 3-1. 2008 NCP Prospective Benefits (GWh and MW) Compared to NCP 2007 Incremental Savings	3-35
Figure 4-1. ENERGY STAR Label Recognition – Comparison by Publicity Areas for 2008	4-11
Figure 4-2. Percent of Appliance Models on Display at Partner Stores that are ENERGY STAR Compliant	4-41
Figure 5-1. Principal Market for Product	5-6
Figure 5-2. Benefits of the Product to Customer	5-7
Figure 5-3. Sales from New Products (1998 to 2007)	5-12
Figure 5-4. NYSERDA Spending on Product Development and Change in Gross State Product	5-14
Figure 5-5. Public Benefit Power Transmission and Distribution Research Program Funds Awarded as of December 2008	5-20
Figure 5-6. Power Systems Funding by Project Type	5-30
Figure 5-7. Power Systems Funding by Technology Area	5-30
Figure 5-8. Peak KW Reduction by Prime Mover for Encumbered Projects (As of Year-End 2008) ...	5-34

Table of Contents

Figure 5-9. Peak KW Reduction by Utility Service Area for Encumbered Projects (Through 2008).....	5-35
Figure 5-10. Distribution of Funding by Project Type through December 31, 2008.....	5-56
Figure 5-11. Next Generation and Emerging Technologies Funding by Sector through December 31, 2008.....	5-56

Acronyms and Abbreviations

AC: Air conditioner

A&E: Architecture and engineering firms

AD: Advanced diagnostics

AHP: Assisted Home Performance with ENERGY STAR®

AMP: Assisted Multifamily Program

B/C: Benefit-cost

BPI: Building Performance Institute

Btu: British thermal unit

Cx: Commissioning

C/I: Commercial/Industrial

CBO: Community-based organization

CCP: Cities for Climate Protection

CEM: Residential Comprehensive Energy Management Program

CFL: Compact fluorescent light

CHG&E: Central Hudson Gas & Electric Corporation

CHP: Combined heat and power

CIPP: Commercial/Industrial Performance Program

CO: Carbon monoxide

CO₂: Carbon dioxide

Con Edison: Consolidated Edison Company of New York, Incorporated

CSG: Conservation Services Group, Inc.

DEC: New York State Department of Environmental Conservation

DG: Distributed generation

DHCR: New York State Division of Housing and Community Renewal

DI: Low-Income Direct Install Program

DOE: United States Department of Energy

DPS: New York State Department of Public Service

DR: Demand response

ECIPP: Enhanced Commercial/Industrial Performance Program

EEPS: Energy Efficiency Portfolio Standard

EES: Energy Efficiency Services

EFP: Existing Facilities Program (Created by merging ECIPP and PLMP)

EMEP: Environmental Monitoring, Evaluation, and Protection Program

EPA: United States Environmental Protection Agency

EPRI: Electric Power Research Institute

ESCO: Energy services company

ESEERCO: Empire State Electric Energy Research Corp.

ESS: Energy Smart Students

EUR: End-Use Renewables Program

FlexTech: Flexible Technical Assistance Program

FR: Freeridership

GSP: Gross State Product

GW: Gigawatt

GWh: Gigawatt-hour

HEAP: Home Energy Assistance Program

HERS: Home Energy Rating System

HPwES: Home Performance with ENERGY STAR®

HTR: Hard-to-reach

HVAC: Heating, ventilation, & air-conditioning

ISO: Independent System Operator

IPPI: Industrial Process & Product Innovation Program

kW: Kilowatt

kWh: Kilowatt-hour

LEEDTM: Green Buildings Leadership in Energy and Environmental Design

LI: Low-Income

LIFE: Low-Income Forum on Energy

LIHEAP: Low-Income Home Energy Assistance Program

LIPA: Long Island Power Authority

M&V: Measurement and verification

MCAC: Market characterization, assessment and causality analysis

MF: Multifamily

MMBtu: Million British thermal units

MOU: Memorandum of Understanding

MPP: Multifamily Performance Program

MW: Megawatt

MWh: Megawatt-hour

NAAQS: National Ambient Air Quality Standard

Nat'l Grid: National Grid

NCP: New Construction Program

NEI: Non-energy impacts

NextGen: Next Generation of Energy Efficient End-Use Technologies Program

NOx: Nitrogen oxides

NPSO: Non-Participant Spillover

NTG: Net-to-gross

Acronyms and Abbreviations

NYC: New York City

NYES: New York Energy SmartSM Program

NYESC: New York Energy SmartSM Communities

NYESH: New York ENERGY STAR[®] Homes

NYISO: New York Independent System Operator

NYPA: New York Power Authority

NYS: New York State

NYSEG: New York State Electric and Gas Corporation

NYSERDA: New York State Energy Research and Development Authority

NYWEA: New York Water Environment Association

O&R: Orange and Rockland Utilities, Incorporated

OPC: Outreach project consultant

OTDA: New York State Office for Temporary and Disability Assistance

PAC: Program Administrator Cost Test

PLMP: Peak Load Management Program

PM: Particulate matter

PON: Program Opportunity Notice

PSC: New York State Public Service Commission

PV: Photovoltaic

QA: Quality assurance

QC: Quality control

RAC: Room air conditioner

RCx: Retrocommissioning

R&D: Research and development

RD&D: Research, development, and demonstration

RFP: Request for Proposals

RG&E: Rochester Gas and Electric Corporation

RPS: Renewable portfolio standard

RR: Realization Rate

SBC: System benefits charge

SCLP: Small Commercial Lighting Program

SO: Spillover

SO₂: Sulfur dioxide

TA: Technical Assistance

TC: Technical Consultant

T&D: Transmission and distribution

TRC: Total Resource Cost Test

TREAT: Targeted Residential Energy Analysis Tools

TTW: Through-the-wall air conditioner

WAP: U.S. Department of Energy Weatherization Assistance Program

WNI: Weatherization Network Initiative

Executive Summary

This report presents evaluation results for the **New York Energy SmartSM** public benefits program (Program) for activities completed through December 2008.¹ The report was jointly prepared by staff of the New York State Energy Research and Development Authority (NYSERDA) and a team of third-party evaluation contractors acting under the terms and conditions of a Memorandum of Understanding (MOU)² between NYSERDA and the New York State Department of Public Service (DPS). This report was provided to DPS Staff for review before being finalized, and is transmitted to the Public Service Commission (PSC) by NYSERDA in fulfillment of its responsibilities under the terms of the MOU.

On December 21, 2005, the PSC ordered³ New York's public benefits program funding extended for five years, from July 1, 2006 through June 30, 2011 and increased funding from approximately \$150 million to \$175 million annually (\$896⁴ million over the five-year period). The continuation and expansion of the Program was intended to help maintain momentum for the State's efforts to develop competitive markets for energy efficiency; demand management; outreach and education services; research, development, and demonstration; low-income energy assistance; and to provide direct economic and environmental benefits to New Yorkers. The Program continues to address market barriers to the competitive procurement of these services. By mid-2011, the SBC funds and interest earnings from the three program rounds will have provided more than \$1.87 billion to support a full range of programs to help the State meet its energy challenges.⁵

During 2008, several changes arising from the PSC's Energy Efficiency Portfolio Standard (EEPS) proceeding have affected NYSERDA's **New York Energy SmartSM** Program portfolio and evaluation efforts. The PSC's June 23rd EEPS Order called for an increase in System Benefits Charge (SBC) collections and a ramp up of program efforts by NYSERDA and the State's six investor-owned electricity transmission and distribution utilities to meet the State's "15-by-15" electricity reduction goal.⁶ NYSERDA complied with the PSC's Order by submitting a Supplemental Revision to the SBC Operating

¹ Previous annual reports dated September 2000, January 2002, May 2003, May 2004, May 2005, May 2006, March 2007 and March 2008 presented cumulative results from the Program's inception on July 1, 1998. The prior reports are available on NYSERDA's Website at www.nyserdera.org and by request.

² The original 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 was signed March 11, 1998, and revised December 6, 2001. A new MOU between the New York State Department of Public Service and the New York State Energy Research and Development Authority was signed on August 22, 2008.

³ Case 05-M-0090, In the Matter of the System Benefits Charge III, Order Continuing the System Benefits Charge (SBC) and the SBC-Funded Public Benefit Programs, issued and effective December 21, 2005.

⁴ Consisting of \$866 million in SBC funding plus \$30 million in anticipated interest earnings.

⁵ In addition to NYSERDA's **New York Energy SmartSM** Program, funded through the SBC, the New York Power Authority (NYPA) and Long Island Power Authority (LIPA) each offer complementary public benefits programs of their own. The three authorities coordinate program design and delivery wherever practicable to maximize the use of public funds 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.

⁶ The "15-by-15" goal refers to a 15% reduction in electricity use from 2015 forecast levels.

Plan incorporating approximately \$80 million per year in additional funds for five new or expanded programs as well as general awareness, administration and evaluation associated with those programs.⁷ As these expanded and new efforts commence in 2009, NYSERDA will begin to include their progress in monthly, quarterly and annual reports to the PSC.

The June 23rd Order further specified that evaluation funding shall be set at 5% of program budgets for the new and expanded programs, and increased from 2% to 5% for the remainder of NYSERDA's existing **New York Energy SmartSM** SBC funded Program. NYSERDA complied with the Order by filing a Transition Plan describing planned enhancements to evaluation, measurement and verification.⁸ DPS Staff was directed to establish common protocols for evaluation, measurement and verification, and convene an EEPs Evaluation Advisory Group to engage in active oversight of all program administrators' evaluation planning and implementation. The EEPs Evaluation Advisory Group was established in August 2008, and includes a NYSERDA representative.⁹ DPS Staff's August 2008 evaluation plan guidelines for program administrators served as the basis for NYSERDA's development and submittal of detailed evaluation plans for the five new/expanded programs in late 2008. When the enhanced evaluation activities commence, NYSERDA will also begin to report on their progress in monthly, quarterly and annual reports to the PSC.

Program Administration

NYSERDA policy ensures that the Program is administered in an open, fair, and equitable manner. Ninety-eight percent (98%) of projects are competitively selected. The remaining 2% of projects involve contracts less than \$25,000 each, unsolicited proposals that are deemed to support the Program's goals, and sole-source contracts with unique, specially-skilled contractors.

Contract awards are recommended to NYSERDA management for consideration and approval by expert panels that review all competitive proposals. The panels consist of technical experts and external members from government and industry. Panels are required to have more external reviewers than internal NYSERDA reviewers. The panels provide feedback on the contents and composition of each program solicitation to help ensure that solicitations will attract the most appropriate projects that will achieve their goals. All solicitations are published in the New York State *Contract Reporter*.

The evaluation function is overseen by NYSERDA and conducted by a team of independent evaluation contractors. All evaluation contractors were selected through competitive solicitation with a member of the former SBC Advisory Group and DPS Staff serving on each review panel. DPS (along with the former SBC Advisory Group) helps allocate the evaluation budget, identify evaluation activities to be conducted, and establish timelines for evaluation activities.

⁷ Expanded programs are New Construction, Flex Tech and EmPower New York. New programs are Industry and Process Efficiency and CFL Expansion. The total EEPs funding included in the Operating Plan was approximately \$260 million over three and one quarter years.

⁸ The August 22, 2008 *New York State Energy Research and Development Authority Transition Plan for Enhancing Program Evaluation* can be found at:
[http://www3.dps.state.ny.us/PSCWeb/PIOWeb.nsf/20b9016ae2129d5c852573db00779ee1/b6768a6d2fc29e0a852574b30049651a/\\$FILE/EEPS%2060%20day%20filing%20NYSERDA%20Transition%20Plan.pdf](http://www3.dps.state.ny.us/PSCWeb/PIOWeb.nsf/20b9016ae2129d5c852573db00779ee1/b6768a6d2fc29e0a852574b30049651a/$FILE/EEPS%2060%20day%20filing%20NYSERDA%20Transition%20Plan.pdf)

⁹ A list of EEPs Evaluation Advisory Group members can be found at:
[http://www3.dps.state.ny.us/PSCWeb/PIOWeb.nsf/20b9016ae2129d5c852573db00779ee1/a4756ca0f43b7628852574b9006ffe45/\\$FILE/Evaluation%20Advisory%20Group%20members.pdf](http://www3.dps.state.ny.us/PSCWeb/PIOWeb.nsf/20b9016ae2129d5c852573db00779ee1/a4756ca0f43b7628852574b9006ffe45/$FILE/Evaluation%20Advisory%20Group%20members.pdf)

New York Energy SmartSM Budget and Spending Status

As shown in Table ES-1, the Program's 13-year budget is approximately \$1.87 billion, which is primarily allocated among four major program areas:

- Commercial/Industrial initiatives account for the largest share, 34% of the 13-year New York Energy SmartSM Program budget, or \$634 million.
- Research and Development accounts for 21% of the 13-year budget, or \$388 million.
- Low-Income initiatives account for approximately 17% of the total 13-year budget, or \$319 million.
- Residential (non-low-income) initiatives also account for almost 17% of the 13-year budget, or \$313 million.

In addition to these major program areas, the 13-year program budget also includes an environmental disclosure program (\$1.9 million), program administration (\$128.3 million), program evaluation (\$34.4 million), and a cost recovery fee (\$25.4 million, a mandatory payment into the General Fund assessed by New York State for state support functions). Table ES-2 shows the financial status of the programs as of December 31, 2008.

Table ES-1. New York Energy SmartSM Program Budget (\$ million)

	Budget ¹			% of Program Area Budget	% of Total Budget
	SBC I & SBC II ²	SBC III ³	Total Budget		
Commercial/Industrial	\$247.1	\$386.8	634.0	37.6%	33.8%
Residential	165.4	147.3	312.8	18.6%	16.7%
Low-Income	86.6	232.0	318.6	18.9%	17.0%
Research and Development	105.9	282.5	388.3	23.0%	20.7%
General Awareness ⁴ (Marketing)	15.9	15.2	31.0	1.8%	1.7%
Program Areas Total	\$620.9	\$1,063.8	\$1,684.6	100.0%	89.9%
Other Costs					
Program Administration	59.8	68.4	128.3	-	6.8%
Metrics and Evaluation	14.5	19.9	34.4	-	1.8%
Environmental Disclosure	0.8	1.1	1.9	-	0.1%
NYS Cost Recovery Fee ⁵	9.2	16.2	25.4	-	1.4%
Other Costs Total	\$ 84.3	\$105.7	\$190.0	-	10.1%
Total New York Energy SmartSM	\$705.2	\$1,169.4	\$ 1,874.7	-	100.0%

¹ Reflects carryover in funds and reallocation as approved by the Public Service Commission in 2007.

² SBC I: July 1, 1998 through June 30, 2001; SBC II: July 1, 2001 through June 30, 2006.

³ SBC III: July 1, 2006 through June 30, 2011.

⁴ General Awareness previously included in Residential Program Area.

⁵ The New York State Cost Recovery Fee is assessed for services to public authorities. The fee is determined by the New York State Division of Budget and imposed and collected by the Department of Taxation and Finance.

Totals may not sum exactly due to rounding.

Source: NYSERDA

Table ES-2. Financial Status of New York Energy SmartSM Program (\$ million) through 2008

	Total 13-Year Budget ¹	Funds Spent			Encumbered Funds ⁴ % of Budget Encumbered	Committed Funds ⁵ % of Budget Committed
		SBC I & SBC II ^{1,2}	SBC III ³	Total Spent & % of Budget		
Program Areas						
Commercial/Industrial	634.0	247.1	104.1	351.2 55.4%	454.4 71.7%	526.4 83.0%
Residential ⁵	312.8	165.4	72.8	238.2 76.2%	256.1 81.9%	264.5 84.6%
Low-Income	318.6	86.6	92.7	179.3 56.3%	231.2 72.6%	237.0 74.4%
Research and Development	388.3	105.9	61.5	167.3 43.1%	251.3 64.7%	316.3 81.5%
General Awareness ⁶ (Marketing)	31.0	15.9	5.2	21.1 67.9%	25.3 81.6%	25.3 81.6%
Program Areas Total	\$1,684.6	\$620.9	\$336.2	\$957.1 56.8%	\$1,218.3 72.3%	\$1,369.5 81.3%
Other Costs						
Program Administration	128.3	59.8	35.0	94.8 73.9%	94.8 73.9%	94.8 73.9%
Metrics and Evaluation	34.4	14.5	7.0	21.5 62.5%	24.5 71.2%	24.8 72.0%
Environmental Disclosure	1.9	0.8	-0.75	0.05 2.5%	0.05 2.5%	0.05 2.5%
NYS Cost Recovery Fee	25.4	9.2	6.7	15.9 62.5%	15.9 62.5%	15.9 62.5%
Other Costs Total	\$190.0	\$84.3	48.0	\$132.3 69.6%	\$135.3 71.2%	135.6 71.4%
Total New York Energy Smart SM	\$1,874.7	\$705.2	\$384.2	\$1,089.4 58.1%	\$1,353.6 72.2%	\$1,505.1 80.3%

¹ Reflects carryover in funds and reallocation as approved by the Public Service Commission in 2007.² SBC I: July 1, 1998 through June 30, 2001; SBC II: July 1, 2001 through June 30, 2006.³ SBC III: July 1, 2006 through June 30, 2011.⁴ Encumbered funds associated with signed contracts and purchase orders.⁵ Committed funds associated with encumbered funds and pending contracts.⁶ General Awareness previously included in Residential Program Area.

Totals may not sum exactly due to rounding.

Source: NYSERDA

Portfolio-Level Findings

Progress Toward Goals

This section presents the cumulative progress of the New York Energy SmartSM Program toward meeting four overarching public policy goals.¹⁰ Overall, the Program is making good progress toward achieving its long-term goals. The goals and progress made through December 31, 2008 are shown in Table ES-3. Substantial additional program-specific and sector-level accomplishments are documented in this report, and further detailed in independent evaluation contractor reports that are available to all parties upon request.

Table ES-3. New York Energy SmartSM Program Goals and Progress through December 31, 2008

Public Policy Goal	Progress as of December 31, 2008
Improve New York's energy system reliability and security by reducing energy demand and increasing energy efficiency, supporting innovative transmission and distribution technologies that have broad application, and enabling fuel diversity, including renewable resources.	The New York Energy Smart SM Program has improved system-wide reliability and peak demand reduction, enabling 575 MW of callable load reduction and installing efficiency measures that permanently reduce peak demand by another 700 MW.
	Renewable energy programs have reduced peak demand on the electric grid by an additional 10 MW.
	The New York Energy Smart SM Program has led to the installation of energy efficiency measures saving 3,220 GWh per year. Of this, nearly 110 GWh of electricity is being generated annually from DG-CHP systems.
	The New York Energy Smart SM Program has led to the installation of wind and photovoltaic (PV) technologies, which provide 106 GWh of clean electricity generation per year. This includes the installation of 865 PV and 15 small wind systems.
	Over the past year, the number of operational Distributed Generation/Combined Heat and Power systems has increased from 45 to 49.
	Under the Public Benefit Power Transmission and Distribution Program, 26 projects have been approved to provide 21 companies, universities and other institutions \$10 million to pursue development of advanced technologies that will improve the efficiency and delivery of power for electric customers across the State.
Reduce the energy cost burden of New Yorkers by offering energy users, particularly the State's lowest income households, services that moderate the effects of energy price increases and volatility and provide access to cost-effective energy efficiency options.	The New York Energy Smart SM Program has saved participating customers nearly \$590 million in annual energy costs.
	More than 72,000 eligible New York low-income customers received direct assistance through the New York Energy Smart SM programs, resulting in \$320/year in average customer energy bill savings for this underserved population.
	The New York Energy Smart SM portfolio has achieved a benefit-cost ratio of 1.8 under the most conservative Total Resource Cost Test scenario.

¹⁰ Case 94-E-0952 *et al.*, In the Matter of Competitive Opportunities Regarding Electric Service, *Staff Proposal for the Extension of the System Benefits Charge (SBC) and the SBC-funded Public Benefits Program*, August 30, 2005.

Public Policy Goal	Progress as of December 31, 2008
Mitigate the environmental and health impacts of energy use by increasing energy efficiency, encouraging the development of support services for renewable energy resources, and optimizing the energy performance of buildings and products.	The annual reduction of emissions resulting from New York Energy Smart SM Programs' energy savings is 2,800 tons of nitrogen oxide (NO _x), 5,120 tons of sulfur dioxide (SO ₂), and 2.2 million tons of carbon dioxide (CO ₂). ¹
	Between 2003 and 2008, the number of PV and small wind installers participating in the New York Energy Smart SM Program has increased from 14 to 100.
	The New York Energy SmartSM Program has helped optimize energy performance: ▪ in 900 new commercial buildings, ▪ in more than 13,300 new homes, ▪ in more than 23,300 existing homes, ▪ in more than 24,000 multifamily housing units, and ▪ through approximately 13,500 energy efficiency projects in existing commercial, industrial and institutional facilities, including technical studies, benchmarking, measure replacement, and reduced-interest financing.
Create economic opportunity and promote economic well-being by supporting emerging energy technologies, fostering competition, improving productivity, stimulating the growth of New York energy businesses, and helping to meet future energy needs through efficiency and innovation.	Through 2008, the New York Energy Smart SM Program has led to the creation of 4,900 total net jobs.
	Initial results show that R&D product development expenditures have lead to an increase in gross state product (GSP). Every one dollar spent on product development projects leads to an increase in the GSP, or value added, by \$4.9.
	Private investment in combined heat and power has increased in New York. The total cost for all projects encumbered through year-end 2008 is \$384 million, 82% of which represents funds from project participants.

¹ These emission reductions are associated with both electric and fossil fuel saving measures. Under a cap-and-trade system, the total number of emission allowances is determined by regulation. Regulated entities can purchase allowances and collectively emit up to the cap that is currently in place. Therefore, in the near term, electric efficiency projects may not decrease the overall amount of emissions released into the atmosphere. However, electric efficiency projects will reduce end-users' responsibility or footprint associated with emissions from electricity production.

Summary of Program Benefits

Table ES-4 provides a summary of the main quantifiable benefits achieved by the New York Energy SmartSM Program for the past five years. By December 2008, the portfolio had achieved 3,220 GWh of cumulative annual electricity savings, and 5.4 million MMBtu of natural gas, fuel oil and other fuel savings. The New York Energy SmartSM portfolio has also reduced peak demand by 1,275 MW, including 700 MW of permanent demand reduction measures and 575 MW of callable load reduction.

Table ES-4. Cumulative Program Benefits from Installed Measures

Benefits	Through Year-End 2004	Through Year-End 2005	Through Year-End 2006	Through Year-End 2007a	Through Year-End 2008
Electricity Savings from Energy Efficiency and On-Site Generation (Annual GWh)	1,400	1,950	2,350	3,070	3,220
Peak Demand Reduction (MW)	860	1,040	1,113	1,200	1,275
Permanent Measures (MW)	325	445	495	650	700b
Curtailable ¹	535	595	618	550	575
Net Fuel Savings (Annual MMBtu)	2,600,000	4,000,000	4,049,000	4,460,000	5,400,000
Annual Energy Bill Savings to Participating Customers (\$ Million)	\$195	\$275	\$330	\$570	\$590
Renewable Energy Generation (Annual GWh)	102	103	105	106	106
Net Additional Jobs ²	2,500	3,100	3,600	4,500	4,900
NO _x Emissions Reductions (Annual Tons) ³	1,280	1,750	2,060	2,570	2,800
SO ₂ Emissions Reductions (Annual Tons) ³	2,320	3,170	3,800	4,720	5,120
CO ₂ Emissions Reductions (Annual Tons) ³	1,000,000	1,400,000	1,600,000	2,000,000	2,200,000
Equivalent number of cars removed from NY roadways	200,000	275,000	320,000	400,000	435,000

a Savings for the New York Energy SmartSM Products Program are estimated based on market data, survey research, and deemed savings values. Savings for this program were last fully captured in 2006. An update, completed and applied in Quarter 1 2009, added electricity, demand, and fuel savings for 2007 appliances only. Once necessary market-level data are available, appliance savings for 2008, as well as lighting savings for 2007 and 2008 will be analyzed and applied.

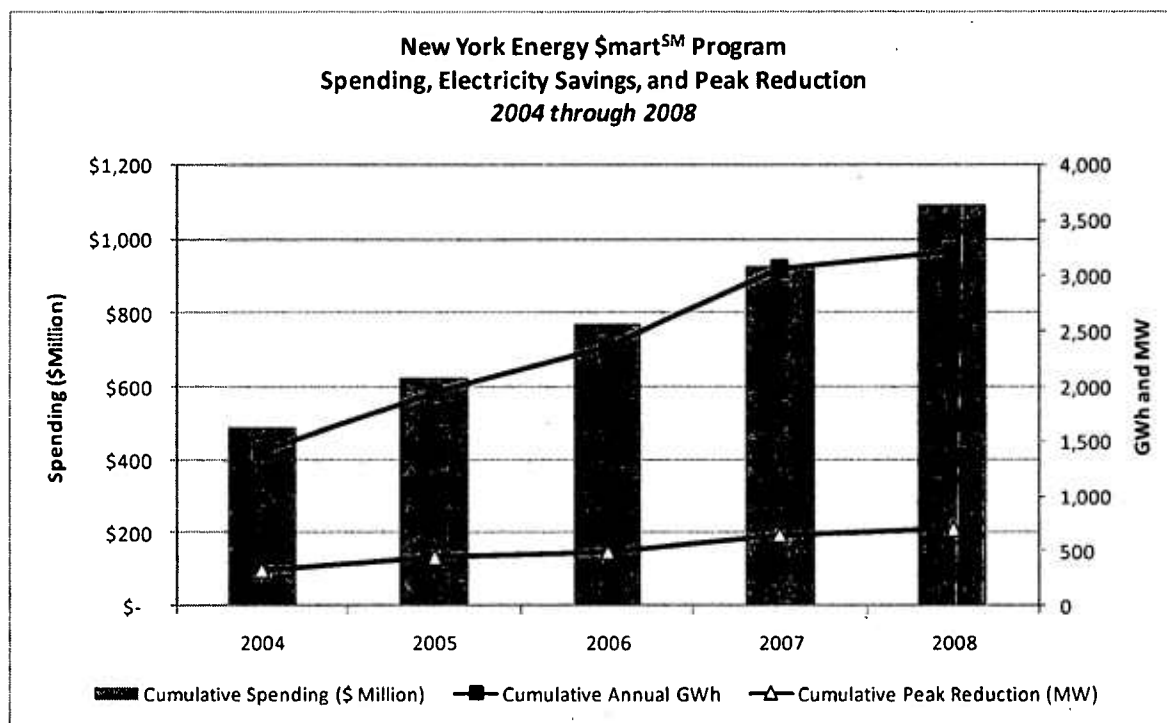
b Does not include 9.8 MW of renewable energy generation capacity.

¹ Curtailable MW have decreased due to a reassessment of the impact of the Enabling Technologies Program. MW enabled under the SBCII program Enabling Technologies for Price Responsive Load were not required to persist beyond the period of the contract. As such, the MWs available have steadily declined since the program's close.

² Figures in this row represent the net additional jobs created through year-end. Results from 2004 through 2007 have been restated based on new analysis conducted in 2009.

³ These emission reductions are associated with both electric and fossil fuel saving measures. Under a cap-and-trade system, the total number of emission allowances is determined by regulation. Regulated entities can purchase allowances and collectively emit up to the cap that is currently in place. Therefore, in the near term, electric efficiency projects may not decrease the overall amount of emissions going into the atmosphere. However, electric efficiency projects will reduce end-users' responsibility or footprint associated with emissions from electricity production.

Figure ES-1 shows the general trend in program spending, electricity savings, and peak demand reductions over the past five years. Spending bars represent the cumulative total spending, in millions, since inception of the 13-year program. Electricity savings and peak demand reductions depicted by the lines are cumulative annual figures. Values shown for each year represent the total electric savings and peak demand reductions from measures installed since program inception that are still operational.

Figure ES-1. Program Spending and Savings (2004-2008)¹

¹ Savings for the New York Energy SmartSM Products Program are estimated based on market data, survey research, and deemed savings values. The full last update, completed and applied in Quarter 1 2007, added electricity and demand savings for both 2005 and 2006. Year-end savings for 2005 and 2006 were not back-adjusted. The cumulative annual savings do not yet reflect additions for 2007 from lighting measures or 2008 from lighting and appliance measures installed as a result of the New York Energy SmartSM Products Program. Additions for 2007 and 2008 will be applied once the necessary market data are available to support this update.

Cost Effectiveness of Programs

For deployment and market transformation programs for which energy and demand savings are estimated, an economic benefit/cost analysis is used that monetizes savings and compares them to costs. Benefit/cost results for these programs are summarized here and presented in more detail in Section 2 of this report. For R&D programs, such as next-generation technologies, distributed generation, new product development, and strategic reliability technologies, the economic benefit/cost methodology is inappropriate because these programs are designed to accomplish a range of objectives, many of which cannot be monetized in the early program years.

Benefit/cost ratios for deployment programs are shown in Table ES-5. Two different tests were used to calculate B/C ratios:

1. Total Resource Cost (TRC) Test divides the present value of the benefits by the present value of total resource costs.
2. Program Administrator Cost (PAC) Test divides the present value of the benefits by the present value of NYSERDA spending.

The benefits included in this year's analysis are described below:

- Scenario 1: This scenario includes: (a) resource benefits associated with reduced electricity generation and capacity, and reduced use of natural gas and water; and (b) capacity market price effect arising from curtailable load programs.
- Scenario 2: Builds upon Scenario 1 by adding participant non-energy impacts such as monetized values for comfort, safety, and productivity.
- Scenario 3: Builds upon Scenario 2 by including macroeconomic value added.

Table ES-5. Benefit-Cost Ratios for the New York Energy \$martSM Portfolio through 2008

	TRC Test	PAC Test
Scenario 1	1.8	5.6
Scenario 2	2.6	7.9
Scenario 3	6.0	18.3

Macroeconomic Impact Analysis

Expenditures made by NYSERDA and program participants have substantial macroeconomic impacts that go far beyond direct benefits. Purchases of goods and services through the **New York Energy \$martSM** Program cause a ripple effect as spending and re-spending influence various sectors of New York's economy and, in turn, affect the level and distribution of employment and income in the State. A macroeconomic impact analysis of the programs was updated for this report. Through the end of 2008, the Program has created 4,900 total net jobs.

Evaluation Projects

Findings in this report are compiled based on the cumulative work of NYSERDA and its independent evaluation contractors over the past several years. The report also includes summary findings from the following recent evaluations completed in 2008:

- Portfolio level macroeconomic impact and benefit/cost analysis update;
- R&D macroeconomic impact analysis update;
- Initial results from a study to evaluate gross and net impacts from projects with the largest energy savings across the portfolio (includes projects in the Peak Load Management, Enhanced Commercial/Industrial Performance, New Construction, FlexTech/Technical Assistance, and Distributed Generation/Combined Heat and Power programs);
- New York City/Westchester process and market evaluations;
- Process evaluation for the Commercial/Industrial Performance Program;
- Best practices process evaluation study for the Loan Fund;
- Market characterization and assessment study for the New Construction Program;

- Prospective benefits study for the New Construction Program;
- New York oversample to the 2008 National ENERGY STAR survey;
- New York oversample to the 2008 National Energy Conservation, Efficiency and Demand Response study;
- Market characterization and assessment for Home Performance with ENERGY STAR;
- Market characterization and assessment for ENERGY STAR Homes;
- Phase 2 process evaluation for Multifamily Building Performance;
- Update of market-based program appliance savings for the Market Support Program;
- Phase 3 process evaluation for Energy Smart Communities; and
- Process evaluation for the EmPower Program.

Commercial/Industrial Programs

The New York Energy SmartSM Commercial/Industrial (C/I) Programs identify opportunities to improve energy efficiency and load management and attempt to cause changes in energy decision making by building owners and operators. In recent years, the C/I Programs have been streamlined to most effectively target diverse market actors, including architects and engineers who work primarily with large buildings and projects, and contractors and distributors whose primary focus is small buildings. The C/I Programs address the efficient use of electricity, petroleum, and natural gas and seek to provide customers with comprehensive, attractive incentives and financing packages. Programs in the C/I area are discussed in detail in Section 3.

Commercial/Industrial Program Findings

Significant progress is being made by the C/I Programs. Several goals were set for the third New York Energy SmartSM Program funding cycle. These goals established levels to reach, by June 30, 2011, for energy and peak demand savings as well as several other key metrics of program success. Overall, the C/I portfolio is performing well in terms of the energy savings and peak demand reduction goals. Half way into the five-year measurement period, the majority of programs have reached or exceeded 50% of their energy savings and demand reduction goals.

Collectively, the C/I Programs are making a significant impact on the market for both existing and new buildings. For the largest energy-saving programs, namely Existing Facilities, High Performance New Buildings, and Technical Assistance, market effects (*i.e.*, spillover) outweigh any naturally occurring adoption (*i.e.*, freeridership) that is occurring. This is indicated by a net-to-gross ratio greater than 1.0.

Across the programs, nine additional logic model-driven goals were set for other key metrics besides energy savings such as the number of customers receiving assistance, funds leveraged, allies participating, and percentage of target markets affected by programs. The Program is making good progress toward these goals. Two of the nine goals have been exceeded, and another three of the nine goals have reached or exceeded 50% progress. Progress on the remaining four goals is at 50% or less.

Residential and Low-Income Programs

The New York Energy SmartSM residential energy efficiency programs influence decisions regarding energy use by homeowners, renters, and participants in the residential energy products, services and new construction markets. These programs also work with the multifamily building industry to improve the efficient use of electricity, petroleum, and natural gas. Residential programs are described in Section 4 of this report.

Low-Income programs reduce households' energy burden¹¹ by improving the efficiency of energy use and providing energy management and aggregated energy procurement services. Initiatives in this program have also been streamlined and include: providing technical support for and installing a variety of energy-efficient electric end-use measures in low-income housing; paying a portion of the incremental cost of energy efficiency measures and electric heat conversions in publicly-assisted housing; helping low-income households aggregate energy purchases; incorporating energy-efficient equipment and design specifications into State and federally-assisted housing; and informing customers about the benefits of energy efficiency and things they can do themselves to reduce consumption. Programs in the Low-Income area are also discussed in detail in Section 4.

Residential and Low-Income Program Evaluation Findings

Significant progress is being made by the Residential and Low-Income portfolio. Several long-term goals were set for the third New York Energy SmartSM Program funding cycle. These goals established levels to reach, by June 30, 2011, for energy savings as well as several other key metrics of program success. Overall, halfway through the five-year measurement period, three out of six Residential and Low-Income program areas have achieved expected electricity savings (*i.e.*, 50% of the five-year goals). Two out of five program areas have reached expected levels on the goals for other fuel savings. A few key programs are either progressing more slowly than planned or have not yet reported progress toward goals. Specifically, the Multifamily Building Performance Initiative (for existing buildings) is still in the process of transition after significant change that combined three former programs into one. Emphasis on program development and the transition to a new implementation contractor slowed intake somewhat in 2006-2007. Intake increased dramatically in 2008; however, because projects typically take two to three years to complete, few have reached completion. The ENERGY STAR Multifamily Building Initiative (for new buildings) completed two projects by the end of 2008. A total of 105 new construction multifamily projects comprising 5,109 individual units have signed a participation agreement, and 47 new construction multifamily projects comprising 2,806 individual units have developed energy-reduction plans.

Across the programs, 26 additional five-year goals were set for other key metrics besides energy savings, such as the number of customers receiving assistance, funds leveraged, allies participating, and outreach activities completed. Overall, the programs are making progress with respect to these other goals. Ten of the goals have already been surpassed (*e.g.*, the number of new independent retailers signed up, ENERGY STAR market share increases, low-income readership of program materials, and low-income individuals reached via seminars). Another six of the goals have reached expected levels (approximately 50% or more achieved). Progress on the remaining ten goals is less than 50%.

¹¹ Energy burden is the percentage of household income used to pay for energy.

Research and Development Programs

NYSDERDA's R&D activities are organized into five primary program areas: energy resources, transportation and power systems, environment, industry, and buildings. Projects in each of these program areas address technologies and mechanisms that affect the energy supply and meet the needs of end users. As a result, crosscutting areas such as environmental protection, waste management, energy product development, and renewable energy technologies are addressed in several programs. Programs in the R&D Program area are discussed in detail in Section 5.

Research and Development Program Evaluation Findings

Significant progress is being made by the Research & Development portfolio. The R&D portfolio has led to the construction of renewable energy generation amounting to 106 GWh per year and nearly 10 MW. Electricity savings of 110 GWh per year are accruing from the DG-CHP Demonstration Program.

Across the programs, numerous near-term goals were set such as: the number of solicitations, studies, and projects; the number of workshops; the number of companies doing business in New York; new products developed and launched; and other important knowledge creation, information dissemination, and commercialization progress metrics. Overall, the programs are performing well with respect to these goals. Results of each program's progress toward its stated goals are shown in table format in Section 5. Many of these goals are qualitative in nature. However, some key areas of progress in the past 30 months include the following:

- Under the Public Benefit Power Transmission and Distribution Program, 26 projects have been approved to provide 21 companies nearly \$10 million to pursue development of advanced technologies that will improve the efficiency and delivery of power for electric customers across the State. The Program has succeeded in collaborating with major stakeholders. The Program has funded projects in each of the electric utility companies, is working with the NYISO's newly formed R&D group to prioritize critical technology needs, and is partnering with the U.S. Department of Energy on smart-grid projects and technology evaluation.
- The Clean Energy Infrastructure Program has helped develop two accredited training institutions, offered 27 training workshops, supported 18 companies in their efforts to expand renewable business networks, and helped three manufacturing companies expand their operations.
- The Power Systems Product Development Program has awarded funding for 53 projects, field test eight new products and completed 12 technology assessments.
- The DG-CHP Demonstration Program has funded 19 projects representing \$27.5 million of funding, \$132.2 million of customer co-funding, and 133.6 MW of anticipated capacity.
- Demand Response and Innovative Rate Research Program has enlisted the participation of 2,151 apartments for time-sensitive electric rate pilot programs.
- The Electric Transportation Program has issued three solicitations and selected 20 projects for funding. A demonstration of a third-rail heater control system, with the potential to save \$1.5 million per year, was completed.
- The Environmental Monitoring, Evaluation, and Protection Program (EMEP) has issued seven solicitations, resulting in 45 contracts and \$7 million in co-funding. Fourteen research reports, five summary communications, and 52 journal articles have been published.

- The Industrial Process & Product Innovation Program has issued one solicitation with two due dates, resulting in \$6.3 million in committed funds for 37 projects and \$11.2 million in co-funding.
- The Municipal Water and Wastewater Efficiency Program has selected six projects for funding. The program goal of providing information to 1,000 individuals serving the municipal wastewater and water treatment sectors was achieved in 2008.
- Under the Next Generation and Emerging Technologies Program, 18 advanced building projects, one daylighting project, six solar thermal projects, and 13 emerging technologies projects have commenced.

Longer-term progress, since program inception, includes the following highlights:

- Under the DG/CHP Demonstration Program, 49 systems are now operational, representing \$24.6 million in program funding, \$93.0 million in total system costs, and 27.2 MW of installed capacity.
- Under the Power Systems Product Development Program, five new products have been launched.
- The Truck Stop Electrification Project developed infrastructure technology, sponsored initial demonstrations and created a New York-based business that allows long haul trucks to eliminate sleeper cab engine idling during mandatory rest periods. Systems developed for the program are currently being sold nationally and are eligible for State and federal incentives.
- As of December 2008, \$4.6 million has been committed under the targeted water and wastewater initiative. An additional \$1.3 million has been awarded for municipal water/wastewater projects under the Technical Assistance Program. Once implementation is complete, 19 demonstration projects should lead to nearly 44,500 MWh of electricity savings and 15.1 MW of peak demand reduction.

Follow Up on Evaluation Recommendations

As appropriate during the course of their work activities, NYSERDA's evaluation contractors often put forth recommendations for programmatic improvements. These recommendations are typically discussed with program staff and included in the evaluation contractors' final reports to NYSERDA. Although it is not expected that every recommendation will be acted upon, NYSERDA's evaluation team seeks to ensure that the recommendations are actionable and are considered by program staff.

In recent years, NYSERDA has made a significant effort to formalize the process for tracking response to and implementation of evaluation contractor recommendations for program improvement. In this year's report, eight programs contain a section detailing recommendations made recently by evaluation contractors and program staff's responses/actions to date.¹² Recommendations already reviewed in prior evaluation cycles but not yet acted upon are revisited with program staff if relevant. Overall, this formal and systematic recommendation tracking process should result in greater use of the knowledge gained from the evaluation work, and longer-term tracking of programmatic changes will determine whether the recommended changes led to the expected outcomes and improvements.

¹² These eight programs are: Existing Facilities, Business Partners, New Construction, Home Performance with ENERGY STAR, ENERGY STAR Labeled Homes, Multifamily Building Performance, EmPower, and the Clean Energy Initiative.

1

Introduction and Public Policy Context

1.1 Introduction

This report updates progress made to date in implementing the **New York Energy SmartSM Public Benefits Program (Program)**. Progress is reported for Program activities completed through December 31, 2008.¹³ The report was prepared jointly by New York State Energy Research and Development Authority (NYSERDA) staff and a team of third-party evaluation contractors, in accordance with the Memorandum of Understanding (MOU)¹⁴ between NYSERDA and the New York State Department of Public Service (DPS).

DPS Staff was provided a draft report for review. Feedback and comments received on the draft report were incorporated into this final report. NYSERDA submits this report to the Public Service Commission (PSC) in fulfillment of its responsibility under the terms of the MOU.

1.2 Public Policy Context

The System Benefits Charge (SBC) Program administered by NYSERDA as the **New York Energy SmartSM Program**, was initiated in 1998 by order of the PSC¹⁵ and has included three funding cycles.¹⁶

The **New York Energy SmartSM Program (Program)** portfolio is comprised of initiatives promoting energy efficiency, including both permanent efficiency reductions as well as peak demand management; facilitating renewable energy infrastructure development; providing energy services to low-income New Yorkers; and conducting research, development, and demonstration of promising new technologies. The

¹³ Previous annual reports were issued in September 2000, January 2002, May 2003, May 2004, May 2005, May 2006, March 2007 and March 2008. Each report presents cumulative results from the Program's inception on July 1, 1998. Reports are available at www.nyserd.org and by request.

¹⁴ The original Memorandum of Understanding (MOU) between the New York State Public Service Commission, New York State Department of Public Service, and New York State Energy Research and Development Authority was signed March 11, 1998, and revised December 6, 2001. A new MOU between the New York State Department of Public Service and the New York State Energy Research and Development Authority was signed on August 22, 2008.

¹⁵ Case 94-E-1052, *et. al.*, In the Matter of Competitive Opportunities Regarding Electric Service, Opinion 98-3, issued January 30, 1998.

¹⁶ The most recent cycle was initiated with the New York State Public Service Commission in Case 05-M-0900, In the Matter of the System Benefits Charge III, *Order Continuing the System Benefits Charge (SBC) and the SBC-funded Public Benefit Programs*, issued and effective December 21, 2005.

Program provides a myriad of services, and includes the dissemination of information to increase consumer energy awareness, marketing of programs and services, provision of financial incentives to spur customer and market investment in energy efficiency and demand management, development and testing of new products, commercializing new technologies, and gathering data and information.

The **New York Energy SmartSM** Program is currently in its third funding cycle. Each funding cycle, and the Program's evolution over time, is described below.

First Funding Cycle (1998 – 2001)

- June 1998 through June 2001. During this three-year period, NYSERDA's administration of the Program was begun with emphasis on designing programs, conducting outreach, and offering technical and financial assistance to customers and market allies to fully deploy programs. Programs were offered to all customers paying the SBC. During this period, NYSERDA administered approximately \$58 million per year in SBC funding.

Second Funding Cycle (2001 – 2006)

- July 2001 through December 2002. During the second funding cycle, NYSERDA was provided approximately \$147 million per year to continue and expand upon its current program offerings. Also during this period, the **New York Energy SmartSM** Program's implementation activities were greatly accelerated as committed program funding more than doubled in the first 18-month period, going from less than \$300 million to more than \$600 million. The rapid increase in program funding commitments was a direct result of program design, outreach, and marketing efforts introduced by NYSERDA during the first three years of the Program. NYSERDA's early efforts were designed to create a market capacity and capability to deliver energy efficiency and related services. Once created, Program activities could be readily accelerated, as partnerships were created with market allies, marketing and general awareness campaigns had succeeded in stimulating demand for services, and the market infrastructure was in place to deliver such services.
- January 2003 through December 2004. As the **New York Energy SmartSM** Program evolved, NYSERDA selectively modified its funding commitments across the many programs offered. For example, funding modifications were required because some 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 to preserve funds through June 2006, when the second funding cycle for the Program was scheduled to end.
- January 2005 through June 2006. NYSERDA continued to assess gaps and opportunities with respect to energy efficiency, low-income services, 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.

Third Funding Cycle (2006 – 2011)

- July 2006 through June 2011. The PSC extended the **New York Energy SmartSM** Program for another five years, increasing funding from approximately \$150 million to \$175 million annually. The continuation and expansion of the Program is designed to help maintain momentum for the State's efforts to develop competitive markets for energy efficiency; demand management (including peak-load reduction); outreach and education services; research, development, and demonstration; and low-income services and to provide direct economic and environmental benefits to New

Yorkers. The extended program will continue to address market barriers to the competitive procurement of these services.

During 2008, several changes that came out of the PSC's Energy Efficiency Portfolio Standard (EEPS) proceeding have affected NYSERDA's New York Energy SmartSM Program portfolio and evaluation efforts.

- The PSC's June 23rd EEPS Order called for an increase in SBC collections and a ramp up of program efforts by NYSERDA and the State's six investor-owned electricity transmission and distribution utilities to meet the State's "15-by-15" electricity reduction goal.¹⁷ NYSERDA complied with the PSC's Order by submitting a Supplemental Revision to the SBC Operating Plan incorporating approximately \$80 million per year in additional funds for five new or expanded programs as well general awareness, administration and evaluation associated with those programs.¹⁸ As these expanded and new efforts begin in 2009, NYSERDA will include their progress in monthly, quarterly and annual reports to the PSC.
- The Order specified that evaluation funding shall be set at 5% of program budgets for the new and expanded programs, and increased from 2% to 5% for the remainder of NYSERDA's existing New York Energy SmartSM Program. NYSERDA complied with the Order by filing a Transition Plan describing planned enhancements to evaluation, measurement and verification.¹⁹ DPS Staff was directed to establish common protocols for evaluation, measurement and verification, and convene an EEPS Evaluation Advisory Group to engage in active oversight of all program administrators' evaluation planning and implementation. The EEPS Advisory Group was established in August 2008, and includes a NYSERDA representative.²⁰ DPS Staff's August 2008 evaluation plan guidelines for program administrators served as the basis for NYSERDA's development and submittal of detailed evaluation plans for the five new/expanded programs in late 2008.

1.3 Design and Conduct of the New York Energy SmartSM Program

In order to successfully pursue the diverse program objectives described above, NYSERDA employs a variety of strategies. Representative strategies are presented in broad terms below. Many programs use a combination of these strategies. Discussions of individual activities are presented throughout this evaluation report.

- Market transformation programs promote energy efficiency by developing markets and permanently changing energy-related decisions by residents, retailers, and manufacturers. Creating an energy-efficiency "ethic" is critical if New Yorkers are to improve energy efficiency without sacrificing energy-related services – making decisions based on life-cycle economic benefits and costs, and

¹⁷ The "15-by-15" goal refers to a 15% reduction in electricity use from 2015 forecast levels.

¹⁸ Expanded programs are New Construction, Flex Tech and EmPower New York. New programs are Industry and Process Efficiency and CFL Expansion. The total EEPS funding included in the Operating Plan was approximately \$260 million over three and one quarter years.

¹⁹ The August 22, 2008 *New York State Energy Research and Development Authority Transition Plan for Enhancing Program Evaluation* can be found at:
[http://www3.dps.state.ny.us/PSCWeb/PIOWeb.nsf/20b9016ae2129d5c852573db00779ee1/b6768a6d2fc29e0a852574b30049651a/\\$FILE/EEPS%2060%20day%20filing%20NYSERDA%20Transition%20Plan.pdf](http://www3.dps.state.ny.us/PSCWeb/PIOWeb.nsf/20b9016ae2129d5c852573db00779ee1/b6768a6d2fc29e0a852574b30049651a/$FILE/EEPS%2060%20day%20filing%20NYSERDA%20Transition%20Plan.pdf)

²⁰ A list of EEPS Evaluation Advisory Group members can be found at:
[http://www3.dps.state.ny.us/PSCWeb/PIOWeb.nsf/20b9016ae2129d5c852573db00779ee1/a4756ca0f43b7628852574b9006ffe45/\\$FILE/Evaluation%20Advisory%20Group%20members.pdf](http://www3.dps.state.ny.us/PSCWeb/PIOWeb.nsf/20b9016ae2129d5c852573db00779ee1/a4756ca0f43b7628852574b9006ffe45/$FILE/Evaluation%20Advisory%20Group%20members.pdf)

sustainable environmental stewardship. Market transformation programs also promote the development of the energy-efficiency supply infrastructure through training, certification, marketing, and other means.

- Energy-efficiency or resource-acquisition programs identify energy savings opportunities and install energy-efficient products and technologies in small homes, multifamily buildings, commercial buildings, industrial plants, and other facilities.
- Load-management programs allow energy users to shift and reduce energy use from on-peak to off-peak periods – thereby reducing customers' energy bills, and improving the reliability of the electric system.²¹
- Low-income services make energy more affordable for low-income households by installing energy-efficiency improvements and by disseminating energy information to homeowners, building owners and operators, and contractors.
- Research, Development and Demonstration (RD&D) programs develop alternative energy resources and technologies, deploy distributed generation and combined heat and power systems, develop and test new technologies and products, and collect and evaluate data for use in environmental analysis and in support of policy decision making. RD&D programs emphasize innovation and support projects and activities that provide opportunities for breakthroughs that might significantly improve existing technologies, products, and markets.

Given the diversity of program purposes, services, and goals, different evaluation methods must be applied to each of the program offerings. According to needs and available resources, the following major evaluation functions are applied to the **New York Energy SmartSM** programs by NYSERDA staff and evaluation contractors: impact assessment, including benefit-cost analysis; market characterization and assessment, including program logic development; and process evaluation. Additional evaluation analyses, such as macroeconomic impact analysis, are conducted at the portfolio level.

1.4 Organization of the Report

This annual report describes how the **New York Energy SmartSM** Program is contributing to meeting its public policy goals. The report is divided into the following sections:

Executive Summary

Section 1 - Introduction and Public Policy Context

Section 2 – Portfolio-Level Reporting

Section 3 – Commercial and Industrial Programs

Section 4 – Residential and Low-Income Programs

²¹ 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 5 - Research and Development Programs

2

Portfolio-Level Reporting

The New York Energy SmartSM portfolio includes numerous program initiatives that individually and collectively help the State progress toward achieving its energy policy goals. This section presents findings and results for the portfolio of New York Energy SmartSM programs. More specific findings and results from evaluations of individual programs are presented separately in Sections 3, 4 and 5.

2.1 Budget and Spending Status

This financial overview of the New York Energy SmartSM Program presents budget and funding status from 1998 through December 31, 2008. The 13-year budget is approximately \$1.87 billion, of which \$1.68 billion is allocated to four major program areas – Commercial/Industrial, Residential, Low-Income, and Research and Development (R&D) – and a general awareness campaign. The budgets for these program areas are presented in Table 2-1 along with the costs for program administration, program evaluation, the Environment Disclosure Program²², and the New York State Cost Recovery Fee²³.

Table 2-1 and Table 2-2 present graphic representations of ratepayer System Benefits Charge (SBC) contributions.

²² This program provides electricity commodity suppliers with data for informing customers about the fuel mix and associated environmental impacts of their electricity sources.

²³ The New York State Cost Recovery Fee is assessed for services to public authorities. The fee is determined by the New York State Division of Budget and imposed and collected by the Department of Taxation and Finance.

Table 2-1. New York Energy SmartSM Program Budget (\$ million)

	Budget ¹			% of Program Area Budget	% of Total Budget
	SBC I & SBC II ²	SBC III ³	Total Budget		
Commercial/Industrial	\$247.1	\$386.8	634.0	37.6%	33.8%
Residential	165.4	147.3	312.8	18.6%	16.7%
Low-Income	86.6	232.0	318.6	18.9%	17.0%
Research and Development	105.9	282.5	388.3	23.0%	20.7%
General Awareness ⁴ (Marketing)	15.9	15.2	31.0	1.8%	1.7%
Program Areas Total	\$620.9	\$1,063.8	\$1,684.6	100.0%	89.9%
Other Costs					
Program Administration	59.8	68.4	128.3	-	6.8%
Metrics and Evaluation	14.5	19.9	34.4	-	1.8%
Environmental Disclosure	0.8	1.1	1.9	-	0.1%
NYS Cost Recovery Fee ⁵	9.2	16.2	25.4	-	1.4%
Other Costs Total	\$ 84.3	\$105.7	\$190.0	-	10.1%
Total New York Energy SmartSM	\$705.2	\$1,169.4	\$ 1,874.7	-	100.0%

¹ Reflects carryover in funds and reallocation as approved by the Public Service Commission in 2007.

² SBC I: July 1, 1998 through June 30, 2001; SBC II: July 1, 2001 through June 30, 2006.

³ SBC III: July 1, 2006 through June 30, 2011.

⁴ General Awareness previously included in Residential Program Area.

⁵ The New York State Cost Recovery Fee is assessed for services to public authorities. The fee is determined by the New York State Division of Budget and imposed and collected by the Department of Taxation and Finance.

Totals may not sum exactly due to rounding.

Source: NYSDERDA

Figure 2-1. New York Energy \$martSM Ratepayer Contributions by Utility²⁴ Service Area

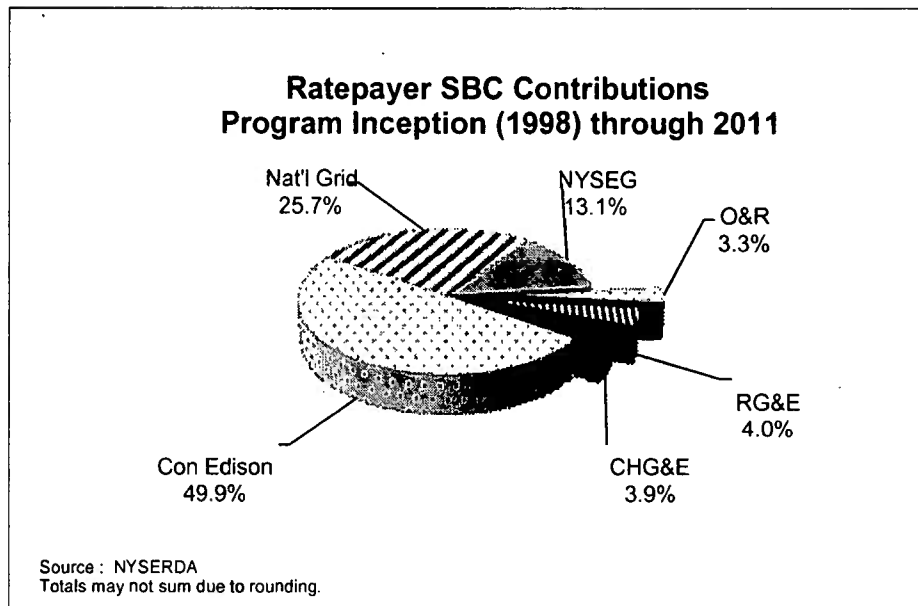
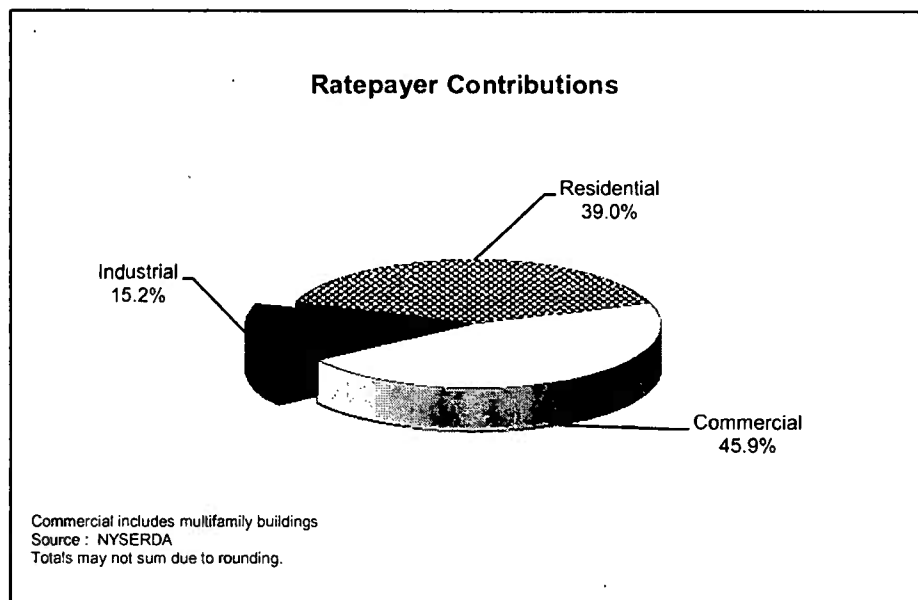


Figure 2-2. New York Energy \$martSM Ratepayer Contributions by Sector



²⁴ The utility service areas: Central Hudson Gas and Electric, Inc. (CHG&E), Consolidated Edison Company of New York, Inc. (Con Edison), National Grid (Nat'l Grid), New York State Electric and Gas Corporation (NYSEG), Orange and Rockland Utilities, Inc. (O&R), Rochester Gas and Electric Corporation (RG&E).

2.1.1 Financial Status and Funding Allocation

Table 2-2 shows the financial status of New York Energy SmartSM through 2008. Spending relative to the 13-year budget is: Commercial/Industrial 55.4%; Residential 76.2%; Low-Income 56.3%; and R&D 43.1%.

Table 2-2. Financial Status of New York Energy SmartSM Program (\$ million) through 2008

	Total 13- Year Budget ¹	Funds Spent			Encumbered Funds ⁴ % of Budget Encumbered	Committed Funds ⁵ % of Budget Committed
		SBC I & SBC II ^{1,2}	SBC III ³	Total Spent & % of Budget		
Program Areas						
Commercial/Industrial	634.0	247.1	104.1	351.2 55.4%	454.4 71.7%	526.4 83.0%
Residential ⁵	312.8	165.4	72.8	238.2 76.2%	256.1 81.9%	264.5 84.6%
Low-Income	318.6	86.6	92.7	179.3 56.3%	231.2 72.6%	237.0 74.4%
Research and Development	388.3	105.9	61.5	167.3 43.1%	251.3 64.7%	316.3 81.5%
General Awareness ⁶ (Marketing)	31.0	15.9	5.2	21.1 67.9%	25.3 81.6%	25.3 81.6%
Program Areas Total	\$1,684.6	\$620.9	\$336.2	\$957.1 56.8%	\$1,218.3 72.3%	\$1,369.5 81.3%
Other Costs						
Program Administration	128.3	59.8	35.0	94.8 73.9%	94.8 73.9%	94.8 73.9%
Metrics and Evaluation	34.4	14.5	7.0	21.5 62.5%	24.5 71.2%	24.8 72.0%
Environmental Disclosure	1.9	0.8	-0.75	0.05 2.5%	0.05 2.5%	0.05 2.5%
NYS Cost Recovery Fee	25.4	9.2	6.7	15.9 62.5%	15.9 62.5%	15.9 62.5%
Other Costs Total	\$190.0	\$84.3	48.0	\$132.3 69.6%	\$135.3 71.2%	135.6 71.4%
Total New York Energy Smart SM	\$1,874.7	\$705.2	\$384.2	\$1,089.4 58.1%	\$1,353.6 72.2%	\$1,505.1 80.3%

¹ Reflects carryover in funds and reallocation as approved by the Public Service Commission in 2007.

² SBC I: July 1, 1998 through June 30, 2001; SBC II: July 1, 2001 through June 30, 2006.

³ SBC III: July 1, 2006 through June 30, 2011.

⁴ Encumbered funds associated with signed contracts and purchase orders.

⁵ Committed funds associated with encumbered funds and pending contracts.

⁶ General Awareness previously included in Residential Program Area.

Totals may not sum exactly due to rounding. Source: NYSDA

Figure 2-3 provides historical information on program funding and spending.

**Figure 2-3. New York Energy \$martSM Program Funding History and Activity
December 1998 through December 2008**

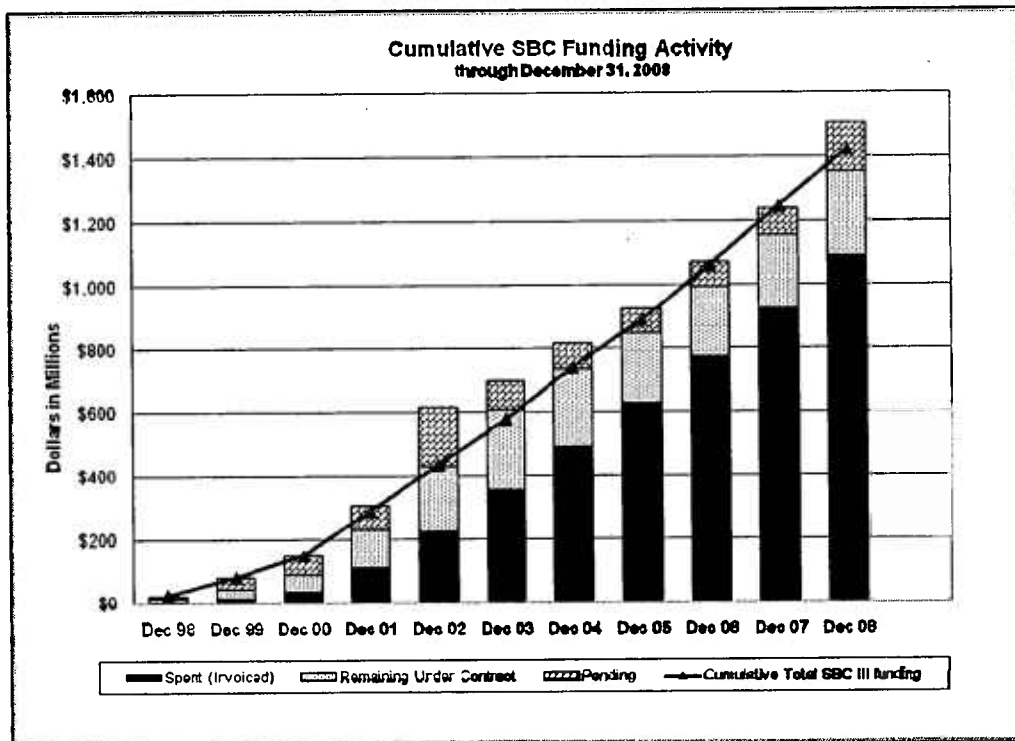


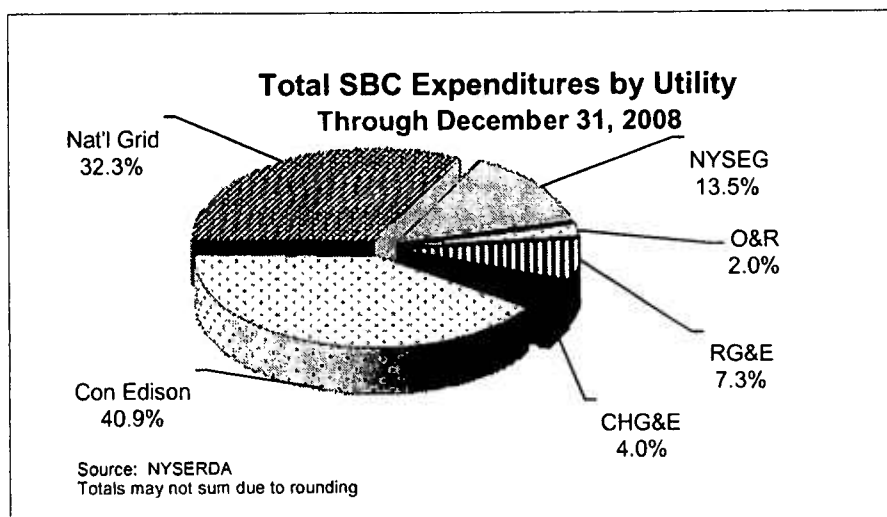
Figure 2-4 shows the percentage of total portfolio spending in each utility territory through December 2008. For some utility territories, spending is currently higher than their SBC collections, and for others spending is currently lower than their SBC collections. Due to the statewide, open competitive nature of nearly all of the New York Energy \$martSM Program spending, NYSERDA processes applications and awards incentives without regard to where Program applicants are located. However, NYSERDA recognizes that a few imbalances exist between collections received from and spending returned to utility territories, and NYSERDA has taken action and is making further plans to correct this imbalance. Actions taken in 2008 include, but are not limited to, the following:

- Completion of a New York City-wide process evaluation to assess NYSERDA program design, outreach, delivery, and management in the context of the unique New York City market. Recommendations from the evaluation contractor conducting the study are included later in Section 2 of this report.
- Completion of a Downstate market characterization and assessment study to provide NYSERDA staff and program implementation contractors with specific market information they can use to identify ways to increase NYSERDA program penetration in the Downstate region, and to better understand Downstate participation in NYSERDA's programs. A summary of findings from the study are included later in Section 2 of this report.

- Increased staffing in its New York City office, including appointment of a new Director, in order to improve customer service and outreach.
- Development of a more detailed tracking system for seven of NYSERDA's major programs serving the Con Edison territory. The tracking system will better identify how the programs are penetrating this market and assist NYSERDA in reallocating resources and/or revising the programs to insure that Con Edison ratepayers are receiving an equitable share of the SBC funds.

Recent and ongoing growth of the service delivery infrastructure in the Con Edison service territory is expected to correct that imbalance over the next year or two. In future reports, NYSERDA will update progress made toward achieving a better balance between service territory collections and spending.

Figure 2-4. Total SBC Expenditures by Utility



2.1.2 Program Areas

Commercial/Industrial Program Area

Table 2-3 presents detailed budget and funding information for the Commercial/Industrial programs. Figure 2-5 and Figure 2-6 show C/I program spending by utility service area and sector, respectively.

Table 2-3. Commercial/Industrial Programs – Financial Status (\$ million) through 2008

Program	Budget ¹			Funds Spent			Encumbered Funds ⁴ % of Budget Encumbered	Committed Funds ⁵ % of Budget Committed
	SBC I & SBC II ²	SBC III ³	Total Budget	SBC I & SBC II ²	SBC III ³	Total Funds Spent		
Existing Facilities ⁶	135.4	190.9	326.3	135.4	38.0	173.4 53.1%	228.2 69.9%	233.1 71.4%
New York Energy Smart SM Business Partners	21.1	22.8	43.9	21.1	6.6	27.7 63.1%	32.2 73.5%	34.9 79.5%
Loan Fund and Financing ⁷	12.3	13.0	25.4	12.3	17.7	30.0 118.3%	34.5 136.2%	34.8 137.2%
Energy Smart Focus	4.8	14.0	18.9	4.8	5.6	10.4 55.1%	12.4 65.8%	14.1 74.9%
New Construction Program	53.1	111.3	164.4	53.1	30.0	83.1 50.5%	114.5 69.7%	174.9 106.4%
FlexTech Technical Assistance	20.4	34.7	55.2	20.4	6.3	26.7 48.4%	32.5 58.9%	34.6 62.8%
Total Commercial & Industrial	\$247.1	\$386.7	\$634.0	\$247.1	\$104.1	\$351.2 55.4%	\$454.4 71.7%	\$526.4 83.0%

¹ Reflects carryover in funds and reallocation as approved by the Public Service Commission in 2007.

² SBC I: July 1, 1998 through June 30, 2001; SBC II: July 1, 2001 through June 30, 2006.

³ SBC III: July 1, 2006 through June 30, 2011.

⁴ Encumbered funds associated with signed contracts and purchase orders.

⁵ Committed funds associated with encumbered funds and pending contracts.

⁶ Existing Facilities Program (EFP) was formed by merging the Peak Load Management and Enhanced Commercial/Industrial Performance (ECIPP) programs.

⁷ NYSERDA will seek permission from DPS for reallocation of funds from within the Energy Efficiency Commercial/Industrial program area. Such intra-program reallocation would not require Public Service Commission approval.

Totals may not sum exactly due to rounding.

Source: NYSERDA

Figure 2-5. C/I Funds Spent by Utility Service Area

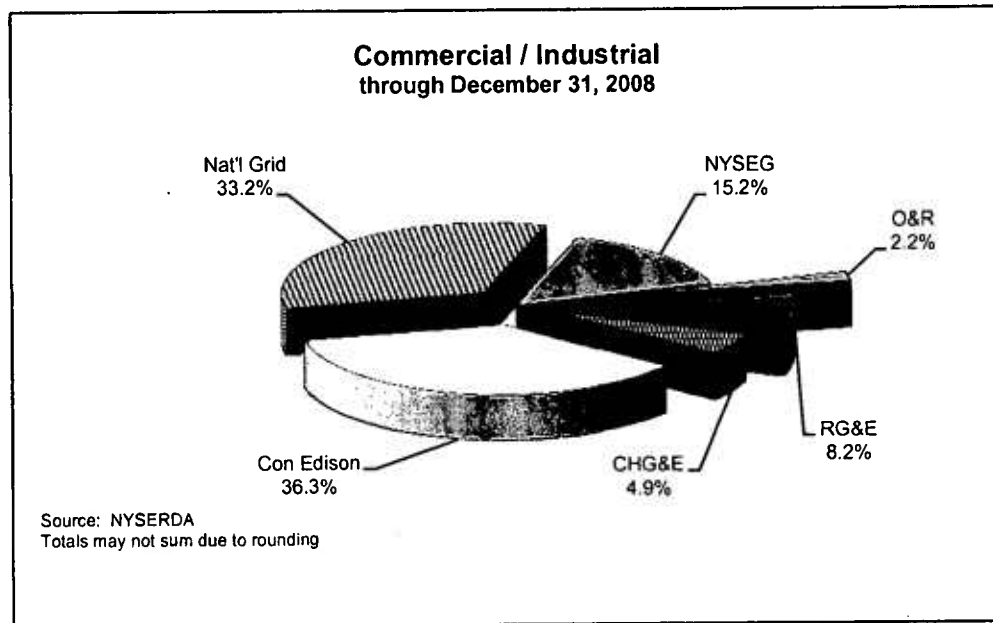
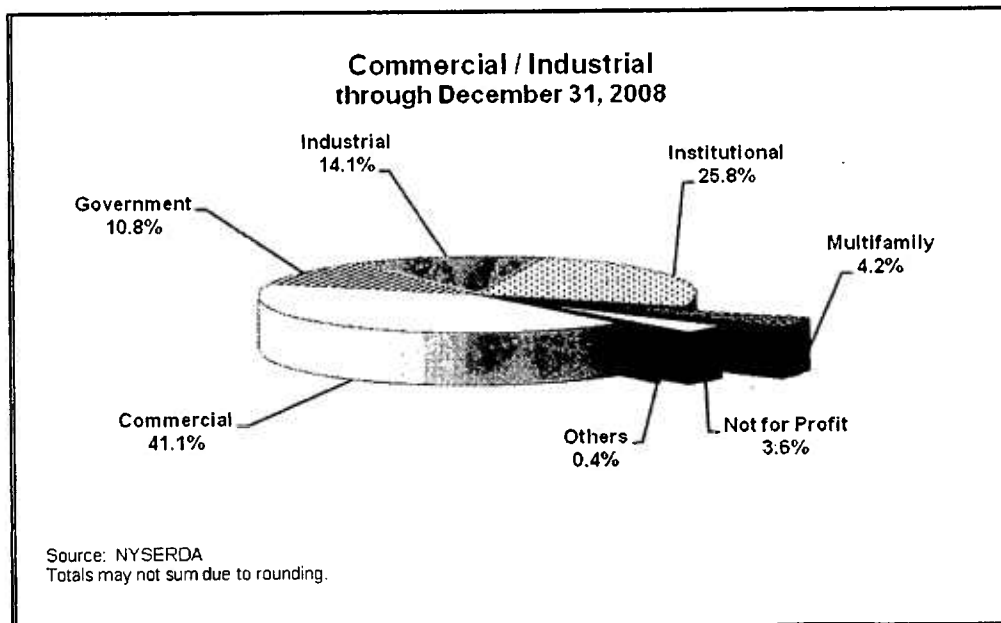


Figure 2-6. C/I Funds Spent by Sector



Residential and Low-Income Program Areas

Table 2-4 presents detailed budget and funding information for the Residential and Low-Income programs. Figure 2-7 and Figure 2-8 show Residential program spending by utility service area and housing type, respectively. Figure 2-9 and Figure 2-10 provide the same information for the Low-Income programs.

Table 2-4. Residential & Low-Income Programs - Financial Status (\$ million) through 2008

Program	Budget ¹			Funds Spent			Encumbered Funds ⁴ % of Budget Encumbered	Committed Funds ⁵ % of Budget Committed
	SBC I & SBC II ²	SBC III ³	Total Budget	SBC I & SBC II ²	SB C III ³	Total Funds Spent		
Residential Programs								
Single Family Home Performance	47.4	60.1	107.5	47.4	31.0	78.4 72.9%	79.3 73.7%	83.3 77.5%
Multifamily Building Performance	18.3	26.1	44.5	18.3	13.6	32.0 71.9%	43.8 98.6%	45.3 102.0%
Market Support Residential	96.5	52.3	148.9	96.5	23.8	120.3 80.8%	124.8 83.8%	127.6 85.7%
Communities and Education	3.2	8.8	11.9	3.2	4.4	7.5 63.1%	8.2 68.9%	8.3 69.1%
Subtotal Residential	\$165.4	\$147.3	\$312.8	\$165.4	72.8	\$238.2 76.2%	\$256.1 81.9%	264.5 84.6%
Low-Income Programs								
Single Family Home Performance	22.3	56.0	78.3	22.3	18.4	40.7 52.0%	41.0 52.4%	43.7 55.8%
Multifamily Building Performance	45.4	114.6	160.0	45.4	39.4	84.8 53.0%	132.8 83.0%	135.5 84.7%
EmPower New York	14.3	49.4	63.7	14.3	32.0	46.2 72.6%	47.6 74.7%	47.8 75.0%
Buying Strategies & Energy Awareness	4.7	11.9	16.6	4.7	2.9	7.5 45.5%	9.8 59.3%	10.0 60.6%
Subtotal Low-Income	\$86.6	\$232.0	\$318.6	\$86.6	\$92.7	\$179.3 56.3%	\$231.2 72.6%	\$237.0 74.4%
TOTAL Residential and Low Income	\$252.0	\$379.3	\$631.4	\$252.0	\$165.5	\$417.5 66.1%	\$487.3 77.2%	\$501.5 79.4%

¹ Reflects carryover in funds and reallocation as approved by the Public Service Commission in 2007.

² SBC I: July 1, 1998 through June 30, 2001; SBC II: July 1, 2001 through June 30, 2006.

³ SBC III: July 1, 2006 through June 30, 2011.

⁴ Encumbered funds associated with signed contracts and purchase orders.

⁵ Committed funds associated with encumbered funds and pending contracts.

Totals may not sum exactly due to rounding.

Source: NYSERDA

Figure 2-7. Residential Funds Spent by Utility Service Area

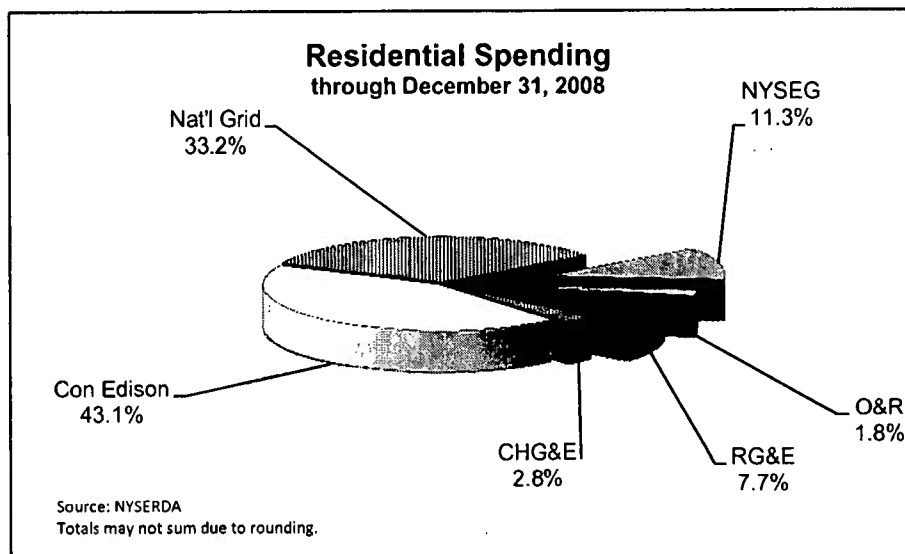


Figure 2-8. Residential Funds Spent by Housing Type

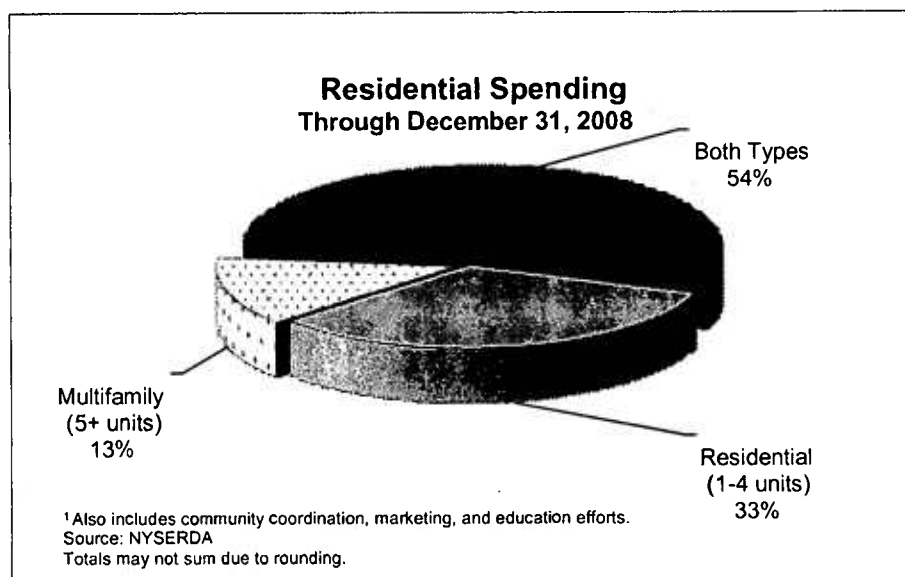


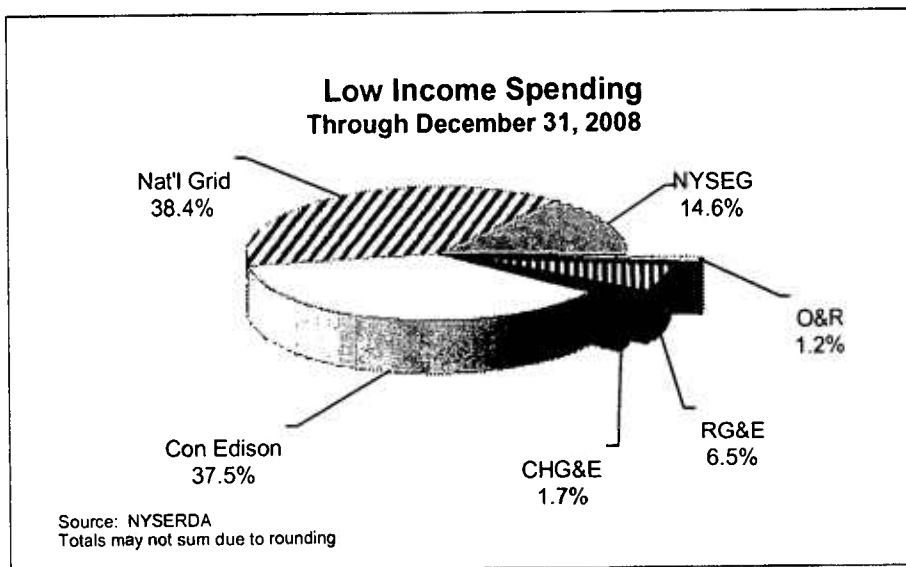
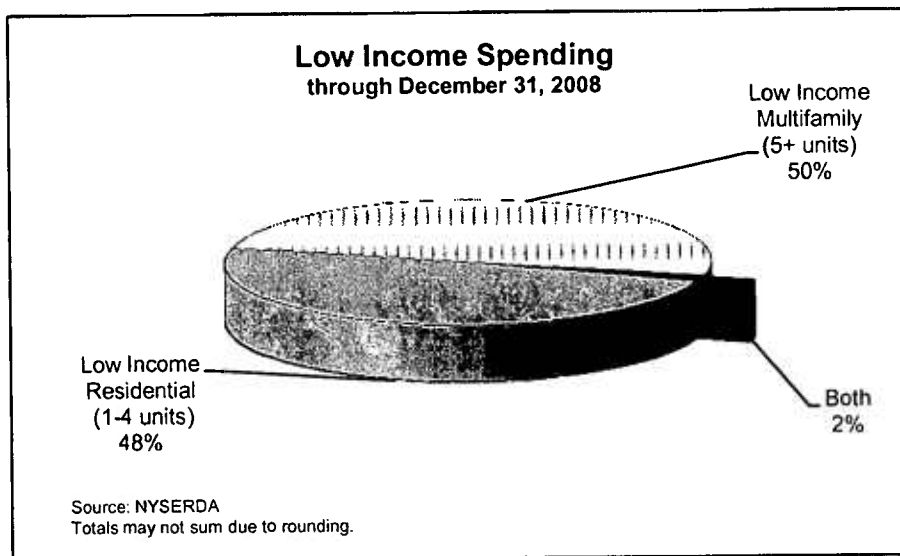
Figure 2-9. Low-Income Funds Spent by Utility Service Area**Figure 2-10. Low-Income Funds Spent by Housing Type****Research, Development and Demonstration Program Area**

Table 2-5 presents detailed budget and funding information for the Research, Development and Demonstration (RD&D or R&D) programs. Figure 2-11 and Figure 2-12 show R&D Program spending by utility service area and technology.

Table 2-5. Research & Development Programs – Financial Status (\$ million) through 2008

Program	Budget ¹			Funds Spent			Encumbered Funds ⁴ % of Budget Encumbered	Committed Funds ⁵ % of Budget Committed
	SBC I & SBC II ²	SBC III ³	Total Budget	SBC I & SBC II ²	SBC III ³	Total Funds Spent % Funds Spent		
Public Benefit Power Transmission and Distribution	0.0	10.0	10.0	0.0	0.19	0.19 1.9%	4.0 40.0%	9.5 95.1%
End Use Renewable Energy Market ⁶	19.0	28.4	47.3	19.0	22.1	41.1 86.8%	47.5 100.2%	47.6 100.4%
Clean Energy Infrastructure	0.0	43.8	43.8	0.0	2.9	2.9 6.7%	10.6 24.2%	28.8 65.9%
Distributed Energy Resources: Products and Demonstrations	34.0	115.3	149.2	34.0	19.2	53.2 35.7%	91.1 61.0%	120.1 80.5%
Demand Response and Innovative Research	0.0	10.0	10.0	0.0	0.1	0.1 0.1%	0.3 3.0%	0.3 3.0%
Electric Transportation	0.0	5.0	5.0	0.0	0.6	0.6 12.0%	2.1 42.6%	3.0 60.7%
Environmental, Monitoring, Evaluation, and Protection	17.7	21.3	39.1	17.7	5.2	23.0 58.8%	31.6 80.9%	34.3 87.8%
Industrial and Municipal Process Efficiency	0.0	15.0	15.0	0.0	1.6	1.6 10.6%	5.7 38.2%	8.2 54.4%
Next Generation and Emerging Technologies	18.3	24.5	42.7	18.3	6.3	24.6 57.5%	33.8 79.0%	38.9 91.1%
Wholesale Renewable Energy Market	16.5	6.3	22.7	16.5	2.4	18.8 82.9%	21.2 93.3%	22.2 97.7%
Other ⁷	0.4	0.0	0.4	0.4	0.0	0.4 100.0%	0.4 100.0%	0.4 100.0%
Regional Greenhouse Gas Initiative	0.0	3.0	3.0	0.0	0.9	0.9 30.5%	3.0 100.0%	3.0 100.0%
TOTAL Research & Development	\$105.9	\$282.5	\$388.3	\$105.9	\$61.5	\$167.3 43.1%	\$251.3 64.7%	\$316.3 81.5%

¹ Reflects carryover in funds and reallocation as approved by the Public Service Commission in 2007.² SBC I: July 1, 1998 through June 30, 2001; SBC II: July 1, 2001 through June 30, 2006.³ SBC III: July 1, 2006 through June 30, 2011.⁴ Encumbered funds associated with signed contracts and purchase orders.⁵ Committed funds associated with encumbered funds and pending contracts.⁶ Over committed amounts will be reclassified to the approved Renewable Portfolio Standard Customer Sited Tier budget.⁷ Other: Projects transferred from ESEERCO (Empire State Electric Energy Research Corp.) Program closed.

Totals may not sum due to rounding.

Source: NYSERDA

Figure 2-11. R&D Funds Spent by Utility Service Area

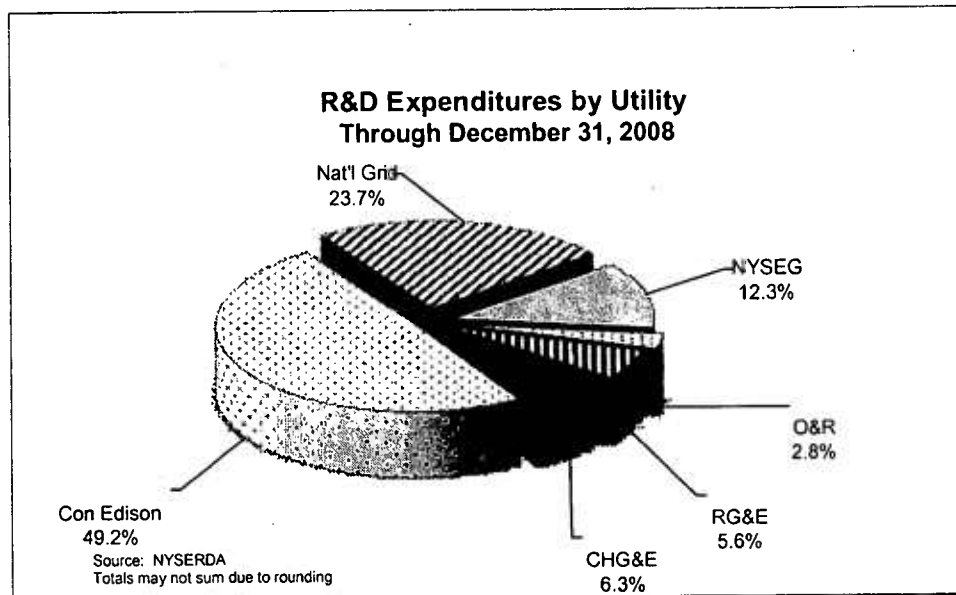
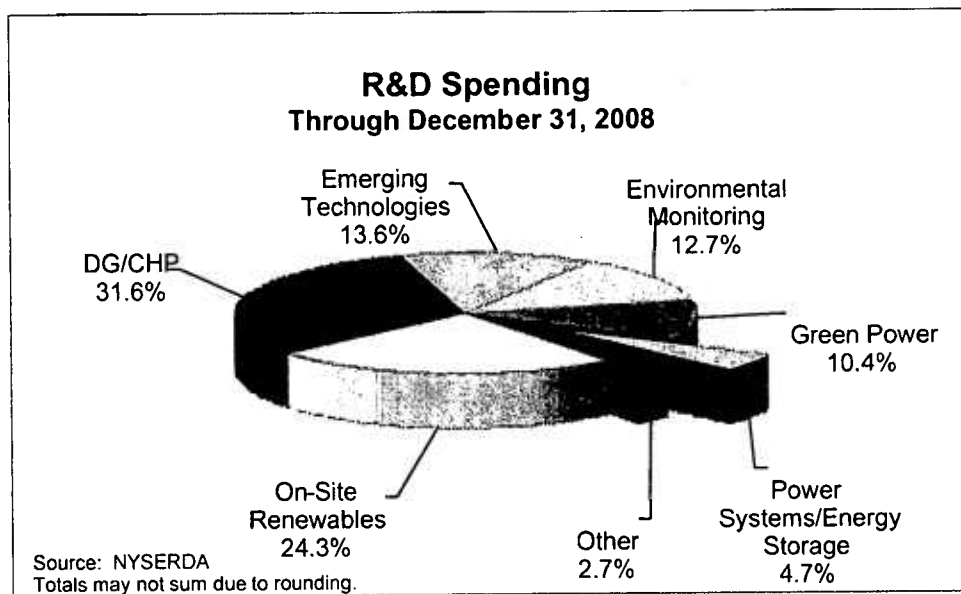


Figure 2-12. R&D Funds Spent by Technology



2.2 Portfolio-Level Findings

This section discusses evaluation activities and portfolio-level findings related to progress toward overarching public policy goals, energy savings achievements, and economic analyses including macroeconomic impacts, and overall cost-effectiveness. These findings were compiled based on the cumulative work of NYSERDA and its evaluation contractor teams over the past several years.

2.2.1 2008 Evaluation Activities

Evaluation activities completed this year include:

- Portfolio level macroeconomic impact and benefit-cost analysis update;
- Initial results from a project to evaluate gross and net impacts from projects with the largest energy savings across the portfolio (includes projects in the Peak Load Management, Enhanced Commercial/Industrial Performance, New Construction, FlexTech/Technical Assistance, and Distributed Generation/Combined Heat and Power programs);
- New York City/Westchester process and market evaluations;
- Process evaluation for the Commercial/Industrial Performance Program;
- Best practices process evaluation study for the Loan Fund;
- Market characterization and assessment study for the New Construction Program;
- Prospective benefits study for the New Construction Program;
- New York oversample to the 2008 National ENERGY STAR survey;
- New York oversample to the 2008 National Energy Conservation, Efficiency and Demand Response study;
- Market characterization and assessment for Home Performance with ENERGY STAR;
- Market characterization and assessment for ENERGY STAR Homes;
- Phase 2 process evaluation for Multifamily Building Performance;
- Update of market-based program appliance savings for the Market Support Program;
- Phase 3 process evaluation for Energy Smart Communities;
- Process evaluation for the EmPower Program; and
- R&D macroeconomic impact analysis update.

In the coming quarter, NYSERDA expects to complete an update to the program level benefit-cost analysis as well as a prospective benefits study on the Home Performance with ENERGY STAR Program.

2.2.2 Progress toward Policy Goals

This section presents the cumulative progress of the New York Energy SmartSM Program toward meeting the four overarching public policy goals set forth by the PSC.²⁵ Overall, the Program is making continued progress toward achieving the long-term goals. The goals and high-level progress through December 31, 2008 are shown in Table 2-6. Substantial additional program-specific and sector-level accomplishments have been documented and are contributing to sustainable progress toward these important overarching public policy goals.

Table 2-6. New York Energy SmartSM Goals and Progress through December 31, 2008

Public Policy Goal	Progress as of December 31, 2008
Improve New York's energy system reliability and security by reducing energy demand and increasing energy efficiency, supporting innovative transmission and distribution technologies that have broad application, and enabling fuel diversity, including renewable resources.	The New York Energy Smart SM Program has improved system-wide reliability and peak demand reduction, enabling 575 MW of callable load reduction and installing efficiency measures that permanently reduce peak demand by another 700 MW.
	Renewable energy programs have reduced peak demand on the electric grid by an additional 10 MW.
	The New York Energy Smart SM Program has led to the installation of energy efficiency measures saving 3,225 GWh per year. Of this, nearly 110 GWh of electricity is being generated annually from DG-CHP systems.
	The New York Energy Smart SM Program has led to the installation of wind and photovoltaic (PV) technologies, which provide 106 GWh of clean electricity generation per year. This includes the installation of 865 PV and 15 small wind systems.
	Over the past year, the number of operational DG-CHP systems has increased from 45 to 49.
	Under the Public Benefit Power Transmission and Distribution Program, 26 projects have been approved to provide 21 companies, universities and other institutions \$10 million to pursue development of advanced technologies that will improve the efficiency and delivery of power for electric customers across the State.
Reduce the energy cost burden of New Yorkers by offering energy users, particularly the State's lowest income households, services that moderate the effects of energy price increases and volatility and provide access to cost-effective energy efficiency options.	The New York Energy Smart SM Program has saved participating customers nearly \$590 million in annual energy costs.
	More than 72,000 eligible New York low-income customers received direct assistance through the New York Energy Smart SM programs, resulting in \$320/year in average customer energy bill savings for this underserved population.
	The New York Energy Smart SM portfolio has achieved a benefit-cost ratio of 1.8 under the most conservative Total Resource Cost Test scenario.
Mitigate the environmental and health impacts of energy use by increasing energy efficiency, encouraging the development of support services for renewable energy resources, and optimizing the energy performance of buildings and products.	The annual reduction of emissions resulting from New York Energy Smart SM Programs' energy savings is 2,800 tons of nitrogen oxide (NO _x), 5,120 tons of sulfur dioxide (SO ₂), and 2.2 million tons of carbon dioxide (CO ₂). ¹
	Between 2003 and 2008, the number of PV and small wind installers participating in the New York Energy Smart SM Program has increased from 14 to 100.

²⁵ Case 94-E-0952 *et al.*, In the Matter of Competitive Opportunities Regarding Electric Service, *Staff Proposal for the Extension of the System Benefits Charge (SBC) and the SBC-funded Public Benefits Program*, August 30, 2005.

Public Policy Goal	Progress as of December 31, 2008
	The New York Energy SmartSM Program has helped optimize energy performance: ▪ in 900 new commercial buildings, ▪ in more than 13,300 new homes, ▪ in more than 23,300 existing homes, ▪ in more than 24,000 multifamily housing units, and ▪ through approximately 13,500 energy efficiency projects in existing commercial, industrial and institutional facilities, including technical studies, benchmarking, measure replacement, and reduced-interest financing.
Create economic opportunity and promote economic well-being by supporting emerging energy technologies, fostering competition, improving productivity, stimulating the growth of New York energy businesses, and helping to meet future energy needs through efficiency and innovation.	Through 2008, the New York Energy SmartSM Program has led to the creation of 4,900 total net jobs.
	Initial results show that R&D product development expenditures have led to an increase in gross state product (GSP). Every one dollar spent on product development projects leads to an increase in the GSP, or value added, by \$4.9.
	Private investment in combined heat and power has increased in New York. The total cost for all projects encumbered through year-end 2008 is \$384 million, 82% of which represents funds from project participants.

¹ These emission reductions are associated with both electric and fossil fuel saving measures. Under a cap-and-trade system, the total number of emission allowances is determined by regulation. Regulated entities can purchase allowances and collectively emit up to the cap that is currently in place. Therefore, in the near term, electric efficiency projects may not decrease the overall amount of emissions going into the atmosphere. However, electric efficiency projects will reduce end-users' responsibility or footprint associated with emissions from electricity production.

2.2.3 Reported and Achieved Energy, Demand and Fuel Savings

The energy, peak demand, and fuel savings from the New York Energy SmartSM Program portfolio from 1998 through December 2008 are presented in Table 2-7. By year-end 2008, the portfolio had achieved 3,223 GWh of cumulative annual electricity savings, and 5.4 million MMBtu of natural gas, fuel oil and other fuel savings. In addition, there are 106 GWh of electricity being generated through renewables. The New York Energy SmartSM portfolio has reduced peak demand by 1,275 MW.

The reductions in energy use translate into:

- \$590 million in annual energy bill savings (electric, oil and natural gas) in 2008 for program participants;
- 2,800 tons of annual nitrogen oxide (NO_x) emission reductions;
- 5,120 tons of annual sulfur dioxide (SO₂) emission reductions; and
- 2.2 million tons of annual carbon dioxide (CO₂) emission reductions, which are equivalent to removing 435,000 automobiles from New York's roadways.

Table 2-7. Cumulative Benefits from Installed Measures through December 2008

Benefits	Through Year-End 2004	Through Year-End 2005	Through Year-End 2006	Through Year-End 2007a	Through Year-End 2008
Electricity Savings from Energy Efficiency and On-Site Generation (Annual GWh)	1,400	1,950	2,350	3,070	3,220
Peak Demand Reduction (MW)	860	1,040	1,113	1,200	1,275
Permanent Measures (MW)	325	445	495	650	700b
Curtable ¹	535	595	618	550	575
Net Fuel Savings (Annual MMBtu)	2,600,000	4,000,000	4,049,000	4,460,000	5,400,000
Annual Energy Bill Savings to Participating Customers (\$ Million)	\$195	\$275	\$330	\$570	\$590
Renewable Energy Generation (Annual GWh)	102	103	105	106	106
Net Additional Jobs ²	2,500	3,100	3,600	4,500	4,900
NO _x Emissions Reductions (Annual Tons) ³	1,280	1,750	2,060	2,570	2,800
SO ₂ Emissions Reductions (Annual Tons) ³	2,320	3,170	3,800	4,720	5,120
CO ₂ Emissions Reductions (Annual Tons) ³	1,000,000	1,400,000	1,600,000	2,000,000	2,200,000
Equivalent number of cars removed from NY roadways	200,000	275,000	320,000	400,000	435,000

a Savings for the New York Energy SmartSM Products Program are estimated based on market data, survey research, and deemed savings values. Savings for this program were last fully captured in 2006. An update, completed and applied in Quarter 1 2009, added electricity, demand, and fuel savings for 2007 appliances only. Once necessary market-level data are available, appliance savings for 2008, as well as lighting savings for 2007 and 2008 will be analyzed and applied.

b Does not include 9.8 MW of renewable energy generation capacity.

¹ Curtable MW have decreased due to a reassessment of the impact of the Enabling Technologies Program. MW enabled under the SBC2 program Enabling Technologies for Price Responsive Load were not required to persist beyond the period of the contract. As such, the MWs available have steadily declined since the program's close.

² Figures in this row represent the net additional jobs created through year-end. Results from 2004 through 2007 have been restated based on new analysis conducted in 2009.

³ These emission reductions are associated with both electric and fossil fuel saving measures. Under a cap-and-trade system, the total number of emission allowances is determined by regulation. Regulated entities can purchase allowances and collectively emit up to the cap that is currently in place. Therefore, in the near term, electric efficiency projects may not decrease the overall amount of emissions going into the atmosphere. However, electric efficiency projects will reduce end-users' responsibility or footprint associated with emissions from electricity production.

Figure 2-13 and Figure 2-14, respectively, show electricity and demand savings by utility service area. The National Grid (37%) and Con Edison (33%) service areas show the highest percentages of electricity savings. The same service areas, Con Edison (39%) and National Grid (33%), are also seeing the highest percentages of the overall demand reductions. Both of these figures are based on the cumulative annual savings achieved through the end of 2008. For certain market transformation and informational programs representing 18% of the portfolio electricity savings and 17% of the demand reductions, savings were apportioned to utility areas based on incentive dollars.

Figure 2-13. Electricity Savings by Utility through December 2008

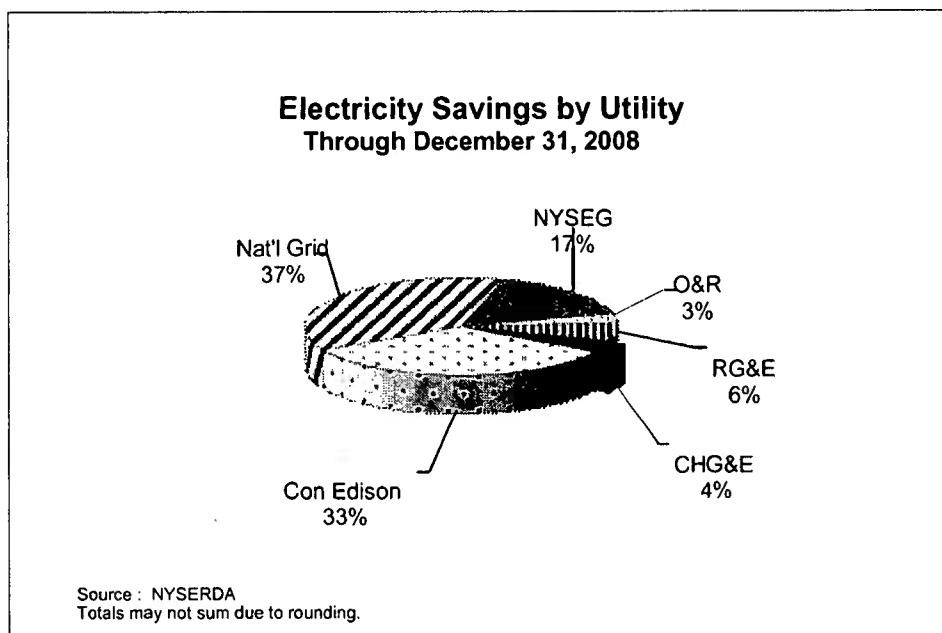


Figure 2-14. Demand Savings by Utility (includes callable MW) through December 2008

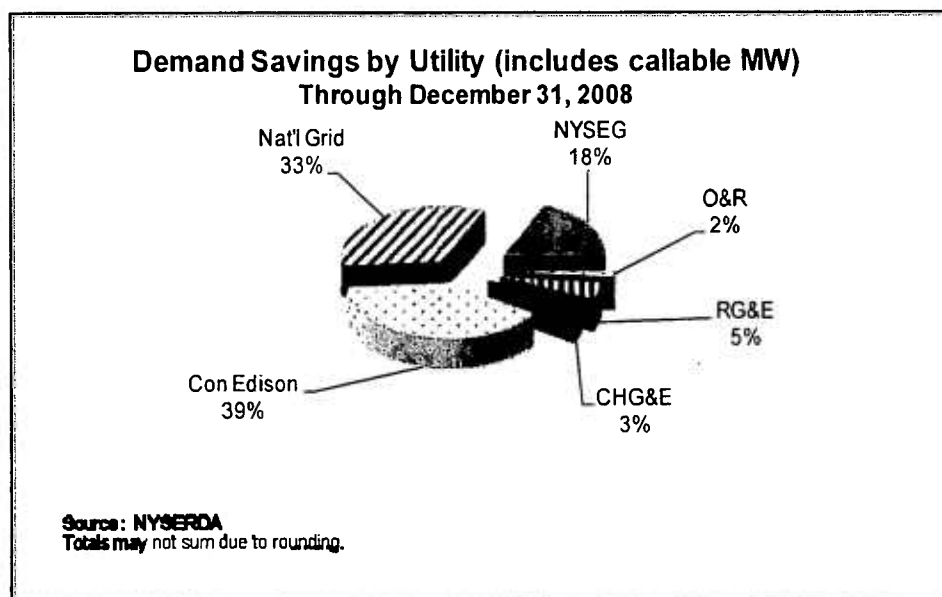


Table 2-8 shows the cumulative annual electricity savings, demand reductions, and other fuel savings from each program. Entries for the Renewable Energy Program represent clean generation rather than reductions in use.

Table 2-8. Adjusted Cumulative Annual Savings by Program through December 2008

Program	Adjusted Cumulative Annual Savings		
	GWh	MW	MMBtu
Existing Facilities: Permanent	1,212.0	241.1	-61,953
Existing Facilities: Callable	N/A	462.5	N/A
New York Energy Smart SM Business Partners	81.1	19.7	N/A
New York Energy Smart SM Loan Fund and Financing	112.2	57.4	838,739
New York Energy Smart SM Focus	0	0	N/A
New Construction Program	301.3	76.6	9,567
Flex Tech Technical Assistance: Permanent	861.8	171.5	3,306,000
Flex Tech Technical Assistance: Curtailable	N/A	12.5	N/A
C/I Sector Overlap Removed	213.4	46.9	165,300
Subtotal Commercial/Industrial	2,355.1	994.0	3,917,487
Single Family Home Performance	39.5	9.0	1,578,486
Multifamily Building Performance	49.3	7.1	318,276
Market Support Program	657.6	136.1	296,607
EmPower New York Program	45.1	7.2	135,392
Subtotal Residential and Low Income	790.0	159.2	2,328,761
DG-CHP Demonstration Program	109.5	27.2	-852,549a
Demand Response and Innovative Rate Research	N/A	99.0	N/A
Renewable Energy Production	106.2	9.8	N/A
Subtotal R&D	186.1	130.5	-852,549
Cross Sector Overlap Removed	29.6	5.4	N/A
NYES Portfolio	3,331.1b	1,284.0	5,393,698

N/A – not applicable, the energy source is not reduced for the particular program.

a Because the electricity saved by the DG/CHP projects replaces electricity formerly purchased from the grid, the program has reduced fuel used at central generating stations, for a net decrease statewide due to greater efficiency of the DG/CHP systems at sites where imported fuel is used. The fuel avoided at the central generating plant is determined from the electricity generated by the DG/CHP installations. Furthermore, at additional projects such as waste water treatment plants, electricity generation is powered fully or partially by digester gas produced on site. Such fuel switching achieves natural gas conservation above and beyond what is achieved through efficiency alone.

b This sum includes 106.3 GWh of renewable energy production, whereas the portfolio-level electricity savings from energy efficiency and on-site generation shown in Table 2-7 does not.

2.2.4 Economic Analysis

This section discusses the macroeconomic impacts of the New York Energy SmartSM Program, as well as the cost effectiveness analysis of the deployment programs.

Macroeconomic Impact Analysis – 2008 Update

Expenditures made by NYSERDA and New York Energy SmartSM Program participants have substantial macroeconomic impacts that go beyond direct benefits to participants. 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. Program participants also experience a stream of energy savings from installed efficiency measures that result in increased economic activity throughout New York State. The stream of energy savings results in increased disposable income for residential customers and lower production costs, and hence greater retained earnings, for commercial and industrial customers.

REMI Policy Insight™ ("REMI") Model

Starting in 2009, NYSERDA used the REMI Policy Insight™ ("REMI") model to evaluate the impacts of the New York Energy SmartSM Program.²⁶ Regional Economic Models, Inc. (REMI) is one of the nation's leading providers of economic forecasting and policy analysis software. The REMI Policy Insight model is used by multiple state governments, and numerous consulting firms, cities, and universities.

The REMI model is a structural economic forecasting and policy analysis model. It integrates input-output, computable general equilibrium, econometric and economic geography methodologies. The model is dynamic, with forecasts and simulations generated on an annual basis and behavioral responses to compensation, price, and other economic factors.

The model consists of thousands of simultaneous equations. The overall structure of the model can be summarized in five major blocks: (1) Output, (2) Labor and Capital Demand, (3) Population and Labor Supply, (4) Wages, Prices, and Costs, and (5) Market Shares.

Analysis Methodology: Brief Overview

This macroeconomic analysis identifies both the positive and negative economic effects to the New York economy due to the New York Energy SmartSM Program. All effects are modeled, and the final result shows the net impacts only.

Positive effects include:

- The increased demand for goods and services resulting from the spending of SBC monies in the New York economy;
- The increased demand for goods and services resulting from the spending of co-funding monies in the New York economy; and
- The increased disposable income and lowered production costs to residential and business customers resulting from the stream of electricity, natural gas, and petroleum energy bill savings.
- Negative effects include:
- The decreased disposable income and increased production costs for residents and business owners resulting from electric ratepayer funding of program spending; and

²⁶ From 2005 through 2008, NYSERDA used the IMPLAN model and emulated the original 2004 analysis conducted by Neenan Associates. Neenan Associates, *Macroeconomic Impact Analysis of the New York Energy SmartSM Program: An analysis of short-term and longer-term impacts*, August 2004.

- The co-funding cost to residential and business program participants resulting in reduced disposable income and an increased cost of production over the life of the installed efficiency measures.

The net macroeconomic impacts are expressed in terms of annual employment²⁷, personal income²⁸, total industry output²⁹, and gross state product³⁰. Note that the macroeconomic results reported in this section are limited to the impacts that are most directly associated with the Program expenditures and the annual energy savings due to those expenditures. The analysis does not capture the more indirect and long-term potential impacts that may result from more widespread market transformation (*i.e.*, permanent adoption of new energy efficiency measures as the status quo in the marketplace).

Results of Analysis

This analysis estimates historical and future impacts of program expenditures through 2008, rather than through the end of the Program. The Program is assumed to completely end after 2008. This method provides a level of transparency to allow for the evaluation of impacts of Program efforts through 2008 only. This is also consistent with most other evaluation activities.

Results of the macroeconomic analysis, encompassing 10 years of program implementation (1999-2008) and 14 years following the assumed end of Program spending (2009 to 2022), indicate that the **New York Energy SmartSM** Program has provided and will continue to provide net macroeconomic benefits to New York in the form of increased employment, personal income, total output, and gross state product. Table 2-9 indicates that the **New York Energy SmartSM** Program has created 4,900 jobs through 2008 compared to the number of jobs that would have existed in the absence of the program. In addition, in 2008, the Program increased personal income by \$293 million, total output by \$1 billion, and gross state product by \$644 million.

Table 2-9. Summary of Macroeconomic Impacts of the New York Energy SmartSM Program (Constant 2008\$)

Economic Variable	in 2008	through 2008	Total through 2022 (assumes program spending ends in 2008)
Net Additional Jobs	4,900	4,900	n/a
Net Additional Jobs Years	4,900	24,700	86,400
Personal Income	\$293 million	\$1.38 billion	\$5.75 billion
Gross State Product	\$644 million	\$2.85 billion	\$13.37 billion
Total Output	\$1 billion	\$4.44 billion	\$20.59 billion

²⁷ Employment comprises estimates of the number of jobs, full-time plus part-time, by place of work. Employees, sole proprietors, and active partners are included, but unpaid family workers and volunteers are not included.

²⁸ Personal Income is the income that is received by all persons from all sources. It is calculated as the sum of wage and salary disbursements and related supplements, proprietors' income, rental income, personal dividend income, personal interest income, and personal current transfer receipts, less contributions for government social insurance.

²⁹ Total industry output is the value of total sales revenue, which includes both final and intermediate goods and services. It can be measured as the total value of purchases by intermediate and final consumers.

³⁰ Gross State Product 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).

Employment Results

Results of the analysis indicate that the New York Energy SmartSM Program provides substantial net macroeconomic benefits to New York in the form of increased employment, both during program spending (1999-2008) and throughout the years examined following implementation (2009-2022), during which the energy consumers continue to experience energy bill savings associated with the previous installation of efficiency measures. As shown in Table 2-9 the New York Energy SmartSM Program is estimated to create approximately 4,900 jobs through 2008, compared to the estimated number of jobs that would have existed in the absence of the Program. Figure 2-15 shows estimated net additional jobs created by year. Due to its activities through 2008, the Program is estimated to create more than 86,400 net job years through 2022 which is the assumed end of life of all energy efficiency measures installed.

Figure 2-15. 2008 Update – Net Employment Impacts by Year

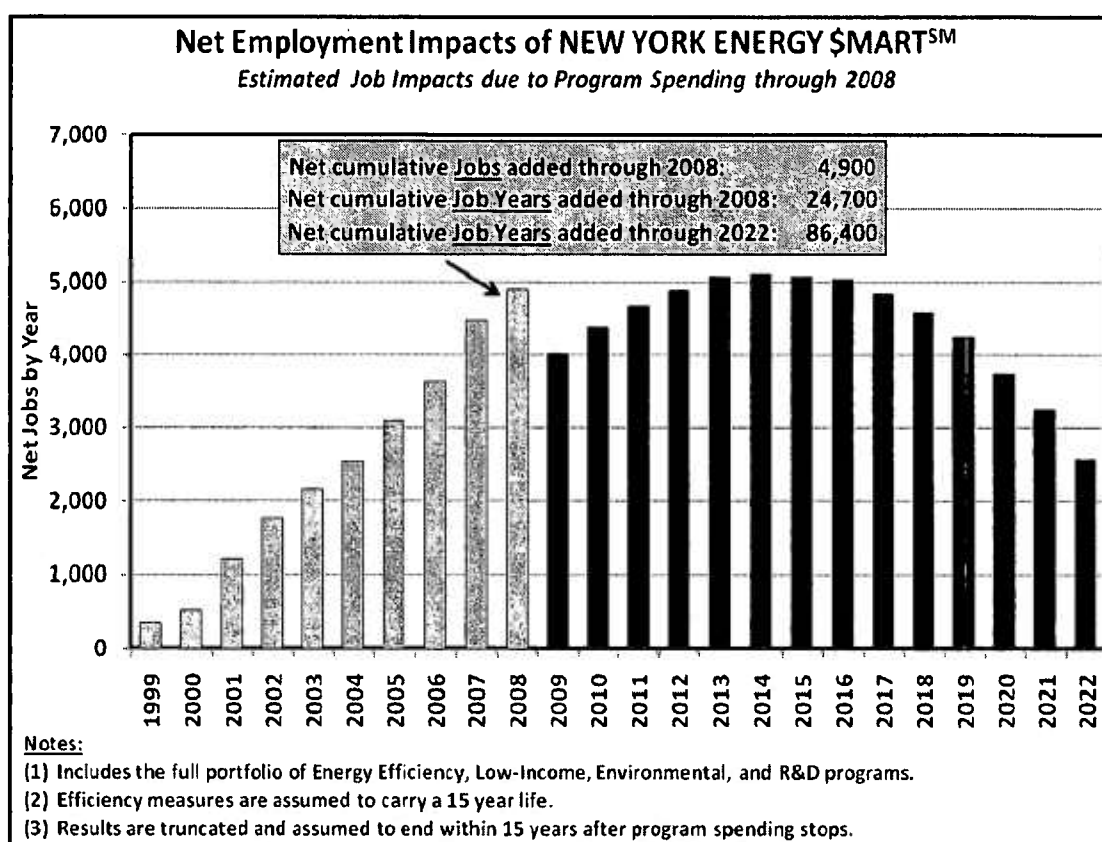


Table 2-10 shows the 2008 net job additions by aggregated REMI sector. Job creation is scattered and widespread, although the largest job creation activity occurs in the "Services" sector, which includes hundreds of professional service jobs like engineers, contractors, and lawyers in addition to educators, health care workers, food service workers, and others. To a lesser extent, in order of prominence, jobs are created in the "Trade"; "Construction, Natural Resources, Mining, and Utility"; and "Transportation, Information, Financial, and Accounting"; "State and Local Government"; and "Manufacturing" sectors.

Table 2-10. 2008 Net Job Additions by Aggregated Sector

Sector	Jobs
Services	2,134
Trade	841
Construction, Natural Resources, Mining, & Utility	794
Transportation, Information, Financial, & Accounting	586
State & Local Government	359
Manufacturing	186
Total	4,900

Benefit-Cost Analysis of Deployment Programs – 2008 Update**Introduction**

This section presents the portfolio-level benefit-cost analysis of the New York Energy SmartSM Program.³¹ The cumulative analysis presents results of program expenditures and measures installed through year-end 2008.

As in previous years, various scenarios are depicted. Also, as in previous years, each successive scenario adds additional benefits. The benefits included in this year's analysis are described below:

- Scenario 1: This scenario includes: (a) benefits associated with reduced electricity generation and capacity, and reduced use of natural gas and water; and (b) capacity market price effect arising from curtailable load programs.
- Scenario 2: Builds upon Scenario 1 by adding participant non-energy impacts (NEIs) such as monetized values for comfort, safety, and productivity.³²
- Scenario 3: Builds upon Scenario 2 by adding macroeconomic benefits.

The monetized value of environmental benefits, such as reductions in emissions of sulfur dioxide, nitrogen oxides, and carbon dioxide, were not included as benefits in the benefit-cost analysis.³³

Methods

This section provides definitions of benefit-cost terms and describes how certain concepts were applied to this year's analysis.

³¹ Program-level benefit/cost ratios will be provided in the 2009 1st Quarterly Report.

³² Prior research by NYSERDA's evaluation contractors was the basis for the non-energy impact inputs. Where researched by the evaluation contractors, NEI values can be found in the program discussions throughout Sections 3 and 4 of this report.

³³ With respect to environmental benefits, 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.

Avoided Electric Energy Costs. The New York Independent System Operator (NYISO) day-ahead (DA) clearing prices were weighted by load to estimate avoided energy costs. The forecast of energy prices was obtained from Department of Public Service (DPS) staff.³⁴ The avoided energy costs used in the analysis are shown in Appendix A. The avoided costs were increased by 2.48% to reflect impact of energy savings that occur during higher-price time periods, such as the summer on-peak demand.

Avoided Electric Capacity Costs. Avoided capacity costs were based on clearing prices in the NYISO capacity auctions. The forecast of capacity prices was obtained from DPS Staff.³⁵ The avoided capacity costs are also shown in Appendix A. Costs include reserve margin requirements.

Avoided Transmission & Distribution (T&D) Costs. The avoided cost estimates of primary lines and distribution substations, determined by DPS Staff, were applied at the rate of \$33.48 per kW-year upstate and \$100 per kW-year in New York City.³⁶ These cost estimates were weighted by measures installed in each region, resulting in a blended cost of \$58.09 per kW-year. This value was applied to the life of the measure.

Capacity Market Price Effect. The capacity market price effect was used to estimate the value of curtailable load. Curtailable load registered at the NYISO results in lower capacity costs for all purchased capacity, resulting in a market price effect. The effect was derived from the NYISO's demand curve and was estimated to be approximately \$600 per kW-year for each kW available in the Con Edison service area. For the rest of the State, the capacity cost reduction was estimated to be approximately \$180 per kW-year for each kW available. The cost estimates were weighted by the installed curtailable load in each region (46% downstate, 54% upstate), resulting in a blended price effect of \$373 per kW-year for each kW enabled. The market price effect was assumed to last for three years. Also, the market price effect is applied only to enabled curtailable load and the benefits are included in Scenario 1.

Discount Rate. A real discount rate of 5.5% was applied to present value costs and savings. Savings and costs were assumed to occur in the middle of each year, as opposed to the end of each year. In previous benefit-cost analyses, a real discount rate of 3.0% was applied.

Focal Year. The focal year of analysis was 2008. All spending and savings were present valued to 2008. In addition, all spending and savings are presented in constant 2008 dollars.

Line Loss Factor. Line loss was estimated to be 7.2% of electricity generation and applied to both energy and capacity.

Macroeconomic Benefits. Macroeconomic benefits result primarily from lower energy bills and consumer spending of bill savings. The metric used to measure macroeconomic benefit was the change in gross state product (GSP). This metric, consists of labor income (employee compensation and proprietor income), property income (interest, rental income, royalties, dividends, and profits), and indirect business taxes (primarily sales and excise taxes). The previous section described the calculation of the macroeconomic impacts of implementing the **New York Energy SmartSM** Program through 2008. For the benefit-cost analysis in this section, the portfolio impacts were adjusted to remove R&D programs.

Measure Life. The life of electric measures was estimated to be 15 years for the portfolio; life of natural gas measures was estimated to be 20 years.

³⁴ Updated in December 2008.

³⁵ Updated in December, 2008.

³⁶ Updated in December, 2008.

Natural Gas Forecast. The forecast of wholesale natural gas prices are shown in Appendix A.

Net Savings. All savings shown in this section have been evaluated and are net of freeridership and spillover.

New York Energy SmartSM Spending. Also referred to as NYSERDA spending, this includes incentives paid to customers, cost of implementation contractors, cost of information-only programs, and prorate costs associated with general awareness, the New York State Cost Recovery Fee, NYSERDA administration costs, and evaluation costs. The spending in this section does not include Research & Development Program funding.

Non-Energy Impacts. Non-energy impacts include benefits such as comfort, safety, and productivity. The portfolio- wide percentage of 28.8% of customer bill savings was used to estimate non-energy impacts.

Retail Energy Prices. The historical and forecasted retail energy prices for electricity and natural gas are presented in Appendix A. Retail rates were used in the calculation of bill savings which, in turn, were used to calculate non-energy impacts.

Program Administrator Cost (PAC) Test.³⁷ This test divides the present value of the benefits by the present value of the New York Energy SmartSM Program spending.

Total Resource Cost (TRC) Test.³⁸ This test divides the present value of the benefits by the present value of New York Energy SmartSM Program spending plus customer co-funding.

Benefit-Cost Analysis

The cumulative energy, capacity, natural gas, and water savings are shown in Table 2-11. The cumulative savings to date are approximately 3,146 GWh per year of electricity, 679 MW of on-peak capacity, 475 MW of curtailable load, 6,246 BBtus of natural gas, and 1.75 billion gallons of water.

Table 2-11. Cumulative Savings Through Year-End 2008

Electricity Savings (GWh/Year)	Capacity Savings (MW-Year)	Curtailable Load (MW-Year)	Natural Gas (BBtu/Year)	Water (Millions of Gallons/Year)
3,146	679	475	6,246	1,752

Note: The 2008 program year savings from the residential Product Support Program were not available at the time of this analysis, and therefore, not included. Furthermore, 2007 lighting savings from the same program were not available.

The cumulative program spending is shown in Table 2-12. Since program inception, the total spending (in constant 2008 dollars) on energy efficiency and demand response programs, including general awareness spending, evaluation costs, administration costs, and New York State Cost Recovery Fee equaled \$963 million. Customer co-funding equaled \$1.7 billion.

³⁷ This test was referred to as the Program Efficiency Test (PET) before 2008.

³⁸ This test was referred to as the Total Market Effect Test (TMET) before 2008.

Table 2-12. Cumulative Spending Through Year-End 2008

	NYSERDA Spending (Constant Millions 2008\$) ¹	Customer Co-Funding (Constant Millions 2008\$) ²	Total Spending (Constant Millions 2008\$)
Commercial/Industrial Sector	\$442	\$1,320	\$1,763
Residential Sector, including Multifamily	\$300	\$418	\$718
Low-Income Sector	\$221	\$45	\$265
Total	\$963	\$1,738	\$2,746

¹ General Awareness, New York State Cost Recovery Fee, Administration, and Evaluation costs were prorated by sector spending.

² Customer co-funding for 2008 was estimated using the co-funding to kWh ratio experienced in 2007.

The present value of the cumulative benefits since program inception is shown in Table 2-13. Benefits that occurred in the past (*i.e.*, before 2008) were compounded using the 5.5% discount rate. Benefits expected to occur in the future were discounted. The benefits associated with avoided resources and curtailable load equal nearly \$5.9 billion; non-energy impacts equal nearly \$2.4 billion; and macroeconomic impacts equal nearly \$11 billion.

Benefit-cost ratios for each scenario are also shown in 3. The Program Administrator Cost test ratios were 5.6, 7.9, and 18.3 for Scenarios 1, 2, and 3, respectively. The Total Resource Cost test ratios were 1.8, 2.6, and 6.0 for Scenarios 1, 2, and 3, respectively.

Table 2-13. Cumulative Benefits Summary

Benefit Source	Present Value of Benefits (Millions \$2008)	Cumulative Benefits (across benefit sources)	Program Administrator Cost (PAC) Test	Total Resource Cost (TRC) Test
Avoided Resources and Curtailable Load benefits	\$5,885a	\$5,885	5.6	1.8
Non-Energy Impacts	\$2,390	\$8,274	7.9	2.6
Macroeconomic Impacts	\$10,991	\$19,265	18.3	6.0

a Of the \$5,885 million of avoided resource benefits, \$670 million is derived from market price effects arising from enabled curtailable load.

The inputs and assumptions used in the benefit-cost analysis are modified each year as better information becomes available. This year's portfolio level benefit-cost analysis results were similar to those from last year. A major source of difference was the higher discount rate that was applied. Another difference was the reduction in the portfolio-level non-energy impact factor which was reduced from 44% to 28.8%. This reduction occurred due to a higher percentage of savings being represented by programs for which non-energy impacts have not been estimated.

The benefit-cost ratios presented here are considered conservative for the following reasons: (1) energy savings from residential lighting sales in 2007 and all savings from program year 2008 of the Product Support Program were not available in time for this analysis, thus underestimating program savings, (2) energy savings in the pipeline, resulting from program expenditures, were not accounted for in the analysis, further underestimating program savings relative to NYSERDA spending; (3) not all programs

have been evaluated for non-energy impacts; (4) post-program market effects were not included in the benefits stream; and (5) the estimate of co-funding may be overstated, resulting in a lower TRC test ratio.

2.3 Largest Energy Savers Impact Evaluation

The Megdal & Associates Impact Evaluation contractor team is currently evaluating the energy savings for a group of large projects that completed participation in NYSERDA's programs between 2005 and 2007.³⁹ The study targets 25 participants, each exceeding 1.5 GWh, from the following programs:

- CIPP (Commercial/Industrial Performance Program);
- DG-CHP (Distributed Generation – Combined Heat and Power);
- NCP (New Construction Program);
- PLMP (Peak Load Management Program); and
- TA (Technical Assistance).

The Large Savers study is designed to evaluate a census of the largest expected savers. Together, the 25 projects represent 128 GWh/yr in savings, or 18% of the 2007 incremental savings reported for the SBC portfolio.

In Phase I, the impact evaluation was completed for 14 of the selected projects. This report presents preliminary results for Phase I of the study. Phase I Large Savers include a wide range of businesses and institutions, including communications, utilities, manufacturing, higher education, recreation, and retail. The Phase I project results presented here represent 79 GWh/yr or 11% of the 2007 incremental savings reported for the SBC portfolio. Assessment of the remaining participants constituting Phase II is expected to conclude in the second quarter of 2009.

It must be emphasized that these preliminary Phase I results, and the complete results after Phase II, are only being applied to these specific projects studied since this is a census of the largest expected savers, results cannot be applied to any other groups of participants in any of these programs or to provide any general conclusions about the programs overall without specific evaluation. However, when complete, the Large Savers study will inform the programs and increase the reliability of NYSERDA's overall program and portfolio savings estimates due to the increased reliability in the estimates for these specific large projects.

2.3.1 Gross Savings Evaluation Methods

The Megdal Team's lead impact evaluation engineers prepared measurement and verification (M&V) plans for each individual site. They first reviewed the project files in detail; verified qualification for inclusion in the Large Savers study, determined what measures would be examined for each specific facility using Pareto analysis, and outlined the evaluation procedure. In forming the plan, the evaluation engineers had the option of proposing simulation of building systems and equipment operations, analysis

³⁹ For the purposes of this study, Large Savers are considered to be organizations that participated in a NYSERDA program resulting in estimated savings of 1.5 GWh/yr or greater.

of utility bills, or direct measurement of equipment performance through metering or monitoring with appropriate instrumentation. Participant or contractor data were also used where deemed reliable.

The M&V plan for each site was based on an eight-page template specifying measure(s), approach, rigor, accuracy, data requirements, analysis, and budget for the evaluation. The engineering director for the evaluation team and NYSERDA's impact evaluation manager reviewed the M&V plans. Refinements were made as necessary.

The lead evaluators worked with NYSERDA program staff to gain access to decision-makers in the participant organizations to arrange for site visits, obtain vendor and site-collected data, and to schedule interviews to gather/obtain data for the net-to-gross analysis. In addition to performing measurements and other data acquisition for the energy-saving evaluation, the lead site evaluation engineer conducted in-depth interviews with decision-makers at the participant organization.

After data collection, the lead evaluator analyzed the data and reported it in a standardized format. The engineering director reviewed all site-specific analysis and reports and performed the summary realization rate analysis.

2.3.2 Net-to-Gross Evaluation Methodology

One purpose of an energy saving program is to induce changes that would not otherwise occur. Program evaluation includes an assessment of which energy saving initiatives were taken as a result of the program, and how much would have been done in the absence of the program. The latter, free-ridership (FR), essentially dilutes the efficacy of the program and is expressed as a percentage of the total savings under the program. Since many large saving projects have access to sophisticated engineering, cost-management resources, and internal financing, a large proportion of them could be expected to undertake energy-saving projects even in the absence of any incentives, in comparison to the general commercial/industrial sector.

A contrary effect, spillover (SO), includes those energy saving actions an organization takes as a result of the program, but for which it does not receive any program incentives. Spillover increases the cost-effectiveness of the program, and is also expressed as a percentage of the total savings under the program. External, or non-participant, spillover often occurs outside the participating organization, as well, but this is not included in the current study which focuses only on the specific participants themselves. However, the general non-participant SO results derived from a separate NYSERDA evaluation have been applied to the projects analyzed.

To determine the net effect of the program, free-ridership and spillover need to be determined and taken into account. Then the NTG ratio is calculated as follows:

$$\text{NTG} = 1 - \text{FR} + \text{SO}$$

Thus, in addition to the engineering evaluation of the physical changes made by the participating organization and the resulting energy savings, knowing the free-ridership and spillover is critical to understanding the effectiveness of the program.

Historically, free-ridership and spillover effects have been assessed through telephone surveys of personnel at participating companies. The Large Savers study sought to investigate free-ridership and participant spillover in more depth than previous evaluations by mirroring the approach used in the verification of gross savings for large-scale projects. The creation of site-specific measurement and verification plans for the highest savings projects is a common expectation for high quality gross savings

evaluations. NYSERDA's approach for its Largest Savers evaluation created a systematic approach to do likewise for free-ridership and participant spillover estimation.

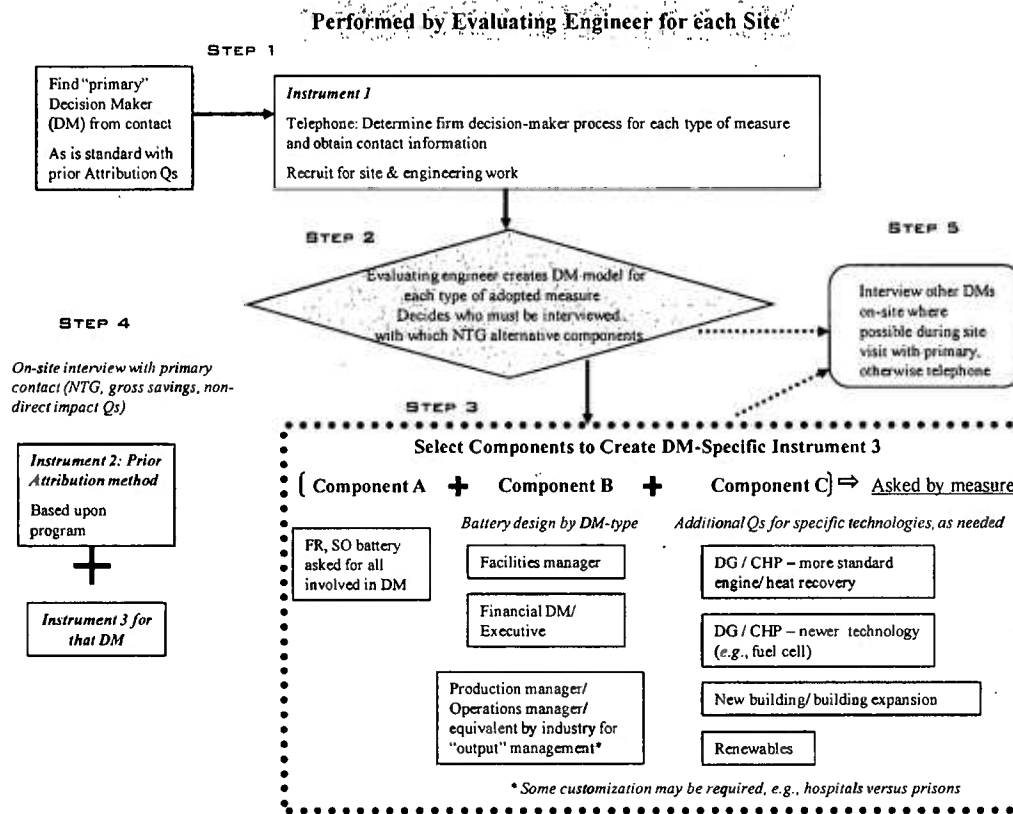
In order to understand the decision-making process in each participating organization, the assessment team sought to identify and conduct in-person interviews, where possible, with all the participants' staff who have influence in making decisions relating to energy equipment or energy usage related products/operations. Referred to as the "salad bar approach", all respondents received a core set of questionnaires ("the lettuce"), then select instruments were applied to each project ("the toppings").

This initial step involves learning how decision-making occurs for each particular firm and project. The information is then used to combine components based upon the type of decision-maker (facility managers, financial personnel, operations personnel) and the type of application (renewables, new construction, DG standard technology and DG emerging technology).

The survey instruments include the same set of questions used in the previous NYSERDA NTG evaluations plus other inquiries to assess construct validity. This strategy allows the Impact Evaluation Team to compare the results using alternative approaches. All interviewees received a common set of inquiries so responses could be compared across decision-makers and that firm's decision-making process. Open-ended questions invited decision-makers to comment at length.

Batteries of questions were developed to be specific to each of the different sites, programs, and decision-makers. The lead engineer compiled the instrument(s), for each of the interviews related to his or her site based upon the initial decision-making inquiry. A diagram depicting this "salad" construction is provided in Figure 2-16.

Figure 2-16. The In-Depth Largest Savers Impact Evaluation Salad Bar Approach to NTG



The analysis combined quantitative and qualitative information from these interviews to ensure consistency and in-depth, firm-specific assessment. The NTG team for each project consisted of that project's lead engineer, another senior engineer from the Large Savers evaluation study, and a senior NTG expert (with a social science background supporting this behavioral assessment and the mixed use of quantitative and qualitative information). The process for estimating the NTG factors for each site was conducted as described below:

- The three senior professionals first independently assessed and estimated free-ridership and participant spillover for that project based upon the interview data for that project (across all interviewees). These independent assessments allowed the process to test and enhance inter-rater reliability.
- Once the independent assessments were made, a teleconference was scheduled. Each member of the project-specific NTG team presented his or her initial estimates and the logic behind the estimates, followed by an open discussion of issues arising from the interviews and challenges in interpreting the responses.

The discussions varied considerably depending upon the responses received, the decision-making process, the type of project, the type of customer, whether the organization is a non-profit, a government entity and their funding circumstances. This process produced a consensus estimate of free-ridership and participant spillover, and estimated upper and lower bounds for these values.

2.3.3 Gross Savings Realization Rates: Preliminary Findings from Phase I

The Phase I reported (Rep) and evaluated (Eval) impact and resulting realization rates (RR) are shown by fuel in Table 2-14. As previously noted, these preliminary Phase I results are project specific. As this is a census of the largest expected savers, results cannot be applied to any other groups of participants in these programs or to provide any general conclusions about the programs overall without specific evaluation.

Table 2-14. Gross Savings Realization Rates

Project	n	Program-Reported and Evaluated Impact and Evaluated Realization Rates (RR) by Fuel														
		Electricity (MWh/yr)			Electricity (MW)			Gas (MMBtu/yr)			Steam (MMBtu/yr)			Diesel (MMBtu/yr)		
		Rep	Eval	RR	Rep	Eval	RR	Rep	Eval	RR	Rep	Eval	RR	Rep	Eval	RR
R&D DG- CHP	4	22,491	20,385	0.91	3.93	3.96	1.01	(203,723)	(169,416)	0.83				0	1,398	na
TA ¹	1	5,235	2,044	0.39	0.70	0.24	0.34									
PLMP	3	7,602	8,098	1.07	2.96	2.17	0.73	(33,600)	(58,580)	1.74	(50,299)	(54,036)	1.07			
CIPP	3	7,357	6,689	0.91	0.58	0.64	1.10	0	(10,029)	na				0	3,250	na
NC	3	9,350	5,686	0.61	1.80	1.52	0.84	39,700	39,061	0.98						

¹The realization rate for Technical Assistance partially reflects the nature of how data is inputted for this program and not entirely due to performance. Many studies provide alternative measures to implement. The program must decide the most likely measure to be installed to enter into the program tracking database. In this case, NYSERDA entered the option with the highest savings, while later the site decided to install an alternative, lower saving option.

Key: Rep = Program-reported, Eval = Evaluated Savings, RR = Realization Rate.

2.3.4 Phase I Participant Free-Ridership and Spillover Findings

This section covers the overall FR results, the program-specific results, a comparison of the FR methods and construct validity. The final components of this section explain the results of the participant spillover analysis and other potential market effects. As in the gross savings, these preliminary Phase I results are only being applied to the specific projects studied. This is a census of the largest expected savers; therefore, results are not expected to apply to any other groups of participants in any of these programs or to provide any general conclusions about the programs overall. When the Large Savers study is completed, it is expected to increase the reliability of NYSERDA's overall program and portfolio estimates due to the increased reliability in the estimates for these specific large projects.

Free-Ridership Results

The free-ridership level seen in Phase I projects is fairly high. Results are outlined in Table 2-15. These results are not completely unexpected, since a higher proportion of the largest customers can be expected to have well trained engineering staff and internal resources to search, consider and finance efficiency improvements.

Free-ridership is based upon customer knowledge of the equipment and building options, the vendor's depth of experience and knowledge of efficient equipment, the customer's decision-making process and financial situation, and the circumstances surrounding the equipment purchase or building construction. There can be significant variation across customers and projects.

Table 2-15. Phase I Project Free-Ridership Estimates

Project ¹	n	Free-Ridership Estimate ²
PLMP	3	59%
CIPP	3	10%
NCP	3	88%
DG-CHP	4	52%

¹ These results are for the projects studied only and will not be applied to the entire program. The program name is used, and the TA program is not within these program-by-program free-ridership results, so as to maintain the confidentiality of the sole participant in the study.

² All estimates are weighted by the *ex ante* savings estimates.

The construction of the in-depth method used in this Largest Savers study deliberately included exact replication of the prior NYSERDA method within its inquiries and calculations to allow comparison of the results for each project between the intense depth method and NYSERDA's current standard self-reported free-ridership method used for all its program evaluations. The Phase I results for the largest savers provide support for NYSERDA's prior method, although the results are still preliminary until Phase II is completed. The prior method replication produced a weighted average FR across all projects in Phase I of 53% compared to a depth method estimate of 53%. There is more variation between NYSERDA's prior method and the depth method on a program level, where the prior method is not within the lower and upper bound of the depth method estimate for PLMP and DG-CHP. In both cases, the depth method produced a lower estimate of FR.

Construct Validity

There are two important questions in the field of self-reported free-ridership estimation: (1) how difficult it is to measure the underlying construct, and (2) what is needed to provide reliable self-report measurements of free-ridership. The Phase I comparison of NYSERDA's prior method and the current method strongly supports the construct validity of NYSERDA's standard self-report survey method. The current method also allows for direct comparison of responses among a range of the parties instrumental in the installation of the efficiency measures, and thus allows for the potential to mitigate self-reporting bias from a particular decision-maker by combining the self-reports from the various perspectives. Through the current process, it was also possible to weight the NTG impacts based on the relative

influence of the decision-maker at each site.⁴⁰ The consensus process also included explicit discussions concerning potential biases, direction and evidence for any biases within a set of interviews. In addition, the evaluators generally agreed that the interviewees provided candid responses to the surveys developed for the Large Savers study, although these responses could still be colored by the difficulty in assessing how one might have acted under a different set of conditions, such as the absence of senior staff members.

The current method included a substantially larger variety of self-report FR questions than is typically employed. This approach allows for a more detailed comparison of the range of possible questions and the consistency of the responses, which is useful for more fully understanding the consequences of restricting the number of FR questions. This result suggests that self-reported FR inquiries should include a battery of questions best suited to measure the underlying construct, the need for experienced evaluators that understand both the science and art behind self-report FR measurement, and the need for self-report FR survey methods to recognize and address inconsistency in customer responses.

Important information that could only be gathered through in-depth interviews with qualitative and quantitative investigations was obtained through the depth approach. The process used to derive the consensus FR estimates provided in-depth participant-specific assessment of any inconsistencies and derived the best FR accordingly.

2.3.5 Spillover

The Largest Saver's self-report method for participant spillover followed NYSERDA's prior survey method, which was a direct query, self-report approach. Only one-third of the 13 Phase I Largest Savers provided any indication of participant spillover or NYSERDA market effect on participant decision-making. These largest savers had lower spillover than seen in the general program evaluations. However, the fact that they incorporated all savings opportunities within their program participation may be one of the reasons they were in the group of largest expected savers. Given the size of these projects, however, even a small percentage of participant spillover savings is meaningful.

Participant inside and outside spillover is presented in Table 2-16. This situation does not reflect the positive participant spillover envisioned when it is normally measured and included in program-induced savings.

⁴⁰ In previous NTG studies, NYSERDA has interviewed some of the different decision-makers, but there was no clear method to weight the results to account for the relative influence of the each party in the decision-making process.

Table 2-16. NYSERDA-induced Participant Spillover

Projects ¹	n	Participant Inside Spillover	Participant Outside Spillover
CIPP	3	1.2%	3.9%
PLMP	3	0%	4.9%

¹ These results are for the projects studied only and will not be applied to the entire program. The program name is used so as to maintain the confidentiality of the participants.

Non-participant spillover, based on results from prior studies, was also added to the results for the projects included in the Largest Savers study. Non-participant spillover for the New Construction Projects was 17%.⁴¹ For all other projects in existing facilities, it was 15%.⁴²

2.3.6 Overall Phase I Preliminary Results and Findings

The overall Realization Rate results for the Phase I participants, combining the realization rates and the NTG factors site-by-site, are shown at the program level in Table 2-17. This table is provided for illustrative purposes only. Actual adjustments were made on a project-by-project basis, not for all projects within a given program that were studied.

Table 2-17. Phase I Net Impact Rate, by Program⁴³

Projects ¹	n	kWh	kW	Gas	Steam	Diesel
R&D DG-CHP	4	46%	50%	44%		NA ²
PLM	3	64%	31%	156%	27%	
CIPP	3	102%	124%	NA ¹		NA ²
NC	3	19%	24%	24%		

¹ These results are for the projects studied only and will not be applied to the entire program. The program name is used, and the TA program is not within these program-by-program results, so as to maintain the confidentiality of the sole participant for the free-ridership results.

² There was no gross fuel impact reported by the program, while savings were found by the impact evaluation. A realization rate where savings found is divided by ex ante savings is not applicable (*i.e.*, mathematically seen as infinite.)

The aggregate results were lower than the simple combination of the RR and NTG results because there was a pattern of lower RR sites having higher FR and vice versa. This pattern results in the overall impact being lower than if low RR and high FR sites were the same or if the high RR and low FR sites were the same.

⁴¹ *New Construction Program Market Characterization, Market Assessment and Causality Evaluation*, prepared by Summit Blue for NYSERDA, May 2006.

⁴² *Commercial and Industrial Market Effects Evaluation*, prepared by Summit Blue Consulting for NYSERDA, October 2007.

⁴³ The results in this table incorporate the realization rates, free ridership, and spillover effects described above and studied in the Large Savers evaluation. They also include the non-participant spillover (NPSO) effect, which NYSERDA evaluates at the program level and is not part of this study. NPSO is additive with other spillover effects. The NPSO values are 17% for new construction and 15% for all other programs.

2.3.7 Use of Findings, Phase II, and Next Steps

It is premature to use the Phase I findings to make any conclusions and recommendations as Phase I includes no more than four sites per program, and summary information provided for projects examined within each program is likely to change as a result of Phase II completion. Once all of the projects have been completed, the Impact Evaluation Team will review the final results and make recommendations on that basis.

The NTG process has generated a wealth of information about decision-making relating to making efficiency upgrades. As Phase II continues and more projects are evaluated, the Impact Evaluation Team expects that this information will be useful for program design, policy purposes, and consideration for improvements to NTG evaluation methods.

This project has resulted in the gross and net evaluation of a substantial portion of NYSERDA's reported savings. The Phase I sites reported 79 GWh/yr⁴⁴ of annual electric energy savings prior to evaluation. In comparison, these savings account for just over 11% of NYSERDA's 2007 incremental reported savings across the SBC programs.

2.4 Portfolio Process Evaluation

2.4.1 Solicitations Released

During 2008, 25 solicitations were issued to competitively select contractors for program design and implementation services. Information on solicitations released in 2008 is shown in Table 2-18.

Table 2-18. Solicitations Released Through Year-End 2008¹

Solicitation Number	Solicitation Name	Solicitation Release Date	Solicitation Closing Date
PON 1202	Marketing and Education through Local Television	1/28/08	3/19/08
PON 1181	EMEP Program Climate Change Research	1/28/08	3/31/08
RFP 1188	Energy Smart SM Communities New York City Region	1/28/08	3/24/08
PON 1184	School Power Naturally...Program Update	2/4/08	5/22/08
PON 1171	Water and Wastewater Technologies Development and Demonstration Program	2/11/08	3/27/08
PON 1208	Electric Power Transmission and Distribution Program	2/18/08	6/4/08
PON 1208A	Electric Power Transmission and Distribution Program	2/18/08	1/21/09
PON 1193	Environmental Technology: Improved Environmental Performance for Power Generation	2/25/08	5/20/08
PON 1206	Data Centers & Server Efficiency	3/3/08	5/1/08
PON 1206A	Data Centers & Server Efficiency	3/3/08	11/13/08

⁴⁴ This includes the 52 GWh/yr for the 14 projects in the gross savings evaluations and 29.8 GWh/yr in savings from a systematic correction made to variable frequency drive projects (with one overlapping project).

Solicitation Number	Solicitation Name	Solicitation Release Date	Solicitation Closing Date
PON 1207	Solid State Lighting Research and Demonstration	3/27/08	5/28/08
PON 1200	Environmentally Preferred Power Systems Technologies	5/5/08	7/16/08
PON 1200A	Environmentally Preferred Power Systems Technologies	5/5/08	1/14/09
PON 1223A	Advanced Transportation Technologies	5/5/08	12/17/08
PON 1223	Advanced Transportation Technologies	5/12/08	7/8/08
PON 1196	Clean Energy Technology Training	5/12/08	6/24/08
PON 1217	Advanced Energy Systems for NYC Passenger Mass Transit	5/19/08	7/24/08
RFP 1211	Media Services	6/2/08	7/1/08
RFQ 1241	Distributed Generation as Combined Heat and Power	6/30/08	8/14/08
RFP 1241A	Distributed Generation as Combined Heat and Power	6/30/08	12/11/08
PON 1241B	Distributed Generation as Combined Heat and Power	6/30/08	4/16/09
PON 1216	Early Stage Support for Developers of Renewable and Clean Energy Products	7/7/08	10/1/08
PON 1236A	Energy Productivity in Innovative Local Food Production Systems	8/18/08	10/2/08
PON 1266	Building Products and Systems	9/25/08	12/8/08
PON 1266A	Building Products and Systems	9/25/08	5/4/09

In addition, two solicitations for financial incentive subscription programs were also issued and some remain open. Information on the incentive solicitations released in 2008 is shown in Table 2-19.

Table 2-19. Incentive Solicitations Released Through Year-End 2008

Solicitation Number	Incentive Solicitation Name	Solicitation Release Date	Solicitation Closing Date
PON 1222	New Construction Program	3/31/08	6/1/09
PON 1219	Existing Facilities Program	6/23/08	7/1/08-6/30/10

2.5 Marketing and Outreach Process Evaluation

In 2008, the Process Evaluation Team completed an evaluation on NYSERDA's Marketing and Outreach activities.⁴⁵ The study relied on secondary data, as well as in-depth interviews with over 40 contacts, including seven NYSERDA directors, 20 NYSERDA program and project managers, and 15 contractors to NYSERDA conducting marketing and outreach activities throughout the organization. Conclusions and recommendations from this research are summarized in this section.

⁴⁵ Process Evaluation findings were summarized in the September 2008 Quarterly Evaluation and Status Report. For the full report, please see Research Into Action, *Marketing and Outreach Activities Process Evaluation*, Prepared for NYSERDA, February 2009.

2.5.1 Conclusions and Recommendations

3. *Conclusion:* NYSERDA, while conducting a great deal of marketing and outreach, and caring deeply about serving its customers well, has not embraced a strong organization-wide marketing philosophy and culture. Top-down leadership will be needed to reach this goal. NYSERDA staff members have many insights about their customers and what they need and want, but this has not been put into a unified marketing framework that all can understand and act upon. A stronger, integrated marketing orientation – one that embraces customer viewpoints and benefits as drivers of strategic decisions – will improve NYSERDA's internal operations, as well as its ability to be a leader in providing energy services and influential technical information.

The limited amount of overarching customer research, as well as many staff respondents who freely say they are not "marketers," has hampered an organization-wide marketing orientation. Customer research can be used to benchmark and track key marketing information, including overall awareness, perceptions, and use of programs and services. It can guide overall direction and specific program and marketing efforts, including what messages resonate with customers. While most staff members do not need to be professional marketers, more training on basic marketing principles and applications, such as community-based social marketing approaches, would enhance their support for a marketing culture.

Recommendation: Senior management needs to continue to establish a marketing philosophy and culture at NYSERDA. Senior managers and the leadership team need to show program staff this is a top priority and provide guidance, financial support, and staff hours. They need to support the positioning and branding roadmap that is being prepared. NYSERDA staff and contractors need to be brought into the same marketing fold, both philosophically and practically. A plan to benchmark and track customer insights and indicators should be developed and implemented, and marketing training for program and contractor staff should be encouraged.

4. *Conclusion:* The roles, responsibilities, and funding of the many actors involved in marketing and outreach functions at NYSERDA deserve more clarification and coordination, especially those of the new marketing department. Program staff members, dedicated program teams, outside contractors, and internal marketing and communication staff members all conduct marketing. However, key marketing actors often do not operate as a team and have been physically dispersed. Lack of written guidelines to help staff understand and meet marketing requirements, several of which are in development, have further contributed to confusion. This study revealed that more leadership, expert guidance, and coordination from a central marketing group could increase efficiency and reduce confusion about the role, applications, and requirements of marketing. In addition, the recent move to house a number of marketing and communications professionals together, across organizational lines (including the experienced REAP marketing team), should enhance teamwork.

Recommendation: Over time, establish the central marketing group as having responsibility for strategic direction, oversight, and guidance for marketing and outreach at NYSERDA. The central marketing group should lead marketing at NYSERDA for both strategic and practical purposes. Additional staff, skills, and funding will be needed for the group to successfully fulfill this larger and more important role. The group should make the completion and adoption of marketing and website guidelines a priority, especially since this process can serve as an entry point for greater communication between marketers and program staff.

5. *Conclusion:* While the Energy Analysis group has concentrated on evaluation tasks, it has many skills and resources that could be a valuable helpmate in NYSERDA's retooling of its marketing philosophy and approach. Key ways that Energy Analysis could be involved include:

- Helping to define goals and indicators;
- Overseeing baseline and other marketing research;
- Helping Marketing gather information about new and underserved markets;
- Incorporating studies to measure marketing and outreach success; and
- Highlighting and communicating research findings important for marketing efforts.

Recommendation: To the extent possible, involve Energy Analysis as the research arm of marketing and outreach.

6. *Conclusion:* A best practices analysis, originally part of this research, could still play a valuable role in the establishing a more active, organization-wide marketing philosophy at NYSERDA. A best practices analysis can compare different ways that organizations structure their marketing departments, it can identify efficient marketing and outreach processes that organizations use, and could explore budgeting and allocation of resources to different tactics and strategies. The best practices effort was postponed so that changes in organization and management of central marketing, and the development of a branding and positioning roadmap, could be used to provide guidance to the Evaluation Team to develop a useful best practices study.

Recommendation: Work with the new marketing director to define, schedule, and implement a tailored best practices analysis.

2.6 New York City/Westchester Process and Market Study Results

In 2008, the Process Evaluation Team and the Market Characterization and Assessment (MCA) Team completed evaluations focusing on the New York City (NYC) and Westchester regions. Findings are summarized in this section.⁴⁶

2.6.1 New York City/Westchester Process Evaluation Findings

In October 2007, Research Into Action, Inc. (RIA) and Nexus Market Research, Inc. (NMR) provided NYSERDA with a report documenting the results of a scoping study to identify program and market opportunities, as well as barriers, in the New York City/Westchester area, and to outline possible studies that could shed light on those opportunities and barriers. As a result of this scoping study, in December 2007, RIA and NMR developed a work plan for a process evaluation to understand participation in NYSERDA's programs in the New York City/Westchester area.

Study Objectives and Methods

The resulting 2008 process evaluation was designed to address two objectives that program staff identified in the scoping study:

⁴⁶ For the full report, please see Research Into Action, *NYSERDA Programs in New York City and Westchester County Process Evaluation*, prepared for NYSERDA, March 2009.

- Understanding motivations for end user participation; and
- Assessing how to work more effectively with market actors and trade allies in New York City/Westchester.

Accordingly, NMR conducted a total of 69 interviews with trade allies, design and construction professionals, vendors, implementation contractors, and trade and professional associations who had experience with NYSERDA's commercial, industrial, and residential programs in the New York City/Westchester area. The interviews focused on what is and is not working well for the programs, the drivers and barriers to participation, and programmatic and market differences between the New York City/Westchester area and the remainder of the state. This report discusses key themes and issues identified in the interviews.

Synopsis of Findings

Objective One

Customers are primarily motivated to participate in the NYSERDA programs by financial considerations, particularly by the NYSERDA incentives. This customer motivation is heightened in a New York City/Westchester business environment that is characterized by high energy costs and operating expenses. New York City/Westchester customers also are motivated by non-financial and non-energy benefits, such as being green, demonstrating organizational stewardship, and promoting the health and comfort of building occupants. In particular, customers' desire to be green and to demonstrate organizational stewardship have increased in importance recently because of public and governmental concerns about dealing with climate change.

Objective Two

NYSERDA can improve the effectiveness of its programs in New York City/Westchester by adapting to its unique business environment and engaging more closely with market actors, trade allies, and end users. Business in New York City/Westchester moves at a very fast pace and market actors and trade allies face pressure to be correspondingly responsive. Furthermore, the buildings in this region often are large and complex, resulting in complicated processes and long timelines. The procedural requirements of NYSERDA programs and the delays they can add to customer projects are thus perceived to run counter to the needs and practices of businesses in New York City/Westchester. NYSERDA is also perceived as being primarily Albany-based and having limited involvement with New York City/Westchester market actors.

Conclusions and Recommendations

Based on the above findings and others discussed in the full body of the process evaluation report, the following conclusions and recommendations emerge. Even though NYSERDA may already be taking some of these recommended actions, they reflect the expressed needs or perceptions of the contacts and these actions may need to be marketed or promoted more by NYSERDA. Further, a number of the following recommendations are associated with raising general awareness of energy efficiency or enhancing professional and institutional knowledge of energy efficiency; while such efforts are valuable and necessary, it may not be possible to link them directly to kWh or Btu savings.

New York City/Westchester Market Structure

1. *Conclusion:* NYSERDA can be more closely connected to the New York City/Westchester market. This will increase its effectiveness by allowing it to engage more intensively with other

market players, including end users, program contractors, professional associations, government entities, and utilities. Such an approach is suggested in particular by feedback from Commercial and Industrial (C&I) program contacts, who cite factors including the fast pace of business in the New York City/Westchester area, the associated expectation for responsiveness, and the close-knit network of market actors and trade allies.

Recommendation A: Create New York City-based positions to demonstrate the seriousness of NYSERDA's commitment to the New York City area and to coordinate and work more closely with city and municipal governments. Note that the latter also will help NYSERDA work with New York City on promoting PlaNYC and other state and city government energy efficiency initiatives.

- Appoint a high-level staff person (e.g., a Director, for NYSERDA's New York City office). [NYSERDA has already done this, but did so after the interviews for this evaluation were conducted.]
- Create a new NYSERDA staff position dedicated to helping program participants deal with city and municipal building departments on codes, regulations, permitting, etc. For example, association representatives suggested that NYSERDA should work with the city and municipal governments to create a fast track for permit approvals for energy-efficient construction.

Recommendation B: Establish a protocol and a process with Consolidated Edison Company of New York, Inc. (CECONY) for fast tracking interconnections for incented energy efficiency and renewable energy measures requiring those interconnections, such as combined heat and power (CHP). If appropriate, involve the local governments in the process to address code and permitting issues. C&I program contacts and association representatives specifically mentioned challenges in getting cooperation from CECONY when working with customers on getting interconnections for distributed generation projects, such as CHP.

Recommendation C: On the NYSERDA website, create a user-friendly New York City-specific roadmap by type of customer, type of trade ally, and type of project to provide guidance on the programs, measures, and available incentives.

- Integrate similar information regarding other energy efficiency programs, such as those from CECONY, National Grid, NYPA, etc. This could also make the NYSERDA website a gateway to energy efficiency for all programs and customers.

Recommendation D: All of the contacts mentioned a need for increased public outreach and education about energy efficiency and NYSERDA programs, which may be accomplished through mechanisms such as the following:

- Establish public education kiosks in heavily traveled locations such as Grand Central Station.
- Develop a Public Energy Center in New York City.

2. *Conclusion:* C&I Program and Multifamily Performance Program (MPP) contacts reported problems with finding qualified staff and subcontractors in the New York City/Westchester area, because those who are knowledgeable about energy efficiency are in short supply and, when available, can be too expensive to hire.

Recommendation: NYSERDA initiatives for workforce development should be certain to include this area. Such initiatives will help increase the supply of qualified personnel which, in turn, will help contain the costs for hiring them.

3. *Conclusion:* Association representatives and C&I program contacts observed that spaces in commercial buildings and market-rate multifamily housing in New York City/Westchester are often leased, which begets the split incentive barrier and limits interest in NYSERDA program participation by the building owners and managers. NYSERDA should seek to address the split incentive barrier to program participation.

Recommendation A: Although NYSERDA may have limited ability to influence leasing practices, it should evaluate the potential for effective promotion of green leases (which incorporate environmental standards for specified levels of energy efficiency, water conservation, *etc.*) or triple net leases (in which the tenant pays for taxes, insurance, maintenance, electricity, and other utilities). NYSERDA could accomplish this, for example, by publicizing the value and benefits of green leases to building owners, building managers, and tenants.

Recommendation B: Communicate with building owners about the value and importance of having a green building.

Recommendation C: Identify and target buildings that have primarily a single tenant or a couple of predominant tenants who will have greater leverage with the building management.

New York City/Westchester Infrastructure and Business Environment

4. *Conclusion:* C&I Program and MPP contacts noted that the New York City building stock includes large and complex buildings, resulting in correspondingly complicated new construction projects with long timelines. NYSERDA programs should allow for the long construction timelines needed for large buildings, and also for greater complexity of building analyses – keeping in mind that the costs will occur early for savings that cannot be claimed for many years.

Recommendation A: For longer-term projects that span more than two or three years, consider incorporating allowances for staff rate increases from the rates that were initially agreed upon with participating contractors. The allowable increases could be based on a cost-of-living index or some other accepted measure of increments in professional compensation levels.

Recommendation B: Offer higher incentives for more complex analyses and/or find ways to provide engineering professionals with technical or financial assistance for doing building analyses.⁴⁷

Recommendation C: Although NYSERDA may be constrained by regulatory and due diligence requirements, to whatever extent possible, it should consider streamlining reporting requirements to reflect the needs and characteristics of larger buildings. For example, the types of reports that are required for smaller buildings could be different from those necessary for larger buildings in New York City/Westchester. In the larger buildings in New York City/Westchester, contacts often reported challenges in obtaining access to the physical facilities and energy-related data. Moreover, even when they are able to obtain the necessary information, it may not fit neatly into NYSERDA's forms that have been designed for smaller buildings.

5. *Conclusion:* C&I program and MPP contacts commented that the large scale and complexity of the New York City/Westchester business environment compels large customers to have professional management of their businesses, including specialized professional staff, formal procedures, and sophisticated evaluation of their investments in energy efficiency projects.

Recommendation A: Ensure that NYSERDA's payback analyses for large commercial customers align with the sophisticated approaches that these customers use when evaluating energy

⁴⁷ This recommendation is not relevant for the New Construction Program because it already provides incentives that are commensurate with the complexity of analyses and size of projects.

efficiency investments in large and complicated construction projects. These analyses would take into account factors such as different scenarios for increases in fuel costs, as well as comparisons with alternative investment choices.

Recommendation B: When dealing with larger developers, allow greater flexibility in program forms, documentation, and requirements to facilitate adaptation to the customers' own internal procedures.

6. *Conclusion:* Business in New York City/Westchester is conducted at a very fast pace – which may be required to overcome structural impediments – and there are correspondingly high expectations for responsiveness from all who conduct business there. In such an environment, the perceptions and actual customer experiences of slow and complex NYSERDA processes are a significant barrier to program participation, and it is important for NYSERDA not to be seen as yet another impediment to commerce. The upfront approval processes, in particular, were mentioned by contacts for all of the programs as a significant source of program contractor and customer frustration. While many programs in many areas face such issues, these issues are particularly salient because of the fast pace of the New York City environment, coupled with the added time pressures associated with bigger projects, longer timelines, and business barriers. NYSERDA should look for ways to increase its program responsiveness in New York City/Westchester.

Recommendation A: Address the fast pace of business in New York City by creating a rapid response team or a fast-track process for customers from the area. Specific objectives of such an initiative should include shortening the report review process and speeding up program payments.

Recommendation B: Although NYSERDA may be constrained by regulatory and due diligence requirements, to whatever extent possible, it should make the application and enrollment process easier and quicker, and streamline application approvals.

Recommendation C: Where appropriate, give contractors some leeway (with a cap on time and money spent) to start gathering information needed for any analyses while staff reviews and approves the initial application. Some C&I program contacts mentioned that they are already doing this for clients with whom they have prior or close working relationships.

Recommendation D: Reduce or streamline the paperwork.

7. *Conclusion:* The recent economic environment has been marked by rapid increases in energy costs, particularly in New York City/Westchester. This has had a ripple effect in other sectors of the economy. For example, some C&I program and MPP contacts reported that the costs of labor or equipment associated with energy efficiency have undergone rapid increases.

Recommendation: For PON budgets that span more than one or two years, and for large customers accustomed to dealing with contingencies, build in a cushion to allow incentive amounts to be adjusted within a limited band, based on the possible volatility of near- to medium-term market conditions (e.g., rapid increase or decrease in costs of energy, labor, or materials). This suggested approach is analogous to that used to manage exchange rates that are pegged to another currency in the volatile foreign exchange markets.

8. *Conclusion:* The options available to New York City/Westchester area building code officials and engineers for learning about energy efficiency are limited or inadequate.

Recommendation A: Have an ongoing program to educate and train building code and department officials on energy efficiency technologies and the NYSERDA programs. Association representatives and residential program contacts, in particular, noted a need for such training and education.

Recommendation B: Work with the New York State Education Department to certify providers of continuing education or professional development credits for engineers. An association representative said that a New York State law requiring engineers to get professional development hours (PDH) has created numerous questionable operations offering such credits and that NYSERDA should work with the New York State Education Department to end this practice.⁴⁸

2.6.2 New York City/Westchester Market Characterization and Assessment Findings

The primary objectives of the Downstate Market Characterization and Assessment Study were 1) to provide NYSERDA staff and their program implementation contractors with specific market information to identify ways to increase NYSERDA program penetration in the downstate region and 2) to extend the results of the recently completed process evaluation to better understand downstate participation in NYSERDA's programs. Findings are summarized in this section.⁴⁹

Market Characterization Findings

The MCA team reviewed a variety of secondary data sources to characterize the downstate market eligible to participate in NYSERDA programs in terms of existing building stock. Where possible, the characterization results were segmented by key parameters (*e.g.*, market sector, building type, building size, energy intensity, etc.) to identify sub-market level trends and opportunities. The data sources used to conduct the analysis were not considered in isolation; rather, they were integrated to the extent possible to present the most comprehensive results given available information. Findings from these efforts are summarized below.

Building Stock

This section presents an overview of the existing building stock in the downstate region. Table 2-20 shows the downstate building stock in terms of building area (square feet). The findings are organized by downstate county and by major sector.

⁴⁸ Sections 7211 and 7212 of Article 145 of the New York State Education Law and Sections 68.11 and 68.12 of the Regulations of the Commissioner of Education.

⁴⁹ For the full report, please see Summit Blue Consulting, *The Five Ws of Downstate New York*, Prepared for NYSERDA. This report will be final April 2009.

Table 2-20. Total Building Area (thousand square feet) by Major Sector and Downstate County

Major Sector	Downstate County						Total
	Bronx	Kings	New York	Queens	Richmond	Westchester	
Residential	428,263	891,963	544,306	792,751	221,513	380,988	3,259,784 (56%)
Commercial	157,757	315,198	713,239	261,603	80,464	177,186	1,705,447 (30%)
Industrial	12,659	44,128	2,706	39,756	2,317	25,611	127,178 (2%)
Mixed	79,071	133,312	403,956	59,688	4,976	-	681,004 (12%)
Unknown	-	425	2,706	43	15	-	3,189 ($<1\%$)
Total, All Sectors (% of Total)	677,750 (12%)	1,385,027 (24%)	1,666,913 (29%)	1,153,842 (20%)	309,284,574 (5%)	583,785 (10%)	5,776,602 (100%)

When the existing building stock is considered in terms of number of buildings, some interesting trends emerge. First, the vast majority of buildings in the downstate region, slightly more than one million buildings (or 88% of the total number of buildings), are classified as residential. Similar to building area, the percentage of residential buildings per county is large and generally consistent across counties with the exception of New York County, in which residential buildings account for slightly less than half (49%) of the total number of buildings. Another interesting observation is the relatively small number of buildings in New York County relative to other counties in the downstate region – New York County accounts for only 4% of the total number of buildings in the downstate region. When considered in concert with the fact that 29% of total building area in the downstate region is located in New York County, it becomes apparent that the average building size in New York County is substantially larger than in other counties. As shown in Table 2-21, this is true across market sectors.

Table 2-21. Average Building Size by County and Major Sector

Average Building Size (ft ²)	Bronx	Kings	New York	Queens	Richmond	Westchester	Downstate Region
Residential	5,295	3,383	23,793	2,227	1,912	2,222	2,849
Commercial	12,004	13,539	63,113	12,690	13,852	29,986	19,092
Industrial	15,590	12,473	23,734	17,019	13,017	30,427	12,992
Mixed	19,178	5,787	32,379	5,218	2,917	NA	12,902

Source: MapPLUTO™, NYC Department of City Planning and (for Westchester County data) McGraw Hill Construction, F.W. Dodge, Building Stock.

Building Ownership and Occupancy

The vast majority of buildings (98%) are privately owned, however, this trend is not consistent across building types. In general, private ownership levels in the C&I sector tend to be less than those in the residential sector, reflecting the greater prevalence of government ownership (city, state, and federal) within the C&I sector. In addition, government-owned buildings within the downstate region are, on

average, nearly twice as large as privately owned buildings, which implies that there is a large potential for economy of scale energy savings within the public building sector.

However, the vast majority of city and state government owned buildings in the downstate region receive electricity from the New York Power Authority (NYPA).⁵⁰ These buildings, which represent more than 11,000 unique accounts and have a 2007 peak demand of approximately 2,000 MW⁵¹, are ineligible to participate in NYSERDA's program offerings given that NYPA customers do not pay the electric distribution System Benefits Charge. However, these buildings are able to participate in NYPA's Energy Services Programs, which provide energy-efficiency improvements, with no up-front costs, to public schools and other government facilities.

Approximately half of the existing commercial building stock in the Middle Atlantic Census Division region is occupied by the building owners.⁵² This is true in terms of both number of buildings (50%) and volume of building area (43%). More than one-third of the existing commercial building stock is non-owner occupied although this percentage varies by building type. For example, previous research conducted by NYSERDA has found that 61% of commercial office space in Manhattan is managed by third-party property management firms, which implies that non-owner occupancy levels within this sub-market are likely greater than those found for the commercial sector as a whole.

Most residents of the downstate region do not own the homes in which they live. Overall, the downstate region has approximately 3.4 million housing units and only 37% of those housing units are owner-occupied. For comparison, the national homeownership rate is approximately 67%.⁵³ Homeownership rates vary significantly by county, with the majority of housing units in Richmond and Westchester counties, 71% and 63% respectively, being owner-occupied units compared to less than one-quarter of the housing units in New York (23%) and Bronx (21%) counties.

Sub-Metering

While it has been inferred that most large commercial tenants in New York City are sub-metered, the data to confirm this is either not available or does not exist.⁵⁴ Given the predominance of the modified gross lease in the commercial sector, in which energy costs are directly passed through to the tenant, there needs to be a mechanism in place with which to allocate these costs amongst multiple tenants. Direct-metering, master-metering with sub-metering, or bulk master-metering with imprecise cost allocation amongst the tenants are the three mechanisms available to pass energy costs on to the tenant: the first two options are clearly the most transparent ones. The fair and transparent allocation of energy costs, combined with the Con Edison Commercial and Industrial Redistribution SC 4 tariff, may provide an insight into the presumed prevalence of sub-metering in the commercial sector.⁵⁵

Table 2-22 shows the incidence of residential sub-metering in the Con Edison service territory. Given that there are under 3,000 master meter accounts in Con Edison's service territory (of which only 181 are sub-metered accounts), and tens of thousands of multi-unit residential buildings within that same area,

⁵⁰ NYPA does not serve Federal government facilities in New York City.

⁵¹ Personal communication, Jim Yates, NYPA, October 18, 2008.

⁵² Note that the Middle Atlantic region includes all of New York, New Jersey, and Pennsylvania. CBECS data cannot be further disaggregated.

⁵³ U.S. Census Bureau, 2007 American Community Survey.

⁵⁴ Neill, Sean. HR&A Advisors, Inc. Personal Correspondence on 10/14/08.

⁵⁵ The SC 4 energy charge is lower per kilowatt hour than the SC 9 (General-Large) energy charge per kilowatt hour. These two rate classes apply to much of the commercial sector. Consolidated Edison.

many of which are classified under the SC 1 or SC 7 tariffs, one may conclude that sub-metering is much less common than bulk master metering in the residential sector.

Table 2-22. Residential Sub-Metering in Con Edison Service Territory⁵⁶

Rate Class	Total Accounts	Sub-Metering Accounts	Sub-Metering Penetration Rate (%)
SC 8	2,267	174	8%
SC 12	474	7	1%

There are several possible reasons for the relative dearth of sub-metering in New York City's residential sector. These reasons may include, but are not limited to, the following: the higher upfront cost of installing individual sub-meters⁵⁷, the NYPSC application conditions and process⁵⁸, the vocal opposition of tenants who believe that their energy costs will increase as a result of sub-metering, a lack of trust on the part of the tenant that the landlord will accurately bill the tenant for his electricity use, general landlord/tenant inertia toward pursuing energy efficiency opportunities, and, perhaps most importantly, the fact that the landlords have no formal recourse to discontinue the tenants' electricity service or evict them altogether for non-payment of the tenant's sub-metered bill.⁵⁹

Building Construction

Nearly 40% of the New York City commercial and industrial building area was constructed during the 1920-1945 timeframe. About one-fifth of the building area in New York County was constructed before 1920. The majority of buildings in Richmond, Queens, Kings, and the Bronx are between 60 and 80 years old and the majority of buildings in New York are between 60 and 100 years old. Given the age of the commercial and industrial building stock in New York City, numerous energy efficiency retrofit opportunities still exist.

As with the commercial and industrial building area, the majority of the residential building area was constructed during the 1920-1945 timeframe, except for the building area in Richmond County, the majority of which was constructed between 1970 and 1990. A little over one-fifth of the building area in New York County and Kings County was constructed before 1920. Again, given the age of the residential building stock in New York City, numerous energy efficiency retrofit opportunities still exist.

Building Renovation

In addition to the opportunity for energy-efficient design during new construction, building alterations or renovations can provide an ideal time to incorporate energy efficiency options into existing buildings. The majority of alterations in the commercial sector in New York City occurred in the past 25 years.

⁵⁶ Tobin, Gerald. Consolidated Edison. Personal Correspondence on 10/15/08.

⁵⁷ The cost to install sub-meters in an apartment is estimated to be \$200 to \$500 per meter and is typically paid for by the apartment building, not the occupant. Romano, Jay. "Parceling Out Power to the People." *The New York Times*. May 4, 2008. <http://www.nytimes.com/2008/05/04/realestate/04home.html?partner=rssnyt&cmc=rss>.

⁵⁸ In addition to NYPSC approval, if there are rent-regulated tenants in the building, the request to sub-meter must also be approved by the State Division of Housing and Community Renewal. <http://www.nytimes.com/2008/05/04/realestate/04home.html?partner=rssnyt&cmc=rss>.

⁵⁹ Michael Colgrove, Director of Energy Programs, New York City, NYSEDA.

Though stores comprise a low percentage of the total downstate market by building area (10%), they make up a high percentage of the total alterations (36%). Stores probably renovate more frequently than office buildings and other commercial buildings because retailers tend to be more concerned with leveraging emerging market trends in the hopes of maintaining and expanding existing customer bases. This implies a market opportunity for NYSERDA – program outreach efforts should target store owners and other retailers in the hopes of engaging them with energy efficiency messaging during planned alteration/renovation activity.

Alterations in the residential sector have primarily occurred in the other multi-family sector (*i.e.*, greater than four family) (88%). Over half of the other multi-family alterations occurred between 1980 and 1989; however, a large percentage of the single family (55%), two family (68%), and three family (58%) alterations occurred between 2000 and 2007. Therefore, though a large majority of alterations occur in the multifamily sector, more recent alterations are occurring in the single, two and three family sectors. Recent activity in these sectors could indicate a need for assistance with energy efficiency and demand response improvements and program outreach efforts should be targeted at this market sector.

Conclusions

Several key themes emerged over the course of this market characterization study. First and foremost, *the downstate region is heterogeneous and complex*. There is a large amount of building area (5.8 billion square feet), of which 56% is residential, 30% is commercial, 2% is industrial, and 12% is mixed/unknown. However, this mix of building uses varies significantly by county, with New York County containing nearly 42% of all commercial space in the region. Buildings tend to be large, multi-tenant buildings in densely constructed neighborhoods, posing difficulties with construction/renovation as well as energy efficiency decision-making.

There is a complex web of relationships between different market actors with roles in the energy efficiency decision making process: architects/engineers, contractors, developers, building owners, property management firms, regulatory agencies, co-op boards, and tenants. Most leases are structured so that tenants, not building owners, are responsible for energy costs; thus, landlords have limited direct incentive to invest in system-level energy efficiency upgrades.

Limited space and high demand have created market conditions that favor landlords over tenants, resulting in high rents and limited negotiating power for tenants. However, recent turmoil in the financial sector and significant job losses in the region have resulted in rising vacancy rates and lower rents which may shift the power dynamic at least in the near term, particularly in the office sector. Building owners may consider energy efficiency upgrades or green building improvements as ways to differentiate themselves from the competition as tenants looking for new space suddenly have more options, provided that the owners receive assistance in funding the upfront costs of these improvements.

The residential market in downstate New York is significantly different than upstate: just 19% of downstate households are in single-family homes, as opposed to 66% of upstate households. Over half (58%) of downstate households are in multi-family buildings with 5 or more units. Few of these multi-unit buildings are sub-metered, meaning that household energy costs bear little relationship to actual household energy usage (conservers likely end up subsidizing the bills of heavy users in the building). Consumer utility costs in the region have grown significantly over the past five years. There are more renters than homeowners in every downstate county except Richmond and Westchester. Homeowners living in condominiums and co-op buildings have fewer options for energy efficiency upgrades than single-family homeowners because modifications to the shared spaces and equipment or conversion to sub-metering requires approval of the majority of owners in the building.

Major new construction projects are occurring within the region, including major redevelopment of lower Manhattan (former World Trade Center site and environs) and Hudson Yards (near the Javits Convention Center in Manhattan), as well as regional business districts such as Jamaica (Queens), downtown Brooklyn (Kings County), the Bronx Center, and the 125th Street Corridor (New York County). Targeting energy efficiency to areas that are already undergoing extensive construction projects saves both time and money by obviating the need for future retrofit projects and avoiding future permitting and logistical hassles.

Market Assessment Findings

The Market Characterization and Assessment (MCA) evaluation team also conducted interviews with Demand Response (DR) providers, Energy Services Companies (ESCOs) and Property Managers assessing their perspectives of the downstate market. Findings from these efforts are summarized below.

Findings from Demand Response Provider Surveys

As of June 2008, 44 DR providers were active in New York State and approximately 1,700 customers representing more than 690 MW were enrolled in a NYISO DR program.⁶⁰ NYSERDA staff have hypothesized that many DR providers offer energy efficiency consulting and support as value-added services to their customers. By developing a better understanding of the business models and customer value propositions in the DR provider community, NYSERDA may be able to identify additional market opportunities and increase program penetration in the downstate region.

In this study, full interviews were conducted with 17 of the 44 DR providers that were identified by the NYISO as furnishing DR services to customers in New York. Based on preliminary screening interviews, 28 DR providers were identified as active in the downstate region; thus, full interviews were completed with approximately 60% of the active DR providers. Furthermore, from the reports of 13 of the 17 DR providers interviewed, it was determined that the responding DR providers serve at least 80% of the load enrolled in the NYISO DR programs.

Diversity of DR Market

One important finding from the survey was that there is no single model that typifies DR providers, both in terms of time in market and size and types of customer base.

- Time in Market - Some DR providers have been in the market for as little as two years, while other providers have been in the market for almost ten years. This is a market with established providers, but one that also continues to grow and change over time.
- Size and Type of Customer Base – There is a full array of large, moderate, and small DR providers active in the downstate region. Some providers serve many customers with moderate loads while others serve a small number of customers with large loads. In general, however, most DR providers active in the downstate region focus on the C&I market sector.

⁶⁰ Sources: http://www.nyiso.com/public/webdocs/products/demand_response/general_info/dr_providers.pdf (accessed September 2008) and NYISO May 2008 DR Registration. This includes participants in the Emergency DR Program and the Special Case Resources ICAP Program. Note that the available data do not provide detail regarding the percentage of total enrolled load that pays System Benefits Charge (SBC) funds and is therefore eligible to participate in NYSERDA programs. If NYSERDA opts to develop strategic relationships with DR providers, a first order of business would be determining whether or not the providers' customers pay SBC funds.

Given this diversity and the evolving market for DR services, NYSERDA would have to make a systematic effort to identify and screen the active DR providers to understand the differences among the DR providers and their respective business models. Doing so would help NYSERDA gain a better understanding of the potential for working with the providers to market energy efficiency and DR programs in the downstate region while also helping NYSERDA prioritize relationship-building activities.

Value-Added Services

The interviews revealed that some DR providers feel that they compete best in the marketplace by focusing on DR only (18% of respondents); some (41%) offer commodity-related services (e.g., green power, energy savings reports, etc.) in addition to DR; and some (41%) offer comprehensive energy-related services including energy efficiency. Several of the respondents who do offer energy efficiency services report that they do not focus on energy efficiency, but will refer customers to appropriate energy efficiency services and products when requested or when a particularly good opportunity for efficiency presents itself. A number of respondents noted that one of the primary services that they offer is metering and tracking of demand and energy consumption; this information is invaluable for identifying potential energy efficiency projects and could be leveraged through partnerships with NYSERDA.

DR Marketing

Two primary models of DR marketing seem conducive to developing partnership arrangements with NYSERDA: a comprehensive marketing approach utilizing both direct and mass marketing techniques, and a more highly targeted direct marketing approach focusing on building relationships. Some DR providers use a model where direct marketing by account executives is supplemented by more broad-based marketing activities such as advertising and attendance at conferences. In these instances, NYSERDA staff could work with the DR account executives to identify NYSERDA programs that would be most beneficial to the provider's clients and to determine how to include information on NYSERDA programs in marketing activities and materials. Other DR providers rely solely on experienced account executives to directly market their services. For such providers, NYSERDA must make direct contact with the account executives to discuss energy efficiency program opportunities and work collaboratively with them to develop effective strategies for communicating these opportunities to the marketplace.

Partnership Opportunities

Most DR providers reported that they were very familiar with NYSERDA, and that they would be willing to work with NYSERDA to initiate or expand the provision of energy efficiency products and services to their customers. There is no single prevailing business model used by DR providers in the downstate region, however, with some providers limiting their business focus to DR services only, while others provide a broader suite of services including electric commodity products and other energy efficiency services. For NYSERDA staff, each group of DR providers offers certain challenges and opportunities.

- **DR Only Providers** – This group presents an important challenge to NYSERDA. These providers have good contacts with large energy users, as well as important information on energy use patterns for their customers. However, they perceive that they are most successful in delivering DR services only. NYSERDA will have to demonstrate to them how expansion to more comprehensive energy management services would be beneficial to them and their customers.
- **DR and Commodity Services Providers** – NYSERDA might consider these providers to be the group that has the greatest long-run potential. These providers look for ways to differentiate themselves from the competition, but do not have a deep understanding of the opportunities offered by

NYSERDA programs. Over time, NYSERDA staff would likely be able to work with these providers to help them expand the level of services they provide to customers.

- Comprehensive Services Providers – In the short run, NYSERDA might prioritize these providers to develop strategic partnerships. These providers are already knowledgeable about ways to market energy efficiency services to customers. NYSERDA staff can work collaboratively with these providers to review current product and service offerings and develop strategies to inform their customers of additional energy efficiency opportunities and relevant NYSERDA program offerings.

While DR providers are interested in working with NYSERDA, most emphasized that NYSERDA staff would need to reach out to them to give them information on relevant opportunities. Doing so would help ensure that NYSERDA is able to leverage potential partnering and co-branding opportunities and that NYSERDA is included on the lists of organizations to which DR providers refer customers interested in pursuing energy efficiency products and services.

Targeted Marketing

DR providers can offer NYSERDA staff additional points of entry into the downstate market. However, staff need to screen each DR provider to understand its business model and interest in engaging in proactive partnerships. Moreover, NYSERDA staff must be prepared to tailor their approach to accommodate each provider's unique position in the marketplace. Given the relatively small population of providers active in the downstate region, this level of attention is feasible and, if successful, will likely generate additional market allies to recruit new participants into NYSERDA's program offerings.

A recent trend in the DR industry has seen many DR providers working to better integrate energy efficiency and DR product and service offerings to provide their customers with comprehensive energy strategies. A number of factors are influencing this trend including rising energy prices, a growing desire to mitigate environmental impacts associated with energy use, and improving technology offerings and information availability. DR providers are trying to leverage these trends to capture more energy efficiency and DR opportunities per customer site, thereby creating a more compelling value proposition for customers. However, many DR providers are finding that customer decision-making regarding energy concerns often remains compartmentalized into separate supply (*e.g.*, purchasing) and demand (*e.g.*, efficiency and DR) considerations due to multiple factors, including organizational inertia, a lack of awareness of available opportunities, and limited experience dealing with innovative energy solutions. If NYSERDA can establish strategic relationships with DR providers positioning themselves in this market space, it is easy to envision a "win-win-win" outcome wherein NYSERDA brings the credibility and knowledge/informational resources necessary to persuade customers to adopt a holistic view regarding their facility's energy use. This outcome would benefit all three actors – NYSERDA would recruit additional customers into its programs, the DR provider would expand its customer base and likely achieve some relative competitive advantage, and the customer would realize multiple financial and operational benefits.

Findings from ESCO Surveys

New York State has instituted a competitive retail market in which customers are able to choose their energy commodity supplier from a pool of Energy Service Companies (ESCOs).⁶¹ As of January 2008,

⁶¹ In most jurisdictions, the term Energy Service Company (ESCO) refers to companies that furnish a broad range of comprehensive energy services. For purposes of this report, ESCO refers to those companies that have been certified by the NYS DPS as energy commodity suppliers.

the New York State Department of Public Service (DPS) identified 33 ESCOs as active in the downstate region serving more than 16% of eligible customer accounts and nearly 46% of eligible retail load within the region.⁶² One reason DPS sought to develop retail competition was to encourage ESCOs to provide value-added customer services as they compete to win customer accounts. NYSERDA is interested in learning more about ESCO activity in the downstate region, particularly as it pertains to the provision of energy efficiency and energy management services.

In this survey, the MCA team interviewed 14 of the 33 ESCOs that were identified by DPS as furnishing electric commodity services to customers in the downstate region. From these interviews, it was determined that, at most, 26 ESCOs are actually active downstate; so the interviews represent over 50% of the active ESCOs. Furthermore, from the reports of 10 of the 14 ESCOs, it was determined that the interviewed ESCOs serve at least 400,000 customers in the downstate region.

Diversity of ESCO Market

One important finding from the survey was that there is no single model that typifies ESCOs. Some have been in the market for as few as two years, while others report having been in the market more than ten years. Some ESCOs serve a few hundred customers and target specific market segments, while others serve more than 200,000 customers of all types. If NYSERDA staff implements a strategy to work with ESCOs to market NYSERDA energy efficiency programs, the first order of business would be to screen each eligible ESCO to ensure that they work in the downstate region and to document the specific set of customers they serve.⁶³ In addition, NYSERDA staff should strive to understand the differences between the ESCOs and develop multiple outreach strategies and messages tailored to the different companies.

Current Energy Efficiency Offerings

The survey found that approximately half of the active ESCOs are currently marketing energy efficiency products and services to their customers. Five of the surveyed ESCOs market energy efficiency and find that it gives them a competitive advantage; one markets efficiency but finds that it does not give them a competitive advantage; and seven ESCOs do not market energy efficiency at all.

Diversity of ESCO Marketing

The ability of an ESCO to work with NYSERDA would vary considerably due to differences in their existing marketing channels; NYSERDA staff will need to tailor their working relationship with each ESCO to suit that ESCO's specific marketing strategy.

Some ESCOs market to customers almost exclusively using mass marketing techniques, including direct mail, telemarketing, and door-to-door marketing. In such a marketing environment, the ESCOs might be able to include NYSERDA program marketing materials as part of their distribution, but would not be able to directly pitch NYSERDA programs.

⁶² Sources: NYPSC Competitive Electric and Gas Marketer Sources Directory, Consolidated Edison Company of New York, Inc. Services Territory (<http://www3.dps.state.ny.us/c/escos6.nsf/Web4?SearchView&SearchOrder=4&Query=%5BServesType%5D=Electric+NonResidential+AND+%5BTerritory%5D=1002>) and New York Electric Retail Migration Data for January 2008 (<http://www.dps.state.ny.us/ElectricMigrationWebReportJan08.pdf>). Note that migration data do not include Long Island Power Authority, small regulated utilities, or those municipalities or other entities who are supplied power through long-term contracts with the New York Power Authority. These sources were accessed in January, 2008.

⁶³ An important element of this exercise would be to ensure that the customers served by the ESCO are eligible to participate in NYSERDA's programs (*i.e.*, the customers pay the System Benefits Charge).

Other ESCOs use more personalized marketing approaches, particularly with commercial and industrial customers. For these ESCOs, being able to share information about NYSERDA program services and incentives might represent an additional means of differentiating themselves from the competition.

Partnership Opportunities

Some ESCOs think of their product purely as a commodity and compete solely on the price of their product. Other ESCOs diversify their product offerings to interest different market segments. Still other ESCOs offer their customers comprehensive energy services that deliver the maximum value to customers.

For NYSERDA staff, each group of ESCOs offers certain opportunities.

- **Commodity Only ESCOs** – These ESCOs might not be the best target for NYSERDA staff. Most compete for customers by keeping prices low. Some have previously undertaken energy efficiency initiatives that they perceive as having failed because “customers are only interested in price.” If it would be more difficult for NYSERDA staff to engage these ESCOs in active partnerships; however, the customers’ perceived sensitivity to financial considerations may represent a market opportunity if targeted education and outreach touting the economic benefits of energy efficiency can be employed to address the apparent first-cost barrier.
- **Commodity Services ESCOs** – NYSERDA might consider these ESCOs to be the group that has the greatest long-run potential. These ESCOs are looking for ways to differentiate themselves from the competition, but do not have a very good understanding of the opportunities offered by NYSERDA programs. Over time, NYSERDA staff might be able to work with these ESCOs to help them increase the level of services they provide to customers.
- **Comprehensive Services ESCOs** – NYSERDA might prioritize these ESCOs for the development of strategic partnerships. These ESCOs are already knowledgeable about ways to market energy services to customers. NYSERDA staff can work collaboratively with these ESCOs to review the ESCOs’ current product and service offerings and develop strategies to inform their customers of additional energy efficiency opportunities and relevant NYSERDA program offerings.

While ESCOs are interested in working with NYSERDA, most emphasized that NYSERDA staff would need to reach out to them to give them information on relevant opportunities. Doing so would help ensure that NYSERDA is able to leverage potential partnering and co-branding opportunities and that NYSERDA is included on the lists of organizations to which ESCOs refer customers interested in pursuing energy efficiency products and services.

Findings from Property Manager Surveys

One potential barrier to the implementation of energy efficiency programs in the downstate region is the misalignment of incentives for the installation of energy efficiency measures in large commercial buildings.⁶⁴ The extent of the misalignment is dependent on a number of factors.

- **Owner / Tenant Buildings** – Barriers to installation of energy efficiency measures tend to be lowest for owner-occupied buildings; building owners can directly assess the energy costs for various

⁶⁴ As noted in later sections of this report, the property managers surveyed for this effort manage buildings in the commercial, industrial, and multi-family residential sectors. However, the property management firms are most active in the commercial sector, so the results are likely most relevant to the commercial sector.

energy-using systems and make decisions regarding investments in higher efficiency equipment to reduce energy costs. However, the downstate region is characterized by many large, non-owner occupied, multi-tenant buildings in which existing contractual relationships may present barriers to investment in energy efficiency.

- **Lease Arrangements** – When whole building energy efficiency systems and measures (e.g., HVAC system upgrades, energy management systems, etc.) are installed in leased buildings, energy consumption for the entire building is reduced. However, existing lease arrangements dictate the extent to which those benefits accrue to building owners and/or building occupants. For buildings with gross leases, landlords are responsible for payment of most utilities and therefore accrue the long-term benefits of energy efficiency improvements. However, for other lease arrangements, individual tenants pay some or all of the utility costs, and thereby may obtain some level of benefit from any building-level energy efficiency investments made by the landlord.⁶⁵
- **Metering** – When tenants are directly metered for electricity by the utility company, they accrue the benefits from any electric energy efficiency improvements they install in the space that they occupy (e.g., lighting, office equipment). If the building is master-metered with submeters assigned to individual tenant spaces, tenants also can accrue benefits from electric energy efficiency improvements they install in the space they occupy. However, if the building is master-metered without submetering, it is difficult for tenants to directly realize benefits from electric energy efficiency measures they install.

The goal of the commercial building property manager survey is to furnish NYSERDA staff with a better understanding of the downstate building market, including the extent to which existing lease arrangements and metering may present barriers to different kinds of energy efficiency improvements and the role that commercial building property managers can play in helping to overcome those barriers.

In this survey, 20 of the identified 34 commercial building property managers were interviewed by the MCA Team. The interviewed firms manage over 300 million square feet of commercial building space in the downstate region.

Property Manager Market

Most of the interviewed property management firms have been in business for ten years or more, indicating that this is a stable market that presents NYSERDA with good opportunities for long-term partnerships. The firms focus primarily on commercial building management, particularly high rise office buildings; however, several of the firms also manage retail and multi-family residential properties. Most of the property managers restrict their business to the downstate region, with many working in New York City only. Even those that work throughout the state reported that over 90% of their business is in the downstate region.

Leasing / Energy Billing Arrangements

All of the property management firms had at least some master-metered buildings in their portfolios. In these buildings, tenants are charged for electric usage in one of three ways: some are charged a fixed amount per leased square foot; some are charged based on a survey of the electric uses in their leased space; and some are charged via submetering arrangements agreed to with the building owner. About

⁶⁵ The level of benefit depends on how the upgrade costs are managed by the landlord, a situation that is discussed further in subsequent sections of this report.

half of the property management firms had buildings direct metered for individual tenants. For any building in which tenants are submetered or directly metered, tenants can directly participate in NYSERDA programs and realize benefits from energy efficiency improvements installed in the spaces they occupy. It also appears that many gross and net leases in the downstate region have special provisions for allocating changes in building level operating costs to tenants. When a lease has these provisions, it is possible for a building owner to invest in whole building energy efficiency measures, capitalize the cost of the energy investment, and pass through the annual increase in operating cost to tenants, along with commensurate reductions in energy costs. However, most of the survey respondents indicated that energy efficiency is not a primary consideration when developing lease structures, which implies that there is the potential for the split incentive barrier to persist in the downstate region.

Energy Considerations

Property management firms were nearly evenly split regarding their perceptions of the importance of energy performance considerations relative to electric commodity costs to their clients with about one-third of the respondents reporting that their clients were more concerned with electric commodity costs, about one-third suggesting that energy performance and commodity costs were equally important, and about one-third reporting that their clients were more concerned about energy performance. However, survey respondents also reported that their clients have a growing interest in energy efficiency and green building services, with LEED certification, concerns regarding their organizations' carbon footprints, and taking action to manage escalating energy costs becoming top of mind for many clients. This trend represents a market opportunity and many of the property management firms are actively pursuing energy efficiency and/or green building initiatives in the hopes of expanding the services they offer and improving the financial performance of their building portfolios. Some firms are handling this work with in-house staff by providing energy consulting services to tenants on energy use and installing energy efficiency improvements in tenant spaces. Most firms, however, refer clients who request information on energy efficiency and green building opportunities to qualified third-party providers including NYSERDA, often working directly with NYSERDA staff on behalf of their clients.

Partnership Opportunities

Most property management firms were familiar with NYSERDA and had previously worked with NYSERDA either directly or on behalf of one of their clients. Respondents also suggested, however, that their clients were not as familiar with NYSERDA, but that some clients had participated in NYSERDA programs.

The survey respondents suggested that a general lack of awareness of NYSERDA programs, perceptions of higher first costs associated with energy efficiency and green building upgrades, and the complexity of NYSERDA programs were barriers to program participation by their clients. These responses suggest that many of the perceived barriers to further investment in energy efficiency and green building options can be overcome through targeted education and outreach to key market actor groups as well as with existing NYSERDA programs that raise awareness and help customers to identify energy efficiency opportunities. The vast majority of respondents stated that they would be interested in working with NYSERDA to help overcome these barriers but that they would like to meet directly with NYSERDA staff on an ongoing basis to discuss current and future program opportunities.

These results imply that property management firms can be an effective conduit for disseminating information furnished by NYSERDA to the broader marketplace. Even more, many firms appear to be willing to work proactively with NYSERDA staff to identify both building owners and tenants in leased space who could benefit from participation in NYSERDA programs. This represents a market opportunity for NYSERDA given the amount of space these firms manage in the downstate region, the

relationships these firms likely have with high-level decision-makers at building owner and tenant organizations, as well as other relevant market actor groups active in the downstate region, and the firms' access to information regarding energy costs and energy systems for their respective building portfolios. The timing may be conducive for establishing these relationships as the downstate market appears to be witnessing a renewed focus on rental income, which offers new opportunities for assessing the financial implications of energy efficiency initiatives.⁶⁶

⁶⁶ Cushman & Wakefield, *Green Buildings – A Behavioral Change*, Business Briefing, August, 2008.

3

Commercial/Industrial Programs

3.1 Overview of Commercial/Industrial Programs

NYSERDA's commercial and industrial sector programs cover new and existing schools, hospitals, office buildings, government buildings, commercial establishments, not-for-profit facilities, and industrial plants. Programs promote competitive markets for energy efficiency services, engender widespread adoption of high-efficiency technologies, and result in increasing customer participation in peak demand response initiatives.

A number of the programs have been specifically designed for electric resource acquisition. Programs offering technical assistance and financial incentives are also part of the portfolio. NYSERDA helps energy service companies (ESCOs) and curtailment service providers to incorporate real-time pricing opportunities into their business models. To help improve the reliability of the State's electric system, the programs include aggressive electric-system and peak-load reduction initiatives. These initiatives reduce the risk of energy supply disruptions and price volatility by implementing long-term energy efficiency improvements that have impact during system peaks, and by improving load management capabilities of commercial and industrial facilities.

Market development strategies for commercial and industrial customers are designed to induce lasting structural and behavioral changes in the marketplace that result in increasing adoption of energy-efficient technologies and practices. Long-lasting, sustainable changes are achieved by reducing barriers to adoption of energy efficiency measures to the point where further public-funded interventions are no longer warranted. Market development initiatives, including financial incentives, increase the availability, promotion, retail stocking practices, and sales of energy-efficient products and services in end-use markets and sectors. This is brought about by changing the behavior of upstream and midstream market participants, including retailers, dealers, vendors, distributors, contractors, installers, trade associations, and manufacturers.

Specific program offerings are briefly described below:

Existing Facilities Program. The Existing Facilities Program (EFP) is a consolidation of two NYSERDA programs, the Peak Load Management Program (PLMP) and the Enhanced Commercial and Industrial Performance Program (ECIPP). This streamlining of program offerings provides a less complicated, more accessible presentation to potential customers. EFP offers performance-based and pre-qualified incentives for a variety of energy projects to customers or ESCOs for electric efficiency, natural gas efficiency, demand response, combined heat and power, and industrial and process-efficiency projects. Allowing customers, ESCOs, and contractors access to multiple incentive strategies to support

their energy projects will enable the New York ESCO community to continue to grow the market in existing facilities for energy efficiency, process equipment, and non-building efficiency measures. Demand response incentives cover equipment and technical solutions that enable significant demand reduction resources and require participation in New York Independent System Operator (NYISO) demand response programs.

New York Energy SmartSM Business Partners. The New York Energy SmartSM Business Partners Program is a consolidation of the Small Commercial Lighting Program (SCLP), Premium Efficiency Motors (PEM) Program, the Commercial HVAC Program, and the Innovative Opportunities Program. This new program focuses on market development. New York Energy SmartSM business partners are allies that agree to work with NYSERDA to promote energy-efficient products and services. In exchange, business partners gain access to special training, tools, guidelines, and performance incentives. NYSERDA works with its business partners to help them differentiate their businesses in a highly competitive marketplace, while assuring appropriate quality control mechanisms. The strategy of partnering with businesses helps to strengthen the market infrastructure leading to increased energy-efficient product and service availability and demand. Thus, business partner efforts will also drive greater activity in NYSERDA's customer-targeted programs.

New York Energy SmartSM Loan Fund and Financing Program. The New York Energy SmartSM Loan Fund and Financing Program expands the availability of low-interest capital to help implement energy-efficiency projects and process improvements. Lenders enroll in the program by signing participation agreements to reduce the interest rates on energy-related loans in exchange for a lump sum subsidy paid by NYSERDA. The Program's ongoing training of the financial sector includes tools to allow lenders to calculate the cash flow advantages their customers will gain from making energy-efficiency improvements.

Energy Smart Focus Program. Energy Smart Focus provides services to facilitate and encourage sector-specific energy-efficiency improvements and practices. The program is a marketing and information transfer effort that uses existing core New York Energy SmartSM programs and services to sponsor deployment, demonstration, research, and development projects in conjunction with sector customized strategies. Such strategies include benchmarking, targeted marketing materials and messages, tools and resource training, partnerships with trade associations, and integration with regional and national efforts.

New Construction Program. The New Construction Program was established to encourage energy-efficient design and building practices among architects and engineers and to urge them to inform building owners about the long-term advantages of building to higher energy-efficiency standards. The program aims to create long-term changes in design practices by integrating energy efficiency and green building concepts into new building designs. The program offers a performance-based approach in which incentives are determined by total electricity savings and are tiered to reward progressively better designs. Through design team incentives and recognition, the program promotes green building and Leadership in Energy and Environmental Design (LEED) and New York – Collaborative for High Performance Schools (NY-CHPS) certification projects.

FlexTech Technical Assistance Program. The FlexTech Technical Assistance Program is a consolidation of services previously offered under the FlexTech, Technical Assistance, and the Energy Audit Programs. The Program provides commercial and industrial customers with objective and customized information to facilitate wiser energy efficiency, energy procurement, and financing decisions. Cost-shared technical assistance is provided for detailed energy efficiency studies from energy engineers and experts. Small customers are eligible for quick walk-through energy audits, with the cost

share reimbursed upon implementation of recommendations. Participants may use NYSERDA-contracted or customer-selected consultants.

3.2 Commercial/Industrial Evaluation Activities

Table 3-1 provides a snapshot of all recently completed, in-progress, and near-term planned evaluation activities for the Commercial/Industrial (C/I) sector programs. The evaluation activities completed in 2008 are highlighted within Section 3, and were used along with results from past evaluations to inform the overall findings and conclusions presented in this report. For evaluation projects currently underway or planned, the anticipated completion date shown in Table 3-1 indicates when NYSERDA expects to report results in future **New York Energy SmartSM** quarterly evaluation and status reports.

Table 3-1. C/I Program Evaluation Activities

Program Name	Evaluation Activities Completed in 2008	Evaluation Activities Underway or Planned (Anticipated Completion Date)
C/I Sector	New York City Market/Process Evaluation ¹	Complete Impact Evaluation of Largest Energy Savers (Q2 2009) Update to Non-Participant Spillover in Existing Facilities Market (2009)
Existing Facilities Program	Largest Energy Savers Study (Partial Results) ¹ Process Evaluation for Commercial/Industrial Performance Program	Impact Evaluation (Q4 2009) Complete Impact Evaluation of Largest Energy Savers (Q2 2009) Benefit-Cost Analysis Update (Q1 2009) Market Characterization & Assessment (2009)
Business Partners	None	Impact Evaluation of Motors (Q3 2009) Market Characterization and Assessment (2009) Process Evaluation (2009)
Flex Tech / Technical Assistance	Largest Energy Savers Study (Partial Results) ¹	Impact Evaluation (2009) Benefit-Cost Analysis Update (Q1 2009)
Loan Fund and Financing	Best Practices Process Evaluation Study	Year-end database review ² (2009)
New York Energy Smart SM Focus	None	Impact Evaluation (2009) Market Characterization and Assessment (2009) Process Evaluation (2009)
New Construction Program	Largest Energy Savers Study (Partial Results) ¹ Market Characterization & Assessment Prospective Benefits	Complete Impact Evaluation of Largest Energy Savers (Q2 2009) Benefit-Cost Analysis Update (Q1 2009) Impact Evaluation (2009) Process Evaluation (2009) Year-end database review ² (2009)

¹ Results presented in Section 2 of this report.

² A year-end database review is a thorough review of program databases for discrepancies in data entry, i.e., no kWh recorded for measures that save electricity, high cost per kWh, savings in the correct range, incorrect application of deemed savings values, etc.

3.3 Key Commercial/Industrial Evaluation Findings

This section summarizes key evaluation findings from the 2008 evaluation activities, and from the cumulative prior body of work by NYSERDA and its evaluation contractors.

3.3.1 Energy, Peak Demand, and Fuel Savings

Through NYSERDA's Impact Evaluation activities, independent third-party contractor teams assessed the energy and peak demand savings reported for the Commercial/Industrial (C/I) programs. Methods used in this assessment included on-site verification of equipment installation and functionality, and review of NYSERDA's files and engineering estimates for reasonableness and accuracy. Based on this review, the contractors adjusted the savings reported by NYSERDA. In turn, the contractors further adjusted these figures, based on primary research, to account for freeridership and spillover. Tables 3-2 through 3-4 summarize the estimated electricity savings, peak demand reduction, and other fuel savings for each of the C/I sector programs. Note that individual program savings are not adjusted for program overlaps. To avoid double counting in the total sector-level savings estimates, the amount of overlap among the individual program savings estimates is subtracted at the bottom of the table.

Several goals were set for the third **New York Energy SmartSM** Program funding cycle. These goals established levels to reach, by June 30, 2011, for energy and peak demand savings as well as several other key metrics of program success. Overall, the C/I portfolio is performing well in terms of the energy savings and peak demand reduction goals. Thirty months into the five-year measurement period, most programs are making good progress toward surpassing their energy savings and demand reduction goals.

Table 3-2 shows progress for each applicable program toward the five-year goal for electricity savings. Table 3-3 shows progress for each program toward the five-year goal for peak demand reductions. Table 3-4 shows other fuel savings achieved by several programs. There was no five-year goal for other fuel savings.

Overall, the C/I programs are making a significant impact on the market for both existing and new buildings. For the largest energy-saving programs, namely, Existing Facilities, New Construction, and Technical Assistance, market effects (*i.e.*, spillover) outweigh any naturally occurring adoption (*i.e.*, freeridership as indicated by a net-to-gross ratio greater than 1.0).

Table 3-2. C/I Program Electricity Savings through December 31, 2008 and Progress toward Five-Year Goal

Program	Energy Savings (GWh)				
	Savings Achieved through			Five-Year Goal through June 30, 2011	Progress Toward Five-Year Goal (% achieved) ¹
	June 30, 2006a	December 31, 2008	July 1, 2006 through September 30, 2008		
Existing Facilities Program: Permanent	837.0a	1,212.0	375.0	427	88%
ConEdison	286.0a	363.9	77.9	N/A	N/A
Business Partners Program	54.1	81.1	27.0	80	34%
ConEdison	4.3	9.2	4.9	N/A	N/A
Loan Fund and Financing	49.6	112.2	62.6	N/A	N/A
ConEdison	0.5	22.4	21.9	N/A	N/A
New Construction Program	188.1	301.3	113.1	210	54%
ConEdison	41.1	87.5	46.4	N/A	N/A
FlexTech Technical Assistance Program	644.1	861.8	217.7	400	54%
ConEdison	115.2	226.1	110.9	N/A	N/A
Overlap Removed	126.7	213.4	86.6	N/A	N/A
ConEdison C/I Total	447.2	709.2	262.0	N/A	N/A
Statewide C/I Total	1,646.3	2,355.1	708.8	N/A	N/A

Note: N/A means not applicable (*i.e.*, a goal has not been set for this program).

¹ Percentage represents the difference between the June 30, 2006 and December 31, 2008 achievements divided by the five-year goal.

a Savings reported previously included projects funded through the ConEdison Power Savings Partners Program. These savings have been removed to more accurately reflect accomplishments.

Table 3-3. C/I Program Peak Demand Savings through December 31, 2008 and Progress toward Five-Year Goal

Program	Peak Demand Savings (MW)				
	Savings Achieved through			Five-Year Goal through June 30, 2011	Progress Toward Five-Year Goal (% achieved) ¹
	June 30, 2006a	December 31, 2008	July 1, 2006 through September 30, 2008		
Existing Facilities Program: Permanent	175.0a	241.1	66.1	110	60%
ConEdison	82.1	103.0	21.0	N/A	N/A
Existing Facilities Program: Curtailable	421.1a	462.1	41.0	240	17%
ConEdison	188.3a	213.0	24.7	125	20%
Business Partners Program	11.8	19.7	7.9	16	49%
ConEdison	1.0	2.2	1.2	N/A	N/A
Loan Fund and Financing	14.3	57.4	43.0b	N/A	N/A
ConEdison	0.5	11.1	10.6	N/A	N/A
New Construction Program	41.0	76.6	35.6	24	149%
ConEdison	11.3	26.3	15.0	N/A	N/A
FlexTech Technical Assistance Program	120.9	171.5	50.6	80	63%
ConEdison	30.6	48.0	17.4	N/A	N/A
FlexTech Technical Assistance Program: Curtailable	10.2	12.5	2.4	N/A	N/A
Overlap Removed	24.5	46.9	22.4	N/A	N/A
ConEdison C/I Total	125.5	416.3	290.8	N/A	N/A
Statewide C/I Total	769.9	994.0	224.1	N/A	N/A

Note: N/A means not applicable (i.e., a goal has not been set for this program).

¹ Percentage represents the difference between the June 30, 2006 and December 31, 2008 achievements divided by the five-year goal.

a Savings reported previously included projects funded through the ConEdison Power Savings Partners Program. These savings have been removed to more accurately reflect accomplishments.

b Savings have decreased slightly from Quarter 3 due to continual maintenance of the program database.

Table 3-4. C/I Program Fuel Savings through December 31, 2008

Program	Fuel Savings (MMBtu)	
	Savings Achieved through	
	June 30, 2006	December 31, 2008
Existing Facilities Program	3,252	-61,953
ConEdison	420	1,215
Loan Fund and Financing	137,239	838,739
ConEdison	4,941	62,905
New Construction Program	0	9,567
FlexTech Technical Assistance Program ¹	3,164,000	3,306,000
ConEdison	800,846	892,620
Overlap Removed	158,200	165,300
ConEdison C/I Total	806,207	956,740
Statewide C/I Total	3,146,291	3,917,487

Note: No goals for fuel savings were established.

¹ The methodology to assess impacts focuses on developing samples based on electricity savings, rather than fuel, resulting in a less than optimal sample for fuel-savings projects and fluctuation over time in the calculated impacts. Also, the program recommends on-site generation, which would result in an increase in fuel use, offsetting fuel reductions achieved.

3.3.2 Summary of Other Key Program Impacts and Results

Across the programs, nine additional logic model-driven goals were set for other key metrics apart from energy savings such as the number of customers receiving assistance, funds leveraged, allies participating, and percentage of target markets affected by the C/I programs. The programs are making good progress toward these nine goals.

- Two of the nine goals have been exceeded
- Another three of the nine goals have reached or exceeded 50% progress
- Progress on the remaining four goals is at 50% or less.

The results of each program's progress toward its stated goals are shown in table format in the subsequent sections.

Selected longer-term achievements (cumulative since program inception) and evaluation findings are as follows:

- Over 6,000 customer projects and \$520 million leveraged funds are attributable to the Existing Facilities Program (EFP).
- The New York Energy SmartSM Business Partners Program has provided training for nearly 1,700 persons on effective, energy-efficient lighting and 494 contractors and distributors on HVAC/retrocommissioning.

- Since its inception the Loan Fund and Financing Program has closed on 660 commercial loans valued at \$189 million.
- Fourteen percent of the square footage in the greater New York City metropolitan area (including Westchester) has been benchmarked using the Focus on Commercial Real Estate Benchmarking Toolkit.
- The New Construction Program has provided technical studies for 1,046 projects and completed 901 projects; 272 projects have received commissioning.
- The FlexTech TA Program, since its inception, has completed over 4,650 customized studies for customers that identify and encourage the implementation of cost-effective, energy-efficient measures, and 271 ESCOs and engineering firms are participating in the program.

3.4 Existing Facilities Program

3.4.1 Program Description

The Existing Facilities Program (EFP) promotes energy efficiency and demand management. This new program is a consolidation of two prior NYSERDA programs -- the Peak Load Management Program (PLMP) and the Enhanced Commercial and Industrial Performance Program⁶⁷ (ECIPP). Building upon the success of these two programs, the July 1, 2008 merger provides a less complicated, more accessible program presentation to potential customers in the marketplace. EFP targets sectors of customers that include commercial and industrial businesses, healthcare facilities, universities and colleges, State and local governments, and mission critical facilities such as data centers and communications facilities.

There are two types of EFP incentives: prequalified and performance-based:

- **Pre-qualified** electric incentives encourage customers working on small-sized energy projects and equipment replacement projects to purchase and install more energy efficient measures. Some of the electric measures available to qualifying customers are lighting, heating, ventilation and air conditioning (HVAC), chillers, motors, variable frequency, and interval meters.
- **Performance-based** incentives are for customers or Energy Service Companies (ESCOs) working on large-scale projects. The incentives are typically higher than those for pre-qualified projects, and the performance-based projects require an engineering analysis, and are potentially subject to measure and verification requirements. The various types of performance-based incentives are expected to result in the following impacts:
 - Electric efficiency incentives encourage the implementation of projects that deliver verifiable annual electric savings.
 - Combined heat and power (CHP) incentives contribute to the installation cost of clean, efficient, and commercially available CHP systems.

⁶⁷ The Enhanced Commercial/Industrial Performance Program combined two early programs – Commercial/Industrial Performance and Smart Equipment Choices.

- Industrial and process efficiency incentives help offset the costs of projects focused on increasing productivity, and increasing electricity consumption on a per-unit of production basis.
- Demand response provides help with a portion of the cost for technology, such as load curtailment and shifting (LC/S) and distributed generation (DG), that enable facilities to participate in the New York Independent System Operator demand response programs (which reduce electricity load in response to emergency and/or market-based price signals).

Energy demand reduction contributes to improvements of New York's energy system reliability and security, while helping businesses and industries to reduce operating costs. Allowing customers, ESCOs, and contractors access to multiple incentive strategies to support their energy projects will enable the New York ESCO community to continue to grow the market for energy efficiency in existing buildings, process equipment, and non-building efficiency measures.

The 13-year EFP budget is \$326.3 million.

3.4.2 Program Accomplishments

With EFP being the product of merging of the PLMP and ECIPP programs, continued tracking of the original individual program goals is no longer possible.⁶⁸ NYSERDA, however does track program outputs that somewhat parallel the former goal activities: a count of EFP customer projects and the leveraged funds for the entire program are listed in Table 3-5.

Table 3-5. Existing Facilities Program – Program Outputs

Output	Value
Customer projects	6,313
Leveraged Funds (\$ million)	\$520 million

3.4.3 Program Impact Evaluation

In 2008, the Impact Assessment team undertook an evaluation of the 25 largest energy savers in the New York Energy SmartSM portfolio. This analysis assessed projects from five different NYSERDA programs (CIPP, TA, NCP, DG/CHP and PLMP) and included measurement and verification and attribution. All of the projects studied saved more than 1.5 GWh/year. Results from Phase 1 for the PLMP and CIPP projects are reported in Table 3-6 within the total program-reported savings. The program realization rates and net-to-gross ratios are applied to the balance of savings not covered in the largest savers analysis. An overall description of the methods and detailed results from the Largest Savers study are included in Section 2 of this report. Cumulative annual savings for EFP, as a single program, include the savings achieved under the predecessor programs.

⁶⁸ Although the goals for PLMP (750 customers receiving assistance) and ECIPP (3,300-3,500 customer projects) are similar, they are not the same metric; consequently the goals cannot be merged. As for the ECIPP leveraged funds goal (\$400-\$450 million), again the data merge does not permit continued tracking of this information.

Table 3-6. Existing Facilities Program Cumulative Annual Energy and Peak Demand Savings (through December 2008)

	Program Reported Savings	Realization rate	Adjusted Gross Savings	Freerider-ship	Spillover	Net-to-Gross Ratio	Net Savings
Existing Facilities Program (EFP) - Total							
MWh/year	1,216,016	N/A	1,213,039	N/A	N/A	N/A	1,212,024
MW On-Peak	294.1	N/A	242.7	N/A	N/A	N/A	241.1
MW - curtailable	517.1	N/A	451.1	N/A	N/A	N/A	462.5
MMBtu/year	-67,062	N/A	-102,559	N/A	N/A	N/A	-61,953

3.4.4 Process Evaluation Results

This study was the first process evaluation of the ECIPP⁶⁹ after earlier programs were integrated to become Tier I and Tier III of the ECIPP. Tier I provided set incentive levels for pre-qualified measures. Tier III provided performance-based incentives and required rigorous project measurement and verification. The new Tier II was offered to provide incentives per kilowatt-hour saved as determined by a documented technical analysis study. The process evaluation was structured to help NYSERDA decide on potential changes to its inspection and verification program administration process and the establishment of policies on incentivizing energy-efficient technologies. These issues resulted in three research objectives:

1. **Current Inspection Practices:** Investigate the inspection practices for Tier III projects and their impact on NYSERDA's resources to assess the feasibility of streamlining and standardizing inspection and verifications.
2. **Comparison of Regional Incentive Design and Inspection Practices:** Investigate incentive design policies and inspection practices followed in regional energy efficiency programs with respect to selecting technologies to incent, discontinuing some incentives, and conducting inspections for installations.
3. **Program Infrastructure Preparedness for Future Expansion:** Investigate whether ECIPP infrastructure is robust enough to handle an anticipated increase in program participation in the future.

The evaluation team conducted in-depth interviews with five NYSERDA staff, 16 energy service companies (ESCOs), seven technical consultants (TCs), and five energy efficiency program managers at other energy efficiency organizations. The team also conducted 82 telephone surveys with Tier I participants. The evaluation team's recommendations corresponding to the study objectives are detailed in the following section along with program staff's response as to how these recommendations will be addressed.

⁶⁹ Process evaluation findings were summarized in the June 2008 Quarterly Evaluation and Status Report. For the full report, see Research Into Action, Inc.: *Process Evaluation Enhanced Commercial Industrial Performance Program*, Prepared for NYSERDA, September 2008.

3.4.5 Follow-up on ECIPP Process Evaluation Recommendations

The follow up on the September 2008 process evaluation report for the now subsumed ECIPP contained several recommendations for program improvement, most of which are still relevant to the new EFP. Those recommendations are listed below along with program staff's responses.⁷⁰

- **Current Inspection Practices:** In a review of practices for Tier III projects and their impact on NYSERDA's resources, a feasibility assessment of streamlining and standardizing inspection and verification activities, including possibly adjusting the minimum project size that would trigger inspection requirements, resulted in:
 - **Finding:** There is an opportunity to reduce the cost for program measurement and verification requirement by increasing the waiver threshold for monitoring of lighting projects from 600,000 kWh in annual savings to 1 million kWh. This may not be risky if NYSERDA continues to encumber incentives at the proposal stage.

Status: NYSERDA discussed results with DPS and set the program M&V threshold for lighting projects at 1 million kWh in annual savings.
 - **Finding:** Institutionalize M&V knowledge by preparing case studies, discussing successful M&V methods at the annual meeting of Technical Consultants, and establishing a database of M&V results.

Status: Project specific M&V results are being tracked through a database.
- **Comparison of Regional Incentive Design and Inspection Practices:** This work investigated policies and practices followed in other regional energy efficiency programs, with respect to selecting technologies to incent, discontinuing incentives offered for certain technologies, and conducting inspections for installations recommended:
 - **Finding:** Accelerate the development of a more formal incentive design process that reflects local retrofit costs and the customer base by collecting retrofit cost data and conducting frequent and focused surveys/interviews to support program design.

Status: A contractor was hired to fully analyze incentive structure and measure eligibility.
 - **Finding:** Consider making Tier II more visible and increase the level of incentives; this would be an alternative to lowering the M&V requirements for small non-lighting projects.

Status: The tier system was eliminated with the roll-out of EFP, a program which provides a uniform incentive structure and allows both customers and energy services companies to apply.
- **Program Infrastructure Preparedness for Future Expansion:** This evaluation objective involved two reviews. First, was a review of whether the ECIPP infrastructure was robust enough to handle an anticipated increase in future program participation. Second, was an assessment of participating customers' experience with the revised administrative procedures.

⁷⁰ Research Into Action, Inc. *Enhanced Commercial/Industrial Performance Program Process Evaluation Report*, September 2008.

- Finding: Review the rebate processing practices at other organizations and consider outsourcing Tier II incentive management.

Status: NYSERDA staff is working internally first, to understand the process before considering the outsourcing of rebates.

- Finding: There should be a concerted effort to review the multiple authorization approval requirements for various tasks, as well as development of enhancements to and the interconnections of NYSERDA's databases

Status: NYSERDA has streamlined the contracting process internally for the new program. NYSERDA's transition to a new database has delayed the interaction of database management.

- Finding: NYSERDA should begin developing marketing expertise, and launch a marketing and support strategy directed at high-potential areas, especially the New York City region.

Status: NYSERDA has hired a marketing director and hired a program director for NYSERDA's New York City office.

3.5 New York Energy \$martSM Business Partners

3.5.1 Program Description

The New York Energy \$martSM Business Partners Program consolidated four prior programs, and added an umbrella Core Services support function. NYSERDA's Core Services contractor provides program design, development, and implementation services. The four program elements included in Business Partners are described below.

- **Commercial Lighting:** Formerly known as the Small Commercial Lighting Program, this effort involved promotion of effective, energy-efficient lighting - "The Right Light" - in commercial and industrial spaces up to 25,000 square feet by partnering with lighting practitioners. The program has provided training, field support, project incentives, and demonstration awards to participating lighting practitioner allies, including contractors, distributors, manufacturer representatives, lighting designers, architects, and engineers. In 2008, NYSERDA hired an implementation contractor through RFP 1054 to evolve and continue these efforts under the Business Partners Program.
- **Motor Systems:** Formerly known as the Premium-Efficiency Motors Program, this effort worked with suppliers and providers of motors and motor repair services to promote sales of National Electrical Manufacturers Association (NEMA) Premium[®] motors, quality motor repairs, and motor management services. Motor management activities included motor assessments, planning for future repair and replacement, and consideration of drives. The Program has worked with vendors to present the case for a motor management program to their customers, to conduct motor assessments, and to facilitate implementation of motor management plans and policies whenever possible.
- **Building Performance and HVAC:** Prior activities under the commercial HVAC Program focused on training and supporting HVAC contractors, distributors and commercial building owners to increase the market share of energy-efficient unitary HVAC units, and increase the demand for retro-commissioning services in existing commercial buildings. The Business Partners Building Performance and HVAC program has supported green building operations and unitary HVAC

advanced diagnostics training for trade unions including the International Union of Operating Engineers (IUOE) Local 94 and Service Employees International Union (SEIU) Local 32BJ, while separate market transformation efforts continued to support benchmarking best practices and retro-commissioning services to improve commercial office building performance.

- **Innovative Opportunities:** Competitively selected projects on emerging and under-used technologies to increase market adoption and penetration. Six projects totaling approximately \$1.7 million in program funding are still underway.

New York Energy \$martSM business partners are allies who agree to work with NYSERDA to promote energy-efficient products and services. In exchange, business partners gain access to special training, tools, guidelines, and performance incentives. NYSERDA works with its business partners to help them differentiate their businesses in a highly competitive marketplace, while assuring appropriate quality. This involves creating a brand identity that conveys the theme that mid-market businesses are vital to the growth of the energy efficiency industry and important to the State's economy.

The Business Partners Program activities, such as training, tools and field support, help improve the awareness of and familiarity with targeted technologies and services. The strategy of partnering with businesses helps to strengthen the market infrastructure leading to increased product and service availability and demand. Additionally, business partner efforts will also help to increase activity in NYSERDA's customer-targeted programs.

The thirteen-year program budget is \$43.9 million.

3.5.2 Program Accomplishments

Table 3-7 shows the Business Partners Program goal to sign up 1,500 partners between July 1, 2006 and June 30, 2011. Although more than 800 allies are currently participating in the commercial lighting program element, a total of 131 partners have signed up over the past 30 months. Program staff expects an increase in partners as the core services and program elements ramp up.

Table 3-7. New York Energy \$martSM Business Partners Program – Long-Term Goals and Achievements

Activity	Program Goals (July 1, 2006 through June 30, 2011)	Achieved July 1, 2006 through December 31, 2008	% of Goal Achieved
Business Partners (signed up)	1,500	131	9%

3.5.3 Program Outputs and Indicators

This section highlights key program outputs. All values reported are cumulative since program inception. Table 3-8 presents the key outputs for the program through December 31, 2008. Some metrics are carried forward from predecessor programs in an effort to show cumulative progress.

Table 3-8. New York Energy SmartSM Business Partners Program – Key Program Outputs

Outputs	Value (Cumulative through December 2008)
Commercial Lighting	
Number of participating allies	806
Dollar value of incentives awarded	\$982,940
Number of completed projects	1,053
Square footage of projects completed	8.8 million
Total persons trained on effective, energy-efficient lighting	1,694
Number of individuals at SCLP ally companies that have taken the National Council on Qualifications for Lighting Professions (NCQLP) certification exam	15
Motor Systems	
Number of motors incented under the former Premium-Efficiency Motor vendor incentive program	11,004
Number of participating vendors (vendors who have participated in at least one customer ride along visit)	31
Number of vendor motor management training sessions held and number of people attending training sessions	16 sessions with 92 attendees
Number of completed customer motor inventories using MotorMaster and number of motors inventoried	97 inventories covering 8,692 motors
Number of written motor management plans developed by customers	1
Building Performance & HVAC	
Number of participating vendors	26
Number of commissioning providers trained	289
Number of HVAC/Retrocommissioning contractors and distributors trained	494 (344 Green Building Operations, and 150 Existing Building Commissioning)
Number of unitary HVAC Rooftop Units tested with advanced diagnostics	1,248
Number of buildings receiving an ENERGY STAR label	5
Number of commercial building owners achieving ENERGY STAR Leader	1
Total square footage benchmarked	59 million

3.5.4 Program Impact Evaluation

Table 3-9 presents cumulative annual net energy and demand savings for the program from inception through December 31, 2008. Realization rates are developed to account for differences in program reported savings and performance of actual installations. Attribution analysis determines, through various methods, whether the gross savings estimate should be further adjusted downward or upward for freeridership or spillover. Adjustments for realization rate, freeridership and spillover, and the ultimate program net-to-gross ratio are also shown in the table. Adjustments for freeridership and spillover were not estimated for the Hospitality Lighting Program. For Commercial HVAC, the savings estimates were determined by NYSERDA's former Market Characterization, Assessment, and Causality (MCAC) team based on market research.

Table 3-9. New York Energy SmartSM Business Partners Cumulative Annual Energy and Peak Demand Savings (through December 2008)

	Program-Reported Savings	Realization Rate	Adjusted Gross Savings	Freeridership	Spillover	Net-to-Gross Ratio ¹	Net Savings
Small Commercial Lighting							
MWh/year	55,059	0.94	51,755	39%	80%	1.10	56,931
MW On-Peak	14.0	1.0	14.0	39%	80%	1.10	15.4
Premium-Efficiency Motors²							
MWh/year	9,885	1.0	9,885	67%	168%	0.88	8,776
MW On-Peak	1.9	1.0	1.9	67%	113%	0.70	1.3
Commercial HVAC³							
MWh/Year	6,767	N/A	6,767	N/A	N/A	N/A	6,767
MW On-Peak	2.0	N/A	2.0	N/A	N/A	N/A	2.0
Hospitality Lighting							
MWh/year	8,660	Not Evaluated	8,660	Not Evaluated	Not Evaluated	Not Evaluated	8,660
MW On-Peak	0.9	Not Evaluated	0.9	Not Evaluated	Not Evaluated	Not Evaluated	0.9
Total Business Partners							
MWh/year	80,371	N/A	77,067	N/A	N/A	N/A	81,134
MW On-Peak	18.9	N/A	18.9	N/A	N/A	N/A	19.7

¹ Net-to-Gross Ratio = (1-Freeridership) * (1+Spillover).

² Savings from the prior motor incentive program have been held constant since the program ended. Savings achieved in 2006 from the new motor management program and the STAC 100 Motors program, in the amount of 296,202 kWh and 48 kW, have been added in the Net Savings column.

³ Cumulative annual savings for the Commercial HVAC portion of the program were reduced in 4th Quarter 2006. This approach was taken due to the known short-term nature of savings from advanced diagnostics and commissioning, which were part of the program.

N/A – not applicable

Non-Energy Impacts

Non-energy impacts (NEIs) studies have focused on the Small Commercial Lighting Program and Commercial HVAC. In general, NEIs can include changes in comfort, safety, and productivity and their value (positive or negative) is expressed as a percentage of the Program's energy savings. Multipliers are shown in Table 3-10.

Table 3-10. Business Partners NEI Results

Results from Direct Query Approach (year of study)	Percentage of Energy Savings
Small Commercial Lighting Program (2007)	11%
Commercial HVAC Program (2004)	25-55%

3.5.5 Follow-up on Evaluation Recommendations

In its May 2007 report on the SCLP, Nexant noted that on some projects the kW reduction was calculated by space types, while a single self-reported operating-hour number was used to estimate the electric energy savings for all the spaces covered by the project.⁷¹ Nexant recommended that NYSERDA use space-specific operating hours for each project with the expectation that this would improve the accuracy of energy savings claimed by each project, and reduce variance observed in the results.

The new Commercial Lighting Program will be launched in the first quarter of 2009. While pre-project documentation of operating hours is not feasible, other methods to determine more accurate operating hours are being considered. These methods will be vetted with NYSERDA's Energy Analysis group prior to requiring their use. In the meantime, the implementation contractor will review applications for space types that typically are not used equally with the rest of a facility (e.g., closets, rest rooms, etc.) and allocate operating hours to these spaces as deemed appropriate.

3.6 New York Energy \$martSM Loan Fund and Financing Program

3.6.1 Program Description

The New York Energy \$martSM Loan Fund and Financing Program expands the availability of low-interest capital to help implement energy-efficiency projects and process improvements. Lenders enroll in the program by signing participation agreements and agreeing to reduce the interest rates on energy-related loans in exchange for a lump sum subsidy paid by NYSERDA. Interest rate reductions range from 4% in most of the State to 6.5% in the Con Edison utility area. The Loan Fund has been an implementation tool for many types of projects, allowing reduced interest rate financing for cutting edge technologies. The Program has been especially beneficial in encouraging lender financing of photovoltaic and wind turbine projects, and in promoting green building measures in new construction.

The Program's ongoing training of the financial sector includes tools to allow lenders to calculate the cash flow advantages their customers will gain from making energy-efficiency improvements. Going forward, NYSERDA will work with ENERGY STAR[®] to develop new or modify existing ENERGY STAR tools to meet this goal.

NYSERDA has worked with more than 100 lenders and leasing companies across the State to increase the availability of low-interest capital for energy efficient equipment and process improvements.

The 13-year program budget is \$25.4 million.

⁷¹ Nexant, *M&V Evaluation Small Commercial Lighting Program*, Prepared for NYSERDA, May 2007.

3.6.2 Program Accomplishments

Table 3-11 highlights the Loan Fund's five-year goals and accomplishments as of December 31, 2008. Thirty months into the five-year period, the Program has already surpassed its goal to sign up 75 lenders and has also met its goal for the dollar value leveraged by closed loans in the commercial and industrial sector. Although the number of commercial/industrial loans was in line with expectations, projects were much larger than anticipated. The Loan Fund per-project cap remained unchanged, but the loan amounts were larger than projected. In early 2009, an additional \$18.3 million in funding was added to the Loan Fund.

Table 3-11. New York Energy SmartSM Loan Fund and Financing Program – Long-Term Goals and Achievements for Commercial/Industrial Projects

Activity	Program Goals (July 1, 2006 through June 30, 2011)	Achieved July 1, 2006 through December 31, 2008	% of Goal Achieved
Customers receiving assistance (closed commercial/industrial loans)	500	284	57%
Participating lenders (signed participation agreements)	75	143	>100%
Leveraged loan amount (for closed commercial/industrial loans)	\$60 million	\$115.6 million	>100%

3.6.3 Program Outputs and Indicators

This section highlights key program outputs as identified through the logic model development work and associated market progress. All values reported are cumulative since program inception. Table 3-12 presents the key outputs for the Loan Fund and Financing Program through December 31, 2008. Table 3-13 presents a sample of key logic model-driven indicators of program success, especially those related to market progress, as tracked by the evaluation and program activities. Together, these tables summarize the most important metrics against which the program is being measured, and progress in those areas.

Table 3-12. Loan Fund and Financing Program – Key Program Outputs for Commercial/Industrial Projects

Outputs	Value (Cumulative through December 2008)
Number of loans closed (all commercial)	660
Value of loans closed	\$189 million
Average loan value	\$300,600
Number of lenders with signed participation agreements	143
Number of lenders actively processing loans	60
Number of lenders with multiple loans	121
Number of lenders with statewide coverage	39

a Includes some early residential activity.

Table 3-13. Loan Fund and Financing Program – Key Market Indicators and Program Cumulative Progress

Topic	Indicator	Value (2005)
Awareness and Knowledge	Increasing awareness among lenders about the financial benefits of energy efficiency	85% of lenders surveyed have at least some familiarity with energy efficiency, compared to only 62% for renewable energy Of those lenders claiming some knowledge, about two-thirds have become more familiar with the technologies and related economics over the past five years
	Awareness of the Loan Fund among contractors and vendors	More than half of borrowers (51% of commercial and 85% of residential) report that their contractor or vendor had either referred them to the Loan Fund or was aware of the program.
	Lenders are able to speak accurately about the economic benefits of energy efficiency and renewable energy investments	35% of lenders consider it important (4 or 5 on a 5-point scale where 5 is the highest) that they understand “the technologies and economics related to energy efficiency equipment and measures” before making loans for new construction or renovation projects that incorporate high efficiency. Lenders have similar views on renewable energy projects.
	Lenders include energy savings within cash flow analysis when reviewing loans	11 out of the 21 commercial lenders surveyed “always” or “often” include energy costs in the cash flow analysis for new construction and renovation projects
Perceptions and Practices	Value of energy efficiency investments is based on principles similar to other business investments (e.g., ROI, payback)	75% of commercial borrowers say they evaluate energy efficiency investments on the same basis as other business investments
	Property owners perceive that renewable energy technology or efficiency products will provide adequate payback	39% of commercial borrowers and 10% of residential borrowers were confident that high efficiency equipment would pay back quickly enough without a financial incentive
	Lenders have confidence that new renewable energy technology or efficiency products will improve ability of borrower to repay loan	Lenders were evenly split on the importance of reduced energy costs improving borrowers’ ability to repay loans and only 7% consider it “extremely important”

3.6.4 Program Impact Evaluation

Table 3-14 presents cumulative annual net energy and demand savings for the program from inception through December 31, 2008. Realization rates are developed to account for differences in program reported savings and performance of actual installations. Attribution analysis determines, through various methods, whether the gross savings estimate should be further adjusted downward or upward for freeridership or spillover. Adjustments for realization rate, freeridership and spillover, and the ultimate program net-to-gross ratio are also shown in the table.

Table 3-14. Loan Fund Cumulative Annual Energy and Peak Demand Savings (Through December 2008)

	Program-Reported Savings	Realization Rate	Adjusted Gross Savings	Freerider-ship	Spillover	Net-to-Gross Ratio ¹	Net Savings
MWh/year	144,121	0.81a	120,684	27%	20%	0.93	112,236
MW On-Peak	39.9	1.73a	61.7	27%	20%	0.93	57.4
MMBtu	567,214	1.59	901,870	27%	20%	0.93	838,739

¹ Net-to-Gross Ratio = 1-Freeridership+Spillover.

a The realization rates calculated only apply to the custom measure kWh and kW savings. Savings arising from pre-qualified measures have a realization rate of 1.0.

3.6.5 Loan Fund and Financing Process Evaluation Results

To expand the reach of the Loan Fund and Financing Program (Loan Fund), NYSERDA requested a formative process evaluation to explore additional avenues for financing projects that do not seek loans from traditional lenders.⁷² It is anticipated that an expansion of the program could result in additional options for projects and, ultimately, increased energy savings attributable to Loan Fund support. To help inform this expansion, Loan Fund staff sought information about approaches and lessons learned from programs involved in applying or providing financing mechanisms other than interest rate reductions that could support projects for customers for whom loans, as currently structured, do not work. This evaluation commenced in late-2007, prior to the major changes that occurred in the economy and financial markets in Fall 2008, so the findings need to be viewed with that in mind.

In the course of developing a project work plan, the process evaluation research team created an extensive list of potential financing products and strategies. The team then worked with Loan Fund staff to narrow the focus of this review to four known, but less standard, approaches for energy efficiency financing programs:

1. Pay-As-You-Save® or On-Bill-Financing programs
2. Construction financing approaches that might include predevelopment loans or bridge financing
3. Programs that allow an energy service company (ESCO) to apply for subsidized financing
4. Programs that are able to address issues associated with subordinated debt

This evaluation involved secondary research, as well as screening interviews with 17 finance program experts and follow-up in-depth interviews with 13 contacts from 11 organizations. The interviews focused on identifying lessons learned and exploring several specific issues of interest to NYSERDA staff regarding innovative or new approaches to financing commercial sector projects.

Conclusions were developed for three of these four approaches noted above; no specific conclusions were associated with subordinated debt. Subordinated debt emerges in unique circumstances and often requires

⁷² The Loan Fund and Financing Process Evaluation results were summarized in the March 2008 Quarterly Evaluation and Status Report. For the full report, please see Research Into Action, *Process Evaluation Best Practices Research New York Energy SmartSM Loan Fund and Financing Program*, Prepared for NYSERDA, May 2008.

legal or financial contract solutions, and is generally not amenable to a programmatic approach. These characteristics make it unlikely that NYSERDA will be able to address issues associated with subordinated debt directly through any program approach. The findings and conclusions for the other three approaches follow.

Overarching Findings

There is growing interest in finding new approaches to financing energy efficiency projects. This interest stems in part from aggressive savings goals, increasing carbon reduction goals, and rising and volatile energy costs. Financing mechanisms are a way to encourage more energy-efficiency installations through the ability of these approaches to overcome the still powerful barriers related to limited capital and the higher first-costs associated with high-efficiency equipment and design and building techniques. Additionally, there is growing recognition that incentives and program budgets are limited, and that programs that can tap into market forces and leverage program dollars with customer dollars are more likely to meet increasing efficiency and carbon mitigation goals.

Many of the new or innovative financing approaches in the marketplace involve venture capital firms and investment banks more interested in financing new technologies or generation capacity than building retrofits. For energy efficiency financing, the tools remain relatively familiar: on-bill-financing, interest rate buy-downs, and leveraging the project support of ESCOs. This research attempted to identify new approaches and explored programs operating through energy efficiency organizations or lending organizations that are able to provide funding.

In our research, two overarching themes emerged in discussing all four of the targeted approaches. First, the importance of flexibility was mentioned by numerous contacts from programs that provide construction financing, that set terms for on-bill financing, and that implement projects with developers or ESCOs. Having the flexibility to adjust terms and amortization schedules to reflect the realities of a specific project minimizes the risk to participants by ensuring that projects are cash-positive for customers. As one contact noted, the goal is to reward, not punish, customers for choosing efficiency.

The other overarching theme was the concern about climate change. The United States Conference of Mayors Climate Protection Agreement has now been signed by over 500 mayors. The International Council for Local Environmental Initiatives (ICLEI) is an international association of local governments and government organizations committed to sustainable development. ICLEI's Cities for Climate Protection™ (CCP) counts more than 800 local governments worldwide committed to integrating climate change mitigation into their decision-making process. ICLEI's CCP Campaign was launched over 10 years ago and plans are coming to fruition. These campaigns illustrate the desire on the part of local government entities to reduce the carbon footprint associated with their cities and has spurred huge investments in (or at least commitments to invest in) upgrades to municipal buildings, renewable energy generation, and transportation planning. Electricity generation and consumption is a significant source of greenhouse gasses, so energy efficiency has gained increased attention as one path to meeting the climate mitigation goals of the world's mayors.

Conclusions

On-Bill Financing

On-bill financing (OBF) and Tariffed Installation Program (TIP) approaches are likely to be increasingly popular, given the favorable treatment by regulators in California, and the inclusion of this approach in the 2007 Energy Bill. The overarching concern among potential implementers is minimizing risk of default. Allowing customers to access NYSERDA incentives for projects expected to be repaid through a

utility-provided TIP could reduce the monthly payments associated with the project and improve the likelihood that energy savings will cover the TIP charge.

Construction Financing

NYSERDA can leverage the Loan Fund subsidies to encourage the installation of energy efficiency in new construction projects. There may be opportunities to do so through identifying and partnering with other organizations already operating in the construction-financing arena. These entities could include Community Development Financial Institutions (CDFI), some of which may have New Market Tax Credit allocations that can be leveraged. Other partners could include construction lenders willing to incorporate energy efficiency grants or loan subsidies into their financing packages, or lending organizations already operating with clear sustainability criteria. These entities may already be known to NYSERDA. Additional research into the construction financing market, the CDFIs operating in New York, and lending organizations already pursuing sustainability, may reveal new partners.

ESCOs

ESCOs continue to provide valuable energy efficiency services to their clients and are able to absorb the performance risk associated with energy efficiency projects through execution of a performance contract. ESCOs do not provide financing directly; however, they regularly package financing and incentive opportunities in proposals to clients. The Loan Fund does not currently prohibit participation of borrowers working with ESCOs. The loan must be taken out by the customer, not the ESCO, which is consistent with the way ESCOs operate.

It does not appear that the Loan Fund can or should do anything specifically to encourage more projects from ESCOs under the current program structure. ESCOs continue to work primarily in the government and institutional sector – entities that may not be able to access financing via the Loan Fund because of public procurement requirements or limitations on debt. Additionally, ESCO projects may frequently be larger than the \$1 million loan limit established by the Loan Fund.

3.7 Energy Smart Focus Program

3.7.1 Program Description

Energy Smart Focus is a sector-specific effort to facilitate and encourage greater energy efficiency awareness and energy efficiency market penetration to the targeted sectors. The program is a marketing and information transfer effort that uses existing core **New York Energy SmartSM** programs and services to sponsor deployment, demonstration, research, and development projects in conjunction with sector customized strategies, including:

- Outreach and one-on-one interactions
- Targeted marketing materials and messages
- Training
- Partnerships with trade associations
- Integration with regional and national efforts

- Benchmarking

Efforts center on each sectors' core mission and increasing productivity while improving energy efficiency and reducing demand. Strategies vary by sector and will be developed to leverage non-energy benefits such as environmental benefits, indoor air quality, productivity, and maintenance savings, which often drive energy efficiency decisions. These efforts will be augmented by sector-independent Web support services.

The five-year program budget is \$18.9 million.

3.7.2 Program Accomplishments

Table 3-15 shows the Energy Smart Focus Program five-year goal for participants receiving assistance. The Program has achieved 8% of its goal. However, only the Energy Smart Schools Program element existed prior to July 2006 and, thus, services to other sectors are still ramping up. Also shown are the Focus Program sector partnerships that have been developed. Partnerships include outside organizations, associations, agencies, utility account executives, supply chain partners etc. who have pledged to assist in the development, promotion, and execution of the Energy Smart Focus Program.

Table 3-15. Energy Smart Focus Program – Long-Term Goals and Achievements

Activity	Program Goals (July 1, 2006 through June 30, 2011)	Achieved July 1, 2006 through December 30, 2008	% of Goal Achieved
Participants Receiving Assistance	21,000	1,735 includes WW and Hospitality ¹	8%
Focus Sector Partnerships ²	NA	232	NA

¹ Includes wastewater and hospitality. Does not include updates from local government, colleges and universities, and the hospitals as these sectors are ramping up.

² This metric is new and was not part of the original SBC3 Operating Plan goals.

3.7.3 Program Impact Evaluation

Energy Smart Focus is primarily a sector-based energy information and services program. Services provided vary by sector, but ultimately many customers will elect to participate in other **New York Energy SmartSM** programs. Energy and demand savings that may be attributable to the Focus Program are tracked and reported under the other **New York Energy SmartSM** programs.

3.7.4 Sector Highlights

As a sector-based energy information and services program, many aspects of the Focus Program cannot be quantified as a goal or achievement. However, these achievements can be more clearly presented in the context of sector highlights. While not quantifiable, these activities and achievements are indicative of success in penetrating the market and influencing the energy efficiency of individual sectors. As the Focus Program matures and the sector activities evolve, Sector Highlights will be revised to show these successes and milestones.

Focus on Commercial Real Estate

The Focus on Commercial Real Estate (CRE) effort has conducted outreach to key owners representing 32% of the New York City market. Over 139 million square feet of commercial office space is managed by these owners. The Focus CRE Benchmarking Toolkit has been used to benchmark 14% of the square footage in the greater metropolitan area, including Westchester County.

- **SL Green Reality Corporation:** More than 18.1 million square feet of this publicly owned real estate has been benchmarked. Energy Scan final reports and leasing analysis have been completed for five buildings representing over four million square feet. Implementation of recommended Energy Conservation Measures is going forward in two buildings without further NYSERDA incentives.
- **Brookfield Properties:** More than 15.7 million square feet have been benchmarked. Three of these buildings represent over four million square feet that have received Energy Scans.
- **Grubb & Ellis:** More than 4.7 million square feet have been benchmarked.
- **Trinity Real Estate:** More than six million square feet have been benchmarked. Leasing analysis has been completed for six properties representing six million square feet.
- **Hines:** More than 7.4 million square feet have been benchmarked. Three buildings have been submitted to the Existing Facilities Program for incentives to improve motor/drive efficiencies.
- **Morgan Stanley (Tenant):** More than 2.9 million square feet have been benchmarked. Four buildings are participating in NYSERDA programs, including Brooklyn's Large Data Center.

Other Focus on CRE activities include:

- Ongoing support to the New York City Mayor's Office of Long Term and Economic Development Corporation in facilitating benchmarking for buildings over 50,000 square feet. This is done using the Focus CRE Toolkit to benchmark all building types (commercial and multi-family).
- Ongoing coordination of the Green Lease with the Natural Resources Defense Council and other co-sponsors to develop a model green lease. This helps to address split incentives between owners and tenants, and encourages building retro-commissioning to improve performance.
- Conducting benchmarking strategy sessions with the U.S. Environmental Protection Agency and the New York City Office of Long Term Planning and Sustainability.
- Conducting lease-based analysis workshops for SL Green and tenant groups.

Focus on Institutions

- The Focus on Institutions program has benchmarked over a third of all eligible public schools in New York State. This program has also facilitated over 60 individual school buildings to earn the ENERGY STAR Building Label, with an additional seven districts earning 12 district level ENERGY STAR Leader awards for overall energy management and improvement. Through the program's benchmarking program, the average school participating has reduced its consumption by 22% over the past six years.

- Over 1,500 design professionals and district staff received training through the program. Most of these training programs provided an individual certification, or continuing education credits towards a professional license.
- The Focus on Institutions program provided support of some sort to over 150 million square feet in 2008.
- Focus on Institutions co-sponsored or participated in several conferences through the year, reaching over 3,500 attendees.
- Focus on Institutions has two Web pages specific to the K-12 and state sectors respectively. These tailored sites average over 500 unique visitors each month.
- Focus on Institutions has continued to support high performance school design and construction. Two schools have now self certified compliance with NY-CHPS, with six more schools queued up to participate in NYSERDA's new third-party verification protocol.
- NYSERDA met with Superintendents from the School Buildings and Grounds Association, working in association with the NYS Education Department and School Facilities Institute Inc., and established a possible training session to be held within the first quarter of 2009. The training session will be open to all school districts in New York, as well as having representation from the New York Power Authority, Long Island Power Authority, and NYSERDA.

Focus on Hospitality

Focus on Hospitality was launched at the International Hotel, Motel, and Restaurant Show at the Javits Center in New York City in November 2007. The initiative was presented to the Board of the New York State Hospitality and Tourism Association (NYSHTA) with several board members agreeing to serve on an industry roundtable to be chaired by the Focus on Hospitality contractor and NYSERDA. Likewise, NYSERDA has been invited to serve on an energy panel and to exhibit at the next NYSHTA annual conference in March 2008. Additionally, Focus on Hospitality has sent out more than 1,200 benchmarking solicitations to members of NYSHTA, inviting them to provide data to determine their baseline scores.

Focus on Hospitality (F on H) worked with 52 entities providing information on or directly referring them to NYSERDA's incentive or technical assistance programs. Two hundred and twenty five members of the Hotel Association of NYC were contacted to determine interest in a benchmarking workshop to be offered in NYC in early 2009. In addition, F on H is working with two other leads for benchmarking activity, each of which would include multiple hotel properties. This quarter, one property of 31,000 square feet was benchmarked.

Other Focus on Hospitality activities include:

- Two kitchen audit training workshops were held in the New York City area. There were a total of 51 attendees including Energy Audit Program auditors, FlexTech contractors, and other interested parties from the Commercial Kitchen Equipment sector.
- Presented energy efficiency strategies and information on programs to 45 attendees of the Empire State B&B Association's Annual Conference.

- Presented to 91 attendees of the Rochester and Rockland/Westchester chapters of the NYS Restaurant Association.
- Convened with the Sullivan County Convention Visitors Bureau. NYSERDA program information was presented and opportunities to participate in future member meetings were discussed.
- Presented to 19 hotel/motel owners at a Broome and Tioga County Convention Visitors Bureau member breakfast.
- At the request of the Mohawk Valley Chamber of Commerce, presented to 32 of its members on energy efficiency strategies, services and incentives for the hospitality and tourism sector.
- Convened with the NYC Convention and Tourism Bureau and presented NYSERDA programs and Focus on Hospitality materials. NYSERDA was asked to present at future CVB member meetings during 2009.

3.8 New Construction Program

3.8.1 Program Description

The New Construction Program⁷³ objective is to create long-term changes in design practices by mainstreaming energy efficiency and green building concepts. The Program is structured upon a performance-based approach in which incentives are determined by total building performance and are tiered to reward progressively more efficient designs. Through design-team incentives and recognition, the Program promotes Green building projects and LEED® certification. Enhancements under the New Construction Program include prescriptive and fast-track approaches using detailed custom analysis tools to ensure that smaller, simpler projects can be reviewed and incentives quickly awarded.

This mature and multi-faceted Program addresses a complex and technically sophisticated market segment. The NYSERDA Program staff has been working within the design and new construction community since 1999, and the Program has evolved to better meet the unique needs of this market segment. The 13-year Program budget is \$164.4 million.

3.8.2 Program Accomplishments

Table 3-16 shows the Program's five-year goals and performance over the most recent thirty months. The Program is progressing well at this point in the five-year period.

⁷³ The program, which operated under the name "High Performance New Buildings Program" for a short time, has reverted back to its old name, which had greater market recognition.

Table 3-16. New Construction Program – Long-Term Goals and Achievements

Activity	Program Goals (July 1, 2006 through June 30, 2011)	Achieved July 1, 2006 through December 31, 2008	% of Goal Achieved
Customers receiving assistance (completed projects)	750	283	38%
Construction market affected (square feet)	75 million	32.7 million	44%
Participating A&E firms (completed projects)	800	453	57%

3.8.3 Program Outputs and Indicators

This section highlights key program outputs as identified through the logic model development work and associated market progress. All values reported are cumulative since program inception. Table 3-17 presents the key outputs for New Construction Program through December 31, 2008.

Table 3-18 presents a sample of key logic model-driven indicators of program success, especially those related to market progress, as tracked by the evaluation and program activities. Together, these tables indicate the most important ways that program progress is being measured, and report how those values are changing due to program activities.

Table 3-17. New Construction Program– Key Program Outputs

Outputs	Value (Cumulative through December 2008)
Number of buildings participating ¹	1,858 active projects (226 with encumbered dollars)
Square footage for active projects ²	102.3 million
Number of completed projects	901
Number of projects receiving TA studies	1,046
Number of projects receiving commissioning	272

¹ The number of active projects with encumbered dollars shows a decline of 1049 to 228 from December 2007 due to a change in reporting. Until December 2007 this number included all encumbered and paid projects, while the current number includes only encumbered projects.

² Reports until December 2007 included square footage for all estimated, encumbered, and paid projects. Current reports include paid projects only. For this reason the total square footage declined from the last quarter.

Table 3-18. New Construction Program – Key Market Indicators and Program Cumulative Progress

Topic	Indicator	Initial Value (2003, unless noted)	Follow-Up (2006, unless noted)	Most Recent (2007, unless noted)
Awareness and Knowledge	Awareness of NYSERDA among non-participating A&E firms and owners	A&Es: 58%	A&Es: 81% Owners: 73%	A&Es: 86% Owners: 85%
	A&E firm familiarity with energy efficiency measures and designs	Participant: 88% (n=44) Non-participant: 89% (n=85)	Participant: 92% (n=48) Non-participant: 74% (n=30)	Participant: 95% (n=60) ¹ Non-participant: 77% (n=60)
	Building owner familiarity with energy efficiency measures and designs	Participant: 92% (n=26) Non-participant: 61% (2004)	Participant: 85% (n=48) Non-participant: 73% (n=30)	Participant: 77% (n=60) ¹ Non-participant: 68% (n=62)
Value of Program Services	Importance of technical assistance for achieving savings according to participating designers and owners	Designers: 38% critically important or important (n=40) Owners: 76% critically important or important (n=31)	Designers: 67% critically important or important (n=48) Owners: 88% critically important or important (n=48)	Designers: 67% extremely or somewhat important (n=60) ¹ Owners: 65% extremely or somewhat important (n=60) ¹
	Importance of incentives for achieving savings according to participating designers and owners	Designers: 70% said incentives were important or critically important (n=44) Owners: 80% said incentives were important or critically important (n=32)	Designers: 98% said incentives were helpful or critical (n=48) Owners: 90% said incentives were helpful or critical (n=48)	Not available, question series no longer asked
Market Penetration	Percentage of New York market participating in the program.	0.4-2% (2000)	12% (2005)	32% (2007)
	Percentage of top architecture and engineering firms, by dollar value and number of projects, participating in the program	50% of architects by dollar value 60% of architects by number of projects 40% of engineers by dollar value and number of projects	80% of architects by dollar value 40% of architects by number of projects 60% of engineers by dollar value 50% of engineers by number of projects	90% of architects by dollar value 60% of architects by number of projects 40% of engineers by dollar value 60% of engineers by number of projects

¹ Wording of the survey question addressing this indicator changed slightly from prior studies.

New Construction Program Market Assessment Findings

In 2008, the Summit Blue team completed a market assessment analysis for the non-residential new construction market.⁷⁴ Select findings from the Market Assessment efforts are summarized below.

- Non-participant awareness of the NCP has risen significantly since the last evaluation of the program – more than half of non-participating building owners (53%) and non-participating A&E respondents (54%) reported being aware of the NCP. This increase is likely driven by a number of factors that may stimulate market actors to seek out information on energy efficiency and green building options, including recent growth cycles in statewide new construction activity, a growing desire within the marketplace to be “green” or pursue LEED certification, rising energy costs, and rising raw materials and construction costs, among others.
- Participants and non-participants alike credit NYSERDA with influencing their knowledge of energy efficiency and green building design. Nearly 60% of participating building owners and 74% of participating A&E respondents reported that NYSERDA had increased their knowledge of energy efficiency and green building design somewhat or a great deal; 26% of non-participating building owners and 25% of non-participating A&E respondents said the same. These results indicate that NYSERDA continues to be viewed as a credible source of information in the marketplace and that NYSERDA’s ongoing efforts to educate key market actor groups have been effective in addressing important market infrastructure and demand-side barriers.
- Participating and non-participating A&E respondents overwhelmingly believe that the focus on energy efficiency in new construction projects has increased or increased significantly over the past five years. The most common reasons cited for the increased focus on energy efficiency were increasing awareness of energy efficiency in the marketplace and rising energy costs. This trend towards an increased focus on energy efficiency relates directly to NYSERDA’s overarching goal of creating a larger, robust and sustainable market for energy efficiency services and products.
- The majority of A&E respondents indicated that the availability of various energy efficiency measures and design approaches had increased in the past five years, particularly the availability of green building design services. Almost half (46%) of all participating A&E respondents and 40% of non-participating A&E respondents said that they incorporated green building design principles into at least 70% of their projects, indicating that A&E firms are responding to the market’s increased interest in green building services.
- Similarly, the majority of A&E respondents (88% of participants and 72% of non-participants) stated that their firms’ recommendations for energy efficiency in new construction projects had increased or increased significantly over the past five years. The top reasons given for the increases in A&E firms’ recommendations for energy efficiency were increasing awareness of energy efficiency in the marketplace, clients’ financial considerations, and general market momentum. A&E firms perceive that their clients are increasingly receptive to the energy efficiency message, a situation that represents a market opportunity for NYSERDA.
- However, it seems that some non-participating A&E firms still underestimate building owners’ interest in energy efficiency; consistently fewer non-participating A&E firms than participating A&E

⁷⁴ Market Assessment findings were summarized in the March 2008 Quarterly Evaluation and Status Report. For the full report, including market characterization data, please see Summit Blue Consulting, *New Construction Program Market Characterization and Assessment*, Prepared for NYSERDA, August 2008.

firms stated that their clients were keenly interested in energy efficiency, that energy performance was more important than other design considerations, and that their recommendations for efficiency had increased in the past five years. These discrepancies between participants and non-participants are not present when viewed from the building owner perspective.

- The most common barriers to energy efficiency for participating building owners were A&E unwillingness to consider energy efficient options (20%), time issues (11%), and lack of training or expertise in the design community (10%); non-participating building owners more frequently mentioned performance uncertainties (22%), competing priorities for attention or capital (13%), and lack of awareness and understanding of energy efficiency (9%). It is interesting to note that the most common barrier for non-participants (performance uncertainties) was not mentioned by a single participant; this indicates that participation in the NCP helps convince building owners of the potential energy savings associated with energy efficient measures and designs

3.8.4 Program Impact Evaluation

Table 3-19 presents cumulative annual net energy and demand savings for the program from inception through December 31, 2008. Realization rates are developed to account for differences in program reported savings and performance of actual installations. The realization rate of 1.03 is applicable to the entire program period, and indicates that the program records were slightly under-estimating the actual energy savings. Attribution analysis determines, through various methods, whether the gross savings estimate should be further adjusted downward or upward for freeridership or spillover. The net-to-gross ratio for the New Construction Program is 1.22, meaning that freeridership that is occurring is outweighed by spillover.⁷⁵ Adjustments for realization rate, freeridership and spillover, and the ultimate program net-to-gross ratio are also shown in the table.

In 2008, the Impact Assessment team undertook an evaluation of the 25 largest energy savers in the New York Energy SmartSM portfolio. This analysis assessed projects from five different NYSERDA programs (CIPP, TA, NCP, DG/CHP and PLMP) and covered measurement and verification and attribution. All of the projects studied saved more than 1.5 GWh/year. Results from Phase 1 for three NCP projects are reported in Table 3-19 within the total program-reported savings. The program does not track or report fuel savings; the fuel savings shown below were found through the largest savers evaluation entirely. The program realization rates and net-to-gross ratios are applied to the balance of savings not covered in the largest savers analysis. An overall description of the methods and detailed results from the Largest Savers study are included in Section 2 of this report.

⁷⁵ The MCAC team continued its Integrated Data Collection (real-time data collection on all projects at the time of project completion) but found that results were similar enough to those reported in the 2006 New Construction Program MCAC evaluation that no modifications to the freeridership or spillover estimates were recommended.

Table 3-19. New Construction Program Cumulative Annual Energy and Peak Demand Savings (through December 2008)

	Program-Reported Savings	Realization Rate	Adjusted Gross Savings	Freerider-ship	Spillover	Net-to-Gross Ratio ¹	Net Savings
MWh/year	247,698	1.03	251,185	40%	85%	1.22	301,256
MW On-Peak	63.0	0.97	60.9	40%	85%	1.22	76.6
MMBtu/year	39,700	N/A	39,061	N/A	N/A	N/A	9,567

¹ Net-to-Gross Ratio = 1-Freeridership+Spillover (a weighted average of the NTG ratios estimated in the previous MCAC analysis and this current analysis is shown here).

Non-Energy Impacts

Non-energy impacts (NEIs) for the New Construction Program were last evaluated in 2005. In general, NEIs can include changes in comfort, safety, and productivity and their value (positive or negative) is expressed as a percentage of the Program's energy savings. The 2005 study found that customers valued NEIs at 40% of the value of the energy savings achieved in their new buildings. This value is similar to the value of NEIs found in an earlier study on the Program.

Prospective Benefits

In early 2008, NYSERDA's Impact Assessment team, led by Megdal and Associates, completed an analysis of prospective benefits from the New York Energy SmartSM Program investments through the New Construction Program.⁷⁶ The objective of this analysis was to determine net energy savings attributable to the program's prior years' expenditures that will be realized after the program is discontinued.

The New Construction Program objective is to create long-term changes in design practices by mainstreaming energy efficiency and green building concepts. The NCP is a mature and multi-faceted market transformation and resource acquisition program that has been operating since 1999. Program-induced spillover is occurring at a rate of 85%. Thus, NCP was an ideal pilot program for estimating prospective benefits.

These prospective energy savings are a forecast of savings to be realized from program-promoted energy efficiency measures and design approaches that are implemented after the program ends, and that would not have occurred without the program investments made prior to termination. The prospective benefits forecast chosen for this evaluation is based on the near-term *hypothetical* situation that the program was terminated on December 31, 2007. The prospective benefit impact estimates are the energy and demand savings that would be expected to occur due to actions taken in 2008 and beyond, given prior program efforts and the state of the market in 2007.⁷⁷ Prospective benefits were evaluated for: currently

⁷⁶ This study was also summarized in the May 2008 Quarterly Evaluation and Status Report. For the full report, please see Megdal & Associates, *Prospective Benefits Impact Evaluation of the New Construction Program*, Prepared for NYSERDA, May 2008.

⁷⁷ Recognize the NYSERDA definition of prospective benefits for this evaluation is significantly constrained from one of forecasting the impacts of all market transformational (MT) effects into a long-term future given the NCP cumulative efforts from SBC 1 through 2007. The current prospective benefits definition was specifically selected by NYSERDA as its first step in estimating future impacts, a definition that could produce the most reliable estimates, conservative for MT impacts but estimates expected to be more precise (less uncertainty).

participating architecture and engineering (A&E) firms; currently participating building owners; and non-participating building owners whose practices have been influenced by the NCP⁷⁸.

Methodology

The prospective benefits analysis is based on an assessment of the percentage of current annual incremental program benefits that can be expected to persist after the program's termination. This approach means that rather than building post-program effects up from an assumption of zero, NYSEDA started with the 2007 incremental net GWh and MW savings – a reasonable expectation of future annual program energy savings if the program continued – and adjusted these savings by expected changes in the supply of and demand for program-supported measures after the program ends. This adjustment was made through use of "Prospective Benefits Factors" that were developed through surveys of participating A&E firms and building owners, and non-participating building owners. These surveys were conducted jointly with the Market Characterization and Assessment team.

Prospective Benefits Factors take on a value between 0 and 1 to reflect the percentage of current savings that is expected to persist after the program ends. For example, a Prospective Benefits Factor of 0.7 means that 70% of current annual program savings are expected to still be realized after the program ends. The evaluation also calculated and used Attribution Weights. These weights estimate the level of program influence on the respondents' future actions.

Prospective Benefits (PB) for the NCP are estimated by applying the attribution-weighted Prospective Benefits Factors to 2007 program net savings. This is done separately for net savings from participants and savings from non-participants, using the following formula:

$$\begin{aligned} \text{Total PB} &= \text{Participant Prospective Benefits} + \text{Non-Participant Prospective Benefits} \\ &= [2007 \text{ Gross Savings} * (1 - 2006 \text{ FR Rate} + 2006 \text{ Inside SO Rate} + 2006 \text{ Outside SO Rate}) * \text{Participant PB Factor}] \\ &+ [2007 \text{ Gross Savings} * 2006 \text{ Non-Participant Spillover Rate} * \text{Non-Participant PB Factor}] \end{aligned}$$

Results

The Impact Assessment team estimates short-term annual Prospective Benefits for the NCP to be approximately 59.5 GWh and 16.6 MW, representing 77% and 75%, respectively, of 2007 incremental net savings.

Table 3-20 presents these results, as well as the 2007 gross savings, the 2006 attribution assumptions, and the attribution-weighted Prospective Benefits Factors used to develop the Prospective Benefits estimates. The table shows that program-influenced non-participants are expected to continue their program-influenced practices at a rate of 83% compared to 76% and 74% for participants (GWh and MW factors, respectively).⁷⁹

⁷⁸ The most recent *New Construction Program Market Characterization, Assessment and Causality Report (May 2006)* estimated and reported impacts for these three groups of market actors. This constituted the base for the prospective benefits estimation.

⁷⁹ Prospective benefit results are based on the following sample sizes: 60 participating A&E firms; 60 participating building owners; 62 non-participating building owners. Given the stratified sampling used, the A&E firm sample represents a large percentage of the market.

Table 3-20. Summary of Prospective Benefits Results

	GWh	MW
Prospective Benefits	59.5a	16.6a
Prospective Benefits - Participants	49.4	13.7
Prospective Benefits - Non-Participants	10.1	2.9
2007 Incremental Gross Savings	71.6	20.4
2006 Free-ridership Rate		0.46
2006 Inside Spillover Rate		0.05
2006 Outside Spillover Rate		0.32
2006 Non-Participant Spillover Rate		0.17
2006 NTG Ratio		1.08
2007 Incremental Net Savings	77.3	22.2
2007 Participant Incremental Net Savings	65.1	18.5
2007 Non-Participant Incremental Net Savings	12.2	3.5
Participant PB Factor	0.76	0.74
Participating A&E PB Factor	0.80b	0.75b
Participating BO PB Factor	0.72c	0.73c
Non-Participant PB Factor	0.83d	0.83d

a Estimates are provided here as point estimates. Unless the Prospective Benefits Factors are assumed to be an index of the underlying construct, derivation of confidence intervals from the variances in this multi-question and factor composite becomes unmeasurable. Further presentation of the variances and discussion of reliability are presented in the *Prospective Benefits Impact Evaluation of the New Construction Program Report*.

b The sample c.v. for the unweighted A&E PB Factor is 0.27 and that for the attribution weights is 0.61.

c The sample c.v. for the unweighted BO PB Factor is 0.29 and that for the attribution weights is 0.76.

d The sample c.v. for the unweighted Non-Participant PB Factor is 0.23.

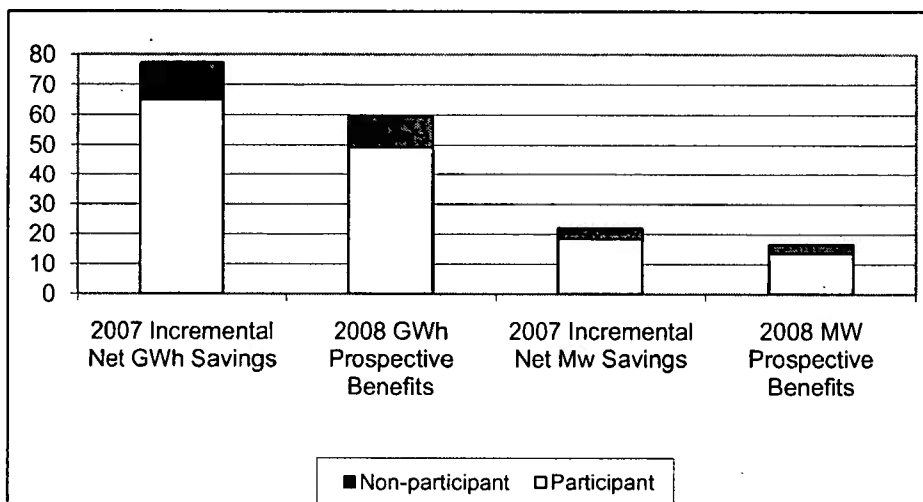
The PB Factors measure the proportion of current year savings expected to be achieved in the following year due to the program's influence. A PB Factor derived from participant responses for what they would do without program incentives, and other current influences, measures how much the current program has transformed their future actions.⁸⁰ The PB estimates derived from non-participant spillover already have non-participants acting from program influence but without any program incentives. This comparative would suggest that the proportion of prospective savings to current savings could be expected to be higher for non-participants who have less of a change in influence factors after program termination than the participants (*i.e.*, the loss of available incentives).⁸¹ Nevertheless, the overall participant incremental net savings are much greater than the non-participant incremental net savings so the PB savings for participants contribute more savings than those contributed by non-participants.

⁸⁰ To the extent that current program participants are free-riders due to prior year programs, however, their future actions are not included as being induced by the current program year. This measurement is incorporated through the attribution weights discussed earlier.

⁸¹ It should be noted that the Prospective Benefits Factors are measuring expected savings for the year after program termination to current savings. The responses from current participants and non-participants are used to derive these factors, yet, these are not expected to be literal estimates of savings from these particular participants and non-participants.

These are high rates of prospective benefits. The savings estimates are substantial and a significant percentage of the savings the program is currently claiming. No additional expenditures are required to obtain these savings. These are the forecast savings from the prior year expenditures. The size of these prospective benefits, compared to the incremental net electricity and demand savings claimed by the NCP, is shown in Figure 3-1.

Figure 3-1. 2008 NCP Prospective Benefits (GWh and MW) Compared to NCP 2007 Incremental Savings



Recall that the reason the NCP was selected for this pilot prospective benefits impact evaluation is it had achieved very high spillover levels. This meant that its prospective benefits could be expected to be high enough to identify and make this study worthwhile to undertake. The level of prospective benefits could be expected to depend upon the level of program-induced market transformation that is being achieved. Readers should be cautioned that few program designs and market transformation accomplishments to-date could be expected to produce this high level of prospective benefits.

These estimates are for the year immediately after the hypothetical 2007 program termination. However, benefits are likely to last beyond the first year. The rate of decay in these savings would likely increase significantly with a change in Energy Codes and is also dependent upon the sustainability of program-induced market transformation. There are very few studies concerning probability of sustainability of effects or decay for efficiency impacts. Significant research to estimate specific levels of decay for this program in the New York markets was beyond the scope of the current evaluation.

The significant level of prospective benefits would suggest the need for continued evaluation of the impacts from the market transformational elements of the New York Energy SmartSM programs. To the extent that these programs have market transformational goals, analysis of the investments should consider including estimates of the prospective benefits in order to fully account for program savings impacts and an evaluation of the goal of the investment.

3.8.5 Follow-up on Evaluation Recommendations

The June 2007 process evaluation report by Research Into Action cited several recommendations for program improvement.⁸² Each of these recommendations and responses or actions by program staff is noted below:

- Increase leveraging of market opportunities and trends. One of the key market opportunities resulting from new construction programs is support for more stringent energy codes (*e.g.*, programs by California, MidAmerican, and Xcel). This, in turn, provides programs the opportunity to push for higher levels of efficiency. Other key trends to leverage include the building community's greater concern for the environment and innovative training opportunities. Other key Trends to leverage include the building community's greater concern for the environment and innovative training opportunities.

The NCP is working to capture additional program participation and savings due to recent heightened market interest in green/sustainable building designs. Market interest in LEED certification is on the rise. The NCP is attempting to bring more industry leaders into the program and highlight accomplishments on their projects that others can emulate. This strategy has worked particularly well in certain end use sectors such as libraries and grocery stores.

Since the last update, NCP staff has continued to bring more industry leaders into the program and highlighted accomplishments (*e.g.*, Food Market Industry) on their projects. Staff will continue this practice. Additionally, NYSERDA has responsibility through the State Energy Plan to assist with upgrades and updates to current energy codes. The NCP will provide information to influence improvements and upgrades in energy codes.

- Make service delivery as effective as possible. The NCP should further investigate the single-contractor approach used for Energy Trust, MidAmerican, and Xcel programs to see if this approach, in whole or in part, could be useful for improving the efficiency of service delivery. Findings suggest the single-contractor approach may also foster greater customer satisfaction, market penetration, and higher savings per project.

NCP staff feels that outsourcing program implementation will not necessarily increase the efficiency and effectiveness of service delivery, nor is an outside implementer the only way to achieve these ends. Outsourcing has several drawbacks including: possible increased costs, loss of the credibility that NYSERDA's direct involvement lends when owners and designers are considering energy efficiency options, loss of institutional knowledge, and a steep initial learning curve. Furthermore, given the scale, scope, and levels of participation in the Program, the single-contractor approach is not practical. The Program processes between 300 and 400 project applications per year with the support of 14 Technical Assistance providers. However, NCP staff recognize that efficiency gains are possible under the current program delivery scheme, and would like to implement more sophisticated project tracking, coordination and communication systems. More internal support, especially in the area of information technology, is necessary to achieve this.

Since the last update NCP Staff has continued to review program delivery, tracking, coordination, and communication systems, and ongoing improvements continue to be implemented. NCP is in the process of implementing a new email system and sharepoint software to improve communication

⁸² Research Into Action, *Best Practices Review New Construction Programs*, Prepared for NYSERDA, June 2007. The old program name "High Performance New Buildings" is referenced in this study.

between program staff and contractors. Staff will also explore opportunities use these systems to improve communication between program staff and consultants.

Summit Blue Consulting also provided recommendations on the NCP as part of its Market Characterization and Assessment Study in August 2008.

- NCP staff should expand existing relationships with A&E firms and other professional organizations active throughout the State (*e.g.*, the U.S. Green Building Council's local chapters, the New York City Mayor's Office of Long Term Planning and Sustainability (PlaNYC), and others), many of which have announced energy initiatives with goals complementary to those promoted by the NCP. By strengthening these relationships and encouraging repeat participation by participating A&E firms, the NCP can potentially enlist these allies to serve as *de facto* program sales agents, identify new construction projects early in the design phase, and enhance program reach.

NCP staff continues to work with numerous A&E firms and professional organizations throughout the State to leverage efforts to promote the NCP and develop opportunities for partnerships and collaborations. Staff continues to explore new opportunities for collaboration. Examples include current work with NYC ASHRAE⁸³, and newly developed partnerships with the US DOE and the Illuminating Engineering Society of North America (IES). NCP staff will continue to pursue these collaborations to leverage the enhanced program opportunities of these partnerships.

- The NCP is well positioned to assist market actors with meeting the requirements of the recently completed revisions to the Energy Conservation Construction Code of New York and the New York City construction code (Title 28) by serving as an independent knowledge base and technical resource for building professionals who are learning to comply with the new code provisions and their increased energy efficiency requirements. This assistance can be accomplished through interactions with relevant market actor groups during recruitment and participation in the NCP as well as NCP staff involvement in training sessions and advisory committees related to new code development. Further, program staff familiar with proposed advanced codes can inform market actors of emerging technology and design innovations that show promise for meeting increased efficiency requirements and use program incentives to help spur market demand for such innovations.

In 2007/2008 NYSERDA worked with the NYS Department of State to develop and deliver training for the new energy codes. NCP will continue, through project scoping meetings, to provide information beyond code opportunities and their projected energy impacts to A&E teams.

- Given the increasing existence of multiple programs and energy efficiency efforts in the New York marketplace, potentially creating areas of overlap and confusion, care must be taken to ensure that messages disseminated by the NCP are crafted in a way that accurately and consistently communicate the ways in which the program interacts with other energy efficiency initiatives.

NCP staff routinely updates its OPC and TA consultants through emails and conference calls on program changes. NYSERDA has also been meeting with the New York State utilities to discuss opportunities to coordinate and collaborate around the new energy efficiency initiatives.

- To increase market penetration in specific building sectors, NCP staff could target marketing and outreach efforts to the design firms most active in those sectors. A variety of methods could be used

⁸³ ASHRAE: American Society of Heating, Refrigerating, and Air Conditioning

to develop targeted marketing strategies including reviews of publicly-available datasets that track new construction activity on a sector-level basis (e.g., the Dodge Players Database), networking by NCP staff during interactions with market actor groups as part of ongoing program outreach activities (e.g., participation in training sessions and advisory committees related to new code development), and market intelligence gathering by Outreach Project Consultants and other technical resources that interact with the targeted market sectors and the NCP on a regular basis.

NCP staff is currently considering the above mentioned methods in the development of outreach and marketing plans as the program continues to move forward.

- Future process evaluation research is suggested to better understand participating A&E firms' use of the NCP's technical assistance services. Results in the current study appear to indicate that the technical assistance provided by NYSERDA is not influencing substantial numbers of A&E respondents to change their original designs. However, the MC&A Team hypothesizes that many participant A&E firms are proposing sophisticated, highly efficient designs from the start, then using NYSERDA's technical assistance services to confirm their expectations of energy savings and to help sell their clients on the efficient designs. Future process evaluation research into this issue would help NCP staff better understand the A&E firms' use of NYSERDA's technical assistance services as part of their overall business model so that staff can tailor the services to be as useful as possible to these important program allies.

NCP staff agree that further development and implementation of process evaluation would provide useful feedback for the program, its allied A&E firms, and OPCs. This issue will be considered by NYSERDA's evaluation team for possible future study.

3.9 FlexTech Technical Assistance Program

3.9.1 Program Description

The FlexTech Technical Assistance Program is a consolidation of services previously offered under the FlexTech, Technical Assistance, and the Energy Audit Programs. This change is part of a continuous stream of evolutionary revisions the program has undergone for the past eight years.

The purpose of the Program is to provide customers with objective and customized information to facilitate wiser energy efficiency, energy procurement, and financing decisions. The Program is available to all commercial and industrial sectors. The Program strives to increase productivity and economic competitiveness by identifying and encouraging the implementation of cost-effective energy-efficiency measures. Studies also include operations management, energy procurement, and on-site Combined Heat and Power (CHP). Cost-shared assistance is provided for detailed studies from energy engineers and experts. Small customers are eligible for quick walk-through energy audits, with the cost share reimbursed upon implementation of recommendations. Participants may use NYSERDA-contracted or customer-selected consultants.

The 13-year program budget is \$55.2 million.

3.9.2 Program Accomplishments

Shown in Table 3-21 is the FlexTech Technical Assistance goal and progress in terms of the number of customers served.

Table 3-21. FlexTech TA Program – Long-Term Goals and Achievements

Activity	Program Goal (July 1, 2006 through June 30, 2011)	Achieved July 1, 2006 through December 31, 2008	% of Goal Achieved
Customers receiving assistance (approved proposals)	3,000	1,696	57%

3.9.3 Program Outputs and Indicators

This section highlights key program outputs and market progress. All values reported are cumulative since program inception. Table 3-22 presents the key outputs for the FlexTech Technical Assistance Program through December 31, 2008.

Table 3-22. FlexTech TA Program – Key Program Outputs

Outputs	Value (Cumulative through December 2008)
Customers receiving assistance (approved proposals)	5,185
Number of studies completed	4,651
Total funds committed	\$31,200,000
Customer cofunding of studies	\$31,200,000
Participating allies (ESCOs and engineering firms)	271

3.9.4 Program Impact Evaluation

Table 3-23 presents cumulative annual net energy and demand savings for the program from inception through December 31, 2008. Realization rates are developed to account for differences in program reported savings and performance of actual installations. Attribution analysis determines, through various methods, whether the gross savings estimate should be further adjusted downward or upward for freeridership or spillover. Adjustments for realization rate, freeridership and spillover, and the ultimate program net-to-gross ratio are also shown in the table.

In 2008, the Impact Assessment team undertook an evaluation of the 25 largest energy savers in the New York Energy SmartSM portfolio. This analysis assessed projects from five different NYSERDA programs (CIPP, TA, NCP, DG/CHP and PLMP) and covered measurement and verification and attribution. All of the projects studied saved more than 1.5 GWh/year. Results from Phase 1 for a single

TA project is reported in Table 3-23 below within the total program-reported savings. The program realization rates and net-to-gross ratios are applied to the balance of savings not covered in the largest savers analysis. An overall description of the methods and detailed results are included in Section 2 of this report.

Table 3-23. FlexTech TA Program Cumulative Annual Energy and Peak Demand Savings (through December 2008)¹

	Program-Reported Savings	Realization Rate	Adjusted Gross Savings	Freerider-ship	Spillover	Net-to-Gross Ratio ¹	Net Savings
MWh/year	760,000	1.0	756,809	25%	48%	1.14	861,761
MW	151.0	1.0	150.5	25%	48%	1.14	171.5
MW Curtailable	11.0	1.0	11.0	25%	48%	1.14	12.5
MMBtu	2,900,000	1.0	2,900,000	25%	48%	1.14	3,306,000

¹ Net-to-Gross Ratio = 1-Freeridership+Spillover (a weighted average of the NTG ratios estimated in the previous MCAC analysis and this current analysis is shown here).

Non-Energy Impacts

NEIs for the Technical Assistance Program were last evaluated in 2004. In general, NEIs can include changes in comfort, safety, and productivity and their value (positive or negative) is expressed as a percentage of the Program's energy savings. The 2004 study found that customers valued NEIs at 37-55% of the value of the energy savings achieved on their projects.

4 *Residential and Low-Income Programs*

4.1 Overview of the Residential and Low-Income Programs

4.1.1 Residential Programs

The residential energy efficiency programs are designed to influence decisions regarding electricity use and to reduce households' energy bills. The programs also address natural gas and petroleum use as part of a comprehensive energy service package. Progress on the following residential programs is discussed in this section:

Home Performance Program. This program, which addresses one- to four-unit homes, includes the Home Performance with ENERGY STAR® Initiative (HPwES) for existing homes, and the New York ENERGY STAR Homes Initiative (NYESH) for newly constructed homes. On the supply side, these initiatives support market development through recruitment, training and incentives for builders and contractors, in order to encourage them to offer energy-efficient options. On the demand side, these initiatives market the benefits of energy efficiency to residential consumers in order to increase demand for efficient products and services. Both HPwES and NYESH have low-income components providing additional incentives for low-income households.

Multifamily Performance Program. The Multifamily Performance Program provides a single point of entry for multifamily building owners and developers interested in improving the energy efficiency of new and existing buildings. The ENERGY STAR Multifamily Building Initiative – the track for new buildings (and complete gut-rehabilitation projects) – concentrates on providing technical assistance to mid-stream market participants and incorporates renewable technologies, advanced metering technologies, real-time pricing strategies, and combined heat and power systems, especially for electrically-heated buildings with base domestic hot water loads. The Multifamily Building Performance Initiative – the track for existing buildings – develops market-based business opportunities for building auditors, financial packagers, designers, architects, and construction inspectors in order to enhance the energy services infrastructure. Both the new construction and existing buildings tracks provide incentives to the building owner and include a low-income component, providing increased incentives. The program results in reduced energy bills and health and safety benefits for occupants.

Market Support Program. The New York Energy SmartSM Market Support Program provides support services to the building performance and low-income programs by increasing the availability of energy-efficient products and by increasing consumer demand. There are four major components to the Market Support Program: 1) the New York Energy SmartSM Products Initiative, which seeks to increase the availability and sales of residential energy-efficient appliances, lighting and home electronics products; 2) the Program Marketing Initiative, which provides marketing for the Home Performance Program, the Multifamily Building Performance Program, the summer and winter tips campaigns, and leveraged campaigns such as "Change a Light, Change the World," as well as marketing assistance to mid-stream

Table 4-2. Residential and Low-Income Program Electricity Savings through December 31, 2008 and Progress toward Five-Year Goals

Program	Energy Savings (GWh)				
	Savings Achieved through			Five-Year Goal through June 30, 2011	Progress Toward Five-Year Goal (% achieved) ¹
	June 30, 2006	December 31, 2008	July 1, 2006 through December 31, 2008		
Home Performance Program: Existing Homes ²	13.5	19.5	6.0	26.1	23%
Con Edison	0.2	0.4	0.2	N/A	N/A
Home Performance Program: New Homes	7.3	19.9	12.6	8.9	142%
Con Edison	0.7	1.1	0.4	N/A	N/A
Multifamily Performance Program: Existing Buildings ³	31.0	49.2	18.2	225.5	8%
Con Edison	19.0	30.9	11.9	N/A	N/A
Multifamily Performance Program: New Buildings	0	0.1	0.1	24	0%
Con Edison	0	0.1	0.1	N/A	N/A
Market Support Program	539.1a	657.6b	118.6	200	59%
Con Edison	305.2	365.1	59.9	N/A	N/A
EmPower New York ⁴	20.1	45.1	23.5	51.1	49%
Con Edison	1.6	5.9	4.3	N/A	N/A
Con Edison Residential & Low-Income Total	326.7	403.5	76.9	N/A	N/A
Statewide Residential & Low-Income Total	610.9	790.0	179.0	N/A	N/A

a This baseline savings figure does not match the 2nd quarter 2006 published value. The impacts for Energy Star Products are derived annually from market data, and the 2nd quarter savings value was estimated retrospectively to provide a more accurate baseline for measuring progress.

b Savings for the New York Energy SmartSM Products Program are estimated based on market data, survey research, and deemed savings values. Savings for this program were last fully captured in 2006. An update, completed and applied in Quarter 4 2008, added electricity, demand, and fuel savings for 2007 appliances only. Once necessary market-level data are available, appliance savings for 2008, as well as lighting savings for 2007 and 2008 will be analyzed and applied.

¹ This percentage represents the difference between the June 30, 2006 and December 31, 2008 achievements divided by the five year goal.

² Savings for the low-income Assisted Home Performance Program (5.8 GWh) are included in this row.

³ Savings for the low-income Assisted Multifamily Program (27.4 GWh) are included in this row, the remainder is savings from the closed Residential Comprehensive Energy and Direct Install programs.

⁴ Savings for the closed program Weatherization Network Initiative (8.2 GWh) are included in this row.

N/A – Not Applicable

Table 4-3. Residential and Low-Income Program Peak Demand Reductions through December 31, 2008

Program	Demand Savings (MW)	
	Savings Achieved through	
	June 30, 2006	December 31, 2008
Home Performance Program: Existing Homes ¹	2.0	2.6
Con Edison	0.0	0.1
Home Performance Program: New Homes	0.9	6.4
Con Edison	0.2	0.4
Multifamily Performance Program: Existing Buildings ²	3.9	7.1
Con Edison	1.7	2.9
Multifamily Performance Program: New Buildings	N/A	0.0
Con Edison	N/A	0.0
Market Support Program	104.3	136.1a
Con Edison	56.4	76.8
EmPower New York ³	2.5	7.2
Con Edison	0.0	1.2
Con Edison Residential & Low-Income Total	58.3	81.4
Statewide Residential & Low-Income Total	113.7	159.2

Note: No goals were set for peak demand savings.

¹ Savings for the low-income Assisted Home Performance Program are included in this row. They represent 0.9 MW of these savings.

² Savings for the low-income Assisted Multifamily Program are included in this row. They represent 4.5 MW of these savings.

³ Savings for the closed program Weatherization Network Initiative are included in this row. They represent 1.3 MW of these savings.

a Savings for the New York Energy SmartSM Products Program are estimated based on market data, survey research, and deemed savings values. Savings for this program were last fully captured in 2006. An update, completed and applied in Quarter 4 2008, added electricity, demand, and fuel savings for 2007 appliances only. Once necessary market-level data are available, appliance savings for 2008, as well as lighting savings for 2007 and 2008 will be analyzed and applied.

N/A – Not Applicable

Table 4-4. Residential and Low-Income Program Fuel Savings through December 31, 2008 and Progress toward Five-Year Goals

Program	Fuel Savings (MMBtu)				
	Savings Achieved through			Five-Year Goal through June 30, 2011	Progress Toward Five-Year Goal (% achieved) ¹
	June 30, 2006	December 31, 2008	July 1, 2006 through December 31, 2008		
Home Performance Program: Existing Homes ²	454,958a	893,262	438,304	1,199,000	37%
Con Edison	8,599	79,232	70,634	N/A	N/A
Home Performance Program: New Homes	376,103b	685,224	309,121	518,500	60%
Con Edison	30,088	54,818	24,730	N/A	N/A
Multifamily Performance Program: Existing Buildings ³	43,932	317,505	273,573	6,014,500	5%
Con Edison	12,581	168,660	156,079	N/A	N/A
Multifamily Performance Program: New Buildings	N/A	771	771	649,000	0%
Con Edison	N/A	771	771	N/A	N/A
Market Support Program	341,920	296,607c	54,609	N/A	N/A
Con Edison	184,945	160,435	29,538	N/A	N/A
EmPower New York	59,341	135,392d	97,241	108,500	90%
Con Edison	0	2,938	2,938	N/A	N/A
Con Edison Residential & Low-Income Total	236,212	466,854	284,690	N/A	N/A
Statewide Residential & Low-Income Total	1,276,254	2,328,761	1,173,619	N/A	N/A

¹ Percentage represents the difference between the June 30, 2006 and December 31, 2008 achievements, divided by the five-year goal.

² Energy savings for the low-income Assisted Home Performance Program are included in this row. They represent 303,709 MMBtu of these savings.

³ Energy savings for the low-income Assisted Multifamily Program are included in this row. They represent 249,641 MMBtu of these savings.

a This value does not match an earlier published value due to changes made to the program tracking database in response to evaluation completed by the M&V contractor.

b This value does not match earlier published values as the realization rate for MMBtu was reassessed to a lower level and applied retroactively in order to accurately reflect progress made during the year.

c Savings for the New York Energy SmartSM Products Program are estimated based on market data, survey research, and deemed savings values. Savings for this program were last fully captured in 2006. An update, completed and applied in Quarter 4 2008, added electricity, demand, and fuel savings for 2007 appliances only. Once necessary market-level data are available, appliance savings for 2008, as well as lighting savings for 2007 and 2008 will be analyzed and applied.

d The fuel savings for the EmPower Program decreased from the Quarter 3 report due to the elimination of non-SBC funded savings.

N/A – Not Applicable

4.3.2 Summary of Other Key Program Impacts and Results

Across the programs, 26 additional five-year goals were set for other key metrics besides energy savings, such as the number of customers receiving assistance, funds leveraged, allies participating, and outreach activities completed. Overall, the programs are making progress with respect to these other goals. Ten of the goals have already been surpassed (*e.g.*, the number of new independent retailers signed up, ENERGY STAR market share increases, low-income readership of program materials, and low-income individuals reached via seminars). Another six of the goals have reached expected levels (approximately 50% or more achieved). Progress on the remaining ten goals is less than 50%. The results of each program's progress toward its stated goals are shown in table format in the subsequent sections.

Select longer-term achievements (cumulative since program inception) and evaluation findings are as follows:

- More than 13,320 ENERGY STAR homes have been built, and more than 23,000 existing homes have received energy-efficiency measures. Nearly 8,000 households have implemented measures through the low-income component of the Home Performance with ENERGY STAR Program.
- As detailed in Section 4.3.3, more than 72,000 low-income households have been served by the New York Energy SmartSM Program.
- As described in Section 4.3.4, in 2008, 76% of customers within the NYSERDA Program area reported recognizing the ENERGY STAR label without being prompted, and 89% reported recognizing the ENERGY STAR label with prompting. Both the unaided and aided recognition percentages showed statistically significant increases over the 2006 values. These findings are in comparison to those described in Section 4.3.5. As found in this study, overall awareness (aided and unaided) of the ENERGY STAR label is 79% for NYSERDA respondents. More specifically, unaided awareness of the label is 62% among upstate New York residents, compared to 55% of downstate New York respondents and 51% of national respondents. Upstate New York unaided awareness of the ENERGY STAR label is statistically significant compared to unaided awareness nationally. Aided awareness of the label is 59% among downstate New York residents, a statistically significant difference from 46% of upstate New York residents and 48% of national respondents.
- Nearly 950 retail store fronts and 34 manufacturer partners are participating in the Market Support Program.
- Since program inception, 162 existing multifamily properties comprising 24,123 individual units have received efficiency services. A total of 105 new construction multifamily projects comprising 5,109 individual units have signed a participation agreement. Also, 47 new construction multifamily projects comprising 2,806 individual units have developed energy-reduction plans.
- Since its inception, the Communities and Education Program has trained 2,418 teachers on educating about energy issues at 171 workshops. An estimated 286,818 students have been reached. More than 800 meetings and outreach sessions have been held, attracting more than 97,000 attendees.
- Nearly 800 oil vendors are participating in the Buying Strategies and Energy Awareness Program.

4.3.3 Low-Income Customers Served

In total, more than 72,000 low-income customers have been served by the New York Energy SmartSM Program. Approximately 32% of the customers served are in the Con Edison utility area where the low-

income population is concentrated in larger multi-family buildings. Table 4-5 shows the distribution of low-income customers served by program and utility service area.

Table 4-5. Number of Low-Income Households Served by Program and Utility Area through December 2008

Utility Service Area	Assisted Multifamily Program	EmPower	Weatherization Network Initiative ¹	Assisted Home Performance	Multifamily Performance Program	Direct Install ¹	Total
Central Hudson Gas & Electric	712	710	97	124	0	388	2,031
Con Edison	7,656	4,340	1,292	167	87	9,612	23,154
National Grid	5,290	12,519	2,026	5,574	0	0	25,409
NYSEG	1,597	9,702	775	1,215	0	0	13,289
Orange & Rockland	75	820	54	21	0	235	1,205
Rochester Gas & Electric	5,181	1,368	357	827	0	0	7,733
Total	20,511	29,459	4,601	7,928	87	10,235	72,821

¹ Closed programs.

4.3.4 NYSERDA Oversample to National ENERGY STAR Survey

In recent years, the Consortium for Energy Efficiency (CEE) has conducted an annual survey of households across the nation to examine awareness and purchase of ENERGY STAR products. In 2001, 2004, 2006 and 2008 NYSERDA elected to fund an over sample within the New York Energy SmartSM service area. This provided an opportunity to collect time series data for the NYSERDA area and to draw comparisons to the national results.

Throughout this discussion both national results excluding the sample from the NYSERDA area ("national excluding NY") and national results including the sample from the NYSERDA area ("national total") are presented. The national results, excluding New York, are provided to allow a ready comparison between the results for NYSERDA area respondents and results for respondents from the rest of the country; the national total results are provided to offer an overview and trends for the nation as a whole. As in previous years' studies, to consider the effect of publicity on national awareness, the designated metropolitan areas (DMAs) in the national sample frame were classified into high- and low-publicity areas.

In 2008, the national sample included 2,161 households and the NYSERDA oversample included an additional 164 upstate and 131 downstate households. As in recent prior years, all survey data were collected via WebTV.

Select findings from this evaluation are described in the following sections.

Recognition of the ENERGY STAR Label

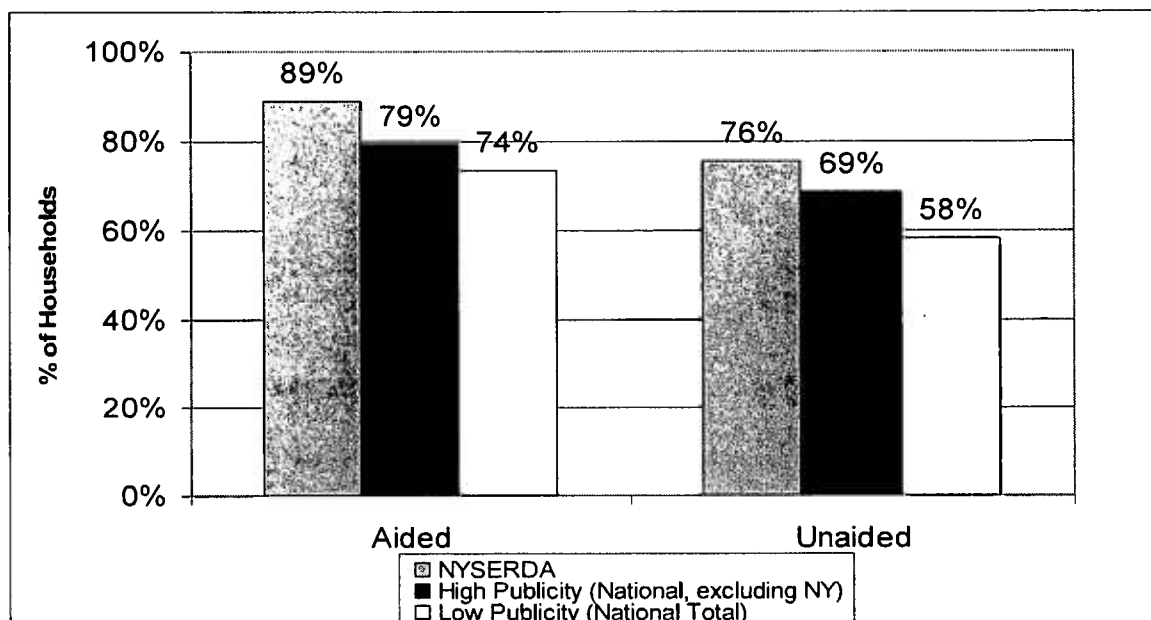
In 2008, 76% of customers within the NYSERDA area reported recognizing the ENERGY STAR label without being prompted by a description or visual image of the label, and 89% reported recognizing the ENERGY STAR label with prompting (*i.e.*, after being shown a visual image of the label). Both the unaided and aided recognition percentages were statistically significant increases over the 2006 values (64% and 81% respectively). Similarly, both unaided and aided recognition increased in the 2008 national (excluding NY) averages (60% without prompting and 74% with prompting). For the national (total) survey, both the unaided and the aided percentages showed statistically significant increases from those reported in 2006. Table 4-6 shows aided and unaided recognition results for each survey year.

Table 4-6. ENERGY STAR Label Recognition

Survey Year	Sample	Unaided Recognition	Aided Recognition
2008	NYSERDA	76%*^	89%*^
	National Excluding NYSERDA	60%^	74%^
	National (Total)	62%^	76%^
2006	NYSERDA	64%*	81%†
	National Excluding NYSERDA	51%	67%
	National (Total)	52%†	68%†
2004	NYSERDA	62%*	72%***
	National Excluding NYSERDA	40%	60%
	National (Total)	41%	61%**
2001	NYSERDA	N/A	57%
	National (Total)	N/A	40%

* NYSERDA and National results for the same year are statistically different at the $p < .1$ level.
 ** 2004 results are statistically significantly different from 2001 results at the $p < .1$ level.
 † 2006 results are statistically different from 2004 results at the $p < .1$ level.
 ^ 2008 results are statistically significantly different from 2006 results at the $p < .1$ level.
 N/A = Not applicable

After examining the national survey results as a whole (both with and without the inclusion of New York), the national survey sample was stratified by respondents in high- versus low-publicity areas and the results were re-examined. As illustrated in Figure 4-1, aided recognition in the NYSERDA area in 2008 was higher than was aided recognition in both the high- (excluding NY) and the low-publicity areas nationally. Unaided recognition in the NYSERDA area was also higher than unaided recognition in the national high-publicity areas (excluding NY), and it was higher than in the low-publicity areas.

Figure 4-1. ENERGY STAR Label Recognition – Comparison by Publicity Areas for 2008**Understanding of the ENERGY STAR Label**

Open-ended responses were used to measure understanding of the ENERGY STAR label. By far, the message that respondents most commonly associated with the label in 2008 was “energy efficiency or energy savings,” which is considered “high” understanding of the label. In the NYSEDA over-sample, 65% of households associated this message with the ENERGY STAR label, which was an increase over the result in 2006 when 54% of the households associated “energy efficiency or energy savings” with the label. In the 2008 national (total) survey, 63% of households associated this message with the ENERGY STAR label, which was significantly higher than the 2006 result when only 57% gave this response.

Purchase of ENERGY STAR Products

Nationally (excluding NY), 53% of the respondents who reported purchasing an ENERGY STAR labeled product said that they were “very much” influenced by the presence of the ENERGY STAR label; in NYSEDA’s area, 47% gave the same response. A total of 85% of the national (excluding NY) respondents reported that they were influenced “very much, somewhat, or slightly influenced” by the ENERGY STAR label, while 82% of NYSEDA respondents reported being influenced at the same level.

On the national (total, as well as excluding NY) level, the difference between the percentage of respondents who reported being influenced by the ENERGY STAR label in 2008 and those who reported being influenced in 2006 increased (and was statistically significant) in all three affirmative response categories. For NYSEDA, the percentages of respondents who were influenced by the ENERGY STAR label also increased in two of three affirmative response categories from 2006 to 2008. Responses for the “very much, somewhat, or slightly” category decreased slightly from the 2006 survey. Table 4-7 presents these results.

Table 4-7. For any ENERGY STAR-labeled product(s) you purchased, how much did the presence or absence of the ENERGY STAR label influence your purchasing decision?

Survey Year	Sample (n)	Very Much	Very Much or Somewhat	Very Much, Somewhat or Slightly	Not at all
2008	NYSERDA (n = 100)	47%	69%*	82%	17%
	National Excluding NY (n = 484)	53%^	76%^	85%^	15%^
	National (n = 584)	53%^	76%^	85%^	15%^
2006	NYSERDA (n = 81)	37%	72%*	88%*&†	21%*&†
	National Excluding NY (n = 498)	33%	63%	79%	21%
	National (n = 579)	34%†	64%†	79%†	21%†
2004	NYSERDA (n = 104)	29%	65%*	80%*	20%*
	National Excluding NY (n = 233)	26%	53%	73%	27%
	National (n = 337)	26%	54%	73%	27%
2001	NYSERDA (n = 138)	33%	67%	78%	22%
	National (n = 420)	27%	65%	72%	28%

(base = aware purchasers that recognize the label)
 * NYSERDA and National results for the same year are statistically different at the $p < .1$ level.
 † 2006 results are statistically different from 2004 results at the $p < .1$ level.
 ^ 2008 results are statistically different from 2006 results at the $p < .1$ level.
 Note that 2004 results are not significantly different from 2001 results.

Loyalty to ENERGY STAR

Over half of NYSERDA respondents (58%) and national respondents (excluding NY) (51%) reported that they would be “very likely” to recommend ENERGY STAR products to a friend. The national values represent statistically significant differences from the 2006 values (50% and 45%, respectively) at the 90% level. In 2006, 78% of national respondents reported that they were at least “somewhat likely” to recommend ENERGY STAR products to a friend. In 2008, this increased to 85%.

Importance of Energy Efficiency in Appliances

In the NYSERDA respondent group, 68% of households in the NYSERDA respondent group said they give energy efficiency more consideration in selecting appliances, lighting, and other home products than they did two years ago. Thirty-two percent (32%) of the remaining respondents said they give energy efficiency the same consideration in selecting these products as they did two years ago, and no respondents said they give energy efficiency less consideration.

Information Sources Seen

National and NYSERDA respondents were asked where they recalled seeing or hearing about the ENERGY STAR label. Most households in both response groups saw the label on appliances or electronic equipment (68% nationally excluding NY, 66% for NYSERDA) as well as on displays in stores (65% nationally excluding NY, and 63% for NYSERDA). The third most common place was TV commercials, with 38% of national respondents (excluding NY) and 54% of NYSERDA respondents mentioning them.

Some statistically significant increases occurred in many of the categories over the 2006 survey and over-sample. In the national (total) sample, all of the statistically significant movement was upward: for example, more respondents reported seeing or hearing about the ENERGY STAR label from store displays (64%, up from 56%), TV commercials (40%, up from 35%), utility mailing or bill inserts (30%, up from 21%), internet (17%, up from 8%), salesperson (12%, up from 9%), and radio commercials (9%, up from 7%).

For the NYSERDA over-sample, statistically significant increases over 2006 responses were reported for displays in stores (63%, up from 55%), TV commercials (54%, up from 42%), Internet (15%, up from 11%), Contractors (9%, up from 2%), Home Builders (8%, up from 3%), and Friends or relatives (11%, up from 6%). A statistically significant decrease in "don't know" responses was also recorded in 2008 compared to 2006, indicating stronger retention for the source of ENERGY STAR awareness.

4.3.5 New York Oversample to 2008 Energy Conservation, Efficiency and Demand Response Study

Abt SRBI, Inc., and Research Into Action, Inc. conducted the multi-client Energy Conservation, Efficiency, and Demand Response Study in 2008 to provide insight into the attitudes and behaviors of residential consumers with respect to energy conservation and efficiency.

For the 2008 survey, 801 interviews were conducted in November and December 2008 with a nationally-representative sample of randomly selected households. Following completion of the national survey, 300 interviews (equally split between upstate and downstate) were also conducted with end-use consumers in New York State (excluding Long Island).

Statistically significant differences between the NYSERDA oversample respondents and those in the national survey are described in the following paragraphs.

Attitudes toward Saving Energy. The only statistically significant difference in attitudes between NYSERDA and national respondents is that 88% of NYSERDA respondents agree that saving energy in their homes saves money, compared with 96% of U.S. consumers. However, downstate respondents were significantly more likely than national respondents to agree that people should try to use less energy to reduce the need for new power plants, that they are interested in knowing how their usage compares with other households in their area, and that they believe global warming is a result of high energy use. They were less likely than national respondents to agree that saving energy in their homes helps them save money.

Trusted Sources of Energy and Environmental Information. While NYSERDA respondents consider the EPA and the DOE as the most trusted sources of energy and environmental information overall, one-quarter views NYSERDA as a reliable source of information about protecting the environment, and three in ten trust it for information about saving energy. Seventeen percent (17%) consider their electric utility as a reliable source of information about saving energy, a statistically-significant difference from 27% in

the national survey. Twenty percent (20%) of NYSERDA respondents view their electric utility as a reliable information source about protecting the environment, a statistically-significant difference from 29% in the national survey. In addition, 16% of upstate respondents said their electric utility is a reliable source of information about saving energy, a statistically-significant difference from 27% nationally.

Energy-saving Behaviors. Upstate New York respondents' energy-saving behaviors are similar to the national results for several indicators. Approximately 92% of both upstate New York respondents and national respondents use full loads for dishes and laundry. In addition, 74% of upstate New York respondents perform annual maintenance on their HVAC systems (compared to 75% nationally); 75% manually adjust their thermostats (compared to 74% nationally); 58% close heating and cooling ducts in unused rooms (compared to 62% nationally); and 37% of upstate New York respondents have installed a new HVAC system (compared to 40% nationally).

Upstate New York respondents were also likely to have undertaken similar energy-saving measures related to water heating as national respondents: 52% of upstate New York respondents turn down the water heater temperature (compared to 60% of national respondents); 57% of upstate New York respondents have added attic or floor insulation (compared to 48% of national respondents); and 39% of both upstate New York respondents and national respondents have added insulation around the water heater.

These energy-saving behavior findings focus on responses from upstate New York residents given the large number of renters downstate in multifamily buildings for which these behaviors largely do not apply.

Purchasing Appliances and Accessories. Seventy-three percent (73%) of NYSERDA respondents said that the ENERGY STAR logo is "very" or "somewhat important" in making an appliance or electronics purchase decision (significantly above the level of 60% nationally). When searching for energy-efficient appliances or accessories, NYSERDA respondents most commonly go to a home improvement store (28%, compared with 30% in the national survey). Twenty-six percent (26%) go to an appliance store, a statistically-significant difference from 16% in the national survey.

Searching for Information about Energy-efficient Products and Services. While NYSERDA respondents generally rely upon the same sources as national respondents for information about energy-efficient products and services, only 29% of NYSERDA residents obtain their information from television, a statistically-significant difference from 39% of respondents nationally. Seven percent (7%) of NYSERDA respondents mentioned utility company advertising, a statistically-significant difference from 15% nationally. Further, downstate respondents are less likely than national respondents to say they obtain information about energy-efficient products and services from television and utility company advertising. Fifty-four percent (54%) of downstate respondents say their primary source of information about products and services is the Internet, compared with 39% of respondents nationally and upstate.

ENERGY STAR Awareness. Overall ENERGY STAR awareness is 79% among NYSERDA respondents, a statistically-significant difference from 68% nationally. With respect to the meaning of ENERGY STAR, 29% of NYSERDA respondents say that an energy-efficiency rating system is the first thing about ENERGY STAR that comes to mind, a statistically-significant difference from 17% nationally. Saving energy comes to mind for 22% of the NYSERDA sample, a statistically-significant difference from 30% of the national sample. Forty-two percent (42%) of NYSERDA respondents said that government sponsorship increases the ENERGY STAR logo's credibility, a statistically-significant difference from 34% nationally.

Sixty-two percent (62%) of upstate respondents said they were aware of a program, brand, or label, compared with 51% of respondents nationally. Aided awareness is 59% among downstate residents, a statistically-significant difference from 46% of upstate respondents and 48% of national respondents.

Customer Satisfaction. Twenty-one percent (21%) of NYSERDA respondents said they are extremely satisfied with their electric utility, a statistically-significant difference from 31% in the national survey. Thirty-four percent (34%) said they were somewhat satisfied, compared with 40% in the national survey.

Forty-nine percent (49%) of NYSERDA respondents said their electric utility does an excellent or good job of providing information about ways to save energy in their homes, significantly below the level of 59% in the national survey. Thirty-nine percent (39%) of NYSERDA sample respondents indicated that their utility does an excellent or good job of actively promoting energy efficiency programs, a statistically-significant difference from 50% overall in the national survey. And finally, 26% of NYSERDA respondents say that their utility does an excellent or good job of providing new products and services, also a statistically-significant difference from the national survey (35%).

The fact that utilities generally have not been running widespread energy efficiency programs in New York for the past decade may contribute to the above noted differences between NYSERDA and the national respondents.

Global Warming. Fifty-two percent (52%) of NYSERDA respondents are completely convinced that global warming is occurring, a statistically-significant difference from 35% in the national survey. Thirteen percent (13%) of NYSERDA respondents are mostly convinced, and 22% are somewhat convinced that climate change is occurring. Only 12% are unconvinced that global warming is occurring, compared with 20% in the national survey. Fifty-three percent (53%) of downstate respondents say that global warming is an extremely important issue to them personally, compared with 36% of respondents nationally.

The following are some statistically significant differences between upstate and downstate respondents in the NYSERDA over-sample:

Attitudes toward Saving Energy. There were a few statistically-significant attitudinal differences between upstate and downstate residents. Fifty-three percent (53%) of downstate residents strongly agree that they are concerned about air pollution, compared with 36% of upstate respondents. Eighty-nine percent (89%) of downstate residents agree that people should try to use less energy to reduce the need for new power plants and 70% that global warming is a result of high energy use, in contrast with 73% and 46%, respectively, for upstate respondents.

Sources of Information about Saving Energy and Protecting the Environment. Thirty-five percent (35%) of downstate respondents view the U.S. Department of Energy as a reliable information source about protecting the environment, compared with only 18% of upstate residents.

Success of Energy-saving Efforts. Twenty-six percent (26%) of upstate residents and national respondents believe their energy-saving efforts have been "very successful", compared with 14% of downstate respondents.

Shopping Behavior. Thirty-six percent (36%) of upstate respondents would go first to a home improvement store, compared with 21% of downstate residents. In contrast, 17% of downstate residents would go first to the Internet, while only 5% of upstate consumers would do so.

Home Energy Audits. While 11% of NYSERDA respondents have had a home energy audit, compared with 14% in the national sample, significantly more upstate than downstate residents have had an audit (15% compared with 7%). Eighty-two percent (82%) of NYSERDA respondents who have had a home energy audit have implemented audit recommendations, the same percentage as nationally.

ENERGY STAR Awareness and Purchases. Aided awareness is 59% among downstate residents, a statistically-significant difference from 46% of upstate respondents and 48% of national respondents. Total awareness (aided and unaided) is 76% for upstate residents and 81% for downstate consumers (a statistically-insignificant difference). Thirty-nine percent (39%) of downstate residents purchased home electronics with the ENERGY STAR logo, a statistically-significant difference from 23% of upstate consumers. In contrast, 23% of upstate residents purchased an ENERGY STAR clothes washer, but only 11% of downstate respondents did so.

CFL Purchases. Upstate respondents are significantly more likely than downstate consumers to purchase CFLs at a discount department store or grocery store and less likely to do so from a home improvement store or bulk shopping club.

Electricity Usage. Downstate respondents were significantly more likely than those upstate to say they are using "a lot" more electricity than five years ago.

Other important findings from the NYSERDA over-sample include:

CFLs. Fifty-four percent (54%) of NYSERDA respondents said they are "very familiar" and 35% are "somewhat familiar" with CFLs, compared with 60 and 31%, respectively, in the national survey. Overall, 89% of NYSERDA and 91% of national respondents are familiar with CFLs. Among the respondents familiar with CFLs, 84% of NYSERDA (and national) respondents have them in their homes. On average, NYSERDA respondents have installed 10.2 CFLs, compared with 11.2 CFLs in the national survey.

Climate Change. Fifty-two percent (52%) of NYSERDA respondents are completely convinced that climate change is occurring, a statistically-significant difference from 35% in the national survey. Thirteen percent (13%) of NYSERDA respondents are mostly convinced, and 22% are somewhat convinced that climate change is occurring. Only 12% are unconvinced that climate change is occurring, compared with 20% in the national survey.

Proprietary NYSERDA Questions. For its over-sample, NYSERDA added two questions to the national survey. Sixty-seven percent (67%) of NYSERDA respondents say they are giving more consideration to energy efficiency than two years ago, while 31% are giving about the same consideration to energy efficiency. Only 1% of respondents say they are giving less consideration to energy efficiency. When asked about their motivations for giving more attention to energy efficiency, respondents most commonly mentioned the desire to save money on their energy bills and the rising costs of energy, followed by environmental concerns.

4.4 Home Performance Program

4.4.1 Program Description

The Home Performance Program addresses one- to four-unit homes through the New York ENERGY STAR® Homes Initiative (NYESH) for newly constructed homes, and the Home Performance with

ENERGY STAR Initiative (HPwES) for existing homes. Both of these efforts are market-based. On the supply side, these initiatives use recruitment, training, and incentives to encourage builders and contractors to offer energy-efficient options. On the demand side, the initiatives market the benefits of energy efficiency to residential consumers to increase demand for products and services that make homes more efficient. In response to a growing need to focus on training and certification for energy efficiency and renewables, during 2008 all workforce activities were consolidated under a separate Workforce Development Initiative delivered through the Market Support Program and described in Section 4.6.

NYESH provides technical assistance and financial incentives to one- to four-family home builders to encourage the adoption of energy-efficient design features and the selection and installation of more energy-efficient equipment in new construction and substantial renovation projects. Participating builders construct New York ENERGY STAR homes that use approximately 30% less energy than homes built to the current energy code. In addition, the program is an enhanced version of the EPA's ENERGY STAR Labeled Homes Program, because in order to earn the New York ENERGY STAR home label, these homes must include a qualified ventilation system; have electrical savings measures (either ENERGY STAR lighting or appliances) that produce annual electricity savings of 600 kWh, compared to standard efficiency measures; and have their performance verified by a certified Home Energy Rating System Rater (HERS) who acts as the independent third party, ensuring that these homes meet program performance criteria.

The HPwES Initiative is designed to enhance the current market capacity for delivering comprehensive energy-efficiency services to existing one- to four-family residences. The program seeks to create a "one-stop shopping" experience for consumers looking to make energy-efficiency improvements to their homes. This is accomplished by requiring the participating contractor who provides the comprehensive home assessment to have the capability to prepare a scope of work and install, or partner with others to install, the energy-efficiency measures. The program also fosters consumer protection by offering training, a robust quality assurance/quality control (QA/QC) process and a one-year warranty, and by requiring certification and accreditation for participating contractors.

Energy-efficiency improvements covered by HPwES include building shell measures such as air sealing and insulation, electric measures like ENERGY STAR refrigerators, heating measures such as boilers and furnaces, cooling measures such as ENERGY STAR room or central air conditioners, and certain renewable energy technologies. Eligible homeowners can elect to receive financing from the **New York Energy SmartSM** Loan Fund or the New York ENERGY STAR financing option.

Integrated with these market-based efforts is the Low-Income Home Performance Initiative, which includes the Assisted Home Performance with ENERGY STAR effort and the Assisted New York ENERGY STAR Homes effort. This initiative provides additional incentives for low-income households; in existing homes, up to 50% of the approved work scope. In addition, participants can use the **New York Energy SmartSM** Loan Fund to further offset costs. The "Assisted" components of the Home Performance Program are available to residents with up to 80% of Area Median Income, or 80% of State Median Income, whichever is higher, for the county (as compared to the 60% of state median income criterion used for participation in the federally-funded Weatherization Assistance Program).

The 13-year program budget is \$185.8 million, which includes \$78.3 million for low-income.

4.4.2 Program Accomplishments

Table 3-16 shows the Program's five-year goals and performance over the most recent 30 months. The program is making good or excellent progress on most goals, but is falling somewhat behind expectations in terms of goals specific to the low-income segment.

Table 4-8. Home Performance Program – Long-Term Goals and Achievements

Activity	Program Goals (July 1, 2006 through June 30, 2011)	Achieved July 1, 2006 through December 31, 2008	% of Goal Achieved
New York ENERGY STAR Homes Initiative			
New ENERGY STAR Homes built	10,750	5,834	54%
New low-income ENERGY STAR Homes built	4,000	13	<1%
Home Performance with ENERGY STAR Initiative			
Existing homes served (receiving treatment)	16,125	14,956	93%
Existing low-income homes served (receiving treatment)	10,500	3,481	33%

4.4.3 Program Outputs and Indicators

This section highlights key program outputs as identified through the logic model development work and related market progress. All values reported are cumulative since program inception. Table 3-17 presents the key outputs for Home Performance buildings through December 31, 2008. Table 4-10 and Table 4-11 present a sample of key logic model-driven indicators of program success, especially those related to market progress, as tracked by the evaluation and program activities. Together, these tables indicate the most important ways that program progress is being measured, and report how those values are changing due to program activities.

Table 4-9. Home Performance Program – Key Program Outputs

Outputs	Value (Cumulative through December 2008)
New York ENERGY STAR Homes Initiative	
Number of completed projects by type	13,320 projects completed including: ▪ 12,273 Certified Single-family market-rate homes ▪ 252 Certified Assisted NYESHs ▪ 605 Model homes ▪ 190 Display homes
Number of “active” participating builders (built at least one home)	158
Dollar value of incentives paid	\$15.6 million
Home Performance with ENERGY STAR Initiative	
Number of homes treated	23,318 ▪ 22,080 Single Family homes ▪ 1,238 Small Multifamily (2-4 units) homes
Number of participating Building Performance Institute (BPI) certified contractors and firms	651 BPI-certified technicians 211 Participating BPI-accredited firms
Dollar value of incentives paid	\$15.7 million in participating contractor incentives

Table 4-10. New York ENERGY STAR Homes Program – Key Market Indicators and Program Cumulative Progress

Topic	Indicator	Initial Value (2003, unless noted)	Follow Up (2005, unless noted)	Most Recent (2008, unless noted)
Awareness and Knowledge	Consumer awareness of the ENERGY STAR label for new homes	59% of participating home buyers (those who purchased a NYESH) were aware of the ENERGY STAR label for homes 52% of non-participating home buyers are aware of the label	92% of participating home buyers were aware of the ENERGY STAR label for homes.	91% of participating home buyers were aware of the ENERGY STAR label for homes.
	Builder familiarity with energy-efficiency measures and equipment	82% of participating builders reported that their familiarity had increased significantly (29%) or somewhat (53%) as a result of the program	85% of the participating builders reported that their familiarity had increased significantly (31%) or somewhat (54%) in the last few years 65% of the non-participating builders reported increasing familiarity	83% of the participating builders reported that their familiarity had increased significantly (51%) or somewhat (32%) in the last few years 76% of the non-participating builders reported increasing familiarity
Availability of Services	Availability of New York ENERGY STAR homes	73% of NYESH purchasers in 2002-2003 reported that NYESHs were very or somewhat available	72% of NYESH purchasers in 2004-2005 reported that NYESHs were very or somewhat available	49% of NYESH purchasers in 2006-2007 reported that NYESH were not hard to find ¹
	Energy-efficiency measures showing changes in availability	Not Available	Builders reported that efficient lighting (93% of participating builders), water heaters (92%), central ACs (86%), and furnaces/boilers (83%) had all shown substantial increases in availability during the last few years	Over 90% of both participating and non-participating builders perceive that high efficiency equipment is readily available in the marketplace ¹
	Availability of HERS raters	Not Available	Fewer than half of the non-participating (36%) and participating (43%) builders stated that HERS raters were very or somewhat available	Over 70% of participating builders and nearly 60% of non-participating builders stated that HERS Raters were available ¹
Market Share and Sales	Market penetration of New York ENERGY STAR Homes (including single and 2-4 family markets)	0.3% in 2001 3% in 2002 7.8% in 2003	11.1% in 2004 11.1% in 2006	19.9% in 2007 (1-2 family only) ²

¹ Wording of the survey question addressing this indicator changed slightly from prior studies.

² Secondary data used to calculate market penetration were recently recategorized and now groups housing stock into one-family, two-family and multifamily (three + units, including large apartment buildings). Previously, data were presented as one family and two-to-four family. Thus, with this new recategorization of data, indicators, such as market penetration, cannot be directly compared to those calculated in years prior to 2007.

³ Partial participants are defined as homeowners who received a comprehensive home assessment but did not install any measures through HPwES.

Table 4-11. Home Performance with ENERGY STAR Program – Key Market Indicators and Program Cumulative Progress

Topic	Indicator	Initial Value (2003, unless noted)	Follow Up (2005, unless noted)	Follow Up (2008, unless noted)
Awareness and Knowledge	Homeowner familiarity with energy-efficiency measures and equipment	Not Available	81% of the participating home owners reported that their familiarity had increased either significantly or somewhat during the last few years More than half of these participants said “all” or “most” of the increase was due to their participation in the HPwES Program	88% of the participating home owners reported that their familiarity had increased either significantly or somewhat during the last few years
	Contractor familiarity with energy-efficiency measures and equipment	Not Available	89% of the contractors said their familiarity had increased significantly or somewhat during the last few years 87% said “all” or “most” of this increase was due to their participation in the HPwES Program	--
	Homeowner awareness of BPI	Not Available	38% of participants had heard of the BPI	37% of participants and 27% of partial participants had heard of BPI ³
Perceived Value	Homeowner views on the importance of BPI certification	Not Available	Among those who had heard of the BPI, 31% considered BPI certification very or somewhat important in their selection of a contractor	Among those who had heard of the BPI, 56% of participants and 13% of partial participants considered BPI certification very or somewhat important in their selection of a contractor
	Contractors viewing BPI as a selling point	Not Available	36% view BPI as a strong selling point and 30% see it as a moderate selling point	32% view BPI as a strong selling point and 33% see it as a moderate selling point
	Homeowner satisfaction with the HPwES program contractors	Not Available	74% of the participating homeowners were very or somewhat satisfied with their contractors	94% of the participating homeowners were very or somewhat satisfied with their contractors
Availability of Services	Contractor promotion of HPwES Program	Not Available	89% of the participating contractors indicated that they were very (53%) or somewhat (36%) actively promoting the HPwES Program	65% of the participating contractors indicated that they were very (47%) or somewhat (18%) actively promoting the HPwES Program
	Participating contractor views on availability of energy-efficiency measures and equipment	58% reported that energy-efficient measures and equipment are very available	82% reported that energy-efficient measures and equipment are very available	65% reported that energy-efficient measures and equipment are very available

Topic	Indicator	Initial Value (2003, unless noted)	Follow Up (2005, unless noted)	Follow Up (2008, unless noted)
Market Share and Sales	Penetration of the HPwES Program in the home remodeling market	0.2-0.3% in 2001 0.7-1.1% in 2002 1.7-2.7% in 2003	1.7-2.7% in 2004 2.1-3.3% in 2005	2.2-3.6% in 2007

¹ Wording of the survey question addressing this indicator changed slightly from prior studies.

² Secondary data used to calculate market penetration were recently recategorized and now groups housing stock into one-family, two-family and multifamily (three + units, including large apartment buildings). Previously, data were presented as one family and two-to-four family. Thus, with this new recategorization of data, indicators, such as market penetration, cannot be directly compared to those calculated in years prior to 2007.

³ Partial participants are defined as homeowners who received a comprehensive home assessment but did not install any measures through HPwES.

4.4.4 Program Impact Evaluation

Table 4-12 presents cumulative annual net energy and demand savings for the program from inception through December 31, 2008. Realization rates are developed to account for differences in program reported savings and performance of actual installations. Attribution analysis determines, through various methods, whether the gross savings estimate should be further adjusted downward or upward for freeridership or spillover. Adjustments for realization rate, freeridership and spillover, and the ultimate program net-to-gross ratio are also shown in the table.

Table 4-12. Home Performance Program Cumulative Annual Energy and Peak Demand Savings (Through December 2008)

	Program-Reported Savings	Realization Rate	Adjusted Gross Savings	Freeridership	Spillover	Net-to-Gross Ratio ¹	Net Savings
New York ENERGY STAR Homes Initiative							
MWh/year	15,498	1.10	17,047	28%	47.6%	1.17	19,946
MW On-Peak	2.4	2.32	5.5	28%	47.6%	1.17	6.4
MMBtu	791,434	0.74	585,661	28%	47.6%	1.17	685,224
Home Performance with ENERGY STAR							
MWh/year	17,439	1.00	17,439	26%	41%	1.12	19,532
MW On-Peak	2.2	1.04	2.3	26%	41%	1.12	2.6
MMBtu	927,390	0.86	797,555	26%	41%	1.12	893,262
Home Performance Program – Total							
MWh/year	32,937	N/A	34,486	N/A	N/A	N/A	39,477
MW On-Peak	4.6	N/A	7.8	N/A	N/A	N/A	9.0
MMBtu	1,718,824	N/A	1,383,217	N/A	N/A	N/A	1,578,486

¹ Net-to-Gross Ratio = 1-Freeridership+Spillover (a weighted average of the NTG ratios estimated in the previous MCAC analysis and this current analysis is shown here).

Non-Energy Impacts

NYSERDA's evaluation contractors examined non-energy impacts (NEIs) for ENERGY STAR Homes in 2005, and NEIs for Home Performance were last studied in 2003. In general, NEIs can include changes in comfort, safety, water use and other factors and their value (positive or negative) is expressed as a percentage of the Program's energy savings. Results from the most recent evaluations are shown in Table 4-13.

Table 4-13. Home Performance NEI Results

Results from Direct Query Approach (year of study)	Percentage of Energy Savings
ENERGY STAR New Homes (2005)	51%
Home Performance with ENERGY STAR (2003)	50%

4.4.5 Home Performance with ENERGY STAR Market Assessment Findings

In 2008, the Summit Blue Market Characterization and Assessment (MCA) Team completed a MCA analysis of the existing residential homes market.⁸⁵ The MCA team relied on secondary data, as well as

⁸⁵ Market Assessment findings were summarized in the September 2008 Quarterly Evaluation and Status Report. For the full report, including market characterization data, please see Summit Blue Consulting, *New York Home Performance with ENERGY STAR Market Characterization and Market Assessment Evaluation*, Prepared for NYSERDA, February 2009.

primary data collection with participating (n=145; 75 market-rate and 70 low-income) and partially participating (n=67) homeowners; participating (n=84), formerly participating (n=17) and nonparticipating (n=82) contractors, to assess program progress in relation to key program indicators.⁸⁶ Selected results are summarized in this section.

- According to participating contractors, most homeowners (78%) are either “neutral” or “hardly aware” of the HPwES Program. Participating contractors believe that customers find out about the program largely from contractor company ads (51%), NYSERDA ads (46%), contractor outreach (37%), and by customer-to-customer referrals (25%).⁸⁷ Although nearly half of those homeowners that contractors perceive are aware of the HPwES Program are believed to be getting their information from NYSERDA sources, a large majority (78%) could use more information. This implies the need for continuing NYSERDA promotional activities and the importance of contractor outreach.
- When participating and partially-participating homeowners who said they installed some measures outside the program were asked why they participated in the program and/or installed energy-saving measures, the answer given most often by both groups was “energy cost savings”, followed by “financial incentives” for participating homeowners and “comfort” for participating and partially participating homeowners. This implies that, for partially participating homeowners, although quite interested in lowering their energy costs, the financial incentives were not high enough to overcome first cost barriers.
- Participating homeowners and partially-participating homeowners were asked how important the comprehensive home assessment (CHA) recommendations were in their decision to install energy-efficient measures. Sixty percent (60%) of participating homeowners and 62% of partially-participating homeowners responded that the recommendations were very important.
- Sixty-five percent (65%) of participating contractors reported the Building Performance Institute (BPI) as a moderate to strong selling point, roughly the same as in 2005. It is interesting to note that 33% of former and nonparticipating contractors responded that BPI is not a selling point (suggesting a potential target market for increased outreach and BPI benefits education).
- Eighty-nine percent (89%) of participating homeowners in 2007 stated that contractors are “somewhat” or “very available” to provide energy-efficiency services within their homes. This represents a continuation of the trend of increased availability from 2003 to 2005. Ninety-six percent (96%) of partially participating homeowners also feel this way (asked for the first time in 2007). In total, from a customer perspective, these findings suggest that contractor availability is keeping up quite well with customer demand. However, when customer responses regarding availability are compared against the contractors’ opinions on this topic, it appears that the availability of skilled specialty contractors may not be sufficient as demand for these services increases.
- Four-fifths (81%) of partially-participating homeowners reported that they did not install any recommended measures. Of the rest, about equal numbers installed the measures themselves (11%) or had a contractor do it outside of the program (8%). Reasons for homeowners’ measure

⁸⁶ Partial participants are defined as homeowners who received a comprehensive home assessment but did not install any measures through HPwES.

⁸⁷ Multiple responses were permitted, hence totals sum to more than 100%.

installation actions taken outside of the program were not directly assessed within this study, but could provide valuable insights for future program design and effectiveness improvement purposes. As part of such an additional assessment, how these installation actions may have varied if the customer had not received a CHA would also be important to capture.

4.4.6 New York ENERGY STAR Homes Market Characterization and Assessment Findings

In 2008, the Summit Blue Market Characterization and Assessment (MCA) Team completed a MCA analysis on the residential new construction market.⁸⁸ The MCA team relied on secondary data, as well as primary data collection with participating (n=150) and non-participating (n=150) homeowners and participating (n=75), former participating (n=16) and nonparticipating (n=76) home builders to assess program progress in relation to key program indicators. Selected results are summarized in this section.

New York ENERGY STAR Homes Market Characterization Selected Findings

- The number and penetration of new one- and two-family homes being built through NYSEDA's NYESH Program has been steadily increasing since 2005, while the total number of new units being constructed in New York has been on the decline during this same period. From program inception through December 31, 2007, the percentage (market penetration) of NYESH one- and two-family homes, out of all new one- and two-family home construction in the New York Energy SmartSM program area, was 19.9%. This is well above the program goal of 10%, and ranges from a high of 29.1% in the Finger Lakes region to a low of 2.7% in the Southern Tier region^{89,90}. If the penetration rate is examined for one-family homes only, the NYESH Program has achieved a cumulative market penetration of 17.7%.
- According to NYSEDA's NYESH Program database, 753 active builders have participated in the program through December 2007, completing 11,022 projects. Of this total number of active builders, 10 (representing just 1.3% of 753 participating builders) have completed 44% of all recorded projects since program inception.

New York ENERGY STAR Homes Market Assessment Selected Findings

- Awareness of the ENERGY STAR label for homes has remained steady among participating homeowners, non-participating homeowners and non-participating builders from 2005 to 2007.
- Builders remain critically important to gaining program participants. Participating homeowners most often heard about the program from their builders. Non-participating homeowners heard about the program most often from television advertising.
- Among non-participating homeowners, the reason most often given for not purchasing a NYESH was "cost" (43%), followed by "my new home is efficient enough" and the homeowner's "lack of

⁸⁸ Market Characterization and Market Assessment findings were summarized in the June 2008 and September 2008 Quarterly Evaluation and Status Reports, respectively. For the full report, please see Summit Blue Consulting, *New York ENERGY STAR Homes Market Characterization and Market Assessment Evaluation*, Prepared for NYSEDA, February 2009.

⁸⁹ NYSEDA Database, and GDS analysis.

⁹⁰ The New York Energy SmartSM territory is made up of eight separate Energy Smart regions, each containing several counties: including Finger Lakes, Western, Central, Capital, Northern, Mid Hudson, Southern Tier, and NY City (downstate)

awareness of the NYESH Program” both at 14%.⁹¹ These answers are significantly changed from those in 2004 through 2005. In the earlier (2004-2005) study, the top two answers to this question, other than “don’t know” (28%), were “ENERGY STAR was not a priority” (22%), and “ENERGY STAR homes were not available” (16%). As the market matures, this suggests that barriers such as awareness and availability are reduced, and cost and perception barriers increase.

- Familiarity with HERS raters among non-participating builders rose to 47%, a 22 percentage point increase since 2005, and in 2007, 22% of non-participating builders used HERS raters, an eleven percentage point increase from 2005. These substantial increases in familiarity indicate that the program is contributing to the development of a sustainable market infrastructure.
- There is a gap between non-participating and participating homeowners in awareness of the availability of ENERGY STAR homes.⁹² Twenty-eight percent (28%) of non-participating homeowners reported that ENERGY STAR homes were not available or hard to find. This gap presents a market barrier that may hinder market penetration. Reasons for this gap could be due to the fact that non-participating homeowners were not aware of, or looking for, ENERGY STAR homes; true unavailability of ENERGY STAR homes; or a lack of builders constructing such homes in their areas.
- According to 38% of the participating builders, consumer demand for ENERGY STAR homes has increased significantly since 2005.
- Among participating homeowners, 78% felt the ENERGY STAR label was either somewhat or very important in their decision to purchase a home.
- Participating builders’ perception of the availability of HERS raters has increased from 2005 to 2007 by over 30 percentage points.

4.4.7 Follow-Up on Evaluation Recommendations

Home Performance with ENERGY STAR

The June 2007 Home Performance with ENERGY STAR measurement and verification report by Nexant identified four recommendations for program improvement.⁹³ These recommendations, along with responses or actions from program staff, follow below:

- Billing release forms and billing data should be collected for all homes in the program. While the billing analysis produced results with wide variations in energy use and savings, the collection of data on additional external factors will increase the usefulness of this evaluation tool.
- The program should require contractors to obtain baseline billing data and enter annual baseline consumption into HomeCheck and TREAT. Both software modeling packages have the ability to use billing data as an input when calculating energy savings. At least one full year of data would be preferable, but even partial year data would be helpful in calculating and verifying modeled savings.

⁹¹ “Don’t Know” was actually the second most stated response, at 19%.

⁹² Of those participating home buyers who responded to the survey, 100% were aware that they purchased an ENERGY STAR Home.

⁹³ Nexant, *M&V Evaluation Home Performance with ENERGY STAR*, Prepared for NYSERDA, June 2007.

Customer billing release forms have been collected for every completed project since May 2005; however gaining approval to collect billing data from utilities has not occurred. NYSERDA's Comprehensive Residential Information System (CRIS) database has been designed to house participant billing and consumption data when the data becomes available. Program and evaluation staff will continue to pursue this data.

- In addition to information obtained during the QA inspection, the program should track the persistence of CFLs at various intervals after project completion.

Quality assurance evaluations for the HPwES Program occur shortly after job completion; given high program volume and current staffing levels, re-entering a home to conduct a follow-up inspection is not feasible. Program and evaluation staff agrees this task would be best tracked by NYSERDA's evaluation contractors as part of other HPwES evaluation activities. Program staff suggest conducting a similar analysis on other measures, too.

- The program database should maintain the utility account information for all homes in the program. Information for both electric and fossil fuel accounts are unique identifiers for a home. Additionally, for multi-family units, all utility account information should be included so that homes with multiple meters can be easily identified.

A field was added to the CRIS database in 2006 for account numbers and this data (collected starting May 2005) has been added in since. Staff acknowledges this issue on the multifamily side and is looking into this recommendation.⁹⁴ NYSERDA's evaluation staff will continue to monitor progress in collecting utility data for multifamily units.

The February 2009 Home Performance with ENERGY STAR Market Characterization and Assessment evaluation by Summit Blue also identified recommendations for program improvement.⁹⁵ These recommendations, along with responses or actions from program staff, follow below:

- Continue to develop the number of participating contractors in areas where the eligible market of existing homes are strongest. Anticipated areas of strong residential energy-efficiency improvement and remodeling activity have been identified in the "downstate" region of the **New York Energy SmartSM** Program area, where there is a sufficient number of residential contractors, but few participating in the HPwES Program. Since participating contractors are a catalyst that drives program participation, targeting contractors in these areas of high concentration of existing homes will help to further penetrate the market.

Program staff agrees with this recommendation and has increased program reimbursement levels for underserved markets in the downstate region as well as the North Country Energy Smart Community. Contractors in these underserved markets receive 100% reimbursement for trainings, BPI certification/accreditation as well as increased co-operative advertising. In addition to promoting the program in such venues as local home shows, program staff has also contracted with a professional marketing company to increase contractors' awareness of HPwES.

- Consider development of targeted marketing materials for former and nonparticipating contractors focused on the value of BPI accreditation. It is interesting to note that 33% of former and

⁹⁴ The volume of 2-4 family homes participating in the HPwES Program is very small (5% of program participation).

⁹⁵ Summit Blue Consulting, *New York Home Performance with ENERGY STAR Market Characterization and Market Assessment Evaluation*, Prepared for NYSERDA, February 2009.

nonparticipating contractors responded that BPI is not a selling point (suggesting a potential target market for increased outreach and BPI benefits education).

- Consider promoting more opportunities for specialty contractor training and networking. Although supply of skilled contractors currently appears to be meeting demand, responses from contractors interviewed suggest a need for increased outreach, recruitment and training of specialty contractors and reinforces the need for more networking within and across participating and nonparticipating contractor groups.
- Consider development of targeted marketing materials for homeowners focused on various elements of "being green". Additional information from homeowners could be helpful in developing targeted marketing materials including: if they perceive the HPwES Program as being a "green" program, and what specific components within the program they consider "green".

Program staff agrees with these recommendations and will share them with the residential marketing team for possible implementation. In addition, NYSERDA currently promotes and subsidizes some specialty trainings.

- Continue to improve the HPwES Program database. Understanding that the HPwES Program database is a work in progress and is being constantly updated, there remain reporting differences between the CSG Quarterly and Annual reports and the NYSERDA database.

Program staff believe that as the databases are monitored and improved, instances of data discrepancies will be lessened.

- Collecting, within NYSERDA and/or CSG's Program database, CHA information from all contractors, regardless of whether measures are ultimately installed or not, could provide additional insights into why the partially-participating homeowners did not act. Gathering information from the CHAs regarding what measures are recommended proved difficult, given the fact that CHA data is typically only entered in cases where customers are planning to move ahead with measure installation. There appears to be great perceived value for the CHAs, even among partially-participating homeowners.

NYSERDA currently collects the summary recommendations page of the CHA; however, since there is no benefit for contractors to report non-program jobs, it would be extremely difficult for NYSERDA to enforce this as a rule.

- Recognize that homeowners are installing energy-efficiency measures outside of the program. Reasons for homeowners' measure installation actions taken outside of the program were not directly assessed within this study, but could provide valuable insights for future program design and effectiveness improvement purposes. As part of such additional assessment, how these installation actions may have varied if the customer had not received a CHA would also be important to capture.

Program staff agrees with this observation. Program and evaluation staff agree this finding would be best researched by NYSERDA's evaluation contractors as part of future HPwES evaluation activities.

New York ENERGY STAR Homes

The June 2007 NYESH measurement and verification report by Nexant identified four recommendations for program improvement.⁹⁶ These recommendations, along with responses or actions from program staff, follow:

- Revise the current program reported baseline water heating gas use in the CSG database for each climate zone. The billing analysis provides actual energy use information that can be applied to adjust the baseline Model Energy Code (MEC) '93 energy use, see Equations 1 and 2 of the above referenced report. To implement the recommended change, the baseline water heating values in the CSG database must be adjusted by the percent change listed in Table 6 of the report. The water heating baseline use for each climate zone should be multiplied by a factor of 0.34 before reporting.

NYSERDA staff is aware of the savings discrepancies and are working with the designers of the modeling software and the program database to reach a conclusion as how to best address the problem. In the meantime, the adjustment factor is applied by CSG before reporting savings.

- A comparison of standards and energy consumption for homes built to MEC '93, Energy Conservation Construction Code of NY (ECCCN), and International Residential Code '04 should be undertaken. The baseline energy consumption and the reference expanded HERS score for a MEC '93 and ECCCN home should be adjusted based on the findings to accurately calculate energy savings for labeled homes.

The NYESH Program uses a nationally recognized and approved software to rate and score homes completed through the Program. This software, REM/RATE, is continually updated to reflect national building code changes. These issues are being addressed by RESNET, the owner of Architectural Energy Corporation. NYESH program staff has agreed to share with NYSERDA's evaluation team findings from RESNET's investigation of savings discrepancies.

- Billing release forms and billing data should be collected for all homes in the program as part of program participation.

NYESH program staff does not have a direct relationship with the customer, making it difficult to obtain billing data. NYESH program staff continues to attempt to gather this information and NYSERDA evaluation staff will monitor progress on this effort.

- Data from REM/RATE files should be included in CSG's database for all homes, including detailed equipment and appliance information and square footage of each home. CSG indicated that this recommendation will be incorporated into a future version of the program database. In addition, NYSERDA should periodically conduct quality control checks to verify that the information in the database is correct.

This recommendation has been implemented. Quality control of REM/RATE files occur when participating homes go through the quality assurance process to highlight any discrepancies. In addition, a detailed review of REM/RATE output files, such as the qualifications, combustion/safety testing and home energy rating certification forms is conducted by NYSERDA and its incentive processing contractor when projects are evaluated for incentive payments.

⁹⁶ Nexant, *M&V Evaluation ENERGY STAR Labeled Homes*, Prepared for NYSERDA, June 2007.

The February 2007 NYESH measurement and verification report by Nexant identified three recommendations for program improvement. These recommendations, along with responses or actions from program staff, follow below:

- Continue to improve the NYESH Program database and correct the reporting disconnect between the CSG database and the NYSERDA NYESH Program database. Since the NYSERDA NYESH database is a work in progress and is constantly updated, matching the reported data from the NYSERDA database with downloaded data from CSG is difficult. Additionally, there are significant reporting differences between the CSG Quarterly and Annual reports and the NYSERDA database. This also presented problems in reporting participant, budget, and savings information.

Any reporting differences have been resolved by updating the NYESH Program database to show program activity for any given period by transmittal date and not by the rating date. This now matches the CSG Quarterly and Annual Report.

The disconnect noted above between CSG and NYSERDA data resulted from two different methods of reporting and counting completed jobs, which has now been reconciled. At the completion of each job, participating homes go through a quality assurance process to identify any potential discrepancies. After these processes are complete, a detailed review of the Builder Home Incentive Qualification form, combustion/safety testing form and home energy rating certificate is conducted by the incentive processing contractor (the New York State Building Builders Association). NYSBA processes the incentive packages and sends them to CSG for their data files. Confusion between the NYSERDA/CSG data and NYSBA reporting arose because NYSERDA counted completed jobs by their Final Rating date and NYSBA counted by their incentive transmittal date. NYSERDA changed this process so that now all parties count jobs based on the transmittal date from NYSBA. This is expected to correct discrepancies in the quarterly and annual data.

- Attempt to close the awareness gap between participating and non-participating homeowners of the availability of NYESH to reduce a barrier to program participation. Consumer demand, driven by program awareness, is a key driver to increasing program participation in the new construction market. Efforts made to increase awareness of the benefits and availability of NYESH throughout the New York Energy SmartSM Program area will leverage the marketing efforts being made by participating builders and could help contribute to increased participation.

The NYESH Program continues to use a three-pronged approach to increase visibility of its programs to non-participating homeowners including: radio, print, and television advertising. The latter has increased this year with the formation of the REAP marketing team, which worked with a professional marketing company to successfully produce a 30 minute promotional video describing NYSERDA Home Performance programs. In addition to these strategies, the NYESH team has been able to leverage the capabilities of NYSERDA's new Marketing and Economic Development unit to gain more visibility among non-participating homeowners through NYSERDA appearances at Home Shows and other high profile community events. Additionally, program staff reaches out to the home builder/contractor community to increase awareness of the program through partnerships with the Building Performance and Construction Association and the New York State Builders Association (a program partner) to help disseminate program information and increase interest among builders who may potentially participate in the program.

- Continue to increase the number of participating builders in areas where construction activities in the residential new homes market are strongest. Anticipated areas of strong residential new construction activity have been identified in the "downstate" region of the New York Energy SmartSM Program area, where there is a sufficient number of residential builders, but few participating in the Program.

Since participating builders are the catalyst that drives program participation, targeting builders in these areas of high construction activity will help to further penetrate the market.

Program staff agrees and has increased cooperative advertising incentives levels as well as Builder Home Incentive levels in the Con Edison territory. In addition, NYESH Program Implementer (Conservation Services Group) has hired several new Account Managers in underserved markets in order to provide more programmatic and technical support to builders. Program staff divided the NYC market into four distinct markets and have dedicated four new Energy Smart Community Coordinators to those areas in an effort to drive program participation among builders.

4.5 Multifamily Performance Program

4.5.1 Program Description

The Multifamily Performance Program has two tracks: the New Construction component for new construction and complete gut-rehabilitation projects and the Existing Buildings component.

Before 2007, construction of new multifamily buildings was addressed through the New Construction Program. Because multifamily buildings differ from non-residential buildings, and because market penetration for multifamily buildings was lower compared to other building types, NYSERDA now addresses new multifamily building construction in the residential program portfolio. The New Construction component provides technical assistance to mid-stream market participants, addressing renewable technologies, advanced metering technologies, real-time pricing strategies, and combined heat and power systems, especially for electrically-heated buildings with base domestic hot water loads. Training regarding the rationale for energy-efficiency measures is also provided for engineers, architects, building owners, building maintenance staff, and tenants.

The Existing Buildings component focuses on enhancing the energy services infrastructure. This involves developing market-based business opportunities for building auditors, financial packagers, designers, architects, and construction inspectors. It consolidates several previous multifamily initiatives in order to provide “one-stop shopping” and allow multifamily building owners and developers to find appropriate NYSERDA services more easily. The previous initiatives now incorporated into the Existing Buildings component include the following:

- The Assisted Multifamily Program (AMP) offered technical assistance and financial packaging to install comprehensive worksopes to improve the energy efficiency of low-income projects. AMP provided needs-based, gap grants to projects to assist in the financing of these worksopes.
- The Residential Technical Assistance (ResTech) Program, which improved the operation of multifamily housing by identifying and encouraging the implementation of cost-effective energy-efficiency measures that also enhance health, safety, and comfort. Activities supported included: feasibility studies, computer-assisted building modeling, energy-efficiency technical training, and commissioning.
- The Residential Comprehensive Energy Management (CEM) Program, which promoted the acquisition and installation of energy management and advanced metering systems. This program helped position residential customers to take advantage of retail competition, while enabling program implementers to access customers’ energy-use data.
- The New York Energy SmartSM Loan Fund (Loan Fund) Program, which supports the implementation of energy-efficiency measures within buildings. The multifamily component of the

Loan Fund provided reduced-interest financing for energy-efficiency measures and related facility improvements. Lending institutions and borrowers in the commercial, industrial, institutional, municipal, multifamily, and residential markets (including building owners and tenants) were all targeted by the program. The Loan Fund provided interest reductions on loan amounts up to \$5 million for multifamily homes for up to five years.

Both initiatives in the Multifamily Performance Program have low-income components. The low-income component for new buildings provides financial assistance during the design and construction phase to help owners complete the construction process, provides training and education to building owners and managers, and monitors energy savings.

The low-income component for existing buildings provides technical and financial assistance to building owners and tenants to make energy-efficiency improvements, thus reducing energy bills and providing increased health and safety benefits to building occupants. The low-income component of the Multifamily Performance Program incorporates many of the features of a previous program, the Assisted Multifamily Program (AMP).

The 13-year program budget is \$204.5 million. The majority of the budget (\$160.0 million) is allocated to the low-income program elements.

4.5.2 Program Accomplishments

Table 4-14 shows the Program's five-year goals and performance over the most recent 30 months. While the progress shown is not the level expected for this point in the funding cycle, these results correspond to completed projects only and do not reflect the large number of projects in the pipeline. Progress is expected to increase in the coming quarters as projects reach completion.

Table 4-14. Multifamily Performance Program – Long-Term Goals and Achievements

Activity	Program Goals (July 1, 2006 through June 30, 2011)	Achieved July 1, 2006 through December 31, 2008	% of Goal Achieved
Number of existing market rate multifamily units receiving energy efficiency services (completed projects)	39,000	3,612	9%
Number of new market-rate multifamily units receiving energy efficiency services (completed projects)	7,500	0	0%
Tenant energy savings per year (at \$250/unit)	\$34,875,000	\$903,000	3%
Number of existing low-income multifamily units receiving energy efficiency services (completed projects)	148,200	9,737	7%
Number of new low-income multifamily units receiving energy efficiency services (completed projects)	12,700	87	1%
Low-income tenant energy savings per year (at \$195/unit)	\$31,375,500	\$1,915,680	6%

4.5.3 Program Outputs and Indicators

This section highlights key program outputs. Program highlights include the following:

- Since program inception, 162 existing multifamily properties comprising 24,123 individual units have received efficiency services.
- A total of 105 new construction multifamily projects comprising 5,109 individual units have signed a participation agreement.
- A total of 47 new construction multifamily projects comprising 2,806 individual units have developed energy-reduction plans.

4.5.4 Program Impact Evaluation

Table 4-15 presents cumulative annual net energy and demand savings for the program from inception through December 31, 2008. Realization rates are developed to account for differences in program reported savings and performance of actual installations. Attribution analysis determines, through various methods, whether the gross savings estimate should be further adjusted downward or upward for freeridership or spillover. Adjustments for realization rate, freeridership and spillover, and the ultimate program net-to-gross ratio are also shown in the table.

Table 4-15. Multifamily Performance Program Cumulative Annual Energy and Peak Demand Savings (Through December 2008)

	Program-Reported Savings	Realization Rate	Adjusted Gross Savings	Free-ridership	Spillover	Net-to-Gross Ratio ¹	Net Savings
Assisted Multifamily Program (AMP)							
MWh/year	33,628	0.97	32,619	27%	15%	0.84	27,384
MW On-Peak	4.3	1.26	5.4	27%	15%	0.84	4.5
MMBtu	297,369	1.0	297,369	27%	15%	0.84	249,641
Comprehensive Energy Management (CEM) Program²							
MWh/year	5,712	0.97	5,541	2%	18%	1.16	6,408
MW On-Peak	0.3	1.77	0.5	2%	18%	1.16	0.6
Low Income Direct Installation²							
MWh/year	11,494	1.0	11,494	0%	0%	1.0	11,494
MW On-Peak	1.6	1.0	1.6	0%	0%	1.0	1.6
Multifamily Performance Program							
MWh/year	3,976	Not evaluated	3,976	0%	0%	Not evaluated	3,976
MW On-Peak	0.4	Not evaluated	0.4	0%	0%	Not evaluated	0.4
MMBtu	67,864	Not evaluated	67,864	0%	0%	Not evaluated	67,864
Multifamily Performance Program – Total							
MWh/year	54,810	N/A	53,630	N/A	N/A	N/A	49,261
MW On-Peak	6.6	N/A	7.9	N/A	N/A	N/A	7.1
MMBtu	365,233	N/A	265,233	N/A	N/A	N/A	317,505

¹ Net-to-Gross Ratio = (1-Freeridership) * (1+Spillover).² Closed program.**Non-Energy Impacts**

NYSDA's evaluation contractors have examined non-energy impacts (NEIs) for both elements of the combined Multifamily Performance Program. The Assisted Multifamily Program was studied in 2003, while the Comprehensive Energy Management Program was the focus of an evaluation in 2004. In general, NEIs can include changes in comfort, safety, water use and other factors, and their value (positive or negative) is expressed as a percentage of the Program's energy savings. Results are shown in Table 4-16.

Table 4-16. Multifamily Performance NEI Results

Results from Direct Query Approach (year of study)	Percentage of Energy Savings
Assisted Multifamily Program (2003)	54%
Comprehensive Energy Management Program (2004)	22-55%

4.5.5 Follow-up on Evaluation Recommendations

The April 2008 Process Evaluation by Research Into Action⁹⁷ made four recommendations for program improvements. Follow up on all four recommendations was last presented in the *New York Energy SmartSM Quarterly Evaluation and Status Report* for the quarter ending June 30, 2008. As of that reporting, three of the four recommendations had been adequately addressed. The one outstanding recommendation is presented below with additional information on NYSERDA's follow-up activities since the last report.

- The MPP should consider strengthening its communication to building owners. In general, the philosophy of depending on the Partner to educate and inform the building owner is working, but there are times when a building owner needs independent information or wants to seek answers that a Partner is not supplying. The MPP should consider developing a Building Owner Portal that would give each building owner access to information about the project and archive questions and answers, as is done for Partner questions.

Response. NYSERDA program staff thinks this is an excellent idea and will work to pursue the recommendation of an owners' portal once work on the development of the Partner Portal is complete (pending availability of in-house programming staff). In the meantime, NYSERDA staff has taken steps to strengthen the relationship between the owner and the TRC Case Manager assigned to every project to help facilitate better communication.

4.6 Market Support Program

4.6.1 Program Description

The New York Energy SmartSM Market Support Program provides support services to the building performance and low-income programs by increasing the availability of energy-efficient products, developing a trained workforce and by providing residential program outreach and marketing services to recruit midstream participants and build consumer demand. The four initiatives involved in this program are the New York Energy SmartSM Products Initiative, the Program Marketing Initiative, the GetEnergySmart.org Website and Workforce Development.

The New York Energy SmartSM Products Initiative, established in 1999, seeks to increase sales of residential energy-efficient appliances, lighting and home electronics products. This initiative works on both the supply and demand sides of the market. Its goals are: 1) to increase the supply of products through partnerships with retailers, manufacturers and distributors, and 2) to create demand for high-efficiency and ENERGY STAR products through consumer awareness and understanding of the ENERGY STAR label.

⁹⁷ Research Into Action, *Multifamily Process Evaluation*, April 2008.

The Program Marketing initiative provides marketing assistance to mid-stream partners, develops and distributes brochures and advertising aimed at consumers, and places advertising. This initiative also performs market research and leverages regional and national initiatives that meet program needs. Program Marketing provides support for the following **New York Energy SmartSM** residential efforts: Home Performance Program, Multifamily Performance Program, summer and winter energy-saving tips campaigns, and leveraged campaigns such as the “Change a Light, Change the World” campaign.

The GetEnergySmart.org Website was initially developed to provide consumers with an on-line tool to assess the energy efficiency of their homes, as well as to provide recommendations on how to improve this efficiency. As the Website evolved, it also came to provide consumers with program and partner information and energy-efficiency tips, and to provide potential program partners with participation information. On-line marketing campaigns and e-mail newsletters were increasingly used to bring consumers to the Website. The Website has become an essential communication, marketing and education tool for residential programs and was redesigned in 2008 to improve navigation and the customer experience.

The Workforce Development Initiative implements workforce training programs to support product development, manufacturing, distribution and sales, installation, operations and maintenance and performance monitoring of energy efficiency and renewable energy products and systems. This initiative partners with many organizations throughout the State to promote development of technical workforce capabilities for technicians and professions involved in the procurement, sales, design, installation and maintenance of energy-efficiency technologies.

The 13-year program budget is \$148.9 million.

4.6.2 Program Accomplishments

Table 4-17 shows the Program’s five-year goals and performance over the most recent 30 months. The program has made excellent progress, exceeding three of its four goals and nearly meeting the remaining goal, only half way through the measurement period.

Table 4-17. Market Support Program – Near-Term Goals and Achievements

Activity	Program Goals (July 1, 2006 through June 30, 2011)	Achieved July 1, 2006 through December 31, 2008	% of Goal Achieved
New manufacturing partners signed up	20	19	95%
New retail partners (independent) signed up	100	241	>100%
New retail partners (big box, mass merchandisers) signed up	6	7	>100%
ENERGY STAR market share increase on targeted products (on average, across products)	25%	28%	>100%

In addition, NYSERDA’s Workforce Development activities are supporting development of an in-state network of training programs to provide accessible and quality training for individuals interested in energy careers. NYSERDA has invested more than \$9 million to develop energy efficiency and renewable energy training centers across the State.

For example, training is provided at several community colleges to support energy-efficiency careers at Centers for Energy Efficiency and Building Science (CEEBS), and for work in clean energy technologies

including solar electric (photovoltaics), solar thermal, geothermal, small and large wind and fuel cells. Some of these training programs are more established than others and with others beginning in 2009. Several photovoltaic (PV) training centers have already earned accreditation for their program from the international Institute for Sustainable Power Quality (ISP). Bronx Community College, SUNY Delhi, and Hudson Valley Community College (HVCC) have developed nationally accredited programs and have trained hundreds of PV practitioners over the past two years.

In addition, HVCC, under contract to NYSERDA, has established its CEEBS training center network at various educational institutions across New York State focusing on energy efficiency and building science training. In 2008, over 790 students (technicians, architects, engineers, and other building professionals) were trained in energy efficiency and building science and in 2009, HVCC plans to add two additional learning centers to meet demand for implementing **New York Energy SmartSM** programs. Building Science training at CEEBS is recognized by the Building Performance Institute (BPI).

4.6.3 Program Outputs and Indicators

This section highlights key program outputs and market progress. Table 4-18 presents the key outputs for the Market Support Program through December 31, 2008. Table 4-19 presents a sample of key logic model-driven indicators of program success, especially those related to market progress, as tracked by the evaluation and program activities.

Table 4-18. Market Support Program – Key Program Outputs

Outputs	Value (Cumulative through December 2008)
Number of retailer participants	946 (store fronts)
Number of manufacturer partners	34
Dollars spent on cooperative advertising, market share incentives and special promotions	\$19.5 million

Table 4-19. Market Support Program – Key Market Indicators and Program Cumulative Progress

Topic	Indicator	Initial Value (2003, unless noted)	Follow Up (2006, unless noted)	Follow Up (2008, unless noted)
Awareness and Knowledge	NY consumer awareness of the ENERGY STAR label	<u>1999 Data</u> 34% (aided awareness from NYSERDA mail survey)	<u>2005 Data</u> 77% (unaided awareness from NYSERDA telephone survey)	76% (unaided recognition) ¹
	Consumer understanding of the ENERGY STAR label	<u>1999 Data</u> 35% <u>2003 Data</u> 47%	<u>2005 Data</u> 87%	65% ¹
Product Availability	Percent of models on <u>display</u> at partner retailers that are ENERGY STAR qualified See Figure 4-2 for interim data points on appliances.	<u>1999 Data</u> Refrigerators – 14% Clothes Washers – 16% Dishwashers – 18% RACs – 26% CFL Bulbs ⁴ – 16% All Fixtures – 0-4%	Refrigerators – 40% Clothes Washers – 48% Dishwashers – 89% RACs – 54% CFL Bulbs ⁴ – 24% All Fixtures – 0-33%	Refrigerators ² – 29% Clothes Washers – 51% Dishwashers ³ – 79% RACs – 63% CFL Bulbs ⁴ – 24% (2007) All Fixtures – 0-46% (2007)
	Percent of models on <u>display</u> at non-partner retailers that are ENERGY STAR compliant	Not available	CFL Bulbs ⁴ – 14% CFL Fixtures – 5-39%	--
Market Share & Sales	ENERGY STAR refrigerator market share	<u>2001 Data</u> 28% NY Partners 16% National Partners in NY ⁵	47% NY Partners 52% National Partners in NY ⁵	<u>2007 Data</u> 39% NY Partners 28% National Partners in NY ⁵

Topic	Indicator	Initial Value (2003, unless noted)	Follow Up (2006, unless noted)	Follow Up (2008, unless noted)
	ENERGY STAR dishwasher market share	<u>2001 Data</u> 48% NY Partners 15% National Partners in NY ⁵	<u>2007 Data</u> 81% NY Partners 92% National Partners in NY ⁵	<u>2007 Data</u> 77% NY Partners 80% National Partners in NY ⁵
	ENERGY STAR clothes washer market share	<u>2001 Data</u> 24% NY Partners 12% National Partners in NY ⁴	<u>2007 Data</u> 46% NY Partners 42% National Partners in NY ⁴	<u>2007 Data</u> 51% NY Partners 43% National Partners in NY ⁴
	ENERGY STAR RAC market share	<u>2001 Data</u> 45% NY Partners 21% National Partners in NY ⁴	<u>2007 Data</u> 79% NY Partners 50% National Partners in NY ⁴	<u>2007 Data</u> 48% NY Partners 54% National Partners in NY ⁴
Incremental Cost	Simple average incremental cost of ENERGY STAR products (% more than non-ENERGY STAR)	<u>2004 Data</u> Refrigerators – \$465 (62%) Clothes Washers – \$410 (89%) Dishwashers – \$174 (47%) RACs – \$44 (18%)	<u>2007 Data</u> Refrigerators – \$473 (45%) Clothes Washers – \$384 (89%) Dishwashers – \$178 (43%) RACs – \$556 (20%)	<u>2007 Data</u> Refrigerators – \$653 (82%) Clothes Washers – \$461 (95%) Dishwashers – \$102 (20%) RACs – \$51 (18%)

Note: RAC stands for room air conditioner.

¹ Wording of the survey question addressing this indicator changed slightly from prior studies.

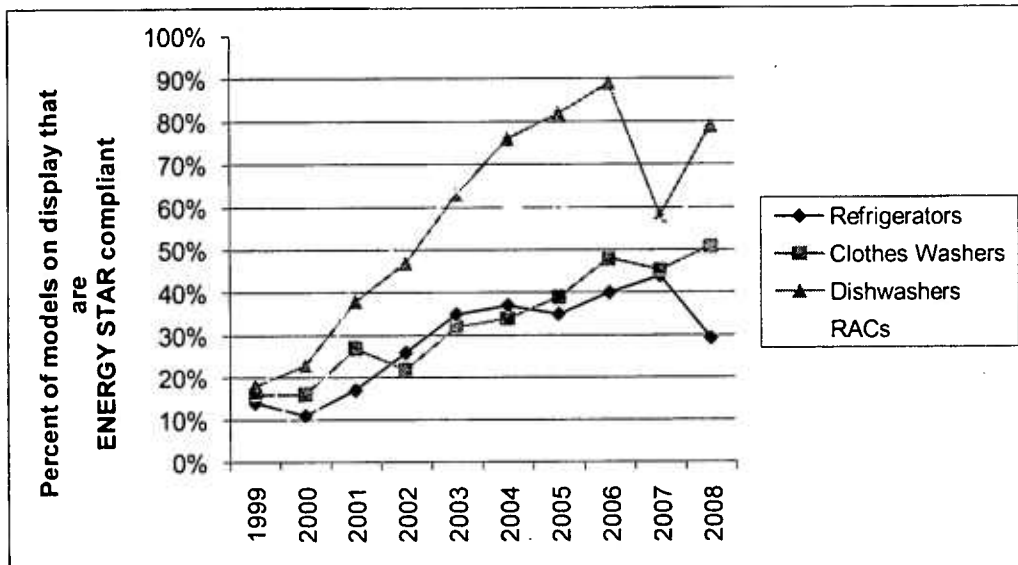
² In 2008, the percentage of ENERGY STAR refrigerators declined from 2007. This decrease is likely due to an increase in the efficiency criteria for ENERGY STAR refrigerators that went into effect in 2008.

³ The percentage of ENERGY STAR dishwashers declined in 2008. This decrease is likely due to an increase in the efficiency criteria for ENERGY STAR dishwashers that went into effect in 2007.

⁴ Compared to all competing bulbs.

⁵ Participating National EPA ENERGY STAR Partner Sales Data, Collected by D&R International.

Figure 4-2. Percent of Appliance Models on Display at Partner Stores that are ENERGY STAR Compliant



The percentage of ENERGY STAR RACs on display declined in 2000, as shown in Figure 4-2 due to a change in Federal minimum efficiency standards. While this percentage increased after that time, it has been declining since 2003 due to the conclusion of the Keep Cool RAC Bounty Program, and, possibly, increased competition from inexpensive imports. Although display of ENERGY STAR RACs has declined, market share of ENERGY STAR RACs remains high among New York retailers (at 54%) relative to other appliances.

The percentage of ENERGY STAR-labeled dishwashers on display declined in 2007. With most dishwashers meeting the prior ENERGY STAR criteria, more stringent qualifying criteria were implemented in 2007, likely resulting in the significant decrease from 2006.

In addition, the percentage of ENERGY STAR-labeled refrigerators declined in 2008. This decrease is likely due to an increase in the efficiency criteria for ENERGY STAR refrigerators that went into effect in 2008.

4.6.4 Program Impact Evaluation

Table 4-20 presents cumulative annual net energy and demand savings for the program from inception through December 31, 2008. Realization rates are developed to account for differences in program reported savings and performance of actual installations. Attribution analysis determines, through various methods, whether the gross savings estimate should be further adjusted downward or upward for freeridership or spillover. Adjustments for realization rate, freeridership and spillover, and the ultimate program net-to-gross ratio are also shown in the table.

For the ENERGY STAR Products and Marketing program element, unit sales attributable to the program were determined based on market research, industry data, and deemed savings values. This procedure is described in more detail in Section 4.6.5.

Table 4-20. Market Support Program Cumulative Annual Energy and Peak Demand Savings (Through December 2008 unless noted)

	Program-Reported Savings	Realization Rate	Adjusted Gross Savings	Free-ridership	Spillover	Net-to-Gross Ratio ¹	Net Savings
New York Energy SmartSM Products and Marketing (2007)²							
MWh/year	n/a	n/a	n/a	n/a	n/a	n/a	615,469
MW On-Peak	n/a	n/a	n/a	n/a	n/a	n/a	121.9
MMBtu	n/a	n/a	n/a	n/a	n/a	n/a	280,298
Keep Cool³							
MWh/year	5,159	1.0	5,159	18%	15%	0.94	4,865
MW On-Peak	8.8	1.0	8.8	18%	15%	0.94	8.3
Bulk Purchase³							
MWh/year	19,451	2.03	39,486	10%	5%	0.95	37,314
MW On-Peak	3.9	1.62	6.4	10%	5%	0.95	6.0
MMBtu	24,307	0.71	17,258	10%	5%	0.95	16,309
Market Support Program – Total							
MWh/year	n/a	n/a	n/a	n/a	n/a	n/a	657,648
MW On-Peak	n/a	n/a	n/a	n/a	n/a	n/a	136.1
MMBtu	n/a	n/a	n/a	n/a	n/a	n/a	296,607

¹ Net-to-Gross Ratio = (1-Freeridership) * (1+Spillover).

² Savings for the New York Energy SmartSM Products Program are estimated based on market data, survey research, and deemed savings values. Savings for this program were last fully captured in 2006. An update, completed and applied in Quarter 4 2008, added electricity, demand, and fuel savings for 2007 appliances only. Once necessary market-level data are available, appliance savings for 2008, as well as lighting savings for 2007 and 2008 will be analyzed and applied.

³ Closed programs.

Non-Energy Impacts

NYSERDA's evaluation contractors have examined non-energy impacts for CFLs and clothes washers. In general, NEIs can include changes in comfort, safety, water use, lighting quality and other factors, and their value (positive or negative) is expressed as a percentage of the Program's energy savings. Results from the most recent direct query analysis on both of these measures are shown in Table 4-21.

Table 4-21. Market Support Program NEI Results

Results from Direct Query Approach (year of study)	Percentage of Energy Savings
Clothes Washers (2004)	27%
CFLs (2005)	60%

4.6.5 New York Energy \$martSM Products: Market Share Update

Market Share Update - Approach

The Summit Blue MCA Team estimated sales and net impacts resulting from sales of ENERGY STAR appliances in the New York Energy \$martSM region. This section provides an update to the analysis for appliance sales in 2007. Using methods established in prior years, the analysis included the components described below.

- **Market share for ENERGY STAR appliances were estimated.** The market share for refrigerators, clothes washers, dishwashers, and room ACs relied on sales data provided by ENERGY STAR National Partner Retailers (collected by D&R International), as well as sales data provided by NYSERDA retailer partners.⁹⁸ The 2005 study had also conducted a residential customer telephone survey to both characterize the size of each distribution channel and to estimate market share for retailers that did not participate in the NYESP Program nor the National ENERGY STAR Program.⁹⁹ These data were utilized again in 2006 and 2007 as inputs for market share, and were updated based on available data sources.¹⁰⁰ Market share for other appliances (freezers, dehumidifiers, through the wall AC, ceiling fans without lights, and air cleaners) were calculated by using the ratio of the ENERGY STAR market share for NYSERDA Partners for these products versus related products (e.g., through the wall AC versus room AC) and applying these same ratios to the market share for the other distribution channels.
- **The number of ENERGY STAR appliance sales were estimated.** ENERGY STAR Market shares were multiplied by the estimated number of units sold to derive the total number of ENERGY STAR units sold. Similar to the 2005 and 2006 analysis, the MCAC team assumed that the Association of Home Appliance Manufacturer (AHAM) shipment data provided a good proxy for sales in New York. Sales in the New York Energy \$martSM region were based on the ratio of households in the New York Energy \$martSM region versus the rest of New York State. For the appliances without AHAM data, the total market size was extrapolated based on the product market share for NYSERDA partners and the total number of units sold per measure (e.g., NYSERDA partners sold a total of 34,556 freezers in 2007, representing 60% of all freezers sold, so the total freezer market was estimated at $34,556 / .60 = 57,171$).¹⁰¹
- **Deducting units that were credited to the New York ENERGY STAR Labeled Homes or the Home Performance with ENERGY STAR Programs.** In an effort to avoid the double-counting of ENERGY STAR products attributable to NYSERDA Programs, any measures that received incentives through these other residential programs were deducted from the unit count that would be credited to the NYESP Program.
- **Estimating the baseline of ENERGY STAR units that would have been sold due to the influence of the National ENERGY STAR Program, programs run by neighboring states, high energy prices, and other exogenous factors.** For this step, the MCA team relied on sales data provided by the

⁹⁸ The MCA Team worked with D&R International to remove the NYSERDA Retailer Partners from the ENERGY STAR National Partner Retailer dataset to avoid double-counting of sales.

⁹⁹ An update to this primary data collection effort is proposed for 2009 MCA evaluation activities.

¹⁰⁰ For example, the 2007 market share for ENERGY STAR appliances for non-partner retailers was assumed to be the 2006 value adjusted upward or downward based on the average change in the NYSERDA and National Partner reported market shares.

¹⁰¹ The MCA Team used this approach to make use of available data; the Team had the 2007 sales data for NYSERDA partners and the percent that number represents of total statewide sales, and from those two data points calculated the total number of units sold.

National ENERGY STAR partners to D&R International. States that did not run ENERGY STAR products programs in 2007 were selected as candidate comparison States.¹⁰² These States were then ranked by median income and education levels (percent of population with a bachelor's degree) in comparison to New York. A total of four States were then selected as comparison States because they ranked closest to New York yet did not have a program to promote ENERGY STAR products.¹⁰³ The weighted average (based on number of units sold per State) National Partner market share was then calculated for each of the four appliances where data were available: refrigerators, clothes washers, dishwashers, and room air-conditioners. ENERGY STAR market share for non-partners was then assumed to be the same as the ratio of National Partners to non-Partners for New York. As no further data was available to evaluate the sales in the non-program states, the National Partner to non-Partner sales ratio in New York offered the best reference to sales in the non-program states. The weighted average ENERGY STAR market share for National Partners and non-partners was assumed to be the baseline market share of ENERGY STAR products that would have occurred in New York in absence of the NYESP Program.¹⁰⁴

- ***Multiplying the attributable units sold by the expected kWh and kW savings per unit.*** The total ENERGY STAR units sold in the New York Energy SmartSM region, after removing those that were credited to other NYSERDA residential programs or considered naturally occurring adoption, are the remaining units that can be credited to the influence of the NYESP Program. These units are then multiplied by the deemed savings (kWh and kW) per measure to estimate total Program savings.

Market Share Update – Findings

NYSERDA Partners surpassed National Partner stores in the proportion of refrigerators, clothes washers, and dishwashers sold with approximately half of all units sold (47%-60%) through NYSERDA Partners and just over forty percent (33%-45%) sold through National Partner stores. The remaining 6%-8% were sold through non-partner retailers (Table 4-22). For Room ACs, however, National Partner stores represented 71% of all sales, followed by NYSERDA Partner (15%) and non-partner retailers (14%). The ENERGY STAR market penetration reported by NYSERDA Partners decreased from 2006 to 2007 for each product except clothes washers. While several factors could account for this trend, program staff believe the addition of new retailer Partners into the program in 2007, including several big box retailers, was a primary driver; staff noted that it often takes time for Partners to adjust their purchasing and sales behavior in response to program interventions.

ENERGY STAR market share rose for all appliances from 2001 to 2006, but generally declined slightly in 2007 compared to 2006. This decline may correspond with the beginning of the overall national

¹⁰² The DSIRE Database of State Incentives for Renewables & Efficiency (<http://www.dsireusa.org>) was used to determine whether or not states had energy efficient appliance programs. Program start dates were confirmed with a phone call to utilities in the comparison states that appeared to have developed programs subsequent to 2007.

¹⁰³ These States included Delaware, Kansas, Nebraska, and Pennsylvania. Although previous reports had used Georgia, Hawaii, Michigan, Ohio, and Utah as comparison states, recently introduced programs, as well as changing socio-economic characteristics, preclude these states as comparison states. In addition, Pennsylvania has a far larger population than the other current comparison states, with higher appliance sales, and thus represents a significantly higher percentage of the baseline comparison sales.

¹⁰⁴ Note that this approach does not account for other factors that may influence market share, including energy prices, climate zone, population center distribution (urban/suburban/rural), precipitation/drought, etc. A 2005 study found that many of these can be significant predictors of ENERGY STAR market share (see Nexus Market Research, RLW Analytics, Shel Feldman Management Consulting, and Research Into Action, "Market Progress and Evaluation Report (MPER) for the 2004 Massachusetts ENERGY STAR Appliances Program," May 2005).

economic contraction, also reflected in a 33% nationwide new home sales decline for the same time period.

Table 4-22 presents the number of ENERGY STAR units, by measure type, credited to the NYESP Program. As discussed above, for the appliances adjustments are made for units included in the New York ENERGY STAR Labeled Homes and Home Performance with ENERGY STAR programs as well as an assumed baseline of units that would have sold in absence of the Program. It should be noted that any influence of the NYESP Program on ENERGY STAR sales in other states (*e.g.*, the NYESP Program influences a multi-state retailer to alter its purchasing and sales behavior) is not accounted for in the calculation of the baseline unit sales presented in Table 4-22. Thus, the results presented in Table 4-22 are likely conservative. The last column presents the ratio of total ENERGY STAR units credited to NYSERDA divided by the number of ENERGY STAR units sold by NYSERDA retailer partners.

Table 4-22. 2007 ENERGY STAR Appliance Sales Attributable to the NYESP Program

	A	B	C	D	E	F	G	H
	Total No. Units Sold in NY	ES Market Share	No. ES Units	Number Reported by Homes Programs	Baseline Units ¹	Net Units Credited to NYESP	Comparison: Reported ES Units Sold by Partners	Ratio of Net Units to Reported Partner ES Sales
Appliances								
Refrigerators	431,428	35%	152,673	1,117	143,513	8,043	102,879	0.08
Clothes Washers	308,646	48%	146,623	314	99,881	46,427	72,766	0.64
Dishwasher	219,107	78%	170,965	2,447	166,831	1,687	83,454	0.02
Room ACs	1,362,482	54%	733,205	0	722,065	11,140	99,337	0.11
Air cleaner	15,773	93%	14,719	0	14,496	224	5,987	0.04
Dehumidifier	25,291	82%	20,664	115	20,350	199	8,315	0.02
Freezers	57,171	9%	5,128	0	4,820	308	3,614	0.09
Through-the-Wall Air Conditioners	273,857	92%	252,188	0	248,357	3,832	34,712	0.11
Ceiling Fans	20,956	47%	9,920	0	9,770	151	4,013	0.04
Total Appliances	2,714,710		1,506,087	3,993	1,430,084	72,010	415,775	0.17

¹ Any influence of the NYESP Program on ENERGY STAR sales in other states (e.g., the NYESP Program influences a multi-state retailer to alter its purchasing and sales behavior) is not accounted for in the calculation of the baseline unit sales; thus, the results presented in Table D-2 are likely conservative.

A Based on AHAM or extrapolated based on Partner sales data.

B Based on sales data of National partners, NYSERDA partners, and 2005 end-use customer survey.

C Columns (A) * (B).

D Fourth Quarter 2007 Reports for the HPwES and NYESLH Programs.

E Based on National Partner sales data from a comparison group of States (that have not run ENERGY STAR programs) selected based on income and education levels similar to New York.

F Columns (C) – (D+E).

G NYSERDA Partner Sales data.

H Columns (F)/(G).

Table 4-23 presents the total savings attributable to the appliance measures from the 2007 NYESP Program. In total, the appliance portion of the 2007 Program resulted in 10,626 MWh of energy and 14.5 MW of peak demand savings. The appliance portion of the Program for 2005, 2006, and 2007 combined has saved 69,661 MWh and 56.2 MW.

Table 4-23. 2007 Net Appliance Sales and Measure Savings Estimates for NYESP Program

	2007 computations - ES Products Measure Savings				
	(A)	(B)	(C)	(A*C)	(B*C)
	kWh per	kW per	2007 Net	kWh Total	Coinc. Peak
Sales and Savings Figures	Unit ¹	Unit ¹	Sales ²	Savings ³	kW Savings
Appliances					
Refrigerator	79	0.011	8,043	635,424	88
Clothes Washer	195	0.28	46,427	9,053,344	13,000
Dishwasher	127	0.18	1,687	214,215	304
Room AC	40	0.07	11,140	445,601	780
Air cleaner	164	0.03	224	49,067	6
Dehumidifiers	114	0.017	199	22,694	3
Freezers	38.6	0.005	308	11,876	2
Through-the-wall room air conditioners	50.2	0.083	3,832	192,349	318
Ceiling Fan	7	0.01	151	1,025	1
Total Appliances			72,010	10,625,595	14,501

¹ Figures from Nexant "New York Energy Smart Programs - Deemed Savings Database 2007".

² Measure installations attributable to the NYESP Program.

³ Note that total energy and demand savings are based on figures that may include additional significant digits that are not presented in this table.

4.7 Communities and Education Program

4.7.1 Program Description

The Communities and Education Programs provide face-to-face contact with New York residents on energy-efficiency topics and NYSERDA programs through schools, local seminars and workshops, and events. The ultimate goal of the program is to help develop an energy-conscious society in New York with the desire and capability to create more efficient and sustainable communities. More immediate goals of the programs include: 1) educating teachers, students, homeowners, renters, representatives of community-based organizations, and community leaders on various energy topics, including energy efficiency and the relationship between energy, sustainability, and economic development in their communities; and 2) making them aware of New York Energy SmartSM programs that can be combined

with local, State, and federal resources to reduce energy consumption in their communities. The two initiatives making up these programs are Energy Smart Students (ESS) and New York Energy SmartSM Communities (E\$C).

Beginning in 2004, ESS introduced energy and energy efficiency curricula to New York's K-12 teachers and students. ESS offers hands-on, project-based lessons that are aligned with the New York State Learning Standards for math, technology, language arts, science, and social studies. ESS has also introduced building sciences to vocational schools, laying the groundwork for the growth of the building performance specialists industry. ESS offers one-day workshops for classroom teachers and other educators on energy literacy, science of energy, energy efficiency at home and at school, and more specialized topics, such as bio-diesel and hydrogen. Teachers attending the workshops are provided with a curriculum for grade levels K-12. The curriculum offers teachers the ability to select modules of varying lengths based on the needs of the students. ESS also sponsors an annual Energy Educator Conference to provide more intensive training to teachers willing to commit to assisting ESS with the training of other teachers. ESS offers teachers mini-grants to fund innovative energy projects in the classroom and community. The program also produces *Energy Smarts*, a bi-monthly newsletter devoted to energy education. In addition, the program participates in statewide teacher conferences and organizations, including the New York State Technology Educators Association and the Science Teachers Association of New York State.

In 2001, E\$C was developed as a partnership with the U.S. Department of Energy's Rebuild America Program. This initiative provides a regional E\$C Coordinator (E\$CC). The Coordinator educates consumers and community leaders on the benefits of energy efficiency and renewable resources, and their ability to impact their own energy costs, using the community infrastructure to increase message reach and impact. The E\$CC also provides ready access to New York Energy SmartSM programs by referring building owners and managers to appropriate program entry points. The initiative includes ten partnerships throughout New York: Western New York, Finger Lakes Region, Central New York, Southern Tier, North Country, Capital Region, Mid-Hudson, and three partnerships in New York City. Throughout the year, the regional partnerships sponsor seminars and workshops, meet with community leaders, and staff the NYSEDA booth at local events, for the following purposes: to educate the public on saving energy at home and in the workplace; to provide public forums for the discussion of energy issues important to their communities; and to work with planners in their communities to ensure that energy is addressed in local ordinances and growth plans. In addition, E\$C has primary responsibility for recruiting builders, contractors, retailers, realtors, code officials, architects, engineers, and others into the residential programs as mid-stream partners, thus eliminating the need for multiple program implementation contractors to recruit partners within the same regions, and reducing confusion and redundancy in the marketplace.

The 13-year program budget is \$11.9 million.

4.7.2 Program Accomplishments

Table 4-24 shows the Program's five-year goals and performance over the most recent 30 months. The Program's performance is at or above expected levels for all seven of the goals.

Table 4-24. Communities and Education Program – Long-Term Goals and Achievements

Activity	Program Goals (July 1, 2006 through June 30, 2011)	Achieved July 1, 2006 through December 31, 2008	% of Goal Achieved
Teachers trained	5,000	2,418	48%
Total students reached	150,000	286,818	>100%
Portion of total estimated to be low-income students	100,000	114,727	>100%
Community events held statewide	1,000	866	87%
Recruiting seminars held statewide	500	300	60%
Home performance contractors, technicians, builders and raters recruited for the Home Performance Program	800	883	>100%
Building analysts, designers, energy consultants, equipment installers, etc. recruited for Multifamily Building Performance Program	100	109	>100%

4.7.3 Program Outputs and Indicators

This section highlights key program outputs as identified through the logic model development work and associated market progress. All values reported are cumulative since program inception. Program highlights include the following:

- Since its inception, there have been 2,418 teachers trained at 171 workshops on teaching about energy issues. All 171 workshops received free use of space and promotional assistance from the host organization. In addition, 18 workshops received funding from utilities and government organizations.
- An estimated 286,818 students have been reached.
- More than 800 meeting and outreach sessions have been held, attracting more than 97,000 attendees.

Table 4-25 presents the key logic model-driven outputs for the Communities and Education Program through December 31, 2008.

Table 4-25. Communities and Education Program – Key Program Outputs

Outputs	Value (Cumulative through December 2008)
Energy Smart Students Initiative	
Number of teacher conferences held to promote ESS	33
Number of workshops	171
Number of teachers (including administrators) trained on energy education topics	2,418
Number of student-centered events attended	24
Number of energy education projects awarded through mini grants)	39

4.7.4 Energy Smart Communities Process Evaluation

This evaluation, developed by the process evaluation team (Research Into Action) represents the third phase of a three phase approach to provide early and continued feedback on the **New York Energy SmartSM Communities** (Energy Smart Communities) program summarized above. This section provides a description of the process evaluation methods and results for phase three of this project.

Phase three of the process evaluation, completed in December 2008, ends the year-long process evaluation effort. The focus in the third phase was to reflect on recent changes in the program, including the continuing program adjustment to Lockheed Martin as the new Services and Support contractor, and the reorganization late in 2008 placing Energy Smart Communities in the newly restructured Marketing and Economic Development Unit at NYSERDA. Phase three goals were to assess the impacts of the changes in program structure, management, support, and implementation, and to explore responses to these reorganizations. The evaluation was designed to assess the effects of these transitions on the Energy Smart Community Coordinators, staff, and program participants.

During phase three, NYSERDA program staff, Lockheed Martin staff, and the coordinators reported a variety of successful activities in the Energy Smart Communities Program. These include: improved training, especially for new coordinators; development of a program implementation handbook; increased value and usefulness of monthly coordination calls; improved communication among program contractors; availability of some local project data; and more consistent monthly reporting on program metrics. The program also continued to redefine the coordinators' scope of work, improve the flow of marketing materials, and provide support for outreach events. Lockheed Martin staff has become more familiar with regional differences and needs, and thus is better able to support regionally-specific aspects of each coordinator's efforts.

In addition, NYSERDA program staff, Lockheed Martin, and the coordinators reported many accomplishments in the program regions. These included: developing and maintaining community partnerships, producing and attending many community events, beginning target projects, and disseminating program information through varied outreach activities.

Despite the improvements and accomplishments to date, the transition process will continue in 2009. Most of the contacts are hopeful that the most recent re-organization will provide better support, and that

the location within NYSERDA will serve the program well. NYSERDA staff, coordinators, and contractors agreed that at this time in 2009, there is more potential for the program to provide value, because the communities are now actively asking for assistance due to increased interest in energy efficiency, and are looking for support for energy-efficiency improvements.

Now that many administrative functions have been addressed and are operating more effectively, program staff expects that Lockheed Martin will be able to focus more of its efforts on coaching and providing additional support for regional projects. Lockheed Martin also will continue current tasks, such as training and reporting, identifying and sharing best practices, and identifying and assisting with the marketing of high-visibility projects.

The main unresolved issues that emerged in the phase three process evaluation are related to the effect of organizational changes on the program, including the lack of clear goals and effective measurement of success; issues with services and support for coordinators; and issues with coordination by NYSERDA staffs to support core program processes.

The many organizational changes at NYSERDA affected the program in several ways. The evaluators found that a clear vision for Energy Smart Communities and its relationship to other NYSERDA programs has yet to be developed. For instance, the program does not have a program brand and there is no statement as to how Energy Smart Communities differs from other NYSERDA outreach efforts. The coordinators noted they remain confused about expectations and priorities for their roles and activities, and how their regional efforts relate to statewide program goals. Establishing clear goals and objectives could be used to develop more satisfactory performance metrics, as the coordinators and program staff all noted that current program indicators only capture some elements of performance and are not the best measures of what actually occurs in the regions.

Issues with services and support also emerged at each phase of the evaluation. In the first phase, program staff and the coordinators reported high expectations for the support to be provided by Lockheed Martin. During the next two phases, program staff and coordinators said they felt these expectations had not been met. Contractual issues delayed program start-up, and during the evaluation period, priorities for Lockheed Martin's work frequently shifted. For example, unforeseen problems, such as turnover among the coordinators, increased the demand for training and coaching, and emphasis on the development of the reporting system limited Lockheed Martin staff's availability for working with the coordinators to develop their regional specific offerings.

Despite these issues, throughout the three phases of the evaluation the process evaluation team found that Lockheed Martin became both an advocate for the coordinators and the conduit for communication with NYSERDA staff. When Lockheed Martin staff was viewed as not effective in these roles, the coordinators noted that it could have been because NYSERDA staff did not get back to the Lockheed Martin staff with a response. In addition, when materials were not available or local project data were needed from NYSERDA, Lockheed Martin staff was limited in its ability to assist the coordinators. Results in phase three indicate that program staff believed Lockheed Martin should take a more proactive role (e.g., in reviewing requests more carefully before sending them to NYSERDA staff).

Coordinators and Lockheed Martin staff said they have not yet received the tools they need to support core program components. In particular, they indicated that marketing materials and local project data were difficult to obtain or were unavailable. In addition, the coordinators and Lockheed Martin reported that it was hard to determine who was responsible for the fulfillment of marketing collateral and that the flow of program information to the coordinators was inconsistent. The coordinators said they would like a variety of tools, such as templates, presentations, and other collateral that could be used statewide (with the ability to customize for local needs). The coordinators said that, although they appreciated the

consistent Web-based reporting format, some could not access the Web site and post reports. Finally, most of the program contacts said they would like program indicators that fully and accurately reflect what they believe the program has accomplished.

The evaluators offer the following conclusions and recommendations.

Conclusions and Recommendations

1. *Conclusion:* The evaluation found no consistent, shared understanding of and messaging for the Energy Smart Communities Program among the coordinators. Lacking clearly defined expectations, the coordinators have developed priorities based on their experience and understanding of their communities. While NYSERDA program staff is working with the coordinators to develop plans to integrate their efforts with the Marketing and Economic Development Unit, coordinators still do not have a clear vision of their roles and the program's role in NYSERDA's marketing and outreach efforts.

Recommendation: The roles, responsibilities, message, and "brand" for the Energy Smart Communities Program should be clarified and coordinated with other NYSERDA outreach efforts. NYSERDA Energy Smart Communities Program staff should develop program guidelines and expected outcomes, and identify the roles and responsibilities of the coordinators in operating within the guidelines. These would include clear expectations for:

- The coordinators' host organization
- The coordinators' roles and their relation to each of NYSERDA's program contractors
- Branding of the coordinators – *i.e.*, how the public will "know" the coordinators and distinguish them from other NYSERDA actors

2. *Conclusion:* Core program processes, including information flow, collateral material fulfillment, and simple access to and use of the GetEnergySmart.org and Share Point sites, are not working successfully for the coordinators.

Recommendation: Support for essential program processes should be improved. First, program staff should ensure that marketing materials include the most recent program information and guidelines for participation. Staff also should develop an order-tracking process for marketing materials and specify guidelines for the speed and fulfillment of materials requested. Staff should direct Lockheed Martin to work with NYSERDA's Marketing and Economic Development unit to quickly develop templates, Power Point presentations, and other tools the coordinators need. It will be especially helpful to combine access to all program functions through one Web site.

3. *Conclusion:* Marketing materials do not address regional and cultural differences, and sometimes do not contain current program information.

Recommendation: With input from the coordinators, NYSERDA program staff should develop marketing materials that contain current program information, reflect regional differences, and are culturally appropriate.

4. *Conclusion:* Reporting does not adequately measure the program's performance. Contacts reported that this was due to the lack of clear program goals and objectives and clear definitions of the activities being measured and how they relate to the goals and objectives.

Recommendation: Clear program goals and objectives should be developed. These should include goals common to all regions, as well as some regionally-specific goals and objectives. New indicators may be needed to address the full range of goals and objectives, including indicators that document coordination with contractors, completed projects, evidence of new and ongoing partnerships, and other characterizations that reflect the depth and breadth of the program's activities and outcomes. Clear definitions of the program metrics should be communicated to the coordinators to ensure consistent reporting.

5. *Conclusion:* Collaboration between the coordinators and contractors for other NYSERDA programs is not working as well as it could. For instance, two coordinators reported that some NYSERDA program staffs do not allow their implementation contractors to attend events with the coordinators. Some implementation contractors consistently participate in the monthly coordination calls, while others do not. Increased activity by the implementation contractors in NYSERDA's Focus Program sectors, while having great potential for improving outreach, also presented a challenge, as coordinators did not have guidance on how to work with the Focus contractors to conduct outreach in their regions.

Recommendation: NYSERDA should establish guidelines for coordination and collaboration between the program implementation contractors and the Energy Smart Communities coordinators. Where program processes make this difficult, guidelines should be reviewed and revised. Program staffs need to communicate more frequently and effectively with the coordinators, particularly about expectations of their work with the Focus sector contractors. To support this, Lockheed Martin could prepare and disseminate best practice case studies of successful coordination efforts.

6. *Conclusion:* The evaluation found that the coordinators still perceive that NYSERDA program staffs generally are unaware of or do not value the coordinators' knowledge of and experience at the local community level. Coordinators said that, as a result, NYSERDA program staffs have not responded quickly to their requests for information, including determinations of a proposed project's program eligibility. Nor have coordinators been notified of program changes in a timely manner or provided with information that regularly is shared with implementation contractors.

Recommendation: Once the roles, scope of work, and priorities for the coordinators have been fully and clearly defined by NYSERDA Energy Smart Communities Program managers, these should be distributed to other NYSERDA program staff members. The Marketing and Economic Development Director should convene a meeting of NYSERDA program and project managers and coordinators to support a facilitated discussion about how to improve collaboration and support between program staff and the coordinators. Such a meeting was held in fall of 2008 with the Marketing and Economic Development staff, including a discussion of how to integrate marketing efforts. NYSERDA program staffs also should ensure that they inform coordinators, constituents, and contractors about all program changes and updates.

7. *Conclusion:* Conducting the process evaluation in phases, which allowed for contact with program staff, Lockheed Martin, and the coordinators every six months, was very successful. These frequent contacts effectively engaged the coordinators in the evaluation process, as evidenced by the many coordinators who sent the evaluation team unsolicited press releases, newsletters, and other examples of their work between interviews. Many noted the relevance of the information to topics discussed during the evaluation interviews. During phase three, several of the coordinators asked if the evaluation would continue, as they found the process helpful in reflecting on their progress as well as that of the program.

Recommendation: Continue the process evaluation of the Energy Smart Communities Program, using the phased approach, including an assessment of the impact of moving the program to the Marketing and Economic Development Unit. The evaluation should continue to engage the coordinators in dialogue about program processes and improvements. It also should provide the Marketing and Economic Development staff timely input about the new organizational structure and progress toward addressing the issues identified in this report.

4.8 EmPower New YorkSM

4.8.1 Program Description

The EmPower New YorkSM Program is part of NYSERDA's portfolio of **New York Energy SmartSM** programs that serve low-income households in the State. Customers of SBC-participating utilities with incomes at or below 60% of State Median Income and households enrolled in utility low-income payment assistance programs are eligible for services. Both property owners and tenants may be served, and the program targets 1-to-4 family homes and multifamily buildings with fewer than 100 units. Priority is given to:

- Households participating in utility low-income programs
- Seniors referred by Offices for the Aging due to financial hardship
- Eligible households receiving services that are coordinated or co-funded by the Weatherization Assistance Program (WAP, run by the New York Division of Housing and Community Renewal, and funded by the U.S. Department of Energy), so as to create comprehensive work scopes that include appropriate electric reduction measures
- Eligible households in buildings not eligible for services through WAP
- Smaller buildings eligible for the Multifamily Performance Program that NYSERDA determines are better served through EmPower New YorkSM

EmPower New YorkSM prioritizes cost-effective electric efficiency measures, particularly lighting and refrigerator replacements. Home performance services, such as insulation, heating system repair and replacement, and air-sealing, are provided in situations where they offer the best means of improving energy affordability. Health and safety measures, such as carbon monoxide (CO) detectors and emergency repairs, are also implemented as the need arises. Whenever possible, services are coordinated and cost-shared with WAP.

All customers who are referred to the program and are not targeted for in-house energy services receive a package of information with educational materials, three CFL light bulbs, a water temperature thermometer, and a nightlight. These households are called "partial participants." Households expected to benefit from more comprehensive treatments receive energy audits and in-home energy education, and additional electric reduction measures (e.g., CFLs and ENERGY STAR-compliant refrigerators) or home performance measures as appropriate. These households are "full participants." There is no cost to the customer for these services and equipment. In rental situations, measures that directly benefit the eligible tenant may be installed without a landlord contribution. Additional measures generally require a 25% landlord contribution. The program also provides free workshops on energy use and financial management offered to the general public by the Cornell Cooperative Extension and HeartShare of New York City. Program audit and installation services are provided through a network of weatherization

agencies and private energy services contractors, all of whom are accredited by the Building Performance Institute (BPI).

Effective July 2006, the Weatherization Network Initiative was merged with EmPower New York. The Weatherization Network Initiative was launched in 2003 to deliver electric reduction measures through the statewide network of weatherization agencies in coordination with the Weatherization Assistance Program. A total of 4,581 households received services through the Weatherization Network Initiative. The total cost was \$5,438,408¹⁰⁵ with an average cost of \$1,187 and average annual savings of \$189 per household. As services are tailored to the needs of the household, actual costs and savings can vary. EmPower expanded the involvement of these weatherization agencies while adding private contractors to ensure cost-effective and timely services.

The combined Weatherization Network Initiative and EmPower New York budget through June 2011 is \$63.7 million. In addition, the comprehensive nature of the program has allowed NYSEDA to leverage considerable non-SBC funds totaling \$16 million to install efficiency measures for an additional 8,700 households. Table 4-26 displays details of the budget and goals of the non-SBC funding sources.

Table 4-26. Non-SBC Funds Leveraged

Source	Incentive Total	Expended on Completed Projects	Unit Goals	Units Completed
Indian Point 2	\$ 2,049,116	\$ 2,049,116	2,232	2,232
Western NY Environmental Program	\$ 895,000	\$ 638,208	1,000	803
National Grid Low Income Gas Customer Efficiency Program				
Phase 1	\$ 2,251,041	\$ 2,251,041	1,039	1,039
Phase 2	\$ 2,097,668	\$ 2,097,668	1,027	1,027
Phase 3	\$ 1,361,180	\$ 89,845	545	34
AES Environmental Program	\$ 255,000	\$ 255,000	322	322
Con Edison Gas				
Phase 1	\$ 925,000	\$ 925,000	450	450
Phase 2	\$ 1,275,000	\$ 4,746	463	2
National Fuel Gas				
Phase 1	\$ 2,513,000	\$ 1,289,080	718	390
Phase 2	\$ 2,513,000	0	718	0
Central Hudson Gas	\$ 311,500	0	145	0
TOTALS	\$16,446,505	\$9,599,704	8,659	6,299

¹⁰⁵ The total cost includes all implementation dollars spent.

4.8.2 Program Accomplishments

Table 4-27 shows the Program's five-year goals and performance over the most recent 30 months. The program is showing excellent progress having achieved 70% of its goal only 50% through the review period.

Table 4-27. EmPower New YorkSM Program – Near-Term Goals and Achievements

Activity	Program Goal (July 1, 2006 through June 30, 2011)	Achieved July 1, 2006 through December 31, 2008	% of Goal Achieved
Households served (completed)	31,500	23,301	74%

4.8.3 Program Outputs and Indicators

This section highlights key program outputs as identified through the logic model development work and associated market progress. All values reported are cumulative since program inception. Program highlights include the following:

- The EmPower New YorkSM Program including the Weatherization Network Initiative (SBC funding) has served 34,060 low-income households in New York.
- The energy cost for the average low-income household served by the program has been reduced by \$316 per year at an average cost of \$1,330 per household.

Table 4-28 presents a sample of key logic model-driven indicators of program success, especially those related to market progress, as tracked by the evaluation and program activities.

Table 4-28. EmPower New YorkSM Program – Key Market Indicators and Program Cumulative Progress (SBC-funded only)

Topic	Indicator	Most Recent (2008)
Recruitment of Low-Income Households	Number of referrals to the program	77,202
	Number of participants selected for comprehensive audit, education, electric reduction, and Home Performance services	34,431
	Number and types of community-based organizations working with program	40 Offices for the Aging, 5 Local Department of Social Services, 20 Housing Agencies, and 35 other Community Based Organizations
	Number of WAP agencies working with program	47
	Number of utilities working with program	6
	Number of energy services contractors working with program	72
Low-income Households and Buildings Served	Participants receiving print and in-home education	43,647
	Households attending energy and financial management workshops	13,159 attendees in 1,676 workshops
	Number of low-income buildings with energy efficient measures installed	34,431

4.8.4 Program Impact Evaluation

Table 4-29 presents cumulative annual net energy and demand savings for the program from inception through December 31, 2008. Realization rates are developed to account for differences in program reported savings and performance of actual installations. Adjustments for realization rate are shown in the table. Attribution analysis, which determines whether the gross savings estimate should be further adjusted downward or upward for freeridership or spillover, was not performed for this program.

In 2007, a full measurement and verification study was conducted on the EmPower New York Program. The realization rates shown in Table 4-29 are reflect the results of this study. Further discussion of recommendations resulting from this study can be found in Section 4.8.6.

Table 4-29. EmPower New YorkSM Program Cumulative Annual Energy and Peak Demand Savings (Through December 2008)

	Program-Reported Savings	Realization Rate	Adjusted Gross Savings	Net-to-Gross Ratio	Net Savings
EmPower New YorkSM					
MWh/year	45,544	0.8	36,890	Not Evaluated	36,890
MW On-Peak	5.9	1.0	5.9	Not Evaluated	5.9
MMBtu	135,392	1.0	135,392	Not Evaluated	135,392
Weatherization Network Initiative					
MWh/year	6,698	1.0	6,698	Not Evaluated	6,698
MW On-Peak	1.0	1.0	1.0	Not Evaluated	1.0
Combined EmPower New YorkSM Program					
MWh/year	52,242	N/A	43,588	N/A	43,588
MW On-Peak	6.9	N/A	6.9	N/A	6.9
MMBtu	135,392	N/A	135,392	N/A	135,392

4.8.5 EmPower Program Process Evaluation

This section presents the methods and results of the complete process evaluation of the **New York Energy SmartSM EmPower New York Program (EmPower)**. This evaluation, conducted by the process evaluation team (Research Into Action), involved in-depth interviews with three New York State Energy Research and Development Authority (NYSERDA) staff, five implementation contractor staff, six utility representatives, and five weatherization agencies and service providers. In addition, the evaluation observed four energy-saving education workshops, conducted two focus groups, and surveyed 200 low-income households.

The evaluation team focused this evaluation on methods to increase enrollment effectiveness, the effectiveness of the energy saving workshops, and issues involving the coordination of Quality Assurance/Quality Control (QA/QC) services. The evaluation finds that there are ways for EmPower to increase the number of candidates for enrollment and to increase the rate at which they enroll. They also found ways to improve the energy saving workshops to make them more effective in getting attendees to take energy-saving actions. The evaluation recommends that the implementation team take advantage of some marketing changes to promote the program and that it redesigns the energy saving workshops to concentrate on getting attendees to take actions to save energy. A complete process evaluation of EmPower was completed in 2007. This evaluation focused on three specific areas of the EmPower program that warranted additional attention. These three areas were:

1. **Assessment of Referrals.** The potential program growth requires that EmPower maintain a referral process that is both comprehensive and efficient. New funding from Energy Efficiency Portfolio Standard (EEPS) creates an immediate need to increase the number of referrals. To this end, the EmPower staff requested that the evaluation team look at ways to better manage this process, including improvements in program communications and improved recruitment of the referrals provided.

2. **Distribution and Effectiveness of Educational Workshops.** The program staff wanted to understand if the workshops were conveniently located near low-income households and whether the sessions were effective in getting attendees to take energy-saving actions.
3. **Coordination of Quality Assurance Responsibilities.** The EmPower Implementation Contractor, Honeywell, develops contractors and performs Quality Control (QC) work on jobs in progress. Conservation Services Group (CSG) independently performs Quality Assurance (QA) inspections on completed work. Program staff was interested in evaluating the success of this process, and the interactions between NYSERDA, Honeywell, CSG, and the participating contractors.

Conclusions and Recommendations: Referral Process

EmPower depends on utilities and social service agencies to supply low-income household leads that EmPower can contact and recruit into the program. EmPower has developed effective procedures for communicating and exchanging data with the utilities and agencies. Additional funding made available in fall 2008 doubled the program's goal for the number of households served each year. The expansion of the production goal raised the question as to whether the existing procedures and sources would be sufficient to meet the new demand for recruits. Through interviews with staff, utilities, and service providers, focus groups, and a survey of 100 non-responding low-income households, the evaluation investigated the referral process. The evaluation has identified some specific modifications that can increase the number of potential participants/referrals. This is particularly important in the few areas of the state where enrollment numbers are lowest.

1. **Conclusion:** There are alternative marketing and outreach approaches that can increase the effectiveness of the recruitment process. Standard marketing literature recognizes that it is necessary to provide multiple opportunities for customers to respond to solicitations. The current approach sends three similar marketing letters to prospective households in a 60-day period. If a household does not respond, it is dropped from follow-up marketing efforts. Focus groups and surveys found that many customers opened the letters from EmPower, but did not complete the enclosed application. The largest uncertainty regarding the letter is generated by the wording "no-cost energy services." Many households read that line and immediately think the letter is a scam. Some look at the 800-number as further proof that the offer is bogus and that it will end up costing them money. These concerns are further exacerbated when the household is unfamiliar with the company sending the letter.

Recommendations

Recommendation A: Send more letters to each household over a longer period.

Recommendation B: Consider refining message that explains how the program is offered at no cost

Recommendation C: Encourage the utilities to send or to let EmPower send using the utility letterhead support letters that verify the legitimacy of the program.

Recommendation D: Retool the letter to enhance its appeal to target households.

- Use different ways to address and stamp the envelopes; particularly using stamps and directly printed addressing.
- Change some of the wording in the letters that the focus group households found confusing or that discouraged them from applying.

- Add wording that assures the customer that this is not an offer to switch their utility company.
 - Add a local phone area code to the letter, because customers associate an 800-number with scams.
 - When applicable, use the terms “gas leak” and “carbon monoxide detection and repair” – terms the customers view as more important and motivating than “customer health and safety,” which is now used in the letters.
2. *Conclusion:* The program wants to increase enrollment to lesser served areas of the state, yet the priority given to referrals from utilities and community-based-organizations (CBOs) limits the program’s ability to control who enrolls in the program. The program staff is focusing its attention on finding ways to increase the number of recruits in the National Fuel regions, where recruitment rates are lower than they are in other areas. Identifying and recruiting households in the Con Edison area was even more of an issue as this evaluation began because Con Edison did not provide recruiting lists. Placing additional resources in these service areas and developing alternative recruitment approaches that do not rely on utility lists are necessary positive steps the program is taking to address this issue. However, building recruitment capacity alone is unlikely to control the recruitment distribution, because the first-come-first-serve recruitment approach now in effect does not give the program the ability to assign priorities for recruitment. The utility referral policy also favors households who are better informed or better able to respond to the recruitment process. If the program wants to reach out to harder-to-reach households or increase participation in underserved locations, the program will need to provide additional support towards recruiting these customers.

Recommendation: Consider strategies to reach households not enrolled in payment assistance programs or referred by a CBO as this inhibits the program’s ability to serve harder-to-reach customers. Be prepared to adjust program support, recruitment incentives, spending limits to attract households of different types and in specific areas where recruitment is harder to accomplish. Quotas for certain types of households or certain locations may be necessary if the distribution of resources is to reach all areas and types of low-income households.

3. *Conclusion:* Using utility lists that are drawn exclusively from low-income customers who have previously enrolled in the utility’s payment assistance program facilitates recruitment and implementation, but is preventing EmPower from serving households that are among the most in need of the EmPower services. Similarly, the program will at some point need to investigate whether the current selection of participants is missing some types of households. To date, the program has generally relied on the utilities to supply referrals from households who have previously signed up for one of the utilities’ payment assistance programs. National Fuel’s list of potential recruits is drawn from a list of households with high fuel use and is not limited to only customers who have signed up for payment assistance. The agencies and contractors interviewed noted that working this list was much harder because the homes were in worse repair and the occupants were less able to deal with the recruitment process. This raises a policy issue for the program: How much attention and resources should be devoted to recruiting these harder-to-reach households when the program already faces the need to double its recruitment output?

Recommendation A: Expand program efforts currently underway to reach beyond utility payment assistance programs. . Restricting utility-generated recruitment to only those households who have previously signed up for a payment assistance program will make it likely that many homes in most need of weatherization services are not being served by EmPower.

Recommendation B: Encourage the utilities to not limit their lists to only those who have responded to payment assistance recruitment.

Assessment of Workshop Delivery and Efficacy

EmPower offers workshops on energy saving and budget management across the state. In 2008, there were 844 energy savings and 484 budget management workshops that attracted more than 19,000 attendees. These workshops were taught by 84 different presenters from three different organizations. The evaluation team performed a survey of 100 attendees to determine if attending the energy saving workshops influenced attendees to take energy-saving actions. To help frame the survey questions, this evaluation looked at the content of the energy saving workshops and observed the delivery of four energy saving workshops. Separately, a geographic information system (GIS) analysis of the relationship between the workshop locations and the population of low-income households was performed.

The survey indicates that most attendees took at least one energy saving action after attending the workshop. About 84% of the respondents say they installed energy-efficient lighting, 42% mentioned turning down their thermostat, 33% added caulking or weatherstripping, 23% turned down their hot water temperature, and 22% installed plastic windows. Unfortunately, the survey cannot fully attribute these actions to the workshops because most of these attendees also received weatherization services that also included in-home education. The survey does indicate that most of the materials, with the exception of the CFL, contained in the tool kit given out at the workshops are not being used.

While the evaluator only attended a small unrepresentative sample of the workshops, there were observable opportunities for the workshops to be more effective in getting attendees to take energy-saving action. It is recommended that the existing workshop curriculum be modified to conform more closely to the best practices in adult education. These modifications include structuring the workshops to focus on getting attendees to identify specific actions they can take, and relying less on one-way lecturing and more on interactive hands-on learning opportunities.

Conclusions and Recommendations: Educational Workshops

1. *Conclusion:* The only justification for EmPower offering the workshops is if they actually lead to attendees taking energy-saving actions. More savings will be achieved if workshops shift emphasis from transferring knowledge to helping attendees identify and take energy-saving actions. While the existing curriculum does have energy saving content, it spends more time conveying knowledge about energy opportunities than it does facilitating action taking. Focusing on getting the actions to be taken means subtle but important changes in the curriculum content and delivery. Primary in this change is the elevation of the energy saving action plan from an exercise that is done at the end of the course to an integral component of the entire course. The existing curriculum covers many topics, more than is absorbable by the typical attendee, and does not establish any priorities in terms of concentrating on those areas that will have the most energy-saving impact. In the observed workshops, the material covered detailed information on a large number of energy measures. A more effective course should focus on identifying the most important measures that attendees can take to save energy and building a plan to get them to take those actions. Most importantly, throughout the course, these topics are reinforced until each attendee has developed a set of actionable items with which they can leave the workshop, return home, and put into action.

Recommendation: Reformulate the workshops to concentrate on the following actions that have the highest potential energy saving.

- Getting attendees to join EmPower and apply for weatherization

- Getting attendees to fill out and implement their Energy Saving Action Plans
 - Getting attendees to understand and use the materials in their Tool Kits
 - Helping attendees with specific issues find answers to their problems and concerns
2. *Conclusion:* Workshops need to incorporate more of the principles of adult education in the workshop design and delivery. The workshops rely heavily on a lecture format with little interaction with the audience. Adult education studies have repeatedly demonstrated that the one-way lecture format has a low-retention effectiveness rate. Following these principles, the workshops need to be retooled to include more hands-on, attendee participatory activities. They should also use a variety of teaching methods that recognize and accommodate people's different learning styles. This includes exercises that tactically use the tool kit and other materials, class participatory opportunities to be the teacher as well as the taught, and a curriculum that re-enforces objectives by addressing them more than once using more than one learning technique.

Recommendation A: Work to eliminate the straight lecture format, as it is shown to be the least effective teaching method.

Recommendation B: Develop hands-on activities, particularly centered around implementing the Tool Kit, which is handed out to all attendees.

Recommendation C: Incorporate the existing Energy Saving Action Plan into the body of the course, not just as something attendees might fill out at the end of the workshop.

Recommendation D: Consider bringing in a train-the-trainer specialist to help the 80 course instructor adapt their workshops to incorporate adult education best practices.

3. *Conclusion:* The program does not keep adequate records of who attends its workshops and this makes it difficult to characterize who is attending and to statistically assess the workshops' value. The absence of a set of attendee names has created difficulties for this evaluation. Without this list, the evaluation could not draw a representative sample of all attendees. More importantly, the lack of a clearly identified list of workshop attendees gives the perception that the workshops are a tangential activity, one not worth tracking.

Recommendation A: Collect the name, address, email address, and phone number of each workshop attendee.

Recommendation B: The tracking system should determine if an attendee is already in EmPower, joined EmPower after attending, is ineligible for EmPower, or has yet to enroll in EmPower.

4. *Conclusion:* The GIS analysis finds areas of the state that do not have a workshop site within reasonable travelling distance. The analysis also finds that the program's drive to locate workshop sites in areas that are more convenient for attendees has been effective, however, there are still many sites that might be relocated to areas with higher concentrations of low-income households. While attention has been made towards moving training sites away from the original practice of locating workshops at sites at or near trainers' facilities, half of the workshop sites are still in locations with low-income household percentages that are below the average for the county. There are also places in the state where the distances to a workshop are beyond what is likely to be acceptable for most potential attendees.

Recommendation A: Locate workshops in areas with large numbers of low-income households. Pay particular attention to finding suitable sites in populated areas identified by the GIS analysis as not having a workshop within acceptable travel distances

Recommendation B: Continue to relocate workshop locations to areas where more of the low-income households live.

Quality Assurance/Quality Control

The QA/QC process is a vital component of EmPower – one that is necessary to ensure customer safety and maximize program performance. An assessment of the QA/QC process indicates that most of the work done by the service providers is done as it is required. Most of the jobs performed by contractors are done in accordance with program standards. Contractors who continually provide exemplary service deserve to be recognized.

Identification of deficiencies in services is to be expected, particularly for less experienced contractors. The QA/QC process should be able to teach inexperienced contractors to do the job right the first time to avoid having to return to the premises to correct the problem. Requiring contractors to return to the premises to address an issue is prudent policy only when the correction makes a difference in energy saving, equipment lifetime, or customer safety.

1. *Conclusion:* While the occurrence of deficiencies is small as a percentage of all jobs completed, the accumulating volume of unresolved deficiencies became an issue. When this evaluation began, there were too many open jobs identified as having a deficiency, with some dating back more than one year. In conjunction with this evaluation, EmPower has addressed the issues raised and made changes in the way it manages the identified deficiencies. Over the last six months, the program has managed to reduce the backlog of accumulated deficiencies and has developed procedures to better handle new deficiencies as they are identified.

Recommendation A: The Implementation Contractor needs to assign a single person with the responsibility to manage the QC process. This would establish a single point of accountability for the QA component. It should be noted that this has been accomplished.

Recommendation B: The existing system for tracking of responses remediation of QA/QC issues identified on Declaration of Completions (DOC) should be updated by first devoting more resources to the process so that clear documentation exists that all DOCs that represent safety or health concerns, equipment lifetime issues, or opportunities for substantial energy saving are quickly resolved. EmPower needs a tracking system for the QA/QC process that operates similar to the way CRIS tracks the rest of the EmPower process.

Recommendation C: Triage should be used to set the priority for all backlogged deficiencies in order to resolve the backlog and make it possible to address deficiencies that occur in the future in a more timely fashion. All deficiencies that represent safety or health concerns, equipment lifetime issues, or opportunities for substantial energy savings should be quickly resolved. Deficiencies whose correction would not result in any real benefits should be eliminated as program requirements and dropped from the existing backlog. An amnesty policy that forgives other deficiencies, where the resolution may have small energy benefits but are insufficient to justify an additional visit, could be enacted. This amnesty should stipulate that any future cases of this deficiency would require the contractor to correct the deficiency. It should be noted that a new QA scoring system was developed by NYSEDA this past fall which maintains a focus on energy efficiency but reduces the focus on

minor programmatic concerns. In addition, the NYSERDA QA Supervisor has developed a process of prior review to ensure that appropriate actions are taken.

4.8.6 Follow-up on Earlier Evaluation Recommendations

In their April 2007 report, Nexant made several recommendations to program staff to improve the program and assist in determining savings.¹⁰⁶ Each of these recommendations and responses or actions by program staff is noted below:

- Devise a methodology to automate the electronic transfer of results from the EmPower New YorkSM Calculator to the EmPower New YorkSM database.

Work on this recommendation is on hold pending and upgrade to the calculator and the availability of in-house staff to perform the needed programming.

- Devise a methodology to incorporate the AHAM¹⁰⁷ baseline energy usage data, adjusted for degradation for refrigerators and freezers in to the EmPower New YorkSM Calculator to avoid the manual data entry errors that occur while transferring results from the REFRIGERATION[®] software to the EmPower New YorkSM Calculator.

This recommendation will also be addressed with the possible upgrade in software mentioned above.

Research into Action completed a Process Evaluation on the EmPower program in July 2007 and developed a number of recommendations for consideration.¹⁰⁸ Each of these recommendations and responses or actions by program staff is noted below:

- Consider further improvements to the Comprehensive Residential Information System (CRIS) database, so that it is easier to account for multiple services that are delivered to one address. This would help NYSERDA to better track interactions between its programs.

The program database has been modified to allow for screening of previously served households. NYSERDA will be developing software for tracking interaction between programs.

- Consider implementation of electronic invoicing to eliminate the primary source of remaining paperwork bottlenecks. Other information that is currently tracked in hardcopy may also be considered for scanning and sending/storing as PDF or other electronic files.

An electronic invoicing system is in development and will be completed pending the availability of in-house programming staff.

- Consider investigating the program impacts being realized from a sample of households that only received the referral packet, as this evaluation suggests that energy savings may be in evidence and worth quantifying. As part of this recommendation, considering having Honeywell conduct follow-up surveys of a portion of package-only customers to quantify actions taken and measures installed before embarking on a more thorough impact study. These customers could also be asked at that point why they elected not to submit the questionnaire and apply for more services.

¹⁰⁶ Nexant, *M&V Evaluation of EmPower New YorkSM Program*, Prepared for NYSERDA, April 2007.

¹⁰⁷ Association of Home Appliance Manufacturers.

¹⁰⁸ Research Into Action, *EmPower Process Evaluation*, Prepared for NYSERDA, July 2007

A similar recommendation had been made on the Impact evaluation side; it currently is not a high priority research item.

4.9 Buying Strategies and Energy Awareness Program

4.9.1 Program Description

The Buying Strategies and Energy Awareness Program is part of NYSERDA's portfolio of New York Energy SmartSM programs serving low-income households in the State. The Buying Strategies and Energy Awareness Programs consist of four initiatives:

- **Buying Strategies** – This initiative works with the Office of Temporary and Disability Assistance (OTDA) to secure discounts on purchases of home heating oil for customers of the federally funded Low Income Home Energy Assistance Program (LIHEAP) customers.¹⁰⁹ The initial Buying Strategies pilot program was launched in 2003 and tested a variety of strategies for securing reduced prices for home heating oil. Using “margin over rack” (MOR) and “discount off retail” (DOR) buying strategies, the program has increased the buying power of LIHEAP funds for heating oil by four to 11%, saving about \$50 per year per household. Based on the successes of the earlier pilot efforts, OTDA committed to a three-year phased implementation of the program, the roll out of this program is shown in Table 4-30. During the 2005-2006 heating season, the Buying Strategies program included 20 counties, and 200 oil vendors participated in the program. During the 2006-2007 heating season, the program expanded to 39 counties, with a total of 317 participating oil vendors. The program expanded its offerings statewide for the 2007-2008 heating season, operating in all 62 counties with 724 oil vendors providing MOR or DOR priced heating oil to HEAP clients. An additional 79 oil vendors are providing heating oil to HEAP clients through price protection plans and/or service contracts. The number of vendors participating in the program grew to 792 for the 2008-2009 heating season with an additional 32 oil vendors providing heating oil to HEAP clients with service contracts.

Table 4-30. Buying Strategies Program Evolution

Heating Season	Number of Participating Counties	Number of Oil Vendors
2005 – 2006	20	200
2006 – 2007	39	317
2007 - 2008	62	724
2008 - 2009	62	792

Included in the Buying Strategies initiative is the Clean and Tune Program, which provides preventive maintenance for the oil-fired heating systems of HEAP households. Under LIHEAP, recipients are offered heating repair and replacement assistance for inoperable furnaces, but they are not offered preventive maintenance services. The Clean and Tune Program addresses this gap by providing maintenance services, resulting in increased efficiencies for operating heating systems and

¹⁰⁹ Customers who have an annual household income of 60% or less than the State Median Income.

reduced health risks and safety problems due to malfunctioning systems. The Clean and Tune Program is currently available to LIHEAP customers of participating oil vendors.

In addition to providing service to HEAP households, the Clean and Tune Program supports the oil industry by providing heating system technician training opportunities and incentives for the purchase of diagnostic equipment. To date, 120 technicians have received training on heating system maintenance procedures and 40 companies have received incentives for the purchase of diagnostic equipment, increasing the quality of the service performed.

- **Targeted Marketing and Outreach** – This initiative works to increase participation in all NYSEERDA-, State-, federal-, utility- and community-based low-income energy efficiency and energy assistance programs. The initiative targets hard-to-reach (HTR) customers such as the elderly, the low-income population, and the non-English speaking population, delivering messages specifically tailored for these groups to make sure they can make informed choices about their options for reducing energy costs. The initiative supplements existing marketing activities and distributes information through events, seminars and meetings sponsored by community-based organizations (CBOs). It also places print advertisements and articles in publications and newspapers that are specifically designed to reach low-income and other HTR populations, as well as radio advertising.
- **Low-Income Forum on Energy (LIFE)** – LIFE provides a forum where energy industry professionals, policy makers, low-income serving agencies, and energy program implementers can discuss issues relevant to the low-income sector. LIFE conducts large statewide conferences, smaller regional meetings, and steering committee meetings to share information about emerging issues and best practices.
- **Energy Smart Students** – The Buying Strategies and Energy Awareness Program contributes funding to the Energy Smart Students (ESS) Program, which is described in Section 4.8 above.

The program budget is \$16.6 million.

4.9.2 Program Accomplishments

Table 4-31 shows the Program's five-year goals and performance over the most recent 30 months. The program is showing excellent performance, having exceeded three of its four goals at the half-way point of the program time frame.

Table 4-31. Buying Strategies and Energy Awareness Program – Long-Term Goals and Achievements

Activity	Program Goals (July 1, 2006 through June 30, 2011)	Achieved July 1, 2006 through December 31, 2008	% of Goal Achieved
Funds leveraged through Buying Strategies initiative	\$20 million	\$7.5 - \$9.6 million	43%
Additional low-income individuals reached via newsletters, weekly newspapers, etc. (readership)	5 million	7.4 million	>100%
Additional low-income individuals reached via seminars and workshops (attendees)	15,000	67,139	>100%
Additional contractors and other partners recruited in low-income districts	50	307	>100%

4.9.3 Program Outputs and Indicators

This section highlights key program outputs as identified through the logic model development work and associated market progress. All values reported are cumulative since program inception. Program highlights include the following:

- One hundred and twenty-four companies have signed Participation Agreements to participate in the Clean and Tune Program under the Buying Strategies initiative.
- To date, 2,509 HEAP households have received services under the Clean and Tune Program, resulting in improved combustion efficiency for the heating system, reduced health and safety risks, and an average out of pocket savings of \$200 per household.
- Based on data from the 2007-2008 heating season, the price savings per gallon of fuel delivered through the Buying Strategies Initiative averaged 15 cents, assuming an average LIHEAP grant of \$450, the average out-of-pocket savings per LIHEAP client for the heating season is about \$50. Savings estimates for the 2008-2009 heating season are not yet available.
- Table 4-32 presents the key outputs for the Buying Strategies and Energy Awareness Program through December 31, 2008.

Table 4-32. Buying Strategies and Energy Awareness Program – Key Program Outputs

Outputs	Value (Cumulative through December 2008)
Buying Strategies	
Total number of participating oil vendors	792
Number of clean and tune contractors enrolled	124
Number of clean and tune services	2,509
Number of oil buying educational material distributed (includes materials sent out by OTDA and NYSEDA)	150,000
Low-Income Forum on Energy (LIFE)	
Numbers of LIFE Steering Committee members	24 member organizations
Number of LIFE meetings and conferences held	28 regional meetings, 6 statewide conferences
Number of attendees at LIFE meetings and conferences	2,768

5

Research and Development Programs

5.1 Overview of the Research and Development Programs

NYSERDA's Research and Development (R&D) activities are organized into seven overarching program areas: energy resources, transportation and power systems, energy and environmental markets, industry, buildings, transmission and distribution, and environmental research. Projects in each of these program areas address technologies and mechanisms that affect energy supply and meet the needs of end users. As a result, crosscutting areas such as environmental protection, waste management, energy product development, and renewable energy technologies are addressed in several programs.

Public Benefit Power Transmission and Distribution Research. The Public Benefit Power Transmission and Distribution Research Program supports transmission and distribution (T&D) research that has broad statewide benefits. Projects provide improvements in energy efficiency, power reliability, quality and security, and reduce the cost of energy and energy delivery. NYSERDA is coordinating with all key stakeholders including the New York State Independent System Operator (NYISO), the New York State Department of Public Service (NYSDPS) and the electric utilities to implement a comprehensive R&D strategy to optimize performance of the electric power delivery system.

Clean Energy Infrastructure. The previous End-Use Renewables (EUR) Program provided the foundation for the creation of the Clean Energy Infrastructure Program. Clean Energy Infrastructure efforts will be closely integrated with other SBC-funded efforts, such as Distributed Energy Resources, to develop and commercialize clean energy technologies. The ultimate goal of these programs is to reach the point at which the value of the technology is worth the investment required by the consumer, and the market infrastructure is in a position to deliver and support the technology over the long term. This program will also complement efforts under the Renewable Portfolio Standard (RPS) by supporting training, education and market development for RPS-eligible technologies such as photovoltaics. The Clean Energy Infrastructure funds may also be used to reduce the installation and operating cost of systems not eligible for RPS funding.

Power Systems Product Development. The goal of this program is to work with New York technology companies to develop distributed generation and storage products, and to expand the number of marketable competitive products that reduce peak load, improve power quality, and provide improved cost-effective environmental performance. The Power Systems Product Development Program supports New York businesses in all aspects of product development necessary to create and commercialize power generating products that are clean, efficient, reliable, and cost effective, as well as other products that

reduce peak demand or improve end user power quality. Additionally, the program focuses on New York specific issues such as economic development and job creation in the State; targets technologies and opportunities that are not being addressed by the market; addresses regulatory barriers to the adoption of superior new technologies; and, emphasizes the development of economically-competitive options for end users.

DG-CHP Demonstration. The DG-CHP Demonstration Program supports the growth of combined heat and power and other distributed generation applications in New York. The program provides funding for single and multi-site demonstrations, and seeks to improve awareness among end-users and project developers of DG-CHP. The program also seeks to address DG-related issues such as DG permitting; Standard Interconnection Requirements (SIR); utility standby service; tariffs; technology risk; renewable fuel options such as anaerobic digesters and landfill gas; and the impact of fluctuating prices of natural gas. The program uses financial incentives to encourage customer-sited DG using commercially available DG technologies such as reciprocating engines, steam turbines, gas turbines and microturbines. The program is coordinated with similar offerings from RPS Customer-Sited tier, Con Edison's System Wide Demand Reduction programs and other Systems Benefits Charge programs such as the Multifamily Performance and the Existing Facilities Programs.

Demand Response and Innovative Rate Research. This new program addresses technology and market barriers that hinder retail customers from being active participants in a smart grid by: 1) participating in energy markets as demand response resources (*i.e.*, load curtailment, demand response generation, etc.), 2) managing and responding to market-based electric rates, and 3) having access to real-time, direct and in-home feedback on energy consumption. Novel load control technologies and techniques can enable more retail electric loads to both participate as demand response resources and respond to dynamic rates. Load controls often yield substantial energy efficiency and can be self-financed from the market-based DR revenues and cost avoidance. The new In-home Energy Feedback research seeks to quantify the effects of providing NYS households with direct real-time feedback on their electrical consumption and cost, as may be accomplished with smart metering.

Electric Transportation. This program supports emerging technologies from inception through field testing and pre-commercial deployment. The benefits of the electric transportation program will include peak load reduction in the New York City load pocket and permanent energy use reductions. These reductions will further result in cost reductions to the subway and commuter rail systems and reduced transmission congestion in the region. Additionally, many projects are expected to reduce transportation costs and emissions from petroleum-fueled vehicles.

Environmental Monitoring, Evaluation, and Protection. The Environmental Monitoring, Evaluation and Protection Program (EMEP) commenced in the late 1990s as an effort to increase understanding of the environmental impacts of electricity production. EMEP initiatives are building on past efforts and evolving to support policy-relevant research in five primary areas: ecosystem response to sulfur, mercury, and nitrogen deposition; health- and energy-related research on air quality, particulate matter, ozone, and co-pollutants; climate change; environmental impacts of alternative energy; and crosscutting environmental science and technology projects. The program is guided by a steering committee comprised of major stakeholder groups. In addition, a separate science advisory committee continues to provide technical review. The program has maintained a robust science and policy communication component to deliver program findings to policy-makers, scientists, and the public. The EMEP closely collaborates with regional and national entities to leverage funds for pertinent research projects.

Industrial Process & Product Innovation (formerly known as Industrial Research, Development, and Demonstration). The Industrial Process & Product Innovation (IPPI) program supports feasibility studies and technology demonstrations that: (1) improve energy productivity and competitiveness of New

York manufacturers (minimize cost per unit output), (2) encourage capital investment and employment growth in New York facilities, (3) introduce New York manufactured goods into new markets, and (4) encourage adoption of process changes that minimize waste. Cost-shared demonstration projects reduce risk and encourage manufacturers to adopt innovative and underutilized process alternatives. IPPI is a collaborative effort of Industrial and Environmental R&D and Energy Efficiency Services.

Municipal Water and Wastewater Efficiency. The Municipal Water and Wastewater Efficiency initiative is a collaborative effort between NYSERDA's R&D and Energy Efficiency Services programs. Since 2000, the ongoing water and wastewater initiative has supported projects that accelerate the use of energy-efficient and innovative technologies by municipal water and wastewater systems in New York through demonstrations, technology transfer, and feasibility studies. All projects have had strong technology transfer components. Additionally, the municipal water and wastewater treatment sector has been integrated into the Enhanced Commercial/Industrial Performance Program.

Next Generation and Emerging Technologies. This program emphasizes discrete and integrated end-use technologies for buildings, daylighting applications, solar thermal applications, and emerging technologies for industry and buildings not covered elsewhere in NYSERDA's **New York Energy SmartSM** portfolio of programs. The bulk of funds for this program are being administered through narrowly defined competitive solicitations focusing on advanced building demonstrations, discrete building technologies, solar thermal applications, daylighting applications, and emerging technologies. The program emphasis is on funding developers of energy-efficient technologies that would be commercially available to end users. Demonstration solicitations are open to all end-use customers, particularly those with high electric loads.

5.2 R&D Program Evaluation Activities

Table 5-1 provides a snapshot of all recently completed, in-progress, and planned evaluation activities for the R&D programs. The evaluation activities completed in 2008 are highlighted within Section 5, and were used along with results from past evaluations to inform the overall findings and conclusions presented in this report. For evaluation projects currently underway or planned, the anticipated completion date shown in Table 5-1 indicates when NYSERDA expects to feature results in future **New York Energy SmartSM** quarterly or annual evaluation and status reports.

Table 5-1. R&D Program Evaluation Activities

Program Name	Evaluation Activities Completed in 2008	Evaluation Activities Underway or Planned (Anticipated Completion Date)
R&D Portfolio	Product Development Impact Study (Survey of companies that have paid recoupment) Macroeconomic Impact of Products Commercialized with NYSERDA funding	Demonstration Project Impact Study (Survey of host site companies, technology vendors, and technology integrators) (2009) R&D Program Solicitation and Contracting Process Evaluation Study (2009) R&D Program Metrics Database (2009)
Public Benefit Power T&D Research	None	None Planned

Research and Development Programs

Program Name	Evaluation Activities Completed in 2008	Evaluation Activities Underway or Planned (Anticipated Completion Date)
Clean Energy Infrastructure	None	None Planned
Power Systems Product Development	None	None Planned
DG-CHP Demonstration	Largest Energy Savers Study (partial results) ¹	Complete Impact Evaluation of Largest Energy Savers (Q2 2009)
Demand Response and Innovative Rate Research	None	None Planned
Electric Transportation	None	None Planned
EMEP	None	Process Evaluation (2009)
IPPI	None	None Planned
Municipal Water and Wastewater Efficiency	None	None Planned
Next Generation and Emerging Technologies	None	None Planned

¹ Results presented in Section 2 of this report.

The results of the product development impact survey and the macroeconomic impacts from product development projects are summarized in Section 5.3.2 of this report. Evaluation activities for the coming year include:

- Process evaluation of the Environmental Monitoring, Evaluation, and Protection Program;
- Process evaluation of the R&D program solicitation and contracting process;
- Continuation of the development of a metrics database to track metrics that reflect R&D program goals, including energy savings, demand reductions, technology transfer, and economic indicators; and
- Completion of the Largest Savers study.

5.3 Program Results Summary

Significant progress is being made by the Research & Development portfolio. This section summarizes key evaluation findings and progress indicators from the latest set of evaluation activities, and from the

cumulative body of work conducted by NYSERDA and its evaluation contractors over the past several years.

5.3.1 Product Development Impact Study

Purpose of the Product Development Survey

The research and development (R&D) product development survey was designed to gather additional information regarding the development and commercialization of new technologies promoted through NYSERDA's R&D efforts, to obtain a better understanding of the markets for these products, and to assess the effectiveness of NYSERDA's program interventions. The survey was focused on the group of R&D participants who received funding for product development and began the process of re-paying NYSERDA. This survey represents the Megdal & Associates (M&A) Impact Team's initial effort to investigate the product development component of NYSERDA's R&D programs.

Methods and Analysis

NYSERDA's R&D activities consist of seven distinct initiatives organized to target specific markets, e.g., energy resources, industry and transportation. Through these initiatives, NYSERDA provides financial support for product development to bring innovative technologies to the market, and the company pays a small percentage of the sales back to NYSERDA once the product has been commercialized (recoupment payments), until the amount of the initial funding has been repaid in full.

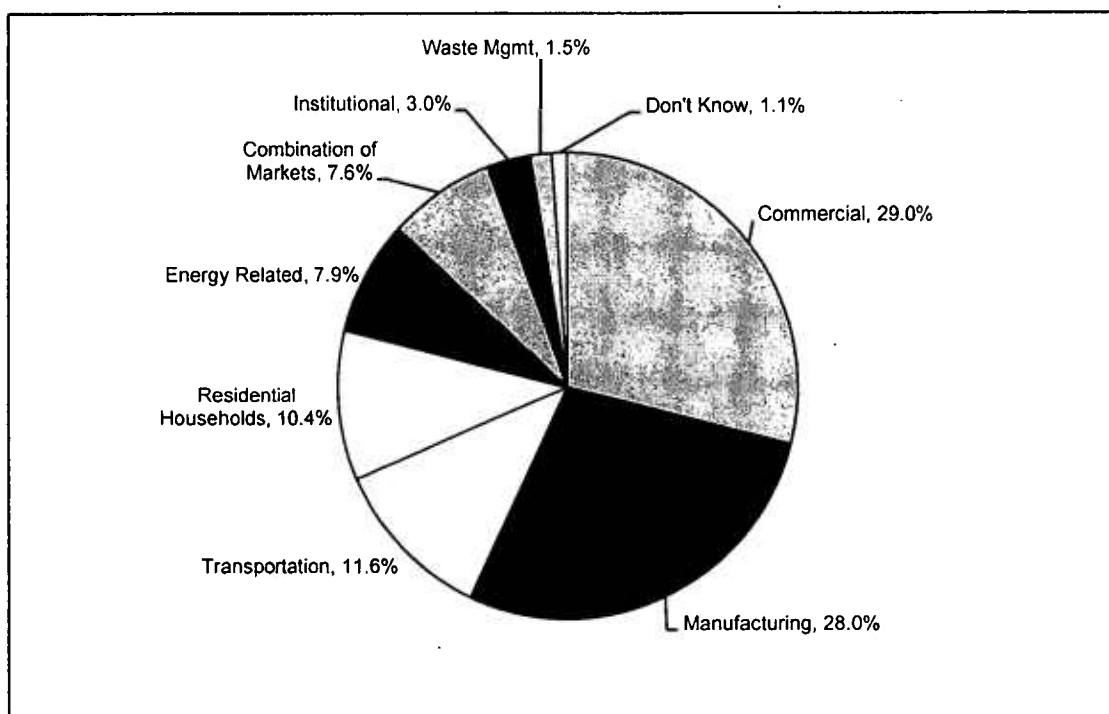
The overarching program goals are to promote a wider range of innovative and effective technologies for reducing energy consumption, to expand the role of clean and renewable fuels, and to eliminate or mitigate the negative environmental effects of industrialization. By providing funding for project development, NYSERDA seeks to shorten the development cycle, bring innovative products to the market earlier, and provide the opportunity for the firm to leverage NYSERDA funds to obtain additional financing from other sources. The program is also intended to encourage indirect effects, such as increased manufacturing in the state of New York and expansion or retention of high quality jobs in New York.

Product and Market Description

The survey covered issues relating to the types of products supported through NYSERDA's R&D efforts, the types of energy and non-energy benefits associated with the products, how the products fit into the companies' portfolios and how the products fit into the market as a whole. The findings below illustrate that NYSERDA has successfully targeted products that are consistent with the goals of the program in terms of achieving energy savings or reducing waste or emissions.

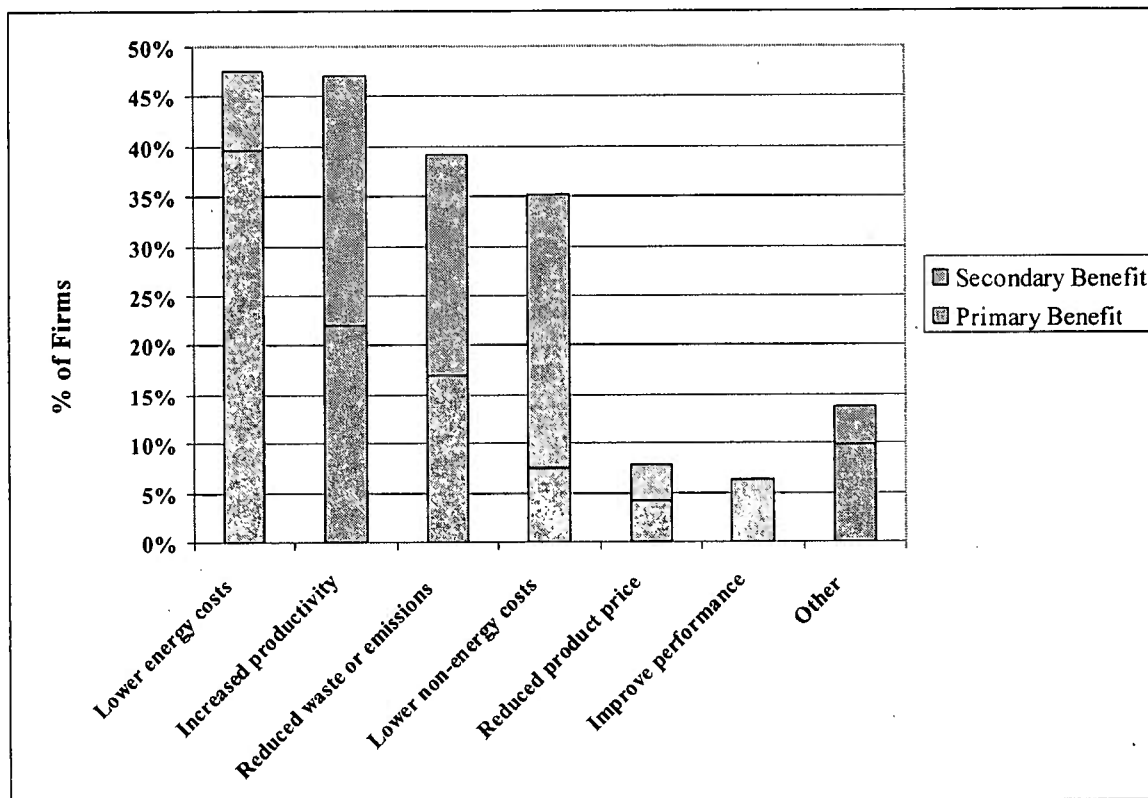
- Figure 5-1 illustrates the variety of markets covered by the NYSERDA-supported product development projects.

Figure 5-1. Principal Market for Product



- Forty-four percent (44%) of the firms stated the product was an improvement or extension of an existing product and 23% reported that the product was distinct from other products made by the firm. In nearly one-third of cases (33%), the product receiving assistance is the first product the company has ever made.
- Only 14% of firms indicated that there was little or no competition for their product. The remaining firms face some sort of competition.
- Thirty-six percent (36%) of the products were used in manufacturing processes, 18% in power production or distribution, 15% in building-related uses, 13% in transportation, 7% related to HVAC systems or components, and the remaining 11% included a variety of other uses.
- Eighty-three percent (83%) of firms reported that their product saved energy. The most common type of energy saved was electricity, cited by 47% of firms, followed by natural gas (18%), oil (8%) and other fuels (9%).
- Nearly 40% of the products have the primary benefit of lowering the energy-related operating cost, with half identifying energy efficiency as either a primary or secondary benefit. Among secondary benefits, the largest share of firms listed lowering non-energy operating costs or labor costs. Other common benefits include increasing yield or productivity and reducing waste or environmental emissions. (See Figure 5-2.)

Figure 5-2: Benefits of the Product to Customer



NYSERDA Influence

NYSERDA's approach is predicated on the assumption that providing additional funding in the early stages of development will allow more of these innovative products to reach the marketplace. The program is also intended to provide leverage for firms to acquire additional funding from other sources.

A series of questions was designed to assess how effective NYSERDA's efforts have been in achieving these objectives. The survey results suggest that NYSERDA has been influential in reaching firms in the early stages of conceptual development, reducing the development timeline and allowing companies to leverage other funds, as shown below.

- About 94% of firms agreed that NYSERDA had a positive impact on the development of their product, while 79% agreed that it had a positive impact on commercialization.
- Sixty-two percent (62%) of firms reported a development time of less than three years for a typical product similar to the NYSERDA-supported product. In comparison, 78% of the NYSERDA-supported products moved from concept to first sales in the same time period.¹¹⁰

¹¹⁰ This analysis is based on the 41 respondents who provided complete data about the timing of the NYSERDA-supported product development and the development of a similar product.

- About two-thirds of firms identified NYSERDA's funding as somewhat or extremely important for leveraging additional funding from other sources.
- NYSERDA first provided funding within three years of the product's proof of concept for 85% of the surveyed firms. Nearly 60% of products were funded during the proof of concept and technical feasibility stage and only 10% during production.
- For most companies, NYSERDA funding precedes funding from other sources. The mean difference in time is 2.7 years.
- Sixty percent (60%) of firms stated that NYSERDA's involvement shortened the time frame for the project development, and about 10% stated that they brought the project to sale four or more years earlier than they would have without the NYSERDA program.

Product Development Timeline

Understanding the timeline of developing new products is useful for refining the program design and the timing of NYSERDA's interventions. In addition, investigating the lifetime and replacement schedule of the products provides key inputs for the benefit/cost analysis. The results of this survey indicate that the NYSERDA-supported products have moved relatively quickly from the conceptual stage to the first sale.

- The prototype phase for most of the NYSERDA-supported products (86%) lasted two years or less. The time from the proof-of-concept to the first sale was two years or less for 79% of products and four years or less for 95% of products.
- Nineteen (19%) of firms reported that the products were in the introduction phase (high costs, low sales), 45% identified the products as in the growth stage (lower costs, increasing sales), 19% of the products were mature (low costs, high sales) and 17% were declining (low costs, declining sales). Of the projects receiving NYSERDA funding in 2000 or later, over 75% are in the introduction or growth stage.
- Over one-quarter of firms do not expect their product to ever be replaced by a new product. While it is anticipated that some products will be replaced quickly, the expected replacement period of 40% of products is five years or more from the date of the first sale.
- About half of the products are expected to have a lifetime of 10 years or longer and one in five has an expected lifetime of less than five years.

Capital

Investigating the magnitude and sources of the capital outlays required for product development provides context for interpreting NYSERDA's contribution to the projects. As may be expected, the development cost of the new products varies widely among the surveyed firms.

- Estimated development costs ranged from \$50,000 to \$80 million, with a mean of \$4.5 million and a median of \$500,000. Removing the two highest and lowest cost estimates results in an adjusted mean of \$1.1 million.
- About half of the products were developed for less than \$500,000, and another 30% for between \$500,000 and \$2 million. About 8% required more than \$10 million in development costs.

- Forty-four (44%) of firms reported receiving investment capital from a variety of sources in addition to NYSERDA, such as private funds, government agencies, internal funding, and other state agencies.

Product Marketing and Sales

The success of a new product is primarily measured in terms the ability to reach the target market and generate sales. The survey included an extensive set of questions to gain a more thorough understanding of the intended market for the projects, the revenues generated through the sales of the product and the growth of sales over the next five years. NYSERDA developed preliminary estimates of product sales on the basis of the recoupment payments. This study suggests that the actual sales are substantially higher than would be indicated from the recoupment payments.

- Actual sales are approximately 134% of the estimated sales from the recoupment payment for active participants.¹¹¹ Table 5-2 shows the estimated sales revenue from the program from 2005 through 2007.

Table 5-2. Estimated Sales Revenue from 2005 through 2007 for all Active Program Participants

				90% Confidence Interval	
Year	Annual Recoupment Payments (\$ in thousands)	NYSERDA's Preliminary Sales Estimate (\$ in thousands)	Adjusted Sales Estimate (\$ in thousands)	Lower (\$ in thousands)	Upper (\$ in thousands)
2005	\$ 617	\$ 41,129	\$ 55,154	\$ 52,707	\$ 57,579
2006	\$ 846	\$ 56,367	\$ 75,588	\$ 72,233	\$ 78,911
2007	\$ 1,678	\$ 111,895	\$ 150,052	\$ 143,392	\$ 156,648

- The primary market for most firms (57%) is the end-use customer. About 16% of firms identified the primary market as wholesalers or distributors, 14% responded other manufacturers and 13% indicated other markets.
- About 22% of firms report that the product currently has no share of their total revenues. 61% stated that the product's share of revenues was between 1% and 20%, and 11% reported the product's share was higher than 20% and less than 40% of revenues. At the higher end of the scale, 3% responded that the NYSERDA-supported product accounted for all of their revenues and another 3% reported product shares between 61% and 80% of revenues. Many firms anticipate that the growth rate expected for product sales will increase the product's share of their overall revenues. About 30% expect an increase between 1 and 10% a year, another 30% expect to see sales increase by 11 to 30%, and 9% anticipate that sales will increase 100% a year.

¹¹¹ Recoupment payments are capped at 1.5% of sales and terminate when the NYSERDA investment has been repaid.

Impacts on the New York Economy

Another underlying objective of NYSERDA's R&D programs is to promote economic activity in New York State. The survey included questions about the extent to which these companies are involved in activities that directly affect employment and other economic activity in New York State. The responses suggest that many firms have expanded operations in New York and the NYSERDA-supported products are related to the retention and possible expansion of the employment opportunities within the state. In contrast, much of product sales are being made outside of the state.¹¹²

- Nearly half (46%) of companies report that they have expanded operations in New York as a result of the product and follow-on products. Where this was the case, 62% of firms report increased revenues.
- Almost two-thirds (64%) of firms manufacture the funded products completely within New York. 22% of firms do not currently manufacture the product in the state.
- Over half (55%) of firms report that the share of sales of the NYSERDA-funded product in New York are 20% or less.
- Surveyed firms reported an average of 24 and a median of 10 full-time employees working in New York State on NYSERDA-supported product development projects funded. Extending these results to the population of active product development projects suggests that a total of 1,683 full-time employees are currently working in New York State on NYSERDA-supported product development projects.
- 67% of firms identified NYSERDA as having a positive impact on retaining and adding employees. These firms reported a total net increase of 31.8 employees per firm.
- 69% of firms reported a total net increase of an average of 26.3 full-time employees working in the State of New York between the time of the funding and the time of the survey.¹¹³ In combination with the previous finding, these results suggest that the product development projects supported by NYSERDA are a significant driver of the increase in full-time employees at these firms.

Recommendations

Three recommendations for future product development surveys arose from the design, implementation and results of this survey.

- Improve project tracking: This market seems to be inherently unstable, making it difficult to construct a comprehensive list of participating firms and current contacts. Companies change names, are sold, or go out of business; product lines are sold to competitors or are dropped and products become obsolete. Regular efforts to track the projects over time could address these concerns and help ensure that the sample frame includes active projects.
- Consider a more comprehensive assessment of program activities: This survey only included firms that made at least one recoupment payment. Future surveys could be targeted toward firms that received NYSERDA funding but have not started making recoupment payments within a specified number of years. This survey could investigate where the product is on the development timeline, if the process became stalled and why, and whether there were other appropriate interventions that could have moved the product to commercialization.

¹¹² The greatest economic gains for New York come from goods or services produced in New York and sold elsewhere. This results in new money coming into the state rather than just a re-distribution of money within the state.

¹¹³ This change in employees is for the firm as a whole, not only the employees working on specific NYSERDA-funded projects.

- Review methods to obtain reliable sales data: Less than half of the survey respondents provided the detailed sales information requested, and it largely did not match up to the annual sales provided to NYSERDA for the purposes of calculating the recoupment amounts. This situation suggests that additional research is required to assess how reliable information can be obtained, both for the purposes of estimating the amount of the recoupment payment and for estimating total product sales.

5.3.2 Macroeconomic Impact Evaluation of Product Development Activities: 2009 Update

Background and Analytic Approach

A primary goal of NYSERDA's R&D programs is to improve the economic environment in New York. R&D projects categorized as product development are designed to increase the manufacturing and sale of new products in the marketplace. Sales of new products sets off a ripple effect that impacts many sectors of the New York economy. NYSERDA staff, working with the Impact Evaluation Team, is developing a multi-faceted approach to quantify these effects.

In 2008, NYSERDA modeled the impact of new product sales using an econometric modeling program called *Policy Insight*, developed by Regional Economic Models, Inc. (REMI) of Amherst, Massachusetts. *Policy Insight* generates year-by-year estimates of the total regional effects of specific policy initiatives. A wide range of input variables are available to predict economic and demographic effects. Estimates of product sales were entered into the modeling tool and the sales were mapped to the *Policy Insight* sector that most closely resembled the characteristics of the new product. Model output measured the statewide year-by-year changes in macroeconomic variables, including: net employment, net employment income, gross state product (GSP),¹¹⁴ and capital investment.

The impact analysis was updated in 2009 using revised sales data. As in 2008, sales were estimated based on recoupment payments received by companies that were awarded NYSERDA funding. In general, recoupment agreements state that companies must repay NYSERDA at a rate of 1.5% of sales revenues until the funding amount is repaid. The repayment amounts by year were obtained from NYSERDA's financial records. Because the repayment amount is capped, and because sales were estimated using the repayments, the sales used in the analyses represent the lower limits on sales.¹¹⁵ In the 2009 update, additional sales data were obtained from four companies that had met their recoupment obligations. These sales that occurred beyond the recoupment period were added to the model.

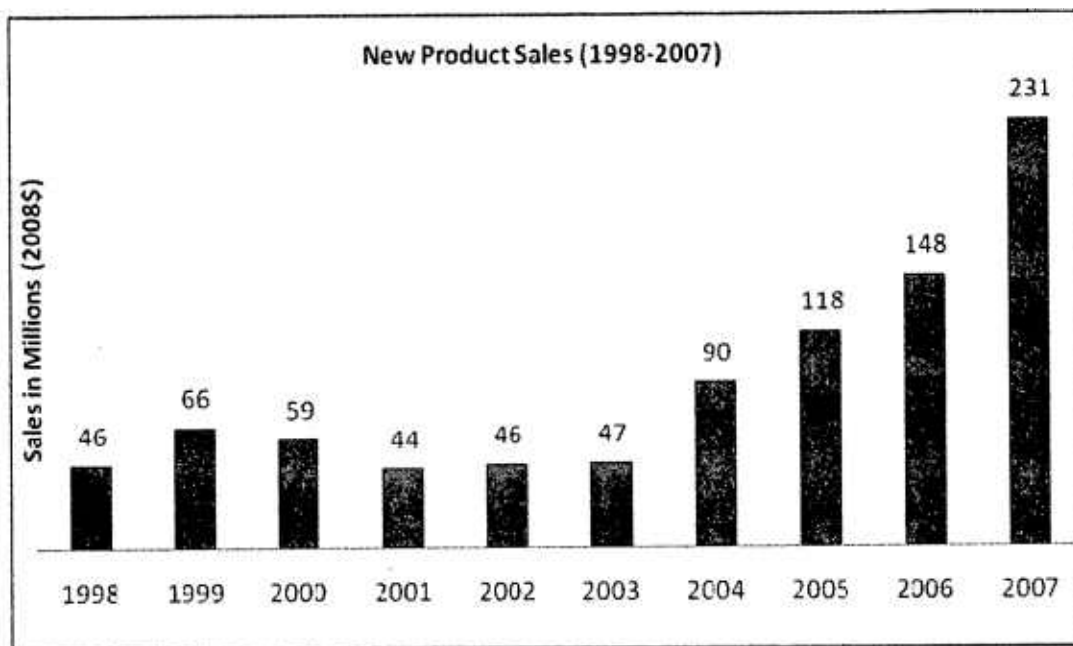
Results

The estimate of new product sales in the years 1997 to 2007 are shown in Figure 5-3. Sales in 2007 reached \$231 million (in constant 2008 dollars). The output from the model is presented in Table 5-3. For the 10-year period from 1998 through 2007, the years for which sales were reported, the average net employment per year is 454 (*i.e.*, on average, 454 jobs were created or retained in each year). Also, from 1998 through 2007, net employment income rose, on average, \$28 million per year and Gross State Product rose \$65 million per year.

¹¹⁴ GSP, also known as 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).

¹¹⁵ Work is currently under way that will allow estimation of sales that would occur beyond the repayment obligation.

Figure 5-3. Sales from New Products (1998 to 2007)



Also shown in Table 5-3 is the NYSERDA spending on product development. Results of the product development impact survey indicated that the lag between NYSERDA funding and product launch was four years. Thus, NYSERDA spending on product development projects during the time period 1995 to 2004 was used to estimate NYSERDA costs associated with the economic impact during the period 1998 to 2007.

Table 5-3. NYSERDA Spending on Product Development and Macroeconomic Impact of Product Sales

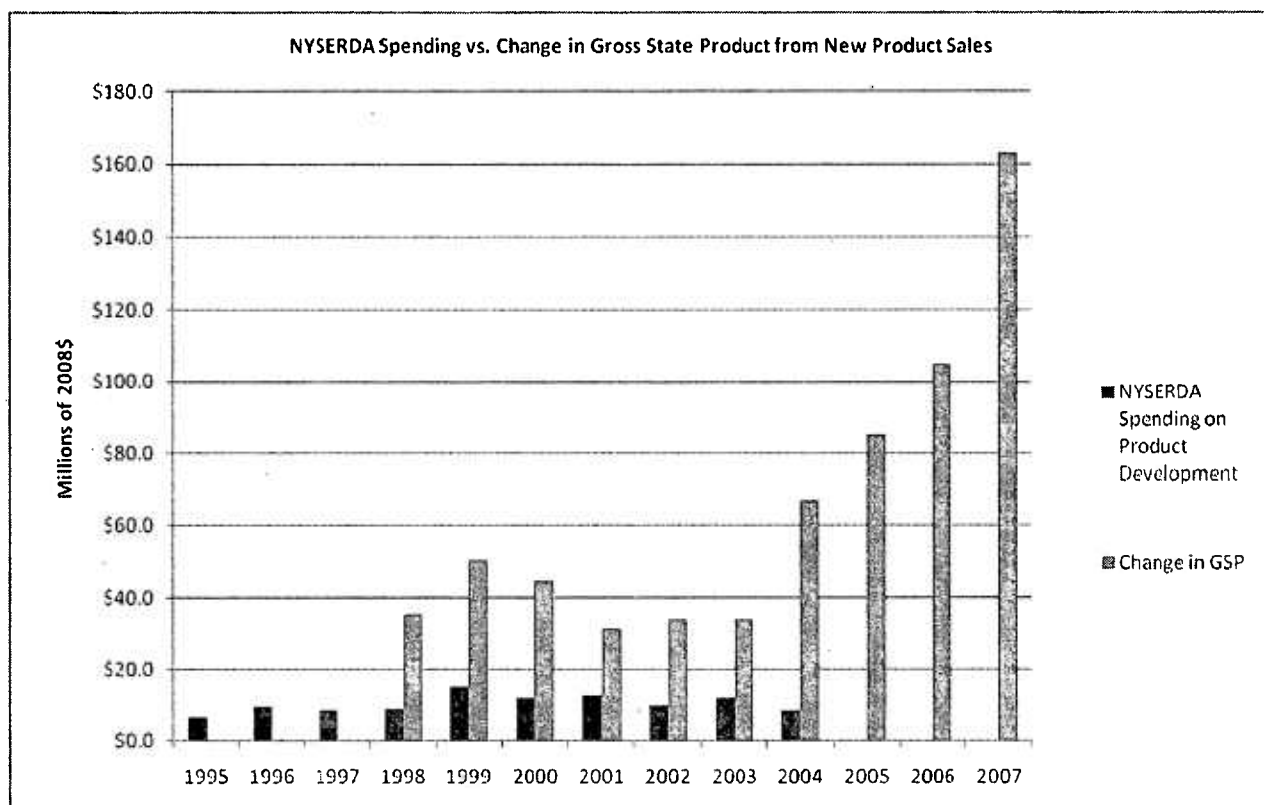
	NYSERDA Spending on Product Development	Employment	Employment Income	Gross State Product
	(Millions of 2008 dollars)	Job Years	(Millions of 2008 dollars)	(Millions of 2008 dollars)
1995	\$6.6			
1996	\$9.6			
1997	\$8.7			
1998	\$9.1	325	\$16.5	\$35.2
1999	\$15.4	427	\$23.4	\$50.5
2000	\$12.3	356	\$21.1	\$44.5
2001	\$12.9	238	\$15.4	\$31.5
2002	\$9.9	253	\$17.3	\$34.3
2003	\$12.2	247	\$16.0	\$34.1
2004	\$8.8	473	\$30.0	\$67.0
2005		597	\$38.0	\$85.4
2006		643	\$41.7	\$105.1
2007		985	\$62.8	\$163.1
Average (1998 to 2007)		454	\$28	\$65

The present value of NYSERDA funding during the period 1995 to 2004 is \$165 million (in constant 2008 dollars). The present value of the change in GSP during the period 1998 and 2020 is \$818 million (in constant 2008 dollars).¹¹⁶ The ratio between NYSERDA funding and change in GSP is 4.9.¹¹⁷ The spending and economic impacts for the time period 1995 to 2007 are shown graphically in Figure 5-4.

¹¹⁶ Focal year was 2008. Discount rate of 5.5% was applied to discount future streams and compound historical streams. All values are in constant 2008 dollars.

¹¹⁷ Although the bulk of the sales originated from projects approved with statutory funding, rather than SBC funding, ratio of benefits to spending are assumed to be the same for both funding sources.

Figure 5-4. NYSERDA Spending on Product Development and Change in Gross State Product



The analysis has several limiting factors that had the effect of either overestimating or underestimating the macroeconomic impacts. The factors that tended to overestimate the impacts were: (1) the impact of the consumer spending of the funds (as opposed to the funds being spent by NYSERDA on product development projects) was not netted out of the analysis and (2) the full product development cost incurred by the participating companies was not entered into the model. The factors that tended to underestimate the impacts were (1) the impact of energy savings and increase in productivity resulting from the sale of new products were not entered into the model and (2) because recoupment payments were capped, any additional sales beyond a certain amount was not available in most cases. Despite these limitations, evidence indicates that NYSERDA funding of product development projects has a positive impact on jobs, employment, and gross state product.

5.3.3 Energy, Peak Demand and Fuel Savings and Clean Generation

Through NYSERDA's Impact Evaluation activities, independent third-party contractor teams assessed the energy and peak demand savings and clean generation reported for the DG-CHP Demonstration, Clean Energy Infrastructure, and Demand Response and Innovative Rate Research programs. Methods used in this assessment included on-site verification of equipment installation and functionality, and review of NYSERDA's files for reasonableness and accuracy. Based on this review, the contractors adjusted the savings reported by NYSERDA. In turn, the contractors further adjusted these figures, based on primary research, to account for freeridership and spillover. Table 5-4 summarizes the estimated electricity

savings and clean generation for each of the three applicable R&D programs. Table 5-5 summarizes peak demand reductions. Table 5-6 shows natural gas impacts for the R&D programs.

Table 5-4. R&D Program Electricity Savings through December 31, 2008

Program	Energy Savings (GWh)	
	Savings Achieved through	
	June 30, 2006	December 31, 2008
DG-CHP Demonstration Program	82.7	109.5
Con Edison	42.0	70.3
Renewable Energy Production	103.8	106.2
Con Edison	0.5	0.9
Overlap Removed	6.6	29.6
Con Edison R&D Total	42.5	71.2
Statewide R&D Total	179.9	186.1

Note: This table shows electricity savings from DG-CHP demonstration projects and SBC-funded wind and PV projects. Although other R&D programs results in energy savings, due to the complexity of the projects, savings are not verified and therefore, not reported here.

Table 5-5. R&D Program Peak Demand Reductions through December 31, 2008

Program	Demand Savings (MW)	
	Savings Achieved through	
	June 30, 2006	December 31, 2008
DG-CHP Demonstration Program	18.1	27.2
Con Edison	8.5	17.2
Demand Response and Innovative Rate Research	137.2	99.0a
Con Edison	68.6	21.0
Renewable Energy Production	8.1	9.8
Con Edison	0.4	0.5
Overlap Removed	1.3	5.4
Con Edison R&D Total	77.4	38.8
Statewide R&D Total	162.1	130.5

a MW enabled under the SBC2 program Enabling Technologies for Price Responsive Load were not required to persist beyond the period of the contract. As such, the available MW have steadily declined since the program's close.

Note: This table shows electricity savings from DG-CHP and demand response demonstration projects and SBC-funded wind and PV projects. Although other R&D programs results in on-peak capacity savings, due to the complexity of the projects, savings are not verified and therefore, not reported here.

Table 5-6. R&D Program Natural Gas Impacts through December 31, 2008

Program	Fuel Savings (MMBtu)	
	Savings Achieved through	
	June 30, 2006	December 31, 2008
DG-CHP Demonstration Program ¹	-571,310	-852,549
Con Edison	-266,937	-496,892
Con Edison R&D Total	-266,937	-496,892
Statewide R&D Total	-571,310	-852,549

¹ Because the electricity saved by the DG/CHP projects replaces electricity formerly purchased from the grid, the program has reduced fuel used at central generating stations, for a net decrease statewide due to greater efficiency of the DG/CHP systems at sites where imported fuel is used. The fuel avoided at the central generating plant is determined from the electricity generated by the DG/CHP installations. Furthermore, at additional projects such as wastewater treatment plants, electricity generation is powered fully or partially by digester gas produced on site. Such fuel switching achieves natural gas conservation above and beyond what is achieved through efficiency alone.

Note: This table shows the negative natural gas impacts from DG-CHP demonstration projects. Although other R&D programs results in positive natural gas impacts, these impacts are not verified and therefore, not reported here.

5.3.4 Summary of Other Key Results

Across the programs, five-year goals, encompassing the period July 1, 2006 to June 20, 2011, were established in the SBC III Operating Plan.¹¹⁸ Overall, the programs are also performing well with respect to these goals. Results of each program's progress toward its goals are shown in table format in the subsequent sections.

Progress toward the five-year goals include the following:

- Under the Public Benefit Power Transmission and Distribution Research Program, 26 projects have been approved to provide 21 companies nearly \$10 million to pursue development of advanced technologies that will improve the efficiency and delivery of power for electric customers across the state. The Program has succeeded in collaborating with major stakeholders. The program has funded projects in each of the electric utility companies, is working with the NYISO's newly formed R&D group to prioritize critical technology needs, and is partnering with the US Department of Energy on smart grid projects and technology evaluation
- The Clean Energy Infrastructure Program has helped develop two accredited training institutions, offered 27 training workshops, supported 18 companies in their efforts to expand renewable business networks, and helped three manufacturing companies expand their operations.
- The Power Systems Product Development Program has awarded funding for 53 projects, field tested eight new products, and completed 12 technology assessments.
- The DG-CHP Demonstration Program has funded 19 projects representing \$27.5 million of funding, \$132.2 million of customer co-funding, and 133.6 MW of anticipated capacity.
- Demand Response and Innovative Rate Research Program has enlisted the participation of 2,151 apartments for time-sensitive electric rate pilot programs.

¹¹⁸ Systems Benefit Charge Proposed Plan for New York Energy Smart Programs (2006-2011), As amended, March 2, 2006.

- The Electric Transportation Program has issued three solicitations and selected 20 projects for funding. A demonstration of a third-rail heater control system, with potential to save \$1.5 million per year, was completed.
- The Environmental Monitoring, Evaluation, and Protection Program has issued seven solicitations, resulting in 45 contracts and \$7 million in co-funding. Fourteen research reports, five summary communications, and 52 journal articles have been published.
- The Industrial Process & Product Innovation Program has issued one solicitation with two due dates, resulting in \$6.3 million in committed funds for 37 projects and \$11.2 million in co-funding.
- The Municipal Water and Wastewater Efficiency Program has selected six projects for funding. The program goal of providing information to 1,000 individuals serving the municipal wastewater and water treatment sectors was achieved in 2008.
- Under the Next Generation and Emerging Technologies Program, 18 advanced building projects, one daylighting project, six solar thermal applications projects, and 13 emerging technologies projects have commenced.

Cumulative progress for programs that started before July 2006 include:

- Under the DG/CHP Demonstration Program, 49 systems are now operational, representing \$24.6 million in program funding, \$93.0 million in total system costs, and 27.2 MW of installed capacity.
- Under the Power Systems Product Development Program, five new products have been launched.
- The Truck Stop Electrification Project has sponsored initial demonstrations and created a New York-based business that allows long haul trucks to eliminate sleeper cab engine idling during mandatory rest periods. Systems developed for the program are currently being sold nationally and are eligible for State and federal incentives.
- As of December 2008, \$4.64 million has been committed under the targeted water and wastewater initiative. An additional \$1.34 million has been awarded for municipal water/wastewater projects under the Technical Assistance Program. Once implementation is complete, 19 demonstration projects should lead to nearly 44,500 MWh of electricity savings and 15.1 MW of peak demand reduction.

5.4 Public Benefit Power Transmission and Distribution Research

5.4.1 Program Description

The Public Benefit Power Transmission and Distribution Research Program, established in July 2006, supports transmission and distribution (T&D) research that has broad statewide energy efficiency and reliability benefits. Projects selected will provide improvements to power reliability, quality and security, and reduce the cost of energy and energy delivery. The five-year budget from 2006 to 2011 is \$10 million. The market response to the program has been significant and the program budget has been expended.

The Program goals, in coordination with the NYISO, DPS, and the electric utilities, are:

- Developing fast simulation modeling systems to rapidly assess grid stability and anticipate and respond to power disturbances,
- Analyzing system modeling data, phasor measurements, and historical trends to develop real-time grid performance indices that can be displayed through a simplified graphical user interface,
- Monitoring electric power frequencies to pinpoint and analyze disturbances, and
- Creating business models to promote sustainable investment in transmission and distribution infrastructure.

5.4.2 Recent Program Accomplishments

To date, two Electric Power Transmission and Distribution Program solicitations (PON 1102 and PON 1208) have been made available. Three funding due-dates were offered through the end of 2008, with a fourth due in mid-January 2009.

Demonstrations, product development, and engineering studies were required to fall within six areas critical to the development of an advanced electric power delivery system in New York State: (1) Monitoring and Diagnostics; (2) Data Processing and Analysis; (3) Optimized Visualization; (4) Secure Communication (per the August 14th Blackout Report recommendations); (5) Improved Control Options; and (6) Enhanced System Performance.

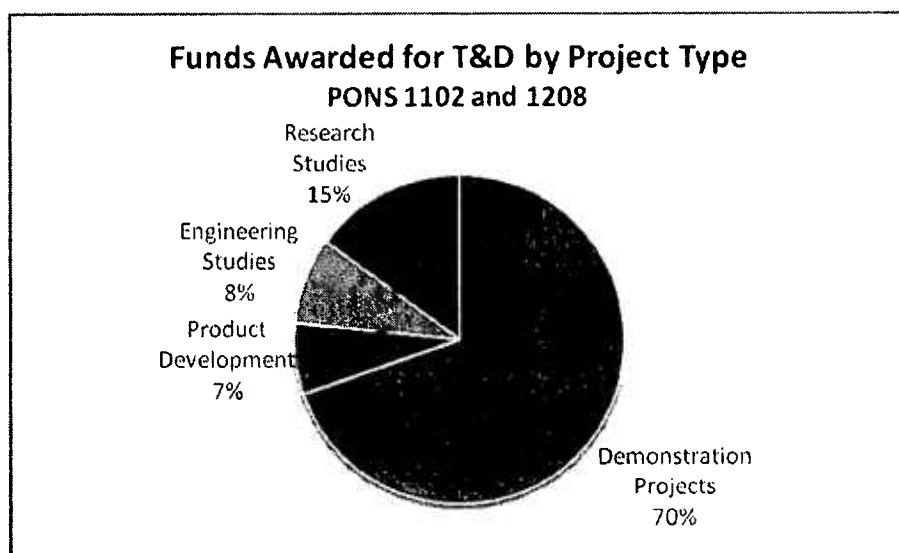
Areas of focus for research studies were: (1) Business Strategies; (2) Regulatory Issues; (3) Public Policy Issues; and (4) Advanced Concepts (promoting collaboration with in-state academic institutions). Summarized in Table 5-7 is progress through year-end 2008 toward the five-year goals set for this program. To date, 26 projects have been approved to provide 21 companies, universities and other institutions \$10 million to pursue development of advanced technologies that will improve the efficiency and delivery of power for electric customers across the State.

Table 5-7. Public Benefit Power Transmission and Distribution Research Program Goals achieved from July 1, 2006 through December 31, 2008

Activity	Program Goals (July 1, 2006 through June 30, 2011)	Achieved July 1, 2006 through December 31, 2008
Issue annual solicitations	12 or more projects resulting in progress toward program objectives	The program was initiated in 2007 with a total of \$10 million available under SBCIII. Two PONS, 1102 and 1208, have since been released, with the following stated objectives: 1. Demonstrate and develop technologies that improve the performance of the electric power delivery system in New York State (<i>Technology Track – Demonstration Projects, Product Development, and Engineering Studies</i>). 2. Develop strategies that support sustainable investment, equitable and efficient electric energy markets, and continued improvement of the electric power delivery system in New York State (<i>Policy Track – Research Studies</i>). PON 1102 (rounds 1 and 2) resulted in a total of fifteen projects. PON 1208, round one (October 2008) resulted 11 proposals. Due to the significant program response and substantial market activity, NYSERDA is considering a re-allocation of SBC funds to augment funds available for PON 1208, round two. The second funding round, originally scheduled for December 2008, was moved to January 2009. All projects are in various stages of development. Several are summarized below.
Technology transfer	Identify successful projects, undertake specific outreach and knowledge transfer activities aimed at utilities	This is an on-going activity. Upon completion of projects, NYSERDA will assess the outcome of the various projects that have commenced recently, and undertake specific outreach and knowledge transfer activities aimed at utilities, as appropriate. Greater detail will be provided as projects near completion and outreach can commence.

Shown in Figure 5-5 is the distribution of project types. Of the \$10 million awarded to date, 70% is for demonstration projects, 7% for product development, 8% for engineering studies that could potentially support future demonstration projects, and 15% for studies that focus on business, regulatory, public policy, and other conceptual issues that must be addressed in order to facilitate private investment and technology adoption within the electric power delivery system.

Figure 5-5. Public Benefit Power Transmission and Distribution Research Program Funds Awarded as of December 2008



Shown in Table 5-8 is the NYSERDA funding and the co-funding provided by the 26 project participants. Overall, every \$1 of NYSERDA funding is leveraged by \$12 of outside funding

Table 5-8. Co-Funding of T&D Projects Awarded (PONS 1102 and 1208 As of December 2008)

Project Type	Number of Projects	Project Cost (\$Million)	NYSERDA Funding (\$Million)	Co-Funding (\$Million)	Co-Funding Ratio
Demonstration Projects	10	\$114.6	\$7.0	\$107.6	15.4
Product Development	2	\$ 11.9	\$0.7	\$11.2	16.1
Engineering Studies	5	\$1.3	\$0.8	\$0.4	0.5
Research Studies	9	\$2.2	\$1.5	\$0.7	0.5
TOTAL	26	\$130.0	\$10.1	\$120.0	12.0

The 26 projects chosen to date under these guidelines are each unique efforts toward common goals. They range from first-of-a-kind superconductor cable installation in Manhattan, to transmission line fault-detecting software and a unique underground compressed-air energy storage project near the New York State Finger Lakes Region. Together with matching funds from contractors, the collective program value is \$130 million. Select projects are described below:

- **Energy Storage:** The largest project, valued at \$59,998,400 million, is an energy storage demonstration project conducted by NYSEG, illustrating a Compressed Air Energy System (CAES) facility in Western New York. Energy storage is key to maintaining reliability and promoting broad statewide penetration of renewable energy resources. In this project, solution-mined salt caverns will be used to store compressed air underground. Designed to provide a nominal power output of 100 MW, the plant will be operated to mitigate the intermittent characteristics of local wind resources and reduce peak daily demand. This is the first demonstration of CAES technology in New York State, and NYSERDA is contributing \$1,000,000. (NYSEG also contributed \$200,000 towards NYSEG's \$373,923 engineering study in connection with this project).

Three other energy storage projects have also been funded:

An engineering study for another CAES system wherein compressed air is stored in above ground steel tubes during off-peak periods, and subsequently discharged during on-peak periods (nominal power output of 20 MW), will be completed by 6-Nines Power LLC and NYPA at the Poletti Power Plant in Astoria, New York. NYSERDA will contribute \$94,500 toward this \$185,400 project.

6-Nines Power LLC will also commence a research study regarding the merits of energy storage as a publicly owned asset, and this study will serve to quantify the value of all associated public benefits. NYSERDA will contribute \$76,500 toward this \$149,365 study.

The demonstration of an energy storage flywheel-based technology to perform fast response frequency regulation will be completed by Beacon Power LLC. The flywheel, comprised of carbon fiber composite material and installed in underground concrete vaults to mitigate noise and safety risk, and can raise or lower frequency as needed in real-time. A 20 MW system will be deployed in Stephentown, New York to provide ancillary services in the NYISO market. This venture represents the consolidation of two projects under two PONs (1208 and 1200), coordinated between two program groups (Power Transmission and Distribution Research and Power Systems Product Development). NYSERDA's total contribution is \$2,000,000 toward an estimated \$52,000,000 initiative involving a possible \$50,000,000 grant/loan from the Department of Energy; \$500,000 of NYSERDA's funding is in connection with the T&D PON 1208.

- **Optimizing the effectiveness of existing assets:** The second largest project, valued at \$37.5 million, will demonstrate a new way to tie isolated Con Edison distribution load islands together with sophisticated cable that can significantly reduce customer power outages and improve existing asset use. Known as Project Hydra, it will be a first-of-its kind demonstration of a superconducting cable that links two area substations within congested distribution networks. Con Edison is partnering with the U.S. Department of Homeland Security and American Superconductor to develop the cable technology that reduces distribution network energy loss and protects substation equipment from fault-currents. NYSERDA is contributing \$1,000,000 and anticipates that the technology could be applied in network distribution circuits in downtown Albany and Buffalo.

A different kind of improved asset use is demonstrated by the conversion of an existing conventional electrical generation facility that uses natural gas and fuel oil into a "Dispatchable Green Energy Facility" that uses biodiesel as a primary fuel source. Carr Street Station, LP, based in East Syracuse, New York, and owned by Brookfield Power, will be used to demonstrate that biodiesel can be used as an alternative to petroleum based fuel oil for power plants throughout New York State. The facility will help mitigate the fluctuations of other renewable technologies such as commercial wind resources and hydro power units. This is the first demonstration of a fully dispatchable renewable resource in New York State, and NYSERDA is contributing \$1,000,000 toward the \$2,975,725 project.

- **Improved efficiency:** The third largest project also involves superconducting cable product development, with a focus on improved efficiency. SuperPower, Inc., of Schenectady, NY (a unit of Royal Philips Electronics, NV) proposes to design, build, and test a prototype superconducting fault-current limiter for use in high-voltage transmission cable. This technology could significantly improve the overall reliability of the transmission system statewide. Teamed with SuperPower are Sumitomo Electric Industries, Linde Gas, American Electric Power, and Oak Ridge National Laboratory. The project makes use of SuperPower's second generation of high-temperature superconducting material for transmission-level applications. NYSERDA is providing \$500,000 toward this \$11,535,732 initiative.

Electric Power Research Institute (EPRI) is working on an engineering study that will be the first in-depth evaluation of secondary network losses, methods for loss reduction, and the development of an accurate simulation tool. This project will provide information on the best way to reduce the loss of electric energy on secondary distribution circuits. EPRI will look at the feasibility of using this simulation tool on the most complex distribution configuration in the country – Con Edison urban networks. Its engineering study will cost \$259,280, and NYSERDA is contributing \$194,280.

Two research studies that support improved efficiency have also been funded:

- JWD Consulting Inc. will research ways to maximally use *existing* transmission network capacity and rights-of-way, of particular value where New York State has not attracted capital investment for new transmission infrastructure. NYSERDA is contributing \$182,500 towards this \$351,000 study.
- New Electricity Transmission Software Solutions, Inc. will conduct research to develop a software tool that the NYISO can incorporate into its energy management control center to optimize coordinated real and reactive power dispatch. Significant reductions in electric energy loss are possible by simultaneously controlling real and reactive power flows.
- **Improved reliability:** A \$4.4 million Smart Grid pilot project with Orange and Rockland Utilities, Inc. (O&R) will upgrade West Nyack area substations and associated distribution circuits to perform as “intelligent” networks with advanced sensors, field devices, on-line decision-making software and improved communications. It will also serve to automatically restore power after disturbances, minimize losses and maximize customer service reliability. NYSERDA is contributing \$1 million to the project that will further complement O&R's future plans for installing advanced meters for customers throughout the service territory.

Microgrids can also improve system reliability:

- Central Hudson Gas and Electric will complete an \$800,000 demonstration (with a \$371,000 contribution from NYSERDA) of a distribution microgrid in the Town of Denning, New York, which will take the form of a distribution load center along with a paralleling generator source. The load center will be automatically isolated from the grid during a distribution circuit disturbance, and operate independently of the remainder of Central Hudson's electrical system. While the theoretical advantages of microgrids are well understood, there is minimal practical experience to inform national and state policy makers.
- Columbia will undertake a \$179,944 research study to document the different types of microgrids that have been deployed around the world, analyze different ownership structures, and provide a comprehensive guide for policy makers and regulators regarding

how to promote microgrid implementation. NYSERDA will contribute \$134,958 toward this much needed analysis.

Clarkson University was selected under the product development category to develop a high voltage insulator that suppresses current leakage, lasts longer, and reduces maintenance costs. Modeled after the water shedding properties of the lotus leaf, its super hydrophobic attributes will be designed, tested, and, ultimately, manufactured in New York State. NYSERDA is contributing \$200,000 to this \$400,401 product development project.

Given the numerous and growing distribution system design options, Clarkson University has also undertaken the development of a software tool that assesses their impact on the reliability and power quality of radial distribution circuits. Its primary focus is to establish uniform design techniques that reduce the frequency of power outages (particularly momentary outages). It will cost a total of \$258,209, and NYSERDA is contributing \$190,079.

An environmental engineering and economic study will be performed by GE International, Inc. Energy Consulting, Schenectady, to identify and test different scenarios relating to greenhouse gas policy implementation. The electric power sector produces one-quarter of the State's greenhouse gas emissions and analysis is needed to study the impact of the Regional Greenhouse Gas Initiative's (10 Northeast states consortium) proposed regional carbon cap and trade program on the reliability of the electric power transmission system. The scenarios will focus on variables such as fuel prices, new generation, emission prices, and transmission improvements and will weigh these against generation dispatch, transmission congestion, and changes in power imports into New York. NYSERDA is providing \$198,750 toward the total study cost of \$265,000.

- **Demand side application:** A New York City local grid project with Innoventive Power, Con Edison, and Verizon will enhance the ability of customer-owned demand-response resources to reduce peak demand within critical load pockets. Thirty-two field sites of customer-owned distributed generation resources, amounting to about 20 MW, will be coordinated using innovative software protocols to enhance grid reliability in lower Manhattan. NYSERDA is providing \$999,665 toward the \$2,451,934 project and anticipates that its results could be applied statewide.

Three smaller projects likewise designed to facilitate interconnection of distributed generation resources and end-use load modulation were also funded:

- New York Presbyterian Hospital will receive \$110,000 toward \$220,000 needed for a ground fault protector that will prevent reverse current flow from a natural gas-fueled combustion turbine operating in a combined heat and power mode.
- Alcoa will receive \$165,000 toward a \$215,000 engineering study to investigate whether its aluminum production process – an electrically intensive industrial load - can be effectively controlled in response to near real-time dispatch signals from the NYISO. This study will provide information about the costs, payback, and technical risks associated with participating in the NYISO's wholesale market.
- Pace Law School Energy Project will research alternative strategies for promoting the deployment of distributed generation, including the removal of certain regulatory restrictions on utility ownership of DG assets, establishing geographically targeted "DG Development Zones", and administering a modified solicitation that reduces DG development risks. NYSERDA is contributing \$148,650 toward the \$203,003 project.

While increasing distributed generation is an energy efficiency goal, it is also important to prepare for its effects on network stability. Power Factor Correction will undertake the first New York State research study to evaluate the impacts of end-use technologies on the power quality of the distribution network. NYSERDA is contributing \$200,000 toward this \$240,950 study.

- **Improved situational analysis:** The Electric Power Research Institute (EPRI) will address another important aspect of system reliability - improving the situational awareness and visualization tools for grid operators. They will develop a software application that will improve the ability of network operators to accurately view the status of the grid from a regional perspective, identify critical voltage area and real-time reactive power requirements, and automate system load shedding to preserve voltage stability and prevent blackouts. NYSERDA is contributing \$744,120 towards this \$1,495,302 project, as well as \$250,000 toward a \$500,000 Fast Fault Screening software application that will quickly and accurately identify and rank the most severe three-phase fault locations on the transmission system.
- **Facilitation of renewable resources:** SMRT Line, LLC will evaluate the opportunity to develop, build and operate a privately-financed non-utility transmission and large-scale wind farm that will alleviate constraints within the national transmission corridor, and facilitate the delivery of utility-scale quantities of offshore wind shared by New York as well as New Jersey. A two-part study will include analyses of the commercial complexities and the regulatory constraints facing the development of new transmission assets. These findings will result in recommendations and a framework for investment in new infrastructure that will effectively upgrade the electric power delivery system to meet growing demand and promote open access to new generation sources, such as offshore wind. This research will cost a total of \$430,000; NYSERDA is contributing \$200,000.

5.5 Clean Energy Infrastructure

5.5.1 Program Description

The success of the previous End-Use Renewables Program provided the foundation for the Clean Energy Infrastructure Program. Clean Energy Infrastructure efforts have been closely integrated with other SBC-funded efforts, such as Distributed Energy Resources, to develop and commercialize clean energy technologies. The ultimate goal of these programs is to reach a point where the value of the technology is worth the investment required by the consumer, and the market infrastructure is in a position to deliver and support the technology over the long term. In 2007 the PV and small wind incentives offered under this program were transitioned to the Renewable Portfolio Standard (RPS) Customer-sited Tier program, which means the incentives are now supported by RPS funds. The remaining Clean Energy Infrastructure program components will continue to be funded through the SBC and will complement the RPS program by supporting training, education, and market development for RPS-eligible technologies and for early stage clean energy companies for such technologies as photovoltaics and small wind.

The End-Use Renewables Program placed significant emphasis on training renewable energy professionals, establishing voluntary certification standards for photovoltaic system installers, establishing and promoting accredited training programs in New York, establishing an internship program to give students from the training programs the experience necessary to sit for the certification exam, developing a series of specialized workshops and training tools, and creating a program to integrate photovoltaic systems on schools with lesson plans that meet New York State learning standards for math, science, and technology. The Clean Energy Infrastructure Program will continue the work begun under the End-Use Renewables Program and will complement the work done by the RPS Customer-sited Tier

program to develop a vibrant, sustainable market for renewable and clean energy technologies using the following strategies:

- Market participant education, consumer awareness, and market development;
- Targeted research, analysis, and education to address technical and information barriers to renewable and clean energy market development; and,
- Innovative initiatives to accelerate the development of early stage entrepreneurial clean energy technology companies. The Program uses an array of business support activities designed to share the risk of implementing new approaches to business growth and market expansion and to encourage the manufacturing of technologies in New York.

The 13-year program budget is \$77.5 million.

5.5.2 Recent Program Accomplishments

Table 5-9 shows the Program's five-year goals and achievements through December 2008.

Table 5-9. Clean Energy Infrastructure Program Goals achieved from July 1, 2006 through December 31, 2008

Activity	Program Goals (July 1, 2006 through June 30, 2011)		Achieved July 1, 2006 through December 31, 2008	% of Goal Achieved
Education, Consumer Awareness and Market Development				
New accredited training institutions	3	Self-sustaining accredited training and certification programs for clean energy technologies in addition to PV	2	67%
New certification exams	5		2	40%
Training workshops	25		27	>100%
Renewable Resource Applications				
Stakeholder workshops	7	Reduction of knowledge and technical barriers currently affecting installation and operation of wholesale and end-use clean energy technologies	13	>100%
Competitive research solicitations	5		14	>100%
Clean Energy Technology Manufacturing and Business Development				
Companies expanding renewable business networks	25	Increase the number of companies developing and manufacturing clean energy technologies, and serving the clean energy businesses in New York	18	72%
Companies expanding manufacturing	10		3 ^a	33%

^aOne company expanding manufacturing that was reported in the third quarter is now "on-hold."

5.5.3 Program Outputs and Indicators

Table 5-10 shows the number of installers participating in the program over the years. In 2008, 35 installers were NABCEP certified, 46 were eligible and 19 were provisional.

Table 5-10. Clean Energy Infrastructure – Key Market Indicators and Program Cumulative Progress

Indicator	2003	2004	2005	2006	2007	2008
Number of participating installers	14	27	32	26	44	100

5.5.4 Program Impact Evaluation

Table 5-11 presents cumulative annual net energy generation for the program from inception through December 31, 2007. In 2007, this program was moved to the Renewable Portfolio Standard Customer-sited Tier Program. Realization rates are developed to account for differences in program reported savings and performance of actual installations. Attribution analysis determines, through various methods, whether the gross savings estimate should be further adjusted downward or upward for freeridership or spillover. Adjustment factors for realization rate and the ultimate program net-to-gross ratio are shown in the table.

Table 5-11. Clean Energy Infrastructure Program Cumulative Annual Clean Generation (through December 2007 when Program moved to RPS)

	Program-Reported Savings	Realization Rate	Adjusted Gross Energy Generations	Net-to-Gross Ratio	Net Energy Generation
End Use Renewables					
MWh/year	6,064	1.04	6,307	1.0	6,307
MW	3.4	0.85	2.9	1.0	2.9
Wholesale Renewables					
MWh/year	99,995	1.0	99,995	1.0	99,995
MW	6.2	1.0	6.2	1.0	6.2
Clean Energy Totals					
MWh/year	106,059	N/A	106,302	N/A	106,302
MW	9.6	N/A	9.1	N/A	9.1

5.5.5 Follow-up on Evaluation Recommendations

A process evaluation completed in 2007 of the of the Photovoltaic (PV) Program examined the training and eligibility requirements and attempted to identify the factors most related to the quality of workmanship in PV installation designs and performance. It was fully reported in the "New York Energy Smart Program Evaluation and Status Report for the year ending December 31, 2007. This section provides additional follow-up on two recommendations – to increase the total budget and to sponsor another workforce development conference.

The report found that workforce development activities and system installation incentives are not sufficient, in themselves, to develop a market for PV or even to match the market penetration rate attained by the eleven other state programs reviewed. Rather, the analysis strongly suggested that overall program budget is a key determinant of the market penetration rate. The report recommended that NYSERDA can best increase the market for customer-sited PV systems, the number of PV installations, and the number of NABCEP installers by increasing its program budget. This recommendation has been implemented. When the PV incentive program transitioned to the RPS in 2008, the program was initially funded at \$13.8 million. However, demand soon exceeded supply, so another \$4.5 million was reallocated to PV from other technology categories. In October 2008, with program funds fully subscribed and demand for more becoming evident, the PSC reallocated another \$20.6 million of RPS funds from the main tier program to the PV program, bringing the total PV incentive RPS program up to \$38.8 million. This infusion of funds should also address other conclusions made in the process evaluation that suggested that NABCEP certification rates are constrained by the low penetration rate of incentivized PV systems. As of 2008 there are now 35 NABCEP certified PV installers, representing 35% of the total number of installers who are eligible to participate in the PV incentive program.

The report also recommended that NYSERDA should hold a second workforce development and training conference, based on the success of the first one held in 2006. In March 2008 NYSERDA did sponsor the second work force conference. It was held at the Hudson Valley Community College in Troy, with the theme: "New Ideas in Educating a Workforce in Renewable Energy and Energy Efficiency - A National Conference for Educators and Trainers." Nearly 350 people attended.

5.6 Power Systems Product Development

5.6.1 Program Description

The Power Systems Product Development Program supports New York businesses in all aspects of product development necessary to create and commercialize power generating products; that are clean, efficient, reliable, and cost effective, as well as products that reduce peak demand or improve end user power quality. Additionally, the Program focuses on addressing regulatory barriers to the adoption of new technologies and emphasizes the development of economically competitive options for end users. As of mid-2008, projects related to transmission and distribution of energy were moved to the Public Benefit Power Transmission and Distribution Research Program discussed in Section 5.4. The five-year program budget is \$25 million.

Additional objectives of the program include:

- Developing products that decrease energy consumption and peak demand
- Addressing economic development and job creation in New York
- Developing technologies and devices that are not currently being addressed by the market
- Reducing environmental impacts of energy production
- Providing economic development opportunities for New York power system firms
- Improving system-wide reliability, stability, and increased security

Activities supported under this program include:

- Development of oil-free bearings that reduce the price of small-scale air powered generators used in solar thermal electric generation
- Development of a compact, wind-powered generator for use in low wind speed applications.
- Development and demonstration of a bio-fuels pre-treatment technology that allows coal boilers to accept 10% biofuel content (by mass), doubling the renewables mass that coal boilers can currently handle.
- Development of seals for steam turbines that ease startup and reduce power loss. The improved seals maintain turbine pressure, providing more power to turbine blades, increasing electrical output.

5.6.3 Program Outputs and Indicators

This section describes cumulative results since 2000 when the program was first funded. Projects funded through the program can be categorized as (1) Technology/Market Analysis Studies; (2) Product Development, and (3) Demonstration. The Technology/Market Analysis studies include projects that analyze market potential and technological feasibility, designed to benefit policy makers and supply-side market actors. Product development projects focus on a clearly defined product and benefits New York manufacturers. Product development activities include prototype development, product testing, and development of commercialization plans. Demonstration projects consist of projects that demonstrate the performance of products that are commercially available. The cumulative number of projects by type and associated funding is shown in Table 5-13.

Table 5-13. Cumulative Power Systems Results from Program Inception through Year-end 2008

Activity	Through Year-end 2008
Number of product development projects initiated and completed to date	26 initiated 9 completed
Number of demonstration projects initiated and completed to date	21 initiated 4 completed
Number of technology/market studies initiated and completed to date	22 initiated 11 completed
Funds contracted to date	\$20.23 Million
Number of new products launched to date	5

The cumulative encumbered funding by project type is presented Figure 5-6. Since program inception, \$22.7 million has been encumbered, with most of the funds going toward demonstrations (46%) and product development (40%).

Funding by technology area is shown in Figure 5-7. This figure shows that the top three funding areas are energy storage (27%), fuel cells (23%), and hydropower (13%).

- Product development, including concept development, prototype production, and product demonstration
- Technology transfer through conferences, papers and Internet accessible data
- Technology and market assessment studies

5.6.2 Recent Program Accomplishments

Table 5-12 shows the Program's five-year goals and performance over the most recent 30 months. The program is making excellent progress toward the majority of its five year goals.

Table 5-12. Power Systems Product Development Program Goals achieved from July 1, 2006 through December 31, 2008

Activity	Program Goals (July 1, 2006 through June 30, 2011)	Achieved July 1, 2006 through December 31, 2008	% of Goal Achieved
Number of contracts signed between July 1, 2006 through June 30, 2011	75	52	69%
New products launched between July 1, 2006 through June 30, 2011	5	3	60%
Sales revenue from new products between July 1, 2006 through June 30, 2011	\$50 million	\$19.7 million	39%
Number of completed field demonstrations between July 1, 2006 through June 30, 2011	15	9	60%
Number of technology assessment studies funded between July 1 2006 through June 30, 2011	20	12	60%

During the last 30 months, progress was made on the following projects:

- Launch of an inverter that allows efficient DC-AC conversion of solar power and reduces power loss when solar panels become partially shaded by trees, chimneys or nearby buildings. NYSERDA has received \$15,000 in recoupment for sales in 2008.
- Developments in material, configuration, and operating characteristics of high temperature solid oxide fuel cells.
- Continued testing of fuel cells in mobile power applications. The devices are operated outdoors continuously, and output and time between failures are tracked. Error analysis and subsequent redesign will improve performance.
- Turbines will be deployed to harness power from tidal flows in the Roosevelt Island region. Turbines were redesigned as a result of initial results.

Figure 5-6. Power Systems Funding by Project Type

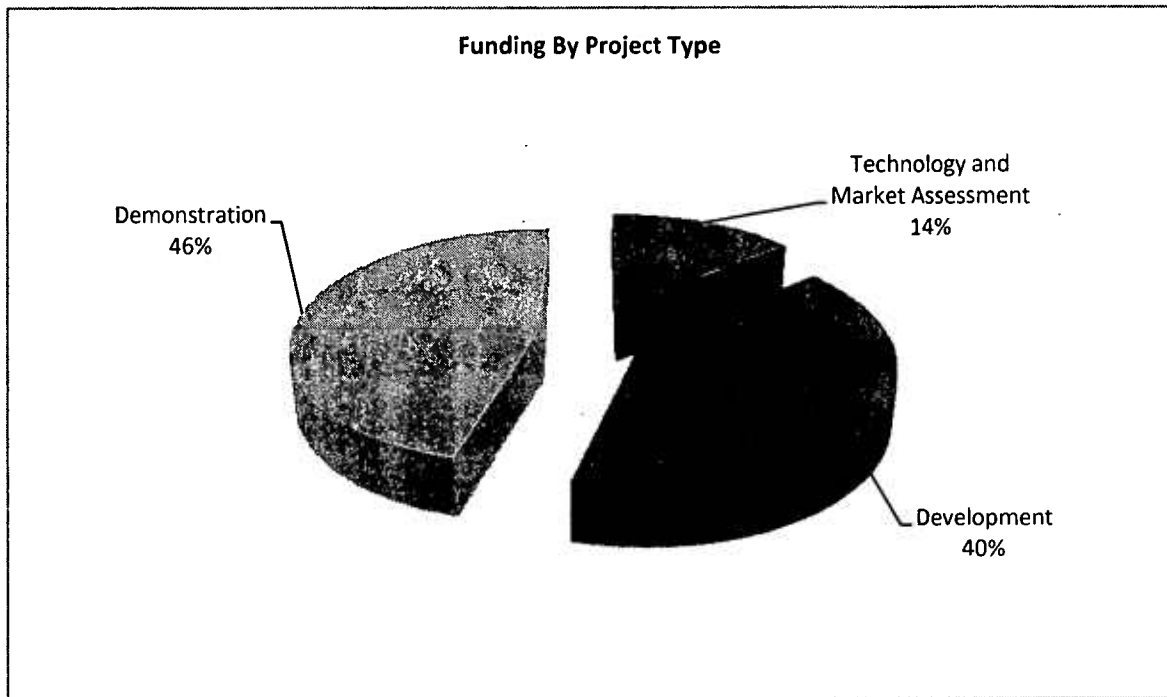
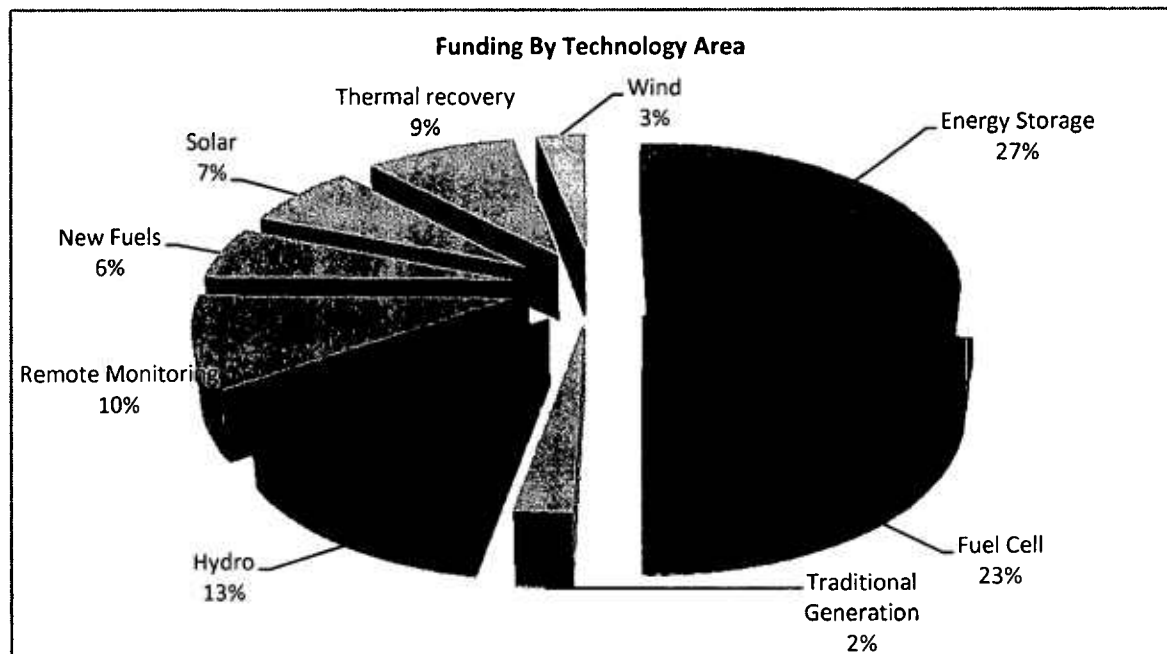


Figure 5-7. Power Systems Funding by Technology Area



Power Systems Commercialization Progress

Products commercialized with assistance through the Power Systems Program are listed in Table 5-14.

Table 5-14. Power Systems Commercialization Progress Since 2000

Product Name	Development Objective	Progress to date
Pressure Actuated Leaf Seals for Turbine Shaft Sealing	Reduce pressure loss of steam turbines through improved shaft seal designs.	Technology has been licensed for use in Dresser-Rand, a NYS manufacturer, for similar pressurized rotating equipment.
Development and Performance Testing for Distributed Power	Verify performance of distributed power and the potential for reducing peak demand by coordinating these power sources remotely.	22 generators have been entered into the experimental database. More units will be added in 2009. The results will help balance centralized and distributed power in the future.
Gaia Power Tower	Develop a battery-based energy storage device that can help level load power needs, as well as integrate with renewable sources.	Product has been commercialized and sold in NY, with ongoing operations.
Direct Methanol Fuel Cell Manufacturability Readiness	Develop Methanol fuel cell for the small applications market, which includes new internal designs and water management features.	Product was unsuccessfully commercialized with ongoing work to improve performance and costs.
Underwater electrical turbine development	Use tidal water flow to generate power through underwater turbines.	The first generation was unsuccessful, new redesigned equipment will be operational in 2009
Use of flywheels for grid stabilization	Experiment with energy storage/frequency regulation with the use of flywheels that can both absorb and generate power.	The successful demonstration of the technology has lead to further expansion. Construction will begin on a 20MW facility in 2009.
Innovative wind generators for low speed wind	Develop a system that will utilize low speed wind found in large sections of the country. Develop a device that can be used where local restrictions no not allow traditional wind turbines	Contractor has designed and performed scale tests on new turbine and is actively searching for demonstration sites.
Photovoltaic controllers and inverting technology, improving production and demand balancing when combined with energy storage.	Improve AC-DC conversion while allowing large arrays of panels to be easily controlled. Shaded or dysfunctional panels can cause a drain on the system by acting as resistance.	Product has been developed and commercialized and is now available for sale.
Oil free 5-20 kw high speed turbo generator	Develop an inexpensive generator that can utilize waste heat through Rankine Cycle generator	Project has been upscaled to 20kw generator, which will improve market applicability.

Power Systems Economic Benefits

Examples of economic development achieved through the program's activities include:

- The fuel cell research and development resulted in the development of 320 jobs at the R&D and manufacturing facility constructed by Plug Power. There was also \$217 million cash investment from Interros and Norilsk Nickel.
- A direct methanol fuel cell project brought in \$1 million in capital investment from Samsung and Gillette/Duracell and a 6% equity investment by E.I. DuPont.
- The 2.5 kVA Utility-Interactive Inverter project has resulted in orders to manufacture components such as printed circuit boards and enclosures. It has also resulted in certification testing by Itertek Testing Service.
- Gaia Power Technologies' power tower has resulted in four investments in New York totaling \$3 million. GHO ventures invested \$2.25 million, and three separate \$250,000 investments were provided by NY Community Investment Company, NJTC Venture Fund and the Small Business Technology Investment Fund of the Empire State Development Corporation. Since 2006, Gaia Power Technologies has more than doubled its manufacturing space at its Peekskill facility and expanded to 16 full-time employees.
- The Roosevelt Island Tidal Energy Project resulted in setting up of an office at the Cooper Union in New York City. In 2007, the contractor, Verdant Power, relocated its corporate headquarters from Alexandria, VA to New York City.
- Optiwind has received outside investment of \$5 million to further develop its product, a low speed wind generator. It has also gained five employees.

5.7 DG-CHP Demonstration

5.7.1 Program Description

The goal of the DG-CHP Demonstration Program is to contribute to the growth of combined heat and power and other distributed generation applications in New York. The program provides funding for single site and multi site (fleet) demonstrations and seeks to improve awareness by end-users and project developers of DG-CHP. The program also seeks to address DG-related issues such as DG permitting; Standard Interconnection Requirements (SIR); utility standby service; tariffs; technology risk; and renewable fuel options such as biomass and landfill gas; and impact of fluctuating prices of natural gas.

The program uses financial incentives to demonstrate and validate advanced features (such as synchronous-parallel interconnection) of customer-sited DG using commercially available DG technologies such as reciprocating engines and gas turbines, and emerging DG technologies such as microturbines and organic Rankine cycle systems. Once validated, commercial DG technologies are supported by NYSERDA through an incentive approach that co-exists with similar offerings from the RPS Customer-Sited tier and Con Edison's System-Wide Demand Reduction programs.

The total program budget is \$67.1 million.

5.7.2 Recent Program Accomplishments

Table 5-15 shows the Program's five-year goals and performance over the most recent 30 months.

Table 5-15. DG-CHP Demonstration Program

Activity	Program Goals (July 1, 2006 through June 30, 2011)	Achieved July 1, 2006 through December 31, 2008	% of Goal Achieved
Issue annual solicitations and incentive offers	Fund 50 or more CHP demonstrations with a cumulative capacity of 100 MW and associated efficiency and environmental benefits, and with 50 MW downstate.	PON 1043 was issued in June 2006. Six CHP demonstration projects resulted, one of which has since dropped out. PON 1178 was issued in October 2007. Eight CHP demonstration projects resulted. PON1241 was issued in August 2008 with three due dates (August 14, 2008, December 11, 2008 and April 16, 2009) Six demonstration projects resulted from the first due date. Proposals received by the second due date are currently being reviewed.	38% (Number of projects funded)
Technology transfer	Conduct technology transfer and outreach activities to broaden acceptance of DG and CHP. Hold annual workshops and publish at least 10 final reports per year.	Currently, site-specific performance data is posted on http://chp.nyserda.org for 36 projects. A CHP Conference was held on June, 2008 in New York City. All presentations from the 2008 conference are available on NYSERDA's Web site. CHP Programs Brochure has been developed and is distributed at appropriate conferences.	N/A

5.7.3 Program Outputs and Indicators

This section highlights key program outputs identified through the logic model development work, and associated market progress. All values reported are cumulative since program inception, unless otherwise noted. In addition to other key program outputs, Table 5-16 presents the number of operational systems through year-end 2006 and year-end 2008. The number of systems nearly doubled in two years

Table 5-16. DG-CHP Demonstration Program – Key Program Outputs

Outputs	Value (Cumulative through December 2006)	Value (Cumulative through December 2007)	Value (Cumulative through December 2008)
Number of operational DG/CHP systems	28	45	49
Total funds awarded for operational DG/CHP systems	\$8.9 million	\$21.8 million	\$24.6 million
Total cost of operational DG/CHP systems	\$39.4 million	\$81.3 million	\$93.0 million

Figure 5-8 presents the peak capacity of projects in the portfolio of encumbered projects by prime mover type. Figure 5-9 shows the same by utility service area.

Figure 5-8. Peak KW Reduction by Prime Mover for Encumbered Projects (As of Year-End 2008)

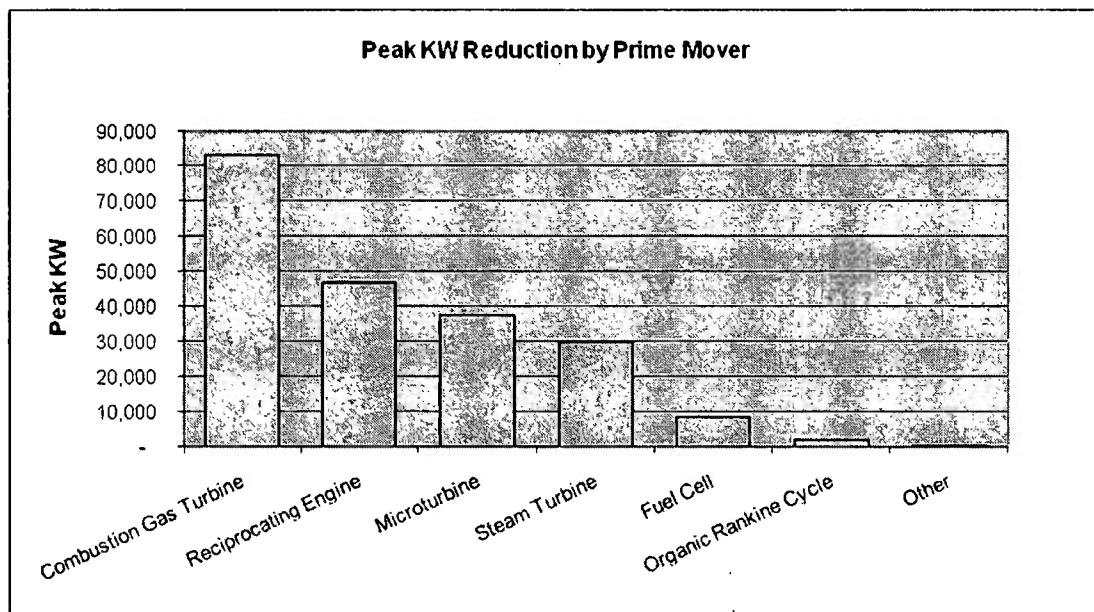
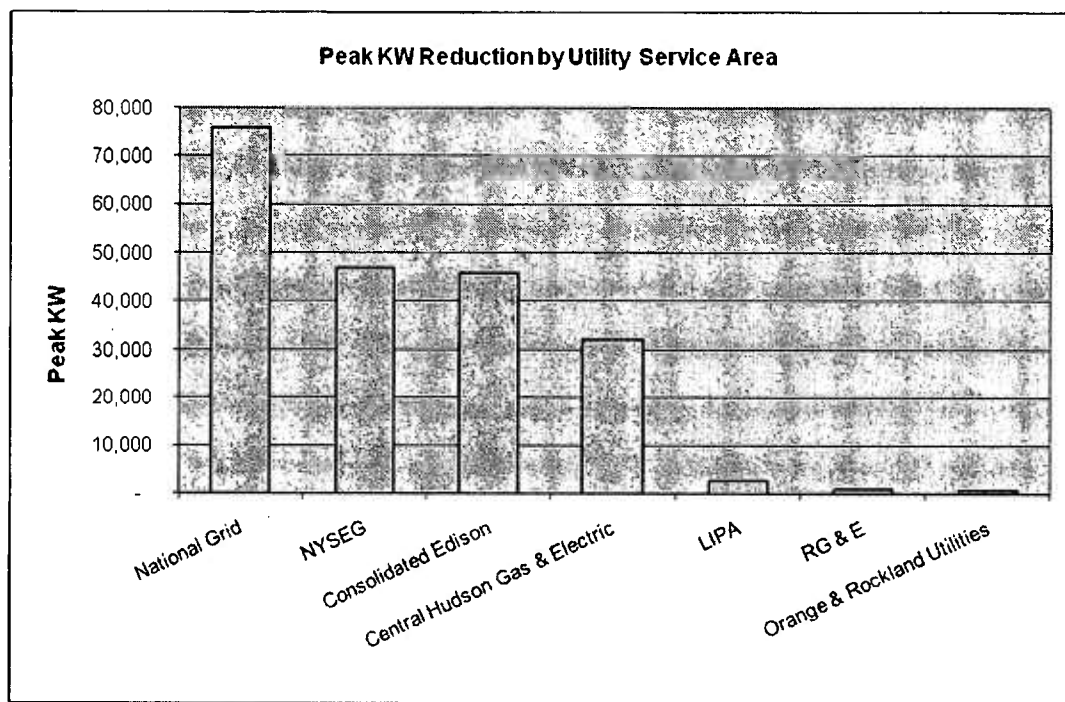


Figure 5-9. Peak KW Reduction by Utility Service Area for Encumbered Projects (Through 2008)



Progress toward Commercialization

Capital Attraction

- Private investment in CHP has increased in New York. The total project cost for all projects encumbered through year-end 2008 is \$383.5 million. Of this total, 82% represents funds from project participants.

Technical Achievements

- As a result of the program, demonstration of innovative electrical interconnection designs has occurred. The system installed at Equity Office Properties in Manhattan was the first installation of a synchronous interconnection system in New York City.
- As a result of the program, several grid-connected CHP systems that have dual-mode operation (operates in grid-parallel mode during normal conditions and operates in stand-alone mode during grid outage) were successfully demonstrated. For example, during the Northeast Blackout of 2003, the CHP system installed at Greater Rochester International Airport operated in stand-alone mode. The project received an award from the U. S. Environmental Protection Agency (<http://www.epa.gov/chp/awards/winners2004.htm>).
- As a result of the program, effective use of non-standard fuel sources (e.g., anaerobic digester gas) for CHP has been demonstrated.
- As a result of the program, third-party financing for CHP is being demonstrated in several settings, including New York City at 230 Park Avenue.

Market Progress

Market progress, such as increased awareness and knowledge of CHP and increased promotion by CHP trade allies, was measured in 2004. Details of the findings are presented in the "DG-CHP Market Characterization and Market Assessment and Causality Study."¹¹⁹

ECONOMIC AND ENVIRONMENTAL BENEFITS

Economic Benefits

- Economic benefits to facility owners include lower energy costs as well as economic impacts from non-energy benefits such as increased reliability and cleaner air. Economic benefits to New York arise when dollars saved on energy are available to spend on other goods and services, promoting economic growth. Past research by ACEEE¹²⁰ has shown that savings are retained in the local economy and generate greater economic benefit than the dollars spent on energy.¹²¹ Recovery and productive use of waste heat from power generation is a critical component of energy efficiency.

Environmental and Other Benefits

- The program has produced ambient air emission reductions. Every proposer is required to submit an emissions analysis and undergo the State Environmental Quality Review Act (SEQRA) process. NOx emissions information was compiled for a subset of projects representative of the program's portfolio of projects. For each project, the NOx reduction was estimated based on (1) the NOx emissions for the installed prime mover, (2) the NOx emissions of the generation facility serving the facility, and (3) the NOx emissions of the thermal equipment. On average, each facility reduced NOx emissions by 50%, or nearly 13,000 lbs. per year, or 1.1 lbs. per megawatthour of electricity produced.
- The program supports the use of renewable energy sources. Of the 118,000 MWh per year currently being generated by operating facilities funded through NYSERDA's DG-CHP program, approximately 11,000 MWh, or 9%, are from renewable fuel systems.
- The program has supported efforts to improve the reliability of New York's electric transmission and distribution system. New York Independent System Operator Zones J (New York City) and K (Long Island) are considered key in terms of congestion and system reliability.¹²² Approximately 47% of the CHP capacity that has been installed or planning to be installed is in the Con Edison service area.

5.7.4 Program Impact Evaluation

This section presents cumulative impacts for the program from inception through December 31, 2008.

¹¹⁹ "DG-CHP Market Characterization and Market Assessment and Causality Study," by Skumatz Economic Research Associates, Inc., Summit Blue Consulting, LLC, and Quantec, LLC, Project Number 7721, May 2005.

¹²⁰ Elliot, R. Neal and Mark Spurr. *Combined Heat and Power: Capturing Wasted Energy*. American Council for an Energy-Efficient Economy. May, 1999.

¹²¹ Spurr, Mark. 1999. *District Energy Systems Integrated with Combined Heat and Power: Analysis of Environmental and Economic Benefits*. Report to the U.S. Environmental Protection Agency. March. Minneapolis, Minn.: International District Energy Association.

¹²² NYISO Electric System Planning Working Group Meeting April 15, 2004, Draft Minutes.

Table 5-17 presents cumulative annual net energy and demand savings for the program from inception through December 31, 2008. Realization rates are developed to account for differences in program reported savings and performance of actual installations. Attribution analysis determines, through various methods, whether the gross savings estimate should be further adjusted downward or upward for freeridership or spillover. Adjustments for realization rate, freeridership and spillover, and the ultimate program net-to-gross ratio are also shown in the table

In 2008, the Impact Assessment team undertook an evaluation of the 25 largest energy savers in the New York Energy \$martSM portfolio. This analysis assessed projects from five different NYSDERDA programs (CIPP, TA, NCP, DG/CHP and PLMP) and covered measurement and verification and attribution. All of the projects studied saved more than 1.5 GWh / yr. Results from Phase 1 for four DG/CHP projects are reported in Table 5-17 below within the total program-reported savings. The program realization rates and net-to-gross ratios are applied to the balance of savings not covered in the largest savers analysis. Overall description of the methods and detailed results are included in Section 2 of this report.

Table 5-17. CHP Cumulative Annual Energy and Peak Demand Savings (Through December 2008)

	Program-Reported Savings	Realization Rate	Adjusted Gross Savings	Freeridership	Spillover	Net-to-Gross Ratio ¹	Net Savings
MWh/year	125,125	0.90	113,064	15%	26%	1.07	109,461
MW	27.9	0.98	28.0	15%	26%	1.07	27.2
MMBtu/year ²	-1,007,962	0.88	-881,378	15%	26%	1.07	-852,549

¹ Net-to-Gross Ratio = (1-Freeridership) * (1+Spillover).

² Because the electricity saved by the DG/CHP projects replaces electricity formerly purchased from the grid, the program has reduced fuel used at central generating stations, for a net decrease statewide due to greater efficiency of the DG/CHP systems at sites where imported fuel is used. The fuel avoided at the central generating plant is determined from the electricity generated by the DG/CHP installations. Furthermore, at additional projects such as waste water treatment plants, electricity generation is powered fully or partially by digester gas produced on site. Such fuel switching achieves natural gas conservation above and beyond what is achieved through efficiency alone.

5.8 Demand Response and Innovative Rate Research

5.8.1 Program Description

This program addresses ways to enable and increase participation by small retail customers and multi-family housing in load curtailment programs sponsored by the NYISO, local utilities, partnerships with load curtailers, and to achieve self-initiated load management. The program also supports development and demonstration of technologies to realize customer benefits under smart grid scenarios. The means for participation include load curtailment and demand-response, responding to market-based electric rates and having in-home energy feedback. NYS DPS, utilities and NYISO are key stake holders in research to advance smart grid and advanced metering (AMI) initiatives and demand response markets.

Curtailment and demand-response research supports participation of small loads and customers that presently constitute a small percentage of NYISO DR programs due to the relatively high cost of load control and aggregation. Emphasis is placed on encouraging technologies that enable curtailable load, separately or in combination with other demand response strategies (storage or on-site generation). The program promotes the development, demonstration, and use of load control and aggregation technologies and flexible end-use devices. The program concentrates on the New York City metropolitan area where capacity is particularly constrained and load curtailment has the highest market value.

The rate research program supports participation in mandatory hourly pricing and time-sensitive pricing pilots. Expansion of utility mandatory hourly pricing programs has greatly increased the number of small commercial and industrial customers that have the opportunity to respond to hourly electric rates. The program also promotes the development of innovative electric service rates by energy services companies (ESCO's) with the ultimate goals of realizing load shifting and peak reductions, creating cost avoidance opportunities for customers, and creating sustainable businesses for providers.

Newly initiated research on in-home energy feedback technology seeks to quantify the effects of providing New York State (NYS) households with direct, real-time feedback on their electrical consumption and cost. It is hypothesized that NYS households equipped with current information about their electricity consumption, may be able to realize electricity savings of as much as 5-7% without the use of time sensitive rates. This research is intended to collaborate with utilities to undertake a pilot of a statistically significant scale to validate the hypothesis. This research builds on numerous small scale pilot studies, done elsewhere, that suggest a positive conservation effect is possible. Results of this research will add to the knowledge about customer benefits associated with household smart metering.

The program budget is \$10 million.

5.8.2 Recent Program Accomplishments

Up to this point, activities in this program area have been successful in developing load control technologies that can be built into fleets of very small loads, specifically for commercial lighting and room air conditioners. Commercial products do exist for this still immature market, but the value proposition is typically dependent on being combined with other DR measures.

This program has also successfully demonstrated a control system in a multifamily complex that is primarily used for submetering and central heating plant control, but can also be used to enable fleet control of window air conditioners for DR.

Table 5-18 shows the Program's five-year goals and performance over the most recent 30 months.

Table 5-18. Demand Response and Innovative Rate Research Program Goals achieved from July 1, 2006 through December 31, 2008

Activity	Program Goals (July 1, 2006 through June 30, 2011)	% of Goal Achieved
Increase small customer participation in wholesale and local demand response programs (MW)	100 MW	1 % of MW goal
<u>Achievements (July 1, 2006 through December 31, 2008)</u>		
One MW enabled.		
The program is still ramping up to meet long term goals of demonstrating enabling load shed technologies. NYSEDA R&D staff began meeting with utilities to understand the existing programs and customer pilots that may offer opportunities for demonstration of enabling technologies or innovative rates. Began demonstration project for commercial application of the Osram Sylvania load shed ballast at five facilities located throughout New York, including Yeshiva University and Welch Allyn manufacturing facility. Demonstration of an advanced, remotely-activated, load shed ballast was completed at the Con Edison Rye facility. Additional demonstration projects have been funded at five different types of commercial or institutional buildings. Innovative Power demonstrated tools to identify demand response opportunities in schools and other building types. A free web-based version of the tool is now under development. Completed demonstration of central air conditioning thermostats configured to allow remote load reduction. The demonstration was hosted by Gateway Energy Services (formerly Econergy) to assess feasibility of including a load curtailment option bundled with residential and small customer service.		
Increase the number of multifamily apartment units participating in real-time and other time-sensitive electric rate pilots	3,000 apartment units	>100% (5,330 units participating in the demonstration)
<u>Achievements (July 1, 2006 through December 31, 2008)</u>		
Completed a three-year time sensitive rate pilot at Clinton Hills cooperative (1,221 units). The load reduction impact of submetering (required for Technical Service Provider rates) was a 23% load reduction. The load shift impact was approximately 1% from peak to off-peak and shoulder periods. Georgetown Mew. Continued demonstration of load management technologies and of time-of-use rate at Georgetown Mews (37 buildings, 930 apartment units, 2,000 KW peak load). Buildings transitioned to time-of-use rate in December 2008, after a one year shadow billing period. Results to date show 18% reduction in energy and demand billing as a result of submetering. Under the shadow billed time-of-use rate, 53% of participants benefited with a 4% reduction in monthly electricity expenses, and 47% saw an increase of the same magnitude. Six window air conditioners (WAC) modified for remote control operation are awaiting installation ahead of the 2009 cooling season. Assuming successful operation, the balance of the building is planned to be outfitted with modified WAC units under separate contract. Technologies installed at Georgetown mews include submetering, fleet-managed window air conditioning, in-apartment energy information display, and in-apartment temperature sensing for boiler control heating. Other Multi-Family Buildings. Several other rental type apartments have been subjected to submetering and are in various stages of implementing time-of-use rates (shadow to actual billing). Results from the most recent year show energy and demand reductions in the range of 16-35%. Some of these buildings were the result of the Contractor replicating results from the experience gained at Georgetown Mews, but not directly funded under the program. The properties include Noble Mansions (237 units), Greenpark Essex/Sussex (282 units, 2 buildings), Trump Village 1 & 2 (881 units, 2 buildings), and Fresh Meadows (3,000 units). Some of these buildings also included in-apartment temperature sensing for boiler control. Initiated research planning and design for state-wide pilot of real-time in-home energy displays. Research is intended to 1) establish both the efficiency and conservation effects of real-time in-home energy feedback, 2) enable isolation of the effect of non-flat rate structures in the presence of a feedback display and 3) produce significant understanding on the feasibility in enabling residential and small load DR via in-home display and automation.		

5.8.3 Program Impact Evaluation

This section presents cumulative annual energy savings for Enabling Technologies, the precursor to Demand Response and Innovative Rate Research. Table 5-19 presents cumulative annual net energy and demand savings for the program from inception through December 31, 2008. Realization rates are developed to account for differences in program reported savings and performance of actual installations. Attribution analysis determines, through various methods, whether the gross savings estimate should be further adjusted downward or upward for freeridership or spillover. Adjustments for realization rate, and the net-to-gross ratio (accounting for freeridership and spillover) are also shown in the table.

Table 5-19. Demand Response and Innovative Rate Research Program Cumulative Annual Energy and Peak Demand Savings (Through December 2008)

	Program-Reported Savings	Realization Rate	Adjusted Gross Savings	Net-to-Gross Ratio	Net Savings
MW	208.3	0.50	104.2	0.95	99.0

5.9 Electric Transportation

5.9.1 Program Description

Analysis has shown that development, qualification, and deployment of advanced technologies for the electrified rail system could reduce peak load by as much as 100 MW in the highly constrained New York City T&D load pocket. New York's electrified commuter rail and subway system alone uses over two billion kWh a year and represents a 1,100 MW demand on the Con Edison distribution system.¹²³

The program supports projects in all stages of technology advancement and higher-risk projects are funded in phases. Successful completion of milestones will be required before beginning the next phase. Two competitive solicitations are anticipated. The first will target improving energy efficiency in the State's current electrified transportation infrastructure. This solicitation will be administered in collaboration with the New York City Metropolitan Transit Authority and the New York Power Authority. Activities will target conductor rails, regenerative braking systems, and propulsion efficiency. The second will target improving energy efficiency through the use of off-peak power in the transportation sector. This solicitation will target electrified anti-idling, plug-in hybrid vehicles, and reduced on-peak demand associated with producing and fueling alternative fuel vehicles.

The program supports emerging technologies from inception through field testing and pre-commercial deployment. Once a product is commercialized and has reliably demonstrated energy benefits, continued support is frequently available through deployment programs and from State and federal tax allowances. Helping to develop products that will make this transition is a fundamental goal of the program.

The ultimate goals of the program are:

- Improve the energy efficiency of the New York's current electrically powered commuter rail and subway system in the New York City load pocket.

¹²³ The subway system pays an SBC fee as do the private sector suppliers.

- Reduce costs of power transmission by allowing unused off-peak capacity to generate revenue and reduce transportation petroleum use, greenhouse gases, and criteria emissions.

The benefits of the electric transportation program will include peak load reduction in the New York City load pocket and permanent energy use reductions. These reductions will result in cost savings to the subway and commuter rail systems and lessen transmission congestion in the region. Additionally, many projects are expected to reduce transportation costs and emissions from petroleum fueled vehicles.

The program budget is \$5.0 million.

5.9.2 Recent Program Accomplishments

Table 5-20 shows the Program's activities over the most recent 30 months.

Table 5-20. Electric Transportation Program Goals achieved from July 1, 2006 through December 31, 2008

Activity	Achievements from July 1, 2006 through December 31, 2008
Solicitations released	8 closed and 2 open
Proposals reviewed	56
Projects funded	29 awarded, 15 contracted
Funding	3.9 million awarded, 2.5 million contracted
Co-funding	6.7 million awarded, 4.1 million contracted

Results to date include the following:

- Electric cars were leased to the public and charging stations were made available at commuter rail stations. Demand for the vehicles exceeded supply by nearly three-to-one. Thousands of gallons of gasoline were replaced by off-peak power.
- Tracksides storage of braking energy from subway cars will be field tested.
- A third-rail heater control system was field tested. This system has the potential of saving over 32,000 MWh annually if implemented throughout the New York City (NYC) transit system. An equal amount would be saved by implementing the automated switch heaters, also demonstrated. New York Power Authority (NYPA) and the Metropolitan Transit Authority (MTA) are reviewing a plan whereby NYPA finances the equipment and MTA makes repayments from the energy savings.

5.10 Environmental Monitoring, Evaluation, and Protection

5.10.1 Program Description

The EMEP Program commenced in the late 1990s in an effort to increase understanding of the environmental impacts of electricity production. EMEP initiatives are building on past efforts and evolving to support research in five primary areas:

- Ecosystem response to deposition of sulfur, nitrogen, and mercury, including continued support of the Adirondack Lakes Water Quality monitoring program with the Adirondack Lakes Survey Corporation and the NYS Department of Environmental Conservation.
- Health and energy-related research on air quality, particulate matter, ozone, and co-pollutants to support continued development of sound air quality management plans for attainment of new ozone and fine particle standards.
- Regional climate change research, including impacts of climate change on New York, and mitigation and adaptation options for the State.
- Environmental impacts of alternative energy resources, including effects of wind turbines and tidal-energy production on wildlife.
- Crosscutting environmental science, technology, and policy projects, such as mitigating environmental impacts of electricity generation critical for fuel diversity.

The program is guided by a steering committee comprised of major stakeholder groups. In addition a separate science advisory committee continues to provide technical review. The program has maintained a robust science and policy communication component to deliver program findings to policy-makers, scientists, and the public. As with previous efforts, NYSERDA is collaborating with regional and national entities to leverage funds for pertinent research projects.

The 13-year budget is \$39.1 million.

5.10.2 Recent Program Accomplishments

Recent program accomplishments are presented in Table 5-21.

Table 5-21. Environmental Monitoring, Evaluation, and Protection Program Goals achieved from July 1, 2006 through December 31, 2008

Activity	Program Goals (July 1, 2006 through June 30, 2011)	Achieved July 1, 2006 through December 31, 2008	% of Goal Achieved
Develop detailed multi-year EMEP research plan with input from policymakers, scientists, and stakeholders	Complete EMEP research plan and update research plan as needed to ensure relevancy	One planning meeting was held with the EMEP advisors, and three other major research planning meetings were held to assist in plan development. All of the attendees at the planning meetings were state or nationally recognized experts from the policy and scientific communities. NYSERDA contracted with the New York	N/A

Activity	Program Goals (July 1, 2006 through June 30, 2011)	Achieved July 1, 2006 through December 31, 2008	% of Goal Achieved
		Academy of Sciences to assist in the development of the research plan, which was finalized and released in September 2007. The Alternative Energy section was updated in April 2008, with details discussing the impacts of wind power development on wildlife in NYS.	
Develop, contract, and manage research projects aimed at priority energy-related environmental research areas	▪ Issue 6 to 10 solicitations ▪ Contract 40 projects ▪ Leverage \$20 million into New York, help build a knowledge-based research infrastructure in New York.	Seven solicitations have been issued that included EMEP funding (focusing on sequestration, impacts of renewable energy, ecosystems, air quality, and climate change). 45 projects have been contracted, leveraging \$7 million in outside co-funding.	70-100% of solicitation goal >100% of projects goal 35% of leveraged funds goal
Sponsor workshops, conferences, and seminars	5 to 10	EMEP co-sponsored two workshops on the creation of a soil-monitoring network in the Northeast. EMEP hosted a seminar (and "webinar") for multiple agency staff on recent findings from the Intergovernmental Panel on Climate Change with IPCC member Dr. Cynthia Rosenzweig. EMEP sponsored two Adirondack Research Consortium conferences. EMEP co-sponsored a conference on climate change at MIT's Endicott House. EMEP hosted its two-day biennial conference on Linking Science and Policy at the Albany Marriott. Co-sponsored a workshop at Columbia University on offshore carbon sequestration. Co-sponsored the America Response to Climate Change conference held in Tupper Lake in June 2008. Co-sponsored an Emissions Inventory Workshop in November 2008.	100%
Provide web-based EMEP data and information	200,000 total customer visits, inquiries, and downloads to the EMEP Web site	During this period, hits on EMEP Web sites totaled nearly 308,505 and downloads totaled more than 63,000.	>100%
Publish NYSERDA research reports	40	14 research reports and five summary communications were published, including a study of options for the design of the emission allowance auction under the Regional Greenhouse Gas Initiative (RGGI).	48%
Publish peer-reviewed journal articles	100	18 articles were published in the area of Air Quality/Health Effects, 33 articles	52%

Activity	Program Goals (July 1, 2006 through June 30, 2011)	Achieved July 1, 2006 through December 31, 2008	% of Goal Achieved
		were published in the area of Ecosystems, and one article was published in the area of Crosscutting Research.	
Provide briefings to decision makers	15	Held two day-long sessions for environmental stakeholders on EMEP's and NYSERDA's activities. Sponsored a meeting with policymakers concerning wind and wildlife. Briefed the new Department of Environmental Conservation (DEC) Climate Change Program Director on EMEP program activities. Arranged for a briefing to DEC staff on carbonaceous fine particle issues in New York and the region. Gave two briefings to NYSDEC and the Governor's Office regarding the results from the Environmental Impacts of Liquid Biofuels project.	47%

5.10.3 Program Outputs and Indicators

Accomplishments of the EMEP since its inception have been documented as part of a peer review value/cost assessment conducted in 2006. Highlights from this assessment as well as others since then include:

- Environmental monitoring data from hundreds of field sites throughout New York have been collected to support program goals.
- Monitoring research projects such as the EMEP-funded NY Supersite will be used to evaluate modeling tools and are expected, over the next few years, to significantly increase confidence in the reliability of these air-quality planning tools.
- Achievements in knowledge dissemination have been significant, with over 200 articles published in peer-reviewed journals.
- Researchers supported by EMEP have provided dozens of briefings to State and federal policymakers in a variety of forums including Congressional briefings/testimony, one-on-one briefings, and workshop and conference briefings.
- EMEP-sponsored research has affected energy-related policy at the State level, including:
 - Data from the Adirondack Lakes Survey Corporation's (ALSC) Long-Term Monitoring project, of which EMEP is the primary funder, and from the EMEP-funded Adirondack Cooperative Loon Project have been used as the supporting technical rationale for New York's Acid Deposition Reduction Program.
 - EMEP mercury research was used in determining the need for a New York State rule for mercury control from power plants. Relevant EMEP research used by the NYS DEC included:

mercury transport and source attribution modeling, wet deposition monitoring data, and mercury surveys in fish and loons.

- EMEP research has brought to light the vast extent of mercury contamination of fish in waters across New York State. Monitoring data have resulted in one of the largest changes in over a decade in fish consumption advisories by the NYS Department of Health, which now include advisories for all Adirondack and Catskill waters.
- Several EMEP research projects provided the scientific foundation for the development of a PM_{2.5} State Implementation Plan, which will ultimately affect utilities and other fossil fuel combustion systems in New York.
- At the federal level, EMEP research has affected policy in the following ways:
 - EMEP-sponsored data have been cited by the U.S. EPA as supporting technical information in evaluating the Clean Air Act Amendments of 1990 and the Clean Air Interstate Rule.
 - The New York State Department of Health recommended that EMEP findings on the effects of short-term SO₂ exposure on asthma be considered in the U.S. EPA's current review of the SO₂ National Ambient Air Quality Standard.
 - EMEP data have provided scientific evidence used in the court decision to strike down the trading component of the Clean Air Mercury Rule, which could have produced biological mercury "hotspots."
 - EMEP data on fine particle emissions from stationary natural gas combustion were used to update the National Emissions Inventory, which is the basis for air quality management plans in New York State and the United States.
 - Results on the speciation of PM_{2.5} and role of PM precursors from the Supersites programs, including early results of the NY Supersite, were used in the U.S. EPA's consideration of the Transportation Conformity Rule Amendments for the New PM_{2.5} National Ambient Air Quality Standard: PM_{2.5} Precursors.
 - EMEP has supported development of the Fluid Dynamic Measurement System (FDMS), based on Rupprecht & Patashnick's (now Thermo Electron) tapered element oscillating microbalance (TEOM) for semi-continuous measurement of fine particles. The U.S. EPA has approved the use of the FDMS by State and local air monitoring agencies as part of the AirNow network for fine PM. In addition, the State of California has recognized the FDMS as a California-approved sampler method.
 - EMEP-funded ozone and PM research has become central to the U.S. EPA's science and policy approach with respect to addressing long-range transport, the need for long-term modeling for SIPs, and how models are to be used for making policy.
 - EMEP research was used to update the U.S. EPA's Guidance on Models and Other Analyses in Attainment Demonstrations for the eight-hour Ozone NAAQS and more recently was used in EPA's Technical Support Document for the Final Clean Air Interstate Rule: Air Quality Modeling.

- EMEP research advanced the concept of an “airshed” for ozone and PM management—a concept that now has been embraced in a National Academy of Science report which recommends that new regulations consider how air pollution travels from state to state.

5.11 Industrial Process & Product Innovation Program

5.11.1 Program Description

The Industrial Process & Product Innovation (IPPI) Program¹²⁴ supports feasibility studies and technology demonstrations and commercialization that (1) improve energy productivity and competitiveness of New York manufacturers (minimize cost per unit of output), (2) encourage capital investment and employment growth in New York facilities, (3) introduce New York-manufactured goods into new markets, and (4) encourage adoption of process changes that minimize waste. Cost-shared demonstration projects reduce risk and encourage manufacturers to adopt innovative and underused product and process alternatives. IPPI combines two Industry programs, Industrial Process and Productivity Improvement (IPPI) and Industrial Product Development, to better serve the industrial sector’s needs. Occasionally, as a companion to the general-industry IPPI solicitation, the IPPI program will also offer a sector-specific solicitation (as is the case with PON 1236 “Energy Productivity in Innovative Local Food Production Systems”). IPPI is a collaborative effort of Industrial R&D and Energy Efficiency Services.

The five-year program budget is \$10 million.

5.11.2 Recent Program Accomplishments

Several goals have been set for the Industrial Process & Product Innovation Program. These goals and progress for the first 30 months ending December 31, 2008 are shown in Table 5-22.

¹²⁴ This program was formerly known as the Industrial Research, Development and Demonstration Program.

Table 5-22. Industrial Process & Product Innovation Program – Near-Term Goals and Achievements

Activity	Program Goals (July 1, 2006 through June 30, 2011)	Achieved from July 1, 2006 through December 31, 2008	% of Goal Achieved
Issue annual solicitations	Fund 30 to 40 cost-shared projects	PON 998 was issued with two rounds of due dates (June 8, and October 5, 2006), with total funding of \$4 million. Projects selected to receive SBC funding: Round One: 6 Round Two: 5 PON 1130 was issued with three rounds of due dates (March 28, July 16, and November 8, 2007), with total funding exceeding \$5.7 million. Projects selected to receive SBC funding: Round One: 3 Round Two: 5 Round Three: 5 PON 1190 was issued in November '07 with three rounds of due dates (March 5, July 2, and November 5, 2008) with total funding of \$5.5 million. Projects selected to receive SBC Funding: Round One: 5 Round Two: 5 Round Three: TBD PON 1206 was issued with two rounds of due dates (May 1st, and November 13, 2008) with total funding of \$3 million. Project selected to receive SBC funding: Round One: 0 Round Two: TBD PON 1236 was issued with two rounds of due dates (October 2, 2008 and January 8, 2009) with total funding of \$1.5 million. Projects selected to receive SBC funding: Round One: 3 Round Two: TBD	97-130%
Technology transfer	Conduct technology transfer and outreach activities to broaden the acceptance of successful technologies and technical approaches via participation in at least two workshops. Publish final reports as projects are completed..	This is an on-going activity that usually takes place near the end of a project, which hasn't happened yet for this relatively new program..	N/A

Program metrics	Industrial Process and Productivity Improvement (IPPI) projects supported during the SBC III period are expected to result in cumulative energy savings of \$5 million, and project-related incremental sales of \$10 million.	Projects are being contracted with requirements for documentation of performance metrics. Projects have not yet been completed; therefore, metrics cannot be ascertained at this time.	N/A
-----------------	--	--	-----

Program Outputs and Indicators Over the past ten years NYSERDA Industrial Process and Productivity Improvement Program averaged \$1.75 million in annual funding, and resulted in cumulative energy savings of almost \$20 million, non-energy benefits in excess of \$21 million, project-related incremental sales of almost \$40 million, and approximately 85 new jobs. This program combined statutory R&D funds and EES federal funds. This program has only been funded with SBC funding for two years – prior funding was completely statutory.

This section highlights key program outputs and market progress. All values reported are cumulative since program inception. Table 5-23 the key outputs for IPPI and Industrial Product Development (IRDD predecessor) through December 31, 2008. In addition to the key outputs, several long-term success indicators will also be tracked including: energy, demand and fossil fuel savings, cost savings from productivity improvements, processes developed, and processes deployed.

Table 5-23. IPPI – Key Program Outputs

Outputs	Goal through 2011	Value (Cumulative through December 2006)	Value (Cumulative through December 2007)	Value (Cumulative through December 2008)
Number of Solicitations completed	5 PONs, 14 due dates	1 PON, 2 due dates	2 PONs, 5 due dates	5 PONs, 10 due dates
Number of proposals reviewed/Recommended for SBC funding	300/40	40/11	104/24	220/37
Number of signed contracts	40	4a	8b	23c
SBC Funds Encumbered (Signed contracts)	\$10,000,000	\$574,251	\$1,938,251	\$4,500,557
Co-funding by Project Participants (For Signed contracts)	\$20,000,000	\$912,505	\$3,962,641	\$11,223,296
SBC Funds Committed	\$10,000,000	\$1,513,547	\$3,962,641	\$6,342,709
New products developed and Energy Savings from Demonstrations	-	-	-	-

a Four projects were terminated prior to contract signing and three contracts are not yet completed or signed.

b Five projects were terminated prior to contract signing and 12 contracts are not yet completed or signed.

c 5 projects were terminated prior to contract signing, one project became a mod to an existing project and eight contracts are not yet completed or signed.

Shown in Table 5-26 is a distribution of contracted projects by type.

Table 5-24. IPPI Contracts by Project Type Through December 2008

	Number of Projects Contracted (Since July 2006)	Funds Encumbered (\$)
Research Studies (feasibility studies, market assessments, etc.)	9	\$611,802
Process Improvement Demonstrations	11	\$3,012,380
Product Development	3	\$876,375
Total	23	\$4,500,557

Municipal Water and Wastewater Efficiency

5.11.3 Program Description

Since 2000, NYSERDA's Municipal Water and Wastewater Initiative has supported projects that accelerate the use of energy-efficient and innovative technologies by municipal water and wastewater treatment systems in New York through demonstrations, feasibility studies, and technology transfer. Approximately 2.5 to 3 billion kWhs are consumed by municipal water and wastewater treatment plants in New York every year. On average, the sector consumes 35% of a typical municipality's energy budget.

There are currently 16 SBC-funded water and wastewater projects, derived from eight solicitations that were developed jointly by NYSERDA's R&D and EES staffs. Five of the eight solicitations were PONs that solicited proposals to demonstrate and evaluate innovative or underused energy-efficient water and wastewater technologies. The sixth was an RFP that solicited proposals to demonstrate real-time monitoring of energy and environmental performance at wastewater treatment plants, with the goal of attracting the energy service sector to the municipal wastewater market. The seventh was an RFP that solicited proposals to benchmark energy use and evaluate the potential for energy efficiency and energy production improvements in the sector. The eighth was a PON to establish the Energy Smart Focus on municipal water and wastewater. A technology transfer project, derived outside of the eight solicitations, is helping to increase the use of a specific energy-efficient filtration technology by providing technical assistance for up to 10 wastewater treatment plants. Technology transfer and outreach were significant components of all of these projects. In addition, the Technical Assistance (TA) Program has served municipal water/wastewater customers since 1997, including 70 site-specific analyses, and the municipal water and wastewater treatment sector has been integrated into the Enhanced Commercial/Industrial Performance program.

Going forward, the Municipal Water and Wastewater Efficiency Program will continue to focus on providing municipalities with information, resources, and services to increase the standard of energy efficiency in the sector, and will continue to be a collaborative effort between NYSERDA's R&D and EES staffs. To that end, the program will continue to support cost-shared demonstration projects to reduce risk and encourage adoption of innovative or underused energy-efficient technologies and practices. Technical assistance will continue to be emphasized for municipalities seeking to upgrade or improve the energy efficiency of their equipment and operations. Energy efficiency incentives will

continue to be offered to move the market toward increasing demand for more efficient equipment. Technology transfer and outreach will continue to be key components of the program, to encourage the adoption of innovative and energy-efficient technologies and practices. Additionally, energy management training will be developed and offered for treatment plant operators, municipal decision makers, consultants, and product vendors.

5.11.4 Recent Program Accomplishments

Several long-term, five-year goals have been set for the Municipal Water and Wastewater Efficiency Program. Since July 1, 2006, the Program has been making good progress toward all of its long-term goals as are shown in Table 5-25.

Table 5-25. Municipal Water and Wastewater Efficiency Program Goals achieved from July 1, 2006 through December 31, 2008

Activity	Program Goals (July 1, 2006 through June 30, 2011)	Achievements from July 1, 2006 through December 31, 2008	% of Goal Achieved
Issue annual solicitation	Select and fund 25 or more projects. Provide assistance to a minimum of 25 municipal wastewater and water treatment facilities.	PON 1040 was issued and 17 proposals were received requesting \$3.9 million in NYSERDA funding. In total, five proposals were recommended for funding; two using SBC funds. The first round of PON 1171 was issued in February 2008 and 12 proposals were received requesting \$3.4 million in NYSERDA funding. Four projects were selected: one is in the contract-development stage and three have been contracted; all will be funded with SBC 3 monies. Projects recommended for funding come from proposals received in response to the annual solicitation. One goal of the solicitation is that all projects selected ultimately produce results with widespread applicability to the municipal wastewater and water sector in New York; this is referred to as "long term assistance". All six projects are anticipated to provide assistance to multiple municipal wastewater and water treatment facilities in New York in both the near and long term.	24%

Activity	Program Goals (July 1, 2006 through June 30, 2011)	Achievements from July 1, 2006 through December 31, 2008	% of Goal Achieved
Technology transfer	Provide critical information on ways to optimize energy use at municipal wastewater and water treatment facilities. Provide information to 1,000 individuals serving the municipal wastewater and water treatment sector in New York.	<u>2006 Achievements:</u> Four presentations were given throughout the State as part of the NY Co-funding for Water and Sewer Infrastructure conferences. The total attendance for the four conferences was approximately 300 individuals. A presentation was given as part of a webcast hosted by the Comptroller's Office. An energy management training conference was co-developed with Global Energy Partners and the New York Water Environment Association (NYWEA). Approximately 70 individuals (municipal operators and elected officials, consultants, engineers) attended the two-day session held in Cooperstown in November. <u>2007 Achievements:</u> The submetering and evaluation of 20 wastewater treatment plants were completed. The final site reports and summaries of findings were posted online. Four presentations were given throughout the State as part of the NY Co-funding for Water and Sewer Infrastructure conferences. The total attendance for the four conferences was approximately 300 individuals. An Energy Management issue of <i>Clearwaters</i> (published by NYWEA) was developed. NYWEA is the New York State chapter of the nation's premier professional organization for the wastewater treatment profession (Water Environment Federation). <u>2008 Achievements:</u> During the first half of 2008, ten presentations were given to diverse audiences: three to Congresswoman Gillibrand's constituency, one at the annual NYWEA conference in New York City, one to local elected officials in White Plains, one at the NY section AWWA spring meeting; one as part of the Genesee/Finger Lakes Regional Planning Commission's summer conference; one as part of the Adirondack Research Consortium annual meeting; one during the NYWEA spring meeting; and one at the national AWWA conference. In total, approximately 550 individuals attended the presentations. The Energy Management issue of <i>Clearwaters</i> (developed by NYSERDA) was published in 2008 and article titled "Supporting the Sustainability of Municipal Water Treatment Assets through Energy Efficiency" was submitted to <i>Clearwaters</i> and published in the winter issue, which was devoted to sustainable infrastructure. On-going: The Energy Smart Focus program is providing customized services to support energy efficiency in the sector. The program offers outreach materials and training to individuals associated with the sector statewide	100%
Energy and cost savings	\$2-3 million per year	See paragraph below for explanation of progress.	

Activity	Program Goals (July 1, 2006 through June 30, 2011)	Achievements from July 1, 2006 through December 31, 2008	% of Goal Achieved
Technical Assistance	Develop, review and approve 30 projects	In total since July 2006 through 2008, nine projects were begun totaling \$186,000; and nine others were completed at a total cost of \$143,500. In 2008 four of these projects were begun and four were completed.	60%

Program Outputs and Indicators As of December 2008, \$4.64 million has been committed under the targeted water and wastewater initiative. An additional \$1.34 million has been awarded for municipal water/wastewater projects under the TA Program. Table 5-26 summarizes the funding status of the programs.

Table 5-26. Project and Funding Status through December 2008¹

	Number of Projects Approved	Funds Awarded (\$ million)	Co-funding (\$ million)
RFP 769 Energy Efficiency Improvements at Water & Wastewater Treatment Plants	1	\$0.13	\$0.05
RFP 601 (Submetering) ²	2	\$1.1	\$0.4
Demonstration Projects (569, 786, 857, 935, 1040, 1171)	16	\$2.99	\$4.09
Technical Assistance ³	81	\$1.34	\$1.34
Technology Transfer	1	\$0.1	\$0.1

¹Table does not include metrics on the Energy Smart Focus PON

² Funded in part under the general Technical Assistance Program

³ Funded under the general Technical Assistance Program

5.11.5 Program Impact Evaluation

Energy Savings

On average, these projects take five to seven years from conception to implementation. However, once implementation is complete, the projects should lead to nearly 44,500 MWh of electricity savings and 15,067 kW of peak demand reduction. Depending on the effectiveness of information dissemination from knowledge created, the potential exists for substantial MWh savings and demand reductions due to replication across the broader New York municipal water/wastewater market sector.

5.12 Next Generation and Emerging Technologies

5.12.1 Program Description

The Next Generation and Emerging Technologies program emphasizes discrete and integrated end-use technologies for buildings, daylighting applications, solar thermal applications, and emerging technologies for industry and buildings not covered elsewhere in NYSERDA's portfolio of New York

Energy SmartSM programs. The bulk of funds will be administered through narrowly defined competitive solicitations. Areas of focus include:

- Advanced Building Products Program concentrates on residential one- to four-family units. The advanced building demonstration element addresses the whole building – striving to reach a 92 or greater HERS rating (qualifying ENERGY STAR homes start at a HERS rating of 84). The discrete building technologies element targets development and demonstration of distinct technologies, e.g., energy systems (production and recovery), heating and cooling, air quality, etc.
- Emerging technologies to support development and demonstration of new technologies that improve electric end-use efficiency.
- Solar thermal applications to support demonstration and provide technical assistance to advance economical collection and utilization of solar thermal space and water heating.
- Lighting incubator program activities that develop and commercialize advanced lighting technologies.
- Power quality, energy management, controls and sensors activities that promote development of technologies that enable customers to monitor and control energy use and power quality.

The program emphasis is on funding developers of energy-efficient technologies that would be commercially available to end users. Demonstration solicitations are open to all end-use customers, particularly those with high electric loads. For example, advanced building demonstrations focus exclusively on residential homes of one to four units.

A new program focus is data center efficiency. A raising demand for computer resources has led to significant growth in the number of data center servers increasing the energy used by these servers and the power and cooling infrastructure (30 to 50% of the energy) that supports them. The energy used by servers and data centers is estimated to be about 61 billion kilowatt-hours (kWh) in 2006 (1.5 percent of total U.S. electricity consumption). Under current efficiency trends, energy consumption by servers and data centers is expected to double in the next five years. Increasing energy use, rising energy prices and white space cost (floor space), and the need for reliable power are causing many data centers to consider re-locating out of the state, leading to the loss of high paying jobs. New York State has the second highest number of data center sites in the U.S.

NYSERDA's Data Center and Server Efficiency Program targets the escalation in energy use by data centers and the need for effective energy-efficiency strategies and new energy saving technologies. Energy efficiency opportunities in servers and data centers include improved operation, adoption of best practices and technologies, and the availability and utilization of state-of-the-art technologies. Depending on the current state of the data center and level of energy efficiency opportunities implemented, a 30 to 80% improvement in energy efficiency could be realized.

Past solicitations have addressed transportation, sensors, energy efficiency, superconductivity, power quality, energy management, and time sensitive pricing.

The thirteen-year program budget is \$42.7 million.

5.12.2 Recent Program Accomplishments

Table 5-27 shows the Program's five-year goals and performance over the most recent 30 months.

Table 5-27. Next Generation and Emerging Technologies Program – Long-Term Goals and Achievements through December 31, 2008

Activity	Program Goals (July 1, 2006 through June 30, 2011)	% of Goal Achieved
Advanced Building Program	Two solicitations Two or more demonstration test beds	>100% of solicitations goal >100% of demo beds goal
<u>Achievements (July 1, 2006 through December 31, 2008)</u>		
<u>Seven solicitations</u> completed and two new solicitations are expected to be released in 2009. PON 1232 Super Insulated Residential Building Opportunities for New and Existing Construction, is expected to be released in Spring 2009. PON 1294 Emerging Technologies for Residential Buildings, is expected to be released in Summer 2009. Twenty projects are contracted consisting of six feasibility studies, eight product development projects, and <u>six demonstrations</u>. ===== RFP 1032 Reference Design Guidebook. This project identified incremental measures needed to raise energy performance of new residential construction. The final report was submitted in October 2007. PON 1062 Advanced Building Envelopes and Energy Systems. Proof of concept is complete for one project; continued work will be funded under PON 1215. Both projects are completed, submission of final report pending. PON 1126 Next Generation Technologies for Residential Buildings. Two rounds of solicitations have been completed and seven projects from the first round are under way. Under round two, four projects are under way and one contract is in the contracting stage. The projects will develop and demonstrate technologies that reduce air conditioning loads, on-site power production systems, design strategies for reducing electric load, and other energy efficient technologies. PON 1096 Demonstration of High Performance Residential Homes. Four teams were formed to design, build, and demonstrate as many as 25 high-performance residential homes illustrating the importance of tight building envelopes and improving on-site construction practices. Six houses have been built to date. PON 1215 Next Generation and Emerging Technologies for Residential Buildings. Under round one, one project is currently in the contract negotiation phase, three projects are underway. Under round two, four projects are in the contracting stage. This program has explored advanced building systems with areas of focus such as whole-house ventilation, compression-less air conditioning, window improvements, and micro-CHP.		
Daylighting Applications	50-100 design assistance projects Five daylighting implementations in buildings	6-12% of the design assistance goal 20% of the daylighting goal
<u>Achievements (July 1, 2006 through December 31, 2008)</u>		
<u>Six</u> clients have received daylighting design assistance services. <u>One daylighting implementation</u> project is under way. ===== PON 1079: Daylight Technical Services, Training and Demonstrations. All five contracts have been signed and work is under way. RFP 1068: Establishment of a Lighting Incubator Center to Support Lighting Start-up Companies in New York. The office for the Lighting Green House incubator has been established at STEP. Business assistance work is underway. PON 1122: Innovation in Lighting: New Products, Demonstrations, and Testing: all five contracts have been signed and work is under way. Release of a new PON is anticipated for late spring 2009 which will include solid state lighting as an area of focus. PON 1207: Solid State Lighting Research and Demonstration was released for the first time. Six projects were selected for funding; all are in the contract negotiation stage.		

Activity	Program Goals (July 1, 2006 through June 30, 2011)	% of Goal Achieved
Solar Thermal Applications	Two solicitations Five demonstrations	50% of the solicitations goal >20% of the goal for demonstration projects
<u>Achievements (July 1, 2006 through December 31, 2008)</u> <u>One solicitation</u> is completed. Solar Thermal applications may continue to be funded under EEPS. Development of a new solicitation is on hold until a decision has been made. <u>One demonstration</u> project is under contract. ===== PON 1085 — Solar Thermal Demonstrations. Six contracts are signed; three are being negotiated. Eight of the nine projects are demonstrations focusing on combinations of solar thermal collectors, radiant floor heating systems, and storage. Five out of 12 systems have been installed. These statutory projects were originally funded as SBC.		
Emerging Technologies	Five solicitations 25 product development projects	80% of the solicitations goal 52% of the projects goal
<u>Achievements (July 1, 2006 through December 31, 2008)</u> <u>Nine solicitations completed to date.</u> Two rounds completed under PON 1105, and <u>one round</u> out of two are completed for PON 1031, PON 1164 and PON 1206. A continuation of both the Next Generation Emerging Technologies solicitation (PON 1105) and the Advanced Sensors & Controls for Energy Management, Power Quality & Electricity System Reliability solicitation are expected to be released in Fall 2009 and Summer 2009, respectively. <u>Twenty product development</u> projects underway. ===== PON 1105 Next Generation Emerging Technologies: Under Round One, nine contracts are signed and work is underway. Under Round Two, five contracts are signed, and four contracts are in negotiation. PON 1031: Advanced Sensors & Controls for Energy Management, Power Quality & Electricity System Reliability. Under round one, five contracts are signed, two are under negotiation. PON 1164: Advanced Sensors and Controls for Building and Industrial Applications. Under round one, two contracts are underway. Under round two, three projects are in the contract negotiation stage. PON 1206: Data Centers & Server Efficiency was released for the first time. Under round one, One project is underway; three are in the contract negotiation stage. Under round two, four projects were selected for funding, all are in the contract negotiation stage. This program has funded a wide variety of product development and demonstration of end-use technologies including thermo-photovoltaic applications, micro-CHP, solid cooper rotor electric motors, high-efficiency bill board displays, solar thermal air conditioning.		

5.12.3 Program Outputs and Indicators

Since its inception in September 1998, the program has awarded projects totaling nearly \$41 million, and contracted nearly \$33 million. Projects were categorized into the following project types:

- Research/Support Studies: include studies that analyze market potential, technological feasibility, and other studies designed to inform policy makers and supply-side market actors.
- Product Development: projects that are focused on a clearly defined product and benefit New York manufacturers.
- Demonstration: projects that demonstrate the performance of products that are commercially available.

- Conference/Membership: projects support activities related to conferences and association membership.

The distribution of funding by project type projects is shown in Figure 5-10. Demonstration projects represent 42% of the funding, followed by Product Development with 33% of the funding. The distribution of funding by sector is shown in Figure 5-11. The Industrial sector has been awarded the most funding with 38%, followed by Services at 24% and Education at 20%.

Figure 5-10. Distribution of Funding by Project Type through December 31, 2008

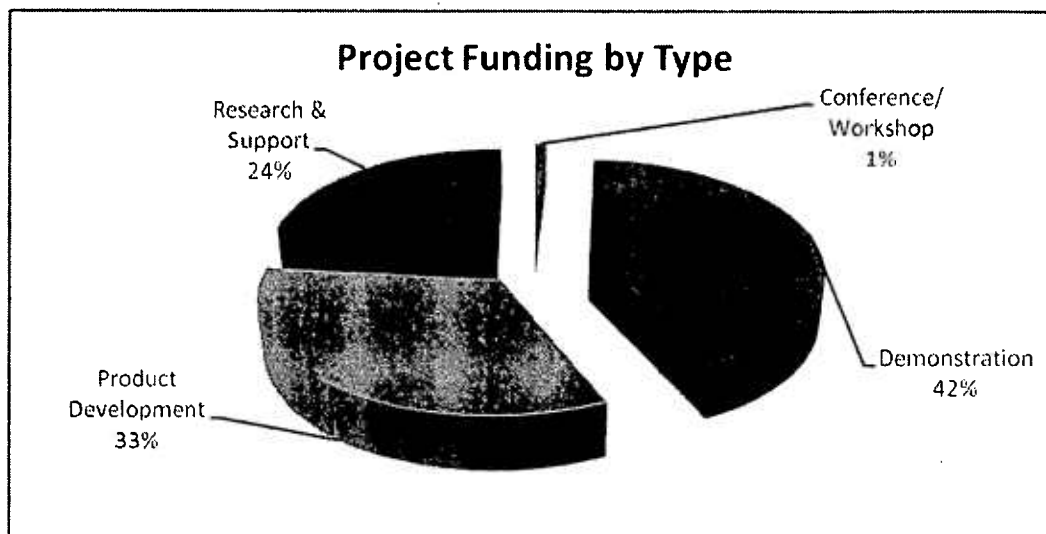
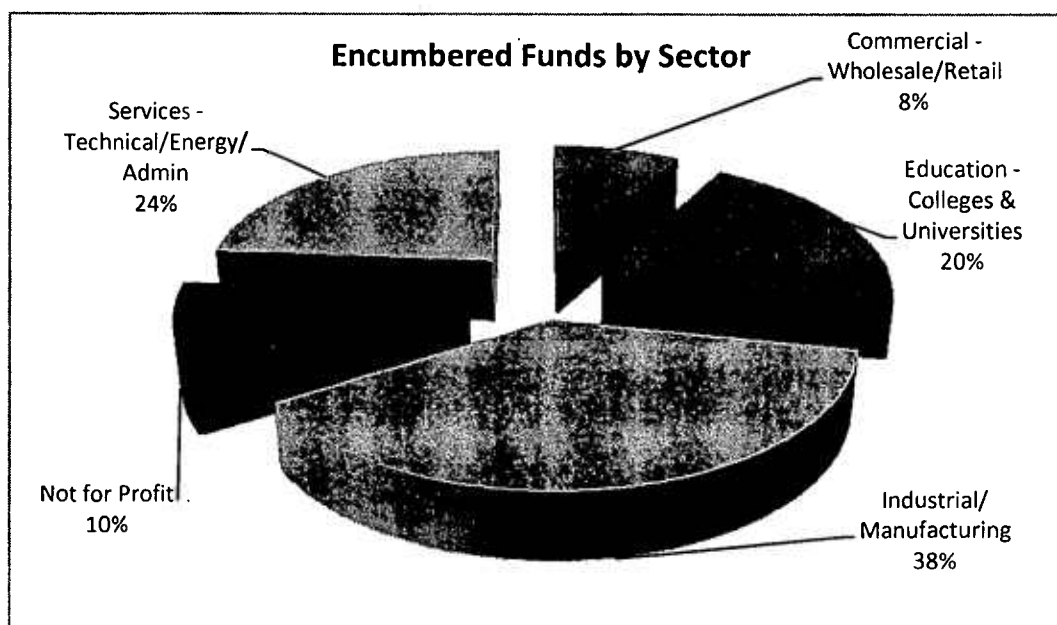


Figure 5-11. Next Generation and Emerging Technologies Funding by Sector through December 31, 2008



Shown in Table 5-28 is a list of new products developed to date, and Table 5-29 lists products under development.

Table 5-28. Next Generation and Emerging Technologies New Product Development

Product Name	Development Objective
Ultra-Low Power Oil-fired Burner	Confirm fitness for full scale commercialization of the Ultra-Low Power system.
Voltage Sag Mitigation Device	Evaluate performance characteristics of an energy-efficient, voltage sag mitigation technology.
T 9000	Development and evaluation of a wall mounted, wireless thermostat control system for baseboard electric heaters and room air conditioners.
Power-Line-Carrier Controlled Fluorescent Lighting	To develop an ultra-efficient, electronic, sub-miniature dimming ballast (SMDB) for fluorescent lighting in the power range of 13W to 32W and a high power electronic dimming ballast (HPEDB) in the power range of 60W to 200W; both with 10-year reliabilities and on/off/dimming control functions through the use of power line carrier controls.
Online Lighting Education Training	To develop and conduct on-line educational seminars on energy efficient lighting systems for key lighting decision-makers in New York State.
Low electric power battery backup oil-fired heating system	Develop and laboratory test a self-powered, oil-fired, heating system for residential and small commercial buildings.
Hybrid Skylighting System	To design, evaluate and demonstrate a hybrid skylighting system combining a skylight with a photosensor to moderate electric light use.
HID Wallpack & Floodlight	To develop, manufacture and market high quality, affordable high intensity discharge (HID) wallpack and floodlight fixtures.
Revolutionary Power Cell	Design and develop a hybrid system including a high power density battery integrated with the contractor's high energy density power cell and demonstrate it in a small electric vehicle.

Table 5-29. Examples of New Product Development Efforts Underway

Product Description	Development Objective
Combined Heat & Power for Households: The Practical Acoustic-Stirling Solution	The project will demonstrate a novel solution to residential co-generation by capturing and using the waste heat generated from a residential furnace or boiler to produce electricity on site for household use.
Demonstration of 600 Watt TPV for Gas Furnace CHP	Thermophotovoltaic electricity generation (TPV) is based on the photovoltaic (PV) conversion of infrared radiation. The infrared radiation is generated by heating an appropriate emitter. The technical goal for this project is to design a 600 watts TPV system that can be used to self-power a residential warm-air furnace.
Intelligent Outlet Project	The goal and objective is to research, develop and market an intelligent outlet which enables consumers to measure and analyze the amount of energy drawn by the devices in standby mode and disable the power to the devices during the times that were noted to not be in use.
Electropolymeric Dynamic Display System (EDDS) Window	The goal of this project is to create a solar responsive façade that substantially lowers the buildings energy consumption profile through the reduction in electric lighting, heating and cooling loads.
Piezoelectric Vibrational Energy Harvester	The goal of this project is to deliver the first integrated, complete power source based on Microgen's PVEH technology. This system will be a first-effort, developmental system, but is expected to provide enough power to successfully power a chosen commercial wireless sensor node in a relevant environment.

Appendix A: Benefit/Cost Analysis Inputs

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

Year	Energy Costs (Cents/kWh in Constant 2008\$)			Capacity Costs (Per kW-Year in Constant 2008\$)		
	Upstate	Downstate	Blended	Upstate	Downstate	Blended
2003	18.80	91.43	45.67	18.80	91.43	45.67
2004	18.80	91.43	45.67	18.80	91.43	45.67
2005	12.92	87.73	40.60	12.92	87.73	40.60
2006	27.87	89.22	50.57	27.87	89.22	50.57
2007	35.63	90.39	55.89	35.63	90.39	55.89
2008	31.13	55.19	40.04	31.13	55.19	40.04
2009	38.88	55.83	45.15	38.88	55.83	45.15
2010	46.29	121.58	74.15	46.29	121.58	74.15
2011	53.21	121.62	78.52	53.21	121.62	78.52
2012	59.72	121.48	82.57	59.72	121.48	82.57
2013	65.90	127.86	88.82	65.90	127.86	88.82
2014	71.78	124.15	91.16	71.78	124.15	91.16
2015	77.31	116.60	91.85	77.31	116.60	91.85
2016	82.46	125.99	98.57	82.46	125.99	98.57
2017	87.26	140.32	106.89	87.26	140.32	106.89
2018	91.80	141.57	110.22	91.80	141.57	110.22
2019	95.99	142.59	113.23	95.99	142.59	113.23
2020	99.99	143.58	116.12	99.99	143.58	116.12
2021	103.68	144.40	118.75	103.68	144.40	118.75
2022	103.58	144.26	118.63	103.58	144.26	118.63
2023	103.68	144.40	118.75	103.68	144.40	118.75

Blend reflects 63% Upstate and 37% Downstate.

Electric energy prices for 2003 to 2007 reflect load-weighted hourly day-ahead NYISO clearing prices in each of those years. Energy prices for the period 2008 to 2023 were estimated by DSP in December, 2008.

Capacity prices for 2004 to 2007 were calculated from capacity auction clearing prices in each of those years; 2003 capacity prices were set to equal 2004 capacity prices. Capacity prices for the period 2008 to 2023 were estimated by DPS in December, 2008. Costs include reserve margin requirements.

Starting in 2008, Downstate is Zone I only. For the period 2003 to 2007, Downstate depicts as Zones H,I, and J.

Table A-2. Natural Gas Wholesale Price Forecast (Per MMBtu in Constant 2008\$)

Year	Upstate	Downstate	Blended
2004	7.31	7.76	7.47
2005	10.65	11.10	10.81
2006	7.91	8.02	7.95
2007	7.78	8.96	8.22
2008	10.26	10.79	10.46
2009	8.50	9.03	8.70
2010	8.29	8.82	8.48
2011	8.08	8.61	8.28
2012	7.88	8.41	8.07
2013	7.88	8.41	8.07
2014	7.88	8.41	8.07
2015	7.88	8.41	8.07
2016	7.95	8.48	8.14
2017	8.02	8.55	8.21
2018	8.09	8.62	8.28
2019	8.09	8.62	8.28
2020	8.09	8.62	8.28
2021	8.09	8.62	8.28
2022	8.09	8.62	8.28
2023	8.09	8.62	8.28
2024	8.09	8.62	8.28
2025	8.09	8.62	8.28
2026	8.09	8.62	8.28
2027	8.09	8.62	8.28

Source: Energy and Environmental Analysis, Inc.

Blend reflects 63% Upstate and 37% Downstate.

Table A-3. Retail Electricity Price Forecast

Year	Upstate Retail Electricity Price (2008 \$/kWh)			Downstate Retail Electricity Price (2008 \$/kWh)			Blended (2008 \$/kWh)
	Residen-tial	Commer-cial	Indus-trial	Residen-tial	Commer-cial	Indus-trial	
2003	0.192	0.239	0.168	0.108	0.149	0.098	0.158
2004	0.197	0.245	0.173	0.109	0.152	0.098	0.161
2005	0.195	0.249	0.157	0.112	0.144	0.104	0.158
2006	0.232	0.274	0.172	0.119	0.152	0.112	0.172
2007	0.225	0.273	0.141	0.131	0.156	0.109	0.170
2008	0.221	0.275	0.189	0.129	0.164	0.131	0.183
2009	0.221	0.275	0.189	0.129	0.164	0.131	0.183
2010	0.221	0.275	0.189	0.129	0.164	0.131	0.183
2011	0.221	0.275	0.189	0.129	0.164	0.131	0.183
2012	0.221	0.275	0.189	0.129	0.164	0.131	0.183
2013	0.221	0.275	0.189	0.129	0.164	0.131	0.183
2014	0.221	0.275	0.189	0.129	0.164	0.131	0.183
2015	0.221	0.275	0.189	0.129	0.164	0.131	0.183
2016	0.221	0.275	0.189	0.129	0.164	0.131	0.183
2017	0.221	0.275	0.189	0.129	0.164	0.131	0.183
2018	0.221	0.275	0.189	0.129	0.164	0.131	0.183
2019	0.221	0.275	0.189	0.129	0.164	0.131	0.183
2020	0.221	0.275	0.189	0.129	0.164	0.131	0.183
2021	0.221	0.275	0.189	0.129	0.164	0.131	0.183
2022	0.221	0.275	0.189	0.129	0.164	0.131	0.183
2023	0.221	0.275	0.189	0.129	0.164	0.131	0.183

Historical retail prices based on typical bills for residential customers with 750 kWh of annual use, commercial customers with 9,000 kWh of annual use, and industrial customers with 720,000 kWh of annual use. Price per kWh was calculated by dividing the variable cost portion of the bill (*i.e.*, total bill minus fixed charges) by the kWh usage. Source: <http://www.dps.state.ny.us>.

Real prices in year 2009 to 2003 assumed to remain unchanged from 2008.

Blend reflects 63% Upstate and 37% Downstate; 15% Residential, 54% Commercial, and 31% Industrial.

These prices were used to estimate consumer bill savings.

Table A-4. Natural Gas Retail Price Forecast

Year	Natural Gas Retail Price (2008 \$/MMBtu)			
	Residential	Commercial	Industrial	Blended
2003	12.34	9.16	7.83	10.67
2004	13.32	10.77	8.58	11.85
2005	15.21	13.14	10.08	13.86
2006	15.73	11.96	10.59	13.77
2007	14.60	11.93	9.75	13.07
2008	15.61	13.12	10.78	14.15
2009	13.06	10.11	8.19	11.43
2010	13.86	11.05	9.00	12.28
2011	13.94	11.15	9.08	12.37
2012	14.02	11.25	9.16	12.46
2013	14.11	11.35	9.25	12.54
2014	14.19	11.44	9.33	12.63
2015	14.27	11.54	9.42	12.72
2016	14.36	11.64	9.50	12.81
2017	14.44	11.74	9.59	12.90
2018	14.52	11.84	9.67	12.99
2019	14.61	11.93	9.76	13.08
2020	14.69	12.03	9.84	13.16
2021	14.77	12.13	9.93	13.25
2022	14.85	12.23	10.01	13.34
2023	14.94	12.33	10.10	13.43
2024	15.02	12.43	10.18	13.52
2025	15.10	12.52	10.26	13.61
2026	15.19	12.62	10.35	13.70
2027	15.29	12.75	10.46	13.81

Note: Blend reflects 63% Upstate and 37% Downstate; 15% Residential, 54% Commercial, and 31% Industrial.

These prices were used to estimate consumer bill savings.

Source: Natural Gas Retail Price Forecast, NYSERDA, January 2009.