Appendix B

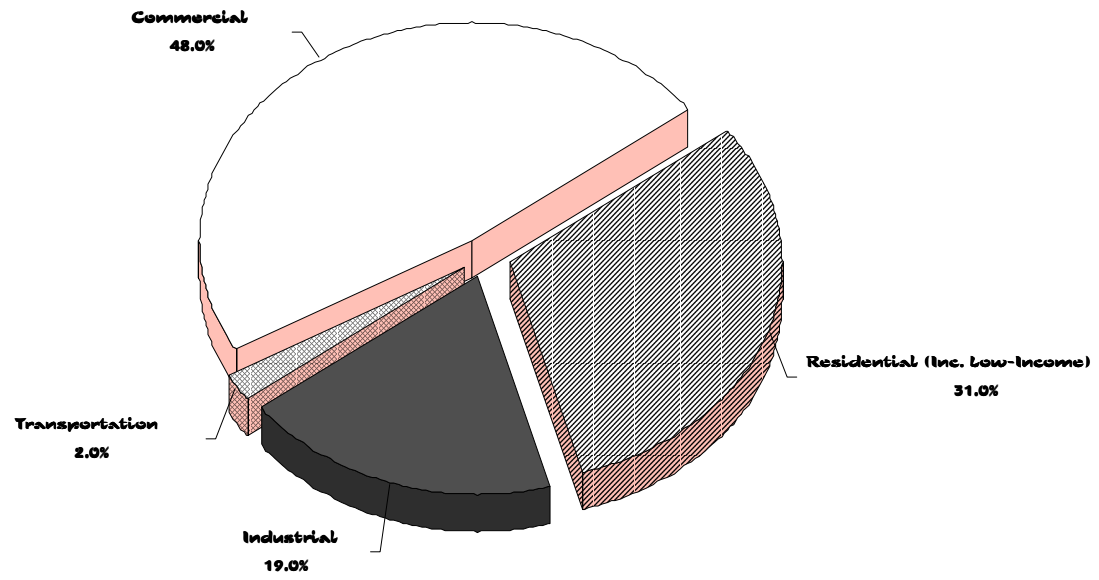
MARKET SECTOR ANALYSIS

INTRODUCTION

This appendix provides a summary of the electricity-use and electric-using products of New York's residential (including low-income), commercial and industrial sectors. The purpose of this appendix is to provide background data and information on where and why the **New York Energy $mart**[SM] programs have targeted specific markets.

The residential, low-income, commercial, and industrial sectors in New York State are comprised of a myriad of customer sub-sectors and end-uses. As shown in Figure B-1, New York's commercial sector is the single largest electricity user, accounting for approximately 48% of total Statewide use, followed by the residential sector, including low-income households (31%), the industrial sector (19%), and transportation sector (2%). Electricity use by each of these customer sectors is provided in Table B-1, along with an identification of major appliances and equipment end-uses. Total Statewide electricity use is estimated at 130 billion kilowatt-hours (kWh) annually.

FIGURE B-1: Electricity Consumption by Market Sector in New York State



Source: New York State Energy Research and Development Authority.
December 1999. Patterns and Trends, New York State Energy Profiles: 1984-1998.

TABLE B-1: Electricity Consumption by Market Sector and End-Usage[1]

Market Sector	Electricity Consumption (million kWh)	Percent of Total	Major Customer Sub-Sectors	Major End-Uses
Residential	40,240	30.7%	Single-family and multifamily homes and apartment buildings.	Space heating and cooling; water heating; refrigeration; lighting; and household appliances.
Low-Income				
Commercial	63,332	48.3%	Office (service businesses), health-care, educational, engineering, warehouse and storage, public safety, retail trade (including food and general merchandise stores), and government services.	Lighting; heating, ventilation, and air-conditioning (HVAC) systems; motors; and refrigeration.
Industrial	25,089	19%	Manufacturing, including industrial machinery and equipment; electronic equipment; instrumentation and monitoring equipment; printing and publishing; and fabricated metals.	Lighting; heating, ventilation, and air-conditioning (HVAC) systems; motors; and refrigeration.
Transportation	2,500	2%	Street lighting.	Traffic lights; street lamps
TOTAL	131,161	100%		

Residential Sector

New York State has approximately 6.5 million households in which approximately 56% or 3.8 million households within the State are single-family units.[2] Housing units in the State turn-over at a rate of approximately 165,800 units annually, representing about 2.4% of the State's housing stock. Approximately 52% of the housing units are owner-occupied and the remaining 48%, are renter-occupied.[3] Currently, more than 136,000 or 2% of all households live in mobile-homes.[3] Approximately 41%, or 2.8 million households are in multifamily buildings. Table B-2 presents a summary of select characteristics that identify electricity usage for New York's residential sector.

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[1] New York State Energy Research and Development Authority. December 1999. *Patterns and Trends; New York State Energy Profiles: 1984-1998.*

[2] Energy Information Administration. November 1999. *A Look at Residential Energy Consumption in 1997. Residential Energy Consumption Survey*. DOE/EIA-0632(97).

[3] The Nelson A. Rockefeller Institute of Government. November 1998. *1998 New York State Statistical Yearbook; 23rd Edition.*

TABLE B-2: New York State Residential Sector Traits

Trait	Residential Sector
Total number of residential households.	- 6.54 million occupied households.[a]
Percent of households that are owner-occupied vs. rent or lease	- 52% are owner-occupied while 48% are renter-occupied.[b]
Total residential electricity use.	- 40,240 GWh of electricity per year.[c]
Total residential electricity expenditure.	- $5.5 billion per year.[c]
Total residential energy expenditure.	- $9.9 billion per year.[c]
Average residential (end-user) electricity costs.	- New York residents in the service areas identified in Table B-4 pay an average of 12.9 ¢ per kilowatt-hour for electricity.[d] The statewide average for all utility service territories is approximately 13.7 ¢ per kilowatt-hour for electricity.[c] - Approximately $790 is spent annually per household for electricity for New York residents located in the service areas identified in Table B-3.[d] The statewide average for all utility service territories was $840.[a]
Residential (end-user) energy costs.	- Residential customers in New York spend, on average, between $1,500 and $1,600 annually to meet their energy needs.[e]

[a] Energy Information Administration. Table 1. Average Monthly Bill by Sector, Census Division and State, 1998. www.eia.doe.gov/cneaf/electricity/esr/t01.txt.
[b] The Nelson A. Rockefeller Institute of Government. November 1998. *1998 New York State Statistical Yearbook; 23rd Edition*.
[c] New York State Energy Research and Development Authority. December 1999. *Patterns and Trends, New York State Energy Profiles: 1984-1998.*
[d] New York State Department of Public Service, Department of Accounting and Finance. *Financial Statistics of the Major Investor-Owned Utilities in New York State;* 1998.
[e] Energy Information Administration. Table 1. Consumption and Expenditures in New York State Households, 1993. Household Energy Consumption and Expenditures 1993 Supplement: States. www.eia.doe.gov/

New York's residential sector, including single family, multi-family, and low-income[4] sectors located in the Central Hudson Gas & Electric Corporation (CHG&E), Consolidated Edison Company of New York, Inc. (Con Ed), New York State Electric & Gas Corporation (NYSEG), Niagara Mohawk Power Corporation (NMPC), and Orange and Rockland Utilities, Inc. (O&R) utility service areas are eligible to participate in the **New York Energy Smart**[SM] programs. Households in these service areas use an annual average of 5,613 kWh of electricity and spend approximately $790 annually for electricity. A summary of average electricity bills by utility customers in the **New York Energy Smart**[SM] service areas is provided in Table B-3. Residential customers pay a range of prices for electricity (per kWh) depending on the service area in which they reside, as indicated in Table B-4.

[4] **New York Energy $mart**[SM] program interventions for the low-income sector currently exist in three of the five service territories listed in Tables A-3 and A-4, including: Consolidated Edison Company of New York, Orange and Rockland Utilities, Inc., and Central Hudson Gas & Electric Corporation (CHG&E).

TABLE B-3: Residential Energy Use by Utility Service Area[5]

		New York Energy $mart℠ Utility Service Area					
Market Sector	**Critical Evaluation Item**	**Central Hudson G&E**	**Con. Edison of NY**	**NYS Electric & Gas**	**Niagara Mohawk Power Co.**	**Orange & Rockland Utilities**	**Total(s)/ Average**
Residential	Total Number of Customers.	228,551	2,622,074	719,463	1,401,180	173,664	5,144,932
	Average Annual Bill Per customer.	$785	$699	$995	$858	$883	$794 (weighted average)
	Average kWh Consumption Per customer.	7,075	4,303	7,149	6,882	6,858	5,613 (weighted average)
	Annual kWh Sales (thous.)	1,616,938	11,282,669	5,143,167	9,642,240	1,190,951	28,875,965

Residential Electric Appliance Market

Residential households in New York State use over 40,000 gigawatt-hours (GWH) of electricity annually, and household appliances account for the largest share of this use. Figure B-2, lists average annual electricity use for household appliances. Major appliances and their electricity use are described in the following sections. New York-specific information is not readily available regarding most of the appliances discussed. Therefore, regional Northeast data is used to generally represent the situation in New York. Table B-5 compares distributor sales data for household appliances in New York to national sales.

TABLE: B-4: Residential Electricity Prices per kWh by Utility Service Area[6]

		New York Energy $mart℠ Utility Service Area					
Market Sector	**Residential Need**	**Central Hudson G&E**	**Con. Edison of New York**	**NYS Electric and Gas**	**Niagara Mohawk Power Co.**	**Orange & Rockland Utilities**	**Average cents per kWh**
Residential	500 kWh	11.47¢	15.48¢	14.43¢	12.44¢	10.89¢	12.76¢
	1500 kWh	10.48¢	13.44¢	13.40¢	10.82¢	8.38¢	11.05¢
	3000 kWh	10.23¢	13.51¢	13.14¢	10.41¢	8.45¢	10.84¢

[5] New York State Department of Public Service, Department of Accounting and Finance. *Financial Statistics of the Major Investor-Owned Utilities in New York State*. 1998.

[6] New York State Department of Public Service Commission. January 1, 2000. *Monthly Residential Bills Including State GRT*. Tariff Department, PSC.

TABLE B-5: NYS Distributor Sales for Household Appliances VS. National Sales[7]

Product Type	NYS Sales (Thousands of Units Sold)	U.S. Total Sales (Thousands of Units Sold)	NYS Sales as a Percent of U.S. Total
Refrigerator Type			
Refrigerators	481,800	7,906,100	6.09%
Chest Freezers	14,400	785,900	1.83%
Upright Freezers	20,900	657,200	3.18%
Room Air Conditioners	440,700	4,548,600	9.68%
Home Laundry Products			
Automatic Washers	297,700	6,201,500	4,8%
Electric Dryers	133,400	3,937,000	3.38%
Gas Dryers	86,500	1,196,200	7.23%
Kitchen Appliances			
Portable Dishwashers	10,400	187,600	4.33%
Built-In Dishwashers	190,100	4,385,900	5.54%
Compactors	2,600	97,000	2.68%

Refrigerators. Virtually all of the 19.7 million households in the Northeast own or have use of at least one refrigerator. Approximately 15% of Northeast households have two or more refrigerators. The greatest percentage of all refrigerators in the Northeast (88.3%) are 15 to 22 cubic feet in size (medium to large). In addition, the largest percent (29%) of all Northeast refrigerators are between five to nine years old. This segmentation is integral to calculating how much energy savings could be realized if older refrigerators where replaced by newer energy-efficient models.[8] Refrigerators manufactured today are significantly more efficient than models sold in 1972, and consume 62% less energy.[9]

Freezers. Approximately one-third of the region's 19.7 million households own freezers. The greatest ownership (37% of all freezers), are between 10 and 19 years of age. However, a significant portion of freezers in the Northeast, (22%), are older than 20 years of age.[9] As a result, energy savings

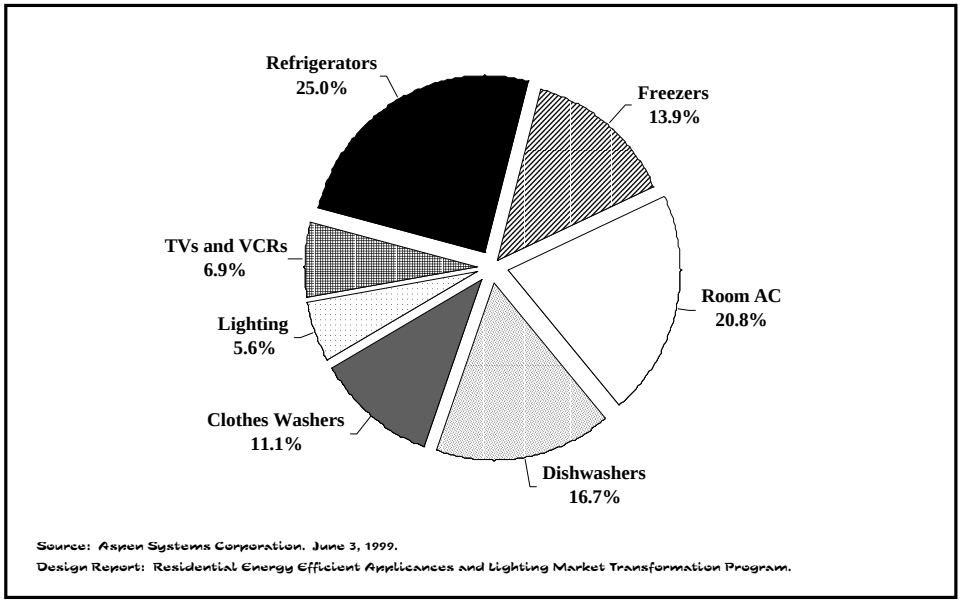
[7] Energy Information Administration/Household Energy Consumption and Expenditures 1993 Supplement: States. www.eia.doe.gov.

[8] Association of Home Appliance Manufacturers. www.aham.org

[9] Energy Information Administration. November 1999. *A Look at Residential Energy Consumption in 1997. Residential Energy Consumption Survey*. DOE/EIA-0632(97).

opportunities exist for replacing these pre-standard model units. Since 1972, energy use for both freezers (and refrigerators) has decreased among all product types (*e.g.*, automatic defrost, manual defrost, uprights, etc.). Both freezers and refrigerators have become more energy-efficient while increasing in size and the number of product attributes. Freezers manufactured today are more energy-efficient, and use 68% less energy than models produced in the 1970s.[8]

FIGURE B-2: Electricity Consumption of Select Household Appliances as a Percent of Total Appliance Consumption



Source: Aspen Systems Corporation. June 3, 1999.
Design Report: Residential Energy Efficient Appliances and Lighting Market Transformation Program.

Clothes-Washers and Dryers. Three quarters (76%) of Northeast households own clothes-washers.[9] [approximately two-thirds of the 19.7 million Northeast households have clothes-dryers.] Clothes-washers manufactured today use 42% less energy than models produced in the 1970s.[8]

Water-Heaters. All of the Northeast's 19.7 million households have some type of water-heater (fueled by either natural gas, electricity, fuel oil, or liquified petroleum gas (LPG)). The largest percent of Northeast households have natural gas water-heaters (46%), followed by electric water-heaters (26%).[9]

Televisions. Almost all (99%) households own at least one color television. The majority of households (36.4%), own two or more color televisions.[9]

Ovens. Nearly all households own some type of cooking oven (approximately 99.5%). The greatest number of households (49.5%) have electric ovens, followed by natural gas ovens (45.5%).[9]

Dishwashers. Approximately half of all households have a dishwasher.[8] The majority of these households (57%) use their household dishwasher less than four times per week. Dishwashers manufactured today use 50% less energy than models produced in the 1970s.[9]

Room Air-Conditioners. Approximately 40% of the Northeast's households use room air-conditioning. Over half of these users have only one unit, while 48% have and operate two or more units. The efficiency of room air-conditioners has been steadily increasing over the past two decades, with room units now using 36% less electricity than units made in 1972.[8,9] Refrigerators and room air-conditioners make up the largest percentage of home appliance sales (in number of units sold) by distributors throughout New York State. In addition, sales of room AC in New York account for approximately 10% of sales nationally.

Lighting. Residential lighting accounts for approximately 10-15% of the total annual residential energy use for United States households. The average American home has 30 lighting fixtures, of which 85% use incandescent bulbs. The greatest lighting energy use in homes is in kitchens, living rooms, bathrooms, bedrooms, and outdoor porch areas.[10]

Low-Income Sector

New York State ranks in the top ten of all states with the greatest percentage of people living in poverty, defined as living with incomes that are below 125% of the federal poverty threshold. This includes all households with a family of four and income just over $20,000. Approximately 2.9 million New Yorkers live below this threshold. [This represents 1.8 million or 26% of the States households]. Of these, 40% receive some type of public assistance. These households spend close to a third of their income on energy costs for their home,[11] including over 20% for space heating, and approximately 3% for electricity in non-electric space heated households. A brief summary of statistics on the low-income sector in New York is summarized in Table B-6.

The largest share of low-income households are in Chautauqua, Cattaraugus, Allegany, and Steuben counties (Southwestern portion of the State); Yates, Tompkins, and Otsego counties (Central region of the State); St. Lawrence, and Franklin (North central portion of the State); and Sullivan, Kings, Bronx, and New York counties (Southeastern portion of the State).[12] Approximately one-quarter of New York City's residents are considered low-income, including 34% of the residents of the Bronx and 28% of those in Brooklyn. In upstate New York, the cities of Albany, Buffalo, Utica, and Newburgh had poverty rates of between 23% and 32% of the residential population.

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[10] Opinion Dynamics Corporation. June 3, 1998. *Baseline Study of the Northeastern Residential Lighting Market.*

[11] New York State Energy Research and Development Authority. May 8, 1998. *Proposed Plan for Public Programs Funded by System Benefits Charge.*

[12] http://factfinder.census.gov

TABLE B-6: New York Low-Income Sector Traits

Trait	Low-Income Sector
Number of low-income households.	- 1.8 million households (2.9 million New York State residents) are characterized as low-income.[f]
Number of people living below the poverty level: New York's national ranking.	- New York State was ranked 5th in the nation in 1998 with regard to the number of people living below the poverty level.[g]
Number of buildings characterized as low-income.	- Over 700,000 residential buildings are characterized as low-income in New York State. The state's low-income sector has over 2.5 billion square feet of floorspace that lies below the poverty line.[h]
Average electricity use among low-income households.	- On average, low-income residents in New York State use more than 5,000 kWh of electricity annually.[h]
Low-income electricity costs per kWh.	- The low-income population of New York State paid 13.8 cents per kWh on electricity in 1993.[h]
Low-income electricity costs per household.	- Low-Income households of New York State spend approximately $700 annually on electricity.[h]
Low-income energy costs per household.	- Low-income households in New York State spent between $1,300 to $1,400 in 1993 to meet their energy needs.[h]
Energy Burden of low-income residents in New York, and the Northeast.	- In past years, Low-Income Home Energy Assistance Program (LIHEAP) participants have paid over 23% of their income for their winter gas bill alone. - The energy burden (percentage of income designated toward energy needs) for the low-income population of New York averages 28%, a figure that is higher than the national average low-income energy burden of 22%.[i] - The Northeast has the highest energy burden in the country.[i]

[f] New York State Energy Research and Development Authority. May 8, 1998. *Proposed Plan for Public Programs Funded by System Benefits Charge.*
[g] U.S. Census Bureau. www.census.gov/statab/ranks/rank19.txt.
[h] Energy Information Administration. Table 1. Consumption and Expenditures in New York State Households, 1993. and Table 4. Electricity Consumption and Expenditures in New York State Households, 1993. Household Energy Consumption and Expenditures 1993 Supplement: States. www.eia.doe.gov/
[i] Economic Opportunity Research Institute; Washington D.C. March 28, 1999. *The Needs of Low-Income Energy Consumers in New York and the Northeast Census Region.*

Higher income households have less of an energy burden[13] compared to low-income groups, largely because lower income households have to spend a larger amount of their income on energy bills than do higher income households. This burden prevents them from owning as many appliances, particularly

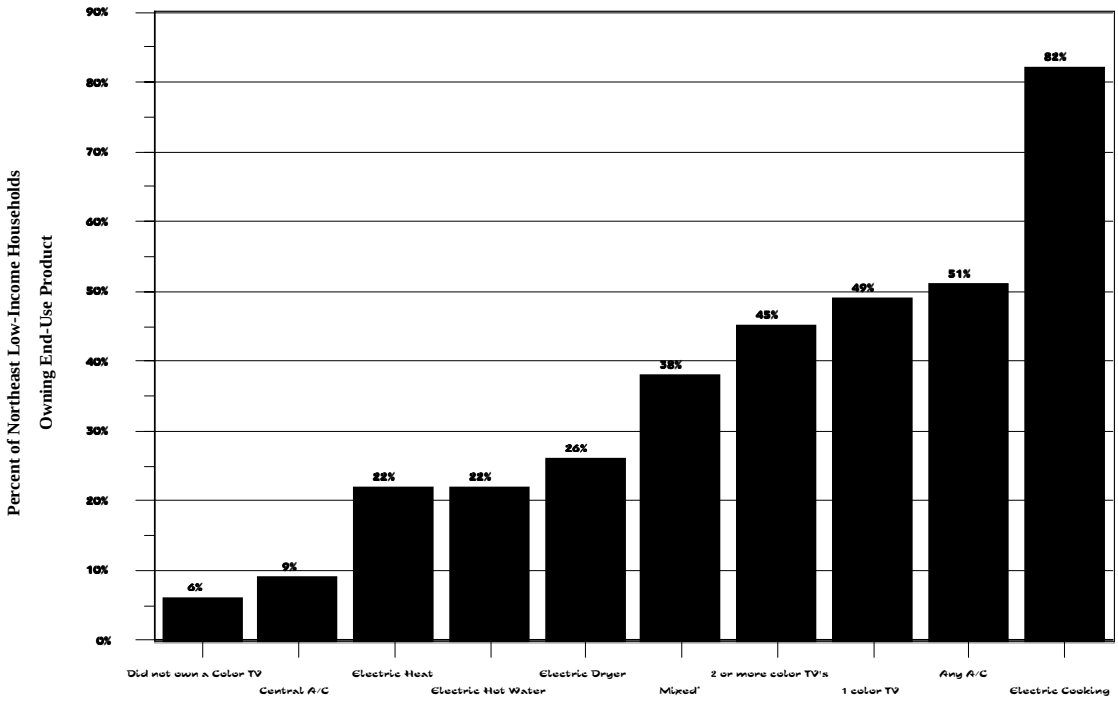
[13] Energy burden is defined as the sum of all residential energy payments made annually by a consumer divided by the households total annual household income.

more expensive energy efficient appliances.[14] While low-income groups of the Northeast (including New York) have increased appliance ownership over the last decade, appliance saturations are still greatest among higher income households. The use of programable thermostats and energy management systems to control energy use is also greatest among higher income households.[14]

Low-Income Electric Products and Services

The low-income population, generally, has increased its ownership and use of electricity using appliances. Figure B-3, illustrates appliance ownership rates for low-income households in the Northeast. The greatest percentage (82%), of low-income households own electric cooking appliances. Most other appliances (color televisions, electric dryers, water-heaters, electric heat, and central air conditioning equipment) are seen, individually, in less than 50% of low-income homes. Figure B-4 lists typical annual expenditures for electric appliances among low-income households. Electric space-heating and water-heating are the two most costly electric end-uses for low-income households.

FIGURE B-3: Appliance Ownership Rates of Low-Income Households in the Northeast

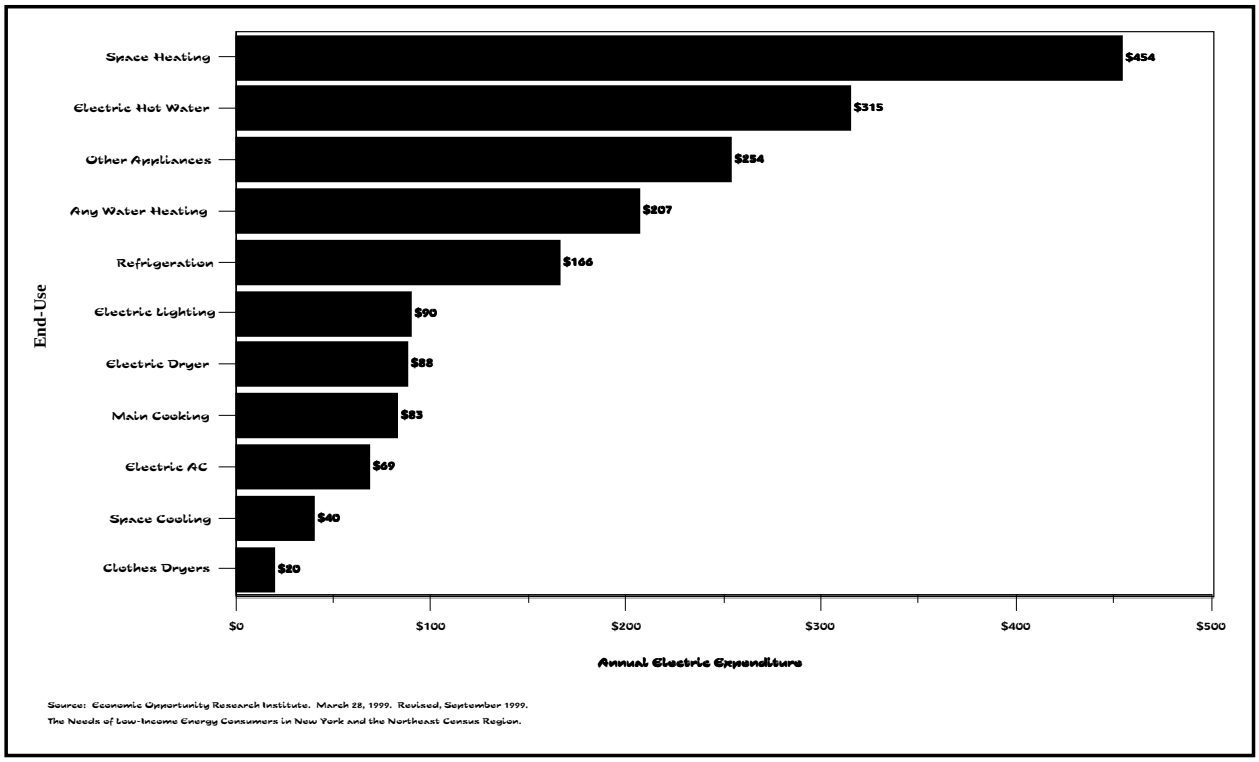


Source: Economic Opportunity Research Institute. March 28, 1999. Revised, September 1999. The Needs of Low-Income Energy Consumers in New York and the Northeast Census Region.

*Mixed includes: Color TV; Microwave; and Clothes Washers

[14] Economic Opportunity Research Institute; Washington D.C. March 28, 1999. *The Needs of Low-Income Energy Consumers in New York and the Northeast Census Region.*

FIGURE B-4: Annual Electric Expenditures for Low-Income Households in the Northeast, by Electric End-Use



Commercial Sector

Information on New York State's commercial sector is largely unavailable, although it is recognized that regional information reveals many of the same characteristics. Where regional information is believed to be representative of New York, such information is presented to help profile the State's commercial sector.[15]

New York State's commercial sector is the largest user of electricity in the State. The commercial sector accounts for 49% of the State's total electricity use.[16] In 1998, commercial electricity use was 63,332 gigawatt-hours, an increase of 5.8% over the 15-year average through 1998.[16] In contrast, New York State's commercial sector accounts for only 11% of the State's total natural gas use. Some of these facts along with a basic summary of sector information are provided in Table B-7.

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[15] The Middle Atlantic region is used as representative of the commercial sector of New York State, where data was not available for the State. The Middle Atlantic region consists of the states of New Jersey, New York, and Pennsylvania. New York State contains 47.5% of the Middle Atlantic's population.

[16] New York State Energy Research and Development Authority. December 1999. *Patterns and Trends, New York State Energy Profiles: 1984-1998.*

The Mid-Atlantic region contains approximately 521,000 buildings totaling 8,743 million square feet of commercial building space. The greatest percentage (50%) of the commercial buildings in the Mid-Atlantic region are one- to two- floored buildings built before 1919 or between 1946 and 1959. These buildings are between 1,000 to 10,000 square feet in size, with the greatest percentage (46%) falling between 1,000 and 5,000 square feet. The greatest percentage (47%) of the Mid-Atlantic's commercial buildings are occupied between 40 to 60 hours per week.[17]

TABLE B-7: New York Commercial Sector Traits

Trait	Commercial Sector
Total commercial customers of electricity.	- There were over 846,000 commercial electricity customers in New York State in 1998.[j]
Total annual commercial sector electricity use.	- New York's commercial sector uses 63,332 GWH of electricity annually.[k] - New York's commercial sector accounts for 48% of the State's total electricity consumption.[k]
Total annual individual commercial customer electricity use in New York State.	- The typical electricity commercial customer in New York uses 62,832 kWh of electricity annually.[k]
Total annual commercial electricity expenditure.	- Over $7.4 billion was spent on electricity in New York's commercial sector in 1998.[k]
Individual commercial customers average price and annual expenditure for electricity.	- Commercial customers in New York pay, on average, 11.7 cents per kilowatt-hour for electricity.[j,k] - The typical commercial customer spent $7,309 in 1998 for electricity.[j] However, for commercial customers in the service territory areas identified in Table B-8, electricity expenditures were slightly lower, averaging $7,043 in 1998.[l]
Total annual commercial energy costs for New York State.	- Over $9 billion was spent on energy in New York's commercial sector in 1998.[k]

[j] Energy Information Administration. Table 1. Average Monthly Bill by Sector, Census Division and State, 1998. www.eia.doe.gov/cneaf/electricity/esr/t01.txt.
[k] New York State Energy Research and Development Authority. December 1999. *Patterns and Trends, New York State Energy Profiles: 1984-1998.*
[l] Financial Statistics of the Major Investor-Owned Utilities in New York State. 1998

As illustrated in Table B-8, commercial customers in the **New York Energy $mart[SM]** program utility

[17] Energy Information Administration. October 1998. *A Look at Commercial Buildings in 1995: Characteristics, Energy Consumption, and Energy Expenditures.* Energy Information Administration. DOE/EIA-0625(95).

service areas used over 41 billion kWh in 1998, representing approximately 65.2% of the commercial electricity use in New York State. These commercial customers spend an average of $7,043 annually for electricity, or about 11.7 cents per kWh. Table B-9 lists average prices for commercial electricity by utility service area and by end-use demand.

TABLE B-8: Commercial Sector Characteristics in the New York Energy Smart[SM] Utility Areas (1998)[18]

		New York Energy $mart[SM] Utility Service Area					
Market Sector	**Critical Evaluation Item**	**Central Hudson G&E**	**Con. Edison of NY**	**NYS Electric & Gas**	**Niagara Mohawk Power Co.**	**Orange & Rockland Utilities**	**Total(s)/ Average**
Commercial	Total Number of Customers.	35,501	404,016	79,225	146,027	26,010	690,779
	Average Annual Bill Per customer.	$2,942	$7,462	$4,938	$8,356	$5,171	$7,043 (weighted average)
	Average kWh Consumption Per customer.	36,209	58,330	42,829	79,169	57,801	59,801 (weighted average)
	Annual kWh Sales (thous.)	1,285,453	23,566,062	3,393,097	11,560,816	1,503,392	41,308,820

TABLE B-9: Commercial Electricity Prices per kWh by Utility Service Area[19]

		New York Energy $mart[SM] Utility Service Area					
Market Sector	**Size of Facility - Need**	**Central Hudson G&E**	**Con. Edison of NY**	**NYS Electric & Gas**	**Niagara Mohawk Power Co.**	**Orange & Rockland Utilities**	**Average cents per kWh**
Commercial	Small (10 kW, 30% L.F.	9.31¢	15.47¢	14.27¢	13.88¢	9.97¢	12.16¢
	Medium (50 kW, 35%L.F.)	9.09¢	15.16¢	13.32¢	11.76¢	9.11¢	11.99¢
	Large (250 kW, 50% L.F.)	7.81¢	12.44¢	11.58¢	11.49¢	5.96¢	9.89¢

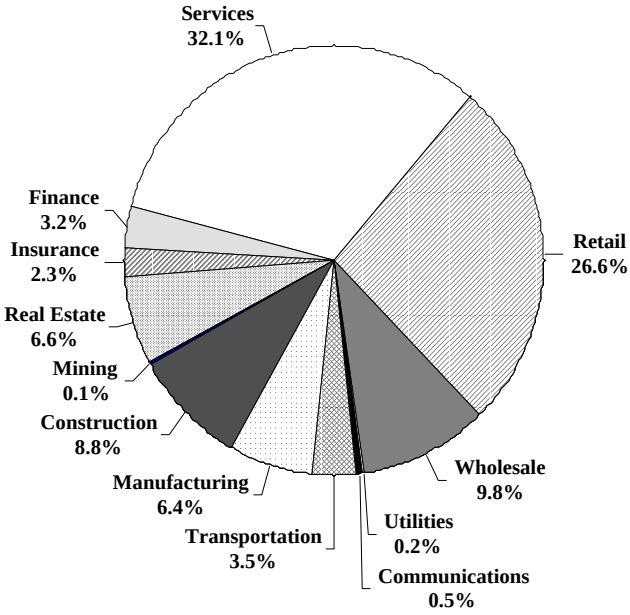
New York's economy is well diversified, as illustrated in Figure B-5, with more than a third of the State's economic activity (in terms of sales) in the services sector, followed closely by the retail sector

[18] Financial Statistics of the Major Investor-Owned Utilities in New York State; 1998

[19] New York State Public Service Commission. January 1, 2000. *Monthly Commercial Bills Including State GRT.* Tariff Department, PSC.

(26%), and wholesale sector (10%). The commercial sector accounts for over 80% of the States total sales.[20] A brief description of the commercial sector by building end-use is provided in the following sections.

FIGURE B-5: Economic Activity in New York State (by Percent of Total Annual Sales)



Source: Economic Census. 1992. www.census.gov/econ97.

Retail. Almost one-quarter (23% or 2,019 million square feet) of the Mid-Atlantic region's total commercial floor-space houses retail operations. In addition, commercial retail buildings use the second largest amount of energy,[21] behind commercial office buildings, using 173 trillion Btu of energy annually (with total expenditures of $3.2 billion per year).[22]

Office. Offices comprise approximately 18.5% (or 1,616 million square feet) of the Mid-Atlantic region's total commercial floor-space. Compared to all other commercial building end-uses, commercial office buildings in the Mid-Atlantic region use the greatest amount of energy, 188 trillion Btu annually, at a cost of $3.7 billion.[22]

Schools.[23] Approximately 15.6% (or 1,363 million square feet) of the Mid-Atlantic region's total

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[20] Calculated by adding wholesale, retail, services, finance, insurance, and real-estate sales figures.

[21] Energy Sources from Major Fuels including: Electricity, Natural Gas, Fuel Oil, and District Heat.

[22] Energy Information Administration. October 1998. *A Look at Commercial Buildings in 1995: Characteristics, Energy Consumption, and Energy Expenditures.* Energy Information Administration. DOE/EIA-0625(95).

[23] This includes buildings designated as: Preschool, elementary, junior high, senior high, college or university classrooms/laboratories, and vocational schools. Other activities include school administration, dormitory, gymnasium, infirmary, library, museum, stadium, and student union.

commercial floor-space houses educational facilities (schools). In addition, schools in the Mid-Atlantic region use 161 trillion Btu of energy annually, at a cost of $2.1 billion, ranking third in energy use behind retail and office buildings.[25]

Municipal. Approximately 14% (or 1,239.5 million square feet) of the Mid-Atlantic region's total commercial floor-space houses local government. Approximately 5.5% (484 million square feet) is used for state government, and 3% of the total floor-space is occupied by federal government. Together these buildings use 190 trillion Btu of energy[24] annually, at a cost of $3,115 million. Approximately 5.5% (or 483 million square feet) of the Mid-Atlantic region's total commercial floor-space is used for public assembly, not including municipal space. These buildings use 75 trillion Btu, of energy annually at a cost of $1,084 million.[25]

Hospitals. Less than 4% (3.6% or 313 million square feet) of the Mid-Atlantic region's total commercial floor-space houses healthcare facilities, including hospitals. Yet, hospitals are the highest energy users per square foot for commercial buildings in the region, using approximately 113 trillion Btu's of energy annually, at a cost of $1.1 billion.[25]

Other. The remainder of commercial sector energy use, accounting for 29% of total energy use is in warehouse and storage space, food service, religious organizations, lodging, and other miscellaneous space.[25]

Commercial buildings in the Northeast spend, on average, $1.39 per square foot of floor-space for major fuels. However, different building types use different amounts of the various fuels. For example, health care facilities costs are approximately $2.60 per square foot (87% more than the average); commercial buildings with lodging as a principal activity spend $2.35 per square foot (69% more than the average); and commercial office buildings spend $1.71 per square foot (23% more than the average) for energy per square foot of floor-space.

Among all Northeast commercial buildings, space heating, water heating, and lighting account for the largest energy use.[25] Table B-10, compares the use of electricity and natural gas to the total energy use by end-use for commercial buildings in the Mid-Atlantic region. With the exception of space-heating and water-heating, electricity is the predominant energy source for almost every other commercial end-use in commercial buildings.

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[24]This includes site electricity, natural gas, fuel oil, and district heat.

[25] Energy Information Administration. October 1998. *A Look at Commercial Buildings in 1995: Characteristics, Energy Consumption, and Energy Expenditures.* Energy Information Administration. DOE/EIA-0625(95).

TABLE B-10: Commercial Building Energy Use by Type and End-Use (Mid-Atlantic) 1995[25]

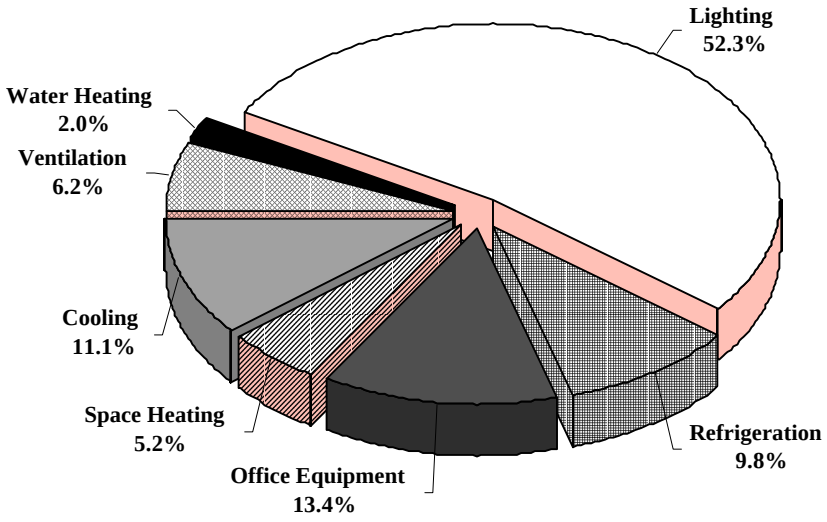
Major End-Use	Major Fuel[26] Consumption (trillion Btu)	Electricity Consumption (trillion Btu)	Natural Gas Consumption (trillion Btu)
Space Heating	266	16	122
Cooling	38	34	--
Ventilation	19	19	--
Water Heating	121	6	51
Lighting	161	161	--
Cooking	26	--	24
Refrigeration	30	30	--
Office Equipment	41	41	--
Total	702	307	197

Commercial Electric Products and Services

Lighting accounts for over half of all commercial sector electricity use (over 52%). Falling significantly behind this is office equipment with 13% of total electricity use, followed by 11% for cooling, less than 10% for refrigeration, and 6% for ventilation, as seen in Figure B-6. Commercial buildings of the Northeast employ a variety of energy conservation measures covering numerous types of equipment and technologies including: lighting, building shell features, HVAC systems, as well as cooling and heating systems. Table B-11, identifies saturation levels among Northeast commercial buildings with regard to energy-efficient products, services, and equipment.

[26] Major Fuels include electricity, fuel oil, natural gas, district steam, district hot water, and district chilled water.

FIGURE B-6: Commercial Electricity Use in Mid-Atlantic States by Major End-Use (Percentage of Total Consumption)



Source: Energy Information Administration. October 1998.
A Look at Commercial Buildings in 1995: Characteristics, Energy Consumption, and Energy Expenditures. DOE/EIA-0625(95).

TABLE B-11: A Look at Energy Conservation in Commercial Buildings, 1995[27]

Energy Conservation Feature/Technology	Percent of Northeast (NE) Commercial Buildings using/employing energy conserving Technology
Energy Conservation Features	90.8% of NE commercial buildings had "any" conservation features.
	86.2% employed a building shell feature.
	68% had energy conserving HVAC systems.
	61.5% had energy-efficient lighting.
Lighting Conservation Features	18.3% of NE commercial buildings used specular reflectors.
	42% had energy-efficient ballasts.
	6.3% had natural lighting control sensors.
	5.7% employed occupancy sensors.
	16.8% used a time clock as a lighting conservation feature.
	12.4% employed manual dimmer switches.

[27] Energy Information Administration. October 1998. *A Look at Commercial Buildings in 1995: Characteristics, Energy Consumption, and Energy Expenditures.* Energy Information Administration. DOE/EIA-0625(95).

Types of Lighting Equipment Technologies	54% of all NE commercial buildings used Incandescent lighting equipment - which accounted for 66% of the commercial floorspace that was lit.
	89% used Standard Fluorescent lighting equipment - which accounted for 92% of the commercial floorspace that was lit.
	13% used Compact Fluorescent lighting equipment - which accounted for 33% of the commercial floorspace that was lit.
	14% used High-Intensity Discharge lighting equipment - which accounted for 38 % of the commercial floorspace.
	7.2% used Halogen lighting equipment - which accounted for 19% of the commercial floorspace.
Building Shell Conservation Features	76% of NE commercial buildings used roof or ceiling insulation.
	54% had wall insulation.
	56% had storm or multiple glazing.
	15% had tinted, reflective or shading glass.
	45.7% had exterior or interior shading or awnings.
HVAC Conservation Features	7.3% had variable air-volume systems.
	11% had an economizer cycle.
	65.4% used regular HVAC maintenance as a conservation measure.
	4.6% had “other” energy-efficient equipment.
Cooling Equipment Technologies	16.5% of NE commercial buildings used residential-type central air conditioners.
	2.2% had heat pumps as cooling equipment.
	23% had individual air conditioners.
	0.4% had district chilled water as a cooling method.
	2.2% had central chillers.
	27% had packaged air conditioning units.
Percent of NE Commercial Buildings with Cooled Floorspace	38% of NE commercial buildings did not have cooled floorspace.
	22.6% of NE commercial buildings had between 1 to 50 percent of their floorspace cooled.
	14% had between 51 and 99 percent of their floorspace cooled.
	25.5% had 100 percent of their floorspace cooled.
Heating Equipment Technologies	2% of NE commercial buildings had/used heat pumps.
	39% had furnaces.
	19.3% had individual space heaters.
	3.6% had district heat.
	33% had boilers.
	49.5% had packaged heating units.
	5.2% had “other” heating equipment/technologies.

The Industrial Sector

The industrial sector of New York, ranked from highest to lowest in sales, includes: manufacturing (including agriculture), mining, and construction businesses. Approximately two-thirds of industrial energy use is for heating (processes), and to provide power for manufacturing. The remaining 33% is used for non-manufacturing heating and power purposes, as well as the extraction and refinement of raw materials. Nationally, manufacturing processes involving petroleum refining, chemicals, and pulp and paper are the largest end-use consumers of energy for heat and power in the industrial manufacturing sector. Combined, these three industries used 8.9 quadrillion Btus in 1998 (national total).[28] Table B-12 presents a snapshot of New York State's industrial sector with regard to energy and electricity use, number of establishments, and employment.

TABLE B-12: New York Industrial Sector Traits

Trait	Industrial Sector
Number of industrial customers.	- 9,023 industrial electricity customers.[m]
Total statewide industrial electricity use.	- 25,089 gWh of electricity per year.[n]
Total statewide industrial electricity cost.	- Over $1.25 billion was spent by New York's industrial sector on electricity in 1998.[n]
Statewide electricity use for individual industrial customers.	The typical industrial customer of the state uses: - 231,712 kWh of electricity per month, and - 2.78 million kWh of electricity annually.[m]
Statewide electricity costs for individual industrial customers.	- New York State industrial customers spend, on average, $156,000 annually for electricity. In addition, industrial consumers spend an average of 4.95 cents per kilowatt-hour on electricity.[m]
Total statewide industrial energy costs.	- Over $1.97 billion was spent by New York's industrial sector on energy in 1998.[n]

[m] Energy Information Administration. Table 1. Average Monthly Bill by Sector, Census Division and State, 1998. www.eia.doe.gov/cneaf/electricity/esr/t01.txt.
[n] New York State Energy Research and Development Authority. December 1999. Patterns and Trends, New York State Energy Profiles: 1984-1998.

During the first five years of the 1990s, the State lost approximately 42,820 industrial jobs annually. This rate of job loss (4% per year) was much higher than the national average of 1%.[29] However, this

[28] Annual Energy Outlook 2000 - Market Trends, Energy Demand. www.eia.doe.gov/oiaf/aeo/demand.html

[29] *The State of Manufacturing in New York State*. July 1998. The Public Policy Institute of New York State, Inc. www.bcnys.org.

situation has improved with industrial jobs in New York State growing annually since 1996. The State's industrial sector in 1996 had a total payroll of approximately $35.6 billion and gross domestic product (GDP) of $593 billion, and now accounts for approximately eight percent (8%) of the nation's GDP. Sixty-six percent of FORTUNE 500 companies, have a presence in New York State, more than any other state in the nation.[30] The State ranks third behind California and Texas with respect to manufactured exports, at over $50 billion annually.[31]

Annual expenditures for energy in this sector totaled approximately $2 billion in 1998, a 15% decrease from the previous year. A review of industrial energy expenditures over the past 15 years shows that 56.3% was spent on electricity alone, followed by natural gas (22.3%), petroleum (8.5%), and finally coal (4.4%). The remaining 8.5% of industrial energy expenditures is spread across distillate, residual, kerosene, and LPG fuels.[32] In 1998, New York State had 9,023 industrial electricity customers. On average, these industrial consumers used 231,712 kilowatt-hours of electricity per month, amounting to an average monthly bill of close to $11,500.[33]

With over 26,000 establishments and over $150 billion in annual sales, manufacturing is an important part of the State's economy. Figure B-7 displays the value of shipments made annually for a variety of New York State manufacturing businesses.[34] Chemical manufacturing, production of industrial machinery, food products, and computer and electronic products are the top-five industries comprising the State's manufacturing base. Although the value for shipments for printing and publishing businesses did not rank in the top five for the State in 1997, of all U.S. states, New York has the greatest concentration of printing and publishing businesses. Information regarding industrial electricity customers of the utility service areas for the **New York Energy $mart**[SM] programs is presented in Table B-13. Table B-14 lists average costs per kWh for industrial customers.

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[30] www.state.ny.us/economy.html *New York State: A Stronger State for a Great People. The Economy.*

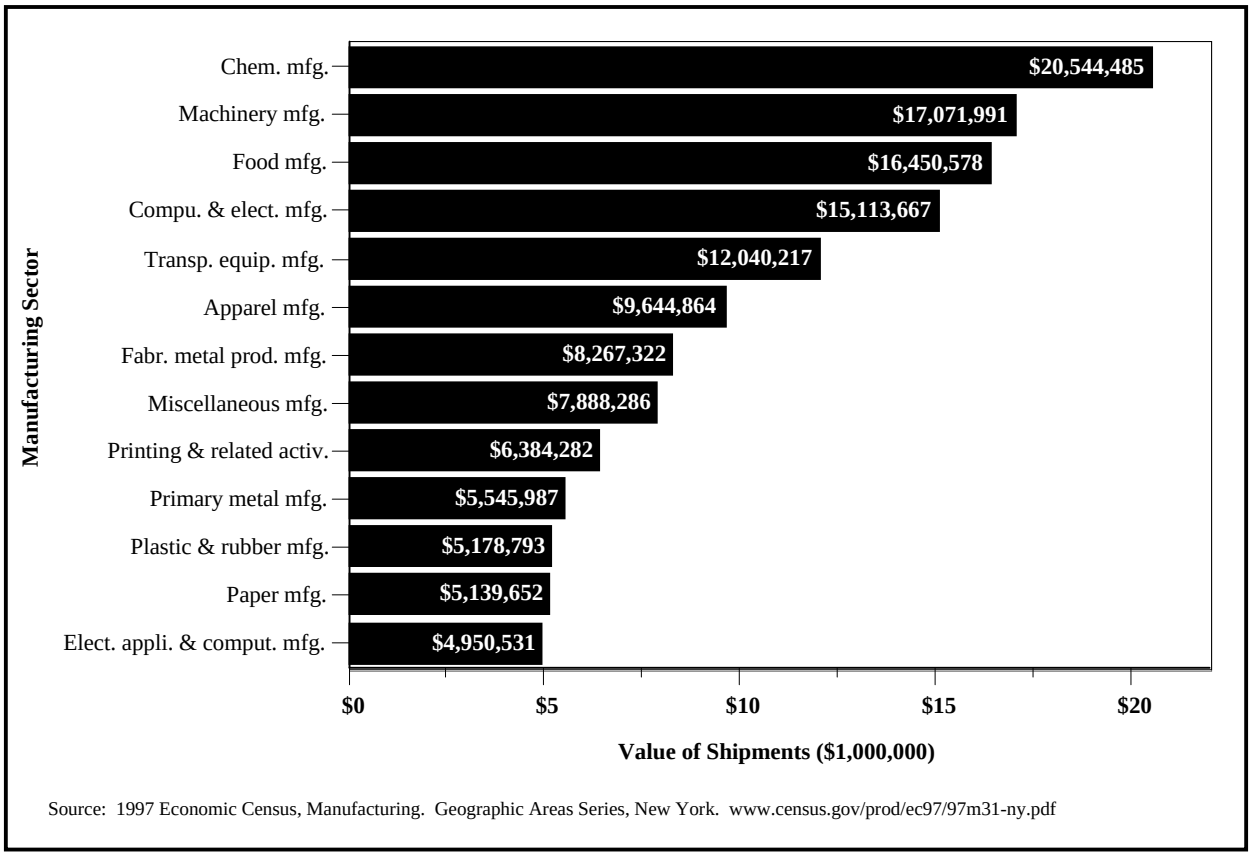
[31] The Public Policy Institute of New York State, Inc. Going Global. www.bcnys.org.

[32] New York State Energy Research and Development Authority. December 1999. *Patterns and Trends; New York State Energy Profiles: 1984-1998*. NYSERDA.

[33] Energy Information Administration. www.eia.doe.gov/cneaf/electricity/esr/t01.txt.

[34] 1997 Economic Census - Geographic Area Series. New York. www.census.gov/prod/ec97/97m31-ny.pdf.

FIGURE B-7: The Value of Manufacturing Shipments for New York's Industrial Sector, 1997



Source: 1997 Economic Census, Manufacturing. Geographic Areas Series, New York. www.census.gov/prod/ec97/97m31-ny.pdf

TABLE B-13: Industrial Consumption for New York Energy Smart[SM] Utility Areas (1998)[35]

		New York Energy $mart[SM] Utility Service Area					
Market Sector	**Critical Evaluation Item**	**Central Hudson G&E**	**Con. Edison of NY**	**NYS Electric & Gas**	**Niagara Mohawk Power Co.**	**Orange & Rockland Utilities**	**Total(s)/ Average**
Industrial	Total Number of Customers	861	638	2,653	2,053	141	6,346
	Average Annual Bill Per Customer	$80,485	$154,726	$90,258	$267,389	$239,568	$156,034 (weighted average)
	Average kWh Consumption Per Customer	1,468,777	1,393,735	1,175,375	5,576,335	4,299,844	2,730,316 (weighted average)
	Annual kWh Sales (thous.)	1,264,617	889,203	3,118,269	11,448,217	606,278	17,326,584

[35] New York State Department of Public Service. 1998. *Financial Statistics of the Major Investor-Owned Utilities in New York State; Electric-Gas-Telecommunications-Water-Cable.*

TABLE B-14: Industrial Electricity Prices per kWh by Utility Service Area[36]

		New York Energy $mart℠ Utility Service Area					
Market Sector	**Size of Facility - Need**	**Central Hudson G&E**	**Con. Edison of NY**	**NYS Electric & Gas**	**Niagara Mohawk Power Co.**	**Orange & Rockland Utilities**	**Average cents per KWh**
Industrial	Small (500 kW, 40% L.F.)	7.88¢	12.33¢	13.61¢	11.58¢	6.35¢	10.23¢
	Medium (2000 kW, 50% L.F.)	9.05¢	8.92¢	12.84¢	10.38¢	5.60¢	9.28¢
	Large (10,000 kW, 65%L.F.)	6.31¢	8.08¢	11.06¢	6.4¢	4.41¢	7.08¢

[36] New York State Department of Public Service. January 1, 2000. *Monthly Industrial Bills Including State GRT*. Tariff Department, PSC.