

SECTION 3.2

ENERGY EFFICIENCY ASSESSMENT

INTRODUCTION

Using energy more efficiently can save money, help promote a cleaner environment, and increase energy security by reducing the State's use of energy and its reliance on imported sources of energy. New York is committed to supporting investments in energy efficiency as described throughout this section. The State's System Benefits Charge (SBC) public-benefits program is highly-regarded nationally. The Long Island Power Authority and New York Power Authority complete the Statewide effort by offering attractive energy efficiency programs to their customers. Several new, aggressive energy efficiency efforts compliment these existing programs. Governor Pataki's Executive Order 111 calls for State agencies and other State entities to reduce their energy use 35% by 2010, relative to 1990 levels. New York is also in the process of adopting more stringent Energy Conservation Construction Code amendments that would make the State's code one of the most progressive in the country.

This Energy Efficiency Assessment provides a history of the State's energy efficiency initiatives, descriptions of current program offerings with funding levels and achievements to date, and projected future funding levels and achievements for major energy efficiency initiatives. This section also discusses the benefits of energy efficiency, as well as the potential for, and the barriers to, further improvement. For the purposes of this assessment, energy efficiency is defined as providing permanent reductions in energy use while maintaining equal or greater quality of services.¹

ENERGY EFFICIENCY IN NEW YORK STATE

This section describes the evolution of energy efficiency programs in New York, including funding levels for major efficiency initiatives over the past eleven years.

Evolution of Energy Efficiency Programs

The nature of the State's energy efficiency programs has changed markedly over

¹ This assessment does not include temporary load curtailment or price responsive load management activities, which are discussed in the Electricity Assessment, Section 3.4, of the State Energy Plan.

the past twenty years. The most significant early investments in energy efficiency programs occurred under the demand-side management (DSM) programs offered by the State's investor-owned utilities. In 1984, the New York State Public Service Commission (PSC) required investor-owned utilities (IOUs) to develop pilot DSM programs to improve energy efficiency and load management. At the PSC's direction, funding for these programs was initially set at approximately \$25 million per year.

After a three-year period, the PSC determined that DSM programs represented a viable option for helping to meet future electricity needs in the State, and the IOUs were directed to develop annual and long-range plans for continuing and expanding such programs. During the period from 1987-1989, utility DSM programs were largely focused on load management. Then, regulatory actions in the early 1990s caused programs to shift toward energy efficiency. In 1992, IOU expenditures on DSM programs reached a peak of \$286 million. At this point, program offerings were quite diverse, ranging from rebates for residential customers to financial incentives for installing high-efficiency measures in industrial facilities. In 1994, DSM expenditures began to decline in part due to the escalating effect of DSM spending on electricity rates, coupled with low prevailing energy prices. Large reserve margins and the economic recession were also factors. DSM expenditures continued to decline through 1996 until the PSC established New York's SBC program.

New York's SBC program was established in May 1996 by PSC Opinion No. 96-12² to fund public benefit programs during the State's transition to a competitive retail electricity market. The SBC is designed to fund public policy initiatives in areas not expected to be adequately addressed by competitive markets: energy efficiency (including peak load reduction), low-income energy affordability, research and development (R&D), and environmental monitoring and mitigation. SBC funding levels were originally established in individual electric utility settlement agreements³ and funds were collected through a non-bypassable charge on electric utility transmission and distribution systems. The PSC capped SBC funding at one mill⁴ per kilowatt-hour (kWh)

² New York State Public Service Commission. Cases 94-E-0952 *et al.* In the Matter of Competitive Opportunities Regarding Electric Service, Opinion No. 96-12, *Opinion and Order Regarding Competitive Opportunities for Electric Service*. Issued and effective May 20, 1996.

³ New York State Public Service Commission. Cases 94-E-0952 *et al.* In the Matter of Competitive Opportunities Regarding Electric Service, Opinion No. 98-3, *Opinion and Order Concerning System Benefits Charge Issues*. Issued and effective January 30, 1998.

⁴ A mill is one tenth of one cent.

during the initial phase of transition, based upon 1995 utility expenditures for DSM programs. Total funding for the three-year SBC program was \$234.3 million. The New York State Energy Research and Development Authority (NYSERDA) was designated as the administrator of the Statewide public benefits program, pursuant to a January 30, 1998 order by the PSC.⁵ The SBC program began operation on July 1, 1998. The PSC allocated \$172 million of SBC funds to NYSERDA, and the IOUs retained the remainder of this funding to meet existing obligations and to continue some low-income programs.

With the advent of the SBC, energy efficiency programs in New York made a transition from rebate-driven offerings to market development initiatives. The **New York Energy \$martSM** public benefits program, offered by NYSERDA, combines infrastructure development, awareness activities, and targeted incentive offerings in order to transform markets. Whereas the DSM programs were primarily based on one-time transactions or rebates to end-users, the SBC market development programs establish long-term relationships with participants and networks of trade allies in order to support sustained changes in markets and consumer behavior.

After two and one-half years of SBC program implementation and evaluation, the PSC directed that these programs be extended with increased funding. In its January 26, 2001 Order⁶, the PSC extended SBC programs through June 30, 2006 and increased funding from \$78.1 million to \$150 million annually. Continuing the SBC programs is intended to help sustain momentum for the State's efforts to promote competitive markets for energy efficiency, offer low-income services, conduct research and development, protect the environment, and provide direct economic and environmental benefits to New Yorkers. Energy efficiency programs are also being recognized for their role in helping ensure electric system reliability during summer peak conditions.

The collective energy efficiency expenditures, including utility DSM, SBC, and other government programs, since 1990 are shown in Table 1. The total investment of these programs over the eleven-year period is more than \$2.9 billion. Spending declined after DSM investments reached a high in 1992. The low reached in 1998 reflects the transition from the utility-sponsored programs to the SBC program. Since

⁵ New York State Public Service Commission. Cases 94-E-0952 *et al.* In the Matter of Competitive Opportunities Regarding Electric Service, Opinion No. 98-3, *Opinion and Order Concerning System Benefits Charge Issues*. Issued and effective January 30, 1998.

⁶ New York State Public Service Commission. Case 94-E-0952. In the Matter of Competitive Opportunities Regarding Electric Service. *Order Continuing and Expanding the System Benefits Charge for Public Benefits Programs*. Issued and effective, January 26, 2001.

1998, spending has been on an upward trend as SBC programs and other energy efficiency programs (*e.g.*, the Long Island Power Authority’s [LIPA] Clean Energy Initiative) began. The following section of this assessment provides more detailed summaries of key energy efficiency programs and their individual achievements.

Table 1: Energy Efficiency Spending in New York State: 1990-2001 (\$Millions)

Year	IOU DSM/SBC Programs ⁽¹⁾	IOU HIECA ⁽²⁾	NYSERDA Programs ⁽³⁾	LIPA ⁽⁴⁾ Programs	NYPA ⁽⁵⁾ Programs	Other Efficiency Programs ⁽⁶⁾	Total ⁽⁷⁾
1990	\$99	\$19	\$9.6	----	\$2	\$94.5	\$224.1
1991	\$198	\$18	\$9.6	----	\$12	\$61.5	\$299.1
1992	\$286	\$18	\$9.6	----	\$22	\$49.9	\$385.5
1993	\$280	\$15	\$9.6	----	\$50	\$69.8	\$424.4
1994	\$188	\$11	\$9.6	----	\$38	\$80.7	\$327.3
1995	\$106	\$10	\$10.3	----	\$54	\$69.0	\$249.3
1996	\$73	\$5	\$10.6	----	\$76	\$49.6	\$214.2
1997	\$48	----	\$12.0	----	\$72	\$44.8	\$176.8
1998	\$12.4	----	\$13.4	----	\$73	\$28.2	\$127.0
1999	\$9.5	----	\$13.6	\$2.9	\$92	\$30.8	\$148.8
2000	\$12.7	----	\$37.5	\$14.6	\$98	\$42.0	\$204.8
2001	\$6.8	----	\$77.4	\$23.9	\$103	n/a	\$211.1
Total ⁽⁷⁾	\$1,319.4	\$96	\$222.3	\$41.5	\$692	\$620.8	\$2,992

Spending, in many cases, is less than actual contracted or encumbered funds. Spending includes administration and overhead.

(1) Source: Department of Public Service.

(2) Home Insulation and Energy Conservation Act. Source: DPS.

(3) Includes energy efficiency and select low-income and research and development (R&D) SBC programs, federally-funded State Energy Programs, Clean Water/Clean Air Bond Act spending for hybrid-electric buses, and statutory R&D initiatives in the energy efficiency area. Source: NYSERDA.

(4) Long Island Power Authority. Clean Energy Initiative spending exclusive of peak load management and renewable programs. Source: LIPA.

(5) New York Power Authority. Source: NYPA.

(6) Includes the federally-funded Weatherization Assistance Program (Source: New York State Division of Housing and Community Renewal), and the portion of Petroleum Overcharge Restitution Act funds for energy efficiency programs not administered by NYPA (Source: NYSERDA).

(7) Totals may not sum due to rounding.

n/a = not available.

DESCRIPTION OF MAJOR ENERGY EFFICIENCY PROGRAMS

This section describes the achievements of several major energy efficiency programs delivered over the past eleven years and major energy efficiency programs currently offered.

Utility Demand Side Management and Public Benefit Programs

In response to industry restructuring in the late 1990s, utilities redirected their efforts from DSM programs to market development activities. Starting in 1998, continuing utility DSM efficiency programs were funded by the SBC.⁷ Energy efficiency expenditures for utility DSM and SBC programs are shown in Table 2 along with actual and projected electricity and summer peak demand reductions achieved between 1990 and 2006.⁸ The *italics* in Table 2 signify *projected* spending and achievements. Select utility energy efficiency activities are described in Table 3.

NYSERDA-Administered SBC Programs

The NYSERDA-administered **New York Energy \$martSM** SBC program commenced by order of the PSC on July 1, 1998, and will run through June 30, 2006. Table 4 shows spending and achievements from the first three years of the **New York Energy \$martSM** program (initial program) along with projected spending and achievements for the remaining five years (expanded program). The *italics* in Table 4 signify *projected* spending and achievements. The major **New York Energy \$martSM** commercial and industrial and residential energy efficiency programs are described in Tables 5 and 6, respectively. Results provided in Tables 5 and 6 are associated with funds awarded through June 2001, unless otherwise noted. For the most part, achievements provided in Tables 4, 5 and 6 include only those associated with direct program participants. The more widespread adoption of energy efficiency that is expected once markets are fully developed will lead to additional electricity and peak demand savings. In addition to the programs listed in Tables 5 and 6, **New York Energy \$martSM** also includes energy efficiency R&D projects focusing on innovative end-use energy-efficient and energy-saving technologies and systems applicable to New York markets.

⁷ Some utilities also retained SBC funding for low-income programs. These programs generally focus on arrearage reduction, and are not included in this discussion.

⁸ Cumulative annual savings associated with pre-1990 spending are 157 GWh and 246 MW.

Table 2: Utility DSM/SBC Spending with Actual and Projected Achievements (1990-2006)

Year	Annual Spending (Millions)	Cumulative Annual Electric Reductions (GWh)	Cumulative Annual Peak Demand Reductions (Summer MW)
1990	\$99.0	325	85
1991	\$198.0	1,082	264
1992	\$286.0	2,289	537
1993	\$280.0	3,620	853
1994	\$188.0	4,632	1,105
1995	\$106.0	5,349	1,269
1996	\$73.0	5,796	1,377
1997	\$48.0	5,796 ⁽¹⁾	1,377 ⁽¹⁾
1998	\$12.4	5,817 ⁽¹⁾	1,382 ⁽¹⁾
1999	\$9.5	5,824 ⁽¹⁾	1,382 ⁽¹⁾
2000	\$12.7	5,834 ⁽¹⁾	1,382 ⁽¹⁾
2001	\$6.8	5,834	1,382
2002	\$5.2	5,834	1,382
2003	\$5.3	5,519 ⁽²⁾	1,297 ⁽²⁾
2004	\$5.4	4,772 ⁽²⁾	1,118 ⁽²⁾
2005	\$5.4	3,575 ⁽²⁾	845 ⁽²⁾
Jan/June 2006	\$2.6	2,254 ⁽²⁾	529 ⁽²⁾
Total	\$1,343.3	74,152	----

Sources: New York State Department of Public Service and New York State Public Service Commission. Case 94-E-0952 In the Matter of Competitive Opportunities Regarding Electric Service, *Order Addressing Petitions for Clarification and/or Rehearing and Adjusting SBC Budgets*. Issued and effective July 3, 2001.

(1) A large portion of spending since 1997 was directed to utility DSM bidding obligations. Savings for these projects were counted in prior years. Additional savings from utilities with the most significant achievements (Consolidated Edison Company of New York, Inc., New York State Electric and Gas Corporation and Niagara Mohawk Power Corporation) are included.

(2) Declining cumulative values shown in projections are due to an assumed 12-year measure lifetime.

Table 3: Select Utility Energy Efficiency Activities

Company Name	Program Name	Program Description
Central Hudson Gas & Electric Corporation	Residential Energy Solutions	Information on electric technologies, rebate program for high-efficiency heat pumps and central air conditioning, and leasing of high-efficiency electric water heaters.
	Commercial/Industrial (C/I) Energy Solutions	Services to assist C/I customers in using energy more efficiently (e.g., low-cost financing, free on-site energy audits).
Consolidated Edison Company of New York, Inc.	Energy Saving Tips	Information for residential customers and tips on saving energy.
KeySpan Corporation	Home Energy Services	Heating and air conditioning services for residential customers.
	Energy Conservation Information	Includes Consumer Update newsletters with tips on saving natural gas in the home.
	C/I Services	Energy management for C/I customers.
	RD&D	Projects test combined heat and power systems that provide waste heat to power applications such as refrigeration system absorption chillers.
New York State Electric & Gas Corporation	Appliance Calculator	Residential customers can calculate annual energy use of different appliances on-line.
	Energy Profiler Online™	On-line C/I customer information on energy usage, including benchmarking information.
Niagara Mohawk Power Corporation	Energy & Your Home Home Energy Analysis	On-line energy analysis and energy saving practices for the home.
	Business Energy Analysis Business Technologies Facility Energy Information	On-line energy analysis and information on advanced end-use technologies.
Orange & Rockland Utilities, Inc.	Household Energy-Saving Tips	Tips for residential customers on saving energy.
Adapted from: Edison Electric Institute. <i>New York State EEI Member and Non-Member Residential/Commercial/Industrial Efficiency and Demand Response Programs for the Summer of 2001</i> . Updated May 30, 2001.		

Table 4: NYSERDA-Administered SBC Energy Efficiency Spending with Projected and Actual Achievements (1998-2006)

Year	Annual Spending (Millions)	Cumulative Annual Electric Reductions (GWh) ⁽³⁾	Cumulative Annual Peak Demand Reductions (Summer MW) ⁽³⁾
1998	\$1.2 ⁽¹⁾	0	0
1999	\$2.6 ⁽¹⁾	81	17
2000	\$26.3 ⁽¹⁾	243	52
2001	\$94.0 ⁽²⁾	399	106
2002	\$153.4 ⁽²⁾	1,183	348
2003	\$115.2	1,772	440
2004	\$115.2	2,198	481
2005	\$115.0	2,623	622
2006	\$135.8	3,156	856
Total	\$758.7	11,655	-----

Sources: *New York Energy SmartSM* evaluation and financial reports and the *System Benefits Charge Proposed Operating Plan for New York Energy SmartSM Programs (2001 - 2006)*, March 15, 2002.

Spending and achievements include Energy Efficiency (exclusive of peak load management), Low-Income, and energy efficiency and strategic R&D. Total spending is approximately \$157.7 million for the initial SBC programs and \$601 million for the expanded SBC programs. Spending for the expanded program includes \$16.5 million in future interest earnings that the PSC has approved for use on energy efficiency programs.

(1) Due to the ramping up of the SBC programs, spending is significantly less than funds encumbered (contracted). Encumbered funds were \$1.9 million in 1998, \$30.8 million in 1999, \$39.6 million in 2000, and \$110.4 million in 2001. Cumulative encumbered funding by December 31, 2001 was \$182.7 million.

(2) Expenditures from the initial and expanded SBC budgets are projected to occur in these years.

(3) Reductions reported here are for completed work under the identified subset of **New York Energy SmartSM** programs, and therefore, will differ from total reductions reported in the sources cited above.

Table 5: Major New York Energy \$martSM Commercial and Industrial Energy Efficiency Programs

Program Name	SBC Budget⁽¹⁾ (Millions)	Program Description	Results/Status (for funds awarded through June 2001)
Commercial and Industrial Performance	\$40.0	Fosters growth of the energy services industry through performance-based incentives to energy efficiency service providers. Leverages private capital investments in electric efficiency and demand saving measures.	\$50 million awarded for 223 projects. Expected savings of 316 GWh and 70 MW.
New Construction	\$17.1	Provides financial incentives to building owners and technical assistance to building designers in an effort to change standard building design and construction practices.	\$28 million awarded for 509 projects saving 80 GWh and 29 MW.
Smart Equipment Choices	N/A	Provides financial incentives for the purchase and installation of cost-effective, high efficiency equipment (<i>i.e.</i> , lighting, motors, and HVAC).	Until 2001, this offer was part of New Construction.
Technical Assistance	\$9.9	Provides cost-sharing of studies by qualified professionals to help end users identify efficiency improvements in their facilities. Services include energy audits, energy operations management, rate analysis and aggregation, and other services.	\$9 million awarded to 789 projects with savings of 231 GWh, 62 MW and 3 TBtu of gas and oil.
Premium Efficiency Motors	\$1.5	Designed to induce lasting structural change in the motors market. Offers incentives to participating vendors for the sale of Consortium for Energy Efficiency-qualified premium efficiency motors.	\$1 million in total awards for 1,919 motors, with savings of 1.4 GWh and 0.3 MW.
Commercial HVAC	\$1.7	Designed to increase availability, promotion and sale of energy-efficient HVAC products and services. Projects promote commissioning and purchase of high efficiency unitary HVAC.	The program recently began. The goal for electricity savings is 6 GWh.
Small Commercial Lighting	\$3.8	Promotes effective, energy efficient lighting in small commercial spaces by offering incentives to contractors and multi-site end users. Also offers contractor training incentives.	The program recently began.
Loan Fund	\$6.0	With more than 60 participating lenders, the Loan Fund offers a 4.5% reduction from lenders rates for energy efficiency improvements and renewable technology projects up to \$500,000.	\$2 million awarded for 289 loans to save 6.7 GWh and 1.5 MW.

Source: NYSERDA. *New York Energy \$martSM Program Evaluation and Status Report: Report to the System Benefits Charge Advisory Group, Initial Three-Year Program.* January 2002.

(1) Budgets are for the first three years. In some cases, awarded funding was allowed to exceed three-year budgets once the expanded SBC program was approved.

Table 6: Major New York Energy \$martSM Residential and Low-Income Energy Efficiency Programs

Program Name	SBC Budget⁽¹⁾ (Millions)	Program Description	Results/Status (for funds awarded through June 2001)
Residential Appliances & Lighting and ENERGY STAR [®] Awareness	\$19.0	Designed to increase awareness of ENERGY STAR [®] and sale of these products. The Residential Appliances & Lighting program works with retailers to improve promotion and sales while the ENERGY STAR [®] Awareness effort provides a multi-media campaign to increase consumer awareness, understanding, and purchases.	Increased consumer awareness (34% to 43%). Market share increases for ENERGY STAR [®] appliances (up 119%), lighting (up 114%), and home electronics (up 7%).
Keep Cool	\$4.1	Designed to reduce peak demand. Residents and building owners turn in old room air conditioners (RACs) and receive \$75 upon purchase of a new ENERGY STAR [®] RAC. Old RACs are recycled. In 2001, the Long Island Power Authority (LIPA) and New York Power Authority (NYPA) joined NYSERDA to offer an expanded program.	Nearly 41,000 RACs from NYSERDA, LIPA, and NYPA areas. Estimated savings are 8.7 GWh and 12 MW. ⁽²⁾
ENERGY STAR [®] Homes	\$2.4	Provides technical assistance and financial incentives encouraging participating builders to construct ENERGY STAR [®] Homes that use 30% less energy than the Model Energy Code.	The program enrolled 38 builders and five raters in its first two months.
Home Performance with ENERGY STAR [®]	\$7.0	Will enhance the existing capacity for delivering energy efficiency services to one- to four-family residences. Consumer protection is fostered by training and qualifying building performance contractors, home energy raters, and contractors providing energy efficiency services.	The program is in its early stages. Fourteen contractors have been certified and 200 homes have received assessments.
Low Income Direct Installation Program	\$9.9	Builds on the federal Weatherization Assistance Program to reduce low-income energy burdens. Offers energy efficiency measures (<i>i.e.</i> , lighting, refrigerators) and information on energy use and efficiency.	Applications for 9,279 units. Savings are estimated at 7.6 GWh and more than 1 MW.
Low-Income Assisted Housing Program	\$3.8	Increase affordability of public housing for low-income residents by incorporating energy efficiency into the design, selection, and installation of equipment in the State's portfolio of publicly-assisted housing. Incentives write down the cost of high efficiency measures.	200 projects have entered the program and construction has commenced on 20 projects.
<p>Source: NYSERDA. <i>New York Energy \$martSM Program Evaluation and Status Report: Report to the System Benefits Charge Advisory Group, Initial Three-Year Program.</i> January 2002.</p> <p>(1) Budgets are for the first three years.</p> <p>(2) Due to the seasonal nature of this program, results are presented through September 2001.</p>			

Public Power Energy Efficiency Programs

The Long Island Power Authority's Clean Energy Initiative. In May 1999, LIPA's Board of Trustees approved a five-year, \$170 million Clean Energy Initiative. This initiative includes energy efficiency programs and research and development efforts. Table 7 depicts the spending and achievements of LIPA's key energy efficiency programs for 1999 through 2001, as well as projected spending and achievements for the remaining years of the initiative. The *italics* in Table 7 signify *projected* spending and achievements. These key energy efficiency programs are then summarized in Table 8.

Table 7: LIPA Clean Energy Initiative Actual and Projected Spending and Achievements for Energy Efficiency Programs (1999-2004)

Year	Annual Spending ⁽¹⁾ (Millions)	Cumulative Annual Electric Reductions (GWh)	Cumulative Annual Peak Demand Reductions (Summer MW)
1999	\$2.9	6.8	3.5
2000	\$14.6	51.0	15.0
2001	\$23.9	112.7	29.5
2002	<i>\$21.5⁽²⁾</i>	<i>183.5</i>	<i>54.7</i>
2003	<i>\$22.3⁽²⁾</i>	<i>261.9</i>	<i>79.2</i>
2004	<i>\$12.5⁽²⁾</i>	<i>307.5</i>	<i>92.0</i>
TOTAL	<i>\$97.7⁽²⁾</i>	<i>923.4</i>	-----

Source: LIPA, *Clean Energy Initiative Biennial Report*, June 2001.

(1) Spending on energy efficiency is only a portion of the total Clean Energy Initiative spending. Remaining funds earmarked for renewables and peak load management programs are not included.

(2) Projected spending is subject to change based on program evaluations and customer needs.

Table 8: Major LIPA Clean Energy Initiative Energy Efficiency Programs

Program Name	Yr. 2000 Spending (Millions)	Program Description	Yr. 2000 Select Results
Residential Lighting and Appliances	\$5.8	Aims to increase ENERGY STAR® lighting and appliance sales through more than 200 participating retailers. Offers rebates and reduced costs for high efficiency measures.	More than 450,000 participants achieving savings of 32.3 GWh and 3.7 MW.
Residential HVAC Efficiency	\$3.3	Customer incentives offset the incremental cost of high efficiency HVAC. Contractor incentives are provided for proper equipment sizing. Contractors are also trained in home safety, health, and comfort issues.	More than 8,000 participants, with electricity and demand savings of 3.7 GWh and 5.6 MW.
Residential Energy Affordability Partnership	\$1.7	Works with federal WAP to provide free installation of cost-effective air sealing, insulation, HVAC repairs, lighting, and other measures to low-income customers.	Visited more than 2,800 dwellings with savings of 2.4 GWh and 0.2 MW.
Residential Information and Education	\$0.4	Provides efficiency information through advertising, the LIPA website, energy audits, and other methods.	Savings of 2.6 GWh and 0.9 MW.
Commercial Construction	\$1.0	Promotes the application of a broad range of energy-efficient electric technologies and design assistance. The program offers prescriptive, custom and whole-building components.	The 36 projects involved to date contribute 1.4 GWh and 0.2 MW of savings.
Regional Premium Efficiency Motors	\$0.1	Offers customer incentives and information and technical assistance for customers, manufacturers, vendors, designers, and engineers. Uses the Northeast Energy Efficiency Alliance's MotorUp program.	75 participants with savings of 0.1 GWh and 0.027 MW.
High-Efficiency Unitary HVAC	\$0.2	Offers incentives for commercial central air conditioners and air and water source heat pumps. Uses the NEEP program concept.	Rebates for 110 units, with savings of 0.3 GWh and 0.18 MW.
Resource Conservation Manager Program	\$0.1	Underwrites the salaries of resource conservation managers employed by schools and municipalities. With proper training, it is expected that these individuals will help end-users reduce resource use and costs.	Three RCM projects are underway.
Customer-Driven Efficiency	\$0.4	Offers residential and commercial incentives, audits, and assistance for efficiency measures not covered by LIPA's other programs.	855 participants with savings of 1.4 GWh and 0.63 MW.
Sources: LIPA, <i>Clean Energy Initiative Biennial Report</i> , June 2001 and LIPA, <i>Clean Energy Initiative Annual Report 2000</i> .			

New York Power Authority Energy Efficiency Programs. The New York Power Authority's (NYPA) Energy Services program began in 1990 as a service to NYPA's government customers in New York City and Westchester County. Since its inception, Energy Services has been expanded to serve State-operated facilities, public schools, community colleges, and county and municipal governments across the State. NYPA finances the identification, design, and installation costs for upgrades to energy-using equipment and recovers these costs by sharing in the resulting electric bill savings. The participants retain all the energy savings once NYPA's loan is repaid, usually within ten years or less. Table 9 shows actual and projected investments and results for NYPA's major energy efficiency programs. The *italics* in Table 9 signify *projections*. NYPA's major energy efficiency programs are described in Table 10. In addition to the efficiency programs listed in Table 10, NYPA is preparing to begin a combined heat and power program in 2002.

Table 9: NYPA Energy Efficiency Programs Actual and Projected Investment and Results (1990 - 2004)

Year	Annual Spending (Millions)	Cumulative Annual Electric Reductions (GWh)	Cumulative Annual Peak Demand Reductions (Summer MW)
1990	\$2	1	0.6
1991	\$12	22	5.6
1992	\$22	66	18.6
1993	\$50	152	37.6
1994	\$38	233	56.6
1995	\$54	286	69.6
1996	\$76.0	360	86.6
1997	\$72.0	465	111.6
1998	\$73.0	556	130.6
1999	\$92.0	607	139.6
2000	\$98.0	667	149.6
2001	\$103	750	171.0
2002	<i>\$100</i>	<i>779</i>	<i>175.6</i>
2003	<i>\$100</i>	<i>835</i>	<i>188.6</i>
2004	<i>\$100</i>	<i>891</i>	<i>201.6</i>
TOTAL	\$992	6,670	-----

Source: NYPA.

Table 10: Major NYPA Energy Efficiency Programs

Program Name	Spending (Millions)	Program Description	Select Results/Status
High Efficiency Lighting Program ⁽¹⁾	\$312.2	Finances installation of efficient lighting, as well as motors, energy management systems, and sensors.	573.1 GWh and 118 MW.
Watt Busters ⁽²⁾	\$5.4	Provided home energy audits and weatherization to residential customers served by NYPA's municipal and cooperative system customers.	37.7 GWh and 15.4 MW.
Public Housing	\$47.1	Replaces old refrigerators in New York City Housing Authority buildings with new units using half the energy and a more environmentally-benign refrigerant. The project has served as a model for more than 100 other public housing authorities and utilities.	70.0 GWh and 8.7 MW. NYPA projects 180,000 replacements by 2003.
New Construction ⁽²⁾	\$2.9	Provided rebates to public entities purchasing NYPA power for installation of high-efficiency lighting and motors in new facilities.	23.6 GWh and 4.3 MW.
Energy Services	\$20.2	Provides audits and efficiency measures, including lighting, boilers, and motors, to public entities.	15.0 GWh and 4.3 MW.
Electro-technologies	\$49.9	Provides NYPA customers with financing, technical services, and installation for energy-efficient electric technologies, such as chillers and water purification.	2.9 GWh and 3.1 MW.
Industrials Program	\$6.8	Provides financing to NYPA's industrial customers for installation of energy efficiency improvements including lighting, HVAC, and motors.	6.7 GWh and 1 MW.
Energy Plus Oil Heat Rebate Program ⁽²⁾	\$6.9 ⁽⁴⁾	Provided nearly 38,300 rebates for the installation of new, high-efficiency residential oil-fired boilers, and warm-air furnaces.	4.4 million gallons of oil ⁽⁴⁾
Non-Electric End Uses	\$19.0	Assists public entities that purchase NYPA power in improving the efficiency of non-electric measures such as domestic water systems and boilers.	Reduced total energy budgets.
Clean Air for Schools	\$74.1	Replaced coal-fired heating in public schools with new systems fired by oil or gas. This program was funded by the 1996 Clean Water/Clean Air Bond Act.	20,000 tons of green-house gases
Climate Controls	\$5.3	Through funding from the New York City Board of Education, NYPA helps to improve air compressors, steam distribution, and thermostat controls in schools.	The program began in 1999.
Coal Pilots ⁽³⁾	\$14.0	Provided funds to replace New York City public school coal boilers with cleaner gas-fired equipment.	Assisted 12 schools.

Source: Data provided by NYPA with the exception of the Energy Plus Oil Heat Rebate Program.

All spending and results from program inception through October 2001.

(1) Includes County and Municipal, Long Island, Public Schools, Southeastern New York, and Statewide High Efficiency Lighting Programs.

(2) Program has concluded.

(3) Includes \$5.5 million in Petroleum Overcharge Restitution (POCR) funding for two rounds prior to NYPA administration. NYPA received approximately \$1.4 million to offer the third and final round of the program.

(4) Results include NYPA's program plus the two prior rounds.

Other Energy Efficiency Programs

This section discusses other energy efficiency initiatives including Executive and Legislative programs, federally-supported programs, such as the Weatherization Assistance Program (WAP) and State Energy Program (SEP), as well as statutory programs currently being administered by NYSERDA.

Governor Pataki's Executive Order 111. In June 2001, Governor Pataki signed Executive Order 111 aimed at improving the energy efficiency of all State agencies, departments, public benefit corporations, and public authorities. As required in the Order, all affected entities shall seek to achieve a 35% reduction in energy use in leased, operated, or owned buildings by 2010, relative to 1990 levels. Affected entities are directed to establish agency-wide reduction targets and schedules for reaching the targets. They must also establish peak electric demand reduction targets for 2005 and 2010. The Executive Order specifies the following practices for existing and new buildings, renovations, and procurement of products and vehicles:

- Existing buildings are required to implement energy efficiency practices with respect to operation and maintenance. Practices could include inspecting and recommissioning, re-tuning heating, ventilation, and air conditioning (HVAC) equipment, and striving to meet the ENERGY STAR[®] building criteria for energy performance and indoor air quality to the maximum extent practicable.
- New buildings or substantial renovations of existing buildings are required, to the maximum extent practicable, to follow guidelines for the construction of "Green Buildings" including guidelines set forth in Tax Law §19, which created the Green Buildings Tax Credit and the U.S. Green Buildings Council's LEED[™] rating system. State agencies engaged in new construction shall achieve at least a 20% improvement in energy efficiency performance relative to levels required by the State's Energy Conservation Code (as amended). For substantial renovation, agencies shall achieve at least a 10% improvement.
- When procuring new products, State agencies are required to select ENERGY STAR[®] products. NYSERDA will adopt guidelines designating target energy efficiency levels for those products not included in the federal government's program.
- When procuring new vehicles, State agencies must obtain increasing percentages of alternative-fuel vehicles. By 2005, at least 50% of new light-duty vehicles acquired by each agency shall be alternatively fueled. By 2010, 100% must be alternatively fueled. For medium and heavy duty vehicles, State agencies must

implement strategies to reduce petroleum use and emissions, using alternative fuel vehicles wherever possible.

Although actual baseline energy usage is still being collected, the estimated annual 1989-1990 energy use for all of the State entities affected by Executive Order 111 was approximately 59 TBtu. With 2002 energy use estimated at about 53 TBtu for the affected entities, total reductions under Executive Order 111 are estimated at approximately 15 TBtu by 2010. The Executive Order specified that NYSERDA shall coordinate implementation. The Order also established an Advisory Council on State Energy Efficiency to assist NYSERDA in this role. NYSERDA has established a task force and is working with NYPA and LIPA to ensure that all agencies have access to the resources they need to establish energy use baselines and develop cost-effective strategies for reducing energy use. In December 2001, NYSERDA issued the *Executive Order No. 111 "Green and Clean" State Buildings and Vehicles Guidelines*. The Guidelines indicate how affected entities can go about improving energy efficiency in existing buildings, new buildings, leased buildings, and product and vehicle procurement. The Guidelines also discuss options for funding energy efficiency, including tax exempt financing, the SBC program, State EnVest, performance-based contracting, and funding available from U.S. Department of Energy solicitations.

New York State Energy Conservation Construction Code. The New York State Energy Conservation Construction Code (Energy Code), which became effective in 1979, sets minimum standards for the design and construction of all new buildings and the substantial renovation of existing buildings. The Energy Code has not been substantially revised since 1989, and it is generally recognized that a large portion of new construction and substantial renovation projects exceeds current Code requirements in terms of energy efficiency.⁹ Therefore, the Energy Code is no longer stimulating the significant energy savings that it had in the past.

Since most of the building equipment covered by the Energy Code can last 20 to 30 years (*e.g.*, HVAC equipment, lighting systems, windows, and insulation materials), there is great opportunity to achieve lasting improvements in buildings through the Energy Code mechanism. New York is currently in the process of amending the Energy Code, including several enhancements such as adopting standards for National Electrical Manufacturers Association (NEMA) Standard ENERGY STAR[®]/TP-1 transformers,

⁹ NYSERDA uses 5% above current Energy Code as standard practice, or the baseline, for New Construction and other programs. This reflects improvements in equipment since the current Energy Code standards were adopted.

adopting recommendations on building commissioning, and retaining higher building envelope requirements for electrically-heated homes. The Energy Code amendments are expected to lead to significant energy and cost savings, as well as environmental benefits. The Energy Code amendments will become effective during Summer 2002, placing New York's building energy codes among the most progressive in the country. The low- and high-end estimates for energy savings and emission reductions are provided in Table 11.

Table 11: Expected Annual Energy Savings and Air Emission Reductions from Energy Code Amendments

	Low Estimate	High Estimate
End-user electricity savings	276 GWh	444 GWh
Other fuel savings (including oil and natural gas)	3.0 TBtu	4.8 TBtu
Cost savings to building owners, operators and tenants (from reduced electricity and other fuels)	\$50 million	\$80 million
Approximate carbon dioxide (CO ₂) emission reductions (from reduced electricity and other fuels)	330,000 tons	530,000 tons
Approximate nitrogen oxide (NO _x) emission reductions (from reduced electricity and other fuels)	370 tons	590 tons
Approximate sulfur dioxide (SO ₂) emission reductions (from reduced electricity and other fuels)	580 tons	940 tons
Source: NYSERDA.		

Clean Water/Clean Air Bond Act. The 1996 Clean Water/Clean Air Bond Act included \$55 million for clean-fueled vehicles and clean-fueled buses. The Clean-Fueled Bus Program, administered by NYSERDA, provides funds to State and local transit agencies, municipalities, and schools for up to 100% of the incremental cost of new alternative fuel buses and supporting infrastructure. A total of \$25 million has been awarded in five rounds of the program. This funding will support the purchase of 529 alternative fuel buses including compressed natural gas (428), battery electric (8), and diesel hybrid-electric technology (93).

The hybrid-electric bus, promoted through the Clean-Fueled Bus Program, was developed under a NYSERDA Research and Development initiative. Electric and hybrid-electric technologies offer many benefits including significant fuel efficiency gains and the resultant reduction in emissions and dependence on imported oil. Efficiency improvements on the order of 25-30% have been achieved in New York City by switching to electric or hybrid-electric buses. These efficiency improvements are

largely the result of the regenerative braking system and the significant decrease in energy use during idling, especially in city traffic. More than \$8.6 million (about one third) of the Clean-Fueled Bus Program funds awarded to date are for hybrid-electric buses. This funding will support 93 buses, all of which are expected to be on routes by about 2006. The 10 diesel hybrid-electric buses currently on routes in New York City are expected to save approximately 34,000 gallons of diesel fuel (representing approximately 4,900 MMBtu) annually. When all 93 buses are on routes, savings will increase to about 364,000 gallons (approximately 50,000 MMBtu) of diesel annually. For more information on clean fuels and technologies, refer to the Energy and Transportation issue report (Section 2.4).

New York State Alternative Fuel (Clean Fuel) Vehicle Tax Incentive. New York recently enacted tax incentive legislation for electric vehicles, clean-fuel vehicles, and clean-fuel vehicle refueling properties. Federal tax credits also exist for these technologies. The State tax incentive program applies to vehicles and refueling properties placed into service after January 1, 1998. The incentive period is set to expire on February 28, 2003. Eligible clean fuels include: natural gas, liquefied petroleum gas, hydrogen, and electricity.¹⁰ The New York State tax credit for electric vehicles is equal to 50% of the incremental cost (up to a maximum of \$5,000 per vehicle) of a comparably-sized and styled gasoline vehicle.

New York State Green Building Tax Credit. In an effort to promote green buildings in New York, the State approved a \$25 million tax credit as part of the fiscal year 2000-2001 budget. The credit is intended to encourage building owners and developers to use advanced materials and technologies in building construction and renovation projects. Specific energy efficiency requirements stipulate that:

- Buildings being newly constructed may use no more than 65% of the energy allowed under the Energy Code; and
- Buildings being rehabilitated may use no more than 75% of the energy allowed under the Energy Code.

Eligible taxpayers include corporations, utilities, banks, insurance companies, and individuals. Eligible buildings include certain hotels, office buildings, and residential multifamily buildings.

¹⁰ The incentive does not cover hybrid electric/gasoline powered vehicles.

Energy Efficiency Standards for State Purchasing. Legislation enacted in 2000¹¹ calls for minimum energy-efficiency standards for appliances and other products purchased by or for the State or any of its agencies. The law requires NYSERDA to design these standards, in consultation with the Office of General Services, to optimize cost-effective savings, while taking into account market availability. A minimum of 18 products and appliances have already been identified and regulations must be promulgated between April 2002 and April 2003. NYSERDA has issued a competitive solicitation and hired a contractor to assist with developing these standards.

Weatherization Assistance Program. The federally-funded Weatherization Assistance Program (WAP), administered by the New York State Division of Housing and Community Renewal (DHCR), weatherizes low-income residences in an effort to reduce energy consumption and minimize energy costs. Services provided are determined by an on-site energy audit that includes health and safety considerations. Between 1990 and 2000, more than \$429 million was spent on weatherization measures. Cumulative annual energy savings in 2000 was approximately six TBtu. Cumulative energy savings from 1990 through 2000 amount to approximately 40 TBtu. The WAP is discussed in more detail in the issue report on New York's public benefit programs (Section 2.5).

NYSERDA-Administered State Energy Program. NYSERDA receives Federal grant funding from the U.S. Department of Energy to administer the State Energy Program (SEP). This program includes, but is not limited to, the following energy efficiency initiatives:

- Residential Technical Assistance (RES^{TECH}) helps improve the operation of multifamily buildings in New York by identifying and encouraging the implementation of cost-effective energy-efficiency measures. A variety of technical assistance services are provided, including computer-assisted building modeling, commissioning and implementation assistance. The first 18 studies completed by RES^{TECH} are expected to achieve average energy savings of approximately 277 MMBtu per year if all of the recommended measures are implemented. Since the recent expansion and extension of the **New York Energy \$martSM** program, RES^{TECH} is jointly funded by federal SEP and SBC funds.

¹¹ New York State Energy Law Article 5, Section 5-108-a.

- State EnVest enables energy-efficiency upgrades to State facilities using energy service contractors to design and install efficiency measures and energy-related capital improvements, and to develop performance contracts on behalf of the customer. The program is supported by third-party financing in the form of tax-exempt municipal leases, and project financing is arranged such that the annual costs will be less than the energy savings realized from the project. Through 2004, State EnVest is expected to result in \$200 million in projects with \$30 million in annual energy savings.

NYSERDA Statutory Energy Efficiency Research and Development. NYSERDA administers statutory funding for energy efficiency Research and Development in the following program areas:

- Buildings programs work with developers, designers, contractors, and building equipment manufacturers to develop and demonstrate innovative, energy-efficient products in the areas of lighting, heating, ventilation, air conditioning, and building controls.
- Industry programs assist businesses in developing, demonstrating, and commercializing energy-efficient technologies and long-term solutions to reducing energy costs. Examples of technologies targeted under this program include superconducting transformers, advanced cooling equipment, furnaces, and boilers.
- Transportation programs provide support to New York State firms for developing and commercializing advanced technologies. Examples include developing an electric postal van for the U.S. Postal Service, electric light-duty carrier route vehicles, and hybrid-electric city buses.

New York State Involvement in Regional and National Collaboratives

Many New York organizations involved in the energy field are members of regional or national collaboratives that promote energy efficiency. Getting involved in these collaborative efforts allows New York to leverage other member activities and benchmark best practices against others in the nation. Examples of New York's involvement in these regional and national collaboratives are described in the following paragraphs.

Consortium for Energy Efficiency. The Consortium for Energy Efficiency (CEE) has more than 50 member organizations that support its mission to promote the manufacture and purchase of energy-efficient products and services. CEE is a national, not-for-profit public benefit corporation with the goal of inducing lasting structural and behavioral change in the marketplace and increased adoption of energy efficient

technologies. In today's restructured utility markets, CEE provides a forum for the exchange of information and ideas. CEE also partners with manufacturers, retailers, and government agencies including the U.S. Environmental Protection Agency. New York members of CEE include LIPA, NYPA, and NYSERDA.

Northeast Energy Efficiency Partnerships. Northeast Energy Efficiency Partnerships, Inc. (NEEP) is a not-for-profit regional organization founded in 1996. NEEP aims to steadily increase energy efficiency levels in homes, buildings, and industries throughout the Northeast region of the United States. New York members of NEEP include the New York State Department of State (Codes Division) and NYSERDA. Both LIPA and NYSERDA coordinate their residential appliances, lighting, and HVAC programs and commercial motors program with NEEP.

ENERGY EFFICIENCY BENEFITS AND BARRIERS

Product and Service End-User Benefits

Benefits to the Commercial/Industrial Sector. In a time of increased business competition and tightening environmental regulations, energy efficiency can help the commercial and industrial sectors to reduce costs and emissions. Energy efficiency improvements often provide ancillary benefits including productivity improvements, increased production, better workplace conditions, and reduced maintenance and other costs. For example, an evaluation of energy-efficient lighting in retail applications found that new lighting stimulated significantly increased sales.¹²

Benefits to the Residential Sector. Residential customers throughout the State have the opportunity to implement energy efficiency improvements that reduce the amount of electricity, natural gas, and fuel oil consumed within single-family and multifamily residences. Significant reductions can often be achieved by implementing efficiency improvements to cooling systems and water and space heaters. However, savings can also accrue from upgrading to higher-efficiency appliances, lighting, and home electronics. The **New York Energy \$martSM** Home Performance with ENERGY STAR[®] program and other residential financing programs offer home energy assessments and reduced-rate loans to consumers in an effort to help identify and implement energy efficiency improvements that can be made in all of these areas. The Home Performance

¹² Over a five-month period, actual sales in one store exceeded expected sales by 35%. Cuttle, C. and Brandston, H. Evaluation of Retail Lighting, *Journal of the Illuminating Engineering Society*. Summer 1995.

with ENERGY STAR® program is expected to result in average electricity savings of more than 700 kWh per year for each participating single-family home. The electricity savings will lead to bill reductions of more than \$80 per household each year.¹³ Over the next five years, this program is expected to serve approximately 265,000 households. This equates to electricity savings of nearly 200 GWh annually and \$22 million in bill reductions per year. Additional natural gas and oil savings are also expected to accrue from the Home Performance with ENERGY STAR® program, leading to further energy bill reductions for participants.

Benefits to the Low Income Sector. Most of the energy-efficiency programs that are offered to low-income customers in the State have as the primary goal improving the affordability of energy. Improvements in energy efficiency are a proven and effective means to increase affordability. Providing more affordable energy can reduce payment problems and the need for other assistance programs.

Overarching Societal Benefits

Energy efficiency improvements deliver direct benefits to the businesses and homes that implement them. Energy efficiency improvements also have more far-reaching societal benefits described in the following section.

Cost Savings. The most obvious cost savings from energy efficiency improvements accrue directly to the facilities or households that implement them. Beyond this, however, there are also benefits to energy users in general. Benefits to energy users will accrue if energy providers are able to invest in energy efficiency and thus avoid more costly capital investments in new facilities. Energy efficiency is a proven component of a balanced approach to supply alternatives. A study currently being conducted by NYSERDA on the potential of energy efficiency will help to identify the value of various energy efficiency measures by geographic area. This study will be completed in July 2002.

Economic Development. Aside from the direct energy cost savings that result from efficiency improvements and reduced energy use, there are additional economic development benefits of energy efficiency. Every dollar that is saved when businesses or households operate more efficiently is funneled into other investments, such as products

¹³ The bill reduction estimate assumes an average Statewide electricity rate of \$0.12 per kWh for residential customers.

or services that might not have been purchased otherwise. For example, energy savings of 928 million kWh and 3.3 TBtu of gas and oil under the **New York Energy SmartSM** program are estimated to lead, both directly and indirectly, to the creation of more than 2,300 jobs in New York's service and retail trade sectors.¹⁴ These jobs will be supported annually for as long as the implemented energy efficiency measures remain in effect. Energy efficiency goods and services sectors will also continue to grow in New York State as a result of higher demand for energy efficiency products and services (*e.g.* energy services companies, appliance retailers, contractors, manufacturers, and lenders). Existing businesses can become more profitable by offering energy efficiency as a value-added service to their clientele.

Environmental. Improvements in electric energy efficiency will ultimately reduce the amount of electricity that is required from generating facilities, including fossil-fuel plants. Reducing generation from such facilities leads to a concurrent reduction in environmental emissions, such as nitrogen oxides (NO_x), sulfur dioxide (SO₂), and carbon dioxide (CO₂), from those plants. Efficiency improvements in the use of natural gas and oil have similar effects. For instance, savings of 928 million kWh and 3.3 TBtu of natural gas and oil from the SBC programs administered by NYSERDA are expected to result in emission reductions of 865 tons of NO_x, 1,490 tons of SO₂, and more than 616,000 tons of CO₂.¹⁵ The CO₂ reductions alone are equivalent to removing more than 123,000 automobiles from New York's roadways for one year. Energy efficiency can also be used to ensure that the State stays within its summer ozone-season NO_x allowance budget. Beginning in 2003, New York's NO_x budget trading program will provide incentives to implement electric end-use efficiency projects by allocating about 3%, or approximately 1,200 tons, of the State's ozone-season NO_x allowance budget to eligible projects. A pilot program, under which 115 tons of NO_x allowances are available for end-use efficiency projects has been in place since 1999. Energy efficiency projects receive certification for tradeable emission allowances they achieve. These allowances can be bought and sold on the open market. The NO_x budget trading program provides a framework for the planned development of a carbon registry for early reductions credits and trading. Electricity customers in New York State have begun to

¹⁴ NYSERDA. *New York Energy SmartSM Program Evaluation and Status Report: Report to the System Benefits Charge Advisory Group, Initial Three-Year Program.* January 2002. These savings are expected from funds awarded through June 2001 and, therefore, do not match the savings presented earlier for installed and completed measures.

¹⁵ NYSERDA. *New York Energy SmartSM Program Evaluation and Status Report: Report to the System Benefits Charge Advisory Group, Initial Three-Year Program.* January 2002. These savings are expected from funds awarded through June 2001 and, therefore, do not match the savings presented earlier for installed and completed measures.

receive a statement in their electric bills on the environmental attributes of the electricity they use. These environmental statements are the result of the New York Environmental Disclosure program established by the Public Service Commission and funded by the SBC. Efficiency improvements to gas and oil combustion equipment and appliances will also lead to a decrease in harmful pollutants released into the environment. Energy efficiency in the transportation sector, for instance, has the potential to decrease Btu use per vehicle mile traveled.

Fuel Diversity and Energy Security. Efficiency improvements can also be viewed as an alternative means to meet the growing demand for energy in New York. Increased energy efficiency, in effect, reduces the State's need for energy generated from coal, oil, natural gas, and other energy sources. By helping to reduce the State's need for imported energy, energy efficiency also has a role in increasing New York's self-sufficiency, improving energy security, and decreasing the outflow of dollars to pay for imported energy.

Energy Generation Facility Siting and Electric System Reliability. Energy efficiency improvements can also help ameliorate the immediate need to site new power generation, transmission, and distribution facilities. Energy efficiency and peak load reduction can be targeted geographically to address pressing supply and transmission constraints. Reliability initiatives in New York consider efficiency, demand reduction¹⁶, and new facility siting alternatives, and ultimately select the balance that will result in lower costs to ratepayers.¹⁷

Barriers to Energy Efficiency

Through years of implementing DSM and SBC programs in New York, a wealth of knowledge has been amassed with respect to barriers preventing more widespread adoption of energy efficiency improvements by various sectors. Barriers are both monetary and non-monetary in nature. Table 12 summarizes barriers found to be important through recent market research.

¹⁶ Demand response programs are discussed in the Electricity Assessment, Section 3.4.

¹⁷ A recent study found that many market transformation programs cost the sponsors less than \$0.01/kWh saved. (Nadel, and Latham. 1998. *The Role of Market Transformation Strategies in Achieving a More Sustainable Energy Future*. Washington, DC: American Council for an Energy-Efficient Economy).

The barriers listed in Table 12 generally apply to the commercial, industrial, and residential sectors. Several of these barriers also apply to the low-income sector. Although programs exist to help this under-served population, there are still barriers to their participation including income level (the working poor may have higher incomes and not be eligible) and lack of awareness of programs offered. Barriers faced by the low-income and under-served populations are discussed in more detail in the issue report on public benefits (Section 2.5).

Table 12: List of Key Barriers to Energy Efficiency

Low awareness and understanding of energy efficiency products and services
Higher initial cost to purchase energy efficiency products and services
Perceived or actual higher costs for maintaining energy efficient products or equipment
Lack of infrastructure of qualified energy efficiency service professionals
Low stocking, promotion, and availability of energy efficiency products and services
Lack of credible information on the savings that can accrue from energy efficiency products and services
Reluctance to try new technologies
Perception of poor performance of energy efficient products
Perceived or actual risk associated with new energy efficiency products and services
Energy efficiency conflicts with other important product design criteria

STATEWIDE ACHIEVEMENTS AND ENERGY EFFICIENCY POTENTIAL

Statewide Achievements Since 1990

Between 1990 and 2001, cumulative savings of 57,256 GWh of electricity and 1,688 MW of summer peak demand have been achieved by the major programs discussed in this assessment. Cumulative annual savings in 2001 were 7,095 GWh, or about 5.2% of the approximately 137,000 GWh of electricity sales to ultimate consumers during that year. Cumulative summer peak demand reductions in 2001 were 1,688 MW, or about 5.4% of the 30,982 MW peak that occurred during that summer. Table 13 provides a compilation of these savings as presented in earlier tables of this assessment. Additional natural gas and oil savings have also resulted from these programs. For example, the Weatherization Assistance Program reports about 40 TBtu of cumulative savings from 1990 through 2000. Additional cumulative diesel savings of 9,300 MMBtu have accrued from the Clean-Fueled Bus Program between about 1999 and 2001. Despite these

accomplishments, there are significant remaining opportunities to improve energy efficiency in the State.

Table 13: Statewide Cumulative Electric and Summer Peak Demand Reductions (1990 - 2001)

Year	IOU DSM/SBC		NYSERDA SBC		LIPA		NYPA		TOTAL ⁽¹⁾	
	GWh	MW	GWh	MW	GWh	MW	GWh	MW	GWh	MW
1990	325	85	---	---	---	---	1	0.6	326	86
1991	1,082	264	---	---	---	---	22	5.6	1,104	270
1992	2,289	537	---	---	---	---	66	18.6	2,355	556
1993	3,620	853	---	---	---	---	152	37.6	3,772	891
1994	4,632	1,105	---	---	---	---	233	56.6	4,865	1,162
1995	5,349	1,269	---	---	---	---	286	69.6	5,635	1,339
1996	5,796	1,377	---	---	---	---	360	86.6	6,156	1,464
1997	5,796 ⁽²⁾	1,377 ⁽²⁾	---	---	---	---	465	111.6	6,261	1,489
1998	5,817 ⁽²⁾	1,382 ⁽²⁾	---	---	---	---	556	130.6	6,373	1,512
1999	5,824 ⁽²⁾	1,382 ⁽²⁾	81	17	6.8	3.5	607	139.6	6,519	1,542
2000	5,834 ⁽²⁾	1,382 ⁽²⁾	243	52	51.0	15	667	149.6	6,795	1,598
2001	5,834 ⁽²⁾	1,382 ⁽²⁾	399	106	112.7	29.5	750	171.0	7,095	1,688
Total ⁽¹⁾	52,198	-----	723	-----	170.5	-----	4,165	-----	57,256	-----

Italics signify projections where actual values were not available.
(1) Totals may not sum due to rounding.
(2) A large portion of utility spending since 1997 went to meet obligations on existing DSM bidding projects. The savings for these projects were counted in prior years. Additional savings, which are expected to accrue from utility SBC programs, are included for Consolidated Edison, New York State Electric and Gas and Niagara Mohawk Power Corporation, as these utilities have the most significant achievements for those years.

The electricity, natural gas, and oil saved over the past 11 years has produced significant environmental and economic benefits. Table 14 shows the estimated emission reductions and job creation resulting from these savings.

Table 14: Cumulative Air Quality and Economic Benefits from Statewide Energy Savings (1990 - 2001)

Estimated Emission Reductions (from electric savings)	42,900 tons NO _x
	86,500 tons SO ₂
	25 million tons CO ₂
Estimated Emission Reductions (from gas and oil savings)	2,000 tons NO _x
	840 tons SO ₂
	2.5 million tons CO ₂
Total Estimated Emission Reductions (from electric, gas and oil savings)	44,900 tons NO _x
	87,340 tons SO ₂
	27.5 million tons CO ₂
Cars Equivalent for CO ₂ Emission Reductions	5.5 million cars removed from the road for one year
Estimated Jobs	15,000
Source: NYSERDA.	

Future Energy Efficiency Potential

New York's Technical, Economic and Achievable Energy Efficiency Potential

In the last decade, a great deal has changed in terms of available energy efficiency equipment and the base-case electricity use in the State's building stock. In October 2001, NYSERDA issued a Request for Proposals (RFP 628-01) to procure contractor assistance in updating and evaluating the current status of, and potential for, energy efficiency in New York. Major tasks for this study include:

- Determining the list of individual and bundled measures to be analyzed;
- Establishing the base case level of technology and associated electricity use in the State's current building stock;
- Evaluating potential savings in electricity use and peak demand resulting from implementing the efficiency measures;
- Determining the technical, economic, and achievable market potential of these technologies;

- Determining the cost of saved energy and the benefit/cost ratio for each measure; and
- Ranking energy efficiency measures based on the above analysis, along with the technical, institutional, policy, and market barriers.

Although the study will be completed in July 2002, preliminary results from the analysis of technical potential are available. The technical potential is defined as the upper limit theoretically possible without regard for cost, market barriers or market acceptability. The preliminary estimates of technical potential are net of achievements to date. The preliminary technical potential for achieving electricity and summer and winter peak demand reductions in the commercial, industrial, and residential sectors is shown in Table 15 for the year 2022. It should be noted that only a small fraction of the technical potential will be economically feasible, and only a portion of the economic potential will be achievable for a variety of reasons. Specific sub-sectors and measures with the highest technical potential are discussed in the following text.

Table 15: Preliminary Technical Potential Results by Sector for 2022

Sector	GWh	Summer Peak MW	Winter Peak MW
Commercial	38,826	11,891	5,959
Residential	23,939	9,526	5,296
Industrial	8,227	1,351	1,273
Total	70,992	22,768	12,528

For existing commercial buildings, lighting, cooling, and refrigeration contribute the most to the preliminary electricity savings technical potential. Cooling and lighting have the largest impact on summer peak demand reduction in existing commercial buildings. For commercial new construction, whole building design is, by far, the largest contributor to the preliminary technical potential for electricity and summer peak demand reduction. In the residential sector, the single largest contributor to preliminary technical electricity reduction potential is lighting. Cooling is the most significant end use in the residential sector in terms of reducing summer peak demand. For the industrial sector, chemical manufacturing and primary metal manufacturing represent the largest portions of the preliminary total technical potential for electricity and summer peak demand reductions.

Potential for Combined Heat and Power

Another initiative currently underway will evaluate and quantify the aggregate energy and economic potential for a wide range of combined heat and power (CHP) technologies in New York's commercial, institutional, and industrial sectors. The project will include analysis of the regulatory, legal, and institutional barriers to CHP, and will develop policy options and market strategies that could be implemented to accelerate market adoption of CHP. The study is being conducted by Energy Nexus Group and the Pace Energy Project. Results will be available soon.

FINDINGS AND CONCLUSIONS

This information and analysis presented in this assessment leads to the following findings and conclusions:

- Over the past decade, energy efficiency programs in New York have evolved in terms of their depth, breadth, and focus. The State now offers a diverse portfolio of programs that is designed to better capture available energy efficiency potential where past efforts could not.
- Since 1990, the State has spent more than \$2.9 billion on energy efficiency programs, even while total annual spending declined from a high in the early 1990s of more than \$400 million per year. Annual energy efficiency spending has been increased through 2006 due to the continuation and expansion of the State's System Benefits Charge (SBC) program, and the anticipated spending of NYPA and LIPA on public benefits programs.
- Between 1990 and 2001, the State's major energy efficiency programs have saved 57,256 GWh of electricity and have reduced summer peak demand by nearly 1,700 MW. Cumulative annual savings in 2001 were 7,095 GWh¹⁸, or about 5.2% of the 137,000 GWh of electricity sales to ultimate consumers in that year. Cumulative summer peak demand reductions in 2001 were 1,688 MW¹⁹, or about 5.4%, of the 30,982 MW peak that occurred during that summer. Natural gas and oil savings of approximately 40 TBtu have also been achieved over this period.
- The cumulative total electricity savings over the period from 1990 to 2001 are estimated to have led to emission reductions of nearly 43,000 tons of NO_x, 86,500

¹⁸ The 7,095 GWh saved in 2001 is enough electricity to power approximately one million homes for a period of one year.

¹⁹ The 1,688 MW saved is equal to the demand of approximately 1.6 million homes.

tons of SO₂²⁰, and 25 million tons of CO₂²¹. Cumulative natural gas and oil savings add an additional 2,000 tons of NO_x, 840 tons of SO₂, and 2.5 million tons of CO₂ reductions. Approximately 15,000 jobs were created or sustained as a result of these programs. These jobs will be sustained for the life of the energy efficiency equipment installed.

²⁰ The reduction in SO₂ and NO_x emissions is equivalent to shutting down about 1,000 MW of coal-fired electricity generation for one year.

²¹ The 25 million tons of avoided CO₂ emissions is equivalent to removing approximately five million cars from the road for one year.