INDUSTRIAL AND PROCESS EFFICIENCY PROGRAM
MARKET CHARACTERIZATION
AND
MARKET ASSESSMENT EVALUATION

Final Report

Prepared for

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NOTICE

ABSTRACT

This report provides information on the market and context within which the Industrial and Process Efficiency Program operates. Specifically, an analysis of New York's manufacturing and industrial markets, along with a description of the market actors providing services to these industries is presented. Additionally a summary of other programs currently operating in New York's industrial marketplace is provided. General market trends and characteristics of specific industries in New York are also described, including the Program's targeted manufacturing industries (e.g., Chemical, Pharmaceutical, Printing/Publishing, Automotive, Food Processing and Forest Products) and Mining, Data Network Storage (Data Centers), and Water/Waste Water Treatment facilities. Given that the Industrial and Process Efficiency Program is a relatively new program, results from this report assess the validity of program assumptions regarding market characteristics, provide additional details regarding market structure and opportunities, and establish baseline measurements of key indicators. These results can be used in subsequent evaluations to assess progress towards meeting the Public Service Commission's public policy goals under which NYSERDA operates, as well as the institutional goals NYSERDA has established to move markets toward improved energy efficiency. In addition, the evaluation results can be used by NYSERDA program staff and managers to adjust program implementation as needed to ensure maximum market interest and uptake of program offerings

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SECTION 1. EXECUTIVE SUMMARY

This report provides detailed results and discussion of the market characterization and assessment (MCA) evaluation conducted for the Industrial and Process Efficiency Program.

This evaluation contains two components:

1. Market Characterization – describes aspects of the market for industrial and process efficiency improvements in New York, including pertinent background information, such as numbers and types of eligible participants (as defined in NYSERDA's Industrial and Process Efficiency Program description) and market data, as well as market actor information, by specified regions of the state, including upstate and downstate comparisons where applicable.
2. Market Assessment – provides baseline information on key indicators that can be tracked over time to assess movement in the market and program progress toward achievement of key goals.

The primary goals of this MCA evaluation effort are to:

1. Develop a comprehensive understanding of current and emerging markets (*e.g.*, market structure and market actors);

2. Provide baseline and background information required by NYSERDA to define and deliver programs to target markets; and

3. Allow for tracking of changes in markets over time with a specific focus on market indicators that are likely to be impacted by program offerings.

The focus of this MCA research is on the market and context within which the Industrial and Process Efficiency Program operates. Given that Industrial and Process Efficiency is a relatively new program, results from this report assess the validity of program assumptions regarding market characteristics, provide additional details regarding market structure and opportunities, and establish baseline measurements of key indicators. These results can be used in subsequent evaluations to assess progress towards meeting the Public Service Commission's public policy goals under which NYSERDA operates, as well as the institutional goals NYSERDA has established to move markets toward improved energy efficiency. In addition, the evaluation results can be used by NYSERDA program staff and managers to adjust program implementation as needed to ensure maximum market interest and uptake of program offerings.

The Industrial and Process Efficiency Program Market Characterization and Assessment Evaluation included surveys with non-participating end-use customers and non-participating technical service providers eligible to participate in the Program.[1]

[1] Participating customers were intentionally not targeted as part of this initial MCA evaluation, since their numbers will be quite limited until the program is more broadly implemented. Note: as part of a process evaluation recently completed for the Industrial and Process Efficiency Program, interviews were conducted with a number of participating customers including: Focus contractors (6), technical reviewers (16), DOE contractors (3), participating customers (48), partial participants (5), participants' contractors (27), and high volume contractors (3).

In addition to the detailed methodologies described further in this report, the following steps were taken to develop this evaluation:

- Met via teleconference with NYSERDA evaluation and program staff to identify and prioritize potential MCA evaluation activities.
- Reviewed secondary data sources, including reports previously prepared for NYSERDA and for other organizations and assessed the sources' value for supplementing current evaluation activities.
- Reviewed and used information from the existing Industrial and Process Efficiency Program logic model to identify and prioritize relevant output and outcome indicators for use in data collection efforts.
- Conducted and analyzed results from telephone interviews with manufacturers, data centers and technical service providers in New York to provide baseline information from which the continuity of longitudinal data can subsequently be assessed.

This MCA evaluation was implemented through a collaborative effort among NYSERDA's Energy Analysis and program staff, APPRISE (NYSERDA's evaluation survey data collection contractor), the MCA evaluation contractor, and other NYSERDA evaluation contractors. Results provide NYSERDA with insights and information to assist in decision-making regarding current and evolving program design and implementation strategies.

1.1 PROGRAM DESCRIPTION

Industrial and process efficiency improvement projects are typically complex and can yield large energy, economic development and productivity benefits. While there has been substantial industrial facility participation in NYSERDA's FlexTech, Existing Facilities and New Construction Programs, to date, there has been limited focus on process efficiency improvements. This leaves considerable opportunity for increased energy efficiency gains in the Industrial, Data Center, Municipal Water and Wastewater, Mining and Extraction sectors.

The Industrial and Process Efficiency Program is receiving funding through the Energy Efficiency Portfolio Standard (EEPS).[2] In response to market feedback, the Industrial and Process Efficiency Program was developed as an additional component to NYSERDA's Existing Facilities and New Construction Programs to provide performance-based incentives for cost-effective process improvements that reduce energy use per unit of production.[3] Since the original Order, this program has received natural gas funding, and has also been reauthorized (as part of subsequent PSC Orders) through December 31st, 2015. This component is the implementation path for process improvement projects developed through the FlexTech Program, or brought to this program independently by technical service providers or other market actors currently working directly within the Program's targeted market sectors.

[2] During 2008, several changes arising from the New York Public Service Commission's (PSC's) EEPS proceeding have affected NYSERDA's SBC program portfolio and evaluation efforts. The PSC's June 23, 2008 EEPS Order called for an increase in SBC collections and a ramp up of program efforts by NYSERDA and the State's six investor-owned electricity transmission and distribution utilities to meet the State's "15-by-15" electricity reduction goal. NYSERDA complied with the PSC's Order by submitting a Supplemental Revision to the SBC Operating Plan incorporating approximately $80 million per year in additional funds for five new or expanded programs as well as general awareness, administration and evaluation associated with those programs. These new and expanded program efforts began in early 2009 upon DPS approval of NYSERDA's revised Operating Plan.

[3] For Data Centers, process improvements would reduce energy use per unit computed.

NYSERDA's Industrial and Process Efficiency Program builds on previous efforts to offer enhanced efficiency opportunities to targeted market segments by making incentives available for industrial process efficiency improvements and substantially expanding marketing activities. In addition, as a potential secondary benefit, the Program may be able to increase the number, and awareness levels of service providers (particularly service providers who are expert in particular industrial processes) regarding opportunities and benefits associated with process efficiency improvements. The Industrial and Process Efficiency Program focuses on key manufacturing sectors in New York: Chemicals (including Pharmaceuticals), Printing and Publishing, Automotive, Food Processing and Forest Product Manufacturing. Data Centers are also included, as their process energy consumption is similar to manufacturing consumption in a number of ways including load shape, process-oriented characteristics, power quality requirements, economic development impact, and load growth potential. In addition, the Mining, Extraction and Water/Wastewater sectors have similar industrial process-type, energy intensive end uses and are included as potential Industrial and Process Efficiency Program target industries. Incentives are offered for energy efficiency projects that reduce energy use on a per unit of production basis. This approach allows NYSERDA to invest in projects that reduce net energy consumption as well as promote efficient load growth and economic development.

The total Industrial and Process Efficiency Program budget for the period 2009 through 2011 is approximately $93 million for electric and $17 million for natural gas (EEPS funded). The total projected energy savings for the Program is 840 GWH for electric and 1,700,000 MMBtu for natural gas from 2009 through 2014.

1.2 RESEARCH APPROACH

This MCA evaluation used a variety of primary and secondary data sources to generate information on a number of topics relevant to the Industrial and Process Efficiency Program. The approach has been driven primarily by elements and activities presented in the Program Logic Model Report[4], and key research findings generated by the evaluation relate to the outputs and outcomes anticipated by the Program Logic Model. In addition, the approach has been implemented in a manner that encouraged a high degree of interaction between the MCA Team and NYSERDA program and evaluation staff as well as DPS staff and other project stakeholders via project planning activities and deliverable review cycles. To conduct this evaluation of the Industrial and Process Efficiency Program, the following steps were taken:

- Project Planning – Including review of available program documentation and prior evaluation results of other relevant programs; meetings and discussions with NYSERDA evaluation staff and other evaluation contractors; a project kick-off meeting with Program staff and other project stakeholders; and the development of a Final Project Work Plan.

- Review of the Program Logic Model – to ensure the document accurately reflects the current program design and state of the market (including: inputs, market actors, barriers, goals, activities, outputs, outcomes, potential external influences and researchable issues). Results of this review provided a prioritization of measurement indicators and researchable issues that was used to guide the rest of this MCA evaluation effort.

- Market Characterization – generated primarily from secondary data sources, supplemented by information gathered during primary data collection efforts and discussions with stakeholders in the Industrial and Process Efficiency Program. Key data sources used for this activity included:

[4] NYSERDA, *Industry and Process Efficiency Program – Draft Program Logic Model Report*, December, 2009. See Section III of this document for additional details regarding the Program Logic Model.

- The Industrial and Process Efficiency Program tracking database;
- Potentially relevant program evaluation reports prepared for NYSERDA and for similar programs operating in other jurisdictions;
- Department of Labor and Statistics data;
- McGraw-Hill Construction Dodge databases;
- U.S. DOE's Commercial Buildings Energy Consumption Survey (CBECS) and Manufacturing Energy Consumption Survey (MECS) data, 2003;
- U.S. Census Data, including County Business Patterns Reports and other relevant data tables;
- Discussions with internal NYSERDA staff who interface with customers in the Program's target market segments (including Energy $mart Communities coordinators);
- Discussions with key external stakeholders that interface with customers in the Program's target market segments;
- Information gathered through ongoing information sharing with Navigant Consulting;
- Membership lists and other publicly-available data from relevant professional organizations (*e.g.*, the Manufacturers' Association of Central New York, the Business Council of New York State, the Empire Development Corporation); and
- Other sources identified and deemed valuable.

Where possible, market characterization results have been segmented on an upstate-downstate regional basis and by market sector[5] to identify spatial variations in program and market opportunities and barriers throughout New York. As requested by NYSERDA, this analysis includes identification of the top five largest companies in each of the Industrial and Process Efficiency Program's targeted market sectors that are eligible to participate in NYSERDA's programs. Data has also been analyzed to identify the count and location of NYSERDA customers in the targeted market segments; the growth trends of these market segments, by number of companies, square footage of building stock and annual sales over the past five years (compared to nationally); and identification of emerging niche markets.

- Market Assessment – generated through primary data collection efforts with end-use customers and technical service providers eligible to participate in the Industrial and Process Efficiency Program.
  - The data collection instruments for this effort were structured around the measurement indicators and researchable issues identified and prioritized during review of the Industrial and Process Efficiency Program Logic Model Report.[6]
  - Care has been taken to ensure that questions were structured in a manner that allows them to be consistently used in subsequent program evaluations so that temporal trends in the measurements can be assessed.

[5] A sector-specific approach enabled assessment of unique technology needs, planning horizons, and operating conditions.

[6] Other evaluation contractors contacted the MCA Team to suggest additions to the instruments to collect data relevant to separate studies and the MCA Team endeavored to accommodate such requests balancing the additional survey components against the need to minimize impacts on survey respondents.

Market Assessment results have been segmented on an upstate-downstate regional basis and by market sector (where applicable) to identify spatial variations in responses and associated market conditions.

- Analysis and Reporting – Conducted by the MCA Team using methods approved by NYSERDA.

1.3 MARKET CHARACTERIZATION – KEY FINDINGS

Market Characterization results help to describe relevant markets for industrial process (and data center) efficiency improvements in New York, including associated background and baseline information regarding the number and types of industries and key market actors, by geographic region throughout the State. The following is a summary of key findings. See Section 3, for more detailed results.

1.3.1 New York Industrial Market in General[7]

Before focusing on the Industrial and Process Efficiency Program's targeted industry sectors, a general overview of the manufacturing market in New York is presented, with key attention to those industries having high concentrations in the State. New York is home to 4% of all manufacturing facilities nationwide. Six industries show high concentrations of employment, having 5% or more of the total number of nationwide employees located in New York. As noted in the following section, a number of these high concentration industries are included in the sectors targeted by NYSERDA's Industrial and Process Efficiency Program including: Pharmaceuticals, Printing and Computers).

1. Apparel Manufacturing (12% of total nationwide employees)
2. Pharmaceutical and Medical Manufacturing (7%)
3. Printing and Related Support Services (6%)
4. Leather and Allied Products Manufacturing (6%)
5. Computer and Electronic Manufacturing (5%)
6. Miscellaneous Manufacturing (7%)

In 2008, 48.5% of New York's manufacturing establishments were located upstate and 51.5% were located downstate. From 2001 to 2009, the total number of manufacturing establishments in New York decreased by 5% statewide (8.4% downstate, 2.6% upstate).[8]

New York offers economic development programs to support the retention of large manufacturing industries, and is investing in infrastructure to provide continued support and growth of these industries.

1.3.2 NYSERDA's Industrial and Process Efficiency Program-Targeted Industries

NYSERDA's Industrial and Process Efficiency-targeted industries represent a large portion of the facilities located in New York. Specifically, in 2008, these industries accounted for:

- 40% of all manufacturing establishments in New York
- 35% of the total number of employees
- 36% of production work hours
- 35% of the payroll

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[7] U.S. Census Data, *American Fact Finder, 2008 Economic Data for the State of New York*, with GDS calculations.

[8] Ibid.

- 42% of the capital expenditures
- 48% of the total value of shipments
- 50% of the total value added[9]

Among all industries, the Pharmaceutical (and Medicine) Manufacturing industry has the greatest total value of shipments and value added. Approximately 11% of the total national pharmaceutical and medicine shipments were produced by the industry employees located in New York in 2008 (7% of nationwide total number of employees). This indicates that New York's Pharmaceutical and Medicine Manufacturing industry employees are outperforming their counterparts.

From an energy intensity perspective, Forest Manufacturing and Chemical Manufacturing (excluding Pharmaceuticals) have the highest energy consumption per employee, at 1,784 and 1,604 MMBtu/employee per year respectively.[10] The Printing and Related Support industry is the least energy intensive industry on a per employee basis, at 155 MMBtu/employee per year. However, when viewed from an MMBtu/dollar of value added or dollar value of sales perspective, the Pharmaceuticals and Medicines Manufacturing industry stands out among all Industrial and Process Efficiency Program-targeted industries as the least energy intensive (0.8 and 0.6 MMBtu, respectively).

New York has the third largest number of chemical manufacturing companies in the nation, is the second largest producer of plastics, and according to Empire State Development Corporation, the Chemical industry shows indications of expansion. In 2008, nearly 4% of the nation's chemical companies were located in New York and these companies had the largest percentage of capital expenditure among all the Industrial and Process Efficiency-targeted industries (11%). This industry appears to be investing in its plant and facilities at a greater rate than other Industrial and Process Efficiency industries.

During the period 2006 to 2007, there has been an overall decline in the total number of establishments (including Chemical companies) in New York's Industrial and Process Efficiency-targeted industries. However, for several sectors, the number of establishments has increased[11]; including:

- Wastewater (Sewage) Treatment Facilities (5.8%)
- Water Supply and Irrigation Systems (5.3%)
- Food Manufacturing (1.7%)
- Transportation Equipment Manufacturing (1.0%)
- Niche markets within the Publishing, Food Manufacturing and Mining industries are also growing in New York, as is Data Storage.[12]

Regarding wastewater facilities, there is a great need in New York for updating and improving these facilities. This presents an outstanding opportunity for the Industrial and Process Efficiency Program.

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[9] Value added is defined as the amount by which the value of an article is increased at each stage of its production, exclusive of initial costs.

[10] When viewed from MMBtu/dollar of value added and MMBtu/dollar value of shipments perspectives, Forest Manufacturing and Chemical Manufacturing (excluding Pharmaceuticals) have energy intensities of 12.3 and 6.5 MMBtu/dollar of value added, and 5.8 and 2.8 MMBtu/dollar value of shipments, respectively.

[11] The years used to determine growth rate percentages are 2006 to 2007. Source – US Census Data, *County Business Pattern Data*.

[12] All information on the emergence of niche markets is qualitative and was gathered from articles and industry reports, so there are no concrete data on the number of number of niche market establishments from which to calculated growth rate percentages for this time period.

Sixty percent (60%) of the facilities are still in service, well beyond their useful life of 30 years, and running inefficiently. In addition, small private irrigation and sewage treatment facilities are being built throughout the State to support condominium and office complexes.

New York is home to the second largest number of data centers nationwide. In a national survey of data center facilities, 83% of respondents reported that they were planning data center expansions in the next 12 to 24 months and energy efficiency is a major factor in their expansion plans. NYSERDA competitively selected a Data Center Outreach contractor, specializing in the Data Center industry, which will lend credibility when soliciting the benefits of the Industrial and Process Efficiency Program, and should enable the Program to penetrate this growing industry.

1.3.3 Market Actors Providing Services to Industrial Customers

Market actors identified in this section are industry partners that are a resource for, or have an influence on, energy efficiency decision-making (*i.e.* suppliers, distributors, manufacturers or equipment). The market actors providing services to industrial and data center customers in New York are separated into two main categories: (1) General Services market actors (*i.e.*, those that work on specific processes in multiple industries), and (2) Industry Specific market actors (*i.e.*, those that provide services mainly in just one industry).

Industrial and process efficiency-specific market actors include process equipment manufacturers and suppliers, packaging suppliers, distributors, repair contractors, industrial designers, equipment testing and engineering services, and consultants. There are nearly 3,000 such market actors that support the industries in New York (49.1% upstate and 50.7% downstate).[13] In addition to the general and cross-industry market actors, as shown in more detail in Section 3 of this report, the largest number of market actors provides services and support to the food manufacturing sector (with 378 located upstate and 354 located downstate). Of these, the greatest number of market actors, in both upstate and downstate, is in food equipment manufacturing and maintenance. Chemical Processing has the second greatest number of market actors, 105 located upstate and 122 located downstate.

1.3.4 Relevant Energy Efficiency Programs

Industrial customers operating within New York have several options available to choose from if they are interested in obtaining outside assistance for enhancing the efficiency of their manufacturing processes. These options include federal, state and utility programs. These programs, examples of which are noted below, offer a variety of assistance, from specialized industry information to reviewing customers' unique processes and energy needs and making recommendations and offering financial incentives to enhance the efficiency of customer operations. These programs have the potential to impact (*i.e.*, either help or hinder) achievement of NYSERDA's Industrial and Process Efficiency Program goals.

- Federal Programs: DOE and EPA
- NYSERDA Industrial and Process Efficiency and Other Programs
- Other New York State Programs and Customer Eligibility
    - Recharge NY (formally Power for Jobs)
    - Empire Program
    - Utility Programs

[13] Number excludes market actors that specifically serve the Data Center industry.

1.4 MARKET ASSESSMENT

Market Assessment results help identify program perceptions and market trends from the perspective of relevant market actors. These results capture valuable information regarding New York industries' familiarity and perceptions associated with energy efficiency, current levels of efficiency within their facilities' processes, practices and perceptions regarding efficiency improvement projects being implemented, types of projects and current levels of investment, barriers impacting investment, and awareness of NYSERDA and other energy efficiency program and funding opportunities. The market assessment for this report contains baseline information to be used in the future to validate program effectiveness and identify areas for program changes to ensure continued success in the marketplace. The following is a summary of key findings. Section 4 provides more detailed results.

1.4.1 Current Levels of Efficiency, Familiarity, or Perceptions

A significant number of the eligible end use manufacturing and data center customers interviewed do not perceive the systems and processes in their facilities to be particularly energy efficient. Over 70% report that they "never," "infrequently" or only "sometimes" perceive process improvement projects as energy projects. These customers do not see energy efficiency as a "very important" factor when planning process improvements and they do not typically incorporate efficiency improvements when a system fails and needs replacement. There is a large portion of the population of eligible end use customers, data centers, and technical service providers that lack awareness of, familiarity with, or confidence in the implementation and benefits associated with energy efficiency in process improvements.

1.4.2 Current Levels of Investment, Types of Process Efficiency Improvements, and Associated Practices and Perceptions

Eligible end use manufacturing and data center customers most typically use internal capital to fund process improvements. Most consider financial criteria to be the major factor in moving forward with a process improvement project, mainly return on investment. An insufficient number of respondents identified specific process efficiency improvement projects that have been implemented within their facilities to report reliable findings regarding project types. However, based on the limited responses received, projects included modification of equipment (mainly for safety purposes) that also resulted in energy usage reduction; the addition of a chilled water system (mainly for environmental reasons) that also increased process efficiency; identification and implementation of demand response opportunities which resulted in persistent lower energy use per unit of production; and replacement of materials used in a specific process with types requiring less materials storage, processing and disposal equipment, resulting in reduced waste stream and increased efficiency. Of the few respondents who said they incorporated energy efficiency into their process improvement projects, a number of the examples provided were not process-related projects at all. This highlights the need for more outreach and education to industrial and data center facilities managers.

1.4.3 Current Barriers Impacting Investment

A majority of the eligible end use manufacturing and data center respondents identified multiple barriers to investing in energy efficient process improvements. The most common responses related to financial issues, with internal funding and competing capital costs being the largest and most important barriers. It is common that an eligible end use manufacturing and data center customer is struggling to overcome multiple barriers.

1.4.4 Value of Technical Assistance Services

Technical service providers (TSPs) are not particularly confident in their own, or other TSP's abilities to provide effective process efficiency improvement services. This is true for both manufacturing and data center TSPs. Neither are they confident in the ability of the markets or technologies to do the same.

Approximately 75% of TSPs think that the market is only "somewhat" or "less than somewhat capable" of providing process efficiency improvement services. Similarly, around 75% think that TSPs are only "somewhat" or "less than somewhat qualified" to implement effective process efficiency improvement projects. Approximately 67% of TSPs report being only "somewhat" or "less than somewhat confident" in the overall performance of the technologies and procedures available for energy efficiency in process improvements. This lack of confidence is likely at least partly attributable to a lack of awareness of new technologies and process efficiency improvement procedures, and a lack of direct experience with process efficiency upgrades.

1.4.5 Awareness of NYSERDA and Other Program/Funding Opportunities

Although most eligible end use manufacturing and data center customers, and TSPs are aware of NYSERDA, fewer than 45% of the responding manufacturing customers, and less than 15% of the data centers interviewed, reported having participated in any NYSERDA program (including the Industrial and Process Efficiency Program) in the past five years. This means that there remains a substantial number of manufacturing facilities and data centers in New York that can be served by NYSERDA's programs. Approximately half of the eligible end use manufacturing and data center respondents did not know about the Industrial and Process Efficiency Program. In addition, nearly half of the TSPs reported that they were unaware of the existence of any non-NYSERDA programs that provide energy efficiency or technical assistance to manufacturing facilities (including more than 30% of data center TSP). This highlights that, overall, there remains a lack of awareness of industry-targeted energy efficiency-related programs (both NYSERDA and non-NYSERDA funded) among TSPs and end use customers.

1.5 RELATIONSHIP TO SELECT INDICATORS AND RESEARCHABLE ISSUES

Results generated during the market characterization and market assessment efforts can typically be related back to relevant outputs and outcome indicators and researchable issues presented in the program logic model to validate the reasonableness of program design and help inform program staff and stakeholders of program progress achieved to date as well as potential areas for program refinement. At this point in the evaluation cycle of NYSERDA's relatively new Industrial and Process Efficiency Program, important *baseline* information has been collected (as highlighted above and presented in more detail in the remainder of this report). Overall, results from this initial study seem to indicate that the Industrial and Process Program, operating in concert with other NYSERDA programs, is positively influencing the market for process efficiency improvements in New York's industrial and data center markets. However, actual *changes* in awareness, practices and perceptions, satisfaction, savings impacts, etc. will need to be determined in subsequent evaluations building off the baseline findings compiled herein.

SECTION 2. INTRODUCTION AND PROGRAM DESCRIPTION

The New York State Energy Research and Development Authority (NYSERDA) is a public benefit corporation established in 1975 that administers System Benefit Charge (SBC) funds, including the **New York Energy $mart**[SM] Program (since 1998) and a number of more recent Energy Efficiency Portfolio Standard (EEPS) Programs under an agreement with the New York State Public Service Commission (PSC). It also oversees the evaluation of the effort on behalf of an SBC Advisory Group that, pursuant to PSC order, is the independent evaluator of these Programs. During 2008, several changes arising from the PSC's EEPS proceeding have affected NYSERDA's **New York Energy $mart**[SM] program portfolio and evaluation efforts. The PSC's June 23, 2008, EEPS Order called for an increase in SBC collections and a ramp-up of program efforts by NYSERDA and the state's six investor-owned electricity transmission and distribution utilities to meet New York's "15-by-15" electricity reduction goal. NYSERDA complied with the PSC's Order by submitting a Supplemental Revision to the SBC Operating Plan, incorporating approximately $80 million per year in additional funds for five new or expanded Fast Track programs, as well as for general awareness, administration, and evaluation associated with those programs. The Industrial and Process Efficiency Program is one of these five Fast Track initiatives offered under the EEPS Order.

NYSERDA contracted with a team under the direction of Navigant Consulting to conduct Market Characterization and Market Assessment (MCA) studies for the SBC-funded Programs. GDS Associates, Inc., as part of the Navigant team, and in conjunction with APPRISE Research, has been the lead contractor for this current MCA study for the Industrial and Process Efficiency Program. The focus of this MCA report is on the market and context within which the Program operates. Given that Industrial and Process Efficiency is a relatively new program, results from this report assess the validity of program assumptions regarding market characteristics, provide additional details regarding market structure and opportunities, and establish baseline measurements of key indicators. These results can be used in subsequent evaluations to assess progress towards meeting the Public Service Commission's public policy goals under which NYSERDA operates, as well as the institutional goals NYSERDA has established to move markets toward improved energy efficiency. In addition, the evaluation results can be used by NYSERDA program staff and managers to adjust program implementation as needed to ensure maximum market interest and uptake of program offerings.

The remainder of this report is organized in the following manner:

- Section 2.1 provides a more detailed description of NYSERDA's Industrial and Process Efficiency Program
- Section 3 discusses the primary and secondary data sources used to evaluate the Program, sample selection, and data collection implementation processes.
- Section 4 presents findings regarding the basic characteristics of the Industrial and Process Efficiency Program's eligible market, program accomplishments and market penetration.
- Section 5 examines the key market assessment indicators and researchable issues developed for the Program including identification of key baseline values from which changes can be assessed over time.
- Section 6 presents a summary of findings and identifies potential actions for consideration by program staff derived from the MCA evaluation.

2.1 PROGRAM DESCRIPTION

Industrial and process efficiency improvement projects are typically quite complex and can yield large energy, economic development, and productivity benefits. While there has been substantial industrial facility participation in NYSERDA's FlexTech, Existing Facilities and New Construction Programs, to date there has been limited focus on process efficiency improvements. This leaves considerable opportunity for increased energy efficiency gains in the Industrial, Data Center, Municipal Water and Wastewater, Agricultural, Mining and Extraction sectors.

The Industrial and Process Efficiency Program is receiving funding through the Energy Efficiency Portfolio Standard (EEPS). Since the original Order, this program has received natural gas funding, and has also been reauthorized (as part of subsequent PSC Orders) through December 31st, 2015. In response to market feedback, the Program was developed as an additional component to NYSERDA's Existing Facilities and New Construction solicitations to provide performance-based incentives for cost-effective process improvements that reduce energy use per unit of production (per unit computed for data centers). This component is the implementation path for process improvement projects developed through the FlexTech Program, or brought to this program independently.

NYSERDA's Industrial and Process Efficiency Program builds on previous program efforts to offer enhanced efficiency opportunities to targeted market segments by making incentives available for process efficiency improvements; substantially expanding marketing; and increasing the number of service providers (particularly service providers who are expert in particular industrial processes). The Industrial and Process Efficiency Program focuses on key manufacturing sectors in New York: Chemicals (including Pharmaceuticals), Printing and Publishing, Automotive, Food Processing and Forest Product Manufacturing. Data Centers are also included, as their process energy consumption is similar to manufacturing consumption in a number of ways including load shape, process-oriented characteristics, power quality requirements, economic development impact, and load growth potential. In addition, mining, extraction and water/wastewater have similar process-orientated missions and expectations and are included as potential Industrial and Process Efficiency Program target industries. Incentives are offered for energy efficiency projects that reduce energy use on a per unit of production basis. This approach allows NYSERDA to invest in projects that reduce net consumption of electricity as well as promote efficient load growth and economic development.

The Program works mainly and directly with industrial and data center customers. Specific activities also include work with other market actors within the demand-side area to help address key market barriers. To date, direct customer applications account for 75% of projects, and 25% of projects have been generated through market actor/contractor assistance. Coordination with the FlexTech and other NYSERDA programs also involves market actors within the mid-market/infrastructure and supply-side areas. As shown below in

Table 1, these activities can be grouped into four main areas: (1) Relationship Building and Promotion, (2) Coordination with Other Programs (especially R&D and FlexTech), (3) Providing Performance-Based Incentives, and (4) Measurement and Verification.[14]

[14] GDS Associates, Inc, *Program Theory and Logic Model Activities for the **New York Energy $mart**^{SM} Industrial Process Efficiency Program Logic Model Report*, Prepared for NYSERDA, December 2010.

Table 1. Industrial and Process Efficiency Program Activities

Relationship Building and Promotion
Marketing activities designed to inform and excite the market- case studies, website information, presentations
Outreach to end-users and building owners (and to technical service providers, but this will mostly be handled by coordination with other NYSERDA programs, including NYSERDA's Industrial Outreach program)
Seminar, conference, and work shop sponsorship
Stakeholders, industry groups, working groups
Key Account Management approach, tracking, continued presence and project management
Coordination with Other Programs
Coordination with FlexTech program, actually implementing the projects developed in FlexTech studies
The market is informed of the Industrial and Process Efficiency Program as one of many **New York Energy $mart^{SM}** programs – coordinate with other NYSERDA (non-FlexTech) and NYISO and utility programs
FlexTech and independent contractors used can identify appropriate **New York Energy $mart^{SM}** programs for future projects
Providing Performance-Based Incentives
Incentives provided based on energy savings from projects that increase productivity and throughput, increase process efficiency, reduce waste, and improve efficiency in compressors, motors, VSDs, cooling, lighting, UPS system upgrades, air flow management, virtualization , and server load prioritization and optimization.
Electric incentives provided at $0.12/kWh upstate and $0.16/kWh in Con Edison territory
Natural Gas incentives provided at $15.00/MMBtu and $20.00/MMBtu in Con Edison territory
Cooperation with utilities and other NYSERDA programs
Measurement and Verification
Verify savings from all projects > 500,000 kWh or > 10,000MMBtu utilizing direct metering and standard measurement and verification protocols, with stipulated savings used for smaller projcets (based on energy savings verified by a NYSERDA technical reviewer)
Technical review contractors: 1) provide initial site visit and project screening, 2) develop M&V plans, 3) install monitor equipment and establish baselines, 4) develop Project Installation Reports, and 5) provide project monitoring (carry out M&V)

The total Industrial and Process Efficiency Program budget for the period 2009 through 2011 is approximately $93 million for electric and $17 million for natural gas (EEPS funded). The total projected energy savings for the Program is 840 GWH for electric and 1,700,000 MMBtu for natural gas from 2009 through 2014.

2.1.1 Program Logic and Measurement Indicators

The Industrial and Process Efficiency Program has been designed to encourage market activity in energy efficiency and engage a greater number of service providers who are expert in particular industrial processes and data centers. Implementation of the Program is expected to:

- Achieve energy reductions through improved efficiency in industrial processes and data centers
- Increase productivity and economic competitiveness of participating facilities through implementation of cost-effective industrial and process energy efficiency measures
- Save approximately 840 million kWh from projects completed between 2009 and 2014
- Save approximately 1.7 million MMBtus and reduce environmental impacts

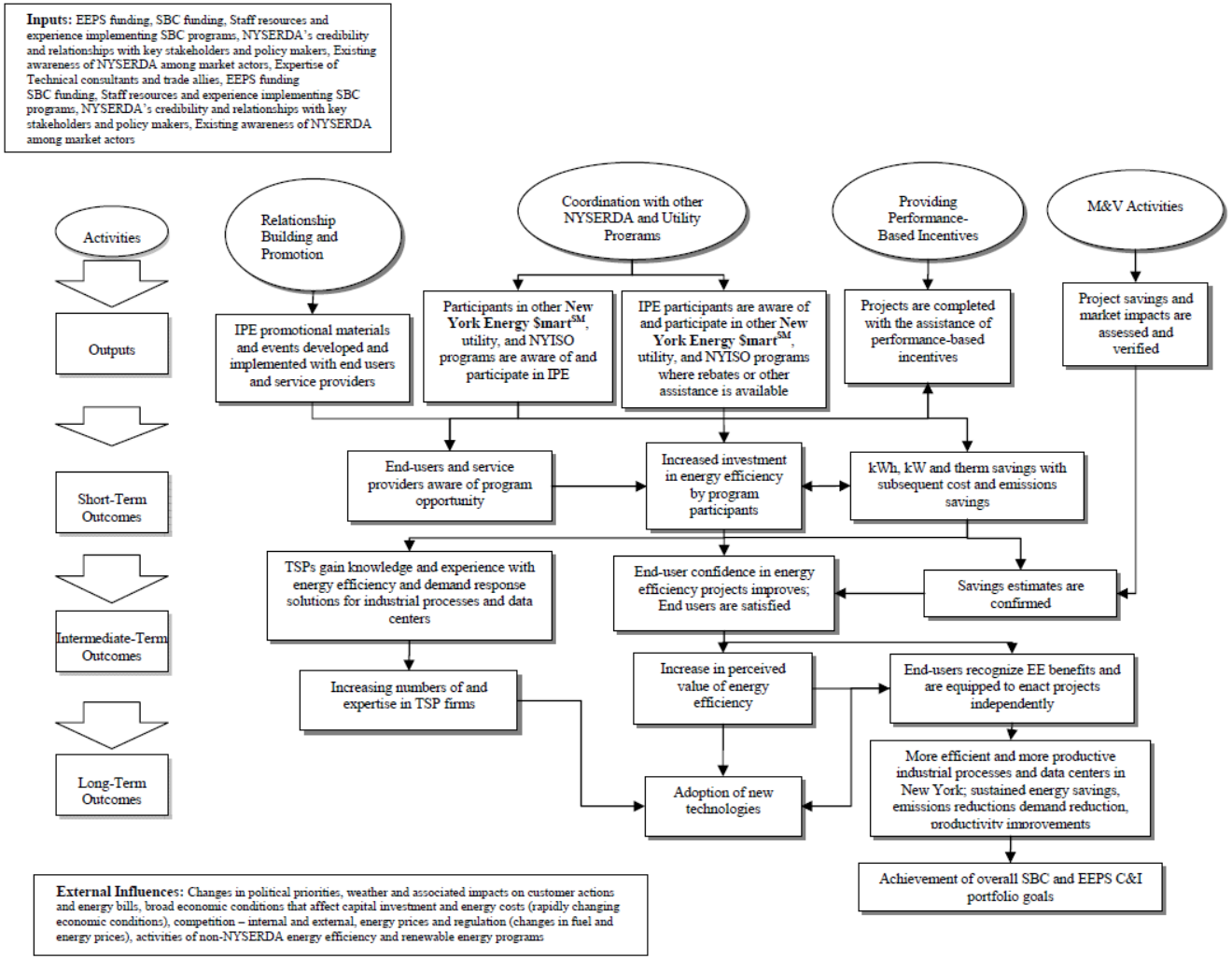
In addition the Program is expected to increase outreach to customers and service providers, participation of growing companies, incentive funding, and the pool of service providers participating in the program.[15]

The activities used to achieve these goals include relationship building and promotion, coordination with other programs, providing performance-based incentives, and measurement and verification. Figure 1 shows the linkages between the Industrial and Process Efficiency Program's activities, outputs and outcomes, and identifies key program inputs and potential external influences. Based on the logic model's near-, intermediate-, and long-term outcomes, key market assessment indicators and researchable issues have been identified for potential examination in this evaluation through information gathered as part of the study's data collection efforts. The following is a partial listing of the indicators that were measured during this evaluation:

- Market perceptions regarding value of technical assistance services to identify, prioritize and implement efficiency upgrade projects and strategies;
- Market awareness of NYSERDA program offerings and broader energy efficiency opportunities;
    - Portion of end-users aware of program opportunity (by industry type and geography)
    - Portion of TSPs aware of program opportunity (by specialty area and geography)
- Customer decision-making processes in terms of engaging process efficiency service providers, making process improvement decisions, and including financial and other non-energy considerations;
- Capability of market infrastructure to provide industrial and process efficiency improvement services and the structure of relationships between such service providers and their customers;
- Industrial and process efficiency improvement of service provider expertise with energy efficiency measures and services related to complex industrial/process project opportunities.

[15] GDS Associates, Inc, *Program Theory and Logic Model Activities for the **New York Energy $mart**^{SM} Industrial Process Efficiency Program Logic Model Report*, Prepared for NYSERDA, December 2010.

Figure 1. Industrial and Process Efficiency Program Logic Diagram



Source: GDS Associates, Inc. *Program Theory and Logic Model Activities for the **New York Energy $mart℠** Industrial Process Efficiency Program*, Prepared for NYSERDA, December, 2010.

SECTION 3. SECONDARY AND PRIMARY DATA SOURCES AND METHODS

3.1 SECONDARY DATA SOURCES

The MCA Team used a variety of secondary sources including results of earlier research efforts to help inform the current study. These sources include:

- The NYSERDA Industrial and Process Efficiency Program Logic Model Report
- The Industrial and Process Efficiency Program tracking database;
- Potentially relevant program evaluation reports prepared for NYSERDA and for similar programs operating in other jurisdictions;
- Department of Labor and Statistics data;
- McGraw-Hill Construction Dodge databases;
- U.S. DOE's Commercial Buildings Energy Consumption Survey (CBECS) and Manufacturing Energy Consumption Survey (MECS) data;
- U.S. Census Data, including County Business Patterns Reports and other relevant data tables;
- Information gathered through ongoing information sharing with Navigant Consulting;
- Membership lists and other publicly-available data from relevant professional organizations (*e.g.*, the Manufacturers' Association of Central New York, the Business Council of New York State, the Empire Development Corporation); and
- Other sources identified and deemed valuable. (a full list of secondary sources used for this report is available in Appendix A).

The information gleaned from these secondary data sources is presented in subsequent sections of this report. Much of the secondary data (e.g., US Census Data) is more than two years old, which were the most recent data available at the time of this evaluation effort. It is important to note that the National Bureau of Economic Research has concluded that the recession "officially" began in December 2007, and that, given the slow GDP growth over the last three years, the numbers presented in this report (e.g., number of manufacturing facilities) remain valid, although they might be somewhat higher now that the economy is no longer in a recession. Similarly, even though some of the data might have changed over the last three years, the relationship between New York and the rest of the country remains the same.

3.2. PRIMARY DATA COLLECTION

The MCA Team's primary data collection activities consisted of telephone surveys with a number of key Industrial and Process Efficiency Program market actor groups including:

- Eligible End Use Customers (comprised of chemical/pharmaceutical, printing/publishing, transportation, food processing, forest product manufacturing, agriculture, mining/extraction, and water/wastewater facilities)
- Data Centers
- Technical Service Providers

The purpose of each survey is summarized briefly below. Copies of the telephone survey instruments are included in Appendix B, C, and D respectively.

1. Eligible[16] End Use Customers General Survey – The MCA Team designed the Eligible End Use Customer Survey to gather information from industrial and manufacturing firms in New York who are eligible for NYSERDA's Industrial and Process Efficiency Program. The survey included questions about industrial systems and processes, process efficiency improvements and investments, and product and technical service providers in the market.
2. Eligible End Use Customer Data Center Survey – The MCA Team designed the Eligible End Use Customer Data Center Survey to gather information from data centers in New York who are eligible for NYSERDA's Industrial and Process Efficiency Program. The survey included questions about the data center's facility support components, IT infrastructure improvements and investments, and product and technical service providers in the market.
3. Eligible Technical Service Providers Survey – The MCA Team designed the Eligible Technical Service Provider Survey to gain a greater understanding of current and emerging markets for process efficiency improvement services and support in New York. The survey included questions about the types of services provided, awareness and use of energy efficiency measures and feasibility studies, and familiarity with NYSERDA and the Industrial and Process Efficiency Program.

All surveys were designed by GDS Associates with assistance from APRISE Incorporated and Opinion America Group to contribute to the Market Characterization and Assessment evaluation of the Industrial and Process Efficiency Program. Survey implementation activities were managed by APPRISE Incorporated. Interviews were conducted by Opinion America Group.

The sections below provide information on the sample, data collection and data processing methodologies used for each market actor group surveyed.

3.2.1. Sample

3.2.1.1. Eligible End Use Customers

Target Population

The MCA Team targeted industrial and manufacturing firms (end use customers) in New York who are eligible for, but have not yet participated in the Industrial and Process Efficiency Program as the sample for this survey. End use customers from five market sectors were targeted: Chemical and Pharmaceutical Manufacturing, Food Manufacturing, Forest Manufacturing, Printing or Publishing, and Transportation Equipment Manufacturing.[17] At individual firms, the target respondent was the chief process engineer, or the engineering, operations, plant or manufacturing manager.

[16] Specifically, eligible customers are the large industrial customers in the Industrial and Process Efficiency-targeted industries, whose annual usage is 2MW and above, or 10,000 MMBtu and above, and pay into the System Benefits Charge (SBC).

[17] These five market sectors were targeted to align with those industrial and manufacturing firms-types that are the focus of NYSERDA's Industrial and Process Efficiency Program. Also, these sectors represent industrial and manufacturing types with some of the highest energy intensities in the State.

Sample Frame

The MCA Team and APPRISE developed the sample frame, which consisted of New York industrial and manufacturing firms in the five market sectors listed above. APPRISE obtained the sample from the Manufacturing News, Inc. (MNI) database. Table 2 shows the source of the sample frame, the sample frame coverage, the total population in the sample frame, and the population eligible for sample selection. APPRISE excluded companies from the total population if they had less than 50 employees (or less than 25 for Chemical/Pharmaceuticals and Forest Manufacturing), or were located in Long Island which is outside of the program's service area.

Table 2. Market Sector Sample Frame

Market Sector	Source	Sample Frame Coverage	Total Population	Population Eligible for Selection
Chemical/Pharmaceuticals	Manufacturing News, Inc. (2010)	The sample frame for Chemical and Pharmaceutical Manufacturing companies includes manufacturing companies in New York that fall under NAICS code 325. Companies with fewer than 25 employees were removed from the sample.	571	261
Food Manufacturing	Manufacturing News, Inc. (2010)	The sample frame for Food Manufacturing companies includes companies in New York that fall under the 3 digit NAICS code 311. Companies with fewer than 50 employees were removed from the sample.	1,916	184
Forest Manufacturing	Manufacturing News, Inc. (2010)	The sample frame for Forest Manufacturing companies includes companies in New York that fall under the 3 digit NAICS code 321. Paper manufacturing companies were excluded, as were companies with fewer than 25 employees.	582	190
Printing/Publishing	Manufacturing News, Inc. (2010)	The sample frame for Printing/Publishing companies includes companies in New York that fall under 3 digit NAICS codes 323 and 511. Companies with fewer than 50 employees were removed from the sample.	4,572	132
Transportation Equipment Manufacturing	Manufacturing News, Inc. (2010)	The sample frame for Transportation Equipment Manufacturing companies includes companies in New York that fall under the 3 digit NAICS code 336. Companies with fewer than 50 employees were removed from the sample.	390	54

Sample Targets

Table 3 shows the initial breakdown of targets by market sector. The MCA Team and APPRISE used the average energy use per employee to allocate the target number of completes for each sector.[18]

Table 3. Initial Sample Allocation Based on Energy Use

Sector - Population:	Energy Use per Employee	% of Total Energy Use per Employee	# Complete @ N=140	% of Survey Sample
Chemical/Pharma (net) – 261	2,053.9	41%	41	29%
Food Manufacturing – 184	434.5	9%	9	6%
Forest Manufacturing (no Paper Products) – 190	1,784.2	36%	35	25%
Publishing/Printing (net)[1] – 132	309.0	6%	6	4%
Transportation Equipment – 54	375.6	8%	7	5%
Data Centers[2] – 298			42	30%
Total – 1,119	**4,957.2**	**100%**	**140**	**100%**

[1] Printing energy use was used as a proxy for publishing energy use.

[2] No energy use data is available for the Data Center sector. Since estimates predict this sector's energy savings at 30%, 30% of the completed surveys are allocated to data centers. Data centers were surveyed as part of a separate effort.

The MCA Team expressed a desire to analyze the Chemical/ Pharmaceutical and the Forest Manufacturing market sectors. In order to furnish statistics with +/- 10% precision at the 90% confidence interval separately, within each of these two market sectors, APPRISE initially augmented the quotas for these two market sectors by 29 and 35 additional completes, respectively. In calculating overall totals (which includes all sectors other than Data Centers), and the upstate and downstate totals, the following weights were applied to the various market sectors. These values were calculated to weight each sector by total energy use, given the number of complete surveys for each sector: Food - 1.86, Forestry - 0.72, Printing/Publishing - 3.04, Chemical/Pharmaceutical - 0.84, and Transportation - 1.41. Data Centers were treated as a separate group. There was no clear sample frame available from which to select a proportionate sample of Data Centers, and as the project developed it became clear that Data Centers needed to be treated separately. Many of the survey questions were entirely different, or differently worded and coded, for Data Centers than for the other market sectors. Thus, the computed overall total, upstate total, and downstate total values include all the market sectors other than Data Centers.

3.2.1.2. Data Centers

Target Population

The MCA Team targeted data centers in New York that are eligible for, but do not participate in the Industrial and Process Efficiency Program as the sample for this survey. Targeted data centers operated across various market sectors including: banking/finance, research/university, health/medical,

[18] Energy Use Data is from the US Census's, *Manufacturing Energy Consumption Survey (MECS), Table 6.1: Consumption Ratios of Fuel, Northeast Census Region,* 2006. The Survey is sponsored by the Energy Information Administration of the Department of Energy. Energy Intensity data for Forest Manufacturing and Chemical mfg (except for Pharmaceuticals) calculated by the Navigant team with data from Tables 6.1 and 3.2 of the 2006 MECS.

government, retail, legal services/law firms, standalone data centers, and others. Appropriate respondents included IT/Data Center Managers, CIO/CFOs, Facility Managers, or CEO/President/General Managers.

Sample Frame

The MCA Team and APPRISE developed the sample frame of data centers. Due to the limited number of databases that contain adequate, current information on data centers, the sample frame was developed using multiple sources. Additionally, APPRISE staff manually screened many of these records for valid respondents. Sources included marketing lists from NYSERDA's implementation contractor, an online data center directory, email lists, a NYSERDA conference attendee list, records obtained from the Flexible Technical Assistance Non Participating End Use Customers Survey, and Google searches. Table 4 breaks down the sources, sample frame coverage, and selected sample size.

Table 4. Data Center Sample Frame

Sample Releases	Source	Sample Frame Coverage	Sample Records Released
Sample Release 1	NYSERDA marketing lists, an online data center directory, email lists, a NYSERDA conference attendee list, and Google searches	New York data centers.	206
Sample Release 2	NYSERDA marketing lists, an online data center directory, email lists, a NYSERDA conference attendee list, and Google searches	New York data centers.	45
Sample Release 3	FlexTech Sample Frame sources: • US Department of Education National Center for Education Statistics • New York State Education Department (NYSED) • New York State Department of Health Division of Health Care Financing • Office of the State Comptroller	**Secondary Schools** • One each from the largest nine cities in NY. **Local Governments** • Governments from the nine largest cities and nine largest counties in NY. **Hospitals** • The largest 21 hospitals in NY as determined by number of beds	48
Total			**299***

*One duplicate was found across the releases, which brought the effective sample release to 298.

Sample Selection

APPRISE prepared a sample frame and then developed "replicates" of 298 observations. For each replicate, the sample was screened and then released to the phone center. APPRISE released three separate sample batches totaling 298 records split between upstate and downstate New York. APPRISE staff pre-screened many of the records to determine accurate contact information with the goal of achieving 42 completed interviews.

Advance Letters

To encourage participation in the study, NYSERDA sent advance letters to all sampled firms three days before the start of interviews. The letter explained the purpose of the study, introduced the data collection company, and reassured potential respondents about confidentiality issues to encourage participation. The letter also provided a call-in number that the potential respondent could use to call in and complete the survey at his/her convenience, and contact information for a NYSERDA evaluation manager who could answer questions about the survey and speak to its legitimacy.

3.2.1.3. Technical Service Providers

Target Population

The MCA Team targeted technical service providers (both engineers and manufacturing representatives) in New York who support (i.e. provide services, sell to, consult, maintain energy systems for) end use customers in the Program's targeted industries, but have not participated in the Industrial and Process Efficiency Program as the population for this survey.

Sample Frame

The MCA Team and APPRISE developed the sample frames for both TSP Manufacturing Representatives and TSP Industrial Engineers. The Manufacturing Representatives sample shown in Table 5 was purchased from Survey Sampling Incorporated based on SIC codes that were linked to companies identified by NYSERDA program staff as having the highest priority among manufacturers and distributors providing equipment specification, manufacture, distribution and installation services to Industrial and Process Efficiency customers.

Table 5. TSP - Manufacturing Representatives Sample Frame

SIC code	SIC Name	Number Upstate	Number Downstate
3563	Air & Gas Compressors	2	15
3585	Air Conditioning, Heating & Commercial and Industrial Refrigeration Equipment	36	58
50840903	Compressor Wholesalers	3	11
3535	Conveyors & Conveying Equipment	2	22
17310202	Energy Management Controls	23	12
3443	Fabricated Plate Work [Power Boilers/Heat Exchangers]	23	67
3823	Industrial Instruments for Measurement, Display & Control of Process Variables	16	48
3567	Industrial Process Furnaces & Ovens	5	14
3554	Paper Industries Machinery	8	14
5075	Warm Air Heating/AC Equipment Supplies Wholesalers	71	154
Total		189	415

The TSP Industrial Engineers sample was selected from the untouched FlexTech TSP sample frame (45 records). Additionally, 93 records were pulled from the FlexTech Non-Participating Technical Service Provider respondents; those who indicated that they provide technical feasibility and process improvement studies.

Sample Selection

As shown in Table 6, the sample was released in four separate batches. Prior FlexTech respondents were released on 3/13/2011. Unused engineering sample was released on 3/23/2011. Manufacturer representatives and additional downstate engineers were released on 4/6/2011. Additional manufacturer representatives were released on 5/13/2011. The entire sample frame of TSPs had to be used to get the targeted number of completes. From a prior survey (FlexTech), APPRISE picked a sample of TSPs. As part of the screening for that survey, APPRISE asked if they did process engineering. The resulting initial sample for this survey represented those FlexTech respondents who did process engineering. However, to complete the targeted number of interviews, APPRISE had to screen the rest of the sample frame and field those cases. With respect to TSP Manufacturing Companies, APPRISE purchases the sample frame, replicated the sample, and released the initial replicate. APPRISE had to subsample from the second replicate to get the targeted number of completes.

Table 6. Survey Sample by Release Date

Sample Releases	Sample Frame Coverage	Sample Records Released	Sample Release Date
Sample Release 1	FlexTech respondents who indicated they perform feasibility studies.	124	3/13/2011
Sample Release 2	Untouched FlexTech Medium and Small Engineers	166	3/23/2011
Sample Release 3	Additional Untouched Downstate Engineers Manufacturer Reps	130 203	4/6/2011
Sample Release 4	Additional Manufacturer Reps	119	5/13/2011
Total		**742**	

Advance Letters

NYSERDA sent out advance letters to the contacts identified in the selected sample two days prior to each sample release. In cases where the contact name was missing, the letter was addressed "To Whom It May Concern." The letter explained the study to the potential respondent, introduced the phone center that would be calling, provided contacts for the potential respondent if they wanted to learn more about the survey effort, reassured potential respondents about confidentiality issues, and encouraged participation in the study by offering a toll-free number potential respondents could dial to complete the interview at their convenience.

Target Completes

As shown in Table 7, the target number of completed interviews was 140, with a 70/70 upstate/downstate split. Actual completes were 71/69 upstate/downstate with the following breakdown by geographic region and type of service provider.

Table 7. Targeted Survey Completes by Geographic Region and Type of Service Provider[19]

	Upstate	Downstate	Total
TSP Industrial Engineers	52	49	101
TSP Manufacturing Representatives	19	20	39
Total	**71**	**69**	**140**

3.2.2. Data Collection

3.2.2.1. Eligible End Use Customers

Overview of Data Collection Procedures

APPRISE administered the Eligible End Use Customer survey as a telephone interview. Interviewers from Opinion America conducted the interviews using a computer-assisted telephone interview (CATI) survey instrument. All interviews were completed in English.

Survey Instrument

The MCA Team designed the survey instrument to assess:

- The industrial or manufacturing systems and processes at the facility,
- Current levels of energy efficiency investments,
- Types of process efficiency improvements,
- Associated practices and perceptions of energy efficiency projects and equipment, and
- Technical service and product providers.

APPRISE conducted five pretests to gauge the length of the interview and to evaluate the flow and content of the survey. DPS staff and NYSERDA evaluation and program staff reviewed and approved the revised instrument.

Survey Administration

The study was in the field from 9/29/2010 to 2/11/2011. On the first day of fielding, the APPRISE survey manager conducted an in-person interviewer training session and monitored interviews. The survey manager continued to remotely monitor interviews throughout the data collection period. The survey averaged 24 minutes per completed interview. Interviewers called during business hours and early

[19] Since results from this survey are not being reported on separately for each cell in the table, determining expected confidence and precision was deemed to be inappropriate.

evenings (for scheduled call-backs and call-ins). If the interviewer reached an individual respondent's voice mail, they left a message on the first contact. After the first contact, they left a message every three days. They did not leave a message on the company's main line.

APPRISE instructed interviewers to initially ask for the person named in the sample file, but if that person was not available, interviewers asked for the following job titles in the order specified below:

1) An engineering manager or chief process engineer

2) An operations, plant, or manufacturing manager

3) Someone in the operations, manufacturing, or engineering department

Respondents in downstate firms proved especially difficult to contact and interview. In an effort to improve downstate contact and completion rates, APPRISE began a more targeted approach to scheduling interviews with this group of respondents. Midway through the field period, APPRISE began conducting scheduling calls internally. Once an appointment for an interview was obtained by APPRISE staff, APPRISE would pass the scheduled interview to Opinion America interviewers, who would conduct the full interview. APPRISE scheduled the final 17 downstate interviews to finish the field period.

Table 8 shows the specific complete totals for each market sector:

Table 8. Completed Interviews[20]

Market Sector	Upstate	Downstate	Completes
Chemical	37	16	53
Food	7	3	10
Forest	40	15	55
Publishing	3	3	6
Transportation	6	1	7
Total	93	38	131

Sample Disposition and Survey Response Rate

[20] Since results from this survey are not being reported on separately for each cell in the table, determining expected confidence and precision was deemed to be inappropriate.

Table 9 shows the disposition of all sampled telephone numbers dialed for this survey and provides the contact, cooperation, and overall response rates. The response rate shows the proportion of all eligible respondents in the sample that were ultimately interviewed. The contact rate is the percentage of the working numbers where a request for an interview was made. The cooperation rate is the percentage of contact numbers where consent for an interview was not refused. The contact rate for the study was 55.5%, the cooperation rate was 70.1% and the overall response rate was 36.7%.[21]

[21] These disposition codes and rate formulae are consistent with the standards of the American Association for Public Opinion Research (AAPOR). The contact, cooperation, and response rates are the AAPOR #3 rates. An overall response rate of 36.7% is quite reasonable for this survey population.

Table 9. Survey Sample Disposition

		Number	Percent
TOTAL SAMPLE USED		438	100%
Excluded Sample	Not working/Unusable number	20	4.6%
Not Contacted	Respondent never available	138	31.5%
	Answer Machine	2	0.5%
	Call back/Left 800#	10	2.2%
Unknown Eligibility	No Answer/Busy	0	0.0%
	Scr. Not complete	24	5.5%
Excluded business	Not Eligible/Not Qualified	30	6.8%
	Over Quota	27	6.2%
Refused/ Break-off	Refused	56	12.8%
	Break-off	0	0.0%
COMPLETED INTERVIEW		131	29.9%
Contact rate[22] (187/337 = 0.555)			55.5%
Cooperation rate[23] (131/187 = 0.701)			70.1%
Response rate[24] (131/(337 + (0.814(24))) = 0.367)			36.7%

Error! Reference source not found. shows the eligibility status and the estimated eligibility rate (e) for the sample. The estimated eligibility rate is the proportion of eligible records among all records in the sample for which a definitive determination of status was obtained. The estimated eligibility rate is used in the calculation of the overall response rate.

Of the total 438 pieces of sample used for the study, 414 pieces of sample had a definitive eligibility status (77 were not eligible and 337 were eligible) and 24 were of unknown eligibility. Therefore, the estimated eligibility status for the study is 337/414=0.814.

[22] Contact rate= Completes + refusals + break-offs/Completes + refusals + break-offs + not contacted.

[23] Cooperation rate=Completes/Completes+refusals+breakoffs.

[24] Response rate=Completes/Completes+refusals+breakoffs+not contacted+ (e*(unknown eligibility). For this study, e=0.814 (see Table 5).

Table 10. Sample Eligibility and Estimated Eligibility Rate

	Number	Percent
Total Sample	**438**	**100%**
Known eligibility	414	94.5%
Not eligible	77	17.6%
Not working sample	20	4.6%
Not eligible respondent	57	13.0%
Eligible	337	76.9%
Unknown Eligibility	24	5.5%
Estimated Eligibility rate (e)	337/414=0.814	

3.2.2.2. Data Centers

Overview of Data Collection Procedures

APPRISE administered the Eligible End Use Customer Data Center Survey as a telephone interview. Interviewers from Opinion America conducted the interviews using a computer-assisted telephone interview (CATI) survey instrument. All interviews were completed in English.

Survey Instrument

The MCA Team designed the survey instrument to assess:

- Facility and IT support components,
- Current levels of energy efficiency investments,
- Types of IT infrastructure improvements,
- Associated practices and perceptions, and
- Technical service and product providers.

The MCA Team modeled the questionnaire after the Eligible End Use Customers General Survey; some sections were identical, and others were tailored to IT infrastructure instead of to process efficiency.

Due to the limited sample, APPRISE conducted four pretests with data centers currently participating in the Industrial and Process Efficiency Program to gauge the length of the interview and to evaluate the flow and content of the survey. The pretest participants were warned beforehand of the redundancy in the questions which were aimed for eligible non-participants of the Program. DPS staff and NYSERDA evaluation and program staff reviewed and approved the revised instrument.

Survey Administration

The study was in the field from 12/08/2010 to 4/07/2011. On the first day of fielding, the APPRISE survey manager conducted an in-person interviewer training session and monitored interviews. The survey manager continued to remotely monitor interviews throughout the data collection period. The

survey averaged 27 minutes per completed interview. Interviewers called during business hours and early evenings (for scheduled call-backs and call-ins[25]). If they reached an individual respondent's voice mail, they left a message on the first contact. After the first contact, they left a message every three days. They did not leave a message on the company's main line.

APPRISE instructed interviewers to initially ask for the person named in the sample file, but if that person was not available, interviewers asked for job titles in the following order: 1) IT/Data Center Manager, 2) CIO/CFO, 3) Facility Manager, and 4) CEO/President/General Manager.

As gatekeepers transferred the interviewers to multiple different individuals, interviewers recorded the name, title, and direct phone number of the next appropriate person to complete the survey. Table 11 shows the disposition of all sampled telephone numbers dialed for this survey and provides the contact, cooperation, and overall response rates. The response rate shows the proportion of all eligible respondents in the sample that were ultimately interviewed. The contact rate is the percentage of the working numbers where a request for an interview was made. The cooperation rate is the percentage of contact numbers where consent for an interview was not refused. The contact rate for the study was 44.0%, the cooperation rate was 59.8% and the overall response rate was 26.0%.[26]

Table 11. Survey Sample Disposition

		Number	Percent
TOTAL SAMPLE USED		298	100%
Excluded Sample	Not working/Unusable number	10	3.4%
Not Contacted	Respondent never available	120	40.3%
	Answer Machine	3	1.0%
	Call back/Left 800#	26	8.7%
Unknown Eligibility	No Answer/Busy	1	0.3%
	Records not yet called/Scr. Not complete	3	1.0%
Excluded business	Not Eligible/Not Qualified	18	6.0%
	Over Quota	0	0.0%
Refused/ Break-off	Refused	46	15.4%
	Break-off	1	0.3%
COMPLETED INTERVIEW		70	23.5%
Contact rate[27] (117/266 = 0.440)			44.0%
Cooperation rate[28] (70/117 = 0.598)			59.8%
Response rate[29] (70/(266 + (0.905(4))) = 0.260)			26.0%

[25] Scheduled "call-ins" refer to situations where respondents can dial in to the call center at a designated date and time to conduct the survey, rather than having the interviewer call back the respondent at a scheduled time.

[26] These disposition codes and rate formulae are consistent with the standards of the American Association for Public Opinion Research (AAPOR). The contact, cooperation, and response rates are the AAPOR #3 rates.

[27] Contact rate= Completes + refusals + break-offs/Completes + refusals + break-offs + not contacted.

[28] Cooperation rate=Completes/Completes+refusals+breakoffs.

[29] Response rate=Completes/Completes+refusals+breakoffs+not contacted+ (e*(unknown eligibility). For this study, e=0.905 (see Table 12).

Table 12 shows the eligibility status and the estimated eligibility rate (e) for the sample. The estimated eligibility rate is the proportion of eligible units among all units in the sample for which a definitive determination of status was obtained. The estimated eligibility rate is used in the calculation of the overall response rate.

Of the total 298 pieces of sample used for the study, 294 pieces of sample had a definitive eligibility status (28 were not eligible and 266 were eligible) and 4 were of unknown eligibility. Therefore, the estimated eligibility status for the study is 266/294=0.905.

Table 12. Sample Eligibility and Estimated Eligibility Rate

	Number	Percent
Total Sample	**298**	**100%**
Known eligibility	294	98.7%
Not eligible	28	9.4%
Not working sample	10	3.4%
Not eligible respondent	18	6.0%
Eligible	266	89.2%
Unknown Eligibility	4	1.3%
Estimated Eligibility rate (e)	266/294=0.905	

3.2.2.3. Technical Service Providers

Overview of Data Collection Procedures

The questionnaire was administered as a telephone interview with the target respondent listed in the sample frame or someone else who could discuss the firm's work conducting energy efficiency feasibility studies or providing technical support for businesses in New York. Interviewers from Opinion America conducted the interview using a computer-assisted telephone interview (CATI) survey instrument.

Survey Instrument

The survey instrument was designed by the MCA Team in consultation with APPRISE, NYSERDA evaluation and program staff as well as DPS staff. The survey instrument was designed to gather information about the types of services the firm provided, awareness and use of energy efficiency measures and feasibility studies, and familiarity with NYSERDA and the Industrial and Process Efficiency Program. A separate screener was created for the manufacturing representatives. Aside from this minor difference, the two survey instruments are identical. APPRISE conducted five in-depth pre-tests to develop specific and relevant closed-end response options for several open-end questions. The pre-tests also assessed the length of the interview, evaluated how well the questions would be understood by respondents, and made sure the logic and flow of the questionnaire was appropriate.

Survey Administration

Interviewers were briefed on the study on March 16, 2011. Interviewer training included an in-person session conducted by APPRISE Policy Analysts, and was attended by the call center supervisors and staff. Written training materials were provided, containing background information about the Industrial and Process Efficiency Program and NYSERDA and APPRISE contact information. Data collection on the study began that afternoon. Calls were not made on Memorial Day (May 30), a federal holiday, during

this field period. Interviewers called during daytime weekday hours and were available on nights and weekends if the respondent wished to schedule a call-back for those times. Calls were rotated between the morning and afternoon on different days of the week. If the interviewer reached the named contact's voicemail, he or she left a message on first contact. After the first contact, the interviewer left a message every three days and attempted each number a minimum of 10 times. The interviews averaged 22 minutes in length. Survey fielding closed on June 28, 2011 with 140 completed interviews.

Sample Disposition and Survey Response Rate

Table 13 shows the disposition of all sampled telephone numbers dialed for this survey and provides the contact, cooperation, and overall response rates. The response rate estimates the fraction of all eligible working numbers where a request for an interview was made. The cooperation rate is the percentage of contact numbers where consent for an interview was not refused.[30] The contact rate for the study was 72%, the cooperation rate was 52%, and the overall response rate was 40%.

Table 13. Survey Sample Disposition

		Number	Percent
TOTAL SAMPLE USED		**742**	**100%**
Excluded Sample	Not working/Unusable number	122	16.4%
Not Contacted	Max Attempts/Respondent never available	65	8.8%
	Answering Machine	0	0.0%
	Call back/Left 800 number	40	5.4%
Unknown Eligibility	No Answer/Busy	15	2.0%
	Screener not complete	0	0.0%
Excluded	Not eligible/Not qualified (previous participants, do not provide feasibility studies)	200	27.0%
	Over quota	30	4.0%
Refused/Break-off	Refused	129	17.4%
	Break-off	1	0.1%
COMPLETED INTERVIEWS		140	18.9%
Contact rate[31][1]	(140+129+1)/(140+129+1+105)	0.72	72.0%
Cooperation rate[32][2]	(140)/(140+129+1)	0.5185	51.9%
Response rate[33][3]	(140)/(140+129+1+105+(0.482*15)	0.3662	36.6%

[30] These disposition codes and rate formulae are consistent with the standards of the American Association for Public Opinion Research (AAPOR). The contact, cooperation, and response rates are the AAPOR #3 rates.

[31] Contact rate = (Completes+refusals+break-offs)/(Completes+refusals+break-offs+not contacted).

[32] Cooperation rate = (Completes)/(Completes+refusals+break-offs).

[33] Response rate = (Completes)/(Completes+refusals+break-offs+not contacted+(e*(unknown eligibility)). For this study, e=0.482 (see Table 3).

Table 14 shows the eligibility status and the estimated eligibility rate (e) for the sample. The estimated eligibility rate is the proportion of eligible cases among all cases in the sample for which a definitive determination of status was obtained. The estimated eligibility rate is used in the calculation of the overall response rate.

Of the total 742 pieces of sample used for the study, 622 pieces of sample had a definitive eligibility status (322 were not eligible, and 300 were eligible). Potential respondents were deemed ineligible if the engineering or manufacturer representative firm had previously participated in the Industrial and Process Efficiency Program, or if their firm did not conduct process improvement or feasibility studies. There were 120 cases with unknown eligibility. The estimated eligibility rate for this study is 300/622=0.482.

Table 14. Sample Eligibility and Estimated Eligibility Rate

	Number	Percent
Total Sample	742	100%
Known Eligibility	622	84%
Not Eligible	322	43%
Not Working Sample	122	16%
Not Eligible Respondent	200	27%
Eligible	300	40%
Unknown Eligibility	120	16%
Estimated Eligibility Rate(e)	**Eligible/Known Eligibility = 300/622 = 0.482**	

3.2.3. Data Processing

3.2.3.1. Eligible End Use Customers

Coding

There were 13 open-ended or Other (Specify) questions, some of which contained field-coded options. An APPRISE Policy Analyst reviewed the verbatim responses in each question and either coded the response into an existing code, created a new code, or left the response as a verbatim. A new code was created if 5% or more of the survey population gave the new response. An MCA Team analyst provided the final coding check on the file. Once approved, APPRISE applied the codes to the final data file.

Data Processing

APPRISE checked the survey data for consistency with the CATI survey instrument and created data files in the following formats: SAS, SPSS, Stata, and Excel (both labeled and unlabeled spreadsheets). Variables and values were labeled consistently with the survey instrument. Stata and Excel codebooks that provided the data layout were developed.

Weighting

These values were calculated to weight each sector by total energy use, given the number of complete surveys for each sector: Food - 1.86, Forestry - 0.72, Printing/Publishing - 3.04, Chemical/Pharmaceutical - 0.84, and Transportation - 1.41.

3.2.3.2. Data Centers

Coding

There were 13 open-ended or Other (Specify) questions, some of which contained field-coded options. An APPRISE Policy Analyst reviewed the verbatim responses in each question and either coded the response into an existing code, created a new code, or left the response as a verbatim. A new code was created if 5% or more of the survey population gave the new response. An MCA Team analyst provided the final coding check on the file. Once approved, APPRISE applied the codes to the final data file.

Data Processing

APPRISE checked the survey data for consistency with the CATI survey instrument and created data files in the following formats: SAS, SPSS, Stata, and Excel (both labeled and unlabeled spreadsheets). Variables and values were labeled consistently with the survey instrument. Stata and Excel codebooks that provided the data layout were developed.

Weighting

The data were not weighted. As the project developed it became clear that Data Centers needed to be treated separately. Many of the survey questions were entirely different, or differently worded and coded, for Data Centers than for the other market sectors. Thus, the computed overall total, upstate total, and downstate total values include all the market sectors other than Data Centers.

3.2.3.3. Technical Service Providers

Data Processing

The survey data were checked for consistency with the survey instrument. Data files were created in the following formats: SAS, SPSS, Stata, and Excel. All files were labeled with variable labels and value labels.

Weighting

The data were not weighted. The sample was allocated based on responses from end use customers as to which suppliers they used for technical information. The sample was drawn from the sample frame in proportion to these responses from the end use customers, thus, the sample is self-weighting.

SECTION 4. MARKET CHARACTERIZATION

This section presents market characterization results for NYSERDA's Industrial and Process Efficiency Program. Specifically, an analysis of New York's manufacturing and industrial markets (including Data Centers), along with a description of the market actors providing services to these industries is presented. Additionally, a summary of other programs, currently operating in New York's industrial marketplace, is provided. General market trends and characteristics of specific industries in New York are also described, including the Program's targeted manufacturing industries (e.g., Chemical/Pharmaceutical, Printing/Publishing, Automotive, Food Processing and Forest Products) and Mining, Data Network Storage, and Water/Waste Water Treatment facilities.

This section is separated into four sub-sections as follows:

- Section 4.1 – summarizes the MCA Team's market characterization approach;
- Section 4.2 – describes the New York industrial market in general and Program-targeted industries;
- Section 4.3 – presents information on market actors;
- Section 4.4 – summarizes the energy efficiency programs available to the industrial market (including NYSERDA's Industrial and Process Efficiency Program) in New York

This market characterization effort provides baseline information on multiple items and will facilitate the identification and examination of changes within New York's manufacturing and business markets over time.

4.1 MARKET CHARACTERIZATION APPROACH

Market characterization results are generated primarily from secondary data sources, supplemented by information gathered during primary data collection efforts and discussions with stakeholders in the Program. To characterize the market within which NYSERDA's Industrial and Process Efficiency Program is being implemented, pertinent market and baseline information has been collected by geographic region throughout the state (*i.e.*, by NYSERDA-designated Energy $mart Community region and upstate vs. downstate comparisons). This market characterization information includes the number and types of manufacturing industries in New York, energy intensity statistics by industry, and key market actors that provide services in these sectors.

In performing this characterization, the MCA Team worked with NYSERDA Energy Analysis and program staff and other NYSERDA program evaluation contractors to identify specific market characterization parameters. For reporting purposes, these parameters have been separated into Industry, Actors, and Program parameters, and are discussed in detail in Sections 4.2, 4.3 and 4.4, respectively.

As part of this effort, the MCA Team:

- Participated in meetings with program staff and other NYSERDA evaluation contractors to discuss potential characterization parameters and other market indicators;
- Discussions with key external stakeholders that interface with customers in the target market segments;
- Reviewed the latest Industrial and Process Efficiency Program logic model, and related MCA evaluation reports and survey efforts (*i.e.*, for Flex Tech) to identify potentially relevant characterization parameters that have previously been identified and tracked by NYSERDA;

- Reviewed program evaluation reports and survey efforts conducted by other entities to identify additional innovative characterization parameters currently being used within the industry; and
- Investigated proprietary and publicly available data sets to determine the types of characterization data available for analysis including:
    - The Industrial and Process Efficiency Program tracking database;
    - New York Department of Labor and Statistics data;
    - Information gathered through ongoing information sharing with Navigant Consulting;
    - Membership lists and other publicly-available data from relevant professional organizations (*e.g.*, the Manufacturers' Association of Central New York, the Business Council of New York State, the Empire Development Corporation).

Table 15 provides a listing of some of the key documents and data sources used in this effort.

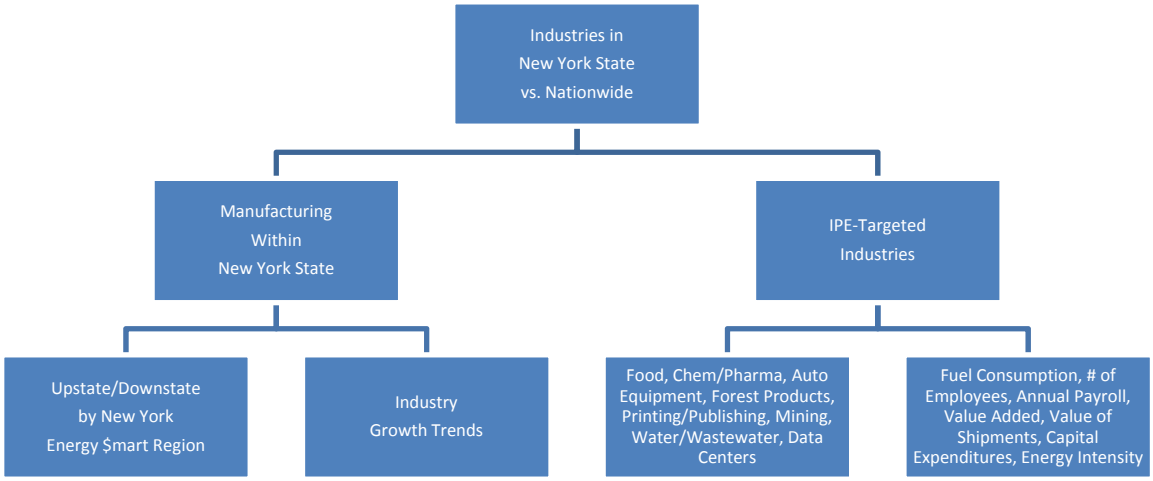
Table 15. Key Data Sources

U.S. Census Data, American Fact Finder, 2008 Economic Data for New York State
County and Business Pattern Data, 2005 – 2007
McGraw Hill Dodge Database, Square Foot and Number of Establishments
Annual Survey of Manufacturers (ASM) 2008, New York State and U.S. Totals
EconomicData.com, September 2009
Empire State Development Corporation
EPA Industries in Focus Program Summary
DOE Industrial Technologies Program Summary
U.S. Census Data 2006, Manufacturing Energy Consumption Survey (MECS), Table 6.1 and U.S. DOE's Commercial Buildings Energy Consumption Survey (CBECS - 2003) data
Duke University Department of Economics, Development of a Performance -based Industrial Energy Efficiency Indicator for Food Processing Plants Report, 9/2009
Food Manufacturing, Food Processing Machinery: Improving Energy Efficiency
U.S. EPA Energy Trends in Selected Manufacturing Sectors, March 2007
ChemicalProcessing.com, "Use it or Lose it, Chemical Industry Energy Consumption 2010
Department of Energy, Industrial Technologies Program, "Energy Use, Loss and Opportunities Analysis, U.S. Manufacturers and Mining," December 2004.
Lawrence Berkley National Labs, Energy Efficiency Improvements and Cost Savings Opportunities for the Vehicle Assembly Industry, March 2008.
New York State Oil, Gas and Mineral Resource 2008, New York State DEC, Division of Mineral Resources.

4.2 INDUSTRIAL FACILITIES CHARACTERIZATION

Results from the industry characterization efforts are presented in this section.[34] The New York industrial market and NYSERDA's Industrial and Process Efficiency Program's targeted markets were analyzed using metrics that identify industry productivity, market share, capital investment and specialized expertise; including the number of employees, value added, total value of shipments, annual payroll, production hours worked and capital expenditure. These metrics were used to compare the New York manufacturing industry to the manufacturing industry nationwide, the Industrial and Process Efficiency industries to the total manufacturing market within New York, and the Industrial and Process Efficiency industries within New York to those industries nationwide. As shown in Figure 2, results are organized into a number of categories. Within each of these categories, detailed findings are presented.

Figure 2. Industrial Facilities Characterization – Organization of Results Areas



4.2.1 Industries in New York vs. Nationwide

New York is home to 4% of all manufacturing nationwide.[35] Figure 3 compares the percentage of employees, annual payroll, worker hours, total value of shipments, and total value added, by manufacturing industries located in New York to those nationally.[36] Six industries show high concentrations of employment, having 5% or more of the total number of employees of those industries located in New York: Apparel Manufacturing 12%, Pharmaceutical and Medical Manufacturing 7%, Leather and Allied Product Manufacturing 6%, Printing and Related Support Services 6%, Computer and

[34] U.S. Census Data, *County Business Patterns data*, from 2005 to 2007, is used for analyzing the number of Industrial and Process and Efficiency Program-targeted and non-Program establishments and non-manufacturing industries by first quarter payroll and annual payroll. U.S. Census ASM data, for 2005, 2006 and 2008, is used for analyzing all Industrial and Process Efficiency Program-targeted and non-Program Manufacturing industries.

[35] U.S. Census Data, *County Business Patterns for New York*, 2005 to 2007. This source, used for the number of employees and manufacturing facilities, does not identify headquarters vs. manufacturing facilities.

[36] ASM 2008, New York and Total U.S.

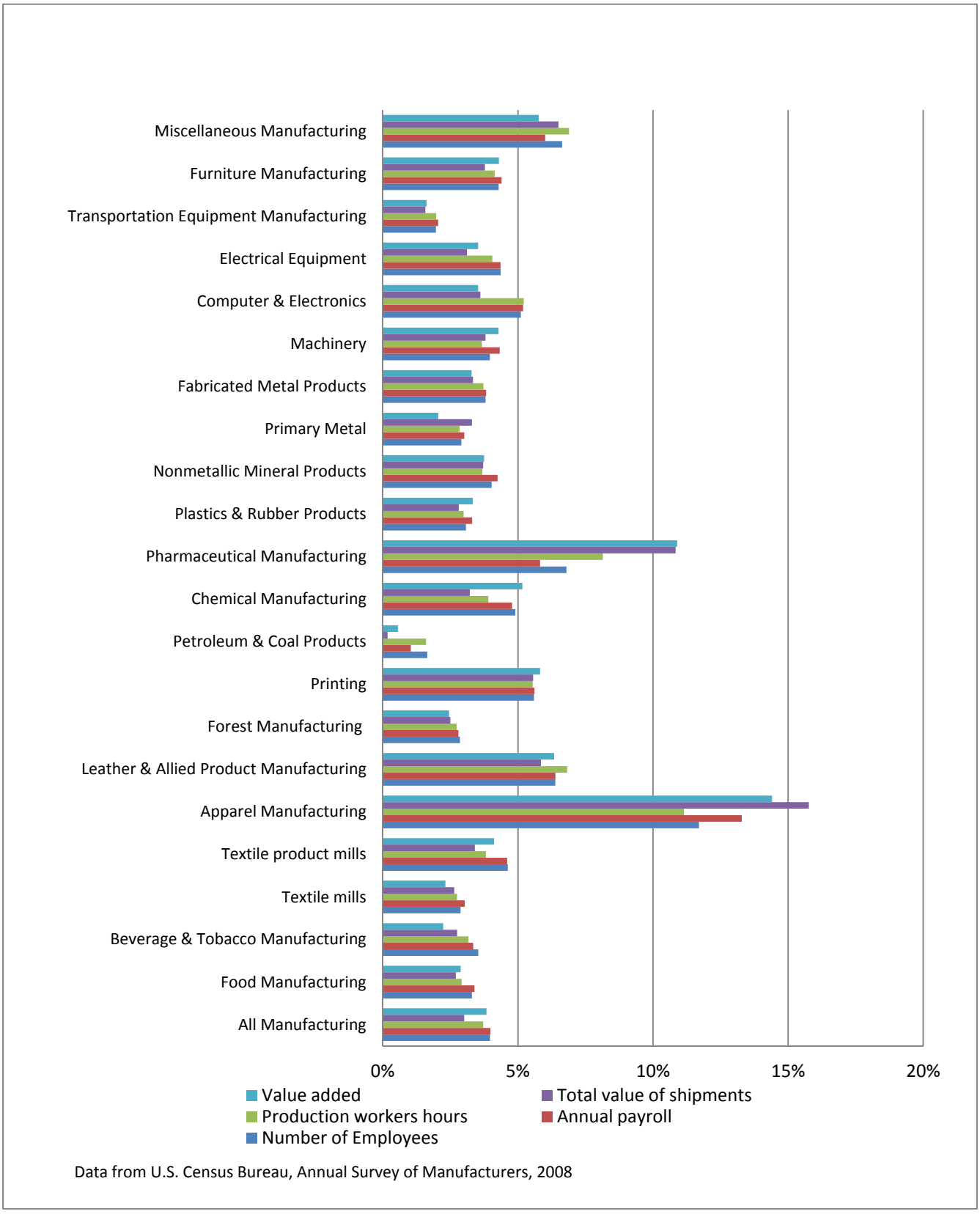
Electronic Manufacturing 5%, and Miscellaneous Manufacturing 7%. These same industries show the greatest percentage of annual payroll for their respective industries, compared nationwide.

New York is home to 12% of all Apparel Manufacturing employees, who earn 13% of total annual payroll for the industry. It is also home to 7% of all Pharmaceutical and Medical Manufacturing employees, who earn 6% of the total annual payroll for the industry. All other industries previously mentioned have equal percentages of employees and payroll.

The value added metric refers to the contribution of an industry to the factors of production, *i.e.* labor, skill and capital goods, which increases the value of a product.[37] Five industries with the highest value added metrics are: Apparel Manufacturing (16%), Pharmaceutical and Medical Manufacturing (11%), Leather and Allied Product Manufacturing (6%), Printing and Related Support Services (6%), and Machinery Manufacturing (4%). Both Pharmaceutical and Apparel industries have value added metrics higher than their number of employee and total annual payroll percentages, indicating these industries are outperforming their counterparts nationally by contributing more value to the product they produce.

[37] Value added is defined as the amount by which the value of an article is increased at each stage of its production, exclusive of initial costs.

Figure 3. NY Manufacturing Industries as a Percentage of National Totals



Data from U.S. Census Bureau, Annual Survey of Manufacturers, 2008

4.2.2 Manufacturing Within New York

There are approximately 18,727 manufacturing establishments, including headquarters and manufacturing plants/facilities in New York.[38] Approximately 40% of these (7,513) are establishments in the Program's targeted manufacturing market sectors, including 571 chemical, 125 pharmaceutical, 2,191 printing, 2,381 publishing, 8 motor vehicle manufacturing, 218 motor vehicle body and part manufacturing plants, 1,916 food processing, 582 wood products and 291 paper product processing firms. In addition to manufacturing establishments, NYSERDA's Industrial and Process Efficiency Program targets a number of non-manufacturing industries including data storage (890), gas and oil mines (97), mineral and sand mines (277), forest extraction companies (257), and water and water treatment facilities (60 and 36, respectively).

4.2.3 Upstate vs. Downstate

There are seven Energy $mart Regions located in Upstate New York, (North Country, Capital, Mid-Hudson, Central New York, Southern Tier, Finger Lakes and Western) and three Energy $mart Regions located downstate (Downstate East, Downstate North and Downstate South). While the geography of upstate New York is considerably larger in size (e.g., square miles) than downstate, the number of manufacturing establishments located in each region is roughly the same.

Just over half (51.5%) of all manufacturing establishments are located downstate.[39] From 2001 to 2009, the total number of manufacturing establishments in New York decreased by 5.0%, decreasing 8.4% downstate and 2.6% upstate. [40]

UPSTATE[41]

Upstate New York measures more than 45,600 square miles and the primary industries include agriculture, life sciences, renewable energy, bio tech, food processing, chemical, pharmaceutical and medical device manufacturing, mining and transportation manufacturing. To provide some sub-regional context, the following are brief descriptions of each of the Energy $mart Regions and the industries located in them, in Upstate New York.

North Country Energy $mart Region[42]

The North Country is a rural region that spans from the eastern shores of Lake Ontario to the western shores of Lake Champlain, to the northern part of the region abutting the Canadian border. This region covers approximately 14,500 square miles and includes Clinton, Essex, Franklin, Hamilton, Jefferson, St. Lawrence and Herkimer counties. It is the largest region in land area and smallest in population among all other Energy $mart Regions in the state.

The North Country's geographic location, specifically access to waterways, as well as abundance of vast land are key factors in the attraction of new manufacturing operations, and this region has been transforming over the past two decades from traditional manufacturing, mining and agriculture sectors to niche industries in those sectors, as well as emerging sectors including biotechnology. Principal industries include agriculture, pharmaceutical, biotech, medical, metal and plastic materials processing, transportation equipment manufacturing, wood products manufacturing, food processing and distribution.

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[38] U.S. Census Data, *County Business Patterns for New York*, 2005 to 2007.

[39] U.S. Census Data, *American Fact Finder, 2008 Economic Data for the State of New York.*

[40] U.S. Census Data, *American Fact Finder, 2008 Economic Data for the State of New York*, with GDS calculations.

[41] Square mileage data calculated from US Census Quick Facts Database.

[42] Empire State Development Regional Summary, *Inside North Country Region*, 2010.

Finger Lakes Energy $mart Region[43]

The Finger Lakes Region of New York covers just under 4,700 square miles and is comprised of nine counties: Monroe, Wayne, Seneca, Ontario, Yates, Livingston, Wyoming, Genesee and Orleans. There are four major cities including Rochester, the third largest city in the State, as well as Geneva, Canandaigua and Batavia. The Finger Lakes area, for which the region is named, contains more than 11 narrow bodies of water.

The region's transportation systems, highly educated workforce and industry in high technology have helped make Rochester a strong export city. Principal industries in this region include optics, photonics, imaging, precision manufacturing, management information systems (MIS)/information technology (IT), business services, food processing and agriculture production, biotechnology/pharmaceutical/ medical research, alternative energy and tourism.

Western Energy $mart Region[44]

The Western New York Region includes the Buffalo-Niagara Metropolitan area, which is compromised of Erie and Niagara counties, and also includes Allegany, Cattaraugus, and Chautauqua counties. The Western New York Region covers nearly 5,000 square miles, and shares a border with Canada.

The region's economy has a particular focus on manufacturing, such as transportation equipment, machinery and fabricated metal products, which are export income-generating industries. Advanced manufacturing in Buffalo/Niagara include automotive part producers and their suppliers, aerospace and defense, industrial/chemical, advanced plastics, and new polymers processing and packaging of foods. Other principal industries in this region include agriculture and agribusiness, life science technology, renewable energy and back office support industries**.**

Central New York Energy $mart Region[45]

The Central New York Energy $mart Region covers nearly 4,800 square miles and includes the Syracuse Metropolitan area located in Onondaga County, and also includes Oneida, Cayuga, Cortland, Madison, and Oswego counties.

Principal industries in Central New York include manufacturing, agriculture and agribusiness, life science technology, renewable energy and back office support industries. Central New York is industry-diverse, and other industries such as health care, education, financial services and transportation are also prominent. While manufacturing has a long history in this area, over the past decade Central New York has developed particular strength and expertise in industries such as biotechnology, bio-processing and medical devices, as well as electronic and wireless devices such as sensors and radar.

The emergence of renewable energy and environmental systems in this region is supported by the New York Center of Excellence in Energy and Environmental Systems (CoE), located in Syracuse, which is known for its work in environmental quality, bio-fuels and biomass, wind, fuel cells, solar, water quality and water resources, green buildings and sustainable design.

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[43] Empire State Development Regional Summary, *Inside the Finger Lakes Region*, 2010.

[44] Empire State Development Regional Summary, *Inside Western New York*, 2010.

[45] Empire State Development Regional Summary, *Inside Central New York*, 2010.

Capital Energy $mart Region[46]

The Capital Region is located in the eastern part of mid-New York State, covering approximately 3,700 square miles and includes the Albany, Troy, Schenectady and Saratoga metropolitan areas. The region is comprised of 11 counties and is known for industries with focus in biotech/life sciences and nanotechnology**.** Other principal industries include computer, electronics and semiconductor manufacturing, forest products, tourism, chemical manufacturing and renewable technology.

Mid-Hudson Energy $mart Region[47]

The Mid-Hudson Energy $mart Region is located north of New York City and south of Albany along the Hudson River, and includes Ulster, Dutchess, Sullivan, Orange, Putnam, Rockland and Westchester counties. The region covers just under 7,300 square miles and is located in the epicenter of the Boston-Washington Corridor and is home to 100+ Fortune 500 Companies, as well as more than thirty colleges and universities.

Some of the world's largest, most sophisticated technology and manufacturing companies are located in this region, as well as healthcare and retail trade companies. Principal industries include distribution, electronics, food processing, life science and biotech, information technology, manufacturing, medical device manufacturing, healthcare services, renewable energy products, research and development (R &D), financial services, back office operations and tourism.

Southern Tier Energy $mart Region[48]

The Southern Tier Energy $mart Region is located on the Pennsylvanian border of New York, lying northwest of New York City and southwest of the State Capitol (Albany). This region covers approximately 5,700 square miles and contains Broome, Chemung, Chenango, Delaware, Otsego, Schuyler, Steuben, Tioga, and Tompkins counties, fine natural resources and agriculture, as well as several educational institutions.

Principal industries in this region include industrial machinery and materials processing, electronics/imaging/simulation, transportation equipment manufacturing, distribution, tourism, agriculture and back office support companies.

DOWNSTATE

The Downstate North, South and East Energy $mart Regions cover just over 300 square miles (excluding Long Island) and are composed of five boroughs: Manhattan, the Bronx, Brooklyn, Queens and Staten Island. More than 40 percent of the State's population resides in the New York City Metropolitan area; it is a premier city in the U.S. and among the most populous in the world. Principal industries in Downstate New York include biotechnology, apparel manufacturing, food processing and financial services.

Customers located on Long Island, east of the Downstate Energy $mart Regions, are eligible to participate in the gas portion of NYSERDA programs only.

[46] Empire State Development Regional Summary, *Inside the Capital Region,* 2010.

[47] Empire State Development Regional Summary, *Inside Mid-Hudson Region*, 2010.

[48] Empire State Development Regional Summary, *Inside Southern Tier Region*, 2010.

Downstate North/South/East Energy $mart Region[49]

New York City is the home for many leading industry giants including bioscience, securities and finance-related services, green building development, food manufacturing, print, television and radio media, tourism and hospitality. It also is the second largest cluster of data storage companies in the nation, second only to Silicon Valley, California. Nearly two-thirds of the nation's pharmaceutical industry is located in or near New York City; the annual output of New York City's food manufacturing industry is approximately $5 billion, employing over 33,800 people. Principal industries in this region include biotechnology, life sciences, pharmaceuticals, green buildings, apparel manufacturing, food processing and distribution, media and entertainment and tourism.

Long Island[50]

Long Island is located at the southern tip of New York, just east of New York City. It stretches approximately 120 miles east and is surrounded by the Long Island Sound and the Atlantic Ocean.

The Long Island Region covers nearly 1,200 square miles and is comprised of Nassau and Suffolk counties and is known for its geographical and industrial diversity. For example, Suffolk County has redeveloped North Fork's potato fields into a burgeoning wine region and is also a leader in technology development. Principal industries in this region include aerospace, electronics, biotechnology, medical imaging, computer technology, financial service, tourism, food processing and agriculture (wine and commercial fish harvesting).

4.2.4 Industry Growth Trends

From 1999 to 2009, there has been zero percent job growth in the manufacturing industry nationwide. In 2009, manufacturing sector production reduced by 35% compared to 10 years ago, and was at the lowest level of manufacturing employment since 1941 even though the size of the nation's overall workforce was up nearly four-fold during that same time.[51] According to the latest available County Business Pattern data (from 2006 to 2007) the total number of manufacturing establishments (NAICS codes 31-33) nationwide has declined just minimally (by 0.45%). During this same time frame, the number of establishments in New York's Industrial and Process Efficiency Program-targeted market segments has experienced similar declines, but to an even lesser extent (decreasing by 0.04%). One reason for the nationwide decline has been the competitive pressure of a global economy, where companies have struggled to reduce their costs and remain competitive. Strategies to reduce costs in manufacturing sectors include streamlining processes, reducing overhead and operating costs, and outsourcing functions to locations where labor is less expensive.

For the data center sector, however, the industry is seeing a substantial increase in demand – although pressures to control costs through outsourcing, offsite storage locations, and utilization of new and evolving technologies are also increasing.[52] This emergence of demand for storage capacity and push for energy efficiency improvements to reduce operation costs, in both manufacturing and data center

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[49] Empire State Development Regional Summary, *Inside New York City*, 2010.

[50] Empire State Development Regional Summary, *Inside Long Island*, 2010.

[51] *"No Growth in Private Sector in 10 years……Manufacturing in Almost 70,"* EcomonicData.com. September 2009.

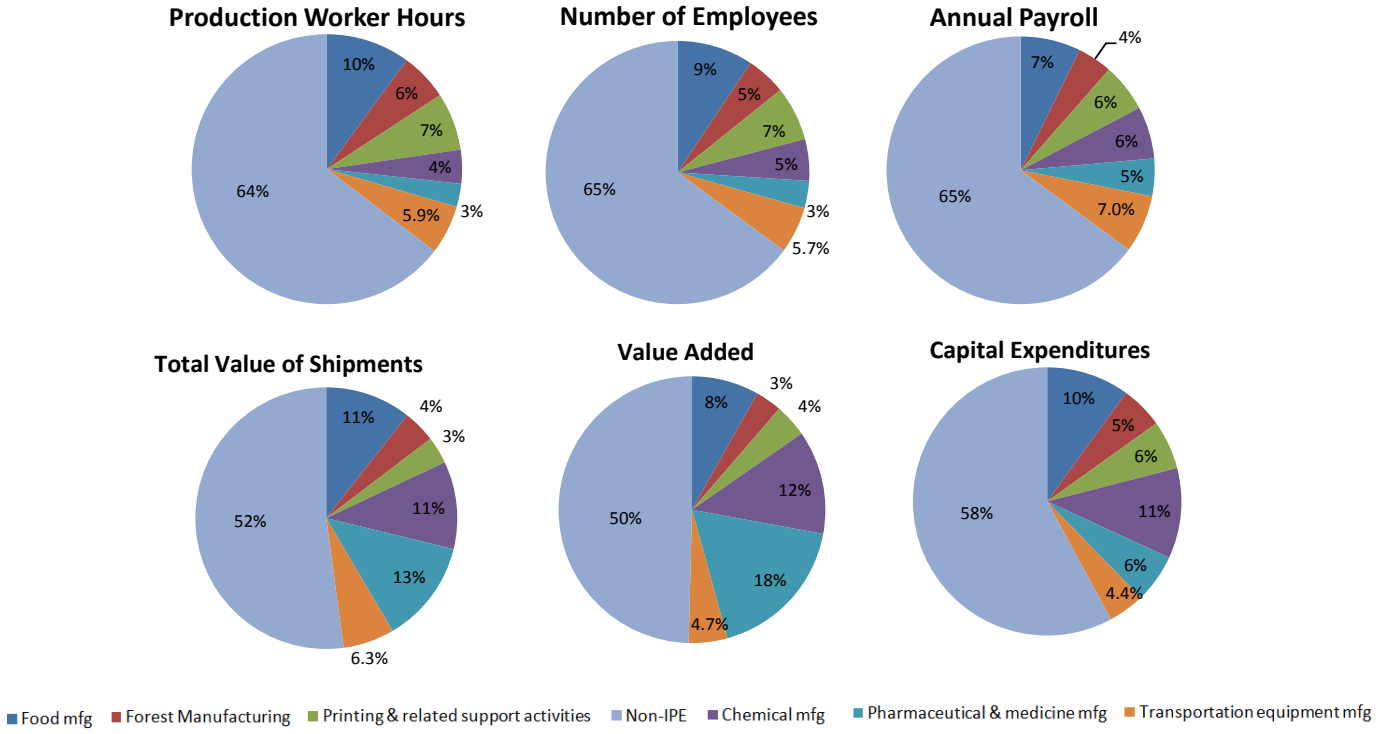
[52] According to *The Vector Approach to Data Center Power Planning, How to Avoid Unplanned Obsolescence in the Power Distribution Infrastructure*, A Thought Leadership White Paper, by EATON, Powering Business Worldwide, June 2009, "Energy costs associated with the growing demand for Data Centers and Network Storage space can be up to 30 times more than that of typical office space. Off site data storage and network systems virtualization can often offer economic and convenient alternatives."

facilities, presents an opportunity for NYSERDA to promote the Industrial and Process Efficiency Program as a tool to help achieve these industries' cost cutting and energy efficiency goals.

In 2008, 1.34 million paid manufacturing employees worked 1.75 trillion production hours, earning $64 trillion in New York. As seen in Figure 4, in 2008, Industrial and Process Efficiency industries accounted for 35% of the total number of employees and 36% of production work hours in the manufacturing industry. Food manufacturing had the highest percent of employees (9%) and production work hours (10%). Printing and Related Support activities had the second highest percent of employees (7%) and production work hours (7%). Pharmaceutical and medicine manufacturing had the lowest percentage of employees (5%) and production work hours (3%). Industrial and Process Efficiency industries represented 35% of the annual payroll, with transportation equipment and food manufacturing each accounting for 7%.

Also shown in Figure 4, in 2008, the total value of shipments in all manufacturing industries in New York was $416.6 trillion, and Industrial and Process Efficiency industries accounted for 48% of this total. Pharmaceutical and medicine manufacturing were the largest contributors among all the Industrial and Process Efficiency industries, accounting for 13%, followed by food manufacturing (11%). The manufacturing industry in New York produced value added worth of $217.7 trillion. Industrial and Process Efficiency industries contributed 50% including: pharmaceutical and medicine manufacturing (18%), followed by chemical manufacturing (12%), and food manufacturing (8%). The total capital expenditure (i.e., money spent to acquire or upgrade physical assets, such as buildings and machinery), by manufacturing industries in New York was $13.2 trillion, and Industrial and Process Efficiency industries accounted for 42% (where chemical manufacturing accounted for 11%, followed by food manufacturing at 10%).

Figure 4. NY Manufacturing Sector, US Census Bureau, Annual Survey Manufacturers, 2008.

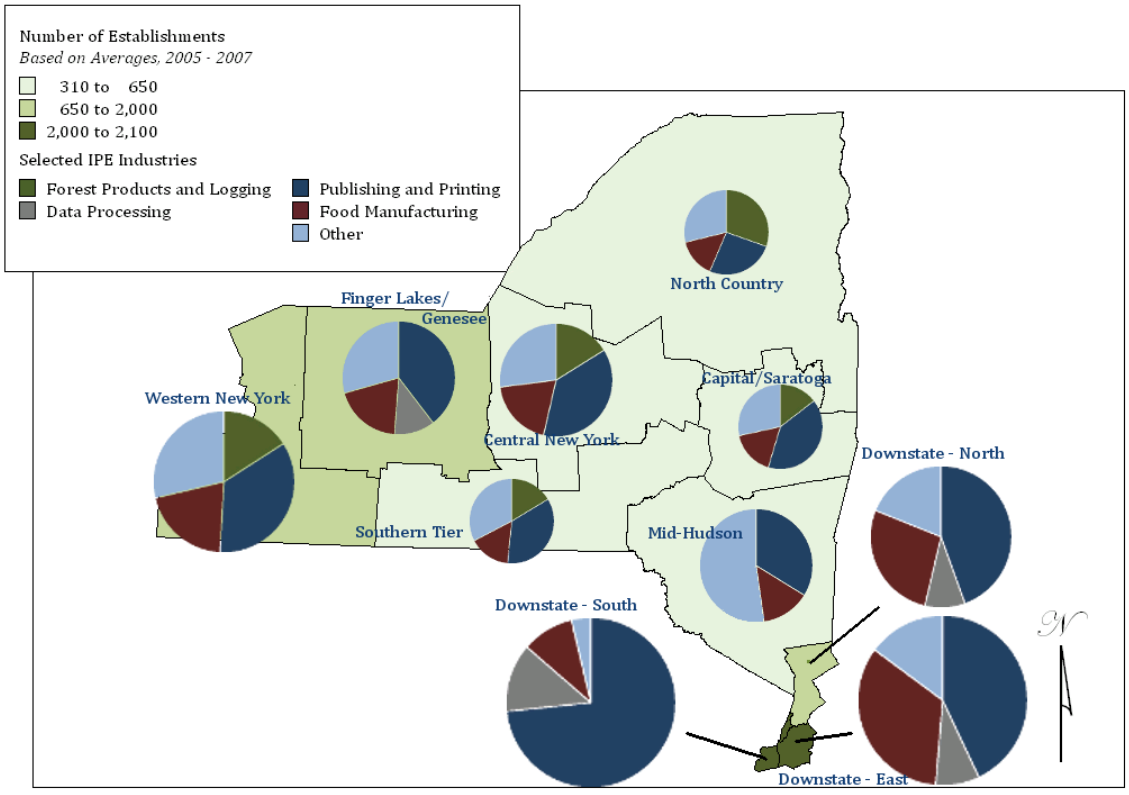


4.3 INDUSTRIAL AND PROCESS EFFICIENCY-TARGETED INDUSTRIES – OVERVIEW

Nine industries are targeted by NYSERDA's Industrial and Process Efficiency Program: 1) food processing, 2) chemical, 3) pharmaceutical, 4) automotive equipment, 5) forest products, 6) printing/publishing, 7) mining/mineral processing, 8) water/wastewater treatment, and 9) data network storage (data centers). Because each process is unique, each industry presents a unique opportunity to gain efficiency by incorporating new and innovative technologies, to fit individual processing needs. The following is a description and comparison of industry metrics for each of the Industrial and Process Efficiency Program's targeted industries for New York vs. Nationwide. These metrics include number of establishments, number of employees, annual payroll, production hours worked, total value of shipments and value added, and this comparison provides information on the business activity of each industry, and New York's market share within this industry. For ease of presentation, the chemical and pharmaceutical industries have been grouped into a single category (chemical/pharmaceutical) in Section 4.3.2.

Figure 5 shows the total number of establishments and top Industrial and Process Efficiency industries within each Energy $mart Region. Each pie graph highlights the proportions of the four most prevalent Industrial and Process Efficiency industries in each region relative to the other Industrial and Process Efficiency industries. As shown in this map, printing/publishing and food manufacturing facilities are predominant in the upstate and the downstate regions, while data processing facilities are most common in regions with large urban areas.

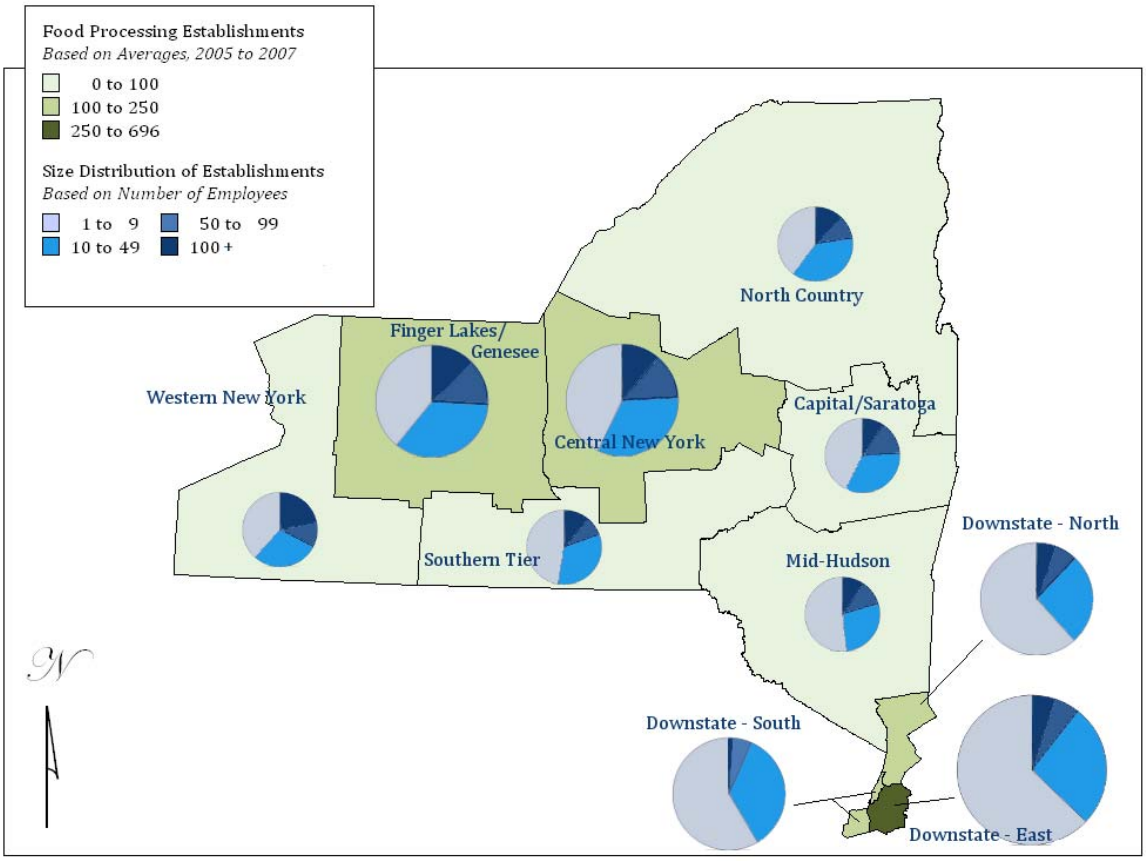
Figure 5. Total Establishments



4.3.1 Food Manufacturing/Processing

Across the state, food processing establishments comprise a significant portion of Industrial and Process Efficiency industries. However, as shown in Figure 6 below, the number of food processing establishments are highly concentrated in the downstate regions, with nearly 57% located in the Downstate – North, South and East Energy $mart Regions. Among the seven upstate regions, the Central New York and Finger Lakes/Genesee Regions have a higher number of food processing establishments than the remaining Energy $mart Regions. Together, the seven upstate regions comprise 12% of the total number of food processing facilities statewide. Note the relatively high proportion of larger facilities, as defined by the number of paid employees working in each facility, in the upstate regions; 25% of facilities located upstate are comprised of 50 or more employees compared to only 15% of facilities located downstate.

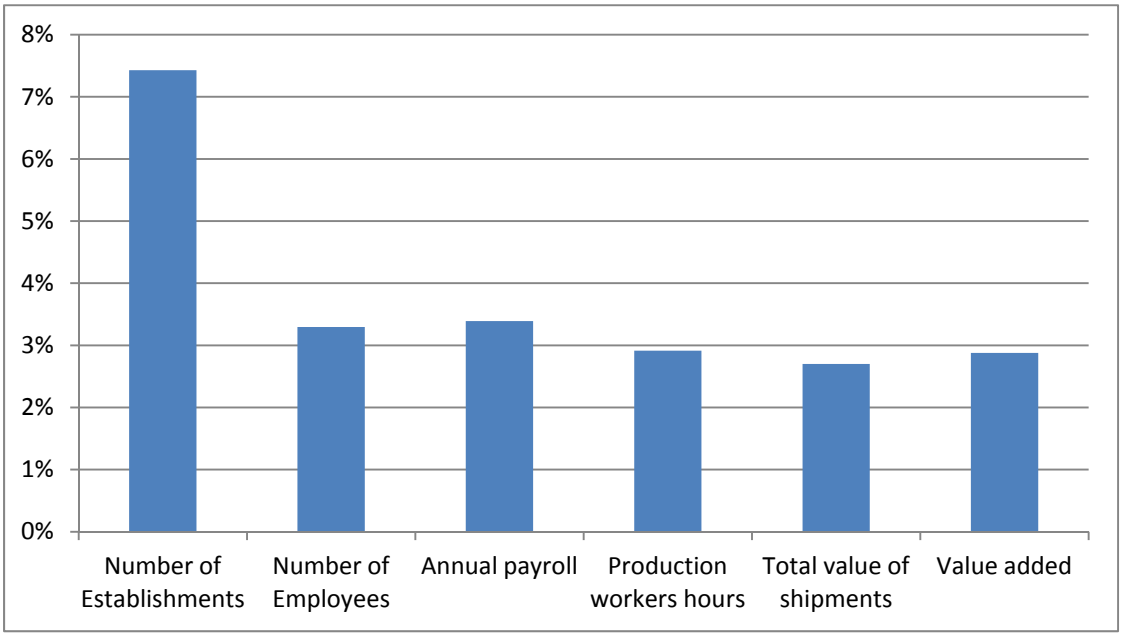
Figure 6. Food Processing Establishments



Approximately 1,916 food processing facilities are located in New York, which is slightly over 7% of the total number of facilities nationwide (Figure 7). Most processing plants produce single or only a few products, so opportunities for efficiency are unique to the individual plant process. Food processing equipment poses some unique challenges for maintenance personnel. Wet operating conditions, wash down requirements, and chemical contaminants found in food processing facilities can require specially-designed equipment. Additionally, the high cost of energy has placed a premium on finding ways to

reduce the energy consumption through equipment and systems throughout a food production facility, without compromising the quality of the end use product. [53]

Figure 7. NY State Food Processing Measurements vs. National



Data from U.S. Census Bureau, Annual Survey of Manufacturers, 2008, and County and Business Pattern 2007 for number of establishments' data.

In food processing operations, energy efficiency opportunities can be gained in the facility itself or in a specific process. Areas of opportunity include lighting, process and shell HVAC , motors and belt drives, compressed air systems, heating and refrigeration systems, and cryonics or system maintenance improvements (*i.e.* eliminating air leaks).

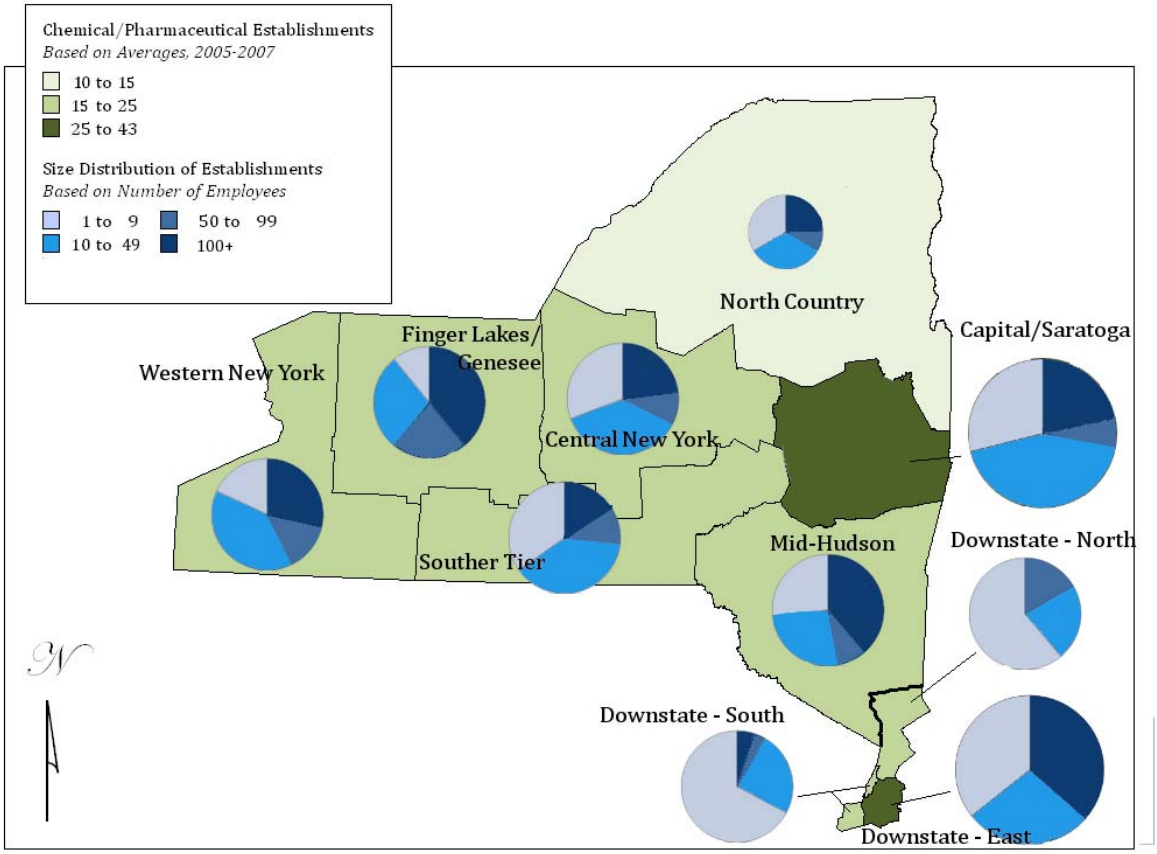
Food processing manufacturers in New York are working fewer production hours, earning more and producing slightly less than their counterparts across the nation. Slightly more than 3.3% of the food processing industry employees working in New York earned 3.4% of the total annual payroll, worked 2.9% of the total production worker hours, producing $5.5 billion (2.7% of US total) in total value of shipments and $3.5 billion total value added (2.9% of US total).

4.3.2 Chemicals and Pharmaceuticals

As can be seen in Figure 8, the Capital/Saratoga and Downstate – East Energy $mart Regions contain the greatest number of chemical/pharmaceutical establishments. In general, however, chemical/pharmaceutical establishments are distributed relatively evenly across the state. Another trend in this industry is the high proportion of larger establishments in the upstate regions, particularly in Western New York and the Finger Lakes/Genesee Region. Establishments in the downstate region tend to be smaller, with 75% having less than 50 employees.

[53] *Food Manufacturing, Food Processing Machinery: Improving Energy Efficiency* http://www.foodmanufacturing.com/Scripts/Products-Food-Processing-Machinery-Improving.asp.

Figure 8. Chemical/Pharmaceutical Manufacturing Establishments

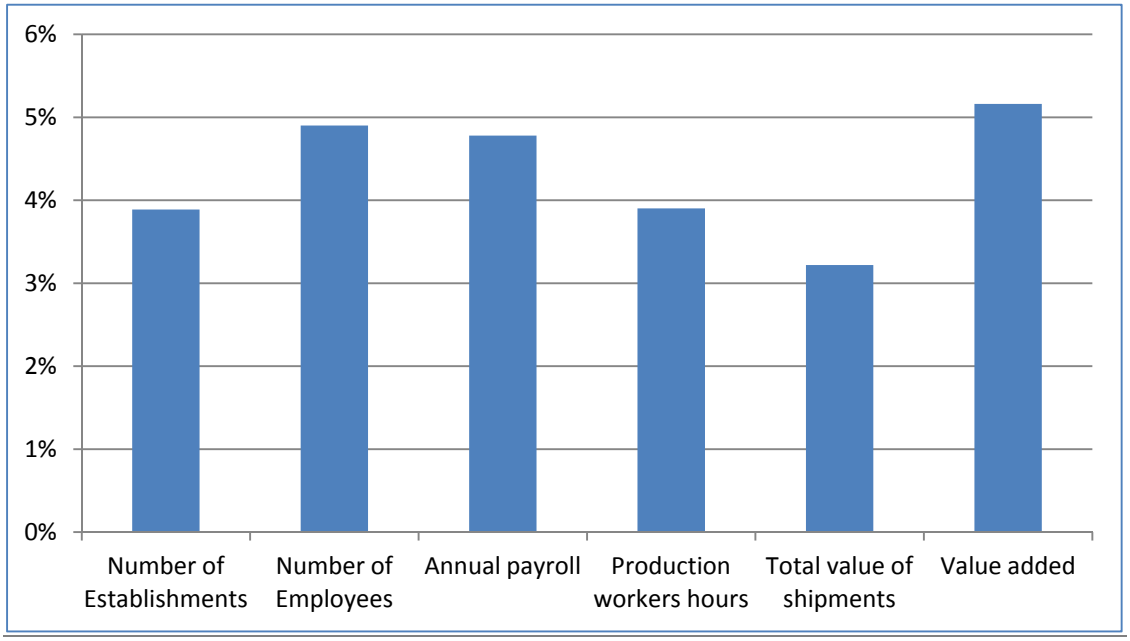


In 2007, New York had the third largest number, over 24,000, of chemical manufacturing facilities in the United States, and market indicators show expansion of regional activity. Next to Massachusetts, New York is the largest producer of plastic in the country.[54] Nearly 4% of all Chemical Manufacturing establishments nationwide are located in New York, with a heavy concentration in the Western part of the State. Chemical manufacturers in the State produce 3.2% of the total value of shipments, nationwide, yet contribute 5% of the total value added nationwide to the products they produce. This means they produce a high quality, specialized product. As seen in Figure 9, nearly 5% of the nation's chemical employees work in the State of New York, earn 4.8% of the total annual payroll, work 3.9% of the total production worker hours nationwide, produce 3.2% of the total value of shipments, or $17.9 billion, and contribute $10.9 billion of value added (5.1%). [55]

[54] Empire State Development, *Materials Processing in NY State white paper*, 2009.

[55] Data from U.S. Census Bureau, *Annual Survey of Manufacturers*, 2008 and *County and Business Patterns* 2007 for number of establishments data.

Figure 9. New York Chemical Manufacturing Measurements vs. National



Data from U.S. Census Bureau, Annual Survey of Manufacturers, 2008 and County and Business Pattern 2007 for number of establishments' data.

The incentive to incorporate energy efficiency, to streamline processes and reduce wasted energy in the chemical and pharmaceutical industries is substantial. According to the Use it or Lose it: Chemical Industry Energy Consumption, 2010 report, "The fundamental laws of physics and thermodynamics make some energy losses unavoidable, but much of this loss is an opportunity to embrace efficient technologies and practices. Every one percent recapture of energy losses saves the chemicals industry over $95 million. Estimates of practical energy savings range from 10 to 20 percent, and if the chemical industry recaptured 10 percent of energy waste, this would represent $1.7 billion."[56]

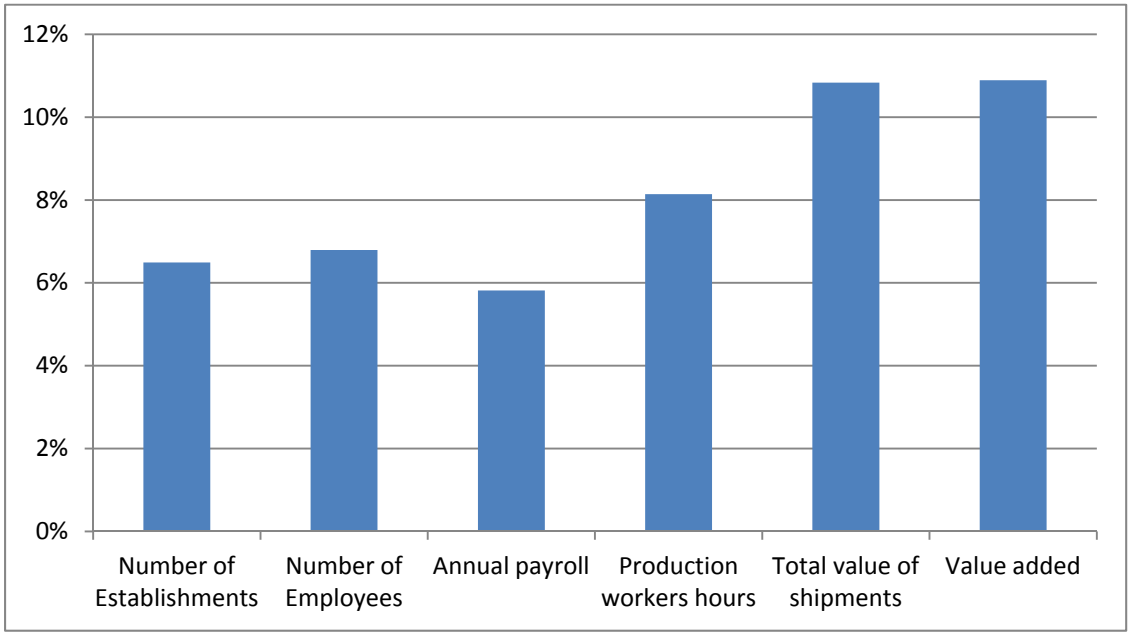
In Chemical Manufacturing, like other industries, energy efficiency opportunities can be made facility wide or within a specific process. Opportunities can include lighting, process and shell HVAC, motors and belt drives, compressed air systems, heating and refrigeration systems, and sterilization or cryonics systems. Further, reconfiguring energy or process systems can also yield energy efficiency benefits. According to the DOE, there is up to 44% indeterminate volume of residual energy after process work is completed that is lost, which could be reapplied to central facility generation. [57]

Like the chemical industry in New York, the pharmaceutical companies also produce high quality and specialized products. As seen in Figure 10, New York is home to more than 6% of the U.S. pharmaceutical companies, where 7% of the industry's employees produce 11% of the industry's total value of shipments, earn 6% of the total annual payroll, work 8% of the Nation's production worker hours, produce a substantial (nearly 11%) $21 billion in total value of shipments and contribute $15.5 billion of value added (also nearly 11%) to its products.

[56] ChemicalProcessing.com, *Use it or Lose it: Chemical Industry Energy Consumption*, 2010, http://www.chemicalprocessing.com/articles/2005/501.html.

[57] Department of Energy Industrial Technologies Program. *Energy Use, Loss, and Opportunities Analysis, U.S. Manufacturing & Mining*. December 2004. http://www.eere.energy.gov/industry/pdfs/energy_opps_analysis.pdf.

Figure 10. NY State Pharmaceutical Manufacturing Measurements vs. National

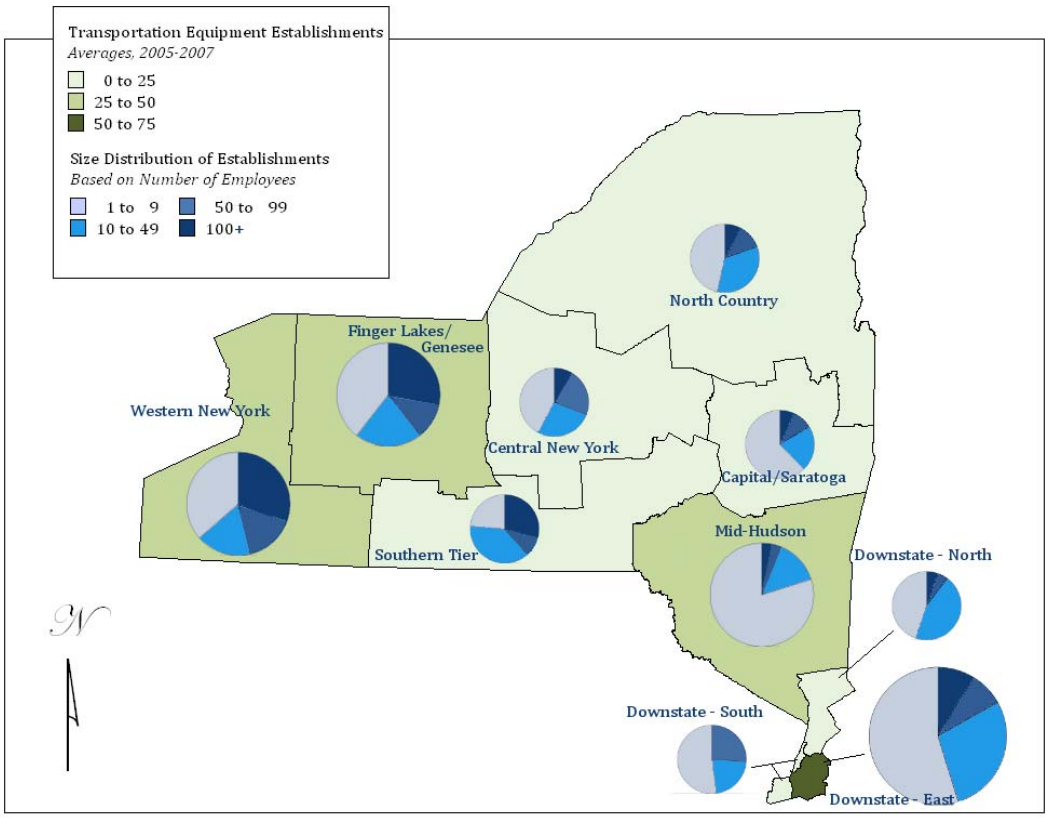


Data from U.S. Census Bureau, Annual Survey of Manufacturers, 2008, and County and Business Pattern 2007 data for number of establishments' data.

4.3.3 Automotive/Transportation Equipment

Figure 11 below shows a high concentration of transportation equipment manufacturing establishments in the Downstate – East Energy $mart Region. Many of these establishments have 50 or more employees. Similarly, almost 40% of these larger establishments are located in Western New York and Finger Lakes/Genesee Regions. The Mid-Hudson Region is also an important center for the manufacturing of Transportation Equipment; though establishments in this area generally consist of fewer employees. Overall, this industry is comprised of relatively large firms (over 25% have 50 or more employees).

Figure 11. Automotive Transportation Equipment Establishments



Since the automotive industry is dependent on the national and international automotive markets, New York automotive manufacturers are subject to volatile and fierce competitive challenges. To remain competitive, manufacturing facilities seek ways to streamline processes and reduce costs. Automotive part manufacturers are primarily located in Buffalo and Rochester in Western New York.

The majority of automotive industry energy demand is met by electricity, with natural gas and other purchased fuels. Energy expenditures comprise approximately 1% of total vehicle production costs. Major end uses of electricity include painting systems (27% to 50%), facility lighting and HVAC (26% to 36%), compressed air (9% to 14%), and welding (9% to 11%). Fuels generate hot water and steam used in paint booths and heat in the curing ovens used to dry paint.[58]

Opportunities for implementing energy efficiency process improvements include general utilities, motor systems, compressed air, heat and steam, lighting and HVAC. Further, The Lawrence Berkeley National Laboratory suggests that implementing an organization-wide energy management program is one of the most successful and cost-effective ways to bring about energy efficiency improvements in this sector.[59]

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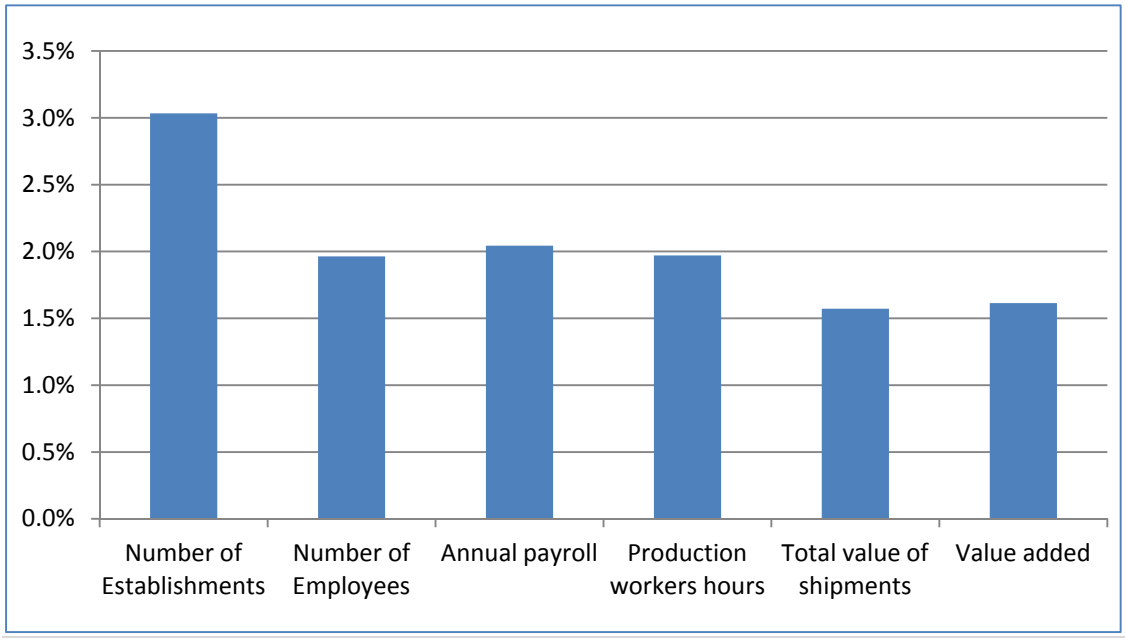
[58] U.S. EPA, *Energy Trends in Selected Manufacturing Sectors: Opportunities and Challenges for Environmentally Preferable Energy Outcomes*, Final Report March 2007**.**

[59] *Lawrence Berkeley National Laboratory Energy Efficiency Improvement and Cost Saving Opportunities for the Vehicle Assembly Industry, An ENERGY STAR Guide for Energy and Plant Managers*, Christina Galitsky and Ernst Worrell Environmental Energy Technologies Division , Sponsored by the U.S. Environmental Protection Agency , March 2008.

As shown in Figure 12, New York is home to slightly more than 3% of the nation's transportation equipment manufacturers. These manufacturers employ less than 2% of the national transportation manufacturing workforce, who earn slightly more than 2% of the industry's payroll and work less than 2% of the industry's hours (i.e., New York is not a major player in this industry when compared to the nation as a whole).

Figure 12. NY State Automotive Transportation Equipment Manufacturing Measurements vs. National



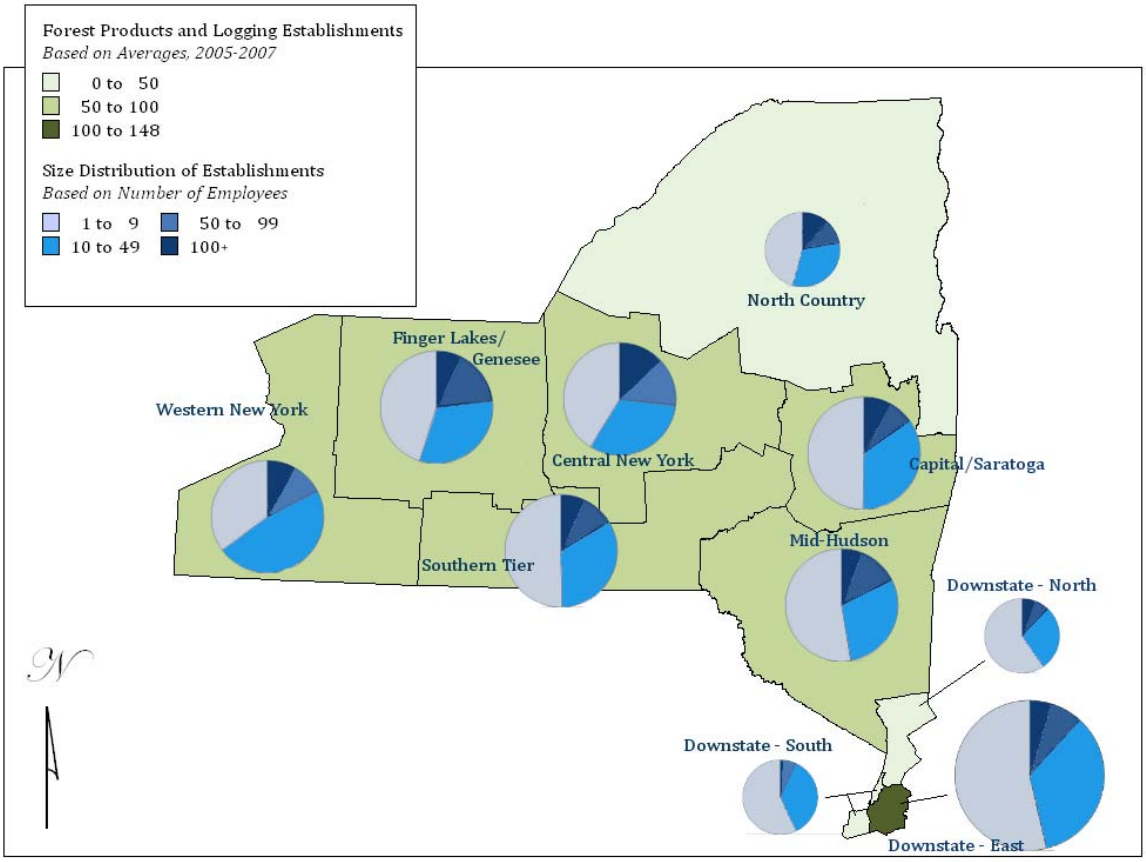
Data from U.S. Census Bureau, Annual Survey of Manufacturers, 2008, and County and Business Pattern 2007 for number of establishments' data.

4.3.4 Forest Products[60]

Figure 13 shows a high concentration of forest products and logging establishments in the Downstate – East Region. The majority, however, of this industry is located in the upstate Energy $mart Regions. The size distribution of forest products and logging establishments is relatively constant across the state, with the Finger Lakes/Genesee and Central New York Regions demonstrating the highest proportions of larger firms. Establishments in the downstate regions tend to be smaller (only 11% have more than 50 employees, compared to 16% in other Energy $mart Regions).

[60] The data sources used to identify establishments in Forest Products industry typically group industry information on forest products processing and logging/timber together even though the individual processes are quite different. Therefore, these processes are presented together in this report.

Figure 13. Forest Product Manufacturing Establishments



The primary economic pressure on the U.S. forest products industry (including papermaking and logging/rough lumber) is from foreign competition, both from historical competitors such as Canada, Scandinavia, and Japan, and from countries with emerging industries such as Brazil, Chile, and Indonesia.[61] Over the past 10 years, Department of Energy, Industrial Technologies Program (DOE/ITP) reports that many forest product companies have been forced to close or idle a large number of mills to reduce costs and remain competitive.

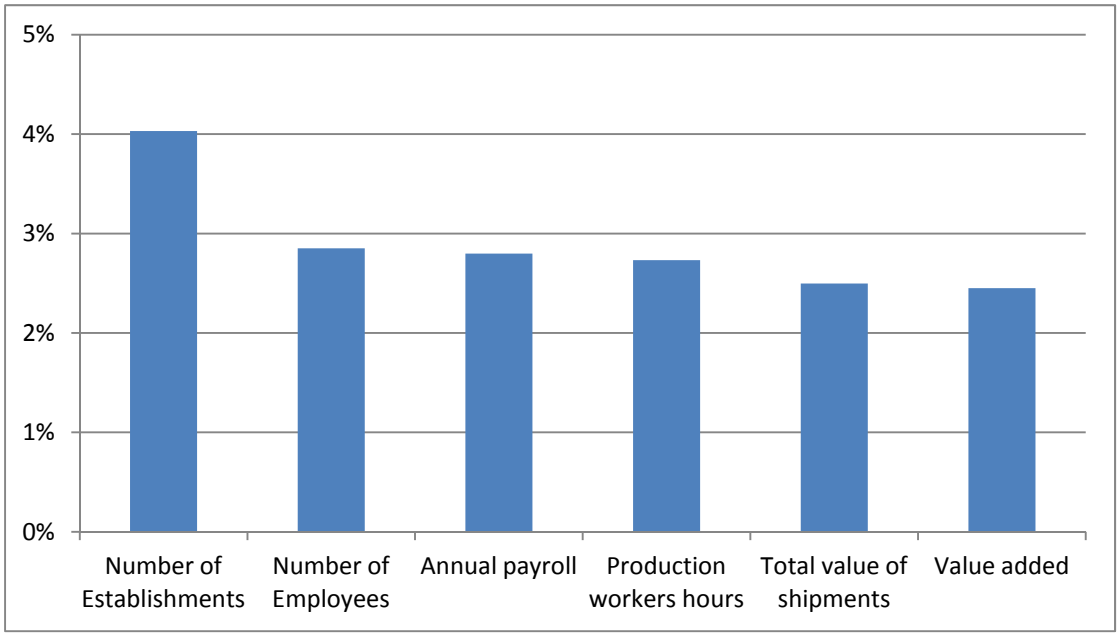
The forest products sector (primarily papermaking as opposed to logging components of this sector), has several unique energy consumption characteristics that distinguish it from other manufacturing sectors. More than half of the sector's energy needs are met with renewable fuels that are byproducts of the manufacturing process. Renewable byproduct fuels are primarily logging and wood processing waste such as bark. The forest products industry is the largest user of wood byproduct fuels. Although somewhat dated, according to an energy data report by the American Forest and Paper Association in 2002, spent pulping liquors (liquid effluent from the digestion of wood during pulping, often used as a processing byproduct fuel) met more than 40% of pulp and paper manufacturing energy needs, and wood waste met around 15%. This statistic remains valid today with respect to the industry's continuing practice of using a significant portion of its own waste products as fuel during its manufacturing process.

[61] *Summary of Forest Products from Energy Trends in Selected Manufacturing Sectors: Forest Products*, http://www.epa.gov/ispd/pdf/energy/ch3-5.pdf.

Another characteristic that distinguishes energy consumption by the forest products industry from that of other manufacturing industries is the extent to which combined heat and power (CHP) applications are used to meet demand for electric and thermal energy. The majority (81%) of the sector's energy requirements are for process heating and cooling systems, particularly those used for drying and evaporation. Due to the substantial energy requirements of the drying stage of the papermaking process, DOE estimates that the largest potential energy savings are from implementation of best available technologies in the paper drying process, and substantial additional potential in connection with liquor evaporation, and pulp digesting processes.[62]

As shown in Figure 14, 4% of the total national forest product manufacturing facilities and nearly 2.5% of forestry and logging facilities are located in New York. New York is a moderate player in this industry, and ranks eighth in the nation in the number of forest product manufacturing establishments. The greatest opportunity for implementing energy efficiency into the forest product manufacturing process would be through drying equipment replacement.

Figure 14. NY State Forest Products Manufacturing Measurements vs. National



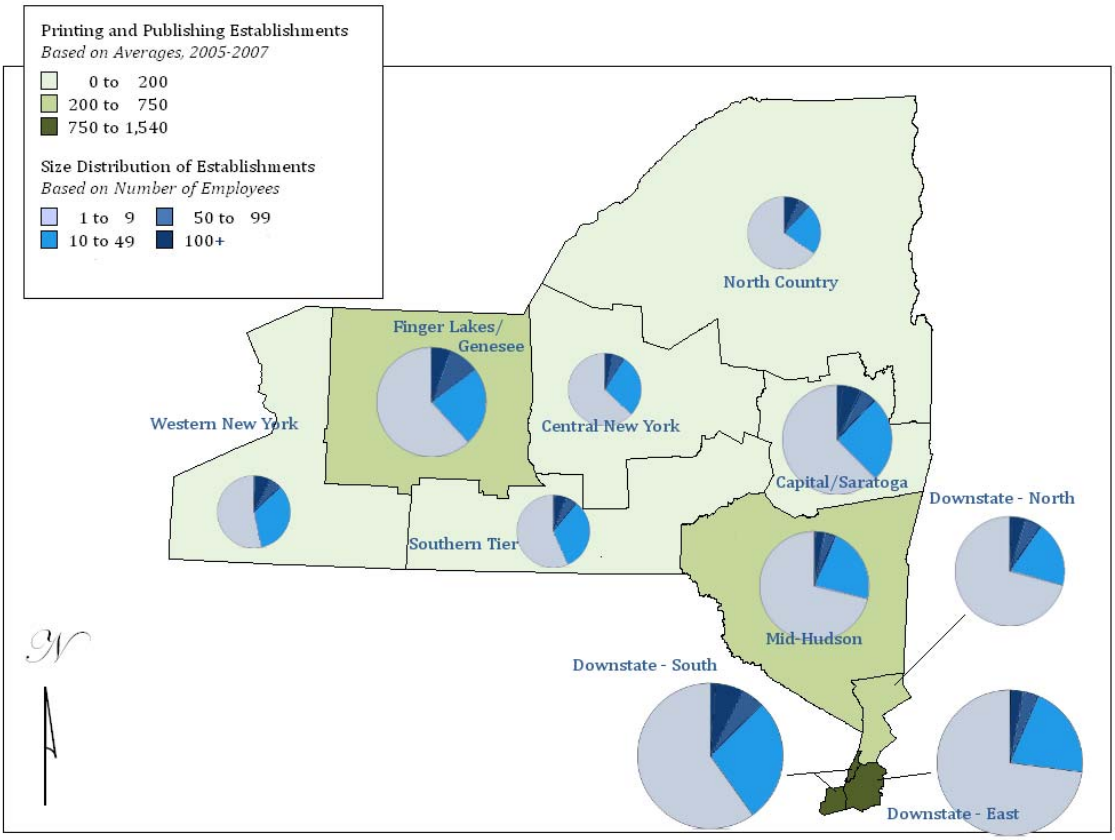
Data from U.S. Census Bureau, Annual Survey of Manufacturers, 2008, and County and Business Pattern 2007 for number of establishments data

4.3.5 Printing and Publishing

Figure 15 shows the size distribution and total number of printing and publishing establishments in New York's Energy $mart Regions. The majority (almost 60%) of this industry is located in the Downstate – South, East and North Regions. The Mid-Hudson and Finger Lakes/Genesee Regions are also important printing and publishing centers, accounting for an additional 10% of the industry in New York. Establishments in both the downstate and upstate regions exhibit similar size distribution trends, closely tracking the statewide average of 10% of firms employing 50 or more employees.

[62] In the DOE bandwidth study, potential energy savings from best-available technology implementation include equipment retrofits and replacement as well as process improvement, and it is not possible to disaggregate the relative potential savings from these opportunities.

Figure 15. Printing and Publishing Establishments



PRINTING

Printing includes commercial printers using lithographic, gravure, flexographic, and screen printing processes. In addition, quick printers, digital printers, business forms printers, book printers, producers of blank books, loose leaf binders, other commercial printers, trade-binders, and firms offering pre-press services are included. [63]

Approximately 6.6% of all the printing establishments nationwide are located in New York (see Figure 16). The types of printing businesses in New York are printers, binders, producers of blank books and loose-leaf binders, and prepress service firms. Two areas of the state show a significantly greater concentration of employment than the nation as a whole, the Capital Region and the Southern Tier. [64] Many of the largest New York City printers provide services to the financial services industry, with approximately 52% of printing establishments located downstate, 19% in eastern NY and 29% in the western part of the state.[65]

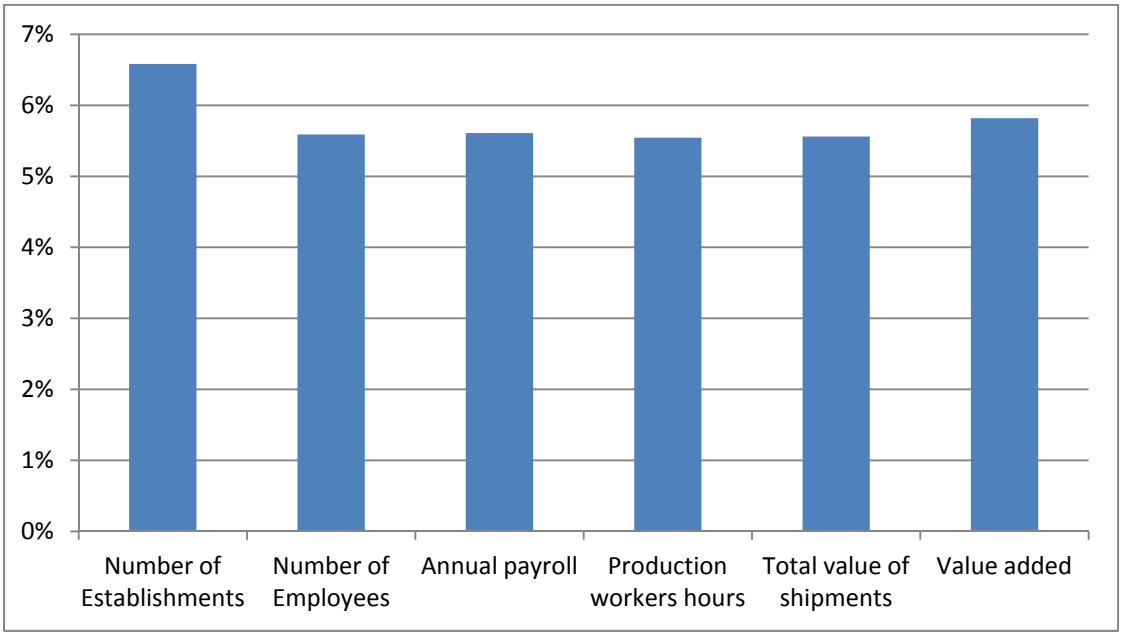
[63] Empire State Development, *Communications and Media White Paper, Summary of Printing and Publishing Industries*, 2005.

[64] Empire State Development, *Communications and Media White Paper*, 2005.

[65] Empire State Development, *Communications and Media White Paper*, 2005.

Energy, mainly electricity, is used in all stages of the printing and publishing process for workspace lights, running printing presses, IT, air conditioning (including air compressors and air exhaust units for air purification particularly for the after burners) and water heating. Efficiencies in this industry can be gained through building envelope improvements in lighting, insulation and HVAC, and also process specific improvements; for example, connecting the vapor extraction air purification to the printing press operation so it is used as needed, and does not run continuously.

Figure 16. New York Printing Measurements vs. National



Data from U.S. Census Bureau, County Business Patterns, 2008

PUBLISHING

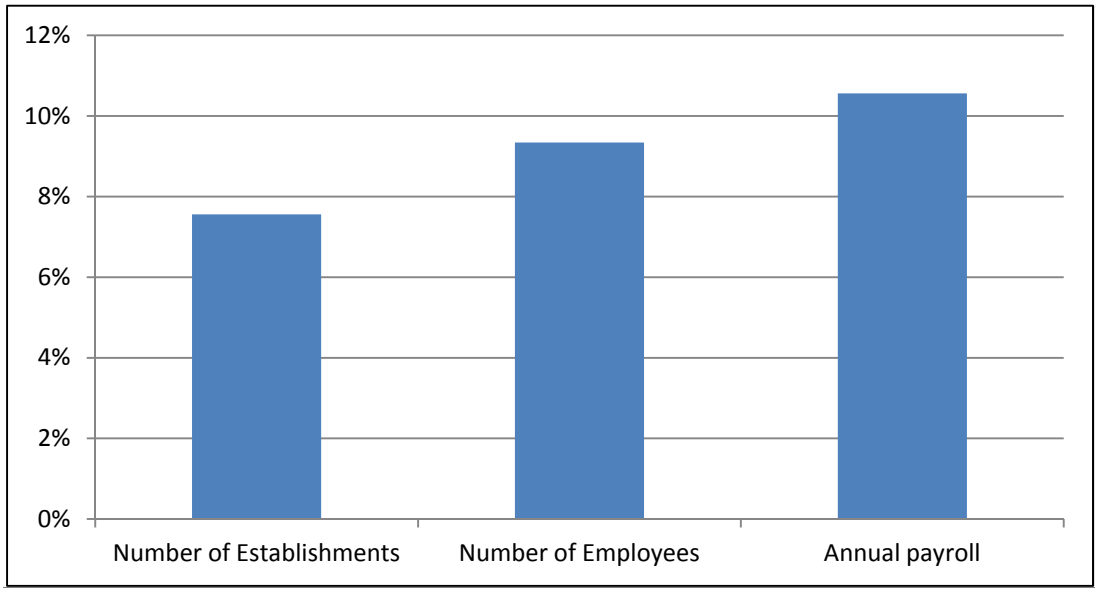
Publishing refers to the stages of the development, acquisition, copyediting, graphic design, production – printing (and its electronic equivalents), and marketing and distribution of newspapers, magazines, books, literary works, musical works, software and other works dealing with information, including the electronic media.[66]

As shown in Figure 17, the Publishing industry is highly concentrated in New York, with nearly 8% of the nationwide establishments and over 9% of all industry employees located in New York. Five Energy $mart Regions show significant concentrations of employment in publishing (Capital Region, Long Island, Mid-Hudson, New York City and the North Country) although the number of paid employees in this industry has been decreasing in the State (by 2.8% between 2005 and 2008).[67]

[66] www.wikipedia.com. Publishing.

[67] Empire Development Corporation, *White Paper on The Communication and Media Service Industry*, 2005.

Figure 17. NY State Publishing Measurements vs. National



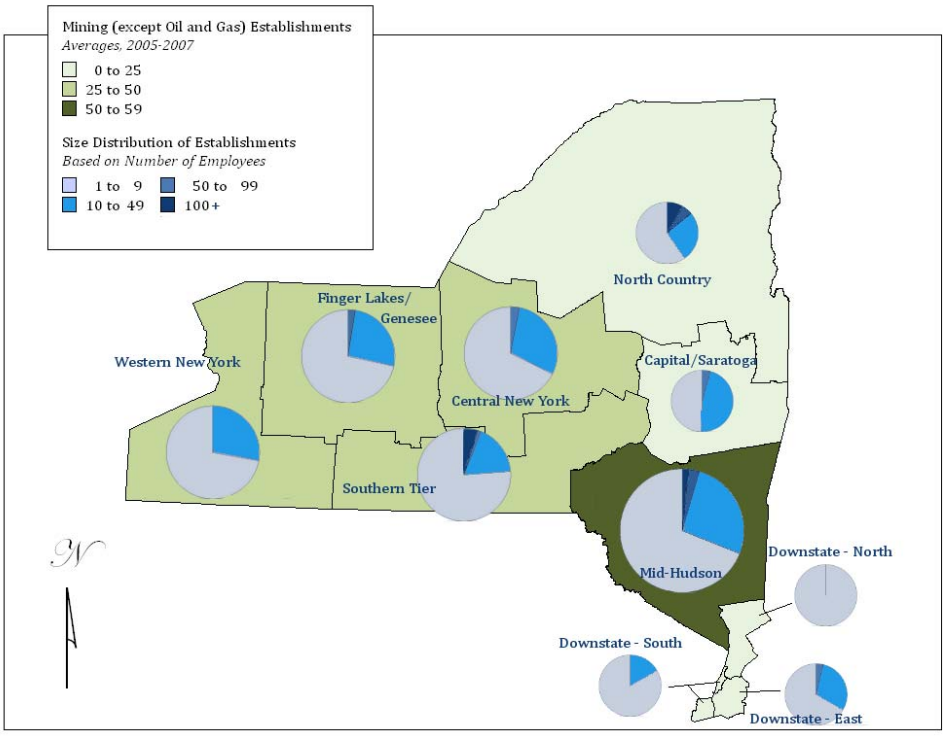
Data from U.S. Census Bureau, County Business Patterns, 2008.

4.3.6 Mining and Minerals Processing

Figure 18 shows the size distribution and total number of mining establishments (except oil and gas[68]) in each Energy $mart Region. This industry is more prevalent in the upstate regions, with only 5% located in the downstate Energy $mart Regions. The Mid-Hudson Region contains the largest number of establishments, while across the central and western areas of the state the industry is generally evenly distributed. Non-oil and non-gas mining establishments tend to be small relative to other Industrial and Process Efficiency Program-targeted industries: only 5% of statewide establishments have 50 or more employees.

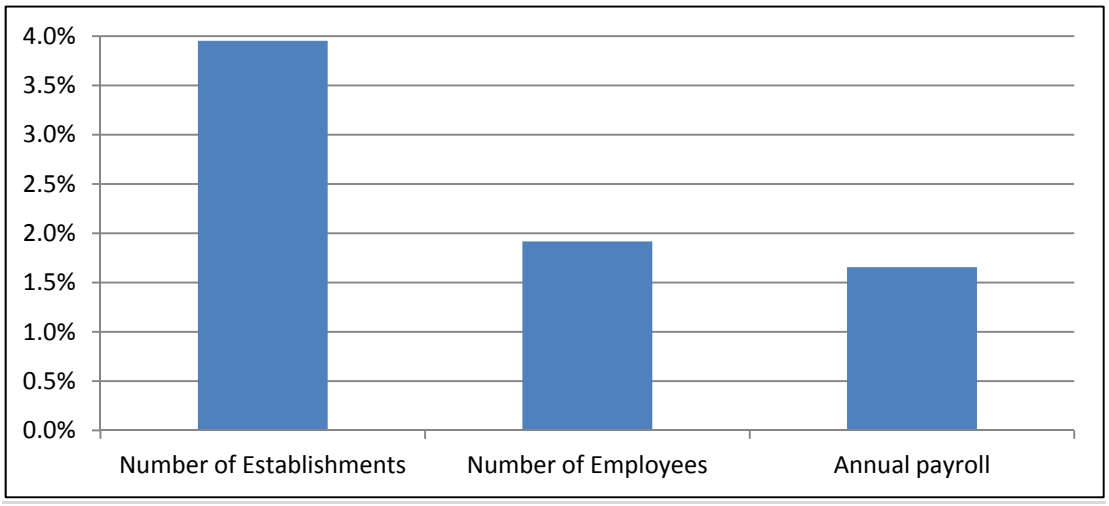
[68] Oil and gas were excluded from this description of mining establishments because, at the time of this study's market characterization activities, oil and gas mining was not part of the program's targeted market sectors.

Figure 18. Mining Establishments



There are approximately 2,166 active mines located in New York. These mines produce $1.3 billion in production value, and generate annual regulatory fees of $2,837,900.[69] As seen in Figure 19, nearly 4% of the mines nationwide are located in New York, employing close to 2% of the mining workforce.

Figure 19. NY State Mining Measurements vs. National



Data from U.S. Census Bureau, County Business Patterns, 2008.

[69] NYS DEC - Division of Mineral Resources, *New York State Oil, Gas and Mineral Resources*, 2008.

According to the U.S. Geological Survey (USGS), crushed stone is New York's leading non-fuel mineral, followed by Portland and masonry cement. These, along with salt, construction sand and gravel, zinc and wollastonite, account for 97% of New York's nonfuel mineral production.[70] New York is the only producer of wollastonite, which is used in heat-resistant ceramics and as filler for paints; however, there is speculation that there is potential depletion of the two New York wollastonite mines within 20 years. The possibility of expanding mining operations to nearby New York State Forest lands is currently prohibited by the State Constitution.

New York is the top producer across the nation of industrial garnet, and ranks third in production (nationwide) of salt and peat, fourth in talc and zinc, ninth in dimension stone, and tenth in clay.[71] Other important minerals mined in New York include bluestone, sandstone, granite, shale and slate, lead, natural gas, and silver.[72] The demand for bluestone, a particular type of commercial sandstone, has increased dramatically since 2002 – creating a niche mining industry in the Catskills. As recently as 2008, New York and Pennsylvania were the only sources of bluestone in the country (from 83 mines).[73]

There are two main activities in the mining and mineral processing industry; product preparation and waste stream reduction. Product preparation cleans, separates and prepares coal, metals and non-metallic minerals from mined material and produces marketable products. Waste stream reduction processes and produces usable and saleable products, in a manner that minimizes air, dust and water emissions, and slurry and other solid waste materials.

The most energy intensive process in mining and mineral processing is rock crushing and grinding. This process also produces hazardous material which needs to be handled carefully. Energy efficient opportunities in this industry include improving motor systems, pump systems, steam systems, compressed air systems and ventilation systems. Many mines and mineral processing plants, either due to age or historical construction, are not optimized for energy efficiency or could offer great opportunities for energy efficiency.[74]

4.3.7 Water/Wastewater Treatment

Figure 20 shows the size distribution and total number of Water and Wastewater Treatment establishments in each Energy $mart Region. The Mid-Hudson Region contains the greatest number of establishments, accounting for nearly 28% of the industry statewide. The Downstate – East and North Regions contain the second and third greatest number of establishments, respectively. This industry is generally comprised of smaller firms, as only 3.5% statewide have 50 or more employees.

[70] Based on 2008 USGS data.

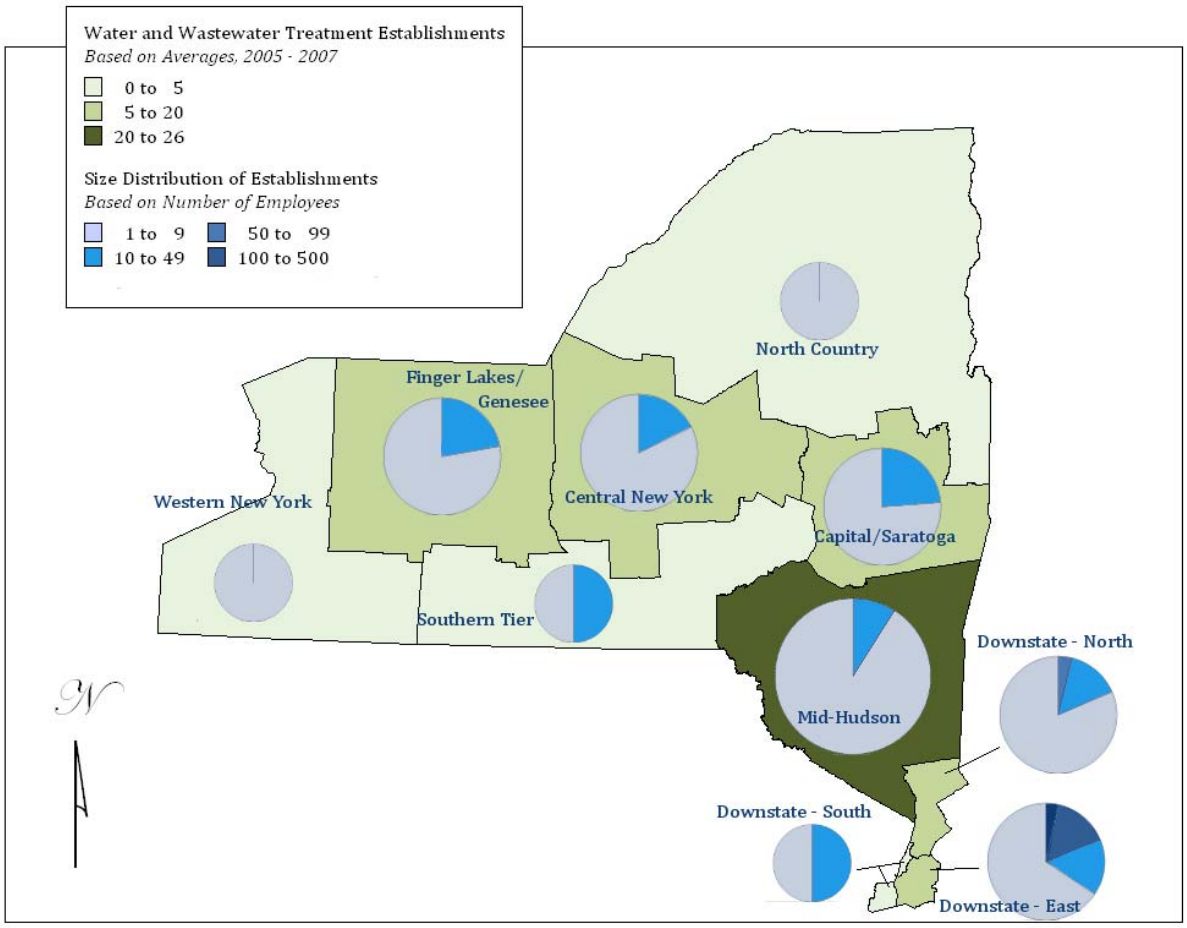
[71] NYS DEC - Division of Mineral Resources, *New York State Oil, Gas and Mineral Resources*, 2008.

[72] Netstate, New York Economy, Agriculture, September 2009, www.netstate.com/economy/ny_economy.htm.

[73] NYS DEC - Division of Mineral Resources, *New York State Oil, Gas and Mineral Resources*, 2008.

[74] National Mining Association in conjunction with the US Department of Energy, Office of Energy Efficiency and Renewable Energy, Office of Industrial Technologies, *Mining Industry of the Future*, 2000.

Figure 20. Water/Wastewater Treatment Facilities



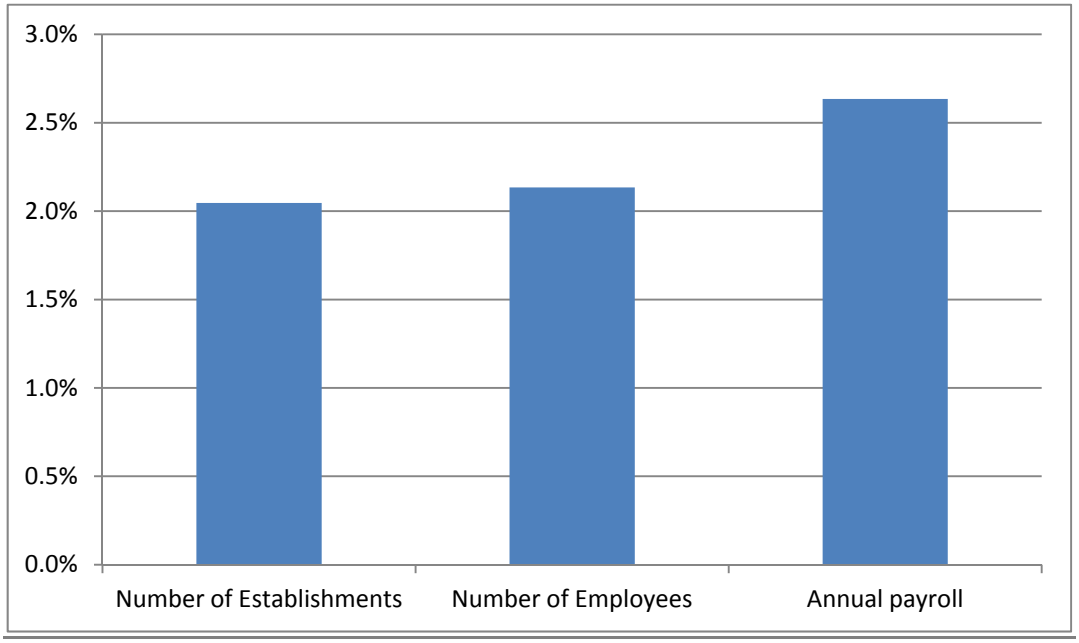
There are approximately 610 publicly owned and operated wastewater treatment facilities in New York. As seen in Figure 21, this represents slightly more than 2% of the Nation's wastewater treatment facilities, serving 1,610 municipalities, including over 22,000 miles of sewer pipe, of which more than 60% are functioning beyond their 30 year useful life.[75] The size of the wastewater systems in New York vary dramatically. The largest system in the state is located in New York City, which processes 1.3 billion gallons of wastewater through 14 facilities. Smaller systems, which process less than 10,000 gallons of wastewater, are located in villages throughout the state.

In addition, there are approximately 160 privately-owned wastewater treatment facilities in Suffolk County alone serving apartment and condo complexes. There are an additional seventy (70) private wastewater treatment facilities located elsewhere across the State.[76] All of these facilities have the same maintenance, repair and replacement needs as the publicly owned and operated facilities.

[75] dec.ny.gov/docs/water, *Wastewater Infrastructure Needs of New York State*, March 2008.

[76] Ibid.

Figure 21. NY State Water/Water Treatment Measurements vs. National



Data from U.S. Census Bureau, County Business Patterns, 2008.

There are two major components of a wastewater treatment system: the collection component (including piping and pumping the wastewater to the treatment facility), and the treatment facility itself. Also, all facilities have at least one secondary treatment process which operates continuously and uses considerable energy.[77] According to the American Water Works Association Research Foundation, on average, wastewater treatment facilities spend 7% of their operating budget on energy. Regardless of the size of the treatment system, the breakdown of energy end-uses within these facilities remains consistent.

Even though a significant number of treatment systems need upgrading, according to the American Society of Civil Engineers 2005 Report Card, fewer than 40% of the systems have plans for capital improvements. Thus, the opportunity for equipment upgrades and efficiency improvements exists in the water/wastewater treatment industry, and it would benefit from participation in the Industrial and Process Efficiency Program. It is estimated that the cost of capital improvement projects per facility is close to $3 million, and the increased standards for operation and quality of treated water impose burdens on systems that are already working at capacity and beyond their designed lives.[78]

Energy efficiency improvements to water and wastewater treatment facilities are often economically attractive because these facilities typically see shorter paybacks on energy efficiency projects than in other industries due to their longer hours of operation. Also, these facilities are necessary public infrastructure and, therefore, have stable financial commitment for long-term viability; they cannot close or move to another community or country as can happen more typically in private industry. [79] The energy efficiency opportunities and potential energy savings varies depending on the type of treatment and delivery system in use, its age, the condition of equipment in use and the capital available to implement

[77] Ibid.

[78] dec.ny.gov/docs/water, *Wastewater Infrastructure Needs of New York State*, March 2008.

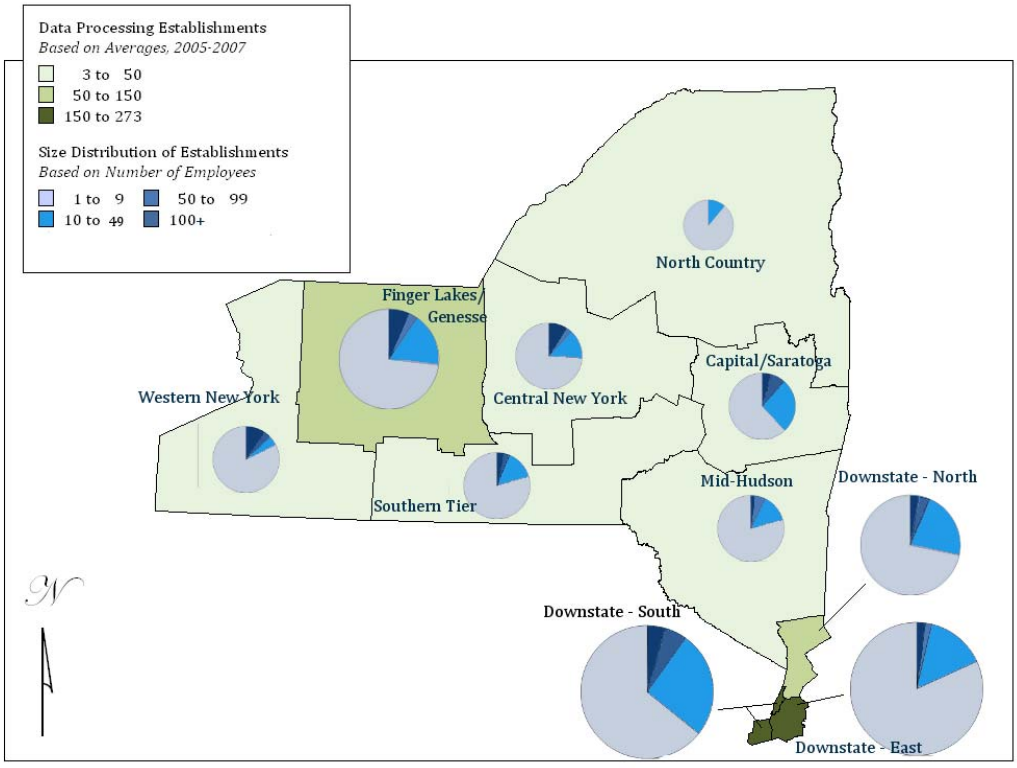
[79] Ibid.

major changes. Typical efficiency improvement opportunities include installing high efficiency motors, variable speed technologies, and integration of efficient pumping systems and procedures. [80]

4.3.8 Data Centers/Network Storage

Figure 22 shows that data center establishments exhibit a strong spatial trend, with high concentrations in the downstate Energy $mart Regions. Over 56% of all data processing establishments in New York are located in the Downstate – North, South and East Regions. Data processing establishments generally hire fewer employees relative to other Industrial and Process Efficiency Industries, as over 70% are comprised of less than 10 employees.

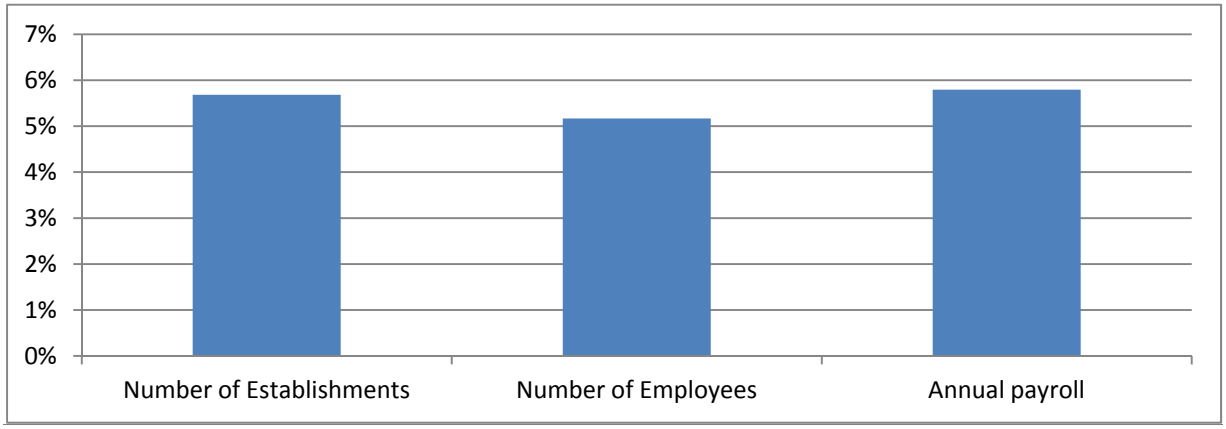
Figure 22. Data Processing Establishments



New York has the second largest number of off-site data center facilities in the country (nearly 6% of the Nation's total number – see Figure 23). The growth of the data network storage industry exceeds 100% annually, and given the increasing demand within all businesses to store information, this growth trend will likely continue in New York and across the country.

[80] Science Applications International Corporation, (SAIC), *Water and Wastewater Energy Best Practice Guidebook*, December 2006.

Figure 23. New York Data Network Storage Measurements vs. National



Data from U.S. Census Bureau, County Business Patterns, 2008.

The capacity of data network storage entities is typically updated every three years, to accommodate the service needs of its customers. Updates to facilities are done routinely as well, which provides an opportunity for NYSERDA to position itself in a leadership role by marketing the Industrial and Process Efficiency Program and explaining its energy efficiency benefits, and promoting it as a way to meet the energy efficient expansion needs of this market sector. One trend in this market is to consolidate data center needs with other businesses to reduce the overhead costs and gain efficiencies in energy usage – this trend is called virtualization. The energy savings gained from server and storage virtualization and consolidation can be maximized if data center managers adjust their power and cooling infrastructure to accommodate the reduced loads.[81]

The results of an annual study conducted by Digital Realty Trust, Inc, of senior decision-makers at large corporations in North America who are responsible for shaping their companies' data center strategies revealed a number of interesting findings, including:[82]

- 83% of respondents are planning data center expansions in the next 12 to 24 months;
- 36% of respondents have definite plans to make those expansions during the current year;
- 73% of respondents plan to add two or more facilities as part of their data center expansions;
- The need for additional power is the top reason for data center expansions, rising from fifth place reason on last year's survey to first place this year;
- Data center and IT budgets are both projected to increase by 8% in the current year, up from 7% and 6%, respectively, from the previous year;
- Of those planning to expand, 70% are planning large projects of at least 15,000 square feet in size or 2 MW or greater of power; and
- 83% of respondents with definite plans to expand in the current year, plan to do so with a partner that specializes in data center design and construction or data center leasing.

[81] Thegreengrid.org, *The Effects of Virtualization on Data Center Physical Infrastructure.* 2/4/2010.

[82] Bizjournal.com, Press Release: Digital Realty Trust, Inc., *"Study of U.S. Data Center Industry Indicates Widespread Expansion of Data Center Facilities Will Continue in 2010 and 2011."* March 3, 2010.

According to Chris Crosby, Senior Vice President of Corporate Development for Digital Realty Trust, "One of the most interesting pieces of data in this study is the lead role that power is now playing in these expansions. The need for additional power has become the main driver for data center expansion plans as companies seek facilities with adequate power and favorable utility rates to control operating costs."[83] Data centers are energy-intensive buildings and are growing at a rapid pace, consuming 10 to 100 times more energy per square foot than a typical office building. In 2006, for example, data centers used more than 60 billion kilowatt-hours, a number that some industry experts expect will increase to 100 billion kilowatt-hours by 2011.[84]

The study also examined data center energy efficiency initiatives:

- 76% of respondents now meter their power use;
- The number of companies that meter power down to the PDU (Power Distribution Unit) level increased by 29% over last year;
- 75% of companies are confident they can comply with future carbon emissions-related and energy-related regulations;
- The average reported power usage effectiveness (PUE) [85] energy efficiency rating for respondents' data centers is 2.9 (relative PUE ratings are discussed in further detail below); and
- One in six respondents report an improved PUE rating of less than 2.0 for their facilities (the lower the PUE, the better the rating)

The Green Grid[86] has defined a PUE rating of 1.0 equivalent to a 100% efficient facility. A study by Lawrence Berkeley National Labs, "Best Practices for Data Centers: Lessons Learned from Benchmarking 22 Data Centers," found that the data centers it studied had a PUE range of 1.3 to 3.0. According to The Uptime Institute, an industry provider of vendor-neutral, research-based information on high-density enterprise computing, the typical data center has an average PUE of 2.5.[87] The Uptime Institute suggests that if data center facilities incorporated the most efficient technologies and used the most efficient equipment available, most facilities could achieve a PUE rating of 1.6, the industry best practice standard. However, it is better if PUE ratings are reported as a range and the average calculated over a period of time due to loads changing as equipment gets turned off and on.[88]

There has been significant progress over the past two to three years in the area of data center energy efficiency. According to the Digital Reality Trust survey, over the past two years, the data center industry has gone from power metering being the exception to power metering being utilized by more than three quarters of respondents. Awareness of PUE is also nearly universal now, with 96% of companies familiar with the emerging standard for measuring energy efficiency. The awareness and importance of energy efficiency, coupled with the growth in this industry makes data centers a significant industry to target.

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[83] Bizjournal.com, Press Release: Digital Realty Trust, Inc., *Study of U.S. Data Center Industry Indicates Widespread Expansion of Data Center Facilities Will Continue in 2010 and 2011*. March 3, 2010.

[84] Mark Szalkus, GE Digital Energy - Power Quality, *What is Power Usage Effectiveness?, A quick lesson on analyzing the energy efficiency level of a data center*, Dec 1, 2008 12:00 PM.

[85] PUE is a measure of a facility's total power delivered divided by its IT equipment power usage level, power usage effectiveness (PUE) is especially important in data centers.

[86] The Green Grid, thegreengrid.org, is a worldwide organization which establishes best practice standards and hosts information forums on topics of importance relating to Data Centers.

[87] Mark Szalkus, GE Digital Energy - Power Quality, *What is Power Usage Effectiveness?, A quick lesson on analyzing the energy efficiency level of a data center*, Dec 1, 2008 12:00 PM.

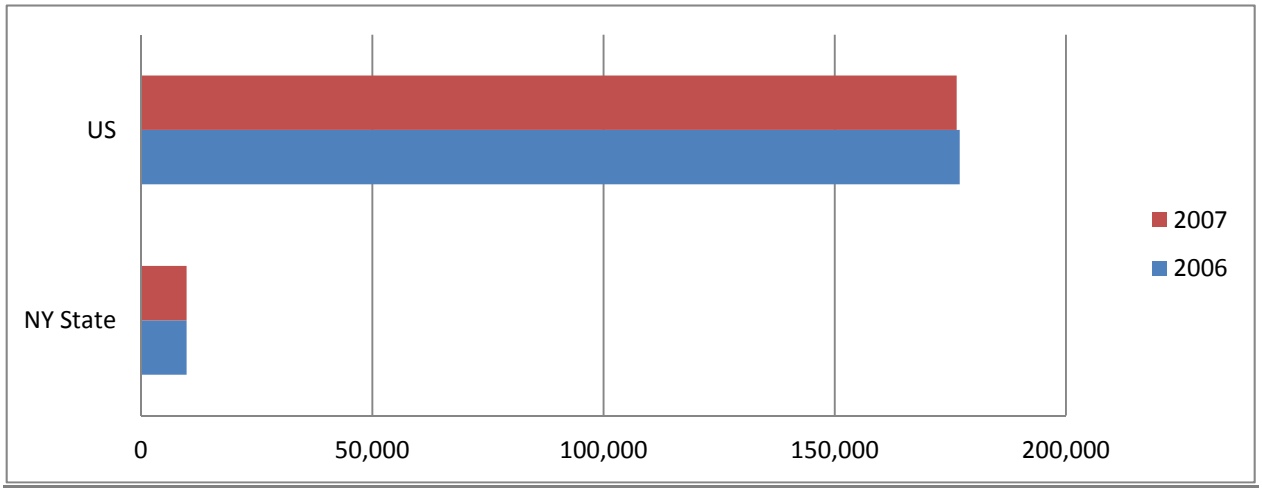
[88] Ibid.

4.4 INDUSTRIAL AND PROCESS EFFICIENCY-TARGETED INDUSTRIES – TRENDS AND DETAILS

NYSERDA's Industrial and Process Efficiency Program provides opportunities for targeted industries in New York to earn incentives, on a per unit produced/computed basis, when new energy efficient technologies are incorporated into facility processes not specifically addressed by other existing NYSERDA programs. As seen in Figure 24, the total number of Industrial and Process Efficiency industry-targeted establishments located in New York decreased 0.04% from 2006 to 2007.[89] This decline is quite small and follows the trend (but to an even lesser extent) of the national market which declined 0.45% during the same period.

Although not shown in the Figure, looking at the raw data for specific Program-targeted industries, from 2006 to 2007, the decline in number of targeted industry establishments ranged from 0.17% (for chemical manufacturing) to 20% (motor vehicle manufacturing). However, during this same period, several sectors experienced growth in the number of establishments; including food manufacturing (1.7%), water supply and irrigation systems (5.26%), and sewage treatment facilities (5.8%). The number of data center establishments experienced substantially greater increase during this same period (13-20% compound annual growth rate). [90]

Figure 24. Number of Establishments in Program Target Markets, NY vs. US, 2006-2007



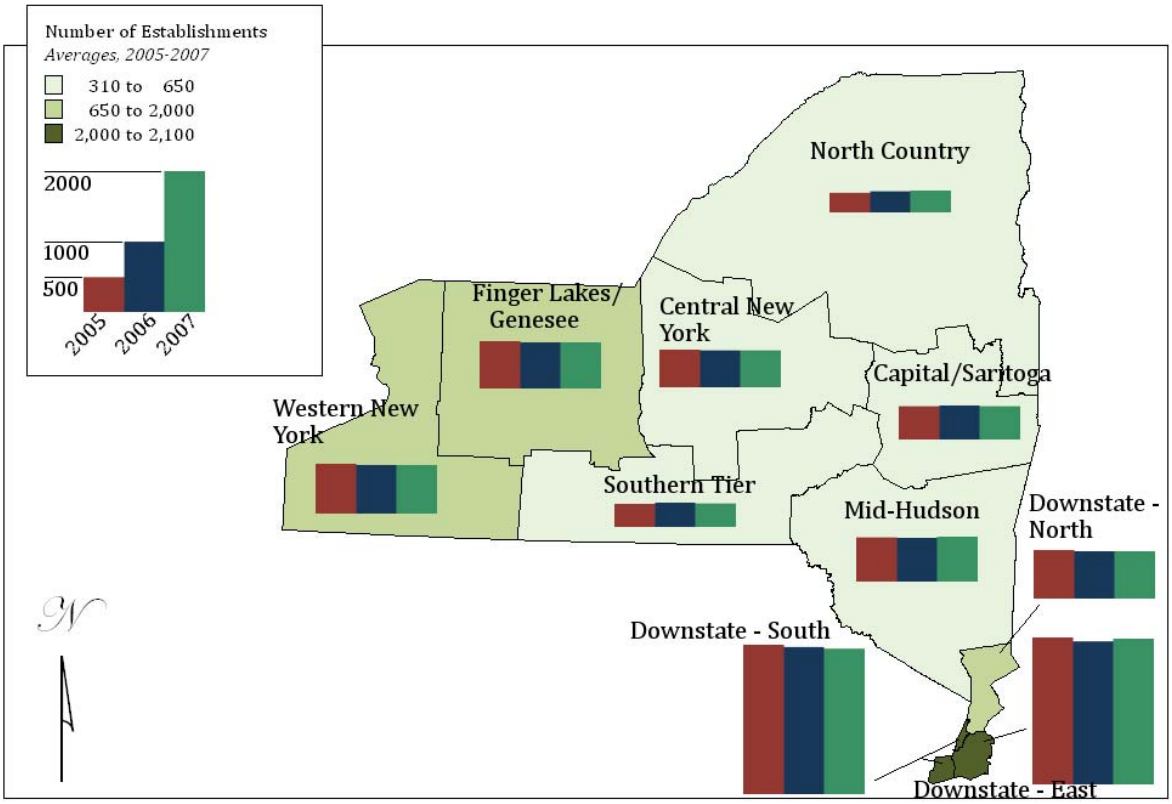
Data from U.S. Census Bureau, County Business Patterns, 2005-2007 (2006 to 2007 data only)

Figure 25 shows the total number of establishments and recent trends in each Energy $mart Region. Between 2005 and 2007, the number of industrial facilities remained stable, exhibiting little change during the three year period. This map also highlights the high concentration of Industrial and Process Efficiency industries in the downstate region. Though the three downstate Energy $mart Regions are geographically the smallest, together they comprise over 56% of the state's Industrial and Process Efficiency Industries.

[89] U.S. Census Data, *County Business Patterns for New York*, 2005 to 2007 (Only 2006-2007 period data used).

[90] Wong, Henry. March 2007. *Personal Communication:* EPA Datacenter Study IT Equipment Feedback Summary. Intel Digital Enterprise Group.

Figure 25. Number of New York Establishments[91]



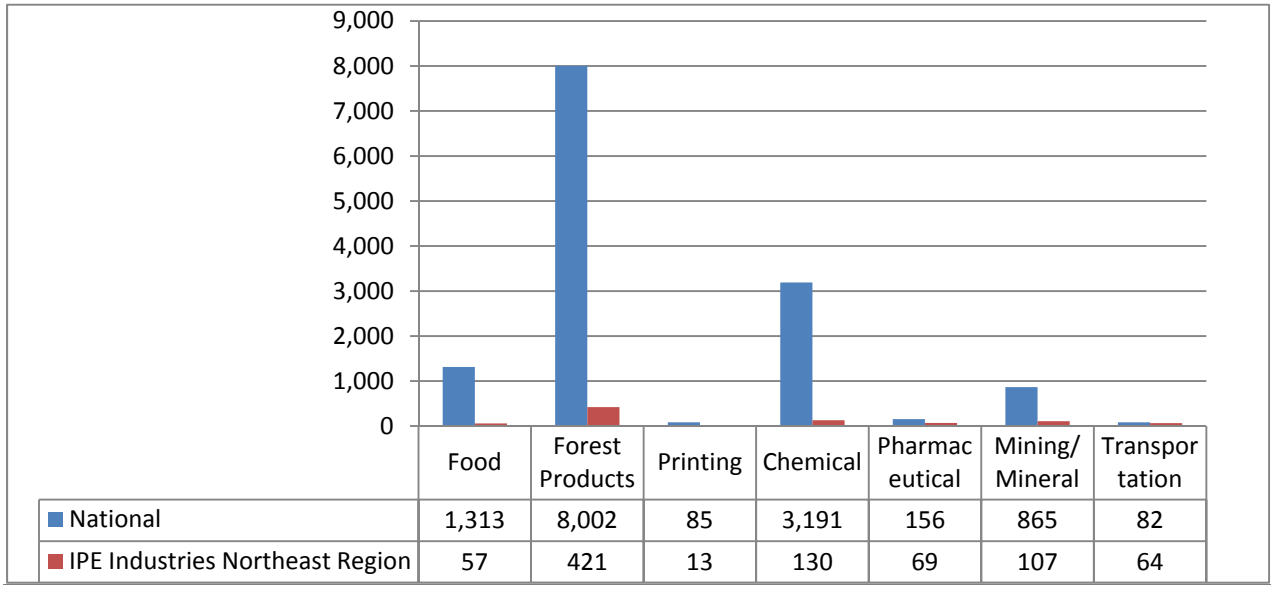
The remainder of this section presents more detailed comparisons of Industrial and Process Efficiency-targeted industries vs. national or regional industry statistics in terms of fuel consumption, number of employees, total value added (and value of shipments), capital expenditures, and production efficiency (energy intensity and lean manufacturing/supply chain management).

4.4.1 Fuel Consumption

Manufacturing industry fuel consumption was reported as part of the 2006 MECS survey for industries in the northeast region and nationally. As shown in Figure 26, the Forest Products industry is the largest fuel consumption industry in the nation. The seven Industrial and Process Efficiency-targeted manufacturing industries shown in this figure represent 6.3% of all fuel consumed for those same industries nationwide, even though in 2006 the Northeast had the highest regional energy prices in the nation. Assistance through NYSERDA's Industrial and Process Efficiency Program will be increasingly helpful for targeted industries to identify and implement process efficiency improvements that will reduce their overall energy and fuel consumption-related operating costs.

[91] The bars in this Figure are showing two things: 1) colors show 2005, 2006 and 2007 changes, and height represents the relative number of establishments (500 or less, between 500 and 1,000 and between 1,000 and 2,000). Combined, one can see the general number in each region and the trend of the period 2005-2007.

Figure 26. Manufacturing Industry Fuel Consumption, National vs. Northeast Region, 2006 (TBtu)[92]

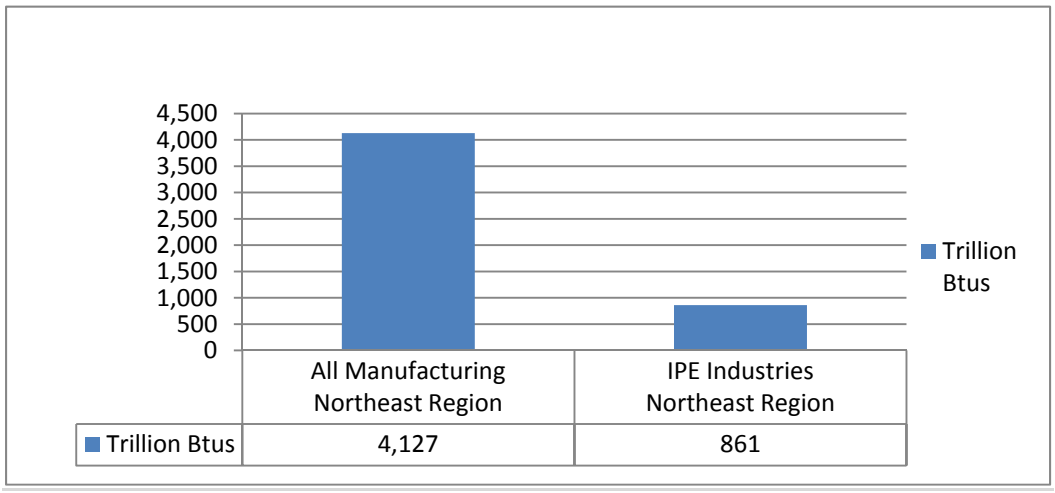


	Food	Forest Products	Printing	Chemical	Pharmaceutical	Mining/ Mineral	Transportation
National	1,313	8,002	85	3,191	156	865	82
IPE Industries Northeast Region	57	421	13	130	69	107	64

Source: MECS Fuel Consumption 2006, National and Regional Data

As seen in Figure 27, within the Northeast Region, Industrial and Process Efficiency-targeted industries account for nearly 21% (861 TBtu) of fuel consumed among all manufacturing industries (4,127 TBtu).

Figure 27. Manufacturing Industry vs. Program Target Industries, Northeast Region Fuel Consumption[93]



	All Manufacturing Northeast Region	IPE Industries Northeast Region
Trillion Btus	4,127	861

Source: MECS Fuel Consumption 2006, National and Regional Data.

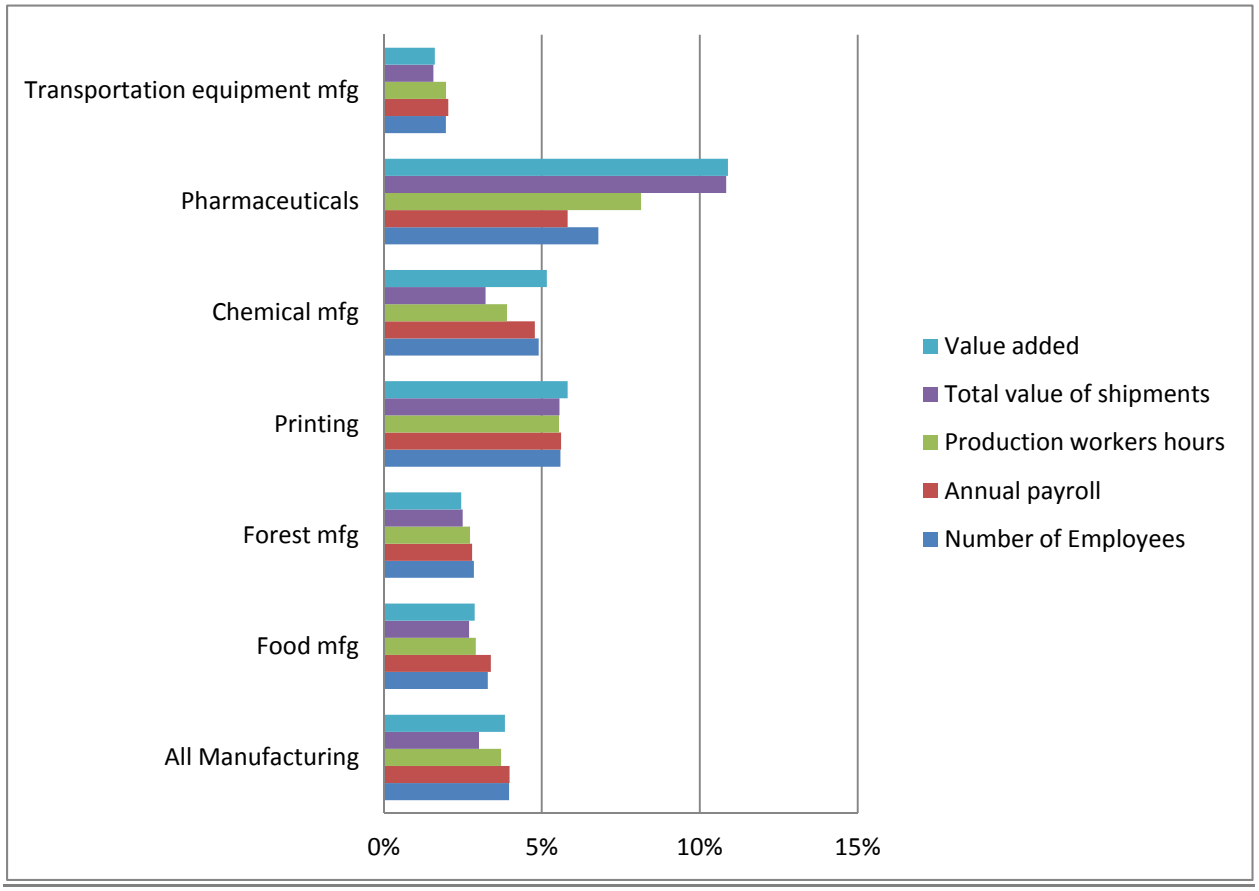
[92] DOE, Industrial Technologies Program, Energy Efficiency as a Resource: Northeast Region, December 2009, and MECS 2006 Report. The Northeast Region includes manufacturing fuel consumption data for Maine, Vermont, New Hampshire, Massachusetts, Connecticut, Rhode Island, New York, New Jersey, and Pennsylvania.

[93] The Northeast Region includes manufacturing fuel consumption data for Maine, Vermont, New Hampshire, Massachusetts, Connecticut, Rhode Island, New York, New Jersey, and Pennsylvania.

4.4.2 Number of Employees, Annual Payroll, Value Added and Value of Shipments

Figure 28 compares value added, total value of shipments, annual payroll, number of employees, and amount of capital expenditure for the manufacturing industry in the State of New York based on the latest available data. As seen in this figure, among all Industrial and Process Efficiency industries, the Pharmaceutical and Medicine Manufacturing industry has the greatest total value of shipments and value added. Additionally, 11% of the total national shipments were produced by 7% of the total industry employees located in New York. A listing of the largest six firms within each of these Industrial and Process Efficiency-targeted industry areas is presented in Appendix E.

Figure 28. Industries in NY State as a Percent of National Totals, 2008

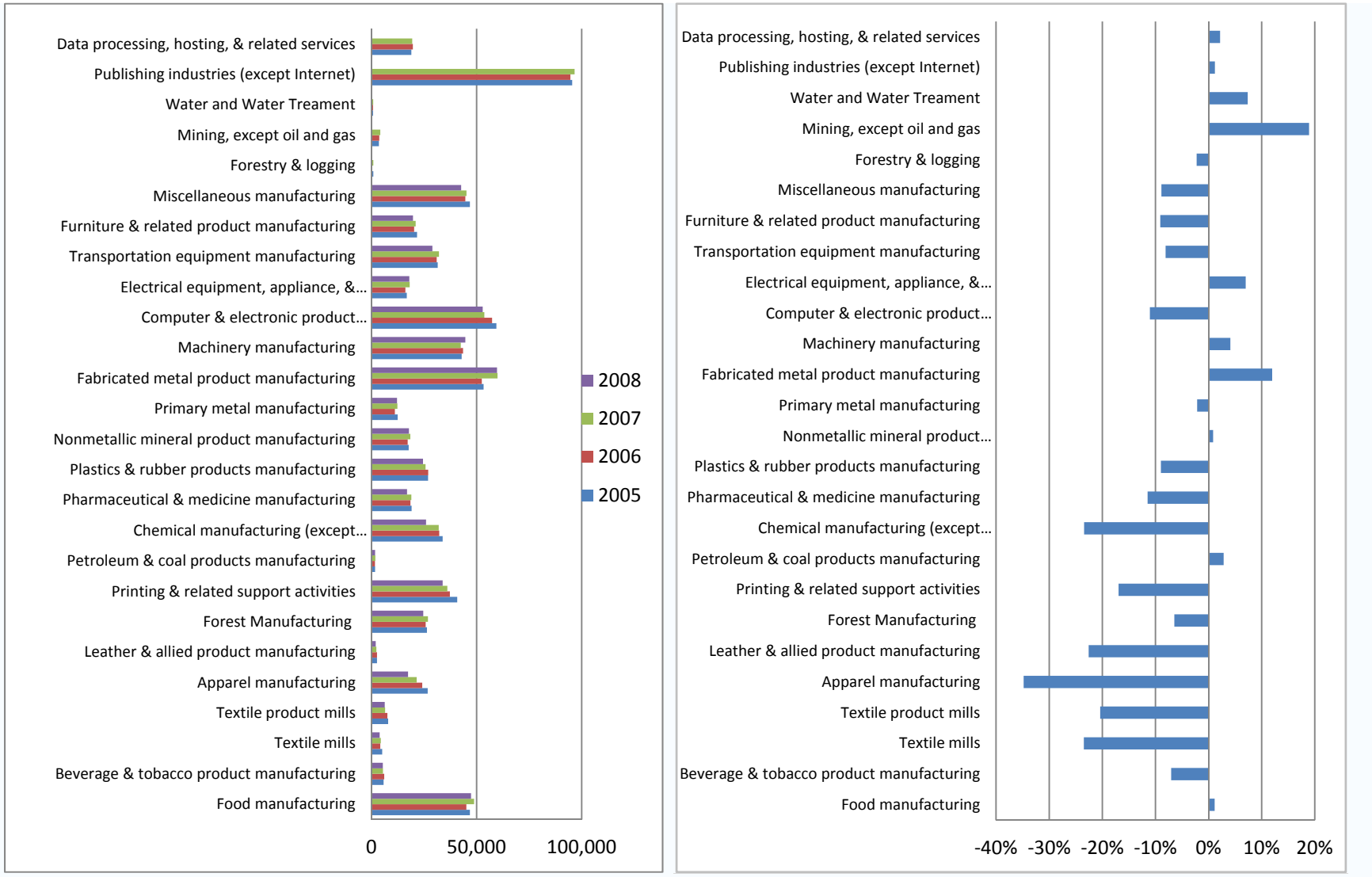


Data from U.S. Census Bureau, Annual Survey of Manufacturers, 2008

Number of Employees

As seen in Figure 29, the number of paid employees has declined in more than half of the Industrial and Process Efficiency Program's targeted industries (mainly the manufacturing-related industries). The steepest percentage decline was seen in chemical manufacturing (a 23% decline, loss of 7,936 jobs). The remainder of NYSERDA's Industrial and Process Efficiency-targeted industries (mainly non-manufacturing industries) has experienced an increase in the number of paid employees. While the greatest percentage increase has been seen within the mining industry (nearly 19%, 665 new employees), the greatest increase in actual number of employees can be seen in New York's publishing industry (1,152 new employees).

Figure 29. Paid Employees and % Change in Number of Employees, 2005-2008



Data from U.S. Census Bureau, Annual Survey of Manufacturers 2005-2008 and County Business Patterns, 2005-2007.

Annual Payroll

As seen in Figure 30, the annual payroll decreased in more than half the Program's targeted industries (mainly the manufacturing-related industries). The steepest percentage decline was seen in Chemical manufacturing (12%). The remainder of NYSERDA's Industrial and Process Efficiency-targeted industries (mainly non-manufacturing industries) has seen an increase in annual payroll. Given the high number of employees in the publishing industry, the total annual payroll far exceeded that of all other industries, however, the largest percentage increase (20%) was seen in the water/wastewater industry.

Total Value Added

As seen in Figure 31, from 2005 through 2008,all Industrial and Process Efficiency-targeted industries experienced a decrease in the percent value added (varying from -3% to -22%) in New York.[94] The greatest percent decline in value added was in the transportation industry (-22%), which mirrors the declining trend of the transportation industry nationwide. Although the Pharmaceutical and Medicine manufacturing industry can be seen in this figure as providing the greatest value added among all manufacturing industries, it too experienced a decline in total value added.

Total Value of Shipments

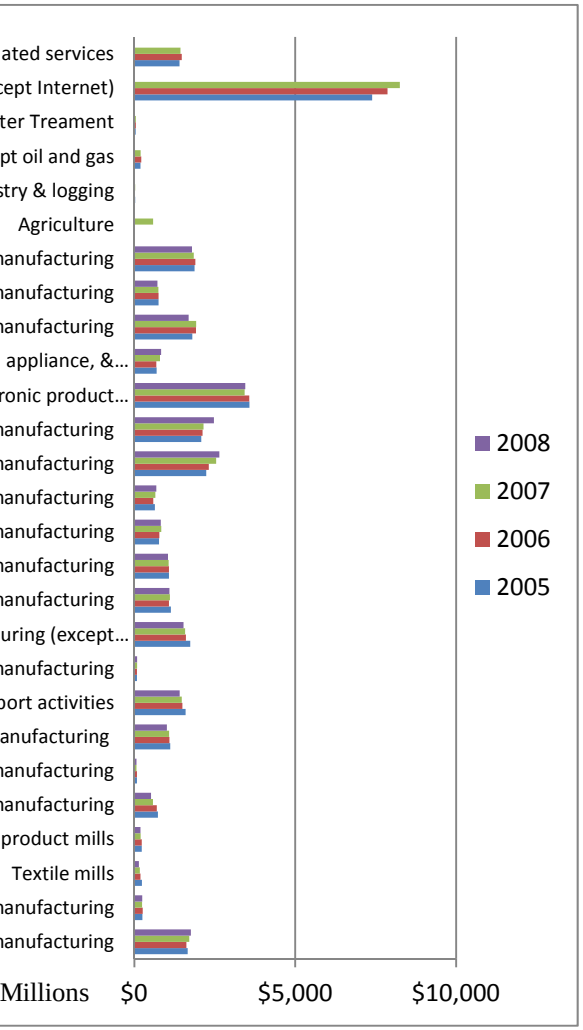
As seen in Figure 32, from 2005 through 2008, three of the six Industrial and Process Efficiency-targeted manufacturing industries in New York experienced an increase in their total value of shipments. The greatest increase is seen in the Food manufacturing industry (13.5%). Although the Pharmaceutical industry experienced only a slight increase in total value of shipments (2%), as can be seen in this figure, it is still the strongest industry in terms of total value shipments (producing over $21 billion in 2008). The greatest percent decrease in total value of shipments was in the transportation industry (12%).

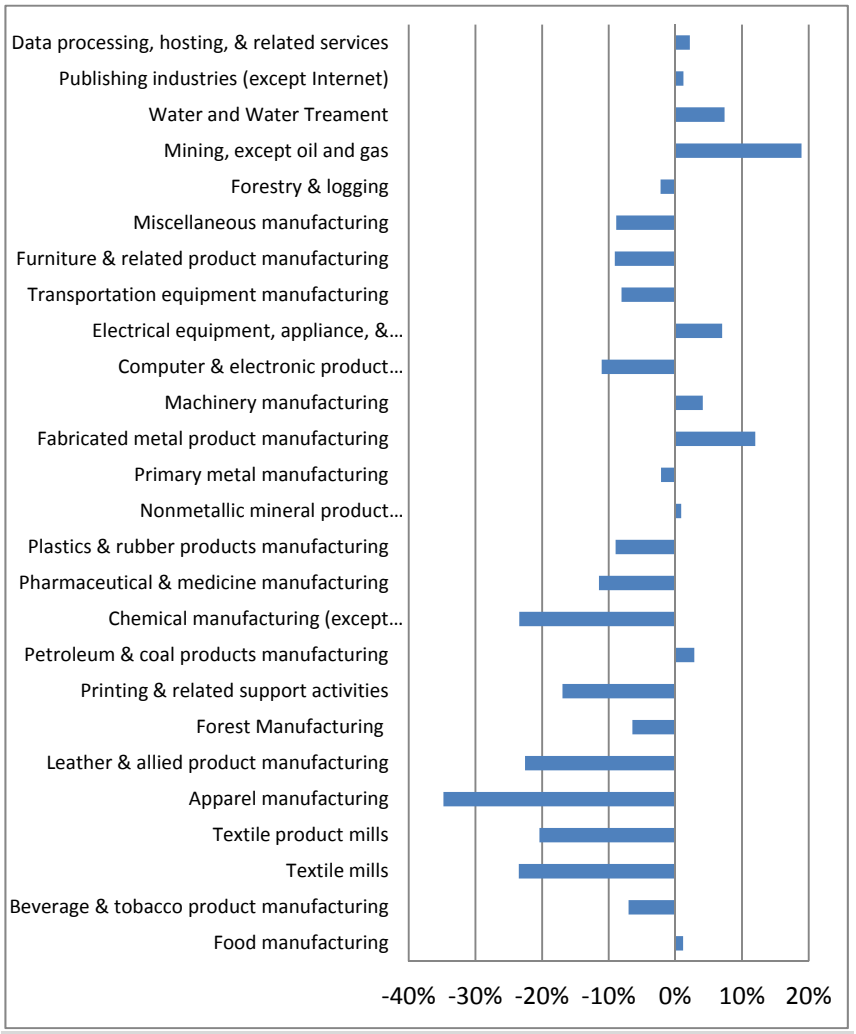
Total Capital Expenditures

During the period 2005 to 2008, the Industrial and Process Efficiency manufacturing industries in New York invested over $2.2 billion in capital expenditures. As seen in Figure 33, the Chemical Manufacturing industry invested the greatest amount during this period (over $1.33 billion), 42% of which was invested in 2008 alone. The Food and Pharmaceutical Manufacturing industries also invested heavily in their facilities (Food Manufacturing invested over $1.3 billion and Pharmaceuticals over $1.2 billion). The greatest percentage increase in Total Capital Expenditure, also shown in Figure 33, was in Printing and Related Support Activities (which increased by 69%, or $113.5 million).

[94] Value added metrics were not available for non-manufacturing industries at this time.

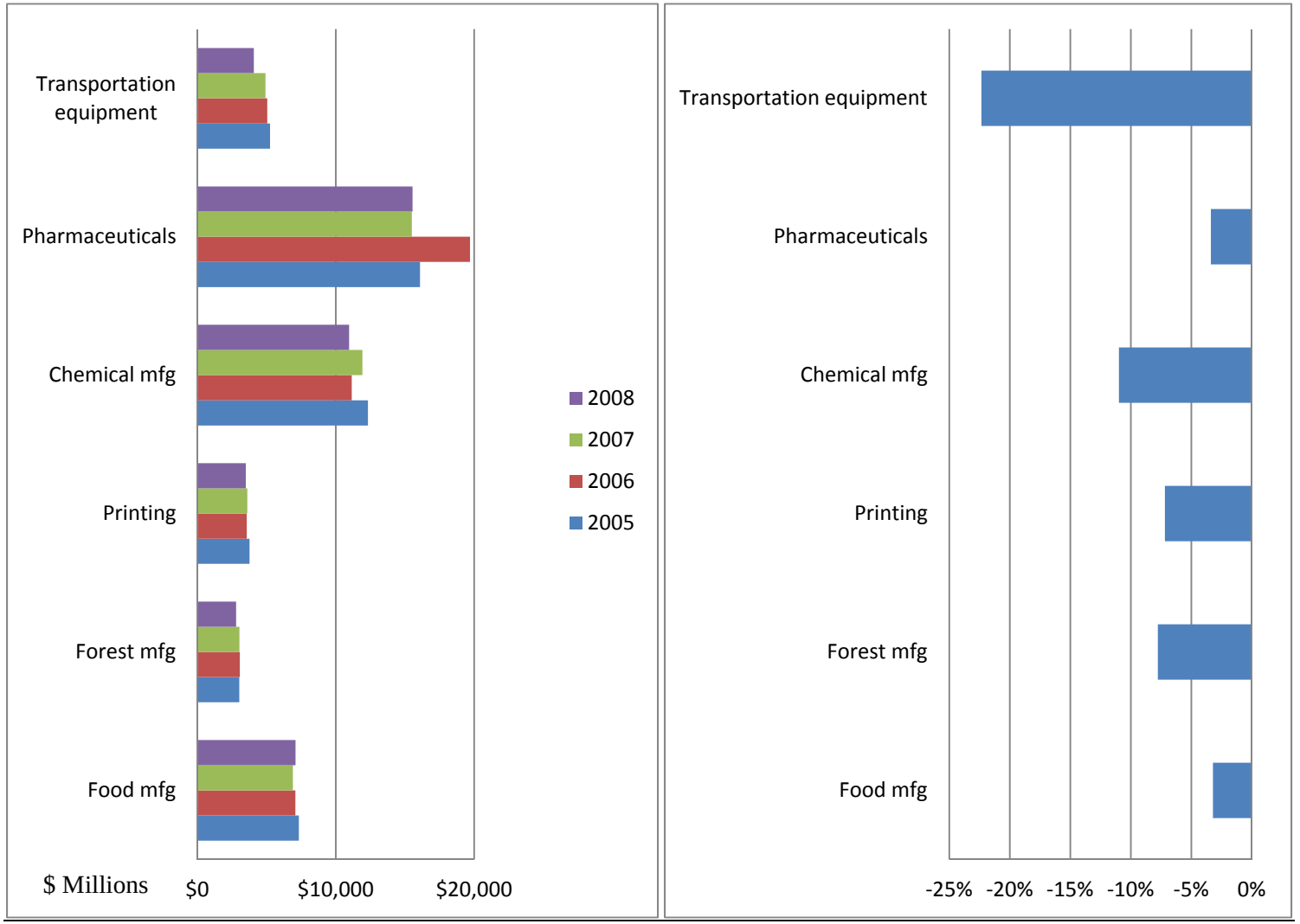
ll ($ Millions) and % Change in Annual Payroll, 2005-2008





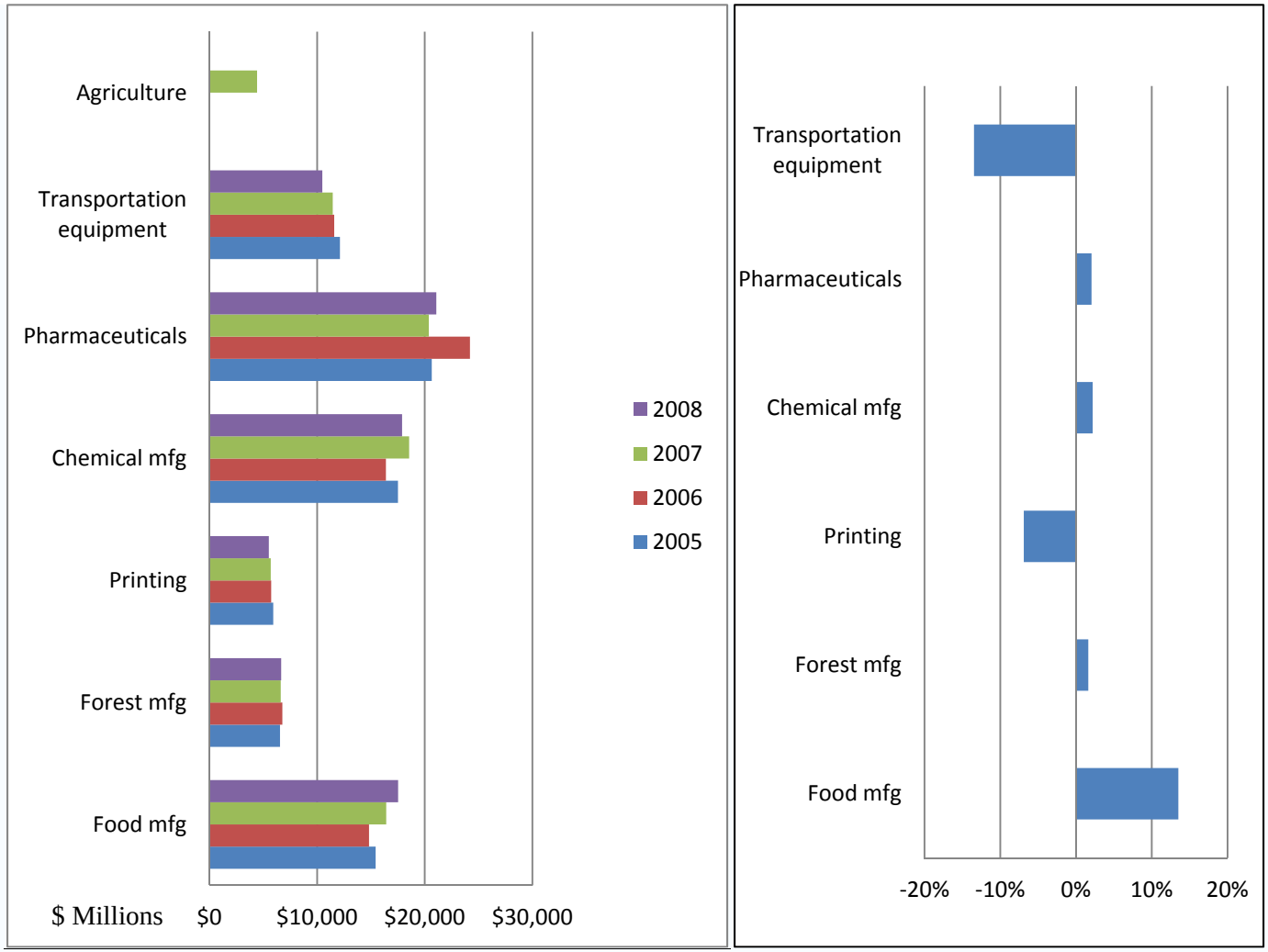
Data from U.S. Census Bureau, Annual Survey of Manufacturers 2005-2008 and County Business Patterns, 2005-2007.

Figure 31. Value Added ($ Millions) and % Change in Value Added, 2005-2008



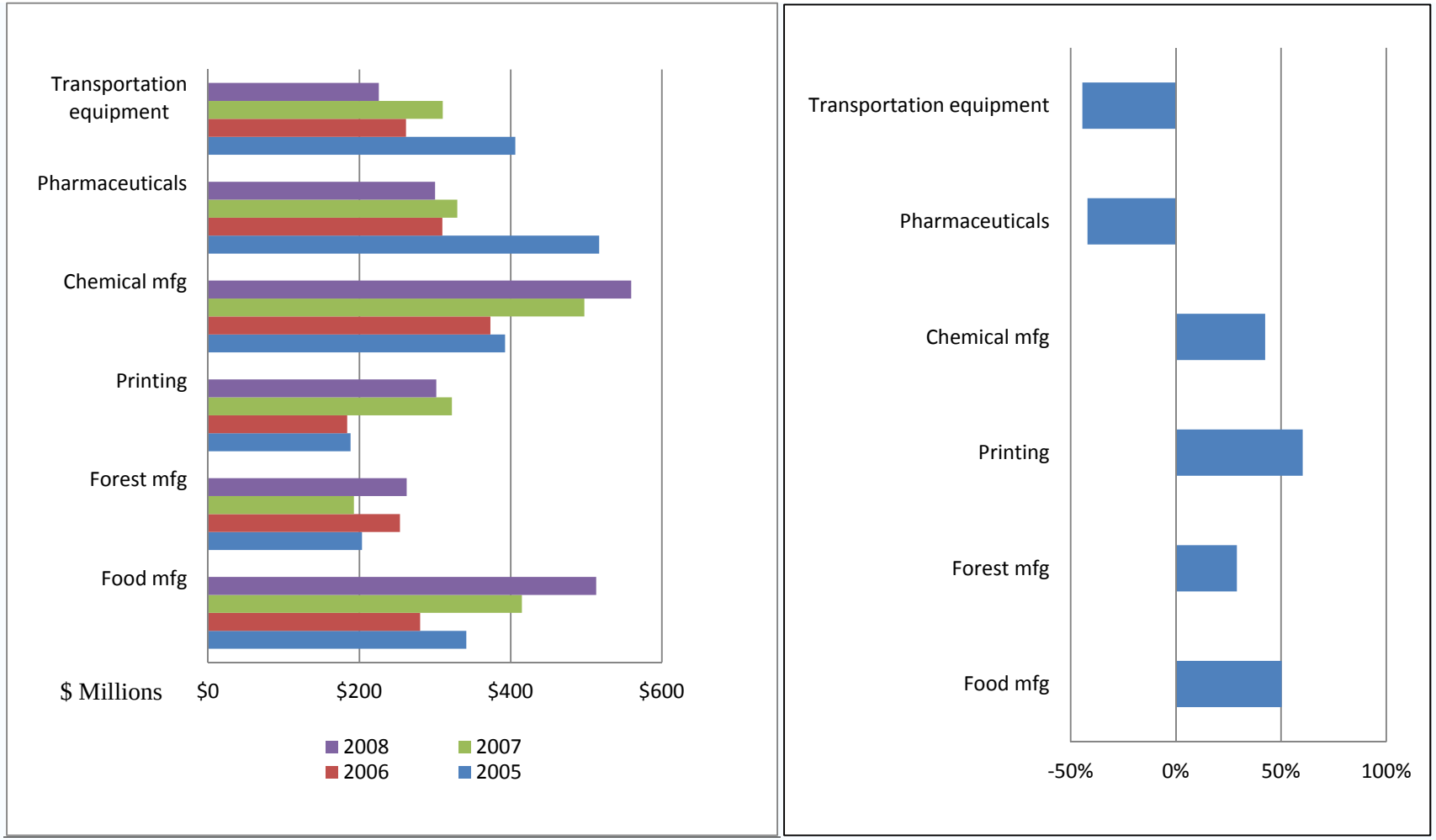
Data from U.S. Census Bureau, Annual Survey of Manufacturers 2005-2008 and County Business Patterns, 2005-2007

Figure 32. Industries Value of Shipments ($ Millions) and % Change in Value, 2005-2008



Data from U.S. Census Bureau, Annual Survey of Manufacturers 2005-2008 and County Business Patterns, 2005-2007.

Figure 33. Capital Expenditures ($ Millions) and % Change in Expenditures, 2005-2008



Data from U.S. Census Bureau, Annual Survey of Manufacturers, 2005-2008.

4.4.3 Energy Intensity

Energy intensity enables a comparison of the energy usage of different industries across multiple variables including: the number of employees, value added and value of shipments. These metrics portray energy use in different ways, enabling a cross industry comparison, and are calculated by dividing the total energy consumption of each industry (including all fuels and electricity) by the total number of employees, total dollars of value added and total dollar value of shipments. The greater the energy intensity, the more energy-intensive the industry is; however, a high energy intensity value does not necessarily mean that the industry is a target for energy efficiency improvement opportunities because it does not provide a complete energy consumption picture. Other factors should be considered in addition to energy intensity, including fuel source, and efficiency measures already installed. However, energy intensity does give insight into the energy footprint of different manufactured goods. Table 16 provides Energy Consumption per Employee, per Dollar of Value Added and per Dollar value of Shipments for Industrial and Process Efficiency manufacturing industries.[95]

Table 16. Energy Intensity of Program-Targeted Manufacturing Sectors, 2006

Three and Four Digit NAICS codes	Code Description	Energy Consumption per Employee (MMBtu)	Energy Consumption per Dollar of Value Added (MMBtu)	Energy Consumption per Dollar of Value of Shipments (MMBtu)
311	Food	434.5	2.2	1.1
321 + 322	Forest Manufacturing	1,784.2	12.3	5.8
323	Printing and Related Support	154.5	1.5	0.9
3254	Pharmaceuticals and Medicines	450.1	0.8	0.6
325 (w/o 3254)	Chemical mfg (except Pharmaceuticals)	1,603.8	6.5	2.8
336	Transportation Equipment	375.6	2.5	0.9

As can be seen in this table, in 2006, Forest Manufacturing is the most energy intensive of these sectors, no matter which metric is chosen. For every dollar of value added, Forest Manufacturing industries consume 12.3 MMBtu of energy, nearly twice that of any of the other Industrial and Process Efficiency-targeted manufacturing industries. Forest Manufacturing can also be said to consume nearly 1,800 MMBtu per employee, and 5.8 MMBtu per dollar value of shipments. Chemical Manufacturing is the second most energy intensive industry in all three metrics, consuming 1,604 MMBtu per employee, 6.5 MMBtu per dollar value added and 2.8 MMBtu per dollar value of shipments.

The least energy intensive Industrial and Process Efficiency manufacturing industries are Printing and Pharmaceuticals. Printing and Related Support Services has the lowest energy consumption per employee, 154.5 MMBtu. This is less than $1/11^{th}$ of the energy consumption per employee of Forest Manufacturing. Pharmaceuticals has the lowest energy consumption per dollar value added (0.8 MMBtu) and per dollar value of shipments (0.6 MMBtu). These represent roughly $1/15^{th}$ and $1/10^{th}$ of the energy intensity of Forest Manufacturing in each of the respective metrics.

[95] Data from the US Census's 2006 Manufacturing Energy Consumption Survey (MECS), Table 6.1: Consumption Ratios of Fuel, Northeast Census Region. The Survey is sponsored by the Energy Information Administration of the Department of Energy. Energy Intensity data for Forest Manufacturing and Chemical Manufacturing (except for Pharmaceuticals) calculated by the Navigant team with data from Tables 6.1 and 3.2 of the 2006 MECS.

Lean Manufacturing, Supply Chain Management Strategies and TQM

Two management strategies used widely in the manufacturing industries to reduce inventory costs and optimize production are lean manufacturing and supply chain management. Lean manufacturing is an operational strategy oriented toward achieving the shortest possible cycle time by eliminating waste. Its key thrust is to increase the value-added work by eliminating waste and reducing incidental work. The technique often decreases the time between a customer order and shipment, and it is designed to radically improve profitability, customer satisfaction, throughput time, and employee morale.

As noted, a primary focus of lean manufacturing is the elimination of waste – that is, anything that does not add value to the final product gets eliminated. In a lean manufacturing system, suppliers often deliver small lots on a daily basis, and machines are not necessarily run at full capacity. In this respect, large inventories are seen as a type of waste that carries with it a high cost.

Improving the energy efficiency of plant processes is a natural fit with the lean manufacturing philosophy, and has recently become an important component of Lean assessments. Implementing lean manufacturing practices, by reconfiguring manufacturing processes to improve energy efficiency and lower marginal cost, will improve the overall energy efficiency of the plant by eliminating "energy waste" in the production chain.[96]

Supply chain management factors heavily into lean manufacturing, and implements a tight partnership with suppliers, facilitating the rapid flow of products and parts to the shop floor. Holding inventory can be a significant cost of production, and the goal of this strategy is to reduce inventory costs significantly.

Both of these strategies, lean manufacturing and supply chain management, can save millions of dollars in the cost of production within manufacturing facilities and produce excellent results in the quality of products produced. The advantages of implementing these strategies include shorter lead times, reduced set-up times, reduced production down time, lower equipment expense, lower operating costs and increased profits. These strategies give the manufacturer a competitive edge by reducing costs and increasing quality, and allowing the manufacturer to be more responsive to customer demands.

Total Quality Management (TQM) is another comprehensive and structured approach to organizational management that seeks to improve the quality of products and services through ongoing refinements in response to continuous feedback. These improvements can include identification and implementation of energy efficiency opportunities.

The TQM approach, coupled with lean and supply chain management philosophies, can offer productivity and profitability benefits to industries other than manufacturing, and are a natural fit to Data Storage. The need to constantly expand data storage capacity, increase cooling and reliability, and incorporate efficiency requires innovative solutions (lean manufacturing) and front line knowledge (TQM). Outsourcing data storage to independent data storage centers and use of virtualization and cloud technologies, can result in both departmental and physical plant efficiency improvements and reduce overhead costs and capital budget requirements.

4.5 MARKET ACTOR CHARACTERIZATION

The market actors summarized in this section (*i.e.* suppliers, distributors, manufacturers or equipment vendors) can be viewed as partners with New York-based industries or manufacturing firms and can be a resource for, or have an influence on these manufacturing firms' energy efficiency decisions. As shown in Table 17, these market actors can be separated into two main categories: (1) General Services, and (2) Technical Services, working across multiple industries. This table also identifies contractors (by trade)

[96] Leonardo Energy; Lean Manufacturing and Energy Efficiency, 2010

and consultants (by industry or process) that could have influence on decisions involving energy efficiency improvement projects within New York's manufacturing and industrial sectors.

Using Thomasnet.com,[97] information on market actors for the Industrial and Process Efficiency industries has been collected. The summary in Table 17 presents information on the types and number of market actors that provide technical information and support services for each Industry and Process Efficiency industry. This information is broken out to show the number of market actors that service companies in both Upstate and Downstate New York. Some of the market actors provide a unique service, thus, this list also contains market actors that are located outside of New York but work within the State.

As shown in this table, over 60% of the General Services-type market actors are located downstate. Nearly 83% of this market actor group (112 of 135) provides Lean Manufacturing services to industrial customers in New York. Of the nearly 860 Technical Services market actors, four service categories are most prevalent: Industrial HVAC (168 providers), Industrial Process Manufacturing Plant Design (153 providers), Industrial Process Equipment (124), and Industrial Process Motor Systems (123). Just under 55% of the Technical Services market actors are located in Upstate New York (45% are located downstate, excluding Long Island).

Table 17. Market Actors Providing Services in Multiple Industries

General Services Market Actors	**Total**	**Upstate**	**Downstate**
Industrial Consulting Services (including Supply Chain Management)	23	11	12
Lean Manufacturing Consultants	112	41	71
Total General Service Market Actors	**135**	**52**	**83**
Technical Services Market Actors Working Across Multiple Industries	**Total**	**Upstate**	**Downstate**
Industrial HVAC (shell)	168	97	71
Lighting (shell)	80	44	36
Industrial pump contractors	21	8	13
Industrial process piping	13	8	5
Industrial process motor systems (including drives)	123	67	58
Industrial process fans	79	46	33
Industrial Refrigeration Equipment & Machinery Suppliers	5	3	2
Sterilization Equipment contractors	11	3	8
Industrial process manufacturing plant designers	153	72	81
Industrial process equipment	124	72	52
Industrial process heating	34	20	14
Industrial process cooling	17	13	4
Industrial process compressed air	29	14	15
Total Technical Services Market Actors	**857**	**467**	**390**

[97] Thomas.net is an online database that enables users to search for firms that are located in or serve a particular industry or a particular region, for example Upstate or Downstate; Identifying market actors located on Long Island was not an option with this database. Vintage of data at time of database access = 2010.

In addition to General Service and Technical Service-type market actors that perform work across multiple industries, there are numerous companies that identify themselves as providing support within specific industry categories. These companies include process equipment manufacturers and suppliers, packaging suppliers, equipment distributors, repair contractors, industrial designers, equipment testing and engineering services, and consultants. According to Thomasnet.com, there are nearly 3,000 market actors that provide these types of support to the Industrial and Process Efficiency industries in New York (equally distributed upstate and downstate).[98] In addition to the general and cross-industry market actors listed above in Table 17, these industry-specific market actors are summarized in Table 18.

As shown in Table 18, the Industrial and Process Efficiency industry receiving process-related services from the largest number of companies is the Food Manufacturing industry (a total of 732 companies were designated as providing services to this industry with 378 located upstate and 354 located downstate). The Chemical and Pharmaceuticals Manufacturing industries have the second and third greatest number of process-related services providers (426 companies combined, 227 and 199 respectively, with nearly 63% located downstate).

Table 18. Industrial and Process Efficiency Industry Specific Market Actors

Industrial and Process Efficiency Industry/Market Actor Area	Upstate	Downstate
Food	**378**	**354**
Food processing equipment manufacturers	70	68
Food processing equipment repair	44	32
Food packaging	45	56
Food processing equipment distributors	37	22
Industrial process industrial designers (food)	74	63
Food processing equipment maintenance	64	64
Food processing equipment testing	44	49
Chemical	**105**	**122**
Chemical processing equipment suppliers	29	37
Chemical processing equipment distributors	29	37
Chemical engineering services	16	14
Chemical plant equipment and machinery	31	34
Pharmaceutical	**53**	**146**
Pharmaceuticals suppliers	24	98
Pharmaceutical packaging suppliers	11	23
Pharmaceutical dryers	2	2
Pharmaceutical filters	9	13
Pharmaceutical blenders	1	4
Pharmaceutical pumps	6	6
Automotive	**11**	**13**
Assembly manufacturing equipment manufacturers (automation)	6	6
OEM automotive parts suppliers	3	6
Automotive assembly equipment suppliers	2	1
Mining	**27**	**34**

[98] Number excludes market actors that specifically serve the Data Center industry.

Machinery suppliers	2	4
Pumps suppliers	4	6
Screens suppliers	4	5
Blowers suppliers	3	4
Compressed air suppliers	14	15
Forest Products	**50**	**32**
Forest products companies	8	4
Papermakers, pulp and fibre suppliers	5	5
Process and processing machine suppliers (dryers)	27	10
Paper and pulp mill pumps suppliers	5	7
Pulp and paper processing equipment and system suppliers	3	1
Paper and pulp mill filter suppliers	2	4
Paper and pulp heat exchanger suppliers	0	1
Logging	**91**	**7**
Kiln suppliers	8	6
Logging service	10	0
Conveyers	73	1
Printing	**63**	**120**
Printing equipment and supplies suppliers	48	90
Conveyer printing equipment	7	2
Printing machinery	8	28
Publishing	**33**	**146**
Publishing services	33	146
Water Irrigation	**10**	**28**
Irrigation systems	1	4
Industrial water supply and irrigation engineering services	2	2
Irrigation pumps suppliers	6	13
Irrigation pipe suppliers	1	9
Wastewater Treatment	**104**	**80**
Wastewater treatment equipment for industrial plants	8	3
Wastewater treatment engineering services suppliers	2	4
Wastewater treatment equipment	62	49
Wastewater pump suppliers	17	13
Wastewater evaporator suppliers	7	1
Wastewater treatment systems	8	6
Wastewater blower suppliers	0	4
Data Storage	TBD	TBD
General service providers (from Table 17)	11	12
Cross-sector market actors (from Table 17)	467	390
	1,403	**1,484**

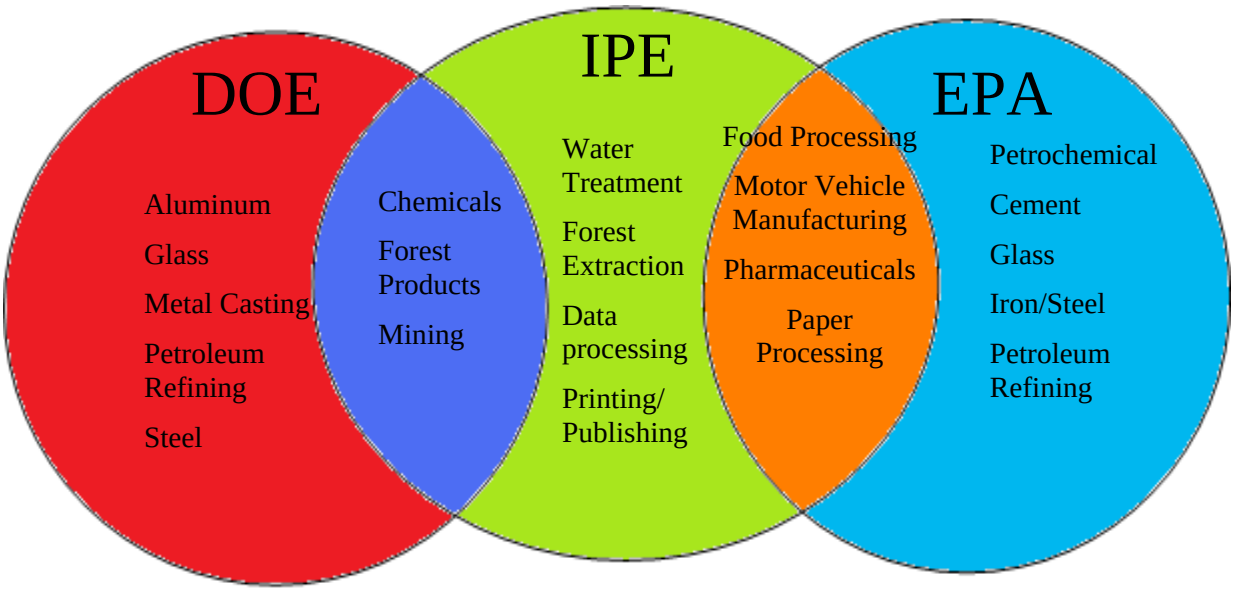
4.6 ENERGY EFFICIENCY PROGRAMS

In addition to NYSERDA's Industrial and Process Efficiency Program, manufacturing and industrial facilities operating within New York have several other options to enhance the efficiency of their industrial processes. These options include federal, state and utility programs which offer a variety of assistance from specialized industry information, to reviewing their unique processes and energy needs and making recommendations to enhance their efficiency. Often these programs include rebates and incentives to help reduce the facilities' out-of-pocket costs.

4.6.1 Federal Programs

As shown in Figure 34, several of NYSERDA's Industrial and Process Efficiency (IPE)-targeted industries can also receive services and support through programs offered by the US Department of Energy (DOE) and the US Environmental Protection Agency (EPA). These industries have been identified by the DOE and EPA as having substantial potential for increased energy efficiency.

Figure 34. Overlap between DOE, IPE, and EPA Programs



The DOE's Industrial Technologies Program (ITP) is essentially a cost sharing research and development initiative that works with industry players to develop and deliver advanced technologies that would increase energy efficiency, improve environmental impacts and boost productivity in the targeted manufacturing industry. It is referred to as the "Industry of the Future" partnership, and its goal is to increase efficiency of industrial energy use, now and in the future. The DOE's ITP/Industry of the Future partnership emphasizes technologies and practices that boost productivity and profit in the nation's energy intensive industries. There is a competitive selection process for projects to be supported. If selected, the program offers financial assistance for research, development and demonstration projects that can accelerate technology innovation. Partners provide 50% of the total cost of the project over the life of the project.

Within this program there is a sub-component called the "Save Energy Now" Program. This component targets opportunities to eight of the nation's most energy intensive industries that use 75% of industrial energy consumption, and represent the largest opportunities to increase energy efficiency in the industrial sector. Targeted industries include: aluminum, chemical, forest products, glass, metal casting, mining, petroleum refining, and steel. According to the DOE, the energy intensive industries targeted through

their programs use large amounts of heat and energy to physically or chemically transform materials. Collectively, they supply 90% of the materials vital to our economy, produce $1 trillion in annual shipments, directly employ over 3 million people, and indirectly provide an additional 12 million jobs at all skill levels[99].

In addition to the DOE's programs, the EPA offers a program call the "ENERGY STAR® Industries in Focus Program." This program provides industry-specific energy management tools to help identify areas for energy efficiency improvements, evaluate potential energy improvement options, develop plans and educate employees. The industries targeted for this program, present opportunities for gaining substantial energy savings and include: cement, corn refining, food processing, glass, motor vehicles, petroleum refining, petrochemicals, and pharmaceutical manufacturing, and represent industries that also have substantial potential for increased energy efficiency.

4.6.2 New York State Programs and Customer Eligibility

The positive economic impact of retaining large industrial and manufacturing customers is critical to the wellbeing of the New York economy, and is a goal shared among utilities and state agencies. New York's customers in the Industrial and Process Efficiency-targeted industries have several options to work with agencies or utilities to incorporate process efficiencies. In addition to NYSERDA's programs, these options include a Recharge NY program offered by the New York Power Authority (NYPA), an Empire Program offered through Empire State Development (New York's chief economic development agency), and various programs being implemented by a number of New York's investor-owned utilities.

A primary objective of this study has been to identify which customers are eligible to participate in NYSERDA's Industrial and Process Efficiency Program. Specifically, eligible customers are the large industrial customers in the Industrial and Process Efficiency-targeted industries, whose annual usage is 2MW and above, or 10,000 MMBtu and above, and pay into the System Benefits Charge (SBC). Customer eligibility is not straight forward and customers are often confused by the array of program options available to them. As a result, customers are often unsure of their own eligibility and will occasionally hire consultants to help determine which program(s) best fits their needs and to help them complete any necessary program paperwork. In certain cases, customers that participate in some of the following programs might be prohibited from participating in NYSERDA's Industrial and Process Efficiency Program.

4.6.3 Recharge NY

NYPA has offered a reduced price for power and tax incentives for companies within their service territory who remain in New York, through its Recharge NY Program (formerly "Power for Jobs"). There were 443 Power for Jobs program participants, 131 of which are participants that have a demand of 400 kW or more, including companies that are in NYSERDA's targeted Industrial and Process Efficiency industries. Historically, NYPA customers who purchase 51% or more of their power from NYPA have been subject to pro-ration of incentives while participating in NYSERDA programs. However, customers who purchase 50% or less of their power from NYPA are eligible to participate fully in NYSERDA programs. This program ended May 15, 2010. Customers who may have been excluded or offered partial participation in NYSERDA programs in the past may now be fully eligible to participate in the Industrial and Process Efficiency Program. See Appendix F for a detailed listing of NYPA's previous Power for Jobs program participants.

[99] DOE Industrial Technologies Program, http://www1.eere.energy.gov/industry/program_areas/industries.html

4.6.4 Empire Program

The Empire Program, sponsored by the State of New York, encourages manufacturers to invest in projects that will increase productivity and competitiveness of their operations by providing capital grants up to $1 million. Manufacturing firms must reside in New York, employ 50 to 1,000 workers, and must export 30% of production beyond their region or supply 30% of their production to a manufacturer that exports beyond their region. Projects must improve productivity or competitiveness, and outcomes of increased production output, process efficiency, quality control, new product of supply development, increased market share, resource conservation, pollution prevention or cost reducing or revenue enhancing measures. The size of the grant is determined by an evaluation process that considers the size and scope of the project, improvements in productivity and competitiveness, as well as the positive impact is will have on its regional economy. Projects receiving funding are required to meet milestones in order to continue to receive financial incentives.

A sub-component of the Empire Program is the Industrial Effectiveness Program, which provides assistance in identifying, developing and implementing improved management production processes to enhance efficiency, expand market share in New York and promote job growth. The amount of a grant can be up to $50,000, and engineering and management assistance is also provided.

The State of New York also offers incentives to commercial and industrial customers, through participation in its Economic Development program, the Empire Zone. Companies are offered tax and energy incentives to locate within established zoned areas, through contractual agreements. This program began in 2006, and ended in 2010. As of November 2009, there were 8,636 companies participating in the Empire Zone Program and located in the 13 Empire Zones throughout New York. Industrial customers participating in the Empire Zone Program are not currently eligible to participate in NYSERDA programs, but will be eligible starting in 2011. The list of Empire zone participants is quite lengthy and can be made available upon request.

4.6.5 Investor-Owned Utility and NY ISO Programs

Among the electric and gas utilities located in the NYSERDA Industrial and Process Efficiency Program's service territory, four offer programs to encourage incorporation of efficiencies in industrial processes to customers located within their New York service territories including Rochester Gas & Electric, New York State Electric and Gas, National Grid, and Orange & Rockland.

In addition, there are a number of other potentially relevant programs being implemented in New York summarized briefly below. These programs have the potential to impact (*i.e.*, either help or hinder) achievement of NYSERDA's Industrial and Process Efficiency Program goals.

Energy Initiative – a National Grid Program[100]

National Grid's Energy Initiative program specifically provides incentives for energy efficiency projects to large commercial, industrial, municipal, and institutional customers in National Grid's service territories, potentially overlapping with the incentives provided by the Industrial and Process Efficiency Program. The Energy Initiative program provides technical assistance in the form of engineering and support services available to help identify, evaluate, and implement energy efficient opportunities for a facility. Also, incentives are available to upgrade the performance of existing equipment and systems and are designed to pay, on average, approximately 40%-50% of the total project cost. Incentives for custom projects provide up to 45% of the total project costs.

[100] National Grid Website: https://www.powerofaction.com/efficiency/

NYISO Demand Response Programs

The New York Independent System Operator's (NYISO's) demand-response programs do not directly overlap with NYSERDA's Industrial and Process Efficiency Program. However, it is possible that Program participants would also be eligible to participate in several demand-response programs offered by the NYISO. Therefore, awareness of and coordination with these programs potentially has many benefits for both end-users and the state. The NYISO has two Demand Response programs: the Emergency Demand Response Program (EDRP) and ICAP Special Case Resources (SCR) program. Both programs can be deployed in energy shortage situations to maintain the reliability of the bulk power grid.[101]

- The Emergency Demand Response Program is designed to reduce power usage through the *voluntary* shutting down of electrical end-uses (or turning on on-site electric energy generators) within businesses and large power users. Companies, mostly industrial and commercial, sign up to take part in the EDRP. The companies are paid by the NYISO for reducing energy consumption when asked to do so by the NYISO.
- Special Case Resources is a program designed to reduce power usage through the *mandatory* interruption of large electrical end-uses within participating businesses and large power users' facilities. Companies, mostly industrial and commercial, sign up to become SCRs. The companies must, as part of their agreement, curtail power usage, usually by shutting down critical end uses when asked by the NYISO. In exchange, they are paid in advance for agreeing to cut power usage upon request.

The NYISO's Day-Ahead Demand Response Program (DADRP) also allows energy users to bid their load reductions, into the Day-Ahead energy market as generators do. Offers determined to be economic are paid at the market clearing price. DADRP allows flexible loads to effectively increase the amount of supply in the market and moderate wholesale electricity prices.

[101] NYISO Website: http://www.nyiso.com/public/products/demand_response/index.jsp

SECTION 5. MARKET ASSESSMENT

This section identifies and examines key program and market assessment indicators for the NYSERDA Industrial and Process Efficiency Program as it relates to eligible end use manufacturing customers, data centers, and technical service providers that have not participated in the Program before.[102] The purpose of this section is to provide a baseline assessment of the markets in which the Industrial and Process Efficiency Program currently operates.

Because of the similarity between the questions asked to eligible end use manufacturing customers and data centers, their results are listed together and grouped broadly into five major categories as follows:

1. Current Levels of Efficiency, Familiarity and Perceptions Relating to Process Efficiency Improvement Projects
2. Current Levels of Investment, Types of Process Efficiency Improvements and Associated Practices and Perceptions
3. Current Barriers Impacting Investment
4. Perceived Value of Technical Assistance Services
5. Awareness of NYSERDA and Other Energy Efficiency Program/Funding Opportunities

The results for technical service provider interviews are grouped similarly and listed separately starting in Section 5.6.

Findings are presented in a statistically valid manner, across all of the Program's targeted manufacturing groups (chemical and pharmaceuticals, printing and publishing, automotive, food processing, forest product manufacturing, and data centers) and from both an upstate and downstate perspective. In addition, results within the chemical/pharmaceuticals, forest products, and data center groups are also statistically valid.

The following is a summary of each section of the manufacturing and data center assessment:

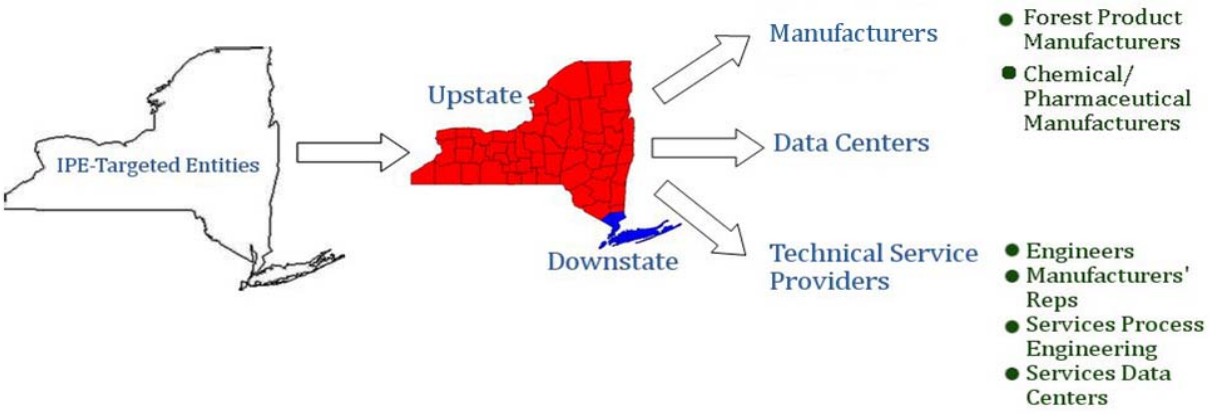
- Section 5.1 discusses current levels of efficiency, familiarity, and perceptions. This includes the types and efficiency of manufacturing systems and processes being used, how and how often the systems are upgraded, respondent perceptions of project efficiency improvements as energy efficiency improvements, and familiarity with and confidence in the technologies and procedures available for improvements.
- Section 5.2 discusses current levels of investment, types of process efficiency improvements, and associated practices and perceptions. This includes the costs for and types of technologies invested in, respondent confidence in new technologies, familiarity with the benefits of energy efficiency improvements, the importance placed on energy efficiency, and the financial-based criteria considered as important factors for improving energy efficiency.
- Section 5.3 discusses barriers impacting investment. This includes the perceived significance of certain barriers to improving energy efficiency, and the perceived single largest barrier to improvements.

[102] Specifically, eligible customers are data centers and the large industrial customers in the Industrial and Process Efficiency-targeted industries, whose annual usage is 2MW and above, or 10,000 MMBtu and above, and pay into the System Benefits Charge (SBC).

- Section 5.4 discusses the value of technical assistance services. This includes respondent perception of the market's capability to provide process efficiency improvements, service providers' technical capabilities to provide these improvements, the type of assistance used for energy efficiency projects, where ideas for improvements are generated within their organizations, and the types of other technical assistance received.
- Section 5.5 discusses awareness of NYSERDA and other energy efficiency program/funding opportunities. This includes awareness of NYSERDA itself, the Industrial and Process Efficiency Program, and other funding programs.

Figure 35 shows how the Industrial and Process Efficiency markets have been grouped for this current assessment. Industrial and Process Efficiency-targeted entities were separated into eligible end use manufacturing customers (including data centers), and technical service providers. The markets were also separated between upstate and downstate, to assess differences between the two regions. End use customers (manufacturers and date centers)[103] and technical service providers were separated into subgroups.

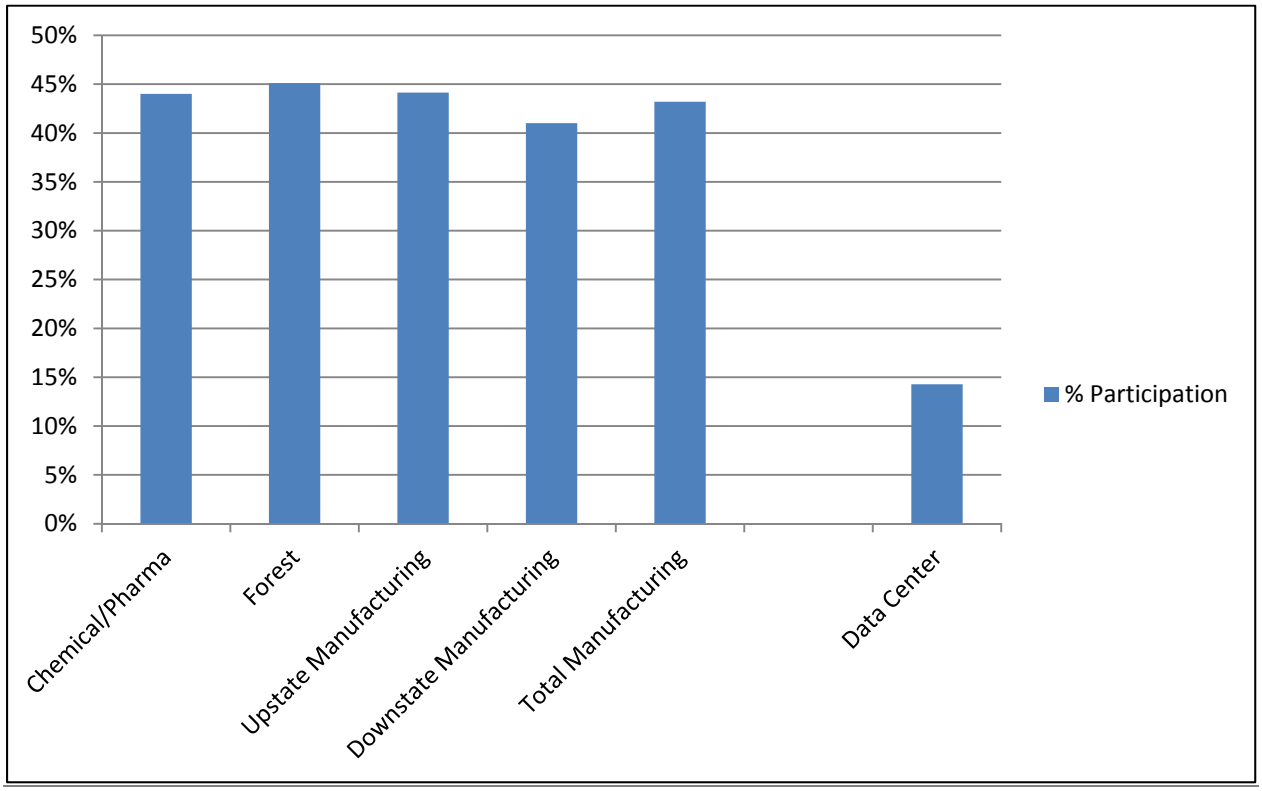
Figure 35. Industrial and Process Efficiency Market Assessment



At the beginning of each interview, organizations were screened to determine whether or not they have participated in any NYSERDA EEPS-funded or **New York Energy $mart**[SM] programs in the past five years. As shown in Figure 36, under 45% of the responding eligible end use manufacturing customers, and less than 15% of data centers reported having participated in any NYSERDA program (including Industrial and Process Efficiency) in the past five years. This means that there remains a substantial number of manufacturing facilities and especially data centers in New York that could be served by NYSERDA's programs.

[103] Transportation equipment manufacturers, food manufacturers, and printing/publishing were also surveyed as part of the Market Assessment effort eligible end-use "Manufacturing" customers (five Program-targeted manufacturing industry sectors total for this survey effort). However, of the eligible end-use manufacturing customers interviewed, only Forest Product and Chemical/Pharmaceutical manufacturers were targeted in the evaluation work plan to receive sufficient responses to present statistically valid data as individual groups. Data Centers were also targeted in the work plan as a segment of the eligible end use customer population, and were reported on separately.

Figure 36. Participation in any NYSERDA or New York Energy $mart Programs in Past 5 years[104]



Source: MCA primary data collection efforts (n=130 and n=70 for EUC and DC in 2010-2011).

One of the survey requirements was that the respondent was not a current or past participant in NYSERDA's Industrial and Process Efficiency Program. If it was determined that the organization had participated in the Program, interviews were terminated.[105] The results of all completed interviews are summarized in the sections below.

5.1.1 Types of Systems and Processes

Table 19 below shows the breakdown of industrial or manufacturing systems and processes being used within eligible end user respondents' facilities. As seen in this table, materials storage and handling, and

[104] The Data Center column in this and all subsequent charts has been separated from the "Manufacturing" customer responses, to ensure that comparisons between the two groups are not made. Data Centers were given a survey specific to that customer type. The other customer subgroups (Manufacturers) were all given a separate, but similar survey more appropriate for manufacturing facilities. As such, results presented in this and all subsequent charts show Chemical/Pharmaceuticals and Forest Products findings separately, while Upstate, Downstate, and Total Manufacturing columns represent combined results from these two industry types along with results from three other targeted manufacturing industries (Transportation Equipment Manufacturers, Food Manufacturers, and Printing/Publishing).

[105] Industrial and Process Efficiency was a relatively new program at the time the survey was fielded. The sample population was developed in advance of the survey, to specifically exclude any known Program participants. No discernible differences were noted during survey implementation between upstate and downstate, in terms of Program participation.

product manufacturing are the two leading responses (94% and 91% respectively) across the entire population, although there are slightly fewer facilities that use these systems downstate than upstate.[106]

Table 19. Processes Used in Manufacturers' Facilities (% using process in facility)

System/Process	Chem/Pharm	Forest	Upstate	Downstate	Total
Materials Storage or Handling	96%	91%	97%	85%	94%
Product Manufacturing	89%	91%	94%	85%	91%
Warehousing	91%	89%	93%	74%	88%
Data Storage	94%	75%	87%	86%	86%
Packaging or Distribution	89%	78%	89%	79%	86%
Transportation	74%	82%	82%	67%	78%
Testing	89%	31%	69%	54%	64%
Finishing	58%	56%	59%	62%	60%
Assembly	51%	64%	61%	55%	59%
Raw Materials	62%	44%	56%	55%	56%
Heating	62%	38%	57%	44%	53%
Water and Wastewater Treatment	55%	25%	51%	33%	45%
Cooling	55%	9%	42%	31%	39%
Separation	23%	13%	19%	13%	17%
Other	6%	4%	5%	2%	4%

Source: MCA primary data collection efforts (n=130 for EUC in 2010-2011).

Note: Ns are not shown individually in tables where all respondents provided an answer and totals sum to 100%. N equals the percentage times the total number of respondents.

[106] It is important to note that the differences observed between upstate and downstate are artifacts of the differences in the frequency of various industries and/or business sizes between the samples for the two regions. The survey sample size was too small to identify specific differences within a meaningful level of statistical significance.

Table 20 shows the percent of data centers that use each of the listed components in their facilities. As can be seen in this table, dedicated HVAC systems have been identified as a data center component by all customers interviewed (100%). On site data storage devices, network equipment, servers, and fire suppression were identified in nearly all data centers (97-99%). Virtual data storage and off-site data storage devices are being used the least, but still have relatively high utilization rates reported (74% and 66%, respectively).

Table 20. Processes Used in Data Center Facilities (% using process in facility)

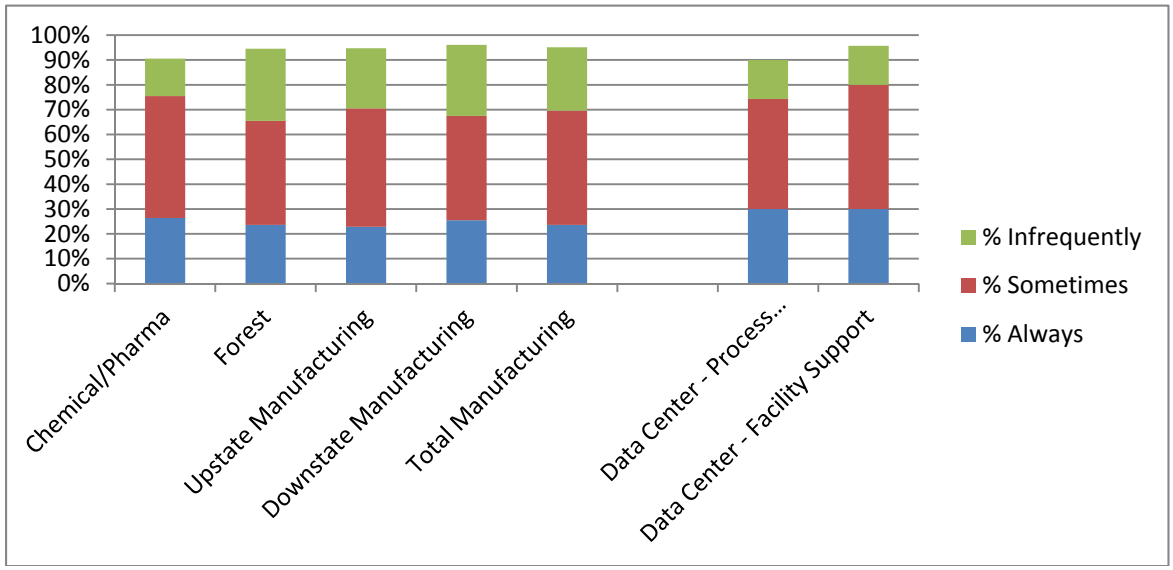
Components	Percent
Dedicated HVAC systems	100%
On Site data storage devices	99%
Network equipment	99%
Servers	97%
Fire suppression	97%
Power distribution units	90%
Data center room/facility insulation	87%
Standby generation	80%
Virtual data storage devices	74%
Off Site data storage devices	66%

Source: MCA primary data collection efforts (n=70 for DC in 2010-2011).

5.1.2 Perception of Process Efficiency Improvements as "Energy" Projects.

Figure 37 below shows the percentage of eligible end use customers, including data centers who "always," "sometimes" and "infrequently" think of process improvement projects as "energy" projects. The remainder "never" think of process improvements as energy projects. By "energy" projects, this question tries to determine to what extent the consumption of energy by the projects' equipment plays a role in the selection and design of the project. As shown in this figure, less than 25% of the manufacturers interviewed "always" consider process improvement projects as "energy" projects. A slightly larger proportion, but still only 30%, of the data center respondents said they "always" view these projects as energy projects. Nearly 30% of the manufacturing organizations (25% of the data centers) responded that they either "infrequently" or "never" consider process improvement projects as energy projects. This means that that there remains substantial opportunity to increase awareness of the value of energy efficiency improvements within industrial processes.

Figure 37. View of Process Efficiency Projects as Energy Projects

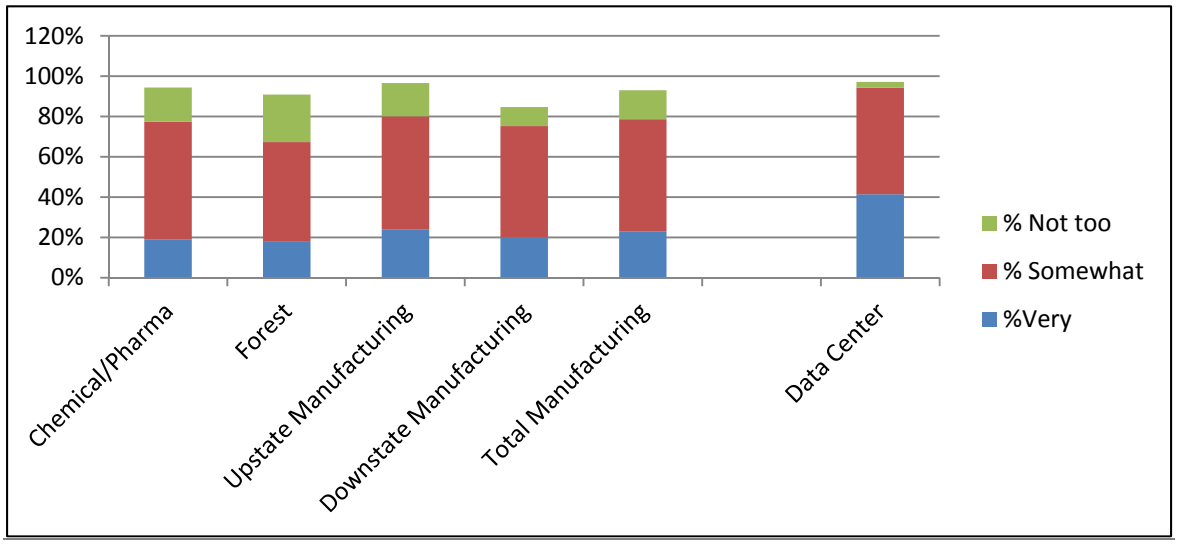


Source: MCA primary data collection efforts (n=130 and n=70 for EUC and DC in 2010-2011).

5.1.3 Familiarity with New EE Technologies and Procedures.

As shown in Figure 38, approximately 20% of manufacturing organizations, and 40% of data centers, answered that they are "very' familiar with new energy efficiency technologies and procedures. More than 20% of this same group of manufacturers responded that they are either "not too" or "not at all" familiar with new technologies. Less than 5% of the data center respondents answered in this manner ("not too" or "not at all" familiar with new technologies). Based on these responses, it appears that there is substantial opportunity to educate manufacturers on the availability and merits of new energy efficiency technologies and procedures applicable to their facilities. This is less true for data centers, whose respondents appear to already be aware of these options.

Figure 38. Familiarity with New EE Technologies and Procedures



Source: MCA primary data collection efforts (n=130 and n=70 for EUC and DC in 2010-2011).

5.1.4 Energy Efficiency of Current Systems and Components

Table 21 below shows the percentage of the manufacturing facilities responding that their industrial processes are either "very" or "somewhat" energy efficient.[107] As seen in this table, for nearly all industrial processes, a majority of respondents (typically over 70 to 88%) perceived their current systems and components to be energy efficient. Exceptions, where component efficiencies were perceived to be lower (50% or less), included heating (among forest manufacturers) and separation processes (among chemical/pharmaceuticals group). This does not necessarily mean that these systems or processes are as efficient as the respondent perceives them to be, but it is nonetheless important to know perceptions, which are very important to subsequent action by the facility. In most cases, there remain a noteworthy percentage of systems and components that respondents, through their own self reporting, perceive to be either "not very" or "not at all" energy efficient. For chemical/pharmaceutical respondents five noteworthy end-uses perceived as being "not very" or "not at all" energy efficiency include data storage, separation, heating, raw materials handling, and product manufacturing (where respondents said at least "somewhat efficient" 41%, 50%, 63%, 72% and 73%, respectively. For the forest industry respondents, heating and separation end uses were rated the least efficient with only 47% and 66% rating these end uses as either "somewhat" or "very energy efficient," respectively.

[107] When determining percentages, subjects where the listed process was "not applicable" were removed from the sample.

Table 21. Manufacturers' Perceived Energy Efficiency of Current Systems and Components

Process	Chem/Pharm	Forest	Upstate	Downstate	Total
Storage or Handling	85% n=47	92% n=48	89% n=88	82% n=34	87% n=122
Warehousing	89% n=47	87% n=47	88% n=84	87% n=30	88% n=115
Product Manufacturing	73% n=45	84% n=49	80% n=84	80% n=34	83% n=119
Packaging or Distribution	91% n=43	81% n=42	86% n=80	88% n=32	87% n=113
Transportation	86% n=37	89% n=44	92% n=72	74% n=27	87% n=102
Data Storage	41% n=43	92% n=38	82% n=78	64% n=34	77% n=113
Testing	83% n=46	94% n=16	84% n=62	86% n=22	84% n=84
Finishing	80% n=30	84% n=31	87% n=53	91% n=25	88% n=79
Assembly	82% n=22	91% n=34	84% n=55	85% n=22	84% n=77
Raw Materials	72% n=33	92% n=24	86% n=50	79% n=22	84% n=73
Water or Waste	85% n=27	85% n=13	82% n=46	94% n=13	85% n=59
Heating	63% n=32	47% n=34	70% n=52	69% n=18	70% n=70
Cooling	83% n=29	80% n=5	86% n=38	82% n=12	85% n=51
Separation	50% n=6	66% n=6	67% n=17	83% n=5	71% n=23

Source: MCA primary data collection efforts (n=130 for EUC in 2010-2011).

N is listed individually in some tables due to "not applicable" answers. N is equal to the total number of respondents (% stating "very" or "somewhat" efficient) minus the number that answered "not applicable."

A similar question was asked of data centers. As shown in Table 22 below, a majority of data center respondents (80% to 94%) perceive the processes currently used in their facilities to be either "very" or "somewhat" energy efficient.[108] Dedicated HVAC systems provided the only exception to this finding, where only 66% perceived this system to be either "very" or "somewhat" energy efficient. The balance of these populations, that considers each component to be "not very" or "not at all" energy efficient, represents an opportunity for energy efficiency improvements in future process efficiency improvements.

Table 22. Data Centers' Perceived Energy Efficiency of Current Systems and Components

Component	Percent*
Network equipment	89% n=64
Servers	86% n=64
On Site data storage devices	85% n=65
Data center room/facility insulation	85% n=60
Power distribution units	88% n=58
Fire detection/suppression	84% n=56
Virtual data storage devices	94% n=48
Dedicated HVAC systems	66% n=65
Standby generation	80% n=51
Off Site data storage devices	87% n=38

Source: MCA primary data collection efforts (n=70 for DC in 2010-2011).

* % stating "very" or "somewhat" efficient.

[108] Subjects where the listed process was not applicable were removed from the sample.

5.1.5 Types of Efficiency Elements Currently Incorporated

Respondents were asked what types of efficiency elements they have incorporated within their facilities' industrial systems and processes. As shown in Table 23, for manufacturing facilities overall (total column), lean practices, pumps and motors, compressed air systems, and heating and cooling are most prevalent at 69%, 63%, 60% and 53%, respectively. Although responses vary somewhat between Chemical/Pharmaceuticals, Forest and upstate/downstate groupings, these four elements remained constant as the top measures incorporated. For data centers, virtual servers were the most common efficiency element incorporated. As can be seen from this data, a substantial potential remains for energy efficiency improvements within the industrial, manufacturing, and data center markets.

Table 23. Types of Efficiency Elements Currently Incorporated (% that incorporate element in facility)

Efficiency Element	Chem/Pharm	Forest	Upstate	Downstate	Total	Data Centers
Lean Practices	58%	64%	73%	60%	69%	N/A
Pumps Motors	68%	53%	66%	55%	63%	N/A
Compressed Air	49%	64%	62%	57%	60%	N/A
Heating Cooling	53%	44%	57%	44%	53%	66%
Demand Response	45%	47%	49%	44%	47%	41%
CHP	36%	31%	43%	23%	37%	29%
Lighting	19%	16%	15%	10%	14%	N/A
Other	2%	7%	6%	11%	8%	N/A
Heat Recovery	4%	0%	8%	5%	7%	N/A
Virtual servers	N/A	N/A	N/A	N/A	N/A	87%
Efficient insulation	N/A	N/A	N/A	N/A	N/A	67%
Equipment usage and monitoring controls	N/A	N/A	N/A	N/A	N/A	57%
Solid state data storage	N/A	N/A	N/A	N/A	N/A	44%

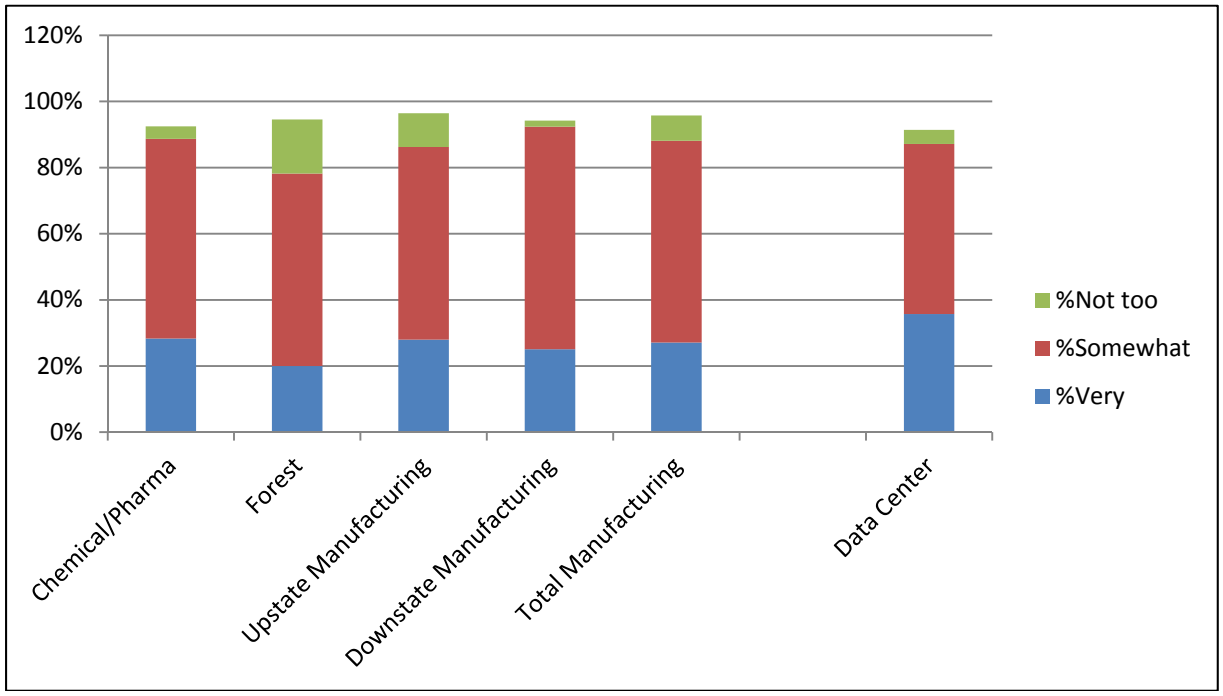
Source: MCA primary data collection efforts (n=130 and n=70 for EUC and DC in 2010-2011).

5.1.6 Confidence in Process Improvement Energy Savings Estimates

As shown in Figure 39, when asked how confident they are that the energy efficiency savings estimates associated with process efficiency improvements and IT infrastructure projects are achievable, over 80% of respondents answered either "very" or "somewhat."

This figure shows that general confidence among all market segments is high regarding the performance of efficiency measures. Results were fairly consistent across the segments. Though respondents seem generally confident, there remains a large percentage of the market where confidence could be improved.

Figure 39. Confidence of Savings from Energy Efficiency

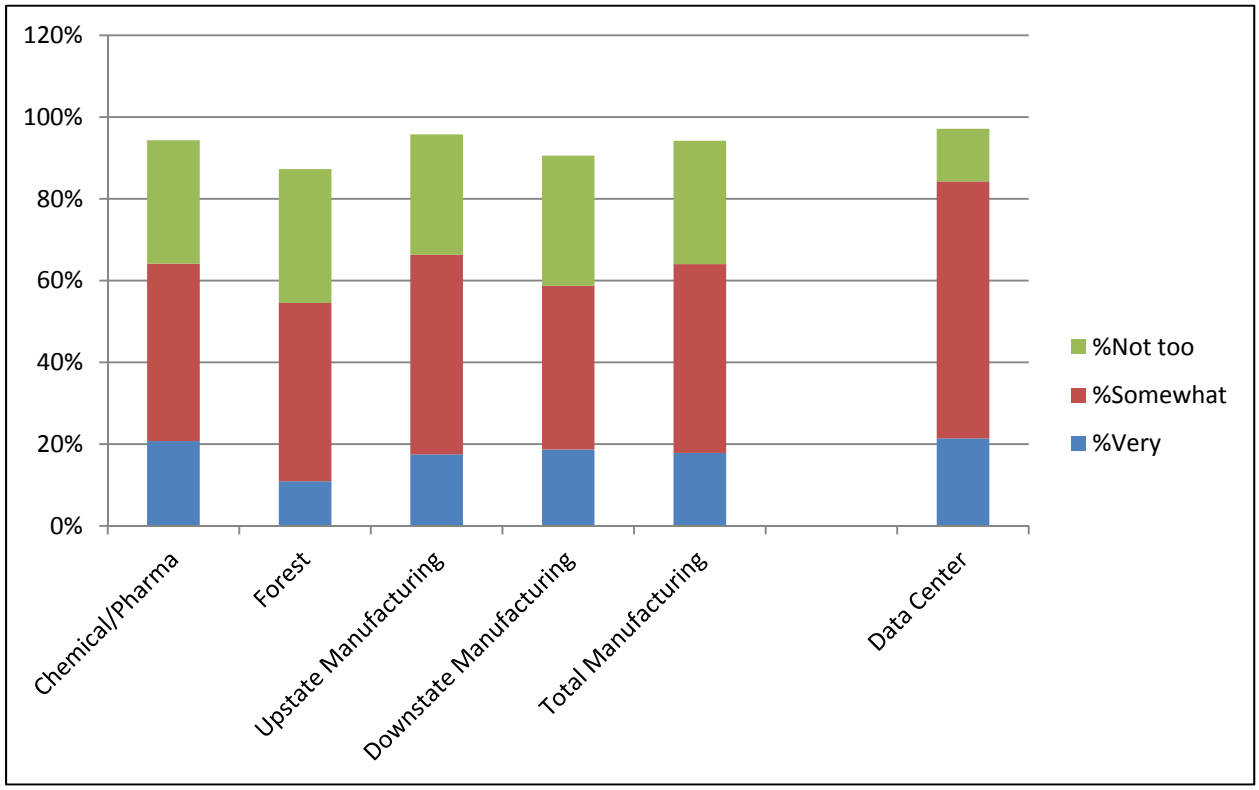


Source: MCA primary data collection efforts (n=130 and n=70 for EUC and DC in 2010-2011).

5.1.7 Familiarity with Methods for Energy Efficiency Integration

An important measurement indicator of NYSERDA's Industrial and Process Efficiency Program involves assessing the extent to which energy efficiency and energy management are being incorporated into the business practices of New York's manufacturing and data center organizations. As a first step in assessing this indicator, Figure 40 provides some baseline percentages. As shown in this figure, just over 60% of the manufacturing organization respondents stated that they are either "very" or "somewhat" familiar with the methods for implementing energy efficiency and energy management into business practices. For data centers, over 80% of respondents stated that they are either "very" or "somewhat" familiar with the methods for implementing energy efficiency and energy management into business practices. It is clear that there remains substantial opportunity within all groups to increase familiarity of methods for energy efficiency integration.

Figure 40. Familiarity with Integrating Energy Efficiency



Source: MCA primary data collection efforts (n=130 and n=70 for EUC and DC in 2010-2011).

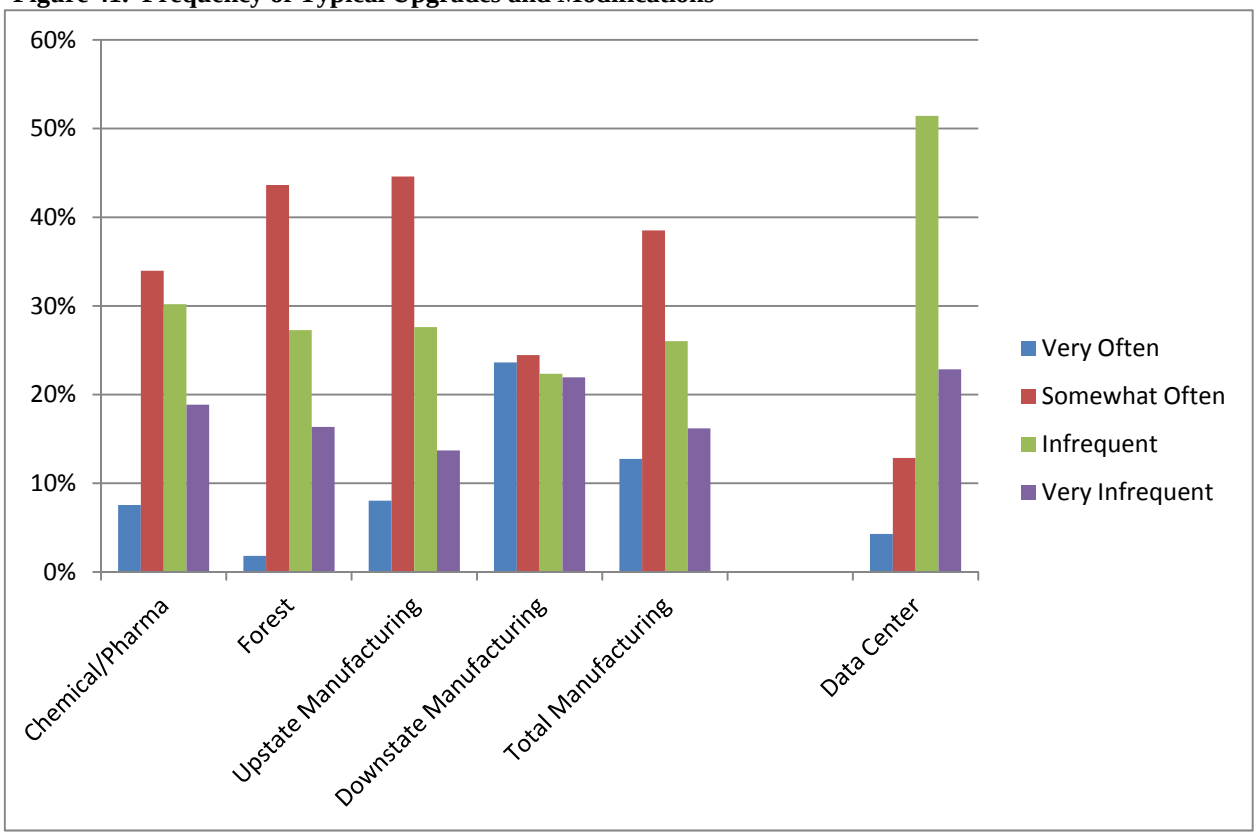
5.1.8 Frequency of Upgrades or Modifications

When asked how often the industrial and manufacturing systems, processes, or IT infrastructure components in their facilities are upgraded or modified, just over 50% of the total manufacturing respondents answered either "very often" (2 years or less) or "somewhat often" (every 3 to 5 years) (Figure 41). For data centers, less than 20% responded in this manner (4% said "very often" – less than 1 year, and 13% said "somewhat often" – between 1 and 2 years).[109]

This figure shows that for all manufacturing respondents, the most typical replacement period is between three and five years ("somewhat often"), followed by six to ten years ("infrequent") For all data center respondents the most typical replacement period is between three and four years ("infrequent").

[109] The time periods were determined by the survey team and were defined to the respondents at the time of questioning. Time periods were specifically defined as different for Manufacturing respondents and Data Center respondents.

Figure 41. Frequency of Typical Upgrades and Modifications



Source: MCA primary data collection efforts (n=130 and n=70 for EUC and DC in 2010-2011)

EUC: Very Often = <2 yrs, Somewhat Often = 3-5 yrs, Infrequent = 6-10 yrs, Very Infrequent = 10+ yrs.

DC: Very Often = <1 yr, Somewhat Often = 1-2 yrs, Infrequent = 3-4 yrs, Very Infrequent = 5+ yrs

As part of the survey effort, after responding with how often they replace or upgrade processes, manufacturers were asked if their upgrade cycle differs by industrial or manufacturing systems and process type. Data center respondents were asked if their upgrade cycle differs by IT component type. "Yes" responses to this question were over 90% and 80% respectively, with some systems replaced more often, and others having replacement cycles of 15 years or more. Actual replacement decisions are based mainly on process and economic needs.

Respondents were also asked to identify the time of year (by calendar quarter) that their companies did capital budgeting or major project planning. Table 24 shows the percentage of each respondent type that prepares their capital budgeting or performs major project planning in each fiscal year quarter. A majority of the manufacturing respondents report Quarter 4 as the quarter where major project planning or capital budgeting occurs. One exception amongst this group is downstate manufacturers that list Quarter 1 as the quarter within which such planning occurs. For data centers, budget planning appears to occur throughout the year, with slightly more respondents identifying Quarter 3 as the major planning quarter. This information could be used by program implementers to help identify the appropriate time to target individual market actor groups regarding potential process efficiency improvement investments.

Table 24. Quarter When Capital Budgeting or Major Project Planning Occurs

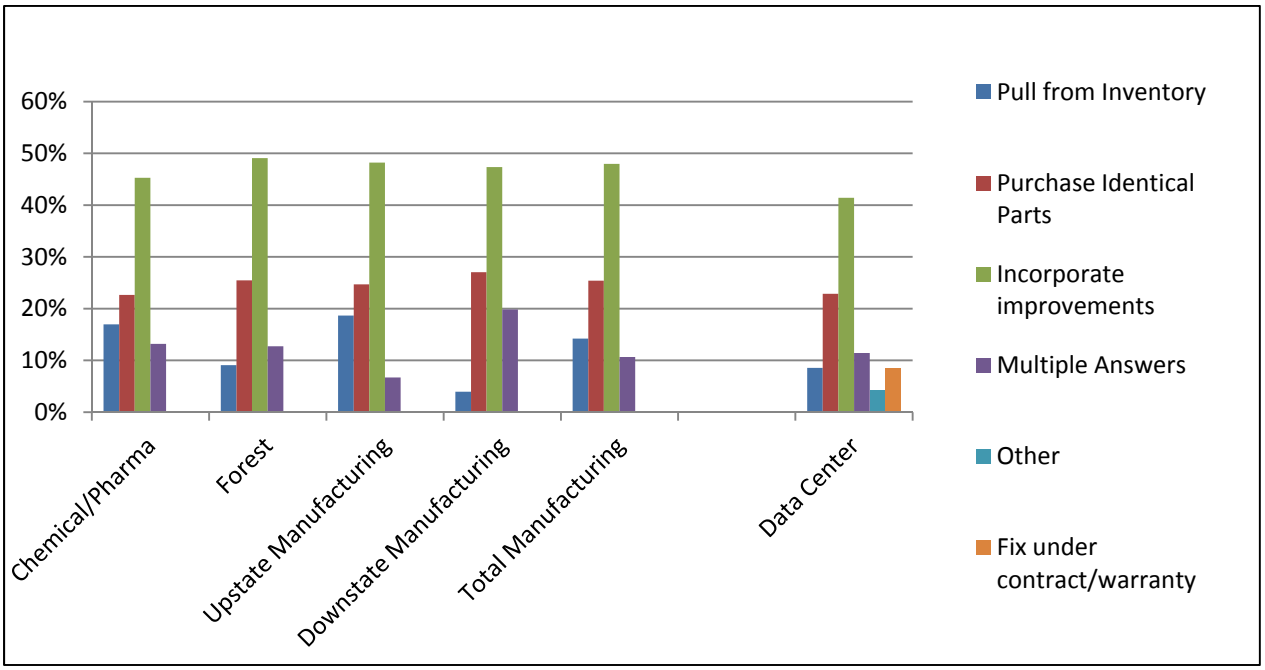
Respondent Type	Q1	Q2	Q3	Q4	Multiple Quarters	All Quarters
Chem/Pharm	0%	6%	25%	43%	2%	6%
Forest	13%	7%	9%	49%	0%	15%
Upstate	18%	2%	23%	44%	0%	0%
Downstate	28%	10%	4%	20%	2%	27%
Total Manufacturing	17%	5%	16%	40%	1%	11%
Data Center	17%	19%	29%	16%	10%	3%

Source: MCA primary data collection efforts (n=130 and n=70 for EUC and DC in 2010-2011)

5.1.9 How Replacements are Typically Made when System Components or Processes Fail

Large industrial systems and processes occasionally fail or break earlier than a company's planned upgrade cycle. Under such circumstances, replacements or repairs need to be made. These repairs and replacements are typically accomplished through one of three approaches: pulling from an inventory of spare parts, purchasing identical new parts, or assessing options and incorporating improvements (including replacement of failed equipment with the purchase of a new piece of equipment that can work effectively with such improvements). Figure 42 shows the approaches respondents said are used in their facilities. As can be seen in this figure, nearly 50% of the manufacturing respondents said that they assess options and incorporate improvements when making early replacement decisions. Over 40% of the data center respondents use this approach as well. Under all component replacement and repair circumstances, opportunities exist to educate customers regarding the benefits of incorporating efficiency improvements into process equipment replacements. Some data center respondents (less than 10%) specified (as an "other" answer) relying on service agreements or warrantees to address failed equipment and early replacement needs. Under these service agreement/warranty circumstances, it is presumed to be more difficult to identify and incorporate efficiency improvements.

Figure 42. How Replacements are Typically Made When Components Fail



Source: MCA primary data collection efforts (n=130 and n=70 for EUC and DC in 2010-2011)

5.2 CURRENT INVESTMENT LEVELS, TYPES OF IMPROVEMENTS, AND ASSOCIATED PRACTICES AND PERCEPTIONS

In this section, current levels of investment, types of process efficiency improvements, and associated practices and perceptions are presented. This includes respondents' perceptions regarding the costs for and types of technologies invested in, confidence in new technologies, familiarity with the benefits of energy efficiency improvements, importance placed on energy efficiency, and the financial-based criteria considered as important factors for improving energy efficiency.

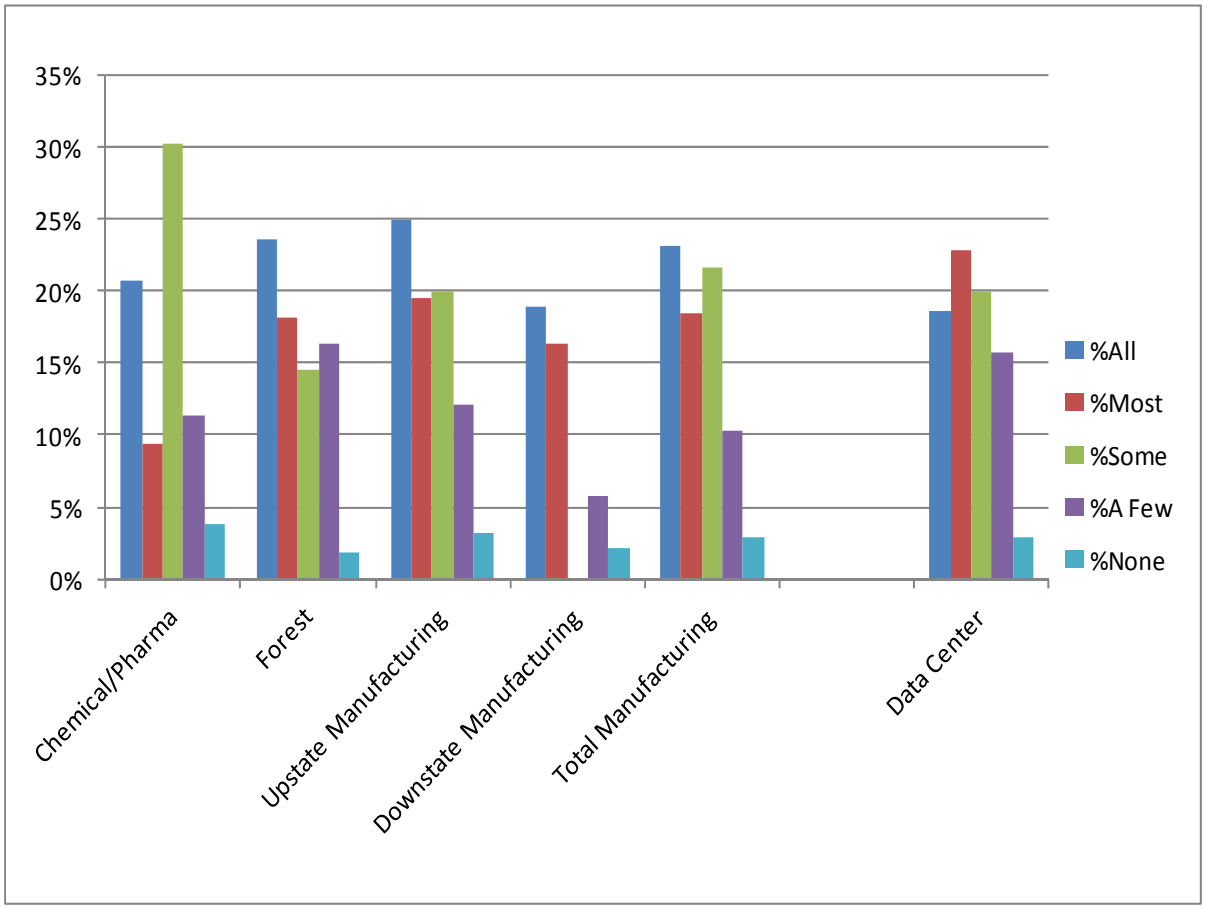
5.2.1 Projects Completed and Associated Energy, Demand, and GHG Reductions

When asked how many process improvement projects were completed over the past five years, approximately 55% of the manufacturing organizations answered between one and six with23% reporting seven or more. Fifty percent (50%) of the data center respondents said that their companies completed between one and six IT infrastructure improvement projects with 45% completing seven or more over the past five years.

A similar question was asked regarding the number of projects completed at their organizations within the past 12 months with approximately 52% of manufacturing and data center facilities saying five or less. These results support the Program's premise that there are a substantial number of process and IT improvement projects being implemented in New York.

Figure 43 shows the percentage of respondents who believe their process and IT improvement projects have resulted in energy and demand savings and/or reduced emissions. As can be seen in this figure, less than 45% of the manufacturing and data center respondents felt that all or most of their projects resulted in savings, with 15-25% responding that all past improvement projects have resulted in savings. Over 30% felt that only "some" or "a few" of these projects yielded savings, and less than 5% "did not see savings" from any improvement project. This suggests that ample opportunity exists to incorporate energy efficiency benefits into future process and IT improvement projects. This figure provides important baseline data from which to help determine the extent to which future Program efforts are increasing the number of customers who realize savings on all or most of their project improvements.

Figure 43. Past Improvement Projects that have Resulted in Savings



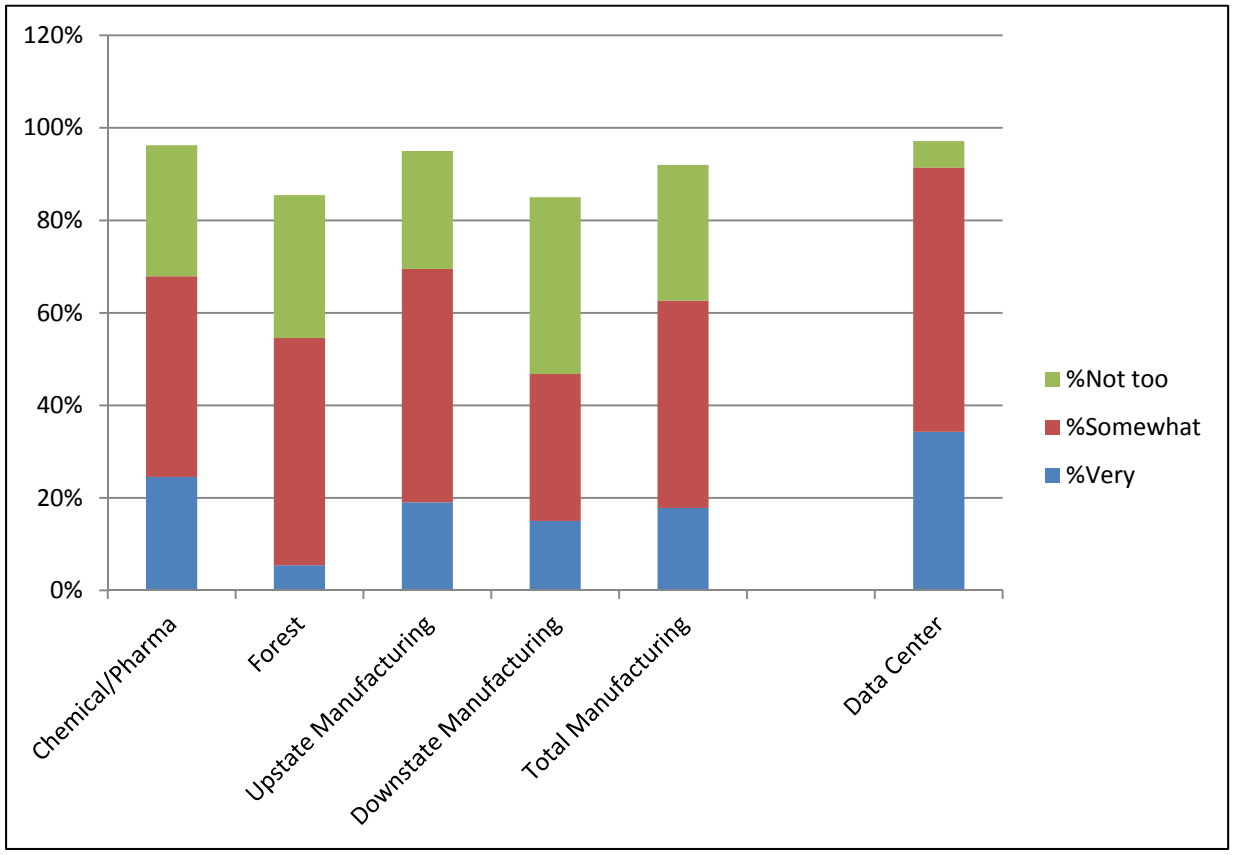
Source: MCA primary data collection efforts (n=130 and n=70 for EUC and DC in 2010-2011)

Totals do not add to 100% due to "don't know" and "not applicable" answers

5.2.2 Familiarity with the Benefits of Process Efficiency Improvements

Manufacturing and data center respondents were asked to assess their level of familiarity with the full range of benefits associated with process and IT efficiency improvements. As shown in Figure 44, over 60% of the manufacturers and more than 90% of the data center respondents answered that they are either "very" or "somewhat" familiar. Nearly 60% of the upstate manufacturers claimed to be either "very" or "somewhat" familiar while only 47% of downstate manufacturers responded in this manner. Also worthy of noting is the forest products segment, which shows the least familiarity with only 5% answering "very familiar" and 49% "somewhat familiar." Given the fact that less than 20% of the manufacturers and 35% of the data center respondents claimed to be "very" familiar with the benefits of process efficiency improvements, there appears to be substantial opportunities for increased education across all targeted industry types.

Figure 44. Familiarity with Process Efficiency Integration Benefits



Source: MCA primary data collection efforts (n=130 and n=70 for EUC and DC in 2010-2011)

Based on actual projects that respondents' organizations claim to have implemented, respondents were asked to asses how much of a number of specific benefits they thought their company's projects may have realized. As shown in Table 25, between 60% and 76% of respondents believed their projects achieved either "substantial" or "some" reliability, productivity, cost savings, and energy savings benefits. In addition, 70% of data center respondents said they realized either "substantial" or "some" quality improvement benefits from previously implemented improvement projects. Assuming that these self-reported estimates are reasonably accurate, even with these high percentages of respondent benefits recognition, there remains a large population within the targeted industries where more information on benefits can be communicated.

Table 25. Benefits Realized by Past Improvement Projects (% seeing "substantial" or "some" benefit)

Benefit	Chem/Pharm	Forest	Upstate	Downstate	Total	Data Center
Reliability Improvements	66%	60%	64%	67%	65%	76%
Productivity Improvements	64%	58%	65%	61%	64%	66%
Cost Savings	66%	56%	67%	56%	63%	63%
Energy Savings	58%	56%	64%	55%	61%	60%
Quality Improvements	60%	51%	59%	56%	58%	70%
Water Waste Reductions	49%	25%	40%	32%	38%	N/A
Emission Reductions	36%	25%	36%	41%	37%	N/A

Source: MCA primary data collection efforts (n=130 and n=70 for EUC and DC in 2010-2011)

Beyond just recognizing that benefits exist, this project assessed the extent to which respondents were confident that results from such benefits would persist over time. Table 26 shows that there is a reasonably high level of confidence (mostly between 60% and 74%) among total manufacturing and data center respondents that each of the listed benefits associated with their project improvements will persist over time. Two noteworthy exceptions among total manufacturing respondents include emissions reductions (43%) and water/waste reductions (39%). This table also shows that variations in confidence exist for certain benefits between upstate and downstate manufacturing respondents and between chemical/pharmaceutical and forest product manufacturers.

Table 26. Confidence in Persistence of Benefits of Improvement Projects

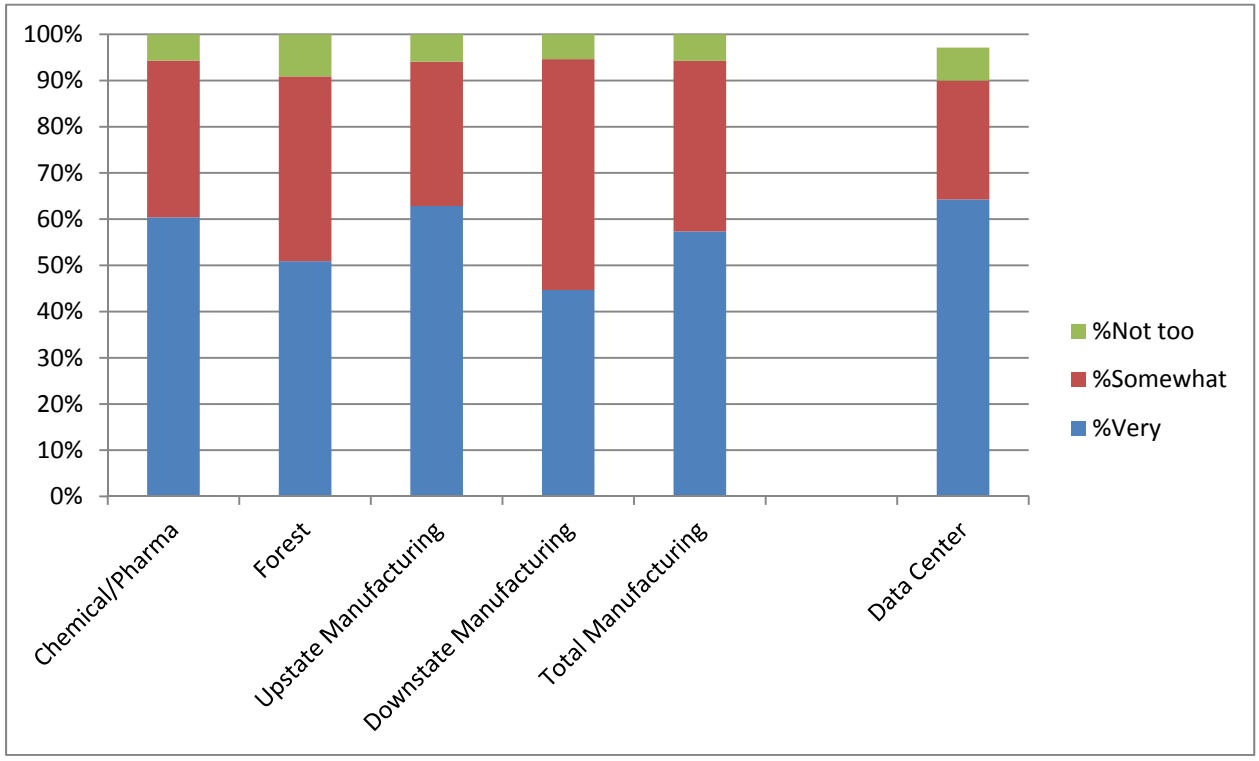
Benefit	Chem/Pharm	Forest	Upstate	Downstate	Total	Data Center
Cost Savings	68%	69%	73%	67%	71%	71%
Reliability Improvements	68%	56%	66%	65%	66%	74%
Productivity Improvements	66%	60%	69%	55%	65%	70%
Energy Savings	66%	65%	68%	53%	63%	66%
Quality Improvements	60%	55%	62%	54%	60%	73%
Emissions Reductions	42%	25%	46%	38%	43%	N/A
Water Waste Reductions	51%	20%	43%	28%	39%	N/A

Source: MCA primary data collection efforts (n=130 and n=70 for EUC and DC in 2010-2011) - % "very" or "somewhat" confident

5.2.3 Importance of Reducing Energy Demand and Consumption

Respondents were asked how important it is to reduce energy demand and consumption in their companies. As shown in Figure 45, 90% or more of the total manufacturing and data center respondents answered either "very" or "somewhat" important (with more than 50% of these two groups answering "very"). The percentage of upstate and downstate manufacturing organizations that perceive reducing energy demand and consumption as "very important" ranged from 63% to 45%, respectively. Overall, this figure shows that all respondents generally see reduced consumption as important, though there is a portion of the population that sees it as only "somewhat" or less important.

Figure 45. Importance of Reducing Energy Demand and Consumption



Source: MCA primary data collection efforts (n=130 and n=70 for EUC and DC in 2010-2011)

5.2.4 Financial Investments in Improvements and Funding Sources

Respondents were asked how many dollars have been invested in process efficiency improvements at their facilities over the past five years (and the past 12 months). Table 27 shows the mean and median of reported responses. As can be seen in this table, the average investment at respondent facilities (mean) over the last five years was just under $6 million per facility for the total manufacturing group (just over $500,000 per facility over the last 12 months). Data center respondents reported an average of approximately $5 million in IT improvement investments at their individual facilities over the past five years (nearly $1.3 million per facility over the last 12 months). Significantly more investment has occurred in chemicals/pharmaceutical facilities than in forest products, and in the downstate region versus upstate.

Table 27. Investments in Improvements (mean and median $ reported over time period)

Segment	Mean (5 Years)	Median (5 Years)	Mean (12 months)	Median (12 months)
Chemical/Pharma	$8,583,000	$250,000	$392,000	$50,000
Forest	$1,006,000	$150,000	$389,000	$10,000
Upstate Mfg	$4,596,000	$500,000	$642,000	$100,000
Downstate Mfg	$9,712,000	$300,000	$207,000	$10,000
Total Mfg	$5,935,000	$500,000	$510,000	$73,000
Data Centers	$5,005,000	$2,000,000	$1,288,000	$500,000

Source: MCA primary data collection efforts (n=130 and n=70 for EUC and DC in 2010-2011)

When asked to identify the sources of funding for these types of investments, as shown in Table 28, a majority of the respondents (67%) across the total manufacturing and data center groups answered "internal capital." For the chemical and pharmaceutical facilities, 77% of respondents identified internal capital as their funding source. It was noteworthy to see that 12% of total manufacturing respondents identified NYSERDA programs as a funding source (16% forest, 14% upstate, and only 4% of data center respondents). This can be interpreted to mean that there remains substantial opportunity for NYSERDA Industrial and Process Efficiency Program uptake.

Table 28. Funding Sources used for Improvements (% stating they use funding source[110])

Funding Source	Chem/Pharm	Forest	Upstate	Downstate	Total	Data Center
Internal Capital	77%	67%	69%	62%	67%	67%
NYSERDA Programs	6%	16%	14%	6%	12%	4%
Financing	8%	9%	9%	14%	10%	0%
Federal Tax Credits	6%	5%	4%	10%	6%	1%
Incentives	4%	5%	8%	0%	5%	7%
Utility Funds	4%	5%	7%	2%	5%	N/A
Other	2%	7%	3%	2%	3%	6%
Grants	N/A	N/A	N/A	N/A	N/A	4%
Non-NYSERDA	N/A	N/A	N/A	N/A	N/A	3%
Investors	N/A	N/A	N/A	N/A	N/A	3%

Source: MCA primary data collection efforts (n=130 and n=70 for EUC and DC in 2010-2011)

Percentages do not all add to 100% due to "refused" and "don't know" answers, and in certain circumstances, percentages add to over 100% due to respondents' ability to report that they used multiple sources.

5.2.5 Decision Factors Related to Process Efficiency or IT System Improvement Projects

Respondents were asked to assess the importance of different factors that organizations might consider when deciding to move forward with process efficiency improvement investments. As shown in Table 29, across the total manufacturing respondent group, financial criteria, safety, and quality were the highest ranked factors (91%, 87% and 86% respectively). For data centers, quality, customer impact, and financial criteria were the highest ranked (96%, 89% and 83% respectively). Safety considerations ranked higher with upstate manufacturers (91%) than with downstate (77%). Consideration of energy efficiency factors ranked substantially lower among manufaturer and data center respondents (55% to 63%) with the highest percentage of respondents ranking this as a "major factor" being located upstate. The desire to be green (or corporate sustainability) also ranked relatively low among respondents (44% to 57%) with the highest percentage of respondents ranking this as a "major factor" being located downstate. The highest ranking factors should be used to help motivate investment in future process and IT

[110] Percentages do not add to 100%. Firms could report that they used multiple sources.

efficiency improvement projects. However, these results show that there is much room to educate and increase targeted facilities' awareness of the benefits of energy efficiency.

Table 29. Major Factors to Moving Forward with Improvements (% reporting factor as a "major" one)

Factor	Chem/Pharm	Forest	Upstate	Downstate	Total	Data Center
Financial Criteria	89%	89%	89%	96%	91%	83%
Safety Improvement	89%	76%	91%	77%	87%	61%
Quality	84%	84%	87%	84%	86%	96%
Process Improvement	77%	71%	82%	72%	79%	74%
Customer Impact	75%	78%	81%	72%	78%	89%
Employee Impact	66%	58%	72%	61%	69%	63%
EE Opportunities	55%	55%	63%	56%	61%	56%
Sustainability	45%	44%	45%	57%	48%	56%
Scrap Reduction	38%	60%	52%	36%	47%	N/A
Timing	30%	27%	29%	45%	34%	37%

Source: MCA primary data collection efforts (n=130 and n=70 for EUC and DC in 2010-2011)

Respondents were also asked to rank the importance of a number of financial factors when deciding to move forward with process efficiency improvement investments. As shown in Table 30, the availability of internal funding (capital budget) ranked highest with responses ranging from 82% to 91%. A similar number of downstate manufacturers (78%) ranked price of energy and availability of internal funding (76%) as critical factors. Also, the availability of outside co-funding or rebates (incentives) ranked somewhat lower across all respondents (26% to 64%), where the highest ranking (64%) was for incentives within the forest industry respondent group. This might indicate an opportunity to increase installation of process efficiency improvements within the manufacturing sectors, if more organizations were made aware of the availability of rebates or program incentives.

Table 30. Major Factors to Improvements (% reporting factor as a "major" one)

Factor	Chem/Pharm	Forest	Upstate	Downstate	Total	Data Center
Internal Funding	90%	82%	87%	76%	83%	91%
Price of energy	66%	75%	73%	78%	74%	49%
Incentives	55%	64%	59%	58%	58%	41%
Outside Co-Funding	34%	40%	42%	26%	37%	41%

Source: MCA primary data collection efforts (n=130 and n=70 for EUC and DC in 2010-2011)

Assuming that funding is available, respondents were asked to identify the main financial criterion used when deciding to move forward with a process efficiency improvement project. As shown in

Table 31, for manufacturing respondents, return on investment is the most important financial factor (ranging from 30% to 40%). For data centers, lifecycle costs and return on investment are rated about the same at 20% and 19% respectively.

Table 31. Main Financial Criterion for Improvements (% reporting as the single most important)

Financial Criterion	Chem/Pharm	Forest	Upstate	Downstate	Total	Data Center
Return on Investment	40%	31%	35%	30%	33%	19%
Payback	15%	20%	22%	18%	21%	10%
Other	11%	18%	13%	10%	12%	17%
First Cost	8%	7%	11%	14%	12%	6%
Lifecycle Costs	6%	5%	5%	5%	5%	20%
Quality/Impact on Customer	6%	4%	3%	9%	4%	7%
Internal Rate of Return	4%	4%	4%	4%	4%	4%
Need for Project	N/A	N/A	N/A	N/A	N/A	11%

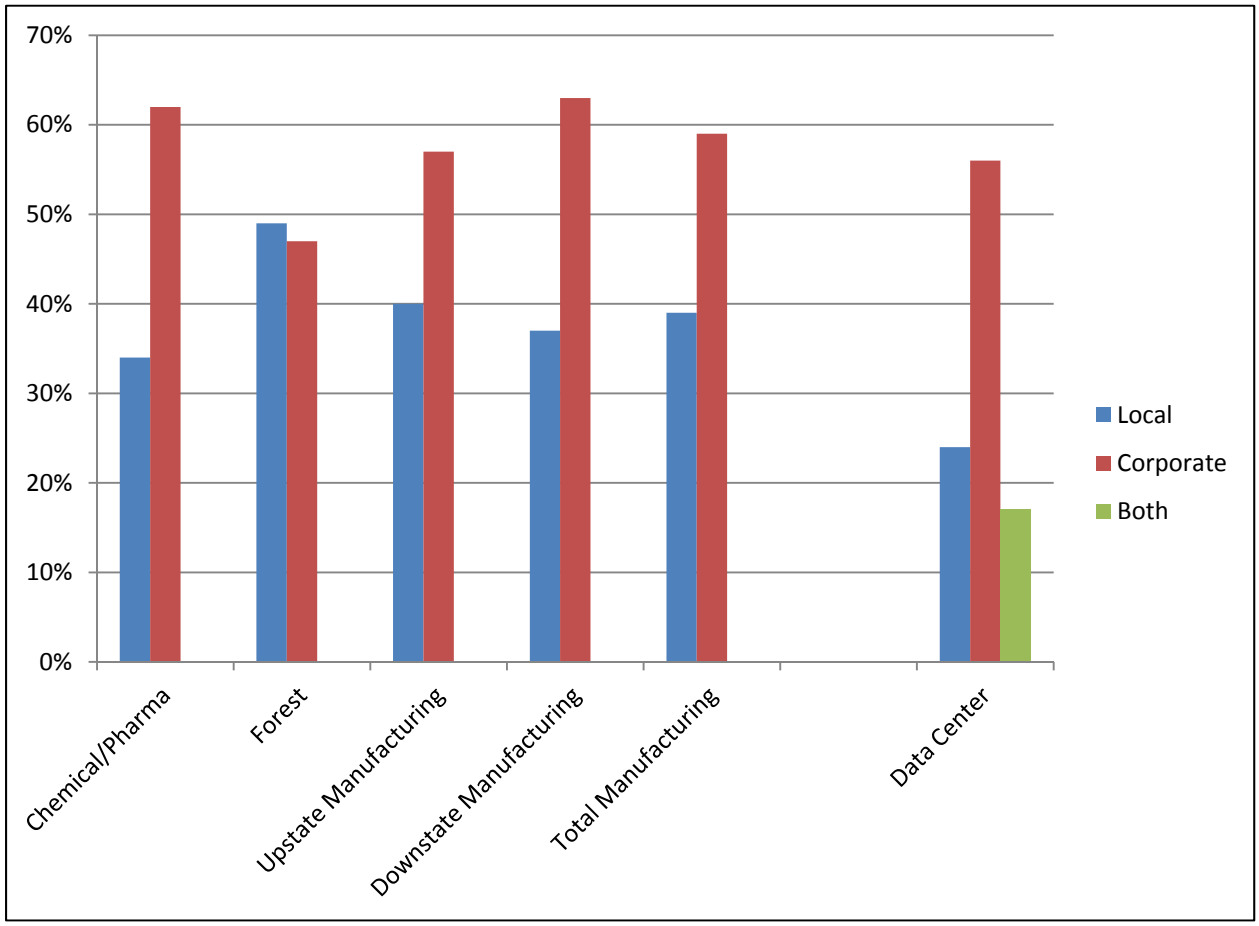
Source: MCA primary data collection efforts (n=130 and n=70 for EUC and DC in 2010-2011)

*Percentages do not add up to 100% due to "Refused," "Don't Know," and "Not Applicable" answers.

For those respondents that identified payback as a major financial criterion, a follow-up question was asked regarding their organization's typical payback threshold. For respondents that provided an answer to this question, payback periods ranged from a low of six months to a high of five years, with most responses at or below two years. Similarly, for those respondents that identified return on investment or internal rate of return as a major financial criterion, a follow-up question was asked regarding their organization's typical investment hurdle rate of return. For respondents that provided an answer to this question, hurdle rates ranged from a low of 3% to a high of 20% or more, with no discernible typical level emerging.

Finally for this section, respondents were asked to identify what level within their organization decisions are made regarding the need for, design, and implementation of process and IT improvement projects. As shown in Figure 46, a majority of respondents (between 56% and 63%) identified their corporate offices as the level where such decisions are typically made. This suggests that the Industrial and Process Efficiency Program will need to target the corporate level decision-makers when looking to increase participation and installation of process and IT efficiency improvements. One exception to this finding was in the forest products industry where 49% identified the local facility office as the decision point, with 47% of these decisions being made at the corporate office level.

Figure 46. Level of Organization Involved in Improvement Decision Making



Source: MCA primary data collection efforts (n=130 and n=70 for EUC and DC in 2010-2011)

5.3 CURRENT BARRIERS IMPACTING INVESTMENT

In this section, current barriers to investment in process and IT efficiency improvement projects are assessed. This includes the perceived significance of certain barriers to improving energy efficiency, and the perceived single largest barrier to improvements.

5.3.1 Major and Minor Barriers

Respondents were first read a list and asked to rank a number of potential barriers that may or may not prevent their companies from incorporating energy efficiency into their process improvement projects. For each potential barrier, allowed responses were either "major barrier," "minor barrier," "not at all a barrier," "refused," or "don't know." As shown in

Table 32, competing capital demands was consistently identified as a major barrier, with responses ranging from 50% for downstate manufacturing organizations to 78% upstate and 61% for data centers.

Table 32. Major Barriers to Improvement* (% saying barrier is a "major" one)

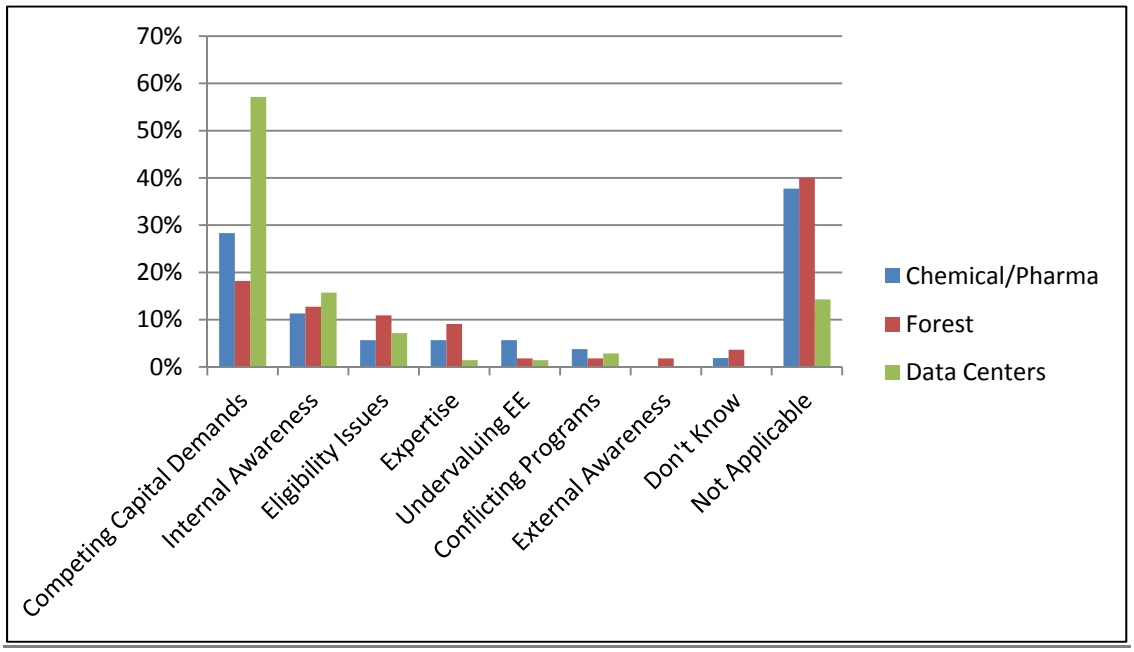
Barrier	Chem/Pharm	Forest	Upstate	Downstate	Total	Data Center
Competing Capital Demands	75%	73%	78%	50%	69%	61%
Eligibility Issues	34%	44%	37%	32%	36%	21%
Expertise	23%	29%	28%	26%	27%	16%
Undervaluing EE	19%	15%	18%	42%	25%	26%
Internal Awareness	23%	18%	25%	23%	24%	20%
External Awareness	6%	15%	20%	12%	18%	13%
Conflicting Programs	9%	11%	17%	13%	16%	15%

Source: MCA primary data collection efforts (n=130 and n=70 for EUC and DC in 2010-2011)

*Responses add to over 100% since respondents were allowed to identify more than one barrier as being "major."

In addition to labeling multiple barriers as major, minor, or not at all a barrier, respondents were asked to identify the single largest barrier encountered by their organization when considering implementation of efficiency improvement projects within their processes or IT systems. Figure 47 shows the percentage of chemical/pharmaceutical manufacturers, forest products manufacturers, and data centers that called each individual item the single "largest" barrier to incorporating energy efficiency into their process or IT infrastructure improvement projects. As can be seen from this figure, competing demand for capital is the largest single barrier for all industry types. This is especially true for data centers at 57%. Internal awareness was also a common response (11-15%). "Not applicable" also shows up quite a bit in this figure (38% to 40% for Chemical/Pharmaceutical and Forest Products, respectively, and 15% for Data Centers). This is because the question was only asked of respondents that had identified more than one of the barriers identified in Table 30 as a "major" barrier.

Figure 47. The Largest Barrier to Improvement



Source: MCA primary data collection efforts (n=130 and n=70 for EUC and DC in 2010-2011)

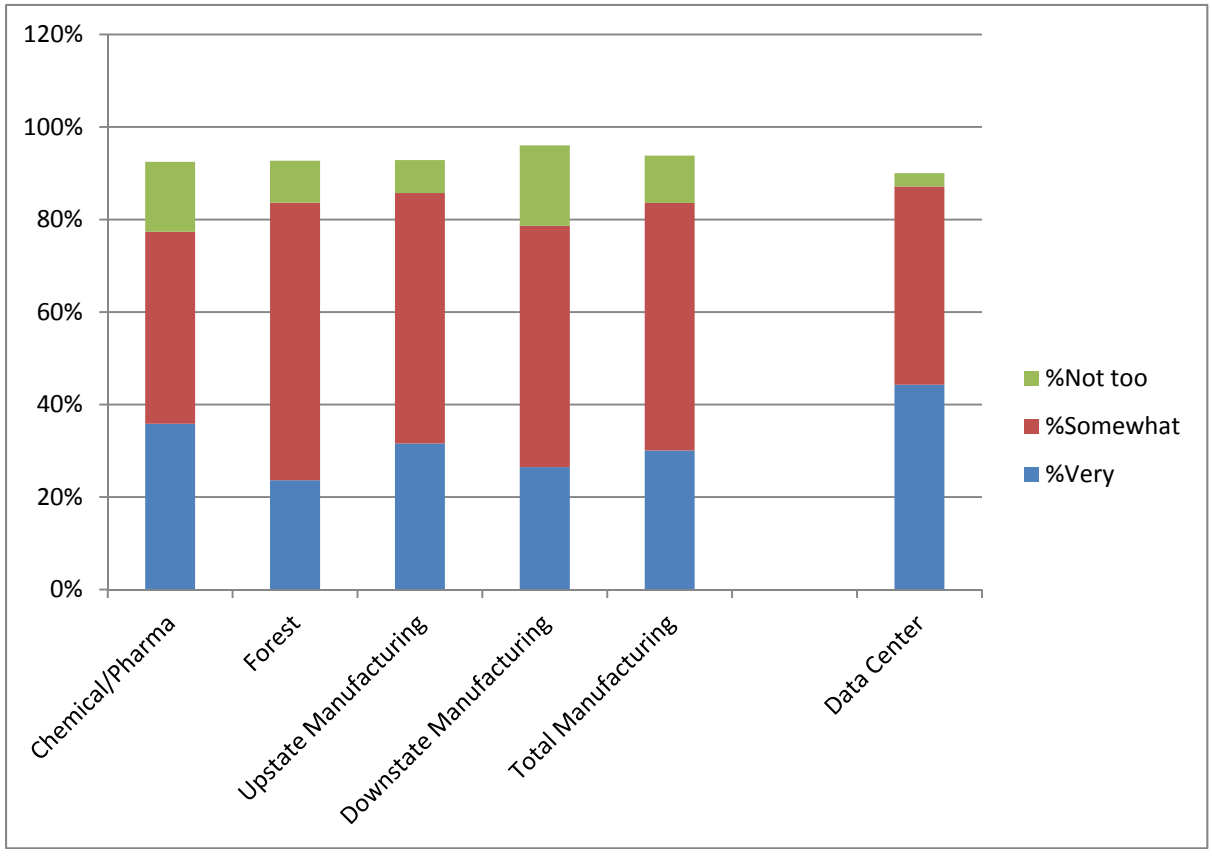
5.4 VALUE OF TECHNICAL ASSISTANCE SERVICES

In this section, the value of technical assistance services is assessed. This includes the perception of the market's capability to provide process efficiency improvements, the perception of the service providers' technical capabilities to provide these improvements, the type of assistance the respondents currently use for energy efficiency projects and how they typically pursue it, where ideas for improvements would likely come from within their organization, and the types of other technical assistance they receive.

5.4.1 Perceived Capability of the Market to Provide Services

Respondents were asked to assess how capable the market is to provide process efficiency and IT infrastructure improvement services. As shown in Figure 48, nearly 85% of the total manufacturing respondents and almost 90% of data centers reported that the market is either "very" or "somewhat capable" to provide services. When looking only at those that responded "very capable," this percentage drops substantially (30% manufacturing and 44% data centers). There is some variation between industry types, but a key conclusion is that there remains substantial room for increasing the market's capability to provide process efficiency and IT infrastructure improvement services.

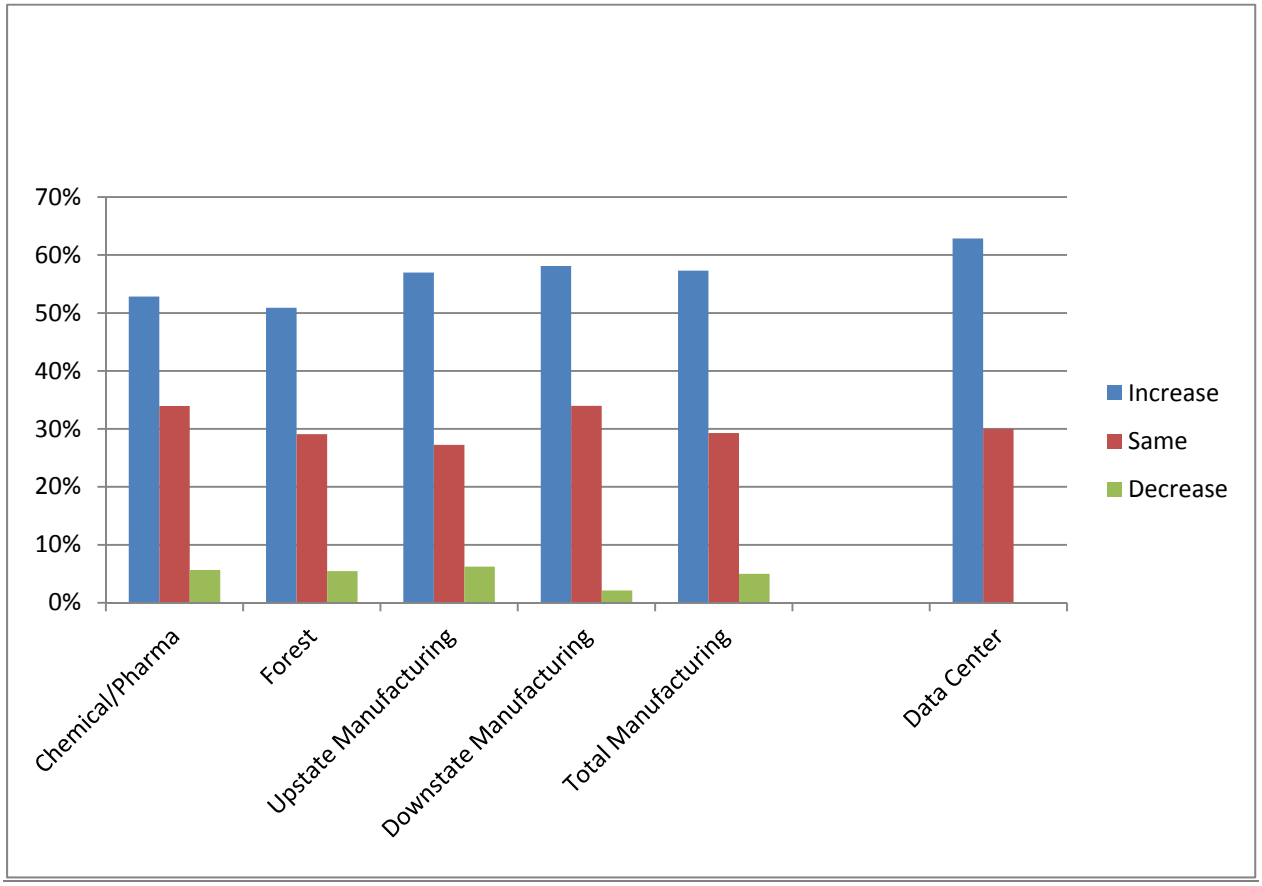
Figure 48. Confidence in the Market's Capability to Provide Services



Source: MCA primary data collection efforts (n=130 and n=70 for EUC and DC in 2010-2011)

When asked if the number of active process and IT efficiency improvement product and service providers has increased over the past three years, as shown in Figure 49, over 50% of the manufacturing respondents felt that it has (over 60% of data center respondents). Less than 30% of total respondents (both data center and manufacturers) felt that the number has stayed the same. Less than 5% reported that the number has decreased over the past three years.

Figure 49. Change in Providers over the Past Three Years



Source: MCA primary data collection efforts (n=130 and n=70 for EUC and DC in 2010-2011)

For those who responded that the number of service providers has increased, a question was asked to identify the potential reasons why. As shown in Table 33 "market opportunity" was the most noted reason for the increase (22% among manufacturer respondents and 39% among data centers).

Table 33. Perceived Reasons for Increase in Service Providers (% that mentioned reason).

Reason for Increase	Chem/Pharm	Forest	Upstate	Downstate	Total	Data Center
Market Opportunity	15%	22%	23%	21%	22%	39%
Increased Awareness	9%	0%	3%	14%	7%	4%
Desire to be Green	6%	9%	5%	4%	5%	10%
Economy	2%	5%	3%	4%	3%	1%
Regulatory Change	8%	2%	4%	0%	3%	1%
Other	4%	2%	3%	2%	3%	0%
Climate Change	2%	0%	0%	2%	1%	1%
Better Technology	N/A	N/A	N/A	N/A	N/A	3%
Energy Expensive	N/A	N/A	N/A	N/A	N/A	3%

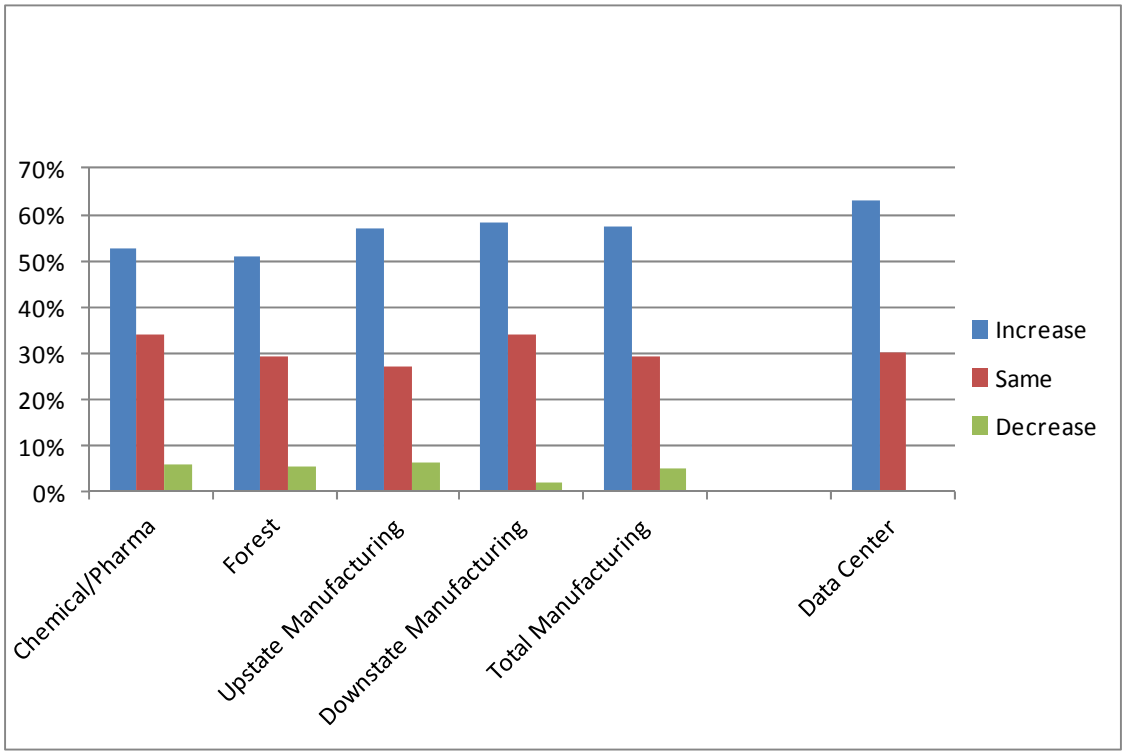
Source: MCA primary data collection efforts (n=130 and n=70 for EUC and DC in 2010-2011)

Note: Reasons were not read to respondents

5.4.2 Change in the Technical Capabilities of Service Providers

Respondents were also asked about the capabilities of the market's process and IT efficiency improvement service product and providers. As shown in Figure 50, approximately 50% of respondents (both manufacturer and data centers) believe that service provider capabilities have increased over the past three years. Chemical/pharmaceutical manufacturers perceive the largest increase at 59%. Less than 6% of all industry types thought the technical capabilities decreased. This figure is an important baseline to measure against in the future as the Program attempts to improve the technical capabilities of process efficiency service providers.

Figure 50. Perceived Technical Capability Changes over the Past Three Years

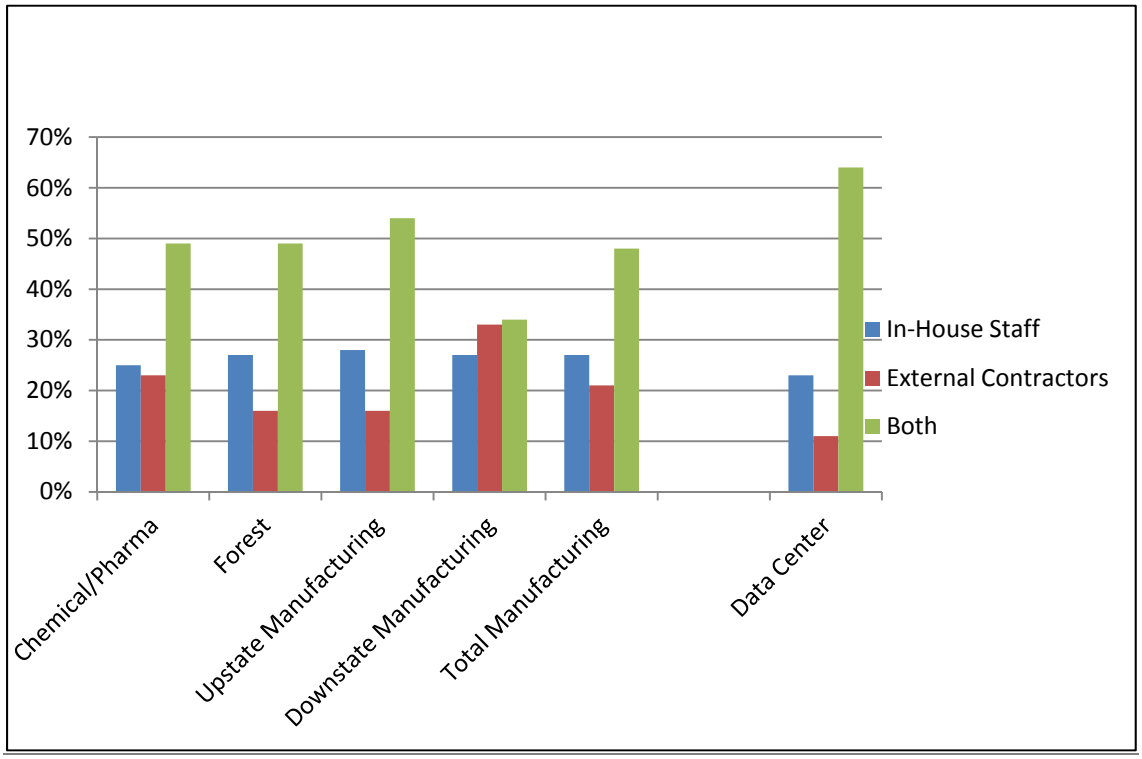


Source: MCA primary data collection efforts (n=130 for EUC in 2010-2011)

5.4.3 Type of Personnel and Sources Used for Process Improvement Projects

Respondents were asked to identify the extent to which in-house staff and contractors are used to assist with process and IT efficiency improvement projects. As shown in Figure 51, facilities most typically use a combination of both in-house and external assistance. Downstate manufacturers appear to rely more heavily on external contractors than do upstate manufacturers (33% downstate, compared to 16% upstate), while a similar percentage of upstate and downstate manufacturers responded that they use in-house staff. This might show that program offerings downstate could benefit from more heavily targeting TSPs and other external assistance with education, while a larger percentage of education and outreach to upstate manufacturers may need to be targeted in-house to increase the Program's effectiveness.

Figure 51. Use of In-House and External Assistance for Improvement Projects



Source: MCA primary data collection efforts (n=130 and n=70 for EUC and DC in 2010-2011)

Respondents were also asked to identify the primary source for process and IT efficiency improvement ideas. As shown in Table 28, the majority of ideas among manufacturing respondents come from senior management (77%) and facilities managers (65%). For data centers, the chief process engineer is the primary source of ideas (63%), followed by facilities manager (47%) and senior management (46%). Looking more closely at individual manufacturing sectors and upstate downstate respondents, other differences can be seen. Although outside sources and suppliers/contractors are not identified as often as internal sources for ideas, they still represent between 22% and 38% of respondent identified primary sources for project ideas. This table should be looked at closely as it reveals different market actors who could be targeted for each industry sector within the Program.

Table 34. Primary Source of Ideas for Improvement Projects (% saying source is a primary source)

Source of Ideas	Chem/Pharm	Forest	Upstate	Downstate	Total	Data Center
Senior Management	64%	80%	74%	84%	77%	46%
Facilities Manager	81%	49%	73%	48%	65%	47%
Chief Process Engineer	40%	29%	39%	20%	33%	63%
Outside Sources	34%	22%	23%	36%	27%	23%
Suppliers or Contractors	23%	38%	27%	26%	27%	34%
Users and operators of IT equipment	N/A	N/A	N/A	N/A	N/A	33%

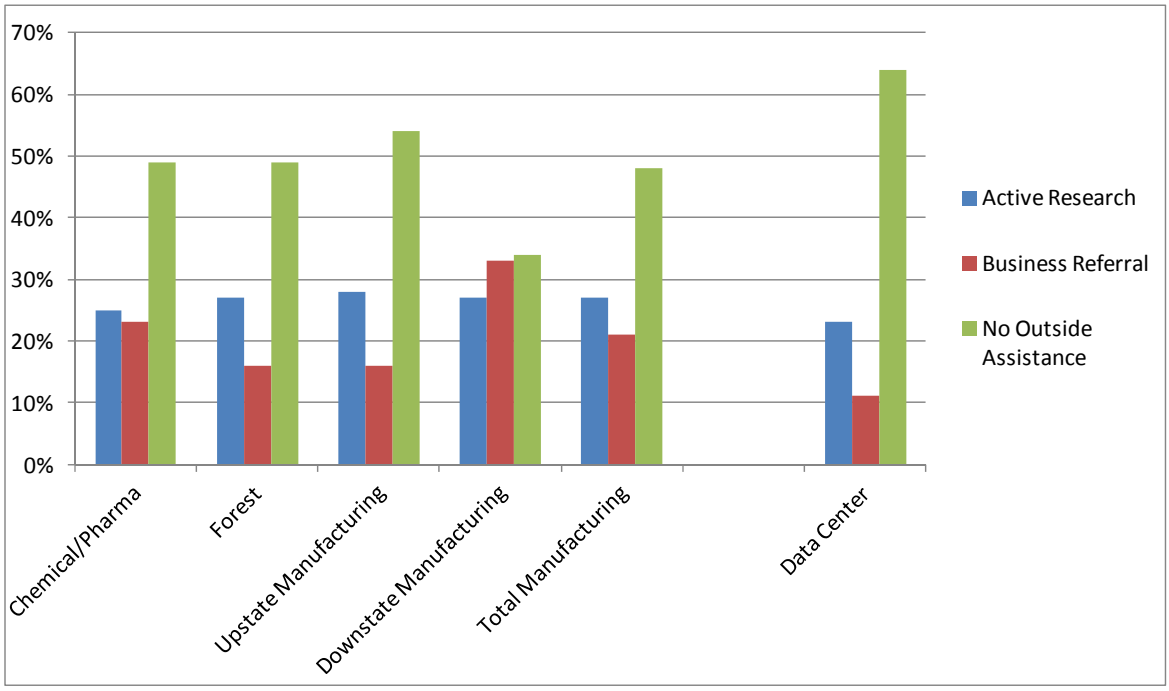
Source: MCA primary data collection efforts (n=130 and n=70 for EUC and DC in 2010-2011)

Percentages do not add to 100% as each "source of ideas" was asked individually – multiple responses were acceptable.

5.4.4 How and When Outside Assistance is Pursued

Respondents were asked to identify how their companies most typically pursue outside assistance regarding process and IT improvement projects. As shown in Figure 52, a majority of respondents (nearly 50% across the manufacturing group and over 60% of data centers) said that they do not seek outside assistance for these types of projects. Between 20% and 25% of respondents conduct active research and contact service providers on their own. Less than 20% of the manufacturing respondents and 10% of data centers rely on business referrals. One noteworthy exception to the use of business referrals is found in downstate manufacturing where over 30% of outside assistance is pursued in this manner.

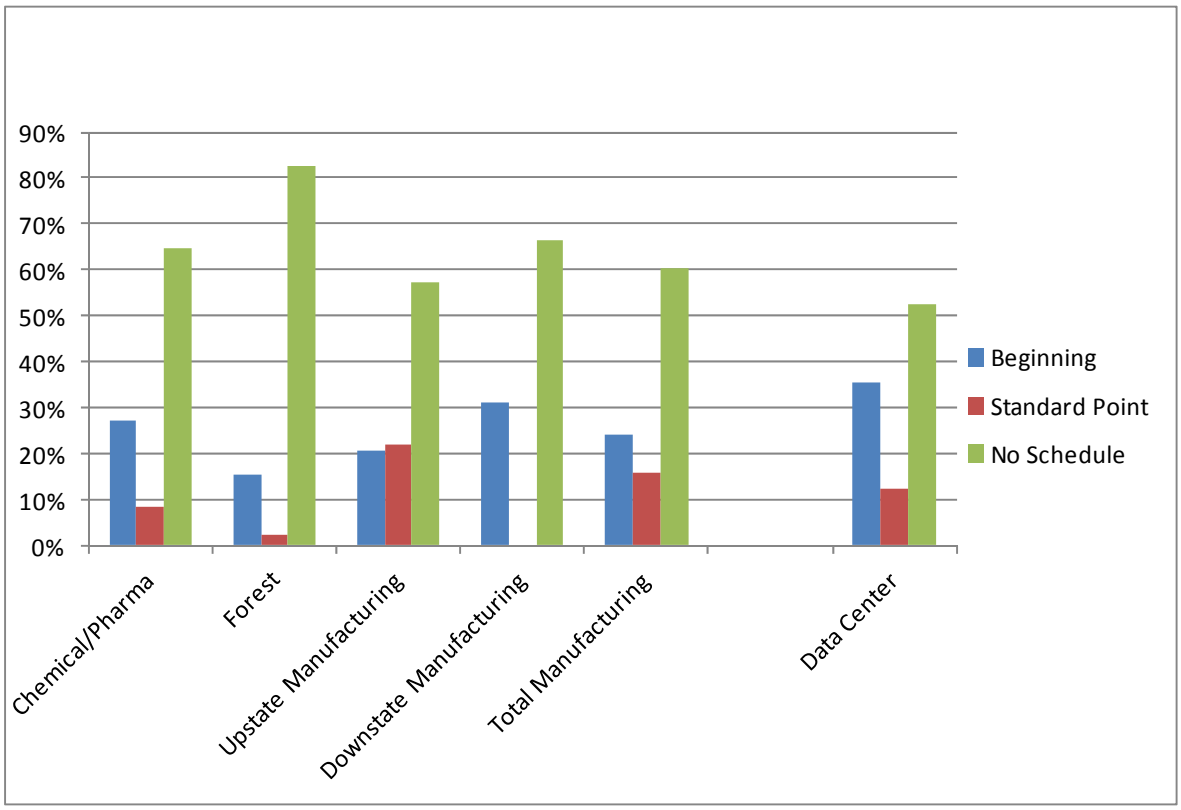
Figure 52. How Outside Assistance is Most Typically Pursued



Source: MCA primary data collection efforts (n=130 and n=70 for EUC and DC in 2010-2011)

Respondents were also asked when their companies typically pursue outside assistance regarding process and IT improvement projects. As shown in Figure 53, the majority (52% to over 80%) of respondents do not pursue assistance at any set point. A range of 15% to 35% of all respondents say that they pursue outside support starting at the beginning of their projects. A smaller percent say that they pursue outside support at some other standard point in the project cycle. Results highlight the fact that NYSERDA's Industrial and Process Efficiency Program may be most effective if it can educate eligible end use customers and data centers before they begin a project. However, the Program can still influence some of these projects even after they have been initiated.

Figure 53. When Assistance is Pursued



Source: MCA primary data collection efforts (n=130 and n=70 for EUC and DC in 2010-2011)

5.4.5 Types of Outside Assistance Procured

When pursuing outside assistance, respondents were asked to identify the typical areas where help was requested. As shown in Table 35, across all respondent areas, the top three types of assistance are for equipment installation (64% to 77%), project design (56% to 69%), and equipment selection (53% to 68%). Over 20% of respondents say that they do not request help in one or more of these areas. This shows another population within which NYSERDA's Industrial and Process Efficiency Program could provide important education and awareness development support regarding the availability and value of using technical service providers.

Table 35. Types of Assistance Typically Used (% that will usually request help with issue)

Issue	Chem/Pharm	Forest	Upstate	Downstate	Total	Data Center
Equipment Installation	77%	64%	72%	68%	71%	70%
Project Design	64%	56%	64%	60%	63%	69%
Equipment Selection	68%	53%	57%	62%	59%	60%
Financial Issues	26%	38%	21%	36%	25%	19%

Source: MCA primary data collection efforts (n=130 and n=70 for EUC and DC in 2010-2011)

Percentages do not add to 100% as each issue was asked individually – multiple responses were acceptable.

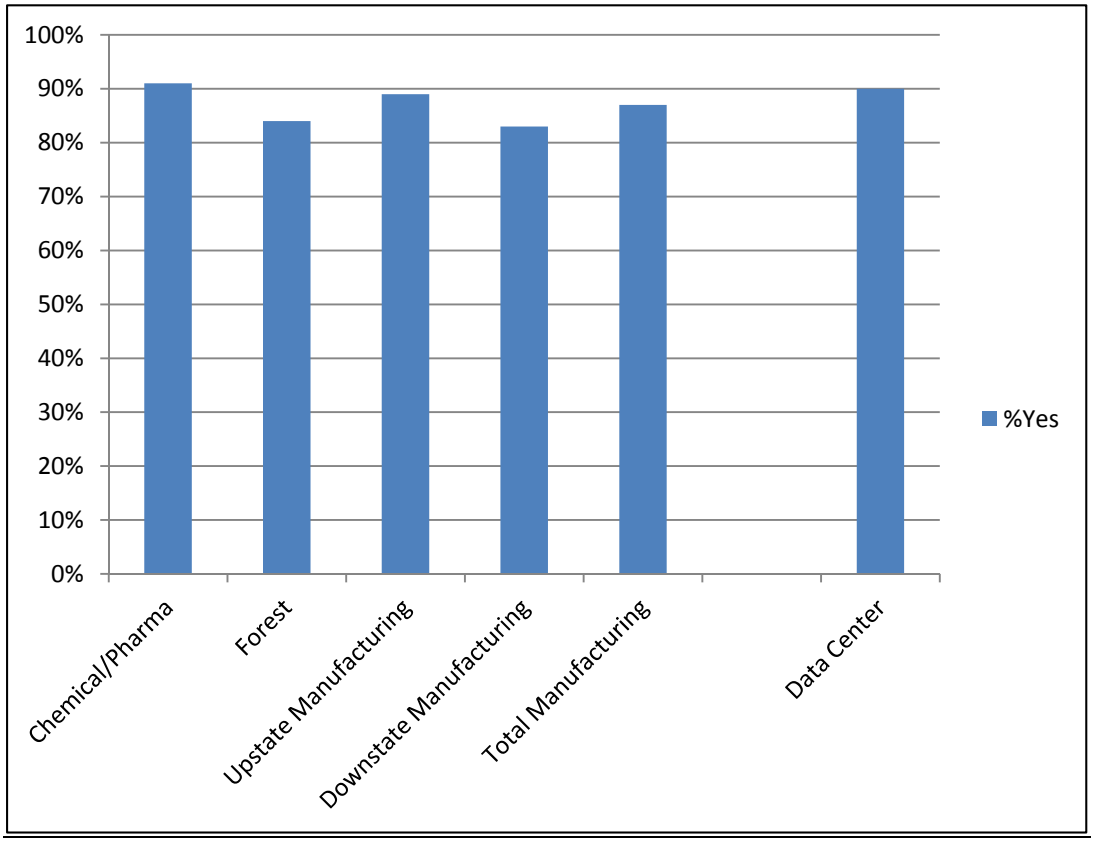
5.5 AWARENESS OF NYSERDA AND OTHER ENERGY EFFICIENCY PROGRAM/FUNDING OPPORTUNITIES

In this Section, results regarding respondents' awareness of NYSERDA and other energy efficiency program/funding opportunities is presented. This includes awareness of NYSERDA itself, the Industrial and Process Efficiency Program, and other funding programs.

5.5.1 Awareness of NYSERDA

As shown in Figure 54, between 80% and 90% of respondents reported awareness of NYSERDA prior to being interviewed for this study. NYSERDA can take advantage of this awareness when marketing the Industrial and Process Efficiency Program's offerings.

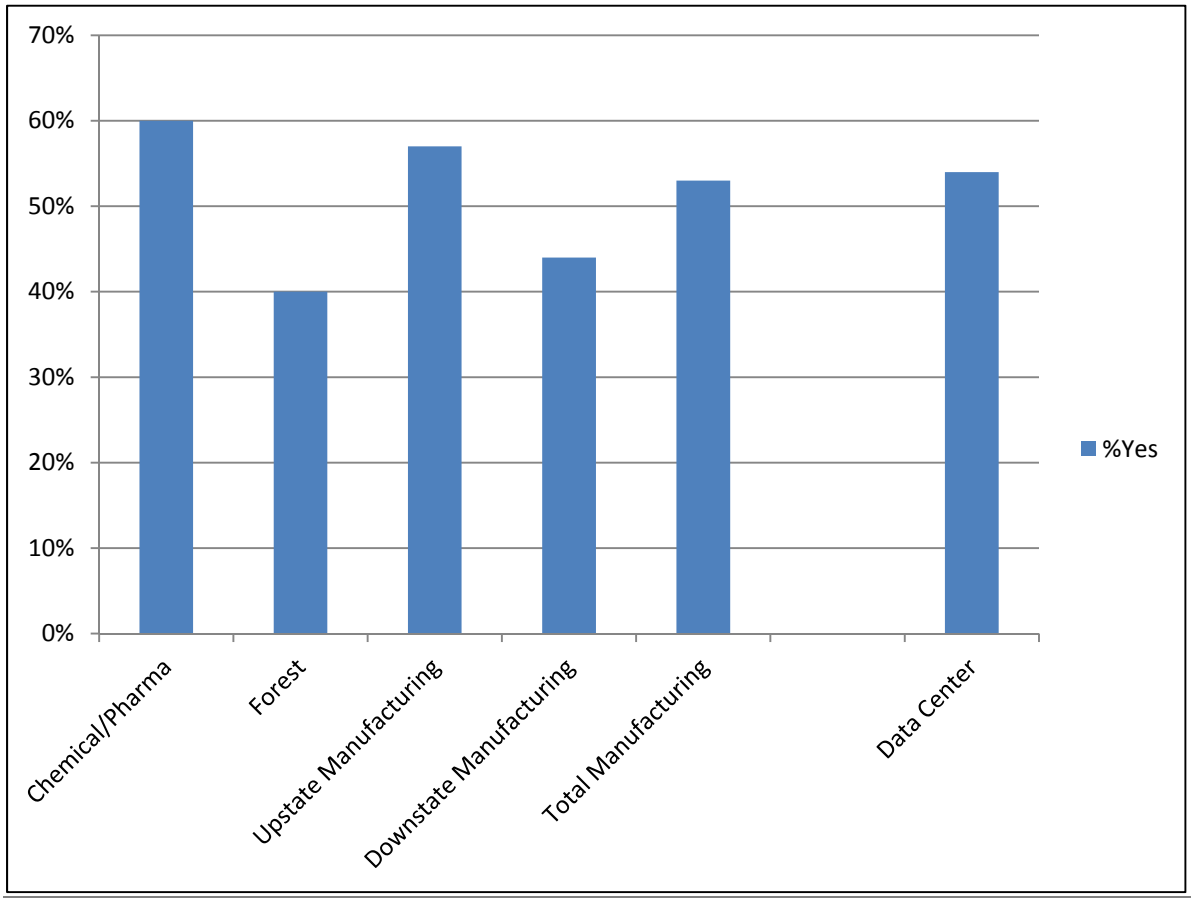
Figure 54. NYSERDA Awareness



Source: MCA primary data collection efforts (n=130 and n=70 for EUC and DC in 2010-2011)

Of those respondents that reported being aware of NYSERDA, a little more than 50% are familiar with the Program. As shown in Figure 55, awareness is lowest within the forest products industry and downstate manufacturing groups (40% and 44% respectively). This will be a useful baseline against which to gauge Industrial and Process Efficiency Program progress going forward.

Figure 55. Industrial and Process Efficiency Program Awareness



Source: MCA primary data collection efforts (n=130 and n=70 for EUC and DC in 2010-2011)

Respondents reporting awareness of NYSERDA's Industrial and Process Efficiency Program were asked to identify how they heard about the program.

Table 36 shows that there are many different ways respondents are learning about the Program. Across the manufacturing groups, community trade organizations, participating contractors, other NYSERDA programs, and program presentations are the top four sources (12%, 11%, 9%, and 8%, respectively). These sources vary somewhat by industry sector, upstate and /downstate. For example, word of mouth is the most common source for Industrial and Process Efficiency Program awareness within the downstate manufacturing community (14%). Word of mouth is also the most common awareness source identified by data center respondents (17%), followed by NYSERDA representatives and presentations (10%), other NYSERDA Programs (7%), and established relationship with NYSERDA (also 7%).

Table 36. How Program Awareness Originated (% mentioned. Sources were not read to respondent)

How Heard about the Program	Chem/Pharm	Forest	Upstate	Downstate	Total	Data Center
Community Trade Orgs	15%	5%	14%	6%	12%	3%
Participating Contractors	8%	5%	11%	9%	11%	3%
Other NYSERDA Programs	13%	5%	9%	9%	9%	7%
Program Presentations	9%	7%	11%	2%	8%	1%
Word of Mouth	4%	4%	4%	14%	7%	17%
Promotional Materials	6%	4%	4%	0%	3%	1%
NYSERDA Website	6%	4%	4%	2%	3%	4%
Media	0%	5%	2%	0%	2%	0%
Other	4%	0%	2%	0%	1%	3%
NYSERDA representatives	N/A	N/A	N/A	N/A	N/A	10%
Established relationship with NYSERDA	N/A	N/A	N/A	N/A	N/A	7%
Utility representatives	N/A	N/A	N/A	N/A	N/A	3%

Source: MCA primary data collection efforts (n=130 and n=70 for EUC and DC in 2010-2011)

5.5.2 Awareness of Other Funding Programs

In addition to awareness of NYSERDA's Industrial and Process Efficiency Program, respondents were asked to identify any other energy efficiency-related funding opportunities or programs they may be aware of. As shown in Table 37, a majority (57% to 75%) of respondents said they are not aware of any other programs. Between 9% and 25% said they know about one other program, but there were not enough duplicate responses for any of these programs to be individually listed. A small amount (4% to 8%) of manufacturing respondents said they are aware of NYSERDA's Lighting Program. Nine percent (9%) of data centers are aware of the Flex Tech Program. In addition, of the 24% of data center respondents that said they are aware of "other" programs (including non-NYSERDA programs), 7% specifically identified NYSEG programs, 4% identified National Grid, 3% identified Con Edison, and 1% individually identified NYPA, ENERGY STAR, and the US Department of Energy.

Table 37. Awareness of Other Funding Programs

Program	Chem/Pharm	Forest	Upstate	Downstate	Total	Data Center
None	57%	75%	67%	70%	68%	N/A
Other	25%	13%	21%	9%	17%	24%
NYSERDA Lighting	8%	7%	7%	4%	6%	0%
National Grid	8%	4%	5%	0%	4%	4%
NYSERDA Other	N/A	N/A	N/A	N/A	N/A	11%
Flex Tech	N/A	N/A	N/A	N/A	N/A	9%
Existing Facilities	N/A	N/A	N/A	N/A	N/A	1%
New Construction	N/A	N/A	N/A	N/A	N/A	1%
NYSERDA Motors	N/A	N/A	N/A	N/A	N/A	0%

Source: MCA primary data collection efforts (n=130 and n=70 for EUC and DC in 2010-2011)

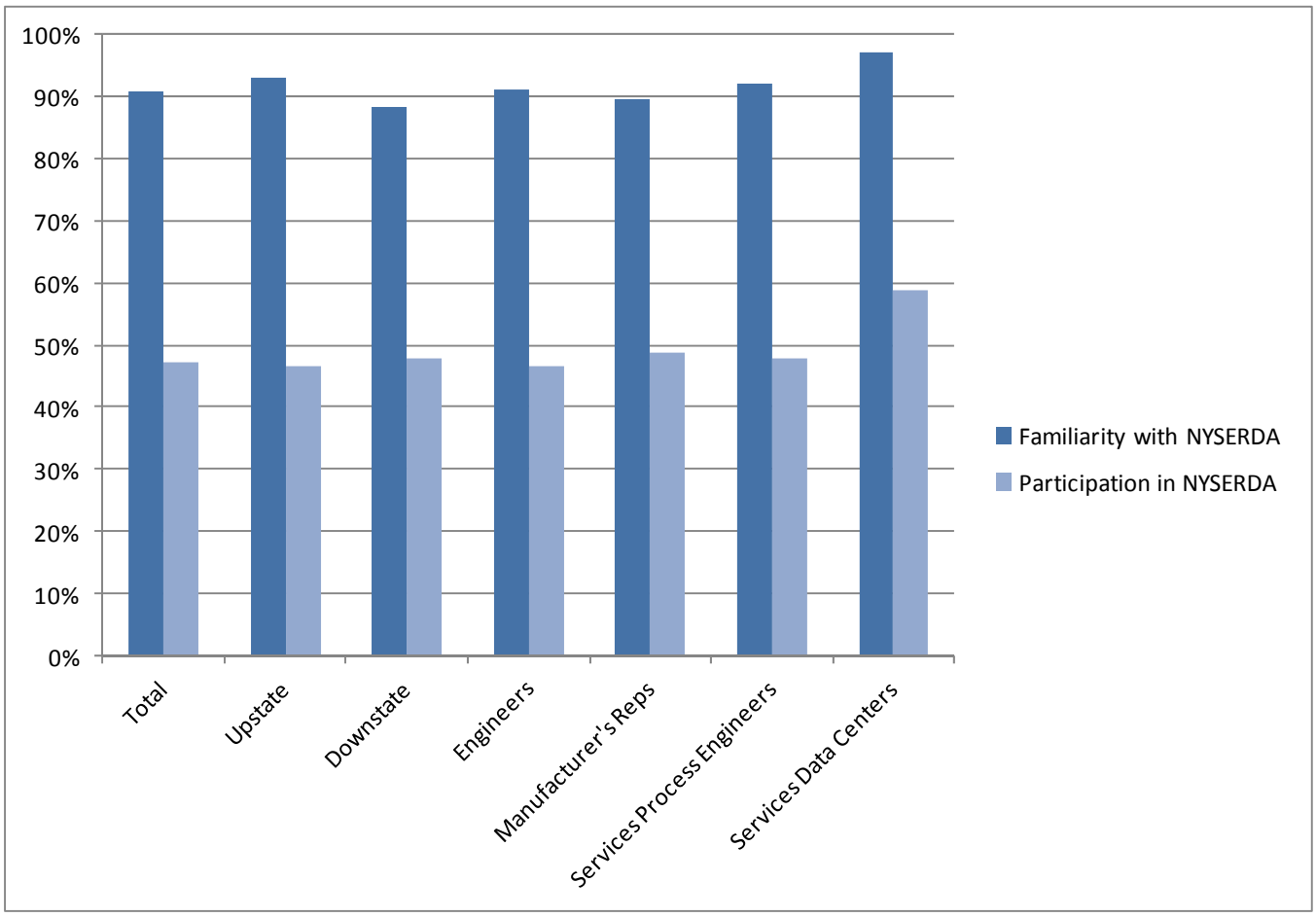
5.6 TECHNICAL SERVICE PROVIDERS OVERVIEW

Technical service providers (TSPs) were given a separate interview with questions unique to their role as it relates to the Industrial and Process Efficiency Program. The TSPs were separated into Engineers and Manufacturer Representatives. For comparative purposes, the data was also separated by Upstate and Downstate TSPs, as well as those that serve manufacturing processes (Services Process Engineers) and those that serve data center systems and processes (Services Data Centers).

- Section 5.7 discusses awareness of NYSERDA and other energy efficiency program/funding opportunities. This includes awareness of NYSERDA itself, the Industrial and Process Efficiency Program, and other funding programs.
- Section 5.8 discusses the supply, qualifications, and technical capabilities of TSPs. This includes the perception of the change in the number of TSPs, the perception of the TSPs' qualifications, and the perception of the TSPs' technical capabilities to provide process improvements.
- Section 5.9 discusses current levels of efficiency, familiarity, and perceptions. This includes the familiarity with and confidence in the technologies and procedures available for process improvements, the importance and view of energy efficiency projects to the TSP, the importance and view of energy efficiency projects to the customers, and the types of energy efficiency projects currently existing and being implemented.
- Section 5.10 discusses current barriers impacting investment. This includes the perceived significance of certain barriers to improving energy efficiency, and the perceived single largest barrier to improvements.
- Section 5.11 discusses the customers' decision making process and their relationship with the TSPs. This includes when and how customers typically pursue outside assistance and the level of decision making involved with process improvement projects.
- Section 5.12 discusses the awareness of process improvement projects in the state. This includes the perception of the frequency of marketing efforts, the perception of the increase in the number of projects, and the perceived reasons for this change in number.

At the beginning of each interview, organizations were screened to determine whether or not they have participated in any NYSERDA or **New York Energy $mart**[SM] programs in the past five years. As shown in Figure 56, between 88% and 97% of TSPs reported awareness of NYSERDA. More than 47% of the responding non-Data Center TSPs, and 59% of Data Center TSPs interviewed, reported having participated in at least one NYSERDA program (including potentially the Industrial and Process Efficiency Program) in the past five years. This means that there remains a substantial number of TSPs in New York that can be served or assisted by NYSERDA's programs.

Figure 56. Familiarity and Participation with NYSERDA



Source: MCA primary data collection efforts (n=140 for TSP in 2011)

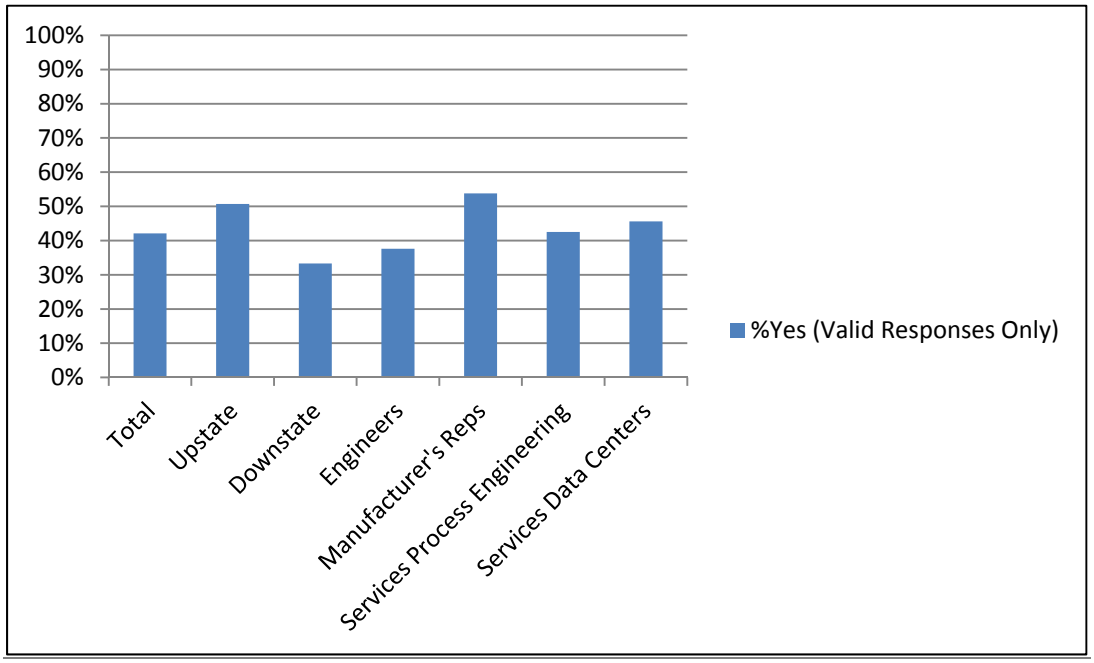
5.7 TSP AWARENESS OF NYSERDA AND OTHER ENERGY EFFICIENCY PROGRAM FUNDING OPPORTUNITIES

In this section, information regarding the awareness of NYSERDA and other energy efficiency program funding opportunities is presented. This includes awareness of NYSERDA itself, the Industrial and Process Efficiency Program, and other programs, along with current or previous participation in FlexTech.

5.7.1 Awareness of Industrial and Process Efficiency and Other NYSERDA Programs

As shown in Figure 57, only 33% to 54% of TSP respondents said they are aware of the Industrial and Process Efficiency Program. Awareness among TSPs is higher in the upstate region than downstate (51% and 33% respectively). Awareness is highest among Manufacturer's Reps (54%). This figure confirms that there remains a large population of TSPs that can be made aware of the presence and goals of the Program and can serve as useful baseline information from which to assess Program progress going forward.

Figure 57. Awareness of the Program



Source: MCA primary data collection efforts (n=140 for TSP in 2011)

Respondents reporting awareness of NYSERDA's Industrial and Process Efficiency Program were asked to identify their information sources. Table 48 shows that there are many different ways respondents are learning about the Program. Across the non-Data Center TSPs, NYSERDA's website, promotional materials and presentations are the top three sources (20%, 10%, and 7% respectively). These three sources also rate in the top three among Data Center TSP respondents at 16%, 10% and 10% respectively. Sources vary somewhat by TSP type and upstate and /downstate location. For example, presentations were identified as the most common information source for Manufacturer's Reps, at 19%. It is worthy to note that over half of the TSP respondents (64% of the Data Center TSPs and 58% of the other TSPs) say that they learned about the Industrial and Process Efficiency Program from various "other" sources.

Table 38. How Program Awareness Originated (% that mentioned source)

Source	Total	Upstate	Downstate	Engineers	Manufacturer's Reps	Services Process Engineers	Services Data Centers
Presentations	7%	6%	9%	0%	19%	8%	3%
Promotional Materials	10%	6%	17%	13%	5%	12%	10%
Other NYSERDA Programs	5%	6%	4%	3%	9%	4%	10%
NYSERDA Website	20%	17%	26%	24%	14%	10%	16%
Media	5%	8%	0%	8%	0%	2%	3%
Contractors	3%	0%	9%	3%	5%	2%	3%
Other	58%	58%	56%	60%	52%	64%	64%

Source: MCA primary data collection efforts (n=140 for TSP in 2011)

In addition to awareness of NYSERDA's Industrial and Process Efficiency Program, respondents were asked to identify any other energy efficiency-related funding opportunities or programs they may be aware of that provide energy efficiency services or technical assistance to industrial, manufacturing, or data center customers in New York (both NYSERDA and non-NYSERDA programs). As shown in Table 39, a small percentage (6% to 11%) of TSPs is aware of NYSERDA's FlexTech Program, 3% to 11% are aware of the Existing Facilities Program, and 2% to 5% are aware of the New Construction Program. Between 26% and 33% of TSPs reported being aware of some other NYSERDA program(s) that they were unable to directly identify. Overall this shows that there remains a large percentage of TSPs that are currently unaware of NYSERDA programs – an excellent opportunity for increased program outreach and marketing efforts.

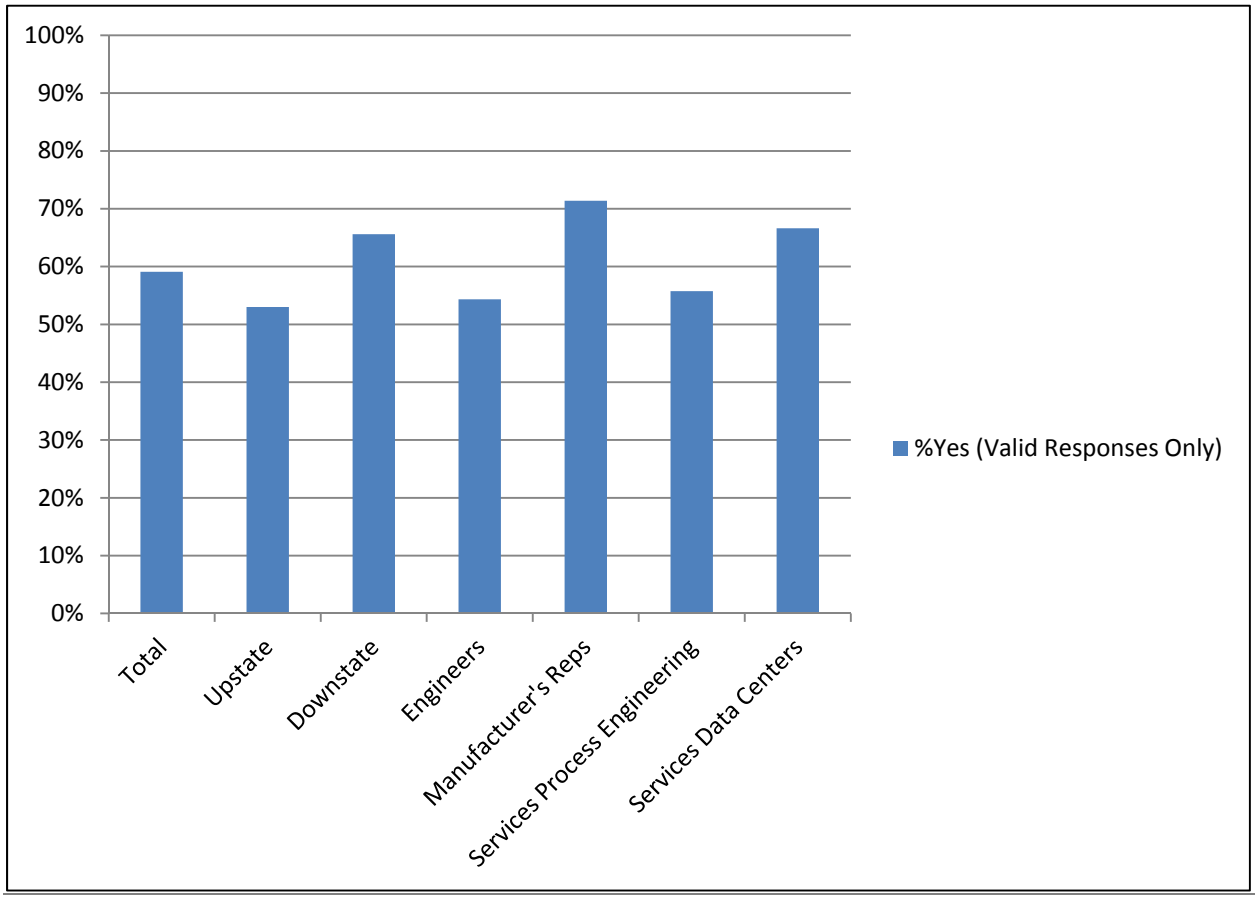
Table 39. Awareness of Other NYSERDA Programs (% that mentioned program)

Program	Total	Upstate	Downstate	Engineers	Manufacturer's Reps	Services Process Engineers	Services Data Centers
FlexTech	9%	6%	11%	11%	6%	8%	11%
Existing Facilities	6%	5%	7%	3%	11%	6%	11%
New Construction	2%	2%	3%	2%	3%	2%	5%
Other	28%	29%	28%	29%	26%	26%	33%

Source: MCA primary data collection efforts (n=140 for TSP in 2011)

Respondents were also asked if they are aware of any non-NYSERDA programs that provide energy efficiency services or technical assistance to industrial, manufacturing or data center customers in New York. They were asked to say which program(s) they heard of, though answers were recorded as "yes" whether they replied with a program or not, unless it was determined that the program they mentioned was not a non-NYSERDA program and the respondent changed his or her answer during the course of the interview. As shown in Figure 58, more than half of all TSPs interviewed (53% to 71%) are aware of at least one non-NYSERDA energy efficiency program.

Figure 58. Awareness of Non-NYSERDA Programs

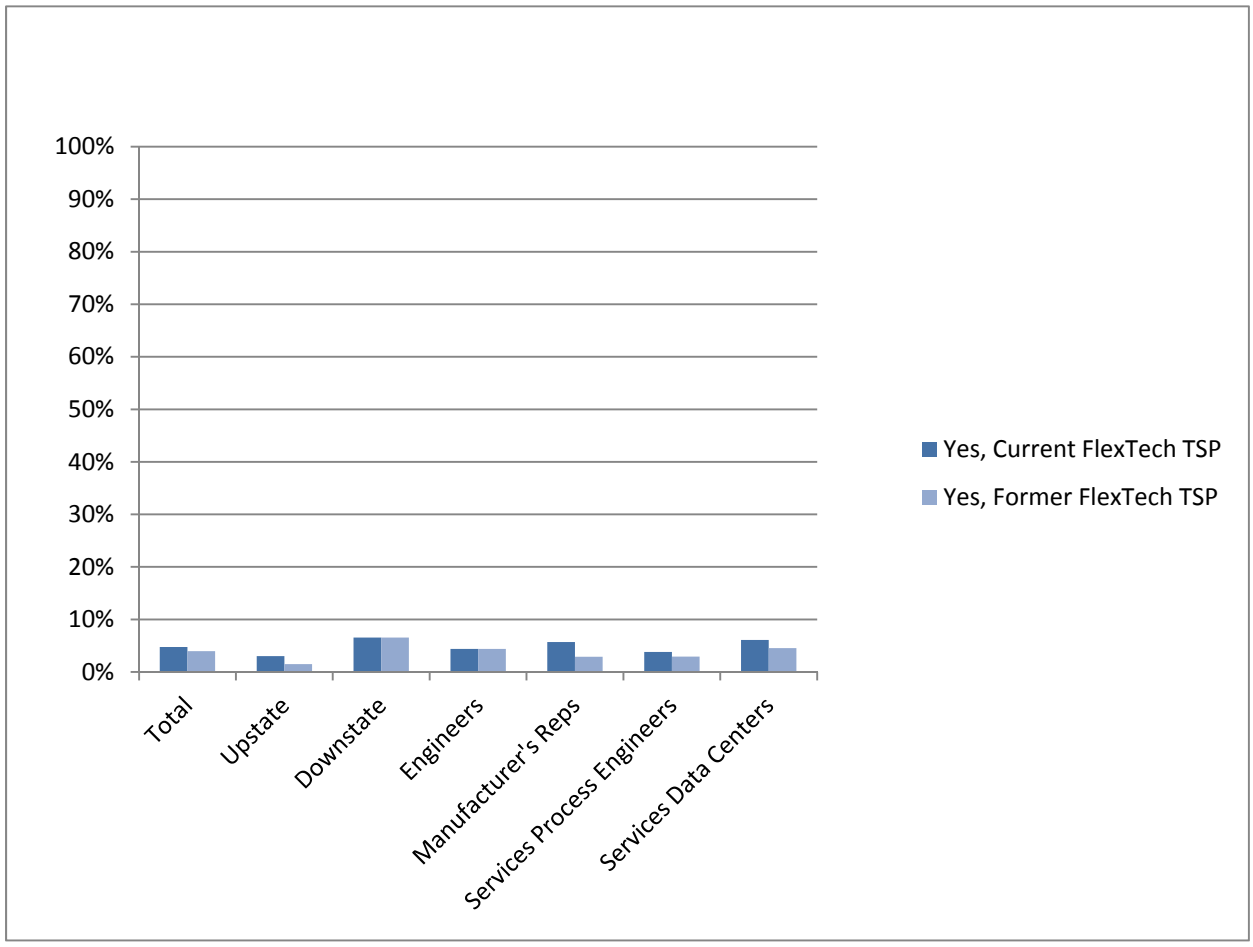


Source: MCA primary data collection efforts (n=140 for TSP in 2011)

5.7.2 FlexTech Experience

TSP respondents were asked if they are currently, or have previously, been a technical service provider for NYSERDA's FlexTech program. As shown in Figure 59, only a very small percentage of TSPs responded "yes" to this question (less than 8% identified themselves as either current or former FlexTech TSPs).

Figure 59. Current and Former Involvement with the FlexTech Program



Source: MCA primary data collection efforts (n=140 for TSP in 2011)

5.8 SUPPLY OF QUALIFIED TECHNICAL SERVICE PROVIDERS

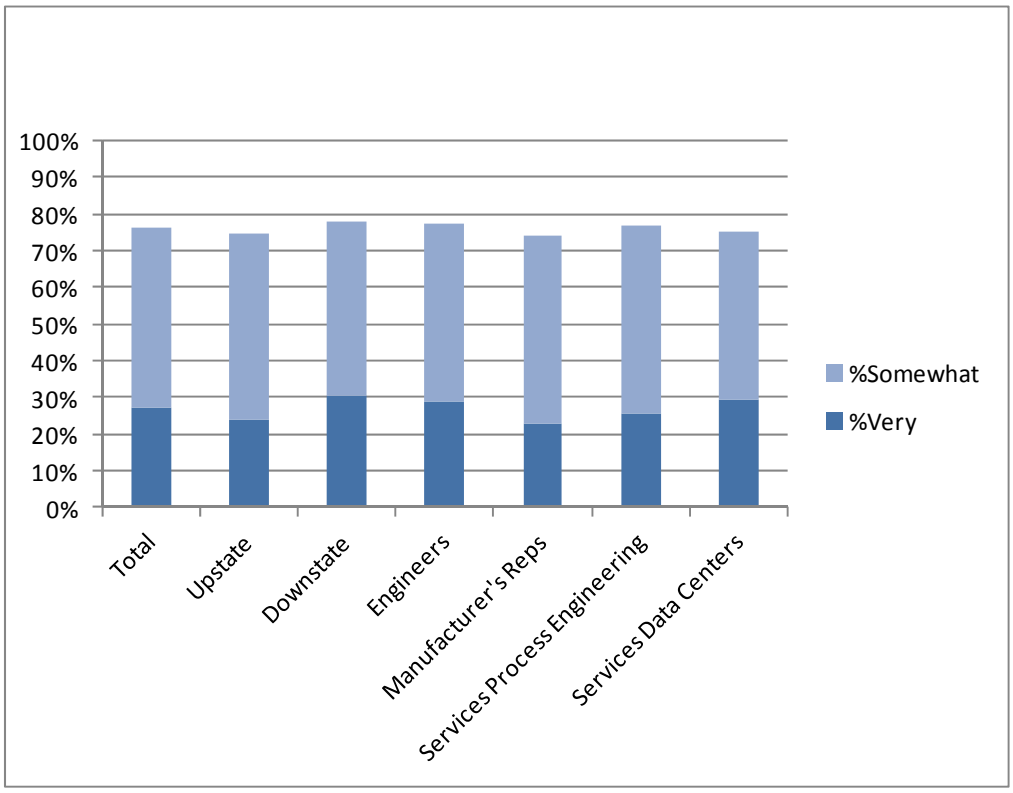
This section summarizes results of TSP responses associated with the supply, qualifications, and technical capabilities of TSPs. This includes the perception of the change in the number of TSPs, the perception of the TSPs' qualifications, and the perception of the TSPs' technical capabilities to provide process improvements.

5.8.1 Capability of the Market to Provide Process Efficiency Improvement Services

Respondents were asked to assess how capable the market is to provide process efficiency improvement services. By "capable" the survey meant that there are a sufficient number of technically-competent individuals or organizations to serve the New York Market. As shown in Figure 60, TSP respondents perceive the market very similarly, with 46% to 51% seeing the market as somewhat capable and 23% to

30% seeing the market as very capable. This means there is a large majority (70% to 77%) of TSPs who see the market as only somewhat, or less, capable to provide improvement services – this represents an excellent opportunity for additional Program outreach and education. These results are very similar to the results obtained from the same question asked to end use customers regarding TSPs. See 5.4.1.

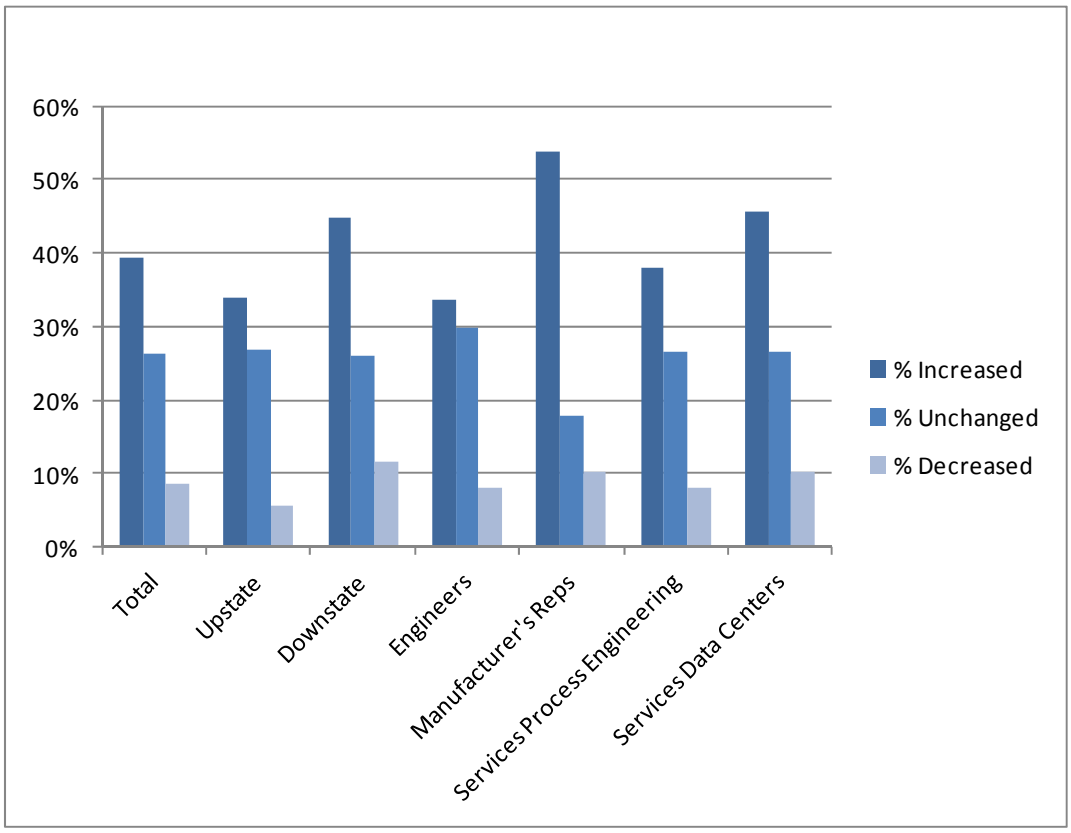
Figure 60. Perceived Capability of the Market to Provide Process Efficiency Improvement Services



Source: MCA primary data collection efforts (n=140 for TSP in 2011)

Respondents were also asked if they thought the number of active process improvement TSPs in New York has increased, decreased or stayed the same over the past three years. As shown in Figure 61, between 35% and 54% of respondents believe the number of TSPs to have increased in the past three years. Manufacturer's Reps are the TSP group having the highest perception of an increase (54%). Engineers had the lowest at 34%. Variations in TSP increase perceptions also existed between upstate and downstate respondents (45% downstate TSPs perceive an increase, compared to 34% of upstate TSPs). A small percent (6% to 12%) of the total TSP respondent population think that the number of TSPs has decreased over the past three years. These results are fairly similar to the results obtained through the same question when asked of the End Use Customer group (see 5.4.1). One exception is that over 15% more Total End Use Customers thought the number of TSPs had "increased" in New York over the last three years than did respondents from the Total TSP group shown below.

Figure 61. Perceived Change in Number of Active Process Improvement TSPs in NY over Last 3 Yrs



Source: MCA primary data collection efforts (n=140 for TSP in 2011)

Those respondents that reported an increase in the number of active TSPs were asked to identify why they thought the number had increased. As shown in Table 40, the most common perceived reason for the increase in TSPs is increased market opportunity (13% to 21%). A noteworthy number (7% to 13%) of TSPs also identified the "desire to be green" as a reason for the increase in TSPs. A large proportion of respondents answered "other" (18% to 28%), but reasons provided were varied with no common themes to report.

Table 40. Perceived Reason for Increase in TSPs (% that mentioned reason)

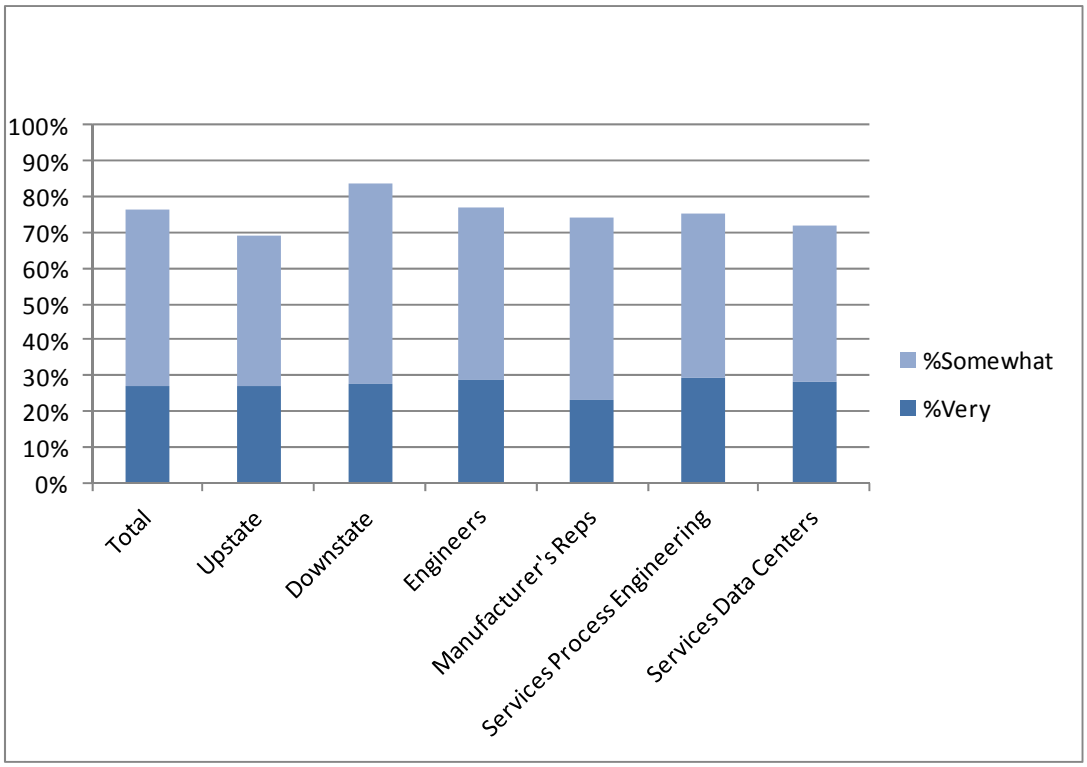
Reasons for Increase	Total	Upstate	Downstate	Engineers	Manufacturer's Reps	Services Process Engineers	Services Data Centers
Market Opportunity	16%	13%	19%	14%	21%	16%	19%
Climate Concern	0%	0%	0%	0%	0%	0%	0%
Desire to be Green	9%	10%	7%	7%	13%	7%	13%
Regulatory Changes	1%	1%	1%	0%	5%	1%	0%
Other	21%	20%	22%	18%	28%	20%	24%

Source: MCA primary data collection efforts (n=140 for TSP in 2011)

Respondents were asked to assess how qualified the existing pool of New York's TSPs (in general across the state) are to implement effective process efficiency improvement projects. As shown in Figure 62,

even though responses to this question can be viewed somewhat as a self assessment, TSPs appear to have a similar, and relatively low perception of the qualifications of New York's existing pool of TSPs (i.e., only 23% to 29% of respondents see TSPs as "very qualified," while 42% to 57% of respondents see TSPs as "somewhat qualified"). Based on these self-assessment responses, it appears that more than 70% of TSPs rate themselves (as a state-wide group) as being only "somewhat qualified" or less. This provides an excellent opportunity and target market for increased education and training activities.

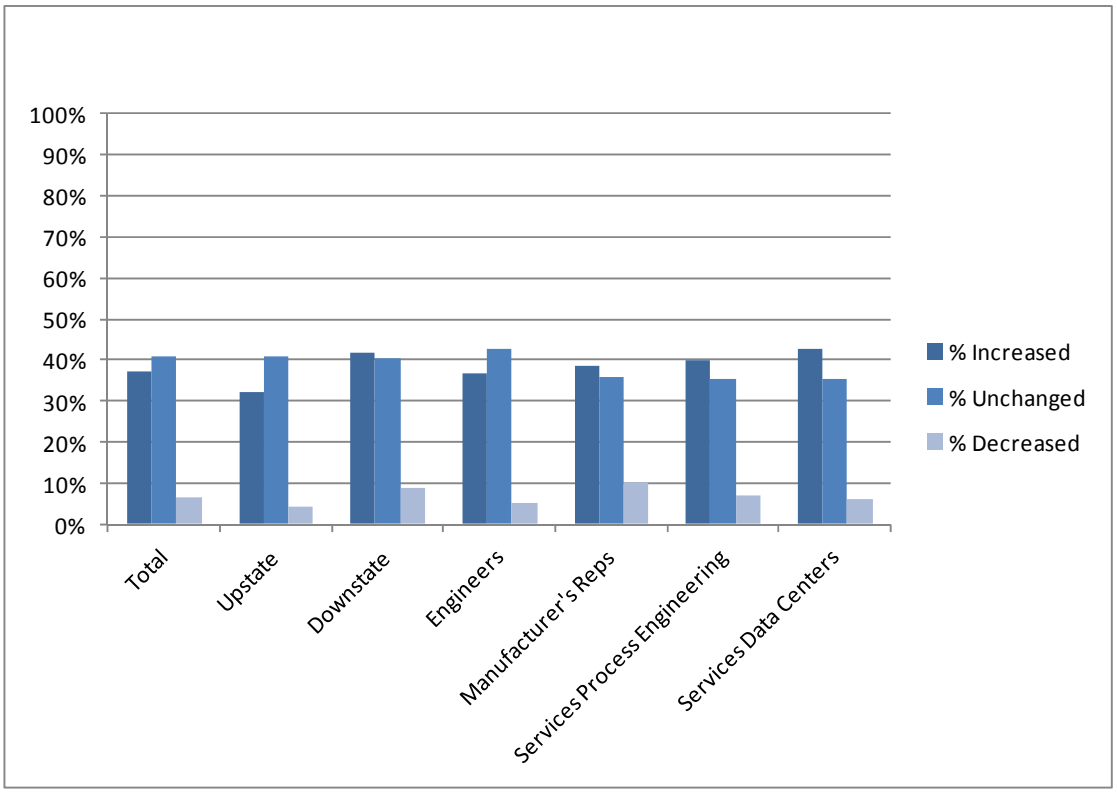
Figure 62. Perceived Qualification of New York TSPs



Source: MCA primary data collection efforts (n=140 for TSP in 2011)

Respondents were also asked to assess any changes in the technical capabilities of TSPs over the past three years. As shown in Figure 63, respondents have a similar perception of the technical capabilities of New York's TSPs. Between 32% and 43% believe that the technical capabilities have increased. While 35% to 41% think that they have not changed, and 4% to 10% think that they have decreased. The population that sees the capabilities as "unchanged" or "decreased" represents the program's greatest opportunity for increased outreach, education and training. These results are fairly similar to the results obtained through the same question when asked of the End Use Customer group (see 5.4.2). One exception is that between 15% to over 25% more Total End Use Customers thought the technical capabilities of TSPs had "increased" in New York over the last three years than did respondents from the Total TSP group shown below.

Figure 63. Perceived Change in the Technical Capabilities of TSPs over Past Three Years

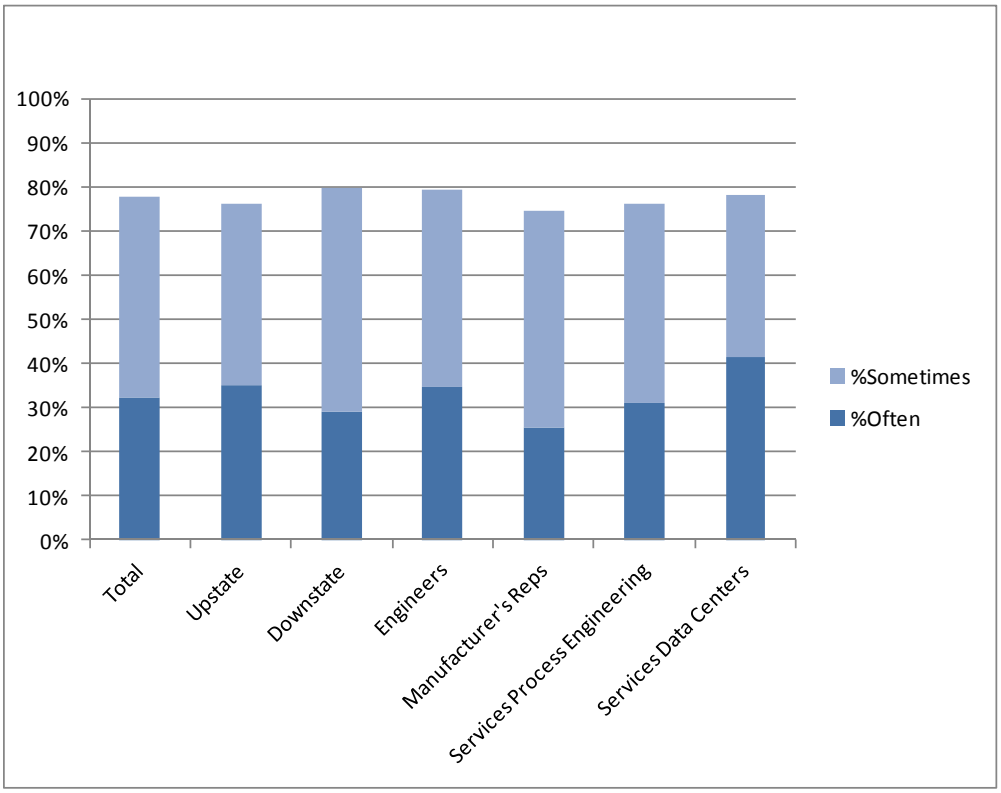


Source: MCA primary data collection efforts (n=140 for TSP in 2011)

5.8.2 TSP Focus on Process Efficiency Improvement Strategies

Respondents were asked how often they believed projects being worked on by TSPs for industrial, manufacturing and data center customers in New York included focus on specific process efficiency improvement strategies. As shown in Figure 64, respondents perceive the frequency of an efficiency focus being part of specific process improvement projects fairly similarly. Between 26% and 41% think that TSPs incorporate efficiency into their project strategies "often," with Manufacturer's Reps on the low end and Data Center Service Providers being the highest. Between 74% and 80% responded either "often" or "sometimes." Viewed another way, there remains a large portion of the TSP population (between 59% and 74%) that think that process efficiency improvement strategies are "sometimes," "rarely," or "never" included in the projects they work on – meaning that there are many projects that can be influenced by the Industrial and Process Efficiency Program's offerings to incorporate energy efficiency improvements. A more focused effort to train TSPs to identify and recognize the benefits of specific process efficiency improvement strategies for their customers would likely increase the number of projects and savings achieved within manufacturing and data center facilities throughout the state.

Figure 64. Frequency Customers Focus on Specific Process Improvement Strategies



Source: MCA primary data collection efforts (n=140 for TSP in 2011)

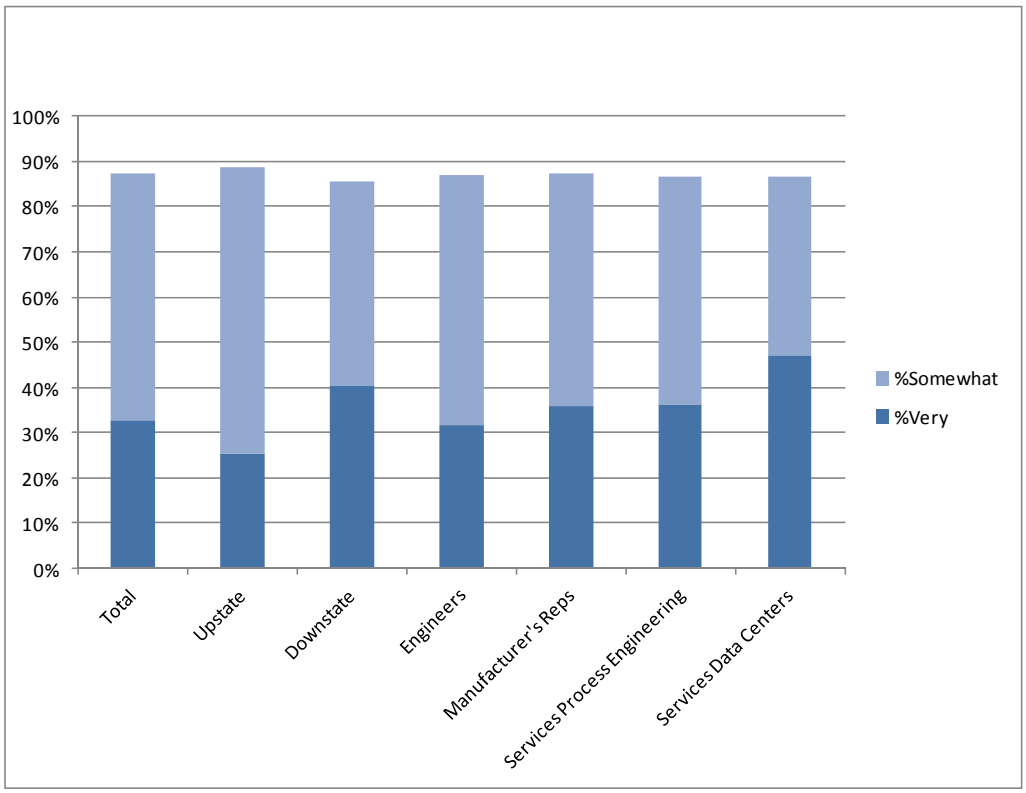
5.9 CURRENT LEVELS OF FAMILIARITY AND PERCEPTIONS

In this section, current levels of efficiency, familiarity, and perceptions are discussed. This includes familiarity with and confidence in the technologies and procedures available for process improvements, the importance and view of energy efficiency projects to TSPs, the importance and view of energy efficiency projects to customers, and the types of energy efficiency projects currently existing and being implemented.

5.9.1 Familiarity and confidence in Technologies and Procedures for Improvement Projects

Respondents were asked to assess their level of familiarity with the technologies and procedures available for improving the energy efficiency of industrial and manufacturing systems and processes. As shown in Figure 65, all respondents report having similar familiarity levels (86% to 89% are either very or somewhat familiar). It is notable that 25% of upstate TSPs reported being very familiar, while 41% of downstate TSPs are very familiar. Data center service providers are the most familiar (47% saying they are very familiar), while engineers are the least familiar (32% very familiar). Viewed another way, these results highlight the fact that between 53% and 75% of the total TSP population report being only somewhat familiar or less (including not too or not at all familiar) – providing excellent targets for additional program outreach and education and a solid baseline from which to measure progress.

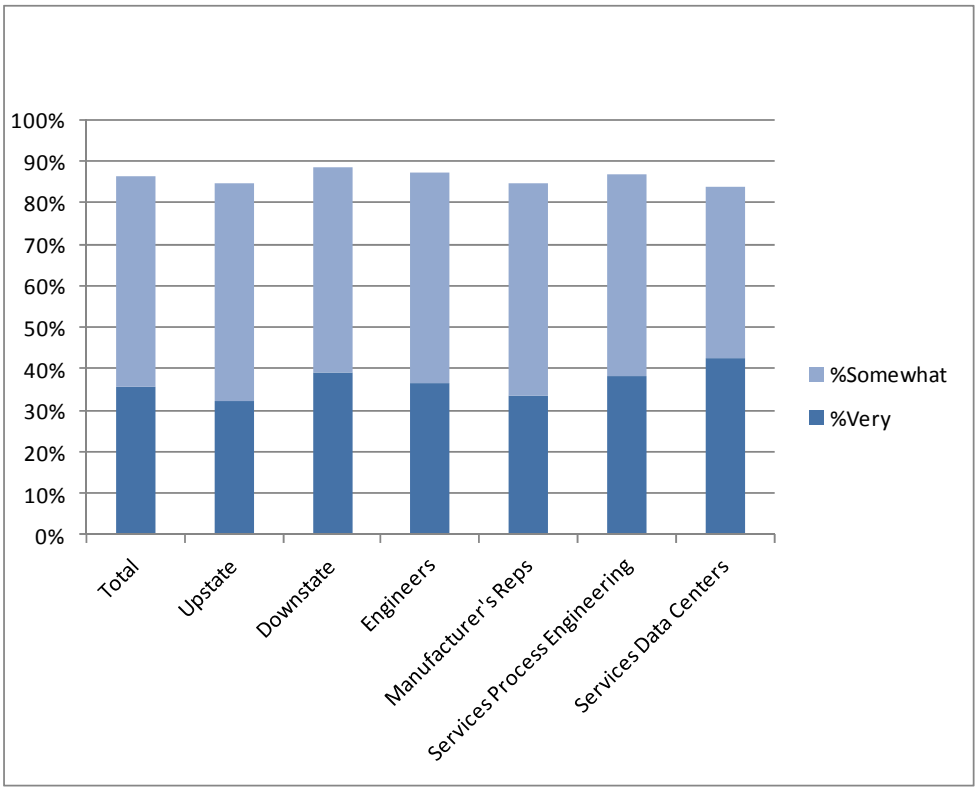
Figure 65. Familiarity with Efficiency Systems and Processes



Source: MCA primary data collection efforts (n=140 for TSP in 2011)

Respondents were asked to assess their level of confidence in the overall performance of these technologies and procedures. As shown in Figure 66, TSPs reported having similar confidence levels. Over 80% of respondents reported being either "very" or "somewhat confident" (32% to 43% are very confident, 41% to 52% somewhat). This means that between 48% and 59% of the total TSP population reported being only "somewhat," "not too," or "not at all" confident – providing excellent targets for additional program outreach and education and a solid baseline from which to measure progress. By developing and exposing TSPs to case studies and other success stories associated with specific industrial and data center process end uses and efficiency improvement results, additional confidence can be gained among the state's TSP group regarding process efficiency improvement technologies and procedures. Such increases in TSP confidence could lead to greater identification and completion of process efficiency improvement projects throughout the state.

Figure 66. Confidence in the Performance of Technologies and Procedures



Source: MCA primary data collection efforts (n=140 for TSP in 2011)

Respondents were asked to rank their levels of confidence regarding the persistence of a number of potential energy efficiency project improvement benefits. Table 41 shows that confidence, overall, is high regarding the persistence of benefits.

Table 41. Confidence in Persistence of Benefits (% "very" or "somewhat" confident)

Benefit	Total	Upstate	Downstate	Engineers	Manufacturer's Reps	Services Process Engineers	Services Data Centers
Cost Savings	93%	89%	97%	92%	95%	92%	94%
Energy/Demand Savings	90%	90%	90%	91%	87%	89%	96%
Productivity Improvements	80%	80%	80%	81%	77%	81%	76%
Product Quality Improvements	80%	76%	84%	80%	79%	80%	79%
Reliability Improvements	82%	82%	83%	84%	77%	80%	85%
Water Reductions	83%	85%	81%	85%	77%	83%	87%
Emission Reductions	83%	83%	83%	87%	72%	84%	90%

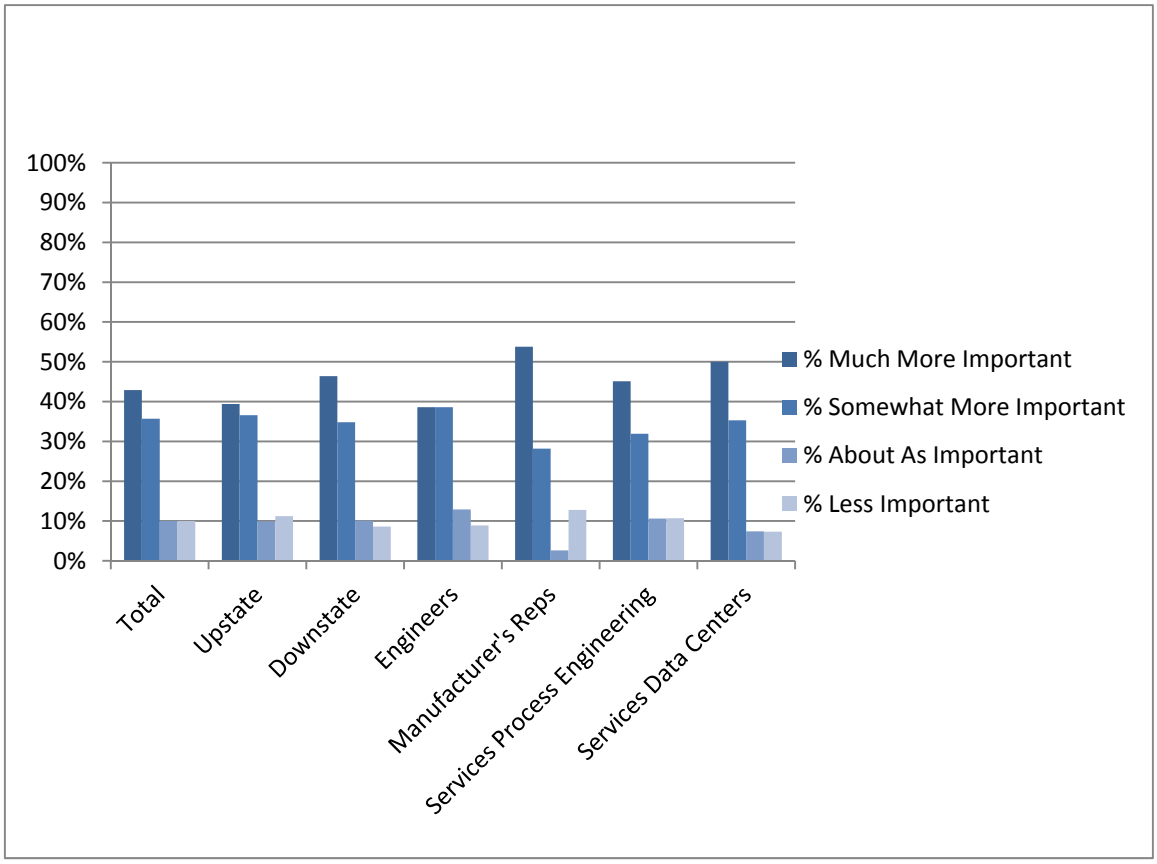
Source: MCA primary data collection efforts (n=140 for TSP in 2011)

5.9.2 Importance of Sale of Energy Efficient Products, Services and Promotion Practices

Respondents were asked how important the sale of energy efficiency products and services is, compared to the sale of less efficient (standard efficiency) products and services in the scope of their companies'

own business priorities. As shown in Figure 67, a majority of TSPs place higher value on the sale of energy efficient products and services (39% to 54% consider these sales much more important, with Manufacturer's Reps being the highest and engineers being the lowest). Overall, 79% of TSPs consider the sale of energy efficiency products and services either much more or somewhat more important. This table shows that a large number of TSPs are placing high importance on energy efficiency and will likely be receptive to the Industrial and Process Efficiency Program's goal of incorporating energy efficient products and services into their business models. The remaining population represents an opportunity for additional Program influence.

Figure 67. Importance of Sale of EE Products and Services compared to Standard Efficiency

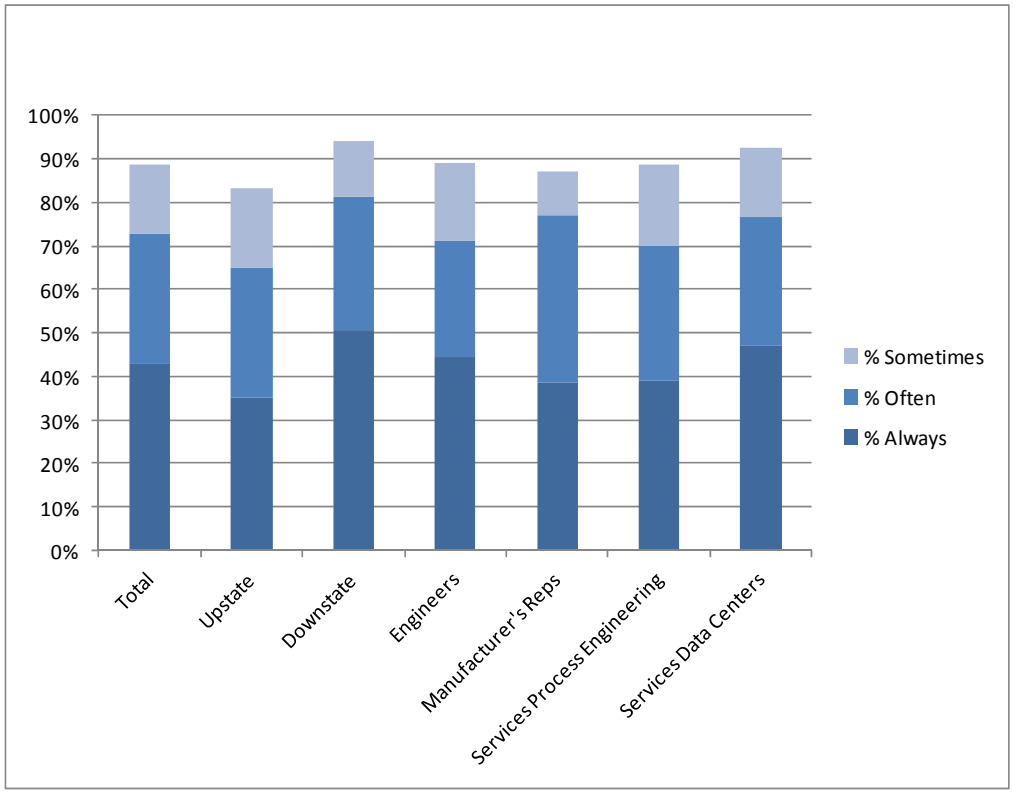


Source: MCA primary data collection efforts (n=140 for TSP in 2011)

5.9.3 Frequency of Promoting the Benefits of Energy Efficiency

Respondents were asked to identify, when marketing or providing services to their customers, how often their companies promoted the benefits of reduced energy demand and consumption achievable through process improvements. Figure 68 shows that TSPs are generally promoting the benefits of energy demand and consumption reduction, with 83% to 94% either always, often, or sometimes promoting the benefits. Between 35% and 51% reported that they always promote the benefits. It is notable that 51% of downstate TSPs say they always promote the benefits, compared with 35% upstate. These numbers show that the benefits of energy efficiency improvements are already being promoted, but there is still a sizable portion of the population that could be promoting the benefits more regularly.

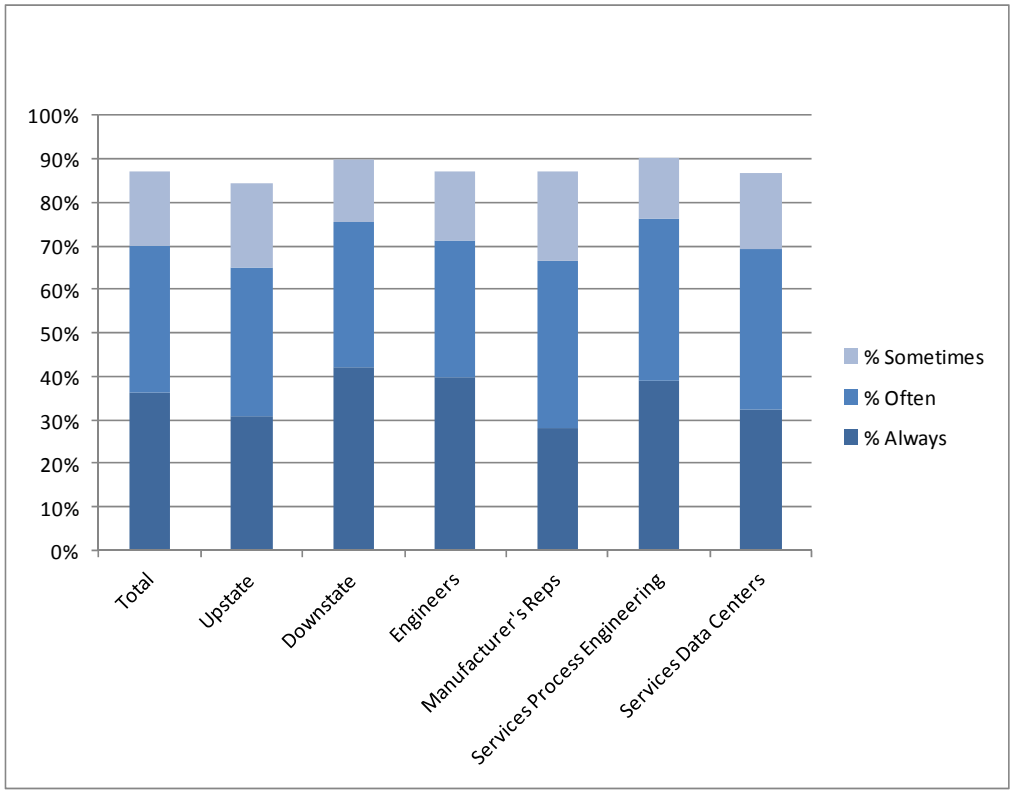
Figure 68. Frequency of Promoting EE Benefits



Source: MCA primary data collection efforts (n=140 for TSP in 2011)

Similarly, respondents were asked to identify how often their companies promoted the benefits of reduced production costs or productivity improvements achievable through process improvements. Figure 69 shows that TSPs are generally promoting these benefits, with 85% to 90% answering "always," "often," or at least "sometimes." Between 28% and 42% of TSPs say they always promote these benefits. When comparing responses regarding the frequency of *promoting productivity benefits* to *energy reduction benefits*, the results appear fairly similar, though in total, more TSPs responded that they always promote the benefits of energy reduction (46%) compared to the 36% that always promote the benefits of productivity. This could mean that less TSPs are familiar with or confident in the productivity benefits that can be associated with incorporating energy efficiency into process and IT improvement projects.

Figure 69. Frequency of Promoting Productivity Benefits

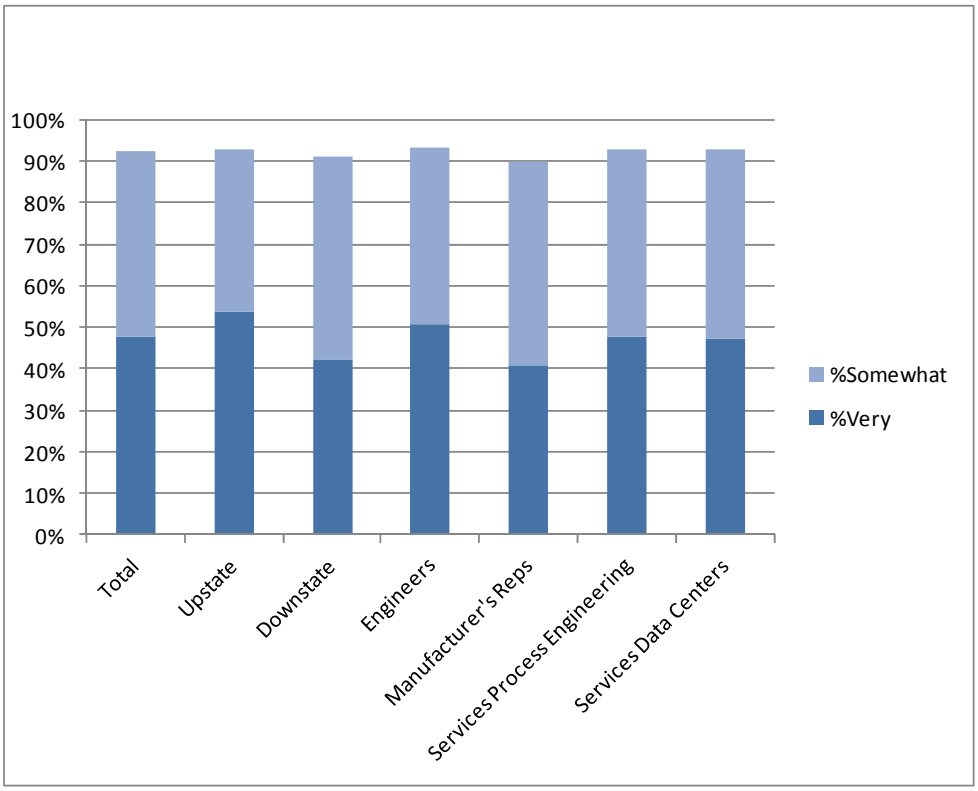


Source: MCA primary data collection efforts (n=140 for TSP in 2011)

5.9.4 Importance of Energy Efficiency to Customers

Respondents were asked to assess how important their industrial, manufacturing and data center customers think it is to reduce energy demand and consumption within their facilities. Figure 70 shows that TSPs report that a majority of customers are seeing the importance of energy demand and consumption reduction, with 41% to 54% saying that energy reduction is "very" important to their customers. Between 90% and 93% reported that their customers think that it is either "very" or "somewhat" important. The rest think it is "not too" or "not at all" important. This data reflects the perception of the TSPs, not the actual opinion of customers. However, these results are quite consistent with the manufacturer and data center customer survey responses.

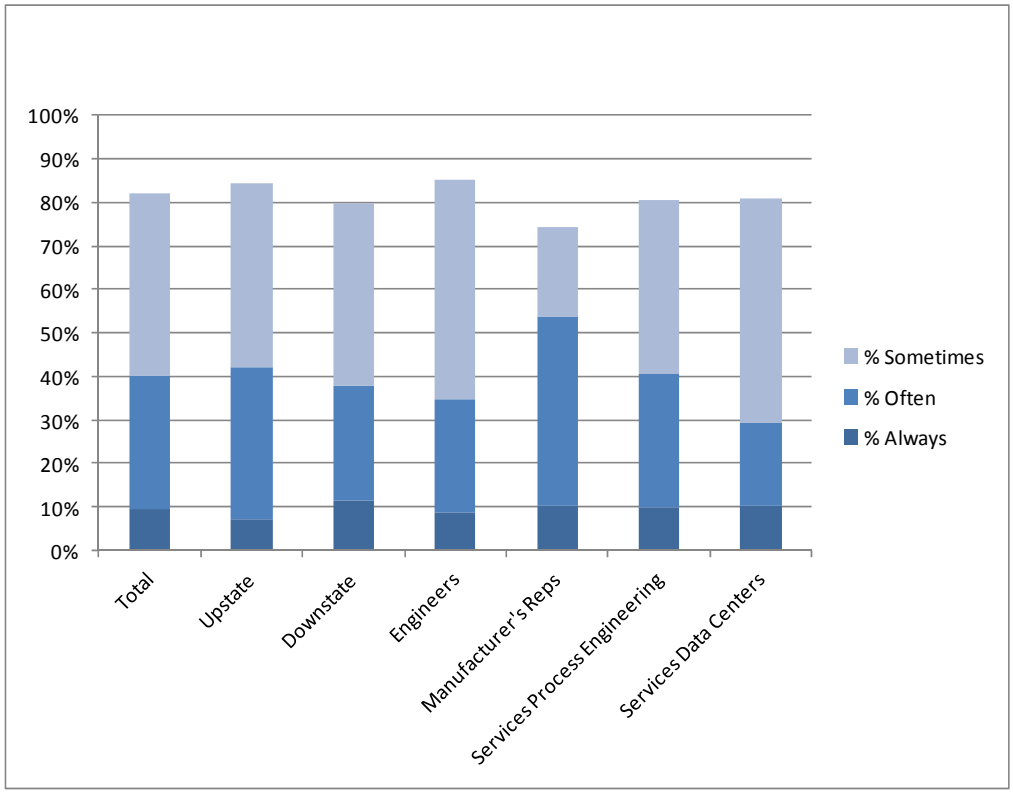
Figure 70. Importance of Customer Energy Reduction



Source: MCA primary data collection efforts (n=140 for TSP in 2011)

Figure 71 shows the percentage of TSPs that perceive their industrial customers as "always," "often," and "sometimes" viewing process improvement projects as "energy" projects. As shown in this figure, TSPs have a similar perception of their customers' view of process improvement projects as "energy" projects, with over 75% answering either "always," "often" or "sometimes." Manufacturer's Reps stand out, reporting that 54% of their customers either often or always think of improvements as energy projects (21% say "sometimes"). This figure also shows that most TSPs perceive that their industrial customers do not always think of process improvement projects as energy projects (only 7% to 12% reported that their customers feel this way), and the majority responded only "sometimes," rarely," or "never." This is consistent with the ratings provided by end use customers (see 5.1.2), where less than 25% of the manufacturers interviewed (and only 30% of data center customers) "always" consider process improvement projects as "energy" projects. This represents a large opportunity for additional industrial and data center customer education. Through a combination of direct customer outreach and by providing TSPs with targeted information, tools and resources, the Industrial and Process Efficiency Program can help to increase awareness of the benefits that energy efficiency can provide when viewed as an important component of process improvement projects.

Figure 71. Perception of Process Improvement Projects as Energy Projects



Source: MCA primary data collection efforts (n=140 for TSP in 2011)

5.9.5 TSP Experience with Systems and Processes

Respondents were asked to identify the types of industrial or manufacturing processes and systems their companies may have worked with.

Table 42 shows that the non-data center-serving TSPs generally have experience with the same systems and processes. However, there are some notable differences between respondent groups, which suggest that the Industrial and Process Efficiency Program may need to target different offerings to the different groups of TSPs. For example, 73% of downstate TSPs have experience with cooling systems compared to 45% upstate. Concerning experience with finishing processes, 49% of upstate TSPs report such experience compared to 32% downstate. Fifty-eight percent (58%) of Process Engineers report having experience with storage and handling systems and processes compared to 39% of Manufacturer's Reps. Fifty-six percent (56%) of Engineers have experience with warehousing compared to 36% of Manufacturer's Reps. Predictably, Data Center TSPs have differing experience from the other TSP respondent groups, most notably with 93% experience with data storage, 72% in cooling, 63% in warehousing, and only 12% in separation and 10% in raw materials. Overall, this table shows that typically around half (though upwards of 90% and as low as 7%) of TSPs do not have experience with any given process. This represents an opportunity to broaden the experience of many TSPs through potential targeted workshops and training offered through the Program.

Table 42. Company Experience with Services (% with experience)

Equipment/ Process	Total	Upstate	Downstate	Engineers	Manufacturer's Reps	Services Process Engineers	Services Data Centers
Product Manufacturing	71%	73%	70%	68%	80%	78%	66%
Water/Waste	59%	56%	62%	61%	54%	62%	57%
Cooling	59%	45%	73%	58%	59%	62%	72%
Heating	58%	58%	58%	62%	46%	60%	56%
Assembly	53%	56%	49%	53%	54%	57%	47%
Storage or Handling	52%	52%	52%	57%	39%	58%	47%
Data Storage	52%	45%	59%	56%	41%	50%	93%
Warehousing	51%	47%	55%	56%	36%	51%	63%
Transportation	47%	42%	52%	49%	44%	49%	37%
Testing	45%	49%	41%	44%	49%	50%	43%
Packaging or Distribution	41%	41%	42%	41%	44%	44%	40%
Finishing	41%	49%	32%	39%	46%	42%	31%
Separation	28%	31%	25%	28%	28%	30%	12%
Raw Materials	23%	25%	20%	23%	23%	21%	10%

Source: MCA primary data collection efforts (n=140 for TSP in 2011)

Respondents were asked to identify the types of efficiency elements that are being incorporated within their customers' systems and processes. As shown in Table 43, within the non-Data Center support sectors, pumps and motors are the most common elements being incorporated (80% to 92%). Heating and cooling components are also prevalent (72% to 87%). Combined heat and power (CHP) projects are also common (60% to 78%), followed by demand response elements (58% to 71%). Energy efficient compressed air elements are also seen (58% to 67%). For data center customers, TSPs typically see pumps and motors (89%), heating and cooling and demand response (82% each) and CHP (70%). Lean practices range from 50% to 64%, and compressed air from 58% to 67%. TSPs appear to see more of each element within downstate customer facilities, with the exception of lean practices.

Table 43. Efficiency Elements Being Incorporated in Facilities (% that see element being incorporated)

Element	Total	Upstate	Downstate	Engineers	Manufacturer's Reps	Services Process Engineers	Services Data Centers
Pumps Motors	88%	83%	92%	88%	80%	84%	89%
Heating Cooling	80%	74%	87%	84%	72%	79%	82%
CHP	69%	60%	78%	70%	67%	68%	70%
Demand Response	67%	65%	70%	71%	58%	64%	82%
Lean Practices	61%	62%	60%	65%	50%	64%	54%
Compressed Air	60%	58%	62%	58%	67%	59%	64%

Source: MCA primary data collection efforts (n=140 for TSP in 2011)

5.10 CURRENT BARRIERS IMPACTING INVESTMENT

In this Section, current barriers impacting investment are discussed. This includes the perceived significance of certain barriers to improving energy efficiency, and the perceived single largest barrier to improvements.

5.10.1 Major Barriers Impacting Investment

Respondents were asked to assess the importance of a number of potential barriers that may prevent customers from incorporating energy efficiency into their process improvement projects including competing capital demands, placing a low value on energy efficiency and sustainability (undervaluing EE), eligibility issues associated with a specific program (eligibility issues), conflicting NYISO, NYSERDA, and utility programs (conflicting programs), a lack of energy efficiency expertise among process engineers or equipment salesmen and installers (expertise), a lack of awareness regarding energy efficiency features, products or services *within* customers' organizations (internal awareness), and a lack of awareness regarding energy efficiency features, products or services *outside* customers' organizations (external awareness). As shown in Table 44, the large majority (74% to 84%) of TSPs consider competing capital demands to be the most significant major barrier impacting investment. To a lesser extent, about one third of each TSP group (between 32% and 43%) say that energy efficiency being undervalued is a major barrier. Similarly, approximately one third (30% to 35%) identify eligibility issues as a major barrier. Between 20% and 36% identify lack of expertise among service providers as a major barrier, and 15% to 32% note lack of internal awareness of energy efficiency features as a major barrier. Lesser still, between 18% and 29% think that external awareness of energy efficiency features is a major barrier. This excludes Manufacturer's Reps, of which only 5% consider external awareness a major barrier. Between 13% and 18% identify conflicting programs as a major barrier.

Table 44. Major Barriers to Incorporating EE (% responding that barrier is a "major" one)

Barrier	Total	Upstate	Downstate	Engineers	Manufacturer's Reps	Services Process Engineers	Services Data Centers
Competing Capital Demands	81%	78%	84%	83%	74%	80%	82%
Undervaluing EE	37%	32%	42%	39%	33%	35%	43%
Eligibility Issues	32%	30%	35%	33%	31%	30%	32%
Expertise	28%	20%	36%	25%	36%	25%	35%
Internal Awareness	27%	23%	32%	32%	15%	25%	22%
External Awareness	22%	18%	26%	29%	5%	23%	25%
Conflicting Programs	15%	13%	17%	14%	18%	14%	18%

Source: MCA primary data collection efforts (n=140 for TSP in 2011)

When asked to identify the single most important barrier, as shown in Table 45**,** competing capital demands ranked highest (77% to 84%) among all TSPs. All other barriers came in at 10% or lower.

Table 45. Largest Barrier to EE (% responding that barrier is the single largest)

Barrier	Total	Upstate	Downstate	Engineers	Manufacturer's Reps	Services Process Engineering	Services Data Centers
Competing Capital Demands	78%	81%	77%	76%	83%	82%	84%
Internal Awareness	8%	5%	10%	9%	4%	4%	4%
Undervaluing EE	4%	5%	4%	6%	0%	4%	2%
External Awareness	3%	5%	2%	3%	4%	4%	4%
Eligibility Issues	3%	2%	4%	1%	8%	1%	4%
Expertise	2%	2%	2%	3%	0%	3%	0%

Source: MCA primary data collection efforts (n=140 for TSP in 2011)

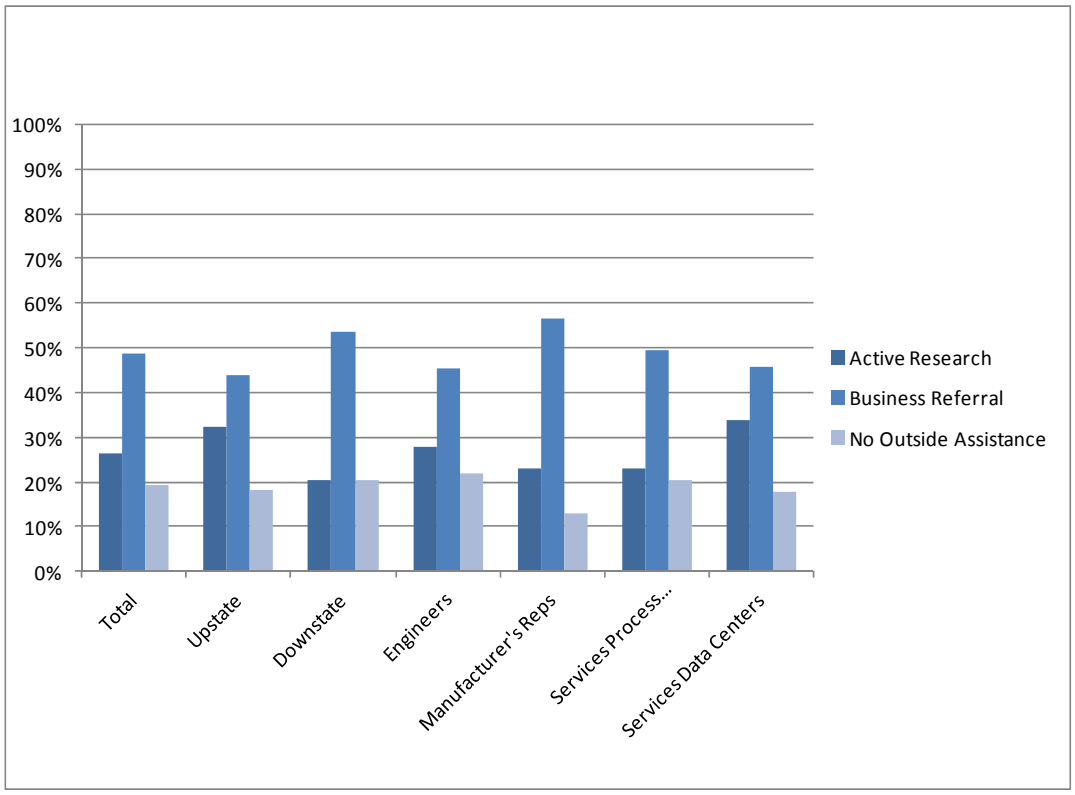
5.11 CUSTOMER DECISION MAKING PROCESS AND STRUCTURE OF RELATIONSHIPS WITH TSPs

In this Section, TSP opinions regarding customers' decision making process and their relationship with the TSPs are presented. This includes when and how customers typically pursue outside assistance and the level of decision making involved with process improvement projects.

5.11.1 Customers' Pursuit of Outside Assistance

Respondents were asked to identify how their customers most typically pursue outside assistance regarding process improvement projects. As shown in Figure 72, in the eyes of TSPs, their customers will most often use a business referral or respond to a marketing/advertising effort when pursuing outside assistance for process improvement projects. The percentages of TSPs identifying business referrals as the most typical outside assistance pursuit are similar across TSP groups, ranging from 44% to 56%. The percent who say their customers most often actively research TSPs ranges from 20% to 34%.

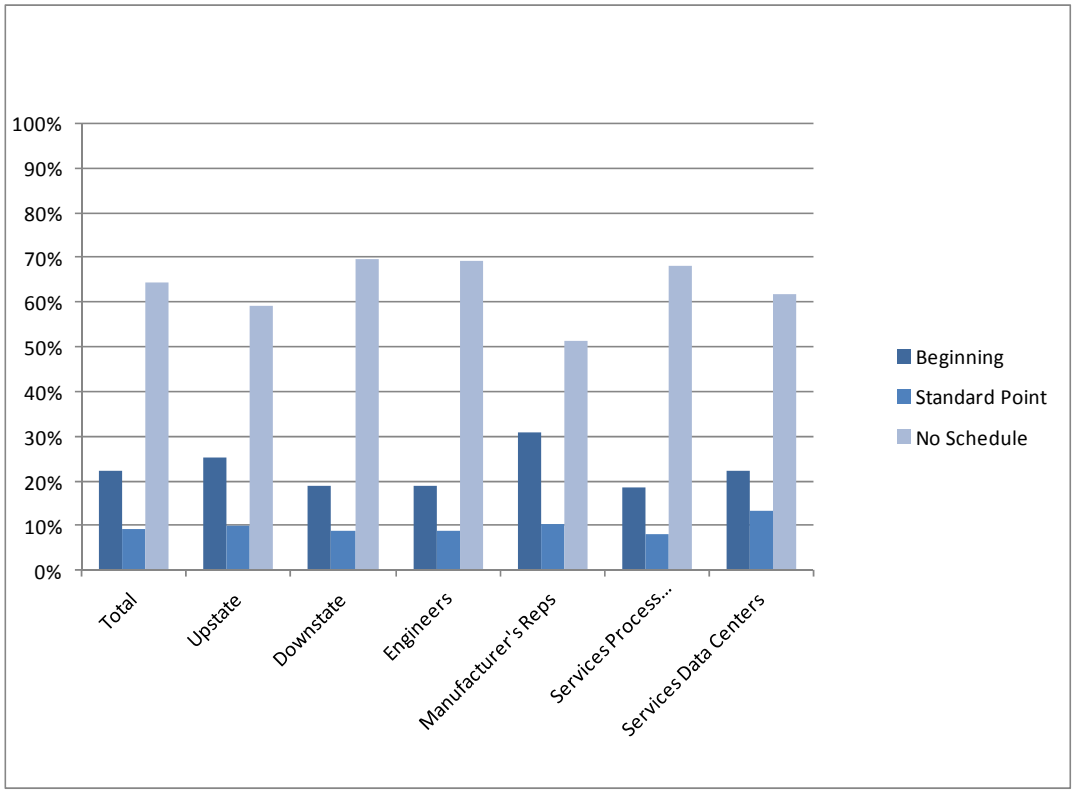
Figure 72. How Customers Most Typically Pursue Outside Assistance



Source: MCA primary data collection efforts (n=140 for TSP in 2011)

Respondents were also asked to identify when in the project cycle they believe their customers most typically pursue outside assistance. As shown in Figure 73, TSPs believe that customers most often do not have a set schedule of when they pursue outside assistance for a project. Thirty percent (30%) of Manufacturer's Reps and between 19% to 25% of the other TSP respondent groups report that customers most often pursue outside assistance at the beginning of a project. Eight percent to 13% think that their customers have a standard point where they will pursue assistance. This shows that there is a large population that could be influenced to pursue the proper assistance at the beginning of a project so as to take advantage of the qualifications and capabilities of technical service providers. These results are consistent with the results of the end use customer and data center surveys.

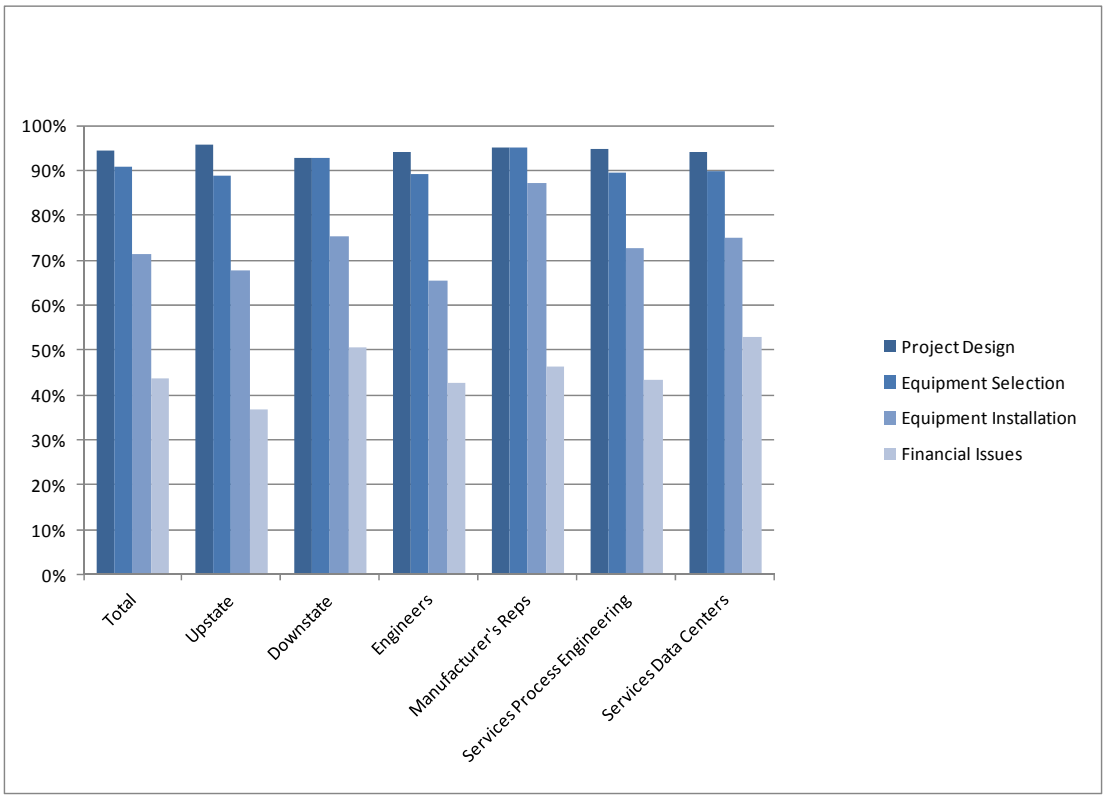
Figure 73. When Customers Typically Pursue Outside Assistance



Source: MCA primary data collection efforts (n=140 for TSP in 2011)

Figure 74 shows the typical areas where outside assistance is requested. As shown in this figure, over 90% of TSPs believe that most customers typically request help with project design and equipment selection. Eighty-seven percent of Manufacturer's Reps report that their customers will typically request help with equipment installation, while the other TSP respondent groups range from 65% to 75%. Fifty-one percent of downstate TSPs (37% upstate) report that customers typically seek help with financial issues(other TSP group responses range from 43% to 53%). The combination of previous data showing that competing capital costs are by far perceived as the single largest barrier, and this data showing that less than half of customers will pursue help with financial issues, reveals a population that will likely need to be directly educated about any financial incentives that could assist with implementation of a process improvement project, as they may not ask for financial assistance and could rule themselves out of otherwise viable project opportunities.

Figure 74. Areas Customers Typically Request Help With

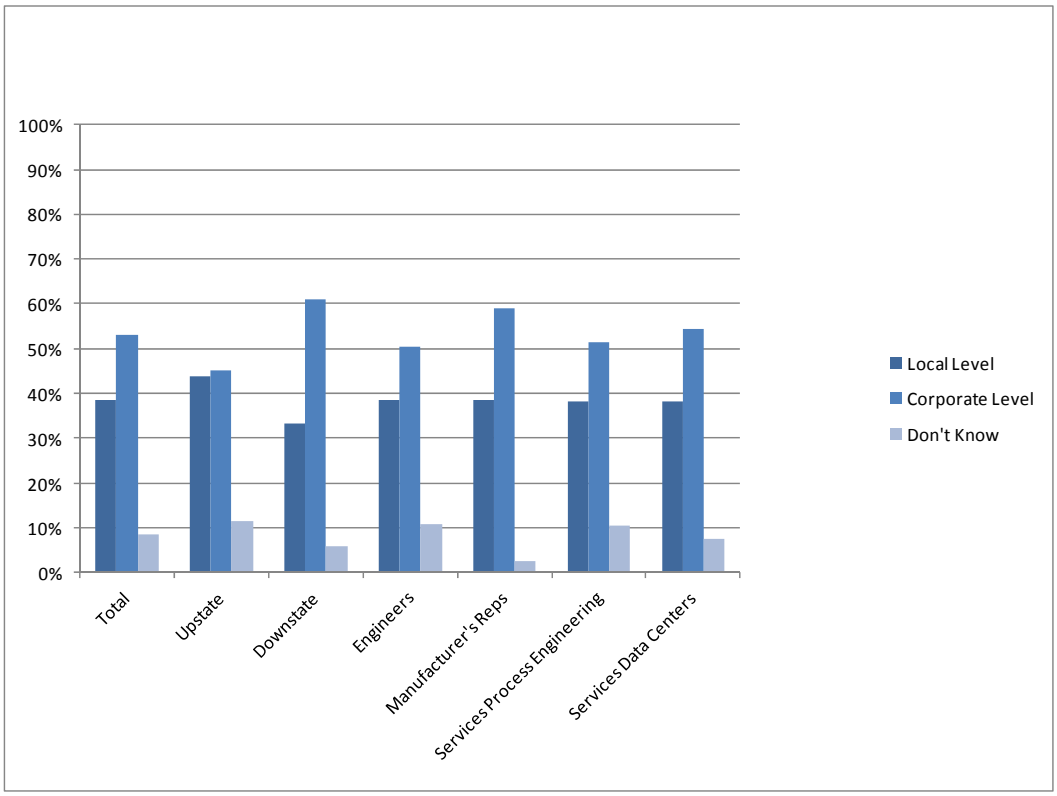


Source: MCA primary data collection efforts (n=140 for TSP in 2011)

5.11.2 Decision Making Level in Organizations

Respondents were asked to identify the level within their customers' orginazations, either local (within the facility) or at the corporate level, where they believed that decisions are made regarding the need for and design and implementation of process improvement projects. As shown in Figure 75, TSPs most often perceive these decisions are typically being made at the corporate level (45% to 61%), though a large percentage also report that the decision making most likely happens at the local level (33% to 44%). More downstate TSPs identify the corporate level (61%) than do upstate TSPs (43%). This difference between upstate and downstate is not reflected in the results of the same survey question asked to end use customer and data center respondents (see 5.2.5). However, the rest of the results are consistent with the TSPs' perceptions.

Figure 75. Level in Organization of Decision Making



Source: MCA primary data collection efforts (n=140 for TSP in 2011)

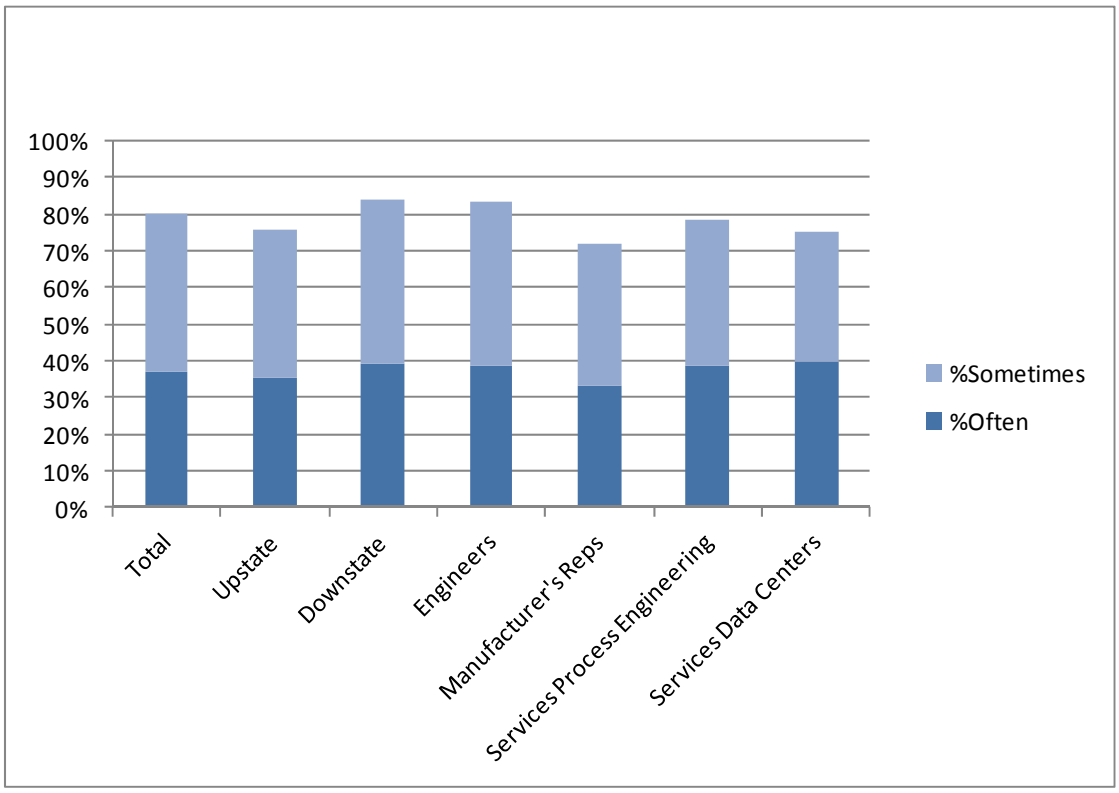
5.12 AWARENESS OF PROCESS EFFICIENCY IMPROVEMENT PROJECTS IN THE STATE

In this section, TSP responses regarding awareness of process improvement projects in the state are presented. This includes the perception of the frequency of marketing efforts, the perception of the increase in the number of projects, and the perceived reasons for this change in number.

5.12.1 Frequency of Process Improvement Featured in Marketing

Respondents were asked to assess how often they are seeing any successful process efficiency improvement projects included within the broad TSP industries' marketing efforts including competitor's company-specific marketing materials, industry publications or trade journals. As shown in Figure 76, TSP groups have similar perceptions, with 33% to 40% saying that they see these messages "often" (35% to 45% see them "sometimes"). Viewed another way, this figure shows that between 60% to 67% of TSPs report seeing this type of messaging only "sometimes," "rarely," or "never." This creates an excellent marketing opportunity for TSPs perhaps with targeted marketing materials development support provided through the Industrial and Process Efficiency Program. By helping New York's TSP industry to show and include successful process efficiency improvements in marketing efforts, industry publications, and trade journals, the Program can make positive impacts on what currently appears to be a fairly untapped marketing strategy. Tracking changes from this initial baseline measurement indicator can be used to assess progress in the market.

Figure 76. Frequency of Seeing Successful Marketing of Process Efficiency Projects

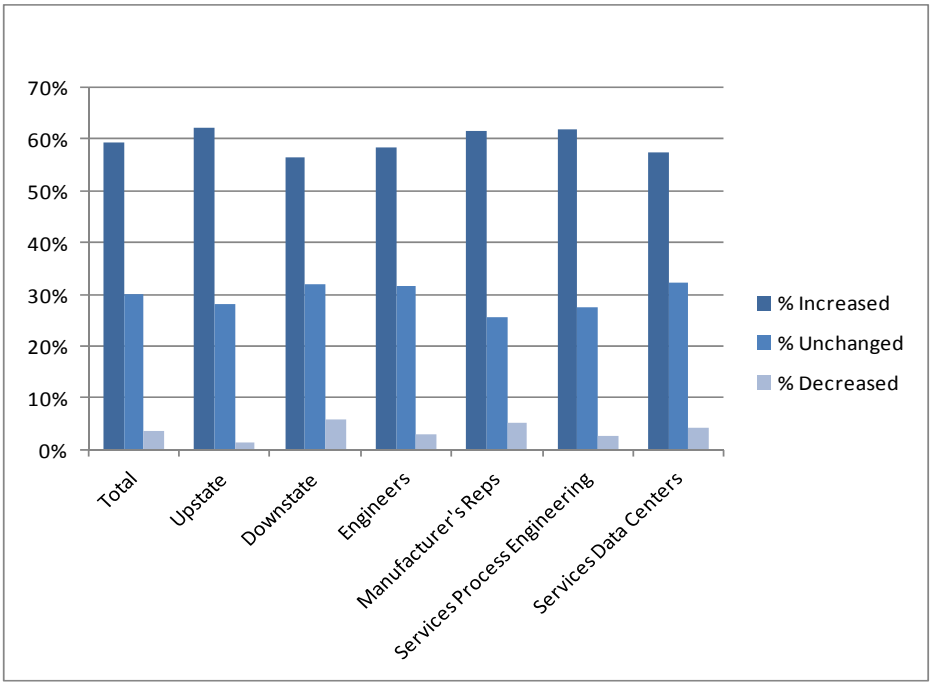


Source: MCA primary data collection efforts (n=140 for TSP in 2011)

5.12.2 Change in the Number of Process Improvement Projects

Figure 77 shows the perceived change among TSP respondents in the number of process improvement projects incorporating energy efficiency, non-energy efficiency technology advancements, or demand response design awareness within New York over the past three years. The figure shows the percentage of TSPs that think the number has increased, hasn't changed, or has decreased. As shown in this figure, TSPs share a similar view of the change in the number of projects over the past three years, with 57% to 62% saying the number has increased. Between 27% and 32% think that the number has stayed the same. Only 1% to 6% of respondents think the number has decreased. This figure shows that most TSPs have seen an increase in the number of projects, but there still remains a large portion of the TSP population that have not noticed any change. This is an important baseline measurement for tracking Industrial and Process Efficiency Program process going forward.

Figure 77. Perceived Change in Number of Process Improvement Projects over Past Three Years



Source: MCA primary data collection efforts (n=140 for TSP in 2011)

For those respondents that said the number of process improvement projects in New York has increased over the past three years, Table 46 below, shows the answers received as the reason for the increase. The most common answer among all respondent types was "increased market opportunity" with 12-23%. "Desire to be green" was the second most common answer among all respondent types (5-15%). A large percentage of respondents gave a variety of other answers, none of which were repeated often enough to be statistically significant.

Table 46. Perceived Reason for Increase in Projects (% that mentioned reason).

Reason for Increase	Total	Upstate	Downstate	Engineers	Manufacturer's Reps	Services Process Engineers	Services Data Centers
Market Opportunity	15%	14%	16%	12%	23%	16%	16%
Climate Change Concern	1%	0%	1%	0%	3%	1%	2%
Desire to be Green	8%	7%	9%	5%	15%	7%	10%
NY or National Regulatory Changes	1%	0%	0.029	0%	5%	1%	0%
Other	46%	52%	39%	48%	41%	48%	46%

Source: MCA primary data collection efforts (n=140 for TSP in 2011)

SECTION 6. SUMMARY OF FINDINGS AND ACTIONS FOR CONSIDERATION

The MCA Team's goal for this report has been to provide data and intelligence to inform program-related decision-making. To this end, the MCA Team has collected and analyzed a substantial amount of primary and secondary data to:

- Characterize the market eligible to participate in the Industrial and Process Efficiency Program and discuss program accomplishments and market penetration.
- Assess the progress of the Industrial and Process Efficiency Program in meeting key program and market assessment indicators.

This section presents the MCA Team's conclusions and recommendations as derived from the evaluation of the Industrial and Process Efficiency Program.

6.1 MARKET CHARACTERIZATION FINDINGS

This section summarizes key findings from the above characterization efforts.

6.1.1 New York Industrial Market in General

New York is home to 4% of all manufacturing facilities nationwide. Six industries show high concentrations of employment, having 5% or more of the total number of nationwide employees of those industries located in New York (a number of these high concentration industries are included in the sectors targeted by NYSERDA's Industrial and Process Efficiency Program including: Pharmaceuticals, Printing and Computers):

1. Apparel Manufacturing (12%)
2. Pharmaceutical and Medical Manufacturing (7%)
3. Printing and Related Support Services (6%)
4. Leather and Allied Products Manufacturing (6%)
5. Computer and Electronic Manufacturing (5%)
6. Miscellaneous Manufacturing (7%)

In 2009, 48.5% of all New York State's manufacturing establishments were located upstate and 51.5% were located downstate. From 2001 to 2009, the total number of manufacturing establishments in New York State decreased by 5% statewide (8.4% downstate, 2.6% upstate).[111]

New York State offers economic development programs to support the retention of large manufacturing industries, and is investing in infrastructure to provide continued support and growth of these industries.

6.1.2 NYSERDA's Industrial and Process Efficiency Program-Targeted Industries

NYSERDA's Industrial and Process Efficiency-targeted industries represent a large portion of the manufacturing facilities located in New York. Specifically, Industrial and Process Efficiency industries account for:

[111] U.S. Census Data, American Fact Finder, 2008 Economic Data for the State of New York, with GDS calculations.

- 40% of all manufacturing establishments
- 35% of the total number of employees
- 36% of production work hours
- 35% of the payroll
- 42% of the capital expenditures
- 48% of the total value of shipments
- 50% of the total value added[112]

Among all Industrial and Process Efficiency industries, the Pharmaceutical (and Medicine) Manufacturing industry has the greatest total value of shipments and value added. Approximately 11% of the total national pharmaceutical and medicine shipments were produced by 7% of the total industry employees located in New York in 2008. This indicates that New York's Pharmaceutical and Medicine Manufacturing industry employees are outperforming their counterparts in other parts of the nation.

From an energy intensity perspective, Forest Manufacturing and Chemical Manufacturing (excluding Pharmaceuticals) have the highest energy consumption per employee, at 1,784 and 1,604 MMBtu/employee per year respectively (12.3 and 6.5 MMBtu/dollar of value added and 5.8 and 2.8 MMBtu/dollar value of shipments, respectively). The Printing and Related Support industry is the least energy intensive industry on a per employee basis, at 155 MMBtu/employee per year. However, when viewed from an MMBtu/dollar of value added or dollar value of sales perspective, the Pharmaceuticals and Medicines Manufacturing industry is the least energy intensive (0.8 and 0.6 MMBtu, respectively)

New York has the 3rd largest number of chemical manufacturing companies in the nation, is the 2nd largest producer of plastics, and according to Empire State Development Corporation, the Chemical Manufacturing industry shows indications of expansion. In 2008, nearly 4% of the nation's Chemical companies were located in New York and had the largest percentage of capital expenditure among all the Industrial and Process Efficiency-targeted industries (11%). The Chemical Manufacturing industry appears to be thriving in the State and invests in its plant and facilities at a greater rate than other industries.

There has been an overall decline in the number of establishments in Industrial and Process Efficiency-targeted industries. However, for several sectors, the number of firms has increased[113]; including:

- Wastewater (Sewage) Treatment Facilities (5.8%).
- Water Supply and Irrigation Systems (5.3%)
- Food Manufacturing (1.7%)
- Transportation Equipment Manufacturing (1.0%)
- Niche markets within the Publishing, Food Manufacturing and Mining industries are also growing in New York, as is Data Storage.[114]

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[112] Value added is defined as the amount by which the value of an article is increased at each stage of its production, exclusive of initial costs.

[113] The years used to determine growth rate percentages are 2006 to 2007. Source – US Census Data, *County Business Pattern Data*.

[114] All information on the emergence of niche markets is qualitative and was gathered from articles and industry reports, so there are no concrete data on the number of number of niche market establishments from which to calculated growth rate percentages for this time period.

Regarding wastewater facilities, there is a great need in New York for updating and improving these facilities. This presents an outstanding opportunity for the Industrial and Process Efficiency Program. Sixty percent (60%) of the facilities are still in service, well beyond their useful life of 30 years, and running inefficiently. In addition, small private irrigation and sewage treatment facilities are being built throughout the State to support condominium and office complexes.

New York is home to the second largest number of data centers nationwide. In a national survey of data center facilities, 83% of respondents are planning data center expansions in the next 12 to 24 months and energy efficiency is a major factor in their expansion plans. NYSERDA competitively selected a Focus on Industrial and Process Efficiency contractor, specializing in the data center industry, which will lend credibility when promoting the benefits of the industrial and process efficiency improvements, and should enable the Program to penetrate this growing industry.

6.1.3 Market Actors Providing Services to Industrial Customers

Market actors in this section are industry partners that are resources for, or have an influence on energy efficiency decisions (*i.e.* suppliers, distributors, manufacturers or equipment). The market actors providing services to industrial, and data center customers in New York are separated into two main categories: (1) General Services market actors (*i.e.*, those that work on specific processes in multiple industries), and (2) Industry Specific actors (*i.e.*, those that provide services mainly in just one industry).

Industry and Process Efficiency Program-specific market actors include process equipment manufacturers and suppliers, packaging suppliers, distributors, repair contractors, industrial designers, equipment testing and engineering services, and consultants. There are nearly 3,000 such market actors that support the Program's targeted industries in New York (49.1% upstate and 50.7% downstate).[115] In addition to the general and cross-industry market actors, the largest number of market actors among the Industrial and Process Efficiency industries is in the food manufacturing, with 378 located upstate and 354 downstate. Of these, the greatest number of market actors, in both upstate and downstate, is in food equipment manufacturing and maintenance. Chemical Processing has the second greatest number of market actors, 105 in upstate and 122 located downstate. Again, the greatest portion is equipment manufacturers, located upstate and downstate.

6.1.4 Relevant Energy Efficiency Programs

Industrial customers operating within New York have several options available to choose from if they are interested in obtaining outside assistance for enhancing the energy efficiency of their manufacturing processes. These options include federal, state and utility programs. These programs, examples of which are noted below, offer a variety of assistance, from specialized industry information to reviewing their unique processes and energy needs, and making recommendations to enhance their efficiency, and include incentives. These programs have the potential to impact (*i.e.*, either help or hinder) achievement of NYSERDA's Industrial and Process Efficiency Program goals.

- Federal Programs: DOE and EPA
- NYSERDA Industrial and Process Efficiency and Other Programs
- Other New York State Programs and Customer Eligibility
    - Recharge NY (formally Power for Jobs)
    - Empire Program
    - Utility Programs

[115] Number excludes market actors that specifically serve the Data Center industry.

6.2 MARKET ASSESSMENT FINDINGS

This section summarizes key findings from the above market assessment efforts.

6.2.1 Current Levels of Efficiency, Familiarity, or Perceptions

A significant number of the eligible end use manufacturing and data centers customers interviewed do not perceive the systems and processes in their facilities to be particularly energy efficient. Over 70% report that they "never," "infrequently" or only "sometimes" perceive process improvement projects as energy projects. Neither do they see energy efficiency as a "very important" factor when planning process improvements, nor do they typically incorporate improvements when a system fails and needs replacement. There is a large portion of the population of eligible end use customers, data centers, and technical service providers that lack awareness of, familiarity with, or confidence in the implementation and benefits associated with energy efficiency in process improvements.

Other findings relating to respondents' current levels of efficiency, familiarity and perceptions include:

- There are a large variety of systems and processes used in Industrial and Process Efficiency-targeted manufacturing facilities and data centers. The following systems and processes are quite common within targeted manufacturing facilities: Storage and Handling, Product Manufacturing, Warehousing, Data Storage, Packing/Distribution, and Transportation. A majority of data centers use Dedicated HVAC, On Site Data Storage, Network Equipment, Servers, Fire detection/suppression and Power Distribution Units. Efficiency improvements associated with these systems and processes should be marketable to a large percentage of the Program's targeted facilities, while improvements associated with other systems and processes may only be marketable to a select portion of the targeted facilities.
- The most common efficiency elements used by Industrial and Process Efficiency manufacturing industries include lean manufacturing practices, pumps and motors, compressed air systems, or are associated with heating and cooling systems. Virtual servers are the most common efficiency element use by data centers.
    - There remains a noteworthy percentage of all of these systems and components that respondents perceive to be either "not very" or "not at all" energy efficient, which represents an opportunity for process efficiency improvements.
- Over 75% of the Program's targeted manufacturers and data centers are not very familiar with the new technologies and procedures for incorporating energy efficiency, or familiar with integrating it in their facilities. About this same percentage do not always think of process improvement projects as energy projects and over half do not typically look to make energy efficiency improvements when replacing systems or processes that fail.
- Nearly 75% of the Industrial and Process Efficiency Program's targeted manufacturers and data centers are not very familiar with the full range of benefits possible through process efficiency integration. They also could be more confident in the persistence of these benefits. Less than half of the Program's targeted manufacturers and data centers that have recently incorporated improvement projects noted that they have seen savings (both energy and cost) from all or most of those projects.
- A substantial need was identified for increasing awareness of industrial and process efficiency improvement opportunities, and improving understanding of the associated technologies and qualifications/skill sets of the technical service providers supporting this market.
- Over 40% of TSPs consider the sale of energy efficiency products and services much more important than other products and services that they sell.

    - Another 33% consider those sales somewhat more important and only 25% consider these sales as less or similarly important.

- Over 70% of TSPs “always,” or “often” promote the benefits of energy efficiency when marketing their products/services. This is very similar to those who say they “always” or “often” promote the benefits of productivity improvements.
- In the TSPs' opinion of their customers, the customers are not extremely focused on energy efficiency. About 50% of TSPs think that their customers find energy reduction to be "very" important, but less than 10% of TSPs think that their customers always view process efficiency projects as energy projects (over 60% say that customers view process efficiency projects as energy projects only sometimes or less).

6.2.2 Current Investment Levels, Types of Improvements, Practices and Perceptions

Eligible end use customers and data centers most typically use internal capital to fund process improvements. Most consider financial criteria to be the major factor in moving forward with a process improvement project, mainly return on investment. An insufficient number of respondents identified specific process efficiency improvement projects that have been implemented within their facilities to report reliable findings regarding project types. However, based on the limited responses received, projects included modification of equipment (mainly for safety purposes) that also resulted in energy usage reduction; the addition of a chilled water system (mainly for environmental reasons) that also increased process efficiency; identification and implementation of demand response opportunities which resulted in persistent lower energy use per unit of production; and replacement of materials used in a specific process with types requiring less materials storage, processing and disposal equipment, resulting in reduced waste stream and increased efficiency. Of the few respondents who said they incorporated energy efficiency into their process improvement projects, a number of the examples provided were not process-related projects at all. This highlights the need for more outreach and education to industrial facilities managers.

Based on the interviews with eligible end use customers, data centers, and technical service providers, other key findings relating to current levels of investment, types of process efficiency improvements, and associated practices and perceptions include:

- With a few exceptions, about 50% of TSPs do not have experience working with any given process or system. Similarly, with some exceptions, generally 33% of TSPs do not see a given efficiency element incorporated within their customers’ systems or processes. This shows that most TSPs may not be well-versed in the areas of process efficiency improvements, or that their customers are not aware of these opportunities sufficiently to ask for them.
- Systems and processes are most commonly modified or upgraded every 3-5 years for manufacturers and data centers. A period of 6-10 years is more common than between 1-2 years.
- Over 50% of the Industrial and Process Efficiency program’s targeted manufacturers and data centers say that reducing energy demand and consumption is very important to them. Over 90% say that it is at least somewhat important. However, 50% of these same manufacturers consider energy efficiency opportunities and sustainability to be major factors for moving forward with a project.
- When making project implementation decisions, approximately 90% consider financial criteria to be a major factor. Safety improvement, quality, process improvement, and customer impact are all universally considered more important than energy efficiency. These features, and associated financial savings, are therefore more likely to be successful when promoting process efficiency improvements to most of the Program’s targeted facilities.

6.2.3 Current Barriers Impacting Investment

A majority of the eligible end use customers and data center respondents identified multiple barriers to investing in energy efficient process improvements. The most common responses related to financial issues, with internal funding and competing capital costs being the largest and most important.

Other key market barrier findings among eligible end use customers, data centers, and technical service providers include:

- It is common that an eligible end use customer or data center is struggling to overcome multiple barriers.
- Internal capital is by far the most common funding source for projects. Competing capital demands is by far the largest barrier to improvement projects.
- The two most important financial factors to moving forward are internal funding and ROI.
- Company tendencies to focus on projects with quick payback periods (between six months to three years) are also a notable barrier by survey respondents.
- Over 67% of manufacturing and data center respondents are not very confident in the savings associated with energy efficiency.
- TSPs see competing capital demands as, by far, the biggest barrier for their customers to incorporating energy efficiency in process improvements.
- Other significant barriers are eligibility issues, a lack of expertise, the undervaluing of energy efficiency, a lack of internal awareness, a lack of external awareness, and conflicting programs.

6.2.4 Value of Technical Assistance Services

Technical service providers are not particularly confident in their own, or other TSP's abilities to provide effective process efficiency improvement services. Neither are they confident of the ability of the markets, technologies, or procedures to do the same. Approximately 75% of TSPs think that the market is only "somewhat" or "less than somewhat capable" of providing process efficiency improvement services. Similarly, around 75% think that TSPs are only "somewhat" or "less than somewhat qualified" to implement effective process efficiency improvement projects. Approximately 67% of TSPs report being only "somewhat" or "less than somewhat confident" in the overall performance of the technologies and procedures available for energy efficiency in process improvements. This lack of confidence is likely at least partly attributable to a lack of awareness and experience.

Other key findings regarding the value of technical assistance services include:

- Nearly 67% of TSPs are only "somewhat" or "less than somewhat familiar" with the technologies and procedures available for improving the energy efficiency of industrial and manufacturing systems and processes. This same percentage of TSP respondents report seeing examples of successful process efficiency improvement projects in marketing materials only "sometimes" or less.
- Almost all TSPs say that their customers will typically request help with project design and equipment selection. About 75% say that they typically request help with installation, and less than 50% say they typically request help with financial issues. About 50% of TSPs say their customers most typically use a business referral (25% say they most typically use active research, and 25% say their customers will typically use no assistance). Most TSPs say that customers typically have no set point when they would pursue outside assistance.
- About 67% of the Program's targeted manufacturers and data centers are not very confident in the ability of the market to provide industrial process improvement services.

6.2.5 Awareness of NYSERDA and Other Program/Funding Opportunities

Although most eligible end use customers, data centers, and TSPs are aware of NYSERDA, fewer than 45% of the responding manufacturing customers, and less than 15% of the data centers interviewed, reported having participated in any NYSERDA program (including the Industrial and Process Efficiency Program) in the past five years. This means that there remains a substantial number of manufacturing facilities and data centers in New York that can be served by NYSERDA's programs. Approximately half of eligible end use customers and data centers did not know about the Program (they heard about Industrial and Process Efficiency through a variety of sources with none being particularly dominant).

Following are other key findings associated with eligible end use customers, data centers, and technical service providers' awareness of NYSERDA and other energy efficiency program or funding opportunities:

- A large number of manufacturing and data center facilities do not know about any other NYSERDA programs. More than 50% of TSPs know about at least one other NYSERDA program (4-8% of eligible end use customers that say they know about NYSERDA Lighting). Approximately 10% of data centers know about the FlexTech Program, and 7% know about programs offered by New York State Electric and Gas. For TSPs, between 6-11% of each TSP segment report knowing about NYSERDA's FlexTech Program (3-11% know about the Existing Facilities Program).
- Less than 10% of TSPs are aware of FlexTech and Existing Facilities programs. Very few are aware of the New Construction program. Nearly half are unaware of any non-NYSERDA program that provides energy efficiency or technical assistance. This highlights that, overall, there is remains a lack of awareness of energy efficiency-related programs among TSPs.

6.3 ACTIONS FOR CONSIDERATION BY PROGRAM STAFF

Developing specific recommendations regarding programmatic changes or modifications was not a goal of this MCA effort. However, the work performed by the MCA Team has identified some potential actions that could be considered by program staff, as suggested below:

- ***Consider increasing efforts focused on improving the technical capabilities and qualifications of process efficiency service providers.*** The surveys revealed that a significant population of both customers and the TSPs themselves are not very confident in the technical capabilities or qualifications of the TSPs to perform the energy efficiency process improvements that the Industrial and Process Efficiency Program hopes to implement. One potential key to the success of this program is for TSPs to be given the information and resources to properly identify and implement process efficiency improvements. In this way, customers may begin to recognize the capabilities and qualifications of these TSPs through participation in, and awareness of successful projects. The success of TSPs implementing process efficiency improvements is also key to raising customer confidence in these projects themselves, and integral to the customers recognizing these improvements as good financial investments. In this way, energy efficiency may become a more significant part of the thought process when confronted with the need to make manufacturing and data center process and system improvements.
- ***Consider broadening the marketing channels being used to promote the Industrial and Process Efficiency Program.*** At the time of this evaluation's telephone surveys (just one year following initial Industrial and Process Efficiency Program launch), 50% of eligible end use customers, data centers, and TSPs were aware of the Program. Respondents that were aware of the Program found out about it through a variety of different channels, with no one channel representing a particularly large portion. As financial criteria are shown to be so important to moving forward with a process improvement project, an eligible end use manufacturing or data center customer

that does not know about the program may not consider efficiency improvements at all based on competing capital needs. This same potential customer could have very inefficient processes that could yield high returns through identification and implementation of improvement projects that they would not consider unless they become aware of the help offered through the Program.

- ***Thorough documentation of program impacts, through site-specific and broader measurement and verification activities could be valuable, from both a marketing perspective and for identifying and implementing program changes as necessary.*** Subsequent impact evaluation studies and market progress assessments should be conducted and compared to this original baseline assessment to determine the Program's success on key program performance indicators. This may reveal areas where minor modifications to delivery strategies could result in increased likelihood of goal achievement. In addition, distribution of targeted impact evaluation results (highlighting, through case studies, achieved energy savings and other related benefits) from a sample of completed projects within specific targeted industries, could help to increase awareness of process efficiency improvement benefits and ultimate program uptake.

APPENDIX A

OTHER SECONDARY DATA SOURCES

- NYSERDA Industrial and Process Efficiency Program Logic Model Report – Final January 12, 2010
- U.S. Census Data, County Business Patterns data, from 2005 to 2008
- U.S. Census Data, American Fact Finder, 2008 Economic Data for the State of New York
- ASM 2008, New York and Total U.S.
- Netstate, New York Economy, Agriculture, September 2009, www.netstate.com/economy/ny_economy.htm
- "No Growth in Private Sector in 10 years……Manufacturing in Almost 70," EcomonicData.com. September 2009
- Empire State Development Regional Summary, 2010
- Food Manufacturing, Food Processing Machinery: Improving Energy Efficiency http://www.foodmanufacturing.com/Scripts/Products-Food-Processing-Machinery-Improving.asp
- Empire State Development, Materials Processing in NY State white paper, 2005, 2009
- ChemicalProcessing.com, Use it or Lose it: Chemical Industry Energy Consumption, 2010, http://www.chemicalprocessing.com/articles/2005/501.html
- Department of Energy Industrial Technologies Program. *Energy Use, Loss, and Opportunities Analysis, U.S. Manufacturing & Mining*. December 2004.http://www.eere.energy.gov/industry/pdfs/energy_opps_analysis.pdf
- U.S. EPA, Energy Trends in Selected Manufacturing Sectors: Opportunities and Challenges for Environmentally Preferable Energy Outcomes, Final Report March 2007**.**
- Lawrence Berkley National Laboratory Energy Efficiency Improvement and Cost Saving Opportunities for the Vehicle Assembly Industry, An ENERGY STAR Guide for Energy and Plant Managers, *Christina Galitsky and Ernst Worrell Environmental Energy Technologies Division* , Sponsored by the U.S. Environmental Protection Agency , March 2008.
- Summary of Forest Products from Energy Trends in Selected Manufacturing Sectors: Forest Products, http://www.epa.gov/ispd/pdf/energy/ch3-5.pdf
- www.wikipedia.com. Publishing
- Mining Industry of the Future, National Mining Association in conjunction with the US Department of Energy, Office of Energy Efficiency and Renewable Energy, Office of Industrial Technologies, 2000
- New York State Oil, Gas and Mineral Resources, 2008 NYS DEC - Division of Mineral Resources
- Water and Wastewater Energy Best Practice Guidebook, Science Applications International Corporation, (SAIC), December 2006
- Wastewater Infrastructure Needs of New York State, march 2008. dec.ny.gov/docs/water

- Bizjournal.com, Press Release: Digital Realty Trust, Inc., "Study of U.S. Data Center Industry Indicates Widespread Expansion of Data Center Facilities Will Continue in 2010 and 2011." March 3, 2010
- Thegreengrid.org, The Effects of Virtualization on Data Center Physical Infrastructure. 2/4/2010
- What is Power Usage Effectiveness?, A quick lesson on analyzing the energy efficiency level of a data center, Dec 1, 2008 12:00 PM, By Mark Szalkus, GE Digital Energy - Power Quality
- DOE, Industrial Technologies Program, Energy Efficiency as a Resource: Northeast Region, December 2009, and MECS 2006 Report. The Northeast Region includes manufacturing fuel consumption data for Maine, Vermont, New Hampshire, Massachusetts, Connecticut, Rhode Island, New York, New Jersey, and Pennsylvania.
- MECS Fuel Consumption 2006, National and Regional Data.
- Data from U.S. Census Bureau, Annual Survey of Manufacturers, 2005- 2008
- Leonardo Energy; Lean Manufacturing and Energy Efficiency, 2010
- NYSERDA, *System Benefits Charge Supplemental Revision for* ***New York Energy $mart^{SM}*** *Programs (2008-2011)*
- DOE Industrial Technologies Program, http://www1.eere.energy.gov/industry/program_areas/industries.html
- NYSERDA Patterns and Trends Report 2007
- New York State, Public Service Commission website, 05-M-0090: System Benefits Charge

APPENDIX B

Non-Participating Manufacturing End-Users Telephone Survey Instrument

NYSERDA Industrial and Process Efficiency (IPE) Program

MARKET CHARACTERIZATION AND ASSESSMENT PROJECT

Eligible Customer – Survey Instrument
(FINAL v9 September 27, 2010) – CATI Format

Introduction

Hello, my name is _____, and I'm calling from _____, an independent research firm, on behalf of the New York State Energy Research and Development Authority, or NYSERDA.

Our firm is conducting research for NYSERDA on Industrial and Process Efficiency in New York State. **[READ IF NECESSARY:** As an independent research firm, [INSERT FIRM NAME] does not intend to report your responses in any way that would reveal your identity or the identity of your company**.]**

[**READ IF NECESSARY OR ASKED** "HOW DID YOU GET MY NAME": We are contacting a sample of owners and managers of industrial and manufacturing facilities in New York State who have not yet participated in the NYSERDA Industrial and Process Efficiency Program, and your company was selected.]

Who at your company can best speak about energy-related investment decision-making? [READ IF NECESSARY: We are looking to speak with a Chief Process Engineer or someone similar at your company].

[RECORD NAME AND FOLLOW UP WITH NEW RESPONDENT]
[IF INITIAL RESPONDENT IS MOST SUITABLE, CONTINUE WITH GENERAL INSTRUCTIONS]
[IF INITIAL RESPONDENT IS MOST SUITABLE BUT NOW IS NOT A COVENIENT TIME TO TALK, SCHEDULE A FOLLOW-UP DATE AND TIME.]

General Instructions

When responding to questions please use your best judgment or give your best estimates. If you don't know how to respond, just say so. At several points today I will refer to "industrial systems and process" improvement projects: for brevity's sake I will use the phrase "process improvement" projects instead. Does this make sense to you?

Screener

S1. To the best of your knowledge, has your firm participated in any NYSERDA or **New York Energy $mart[SM]** programs in the past five years? (READ IF NECESSARY: These could include: NYSERDA' Industrial and Process Efficiency Program, FlexTech, Existing Facilities, New Construction and/or other programs).

01 DID NOT PARTICIPATE IN ANY NYSERDA PROGRAMS
02 PARTICIPATED, BUT CAN'T RECALL WHICH ONES
03 PARTICIPATED IN NYERDA IPE PROGRAM

04 PARTICIPATED IN NYSERDA PROGRAM OTHER THAN IPE (SPECIFY)
96 REFUSED
97 DON'T KNOW

IF S1 = 03, TERMINATE

S2. My records show that your company's primary business activity is [INSERT FROM DATABASE]. Is that correct?
01 YES [SPECIFY IF NEEDED]
02 NO
96 REFUSED
97 DON'T KNOW

S2a. **(ASK S2a IF S2 = 02, ELSE SKIP TO A1)**
How would you describe your company's primary business activity? [DO NOT READ, ACCEPT ONLY ONE ANSWER]
01 CHEMICALS (INCLUDING PHARMACEUTICALS)
02 PRINTING AND PUBLISHING
03 TRANSPORTATION (INCLUDING AUTOMOTIVE)
04 FOOD PROCESSING
05 FOREST PRODUCT MANUFACTURING
06 DATA CENTER
07 AGRICULTURE
08 MINING/EXTRACTION
09 WATER/WASTEWATER
10 OTHER (SPECIFY): _____
96 REFUSED
97 DON'T KNOW

IF S2a = 06-10, TERMINATE

A. <u>Current Levels of Efficiency, Familiarity and Perceptions</u>

A1. I'm going to read you a list of some industrial or manufacturing systems and processes. Please tell me which ones your company has in the facility where you work.

Does your company have [INSERT ITEMS (a-n)]:
a. Raw materials extraction or processing?
b. Materials storage or handling?
c. Data storage or processing?
d. Product manufacturing?
e. Separation?
f. Assembly?
g. Process heating? [READ IF NECESSARY: including baking, drying, etc.]
h. Process cooling? [READ IF NECESSARY: including refrigeration, freezing, etc.]
i. Product finishing?
j. Product testing?
k. Packaging or distribution?

l. Warehousing?
m. Transportation, including conveyors, lifts, etc?
n. Water or waste treatment? [READ IF NECESSARY: pre and post processing]
    01 YES
    02 NO
    96 REFUSED
    97 DON'T KNOW

A1o. Are there any other systems or processes that I have not mentioned?
01 YES [SPECIFIY]
02 NO
96 REFUSED
97 DON'T KNOW

A2. To what extent does your company view process efficiency improvement projects as "energy" projects: always, sometimes, infrequently, or never? [READ IF NECESSARY: By "energy" projects – we mean to what extent does the consumption of energy of the project's equipment play a role in the selection and design of the project?]
01 ALWAYS
02 SOMETIMES
03 INFREQUENTLY
04 NEVER
96 REFUSED
97 DON'T KNOW

A3. How familiar are you with new technologies and procedures available for improving the energy efficiency of industrial systems and processes: very, somewhat, not too, or not at all familiar?
01 VERY
02 SOMEWHAT
03 NOT TOO
04 NOT AT ALL
96 REFUSED
97 DON'T KNOW

A4. For each of the industrial or manufacturing systems and processes in the facility where you work, please tell me how **energy efficient** that system is—very, somewhat, not too, or not at all energy efficient? First, [INSERT ITEMS FROM A1a-n = 01, YES]: [READ IF NECESSARY: How energy efficient is this system or process?]
a. Raw materials extraction or processing?
b. Materials storage or handling?
c. Data storage or processing?
d. Product manufacturing?
e. Separation?
f. Assembly?
g. Process heating? [READ IF NECESSARY: including baking, drying, etc.]
h. Process cooling? [READ IF NECESSARY: including refrigeration, freezing, etc.]
i. Product finishing?
j. Product testing?

k. Packaging or distribution?
l. Warehousing?
m. Transportation, including conveyors, lifts, etc.?
n. Water or waste treatment? [READ IF NECESSARY: pre and post processing

01 VERY ENERGY EFFICIENT
02 SOMEWHAT ENERGY EFFICIENT
03 NOT TOO ENERGY EFFICIENT
04 NOT AT ALL ENERGY EFFICIENT
96 REFUSED
97 DON'T KNOW

[ASK A4o IF A1o = 01, ELSE SKIP TO A5]

A4o. How energy efficient is the [INSERT RESPONSE FROM A1o = 01] at your facility—very, somewhat, not too, or not at all efficient?

01 VERY ENERGY EFFICIENT
02 SOMEWHAT ENERGY EFFICIENT
03 NOT TOO ENERGY EFFICIENT
04 NOT AT ALL ENERGY EFFICIENT
96 REFUSED
97 DON'T KNOW

[ASK A5 IF AT LEAST 1 RESPONSE FROM A4a-o = 01 OR 02, ELSE SKIP TO A6]

A5. What types of efficiency elements have been incorporated within your facility's industrial systems and processes? Do they include [INSERT ITEMS (a-f)]: ROTATE ITEMS?

a. Efficient pumps or motors
b. Efficient compressed air systems
c. Efficient process heating or cooling
d. Lean practices [READ IF NECESSARY: Lean practices are operational strategies designed to reduce waste, costs, and lead times during production]
e. Combined heat and power
f. Load shifting or demand response

01 YES
02 NO
96 REFUSED
97 DON'T KNOW

A5g. Are other types of efficiency elements incorporated within your facility's industrial systems and processes?

01 YES [SPECIFY]
02 NO
96 REFUSED
97 DON'T KNOW

A6. How confident are you that the energy efficiency savings estimates associated with process efficiency improvement projects are achievable: very, somewhat, not too, or not at all confident?

01 VERY
02 SOMEWHAT

03 NOT TOO
04 NOT AT ALL
96 REFUSED
97 DON'T KNOW

A7. How familiar are you with methods for integrating energy efficiency and energy management into business practices: very, somewhat, not too, or not at all familiar?
01 VERY
02 SOMEWHAT
03 NOT TOO
04 NOT AT ALL
96 REFUSED
97 DON'T KNOW

A8a. Approximately how often are the industrial or manufacturing systems and processes in the facility where you work upgraded or modified: within 2 years or less, every 3 to 5 years, every 6 to 10 years, or more than 10 years?
01 2 YEARS OR LESS
02 EVERY 3 TO 5 YEARS
03 EVERY 6 TO 10 YEARS
04 MORE THAN 10 YEARS
96 REFUSED
97 DON'T KNOW

A8b. Does this upgrade cycle differ by industrial or manufacturing systems and process type?
01 YES [SPECIFY]
02 NO
96 REFUSED
97 DON'T KNOW

A8c. What time of year does your Company do its capital budget or major project planning: Quarter 1, Quarter 2, Quarter 3, or Quarter 4?
01 QUARTER 1
02 QUARTER 2
03 QUARTER 3
04 QUARTER 4
05 MULTIPLE QUARTERS [SPECIFY]
96 REFUSED
97 DON'T KNOW

A9 Which of the following three statements best describes how replacements are made when components of the large industrial systems and processes fail or break at your facility earlier than your planned upgrade cycle? [DO NOT INITIALLY READ "OTHER" CHOICE]
01 We fix it by pulling from the inventory of spare parts
02 We fix it by purchasing identical new parts to replace failed or broken components (READ IF NECESSARY: These are parts NOT taken from inventory)
03 We fix it by assessing options and incorporating improvements
04 [READ IF NECESSARY] OTHER [SPECIFY]

96 REFUSED
97 DON'T KNOW

B. Current Levels of Investment, Types of Process Efficiency Improvements and Associated Practices and Perceptions

B1. Approximately how many process improvement projects has your company implemented within your facility over the last 5 years?
01 [RECORD # OF PROJECTS]
96 REFUSED
97 DON'T KNOW

[ASK B1a IF B1 = 01, ≥ 1, ELSE SKIP TO B2]

B1a. How many of these were implemented in the past 12 months?
01 [RECORD # OF PROJECTS]
96 REFUSED
97 DON'T KNOW

[ASK B2 IF B1 = 01, ≥ 1, ELSE SKIP TO B6]

B2. Approximately how many of these projects over the past 5 years resulted in energy and demand savings or reduced emissions: all, most, some, a few, or none?
01 ALL
02 MOST
03 SOME
04 A FEW
05 NONE
96 REFUSED
97 DON'T KNOW

[B3-B5 ASKED DURING FOLLOW-UP INTERVIEW; SKIP TO B6]

B3. Please briefly describe the largest (or most recent) such project(s) your company has implemented. [READ IF NECESSARY: Largest means most energy or demand savings] [LIMIT NUMBER OF PROJECTS DESCRIBED TO NO MORE THAN 2]
01 RECEIVED FOLLOW-UP RESPONSES [VERBATIM AT END]
02 DID NOT RECEIVE FOLLOW-UP RESPONSES

B4. Did any of these projects involve innovative or new technologies? [READ IF NECESSARY: "New" means relatively recent entry into the marketplace (within the past 2 to 4 years), "innovative" entail technologies that are designed and implemented to maximize efficiency and effectiveness of systems and resources]
01 YES [SPECIFY—Verbatim included at end]
02 NO
96 REFUSED
97 DON'T KNOW

B5. How confident are you in the performance of these innovative or new technologies: very, somewhat, not too, or not at all confident?
01 VERY

02 SOMEWHAT
03 NOT TOO
04 NOT AT ALL
96 REFUSED
97 DON'T KNOW

B6. How familiar are you with the full range of benefits associated with process efficiency improvements: very, somewhat, not too, or not at all familiar?

01 VERY
02 SOMEWHAT
03 NOT TOO
04 NOT AT ALL
96 REFUSED
97 DON'T KNOW

[ASK B7 IF B1 = 01, ≥ 1, ELSE SKIP TO B9]

B7. I'm going to read you a list of potential benefits of implementing process efficiency improvement projects. For each one, please tell me how much benefit, if any, your company realized from the projects you have implemented – a substantial amount, some, only a little, or none at all. First, [INSERT ITEMS (a-g)]…

a. Cost savings
b. Energy or demand savings
c. Productivity improvements
d. Product quality improvements
e. Reliability improvements
f. Water use and/or waste stream reductions
g. Emission reductions

01 SUBSTANTIAL
02 SOME
03 ONLY A LITTLE
04 NONE
96 REFUSED
97 DON'T KNOW

[ASK B8 IF ANY B7a-g = 01, 02, OR 03, ELSE SKIP TO B9)

B8. For each of these benefits, how confident are you that the benefit will persist over time: very, somewhat, not too, or not at all confident? First, [INSERT ITEMS (a-g) IF B7a-g = 01 OR 02, OR 03]…

a. Cost savings
b. Energy or demand savings
c. Productivity improvements
d. Product quality improvements
e. Reliability improvements
f. Water use and/or waste stream reductions
g. Emission reductions

01 VERY CONFIDENT
02 SOMEWHAT CONFIDENT
03 A LITTLE CONFIDENT

04 NOT AT ALL CONFIDENT
96 REFUSED
97 DON'T KNOW

B9. How important is reducing energy demand and consumption in your company: very, somewhat, not too, or not at all important?
01 VERY IMPORTANT
02 SOMEWHAT IMPORTANT
03 NOT TOO IMPORTANT
04 NOT AT ALL IMPORTANT
96 REFUSED
97 DON'T KNOW

B10. Approximately how many dollars has your company invested in process efficiency improvement projects at your facility over the last **5 years?** (READ IF NECESSARY: A rough estimate is fine.)
01 [RECORD DOLLAR AMOUNT]
96 REFUSED
97 DON'T KNOW

[ASK B10a IF B10 = 01, >0, ELSE SKIP TO B11]

B10a. Approximately how much of this amount would you estimate your company invested in these projects over the last **12 months**? (READ IF NECESSARY: Again, a rough estimate is fine)
01 [RECORD DOLLAR AMOUNT]
96 REFUSED
97 DON'T KNOW

[ASK B11 IF B10 = 01, >0 OR 96 OR 97]

B11. Please identify the sources of funding for these types of investments [OPEN ENDED, CODE ALL THAT APPLY; DO NOT READ, PROMPT IF NECESSARY]
01 INTERNAL CAPITAL
02 FEDERAL TAX CREDITS
03 PERFORMANCE-BASED INCENTIVES
04 NYSERDA PROGRAMS
05 OTHER [SPECIFY]
96 REFUSED
97 DON'T KNOW

B12. Now, I'm going to read you a list of different factors organizations might consider when deciding to move forward with **process efficiency** improvement investments. For each one, please tell me if this is a major, minor, or not a factor you consider when making decisions about **process efficiency** investments. First, do you consider [INSERT ITEMS (a-i)]: ROTATE ITEMS
[READ IF NECESSARY: Is this a major, a minor, or not a factor you consider when making decisions about **process efficiency** investments?]
a. Financial criteria (project payback, internal rate of return, etc.)
b. Impact on your customers
c. Impact on your employees
d. Product, service, or manufacturing quality
e. Process improvement

f. Safety improvement
g. Scrap reduction
h. Energy efficiency opportunities
i. Timing in the year or business cycle
j. Desire to be green or corporate sustainability.

01 MAJOR FACTOR
02 MINOR FACTOR
03 NOT A FACTOR
96 REFUSED
97 DON'T KNOW

[READ B13 if B12a=01 OR 02, MAJOR/MINOR, ELSE SKIP TO B15]

B13. How important are the following financial factors when deciding to move forward with a process efficiency investment? [FOR EACH a-d, READ] How is important is the [INSERT a-d]? Would you say it is a major, a minor, or not a factor when deciding to move forward with a process efficiency improvement project?

a. Availability of internal funding or capital budget
b. Availability of other outside co-funding
c. Availability of rebates or program incentives
d. Price of energy

01 MAJOR FACTOR
02 MINOR FACTOR
03 NOT A FACTOR
96 REFUSED
97 DON'T KNOW

B14a. Now, assuming that funding is available, what is the main financial criterion you use when deciding to move forward with a process efficiency project? [DO NOT READ LIST. ACCEPT ONE ANSWER ONLY.]

01 PAYBACK
02 RETURN ON INVESTMENT (ROI)
03 INTERNAL RATE OF RETURN (IRR)
04 FIRST COST (INITIAL/UPFRONT COSTS)
05 LIFECYCLE COSTS (OPERATING/MAINTENANCE COSTS)
95 OTHER (SPECIFY)
96 REFUSED
97 DON'T KNOW

[ASK B14b IF B14a = 01, ELSE SKIP TO B14c]

B14b. In general, what is the payback threshold your organization uses before deciding to proceed with a process efficiency investment? [RECORD IN MONTHS OR YEARS]

01 [RECORD MONTHS]
02 [RECORD YEARS]
96 REFUSED
97 DON'T KNOW

[ASK B14c IF B14a = 02 OR 03, ELSE SKIP TO B15]

B14c. In general, what is the investment hurdle rate of return your organization uses when deciding to proceed with a process efficiency investment? [READ IF NECESSARY: What is the hurdle rate your organization uses to measure the return on investment or internal rate of return?]

01 [RECORD %]
96 REFUSED
97 DON'T KNOW

B15. At what level in your organization are decisions made regarding the need for and design and implementation of process improvement projects: at the local or facility level, or at the corporate office level?

01 LOCAL/FACILITY LEVEL
02 CORPORATE OFFICE LEVEL
96 REFUSED
97 DON'T KNOW

C. Current Barriers Impacting Investment

C1. I'm going to read you a list of potential barriers that may or may not prevent your organization from incorporating energy efficiency into your company's process improvement projects. For each, please tell me if it is a "major barrier", a "minor barrier" or "not at all a barrier" to incorporating energy efficiency into these projects. First, [INSERT ITEMS (a-g)]… [READ IF NECESSARY: Is this a barrier to incorporating energy efficiency into process improvement projects?]

a. Lack of **internal** awareness regarding energy efficiency features, products or services [READ IF NECESSARY: "Internal" refers to individuals within your particular organization].
b. Lack of **external** awareness regarding energy efficiency features, products or services [READ IF NECESSARY: "External" refers to individuals outside of your organization].
c. Lack of energy efficiency expertise among process engineers or equipment salesmen and installers.
d. Competing demands for capital.
e. Placing a low value on energy efficiency and sustainability.
f. Conflicting NYISO, NYSERDA, and utility programs.
g. Eligibility issues associated with specific programs.

01 MAJOR BARRIER
02 MINOR BARRIER
03 NOT A BARRIER
96 REFUSED
97 DON'T KNOW

[ASK C2 IF >1 C1a-g = 01 OR 02, SKIP TO SECTION D IF ONLY 1 C1a-g = 01]
[PROGRAM AVAILABLE RESPONSES FROM C1a-g THAT WERE 01 OR 02, MAJOR OR MINOR]

C2. Which of the barriers you identified is typically the **largest** barrier for your organization? [IF NECESSARY TO PROMT: You mentioned that [READ LIST] were barriers to incorporating energy efficiency into capital improvement projects] ACCEPT ONLY ONE CHOICE]

01 Lack of **internal** energy efficiency awareness.

02 Lack of **external** energy efficiency awareness.
03 Lack of energy efficiency expertise.
04 Competing demands for capital.
05 Undervaluing energy efficiency and sustainability.
06 Conflicting NYISO, NYSERDA, and utility programs.
07 Eligibility issues associated with specific programs.
96 REFUSED
97 DON'T KNOW

D. <u>Value of Technical Assistance Services</u>

D1. How capable is the market to provide process efficiency improvement services: very, somewhat, not too, or not at all capable?
01 VERY
02 SOMEWHAT
03 NOT TOO
04 NOT AT ALL
96 REFUSED
97 DON'T KNOW

D2. In your opinion, has the **NUMBER** of active process efficiency improvement product and service providers increased, decreased or stayed the same over the past three years?
01 INCREASED
02 DECREASED
03 STAYED THE SAME
96 REFUSED
97 DON'T KNOW

[ASK D3a IF D2 = 01, ELSE SKIP TO D3b.]
D3a. Why do you think the number has increased? [DO NOT READ. CODE ALL THAT APPLY]
01 INCREASED MARKET OPPORTUNITY
02 CONCERNS ABOUT CLIMATE CHANGE
03 INCREASED DESIRE TO BE "GREEN"
04 REGULATORY CHANGE (NY-SPECIFIC/NATIONAL)
05 OTHER (SPECIFY)
96 REFUSED
97 DON'T KNOW

[ASK D3b if D2 = 02, ELSE SKIP TO D4]
D3b. Why do you think the number has **decreased?** [DO NOT READ. CODE ALL THAT APPLY]
01 DECREASED MARKET OPPORTUNITY
02 LACK OF CAPITAL FOR INVESMENT
03 PROGRAM CHANGES
04 PROGRAM BUREAUCRACY CHANGES
95 OTHER (SPECIFY)
96 REFUSED
97 DON'T KNOW

D4. In your opinion, have the **TECHNICAL CAPABILITIES** of process efficiency improvement product and service providers increased, decreased or stayed the same over the past three years? [READ IF NECESSARY: By technical capabilities we mean things like provider expertise, scope of service offerings, technical knowledge and work quality related to complex industrial or process project opportunities].

01 INCREASED
02 DECREASED
03 STAYED THE SAME
96 REFUSED
97 DON'T KNOW

D5. Does your organization use in-house staff or external contractors to assist with process efficiency improvement projects?

01 IN-HOUSE STAFF
02 EXTERNAL CONTRACTOR
03 BOTH
04 OTHER [SPECIFY]
96 REFUSED
97 DON'T KNOW

D6. Now I'm going to read you a list of sources that may provide ideas for industrial systems and process efficiency improvements within your organization and I'd like you to tell me for each one, if it is a primary, secondary, or not a source of ideas for these improvements. First… [INSERT ITEMS (a-e)]: ROTATE ITEMS [READ IF NECESSARY: Is this a primary, secondary, or not a source of ideas for capital improvement projects in your organization?]

a. Senior management of the organization
b. Facilities manager
c. Chief process engineer
d. Outside consultants, audits, or reports
e. Suppliers or contractors

01 PRIMARY
02 SECONDARY
03 NOT A SOURCE
96 REFUSED
97 DON'T KNOW

[ASK D6f IF D6a-e ≠ 01, ELSE SKIP TO D7]

D6f. Who **is** a **primary** source of ideas for capital improvements in your organization? [READ IF NECESSARY: You indicated that none of the sources I listed was a **primary** source of ideas for capital improvements.]

01 [RECORD VERBATIM]
96 REFUSED
97 DON'T KNOW

D7a. Which of the following three statements best describes **how** your company **most typically** pursues outside assistance regarding process improvement projects? [READ LIST] [ACCEPT ONLY ONE RESPONSE]

01 We actively research and contact service providers on our own.
02 We reach out to service providers only after receiving marketing efforts or a business referral.
03 We do not seek outside assistance for these projects.
96 REFUSED
97 DON'T KNOW

[ASK D7b IF D7a ≠ 03, ELSE SKIP TO E1]

D7b. Which of the following statements best describes **when** your company **most typically** pursues outside assistance regarding process projects?
01 We pursue help from the **beginning** of each project.
02 We pursue help at a **standard point** for each project.
03 We **do not** have a set schedule of when to pursue help.
96 REFUSED
97 DON'T KNOW

D8 Do you typically request help in any of the following areas? First, with [INSERT ITEMS (a-d)]…?
a. Project design
b. Equipment selection
c. Equipment installation
d. Financial issues
01 YES
02 NO
96 REFUSED
97 DON'T KNOW

E. <u>Awareness of NYSERDA and Other Energy Efficiency Program/Funding Opportunities</u>

E1. Prior to this call, were you aware of the New York State Energy Research and Development Authority, also known as NYSERDA?
01 YES
02 NO
96 REFUSED
97 DON'T KNOW

E2. Prior to this call, were you aware of NYSERDA's Industrial and Process Efficiency, or "IPE" Program?
01 YES
02 NO
96 REFUSED
97 DON'T KNOW

[ASK E3 IF E2 = 01, ELSE SKIP TO E4]

E3. How did you hear about the IPE Program? [DO NOT READ LIST, CODE ALL THAT APPLY]
01 IPE PROGRAM PRESENTATIONS
02 IPE PROMOTIONAL MATERIALS
03 OTHER NYSERDA PROGRAM(S) (FLEXTECH, NCP, EXISTING FACILITIES) [SPECIFY]
04 NYSERDA WEB SITE

05 MEDIA [SPECIFY]
06 PARTICIPATING CONTRACTORS
07 OTHER [SPECIFY]
96 REFUSED
97 DON'T KNOW

E4. Which other NYSERDA or non-NYSERDA programs and funding available to assist with identifying and implementing process efficiency improvement opportunities are you aware of?
01 [RECORD VERBATIM—IF THEY CITE "UTILITY" HAVE THEM STATE WHICH ONE]
02 NONE
96 REFUSED
97 DON'T KNOW

F. <u>Firmographic Information</u>

[READ] Last, I just have a few questions about your organization.

F1. About how long has your company been in business?
01 [RECORD NUMBER OF YEARS]
02 [RECORD YEAR ESTABLISHED]
96 REFUSED
97 DON'T KNOW

F2. Is your company independent or part of a larger company?
01 INDEPENDENT
02 PART OF A LARGER COMPANY
03 OTHER (SPECIFY)
96 REFUSED
97 DON'T KNOW

F3. About how many buildings are owned or operated by your company in New York State?
01 [RECORD APPROXIMATE # OF BUILDINGS]
96 REFUSED
97 DON'T KNOW

F4. What is the name of the city or town where your Company's **primary** New York State operational facility is located?
01 [RECORD CITY/TOWN NAME]
96 REFUSED
97 DON'T KNOW

F5. Approximately how many full time employees does your company employ at all of its locations in New York State?
01 [RECORD NUMBER]
96 REFUSED
97 DON'T KNOW

F6. Has this number increased, decreased or stayed about the same over the past five years?

01 INCREASED
02 DECREASED
03 STAYED THE SAME
96 REFUSED
97 DON'T KNOW

That concludes our survey.
Thanks so much for your time and opinions. Please note that you might be contacted again in the future as part of evaluations of other NYSERDA efforts. So thanks in advance for that input as well.

APPENDIX C

Non-Participating Data Center End-Users Telephone Survey Instrument

NYSERDA Industrial and Process Efficiency (IPE) Program

MARKET CHARACTERIZATION AND ASSESSMENT PROJECT

Eligible Customer – Survey Instrument for Data Centers
(DRAFT v11 December 1, 2010)

Respondent's Contact Information [GET BEFORE INTERVIEW]

Name _____ Interviewer Initials _____
Firm Name _____ Survey Date _____
Phone Number _____ Date Signed _____

Introduction

Hello, my name is _____, and I'm calling from OpinionAmerica, an independent research firm, on behalf of the New York State Energy Research and Development Authority (NYSERDA).

Our firm is conducting research for NYSERDA on data center efficiency in New York State. **[READ IF NECESSARY** As an independent research firm, _____ [INSERT FIRM NAME] does not intend to report your responses in any way that would reveal your identity or the identity of your company.]

[READ IF NECESSARY OR ASKED "HOW DID YOU GET MY NAME?" We are contacting a sample of owners and managers of data centers in New York State who have not yet participated in the NYSERDA Industrial and Process Efficiency Program, and your company was selected.**]**

Who at your company can best speak about data center efficiency improvements and investments at your organization? We are looking to speak with a Facilities or IT Manager if possible [READ IF NECESSARY: A CIO or CFO could also be appropriate.]

General Instructions

When responding to questions please use your best judgment or give your best estimates. If you don't know how to respond, just say so.

Distinction between IT Infrastructure and Facility Support Systems

A data center is a facility that contains IT infrastructure and facility support systems. **IT infrastructure** is considered the electronic equipment, like servers, used for data processing, data storage, and communications networking. **Facility support systems** include cooling, air flow management, UPS and power distribution equipment. At several points today I will refer to either "**data center storage and processing**" improvement projects or "**facility support system**" improvement projects. For brevity's sake I will use the phrase "**IT improvement**" or "**facility improvement**" projects instead. Does this make sense to you?

Screener

S1. To the best of your knowledge, has the data center where you work participated in any NYSERDA or **New York Energy $mart[SM]** programs in the past five years? (READ IF NECESSARY: These could include: NYSERDA's Industrial and Process Efficiency Program, FlexTech, Existing Facilities, New Construction and/or other programs).

01 DID NOT PARTICIPATE IN ANY NYSERDA PROGRAMS
02 PARTICIPATED, BUT CAN'T RECALL WHICH ONES
03 PARTICIPATED IN NYERDA IPE PROGRAM
95 PARTICIPATED IN NYSERDA PROGRAM OTHER THAN IPE (SPECIFY)
96 REFUSED
97 DON'T KNOW

IF S1 = 03, TERMINATE

F1. How would you describe your company's primary business activity? [DO NOT READ, CODE ALL THAT APPLY]

01 STANDALONE DATA CENTER/DATA PROCESSING/NETWORK COMMUNICATIONS
02 INVESTMENTS/BANKING/FINANCE/INSURANCE
03 RESEARCH/UNIVERSITY
04 HEALTH/MEDICAL
05 TELECOM
06 STATE/FEDERAL/MUNICIPAL GOVERNMENT
07 RETAIL
08 INDUSTRIAL/MANUFACTURING
95 OTHER (SPECIFY): _____
96 REFUSED
97 DON'T KNOW

A. Current Levels of Efficiency, Familiarity and Perceptions

A1. I'm going to read you a list of some IT infrastructure and facility support components. Please tell me which ones your company has in the facility where you work.

Does your company's IT infrastructure or facilities support system utilize [INSERT ITEMS (a-k)]:

a. Servers?
b. **On site** data storage devices?
c. **Off site** data storage devices?
d. **Virtual** data storage devices?
e. Network equipment?
f. Dedicated HVAC systems [READ IF NECESSARY climate control/cooling systems]?
g. A dedicated data center room/facility insulation?
h. Power distribution units (PDUs)?

i. Standby generation?
j. Fire detection/suppression systems?

01 YES
02 NO
96 REFUSED
97 DON'T KNOW

A2. To what extent does your company view **IT infrastructure** improvement projects as "energy" projects: always, sometimes, infrequently, or never? [READ IF NECESSARY: By "energy" projects – we mean to what extent does the consumption of energy of the project's equipment or data center environment play a role in the selection and design of the project?]

01 ALWAYS
02 SOMETIMES
03 INFREQUENTLY
04 NEVER
96 REFUSED
97 DON'T KNOW

A2a To what extent does your company view **facility support** improvement projects as "energy" projects: always, sometimes, infrequently, or never? [IF NEEDED: By "energy" projects – we mean to what extent does the consumption of energy of the project's equipment or data center environment play a role in the selection and design of the project?]

01 ALWAYS
02 SOMETIMES
03 INFREQUENTLY
04 NEVER
96 REFUSED
97 DON'T KNOW

A3. How familiar are you with new technologies and procedures available for improving the energy efficiency of IT Infrastructure: very, somewhat, not too, or not at all familiar?

01 VERY
02 SOMEWHAT
03 NOT TOO
04 NOT AT ALL
96 REFUSED
97 DON'T KNOW

A4. For each of the following IT Infrastructure or facility support components where you work, please tell me how energy efficient that component is—very, somewhat, not too, or not at all energy efficient? First, **[INSERT ITEMS FROM A1 = 1, YES]**: [READ IF NECESSARY: Please answer based on how energy efficient the **majority** of the [INSERT ITEMS a-j] are.]

a. Servers?
b. **On site** data storage devices?
c. **Off site** data storage devices?
d. **Virtual** data storage devices?
e. Network equipment?
f. Dedicated HVAC systems [READ IF NECESSARY climate control/cooling systems]?
g. Data center room/facility insulation?

h. Power distribution units (PDUs)
i. Standby generation?
j. Fire detection/suppression systems?

01 VERY ENERGY EFFICIENT
02 SOMEWHAT ENERGY EFFICIENT
03 NOT TOO ENERGY EFFICIENT
04 NOT AT ALL ENERGY EFFICIENT
96 REFUSED
97 DON'T KNOW

[ASK A5 IF AT LEAST 1 RESPONSE FROM A4a-A4j = 01 OR 02, ELSE SKIP TO A6]

A5. What types of efficiency elements have been incorporated within your data center's facilities and IT components? Do they include [INSERT ITEMS a-g]: ROTATE ITEMS?

a. Efficient HVAC [READ IF NECESSARY – right sized equipment, use of economizers & free cooling, high SEER/Energy Factor A/Cs and chillers, super insulated and sealed ducts and air handlers, programmable thermostats and energy management systems and controls]
b. Efficient insulation of the facilities housing IT equipment
c. Combined heat and power generation systems [READ IF NECESSARY: This provides both electric power needs and thermal energy for heating other areas of the company's facility]
d. Virtual servers
e. Solid state data storage devices
f. Equipment usage and power monitoring controls, such as plug strips and enabling auto off features
g. Load shifting or demand response

01 YES
02 NO
96 REFUSED
97 DON'T KNOW

A6. How confident are you that the energy efficiency savings estimates associated with IT Infrastructure improvement projects are achievable: very, somewhat, not too, or not at all confident?

01 VERY
02 SOMEWHAT
03 NOT TOO
04 NOT AT ALL
96 REFUSED
97 DON'T KNOW

A7. How familiar are you with methods for integrating energy efficiency and energy management into business practices: very, somewhat, not too, or not at all familiar?

01 VERY
02 SOMEWHAT
03 NOT TOO
04 NOT AT ALL
96 REFUSED

97 DON'T KNOW

A8. Approximately how often are the IT infrastructure components in your data center upgraded or replaced: every year or less, every 1 to 2 years, every 3 to 4 years, or 5 or more years?
01 EVERY YEAR OR LESS
02 EVERY 1 TO 2 YEARS
03 EVERY 3 TO 4 YEARS
04 5 OR MORE YEARS
96 REFUSED
97 DON'T KNOW

A8a. Does this upgrade cycle differ by IT Component type?
01 YES (SPECIFY)
02 NO
96 REFUSED
97 DON'T KNOW

A10. What time of year does your data center do its capital budget/major project planning: Quarter 1, Quarter 2, Quarter 3, or Quarter 4?
01 QUARTER 1
02 QUARTER 2
03 QUARTER 3
04 QUARTER 4
05 MULTIPLE QUARTERS [SPECIFY]
96 REFUSED
97 DON'T KNOW

A11. Which of the following three statements best describes how replacements are made when components of the IT Infrastructure fail or break earlier than your planned upgrade cycle?
01 We fix it by pulling from the inventory of spare parts
02 We fix it by purchasing new identical parts to replace failed or broken components (READ IF NECESSARY: These are parts NOT taken from inventory)
03 We fix it by assessing options and incorporating improvements
95 OTHER (SPECIFY) [READ IF NECESSARY]
96 REFUSED
97 DON'T KNOW

B. <u>Current Levels of Investment, Types of Process Efficiency Improvements and associated practices and perceptions</u>

B1. Approximately how many IT Infrastructure (or facility) improvement projects has your company implemented within your facility over the last 5 years?
01 [RECORD # OF PROJECTS]
96 REFUSED
97 DON'T KNOW

[IF B1 01 ≥ 1 ASK B1a, ELSE SKIP TO B8]

B1a. How many of these were implemented in the past 12 months?

01 [RECORD # OF PROJECTS]
96 REFUSED
97 DON'T KNOW

B2. Approximately how many dollars has your company invested in IT Infrastructure (or facility) improvement projects in your data center over the last 5 years? (READ IF NECESSARY: A rough estimate is fine.)

01 [RECORD DOLLAR AMOUNT]
96 REFUSED
97 DON'T KNOW

[IF B2 01 ≥1 ASK B2a, ELSE SKIP TO B3]

B2a. Approximately how much of this amount would you estimate that your company invested in these projects over the last 12 months? (READ IF NECESSARY: Again, a rough estimate is fine)

01 [RECORD DOLLAR AMOUNT]
96 REFUSED
97 DON'T KNOW

[ASK B3 IF B2 01> 0 OR B2 = 96 OR 97]

B3. Please identify the source(s) of funding for these types of investments [OPEN ENDED, CODE ALL THAT APPLY; DO NOT READ, PROMPT IF NECESSARY]

01 INTERNAL CAPITAL
02 FEDERAL TAX CREDITS
03 PERFORMANCE-BASED INCENTIVES
04 NYSERDA PROGRAMS
95 OTHER [SPECIFY]
96 REFUSED
97 DON'T KNOW

B4. Approximately how many of these projects over the past 5 years resulted in energy and demand savings or reduced emissions: all, most, some, a few, or none?

01 ALL
02 MOST
03 SOME
04 A FEW
05 NONE
96 REFUSED
97 DON'T KNOW

[B5-B7 ASKED DURING FOLLOW-UP INTERVIEW; SKIP TO B8]

B5. Please briefly describe the largest (or most recent) such project(s) your company has implemented. [READ IF NECESSARY: Largest means most energy/demand savings] [LIMIT NUMBER OF PROJECTS DESCRIBED TO NO MORE THAN 2]

01 RECEIVED FOLLOW-UP RESPONSES [VERBATIM AT END]

02 DID NOT RECEIVE FOLLOW-UP RESPONSES

B6. Did any of these projects involve innovative or new technologies? [READ IF NECESSARY: "New" means relatively recent entry into the marketplace (within the past 2 to 4 years), "innovative" entail technologies that are designed and implemented to maximize efficiency and effectiveness of systems and resources]

01 YES [SPECIFY—Verbatim included at end]
02 NO
96 REFUSED
97 DON'T KNOW

[ASK B7 IF B6 = 01, ELSE SKIP TO B8]

B7. How confident are you in the performance of these innovative or new technologies: very, somewhat, not too, or not at all confident?

01 VERY
02 SOMEWHAT
03 NOT TOO
04 NOT AT ALL
96 REFUSED
97 DON'T KNOW

B8. How familiar are you with the full range of benefits associated with IT Infrastructure (or facility) improvements: very, somewhat, not too, or not at all familiar?

01 VERY
02 SOMEWHAT
03 NOT TOO
04 NOT AT ALL
96 REFUSED
97 DON'T KNOW

[ASK B9 IF EITHER B1 01 OR B1a 01 ≥ 1, ELSE SKIP TO B10]

B9. I'm going to read you a list of potential benefits of implementing IT Infrastructure (or facility) improvement projects. For each one, please tell me how much benefit, if any, your company realized from the projects you have implemented – a substantial amount, some, only a little, or none at all. First, [INSERT ITEMS a-g]...

a. Cost savings
b. Energy/demand savings
c. Productivity improvements
d. Product quality improvements
e. Reliability improvements

01 SUBSTANTIAL
02 SOME
03 ONLY A LITTLE
04 NONE
96 REFUSED
97 DON'T KNOW

[FOR EACH B9a-e = 01, 02, OR 03, ASK B10, ELSE SKIP TO B11)

B10. For each of these benefits, how confident are you that the benefit will persist over time: very, somewhat, not too, or not at all confident? First, [INSERT ITEMS IF B9 = 01 or 02, OR 03]…

a. Cost savings
b. Energy or demand savings
c. Productivity improvements
d. Product quality improvements
e. Reliability improvements

01 VERY CONFIDENT
02 SOMEWHAT CONFIDENT
03 NOT TOO CONFIDENT
04 NOT AT ALL CONFIDENT
96 REFUSED
97 DON'T KNOW

B11. How important is reducing energy demand and consumption in your company: very, somewhat, not too, or not at all important? [READ IF NECESSARY: "Company" refers to the larger organization your data center provides support for]

01 VERY IMPORTANT
02 SOMEWHAT IMPORTANT
03 NOT TOO IMPORTANT
04 NOT AT ALL IMPORTANT
96 REFUSED
97 DON'T KNOW

B12. Now, I'm going to read you a list of different factors organizations might consider when deciding to move forward with **IT Infrastructure (or facility)** improvement investments. For each one, please tell me if this is a major, a minor, or not a factor you consider when making decisions about these investments. First, do you consider [INSERT ITEMS (a-i)]: ROTATE ITEMS [READ IF NECESSARY: Is this a major, a minor, or not a factor you consider when making decisions about **IT Infrastructure (or facility) improvement** investments?]

a. Financial criteria (project payback, internal rate of return, etc.)
b. Impact on your customers
c. Impact on your employees
d. Product/Service Quality
e. Process improvement
f. Safety improvement
g. Energy efficiency opportunities
h. Timing in the year or business cycle
i. Desire to be green or corporate sustainability.

01 MAJOR FACTOR
02 MINOR FACTOR

03 NOT A FACTOR
96 REFUSED
97 DON'T KNOW

[READ B13 if B12a=01 OR 02, MAJOR/MINOR, ELSE SKIP TOC1]

B13. How important are the following financial factors when deciding to move forward with an IT Infrastructure (or facility) improvement investment? [FOR EACH a-d, READ] How is important is the [INSERT a-d]? Would you say it is a major, a minor, or not a factor when deciding to move forward with these improvement projects?

a. Availability of internal funding or capital budget
b. Availability of other outside co-funding
c. Availability of rebates or program incentives
d. Price of energy

01 MAJOR FACTOR
02 MINOR FACTOR
03 NOT A FACTOR
96 REFUSED
97 DON'T KNOW

B14a. Now, assuming that funding is available, what is the main financial criterion you use when deciding to move forward with an IT Infrastructure (or facility) improvement project? [DO NOT READ LIST. ACCEPT ONE ANSWER ONLY.]

01 PAYBACK
02 RETURN ON INVESTMENT (ROI)
03 INTERNAL RATE OF RETURN (IRR)
04 FIRST COST (INITIAL/UPFRONT COSTS)
05 LIFECYCLE COSTS (OPERATING/MAINTENANCE COSTS)
95 OTHER (SPECIFY)
96 REFUSED
97 DON'T KNOW

[ASK B14b IF B14a = 01, ELSE SKIP TO B14c]

B14b. In general, what is the payback threshold your organization uses before deciding to proceed with an IT Infrastructure (or facility) improvement investment? [RECORD IN MONTHS OR YEARS]

01 [RECORD MONTHS]
02 [RECORD YEARS]
95 OTHER (SPECIFY)
96 REFUSED
97 DON'T KNOW

[ASK B14c IF B14a = 02 OR 03, ELSE SKIP TO B15]

B14c. In general, what is the investment hurdle rate of return your organization uses when deciding to proceed with an IT Infrastructure (or facility) improvement investment? [READ IF NECESSARY: What is the hurdle rate your organization uses to measure the return on investment or internal rate of return?]

01 ____ RECORD %

96 REFUSED
97 DON'T KNOW

B15. At what level in your organization are decisions made regarding the need for and implementation of IT Infrastructure (or facility) improvement projects: at the local/facility level, or at the corporate office level?
01 LOCAL/FACILITY LEVEL
02 CORPORATE OFFICE LEVEL
03 BOTH
96 REFUSED
97 DON'T KNOW

C. Current Barriers Impacting Investment

C1. I'm going to read you a list of potential barriers that may prevent your organization from incorporating energy efficiency into your company's IT Infrastructure (or facility) improvement projects. For each, please tell me if it is a "major barrier", a "minor barrier" or "not a barrier" to incorporating energy efficiency into these projects. First, [INSERT ITEMS a-g]

a. Lack of **internal** awareness regarding energy efficiency features, products or services [READ IF NECESSARY: "Internal" refers to individuals within your particular organization]
b. Lack of **external** awareness regarding energy efficiency features, products or services [READ IF NECESSARY: "External" refers to anybody outside of your organization]
c. Lack of energy efficiency expertise among IT design and specification engineers or equipment salesmen and installers.
d. Competing demands for capital.
e. Placing a low value on energy efficiency and sustainability.
f. Conflicting NYISO, NYSERDA, and utility programs.
g. Eligibility issues associated with specific programs

01 MAJOR BARRIER
02 MINOR BARRIER
03 NOT A BARRIER
96 REFUSED
97 DON'T KNOW

[ASK C1h IF C1a-g = 03, NOT A BARRIER, ELSE SKIP TO C2]

C1h. What is a barrier to your organization incorporating energy efficiency into your IT infrastructure (or facility) improvement projects?
01 [RECORD VERBATIM]
96 REFUSED
97 DON'T KNOW

[ASK C2 IF >1 C1a-g = 01 OR 02, SKIP TO SECTION D IF ONLY 1 C1a-g = 01]
[PROGRAM AVAILABLE RESPONSES FROM C1a-g THAT WERE 01 OR 02, MAJOR OR MINOR]

C2. Which of the barriers you identified is typically the **largest** barrier for your organization? [IF NECESSARY TO PROMT: You mentioned that [READ LIST] were barriers to incorporating energy efficiency into capital improvement projects] ACCEPT ONLY ONE CHOICE]

01 Lack of **internal** energy efficiency awareness.
02 Lack of **external** energy efficiency awareness.
03 Lack of energy efficiency expertise.
04 Competing demands for capital.
05 Undervaluing energy efficiency and sustainability.
06 Conflicting NYISO, NYSERDA, and utility programs.
07 Eligibility issues associated with specific programs.
96 REFUSED
97 DON'T KNOW

D. <u>Value of Technical Assistance Services</u>

Now I would like to ask you some questions regarding Technical Service Providers in NY that provide **IT infrastructure or facility support system improvement services**. For **IT infrastructure**, these service providers focus on helping customers identify and implement customized approaches to reduce energy use of electronic equipment used for data processing, data storage, and communications networking. For **facility support systems**, these service providers focus on identifying and implementing energy reduction opportunities like cooling, air flow management, UPS and power distribution equipment. Please answer questions thinking only about these specific types of technical service providers.

D1. How capable is the market to provide IT Infrastructure (or facility) improvement services: very, somewhat, not too, or not at all capable?

01 VERY
02 SOMEWHAT
03 NOT TOO
04 NOT AT ALL
96 REFUSED
97 DON'T KNOW

D2. In your opinion, has the **NUMBER** of active IT Infrastructure (or facility) improvement product and service providers increased, decreased or stayed the same over the past three years?

01 INCREASED
02 DECREASED
03 STAYED THE SAME
96 REFUSED
97 DON'T KNOW

[ASK D3a IF D2 = 01, ELSE SKIP TO D3b.]

D3a. Why do you think the number has increased? [DO NOT READ. CODE ALL THAT APPLY]

01 INCREASED MARKET OPPORTUNITY
02 CONCERNS ABOUT CLIMATE CHANGE
03 INCREASED DESIRE TO BE "GREEN"
04 REGULATORY CHANGE (NY-SPECIFIC/NATIONAL)
95 OTHER (SPECIFY)

96 REFUSED
97 DON'T KNOW

[ASK D3b if D2 = 02, ELSE SKIP TO D4]

D3b. Why do you think the number has **decreased?** [DO NOT READ. CODE ALL THAT APPLY]
01 DECREASED MARKET OPPORTUNITY
02 LACK OF CAPITAL FOR INVESMENT
03 PROGRAM CHANGES
04 PROGRAM BUREAUCRACY CHANGES
95 OTHER (SPECIFY)
96 REFUSED
97 DON'T KNOW

D4. Does your organization use in-house staff or external contractors to assist with IT Infrastructure (or facility) improvement projects?
01 IN-HOUSE STAFF
02 EXTERNAL CONTRACTOR
03 BOTH
95 OTHER [SPECIFY]
96 REFUSED
97 DON'T KNOW

D5. Now I'm going to read you a list of sources that may provide ideas for IT Infrastructure (or facility) improvements within your organization and I'd like you to tell me for each one, if it is a primary, secondary, or not a source of ideas for these improvements. First… [INSERT ITEMS]: ROTATE ITEMS [READ IF NECESSARY: Is this a primary, secondary, or not a source of ideas for IT infrastructure (or facility) improvement projects in your organization?]
a. Users and operators of IT (or facility) equipment
b. Senior management of the organization
c. Facilities manager
d. Chief IT systems engineer
e. Outside consultants, audits, or reports
f. Suppliers or contractors
01 PRIMARY
02 SECONDARY
03 NOT A SOURCE
96 REFUSED
97 DON'T KNOW

[IF D5a-D5f ≠ 01, ASK D5g, ELSE SKIP TO D6a]

D5g. Who **is** a **primary** source of ideas for capital improvements in your organization? [READ IF NECESSARY: You indicated that none of the sources I listed was a **primary** source of ideas for capital improvements.]
01 [RECORD VERBATIM]

96 REFUSED
97 DON'T KNOW

D6a. Which of the following three statements best describes **how** your company **most typically** pursues outside assistance regarding IT Infrastructure (or facility) improvement projects? [ACCEPT ONLY ONE RESPONSE]

01 We actively research and contact service providers on our own.
02 We reach out to service providers only after receiving marketing efforts or a business referral.
03 We do not seek outside assistance for these projects.
96 REFUSED
97 DON'T KNOW

[READ D6b IF D6a ≠ 03, ELSE SKIP TO E1]

D6b. Which of the following statements best describes **when** your company **most typically** pursues outside assistance regarding IT Infrastructure (or facility) improvement projects?

01 We pursue help from the **beginning** of each project.
02 We pursue help at a **standard point** for each project.
03 We do not have a set schedule of when to pursue help.
96 REFUSED
97 DON'T KNOW

D7. Do you typically request help in any of the following areas? First, with [INSERT CHOICES a-d]

a. Project design
b. Equipment selection
c. Equipment installation
d. Financial issues

01 YES
02 NO
96 REFUSED
97 DON'T KNOW

E. <u>Awareness of NYSERDA and Other Energy Efficiency Program/Funding Opportunities</u>

E1. Prior to this call, were you aware of the New York State Energy Research and Development Authority, also known as NYSERDA?

01 YES
02 NO
96 REFUSED
97 DON'T KNOW

E2. Prior to this call, were you aware of NYSERDA's Industrial and Process Efficiency, or "IPE" Program?

01 YES
02 NO
98 REFUSED

99 DON'T KNOW

[READ IF E2 = 01, ELSE SKIP TO E4]

E3. How did you hear about the IPE Program? [DO NOT READ LIST, CODE ALL THAT APPLY]
- 01 IPE PROGRAM PRESENTATIONS
- 02 IPE PROMOTIONAL MATERIALS
- 03 OTHER NYSERDA PROGRAM(S) (FLEXTECH, NCP, EXISTING FACILITIES [SPECIFY])
- 04 NYSERDA WEB SITE
- 05 MEDIA [SPECIFY]
- 06 PARTICIPATING CONTRACTORS
- 95 OTHER [SPECIFY]
- 96 REFUSED
- 97 DON'T KNOW

E4. Are you aware of any other NYSERDA programs that provide funding to help identify and implement process efficiency improvement opportunities?
- 01 YES [SPECIFY]
- 02 NO
- 96 REFUSED
- 97 DON'T KNOW

E4a Are you aware of any non-NYSERDA programs that perform these tasks?
- 01 YES [SPECIFY – IF THEY CITE 'UTILITY' HAVE THEM STATE WHICH ONE]
- 02 NO
- 96 REFUSED
- 97 DON'T KNOW

F. Firmographic Information

[READ] Last, I just have a few questions about your organization.

F1. About how long has the data center in your company been in business?
- 01 [RECORD NUMBER OF YEARS]
- 96 REFUSED
- 97 DON'T KNOW

F2. Is the company for which your data center provides support independent or part of a larger company?
- 01 INDEPENDENT
- 02 PART OF A LARGER COMPANY
- 95 OTHER (SPECIFY)
- 96 REFUSED
- 97 DON'T KNOW

F3. About how many buildings in New York State are owned or operated by the company for which your data center provides support?

01 [RECORD APPROXIMATE # OF BUILDINGS]
96 REFUSED
97 DON'T KNOW

F4. What is the name of the city or town where your Company's primary New York State data center is located?

01 [RECORD CITY/TOWN NAME]
96 REFUSED
97 DON'T KNOW

F5. Approximately how many full time employees does the company for which your data center provides support employ at all of its locations in New York State?

01 [RECORD NUMBER]
96 REFUSED
97 DON'T KNOW

F6. Has this number increased, decreased or stayed about the same over the past five years?

01 INCREASED
02 DECREASED
03 STAYED THE SAME
96 REFUSED
97 DON'T KNOW

That concludes our survey.
Thanks so much for your time and opinions. Please note that you might be contacted again in the future as part of evaluations of other NYSERDA efforts. Have a good day.

APPENDIX D

Non-participating Technical Service Providers Telephone Survey Instrument

NYSERDA Industrial and Process Efficiency (IPE) Program
MARKET CHARACTERIZATION AND ASSESSMENT PROJECT
Eligible Technical Service Providers – Survey Instrument
(March 23, 2011, Version 14)

Respondent Identification

FlexTech Respondent Introduction [USE IF ft_cm=01]

[INTERVIEWER NOTE] "Interviewer- This person previously completed a FlexTech survey, if they are not the appropriate respondent for IPE, we will ask for a referral to an appropriate colleague.

Hello, my name is _____, and I'm calling from Opinion America on behalf of NYSERDA. First, I'd like to thank you very much for your recent participation in NYSERDA's FlexTech Evaluation survey. Your input was very valuable and will help NYSERDA improve the FlexTech program in the future. We're now evaluating NYSERDA's Industrial Process and Efficiency, or IPE program. Previously, you mentioned that your company performs engineering feasibility studies for **[IF data=01, INSERT "data centers"; IF inpm=01 OR both=01, INSERT "industrial or manufacturing processes"]**. Who at your company can best speak about your work in these areas?

[IF REFERRED TO A DIFFERENT PERSON, RECORD NAME AND REPEAT INTRODUCTION WITH NEW RESPONDENT]
[IF INITIAL RESPONDENT IS MOST SUITABLE, CONTINUE WITH GENERAL INSTRUCTIONS]
[IF INITIAL RESPONDENT IS MOST SUITABLE BUT NOW IS NOT A COVENIENT TIME TO TALK, SCHEDULE A FOLLOW-UP DATE AND TIME BY SAYING: "Thank you very much, what would be the most convenient time of day and day of the week for me to call you back?]

Non FlexTech Respondent Introduction [USE IF ft_cm=02]

[INTERVIEWER NOTE] "Interviewer- This is not a FlexTech respondent, we would like to start the screening process immediately."

Introduction for potential respondent or gatekeeper:
Hello, my name is _____, and I'm calling from _____, an independent research firm, on behalf of the New York State Energy Research and Development Authority (NYSERDA).

Our firm is conducting research for NYSERDA on Industrial and Process Efficiency in New York State.

[READ IF NECESSARY/IF ASKED "HOW DID YOU GET MY NAME"]: We are contacting a sample of technical service providers active in New York State who are eligible but have not yet participated in NYSERDA's Industrial and Process Efficiency Program, and your company was selected.]

Who at your company can best speak about your firm's work conducting engineering feasibility and technical assistance studies in New York State?

[READ IF NECESSARY: My questions should only take about 15-20 minutes.**]**
[READ IF NECESSARY: As an independent research firm, we do not intend to report your responses in any way that would reveal your identity or the identity of your company**.** If you have questions, you can contact NYSERDA's project manager for this study, Ken Galarneau at NYSERDA at 518-862-1090 ext. 3534 or krg@nyserda.org. **]**

[IF REFERRED TO A DIFFERENT PERSON, RECORD NAME AND REPEAT INTRODUCTION WITH NEW RESPONDENT]
[IF INITIAL RESPONDENT IS MOST SUITABLE, CONTINUE WITH GENERAL INSTRUCTIONS]
[IF INITIAL RESPONDENT IS MOST SUITABLE BUT NOW IS NOT A COVENIENT TIME TO TALK, SCHEDULE A FOLLOW-UP DATE AND TIME BY SAYING: "Thank you very much, what would be the most convenient time of day and day of the week for me to call you back?]

General Instructions [READ TO ALL]
To remind you, we will be discussing NYSERDA's Industrial Process and Efficiency Program, or IPE. The program aims to provide performance based incentives to companies who conduct engineering feasibility and technical assistance studies. When responding to questions please use your best judgment or give your best estimates. If you don't know how to respond, just say so. At several points today I will refer to "industrial systems and process" or "data center efficiency" improvement projects: for brevity's sake I will use the phrase "process improvement" projects instead. Does this make sense to you?

Screener

[**IF ft_cm=02, ask S0, ELSE SKIP TO S1]**

S0. First, just to confirm that we are talking to the right type of company, I have a few questions about your firm. Does your firm provide engineering feasibility or technical assistance studies for… [READ LIST]

a. Industrial or manufacturing processes?
b. Data centers?

01 YES
02 NO
96 REFUSED
97 DON'T KNOW

[IF S0a OR S0b = YES, THEN PROCEED TO S1, OTHERWISE, THANK & TERMINATE]

S1. Prior to this call, were you aware of the New York State Energy Research and Development Authority, also known as NYSERDA?

01 YES
02 NO
96 REFUSED
97 DON'T KNOW

IF S1 = 01, ASK S2, ELSE SKIP TO B1

S2. To the best of your knowledge, has your firm participated in any NYSERDA or **New York Energy $mart[SM]** programs in the past five years? [READ IF NECESSARY: These could include: NYSERDA's Industrial and Process Efficiency Program, FlexTech, Existing Facilities, New Construction and/or other programs.]

01 DID NOT PARTICIPATE IN ANY NYSERDA PROGRAMS
02 PARTICIPATED, BUT CAN'T RECALL WHICH ONES
03 PARTICIPATED IN NYSERDA IPE PROGRAM
04 PARTICIPATED IN NYSERDA PROGRAM OTHER THAN IPE (SPECIFY)
96 REFUSED
97 DON'T KNOW

IF S2 = 03, TERMINATE

A. Awareness of NYSERDA and Other Energy Efficiency Program/Funding Opportunities

A1. Prior to this call, were you aware of NYSERDA's Industrial and Process Efficiency, or "IPE" Program?

01 YES
02 NO
96 REFUSED
97 DON'T KNOW

[ASK A2 IF A1 = 01, ELSE SKIP TO A3]

A2. How did you hear about the IPE Program? [DO NOT READ LIST, CODE ALL THAT APPLY]

01 IPE PROGRAM PRESENTATIONS
02 IPE PROMOTIONAL MATERIALS

03 OTHER NYSERDA PROGRAM(S) (FLEXTECH, NCP, EXISTING FACILITIES) [SPECIFY]
04 NYSERDA WEB SITE
05 MEDIA [SPECIFY]
06 PARTICIPATING CONTRACTORS
07 OTHER [SPECIFY]
96 REFUSED
97 DON'T KNOW

A3. Are you aware of any other NYSERDA programs that provide energy efficiency services or technical assistance to industrial, manufacturing or data center customers in New York State? IF YES: SPECIFY [DO NOT READ. CODE ALL THAT APPLY]

01 FLEXTECH PROGRAM
02 EXISTING FACILITIES PROGRAM
03 NEW CONSTRUCTION PROGRAM
04 OTHER NYSERDA PROGRAM [SPECIFY]
96 REFUSED
97 DON'T KNOW

A3a. Are you aware of any **non-NYSERDA** programs that provide energy efficiency services or technical assistance to these customers in New York State?

01 YES [SPECIFY – IF THEY CITE 'UTILITY' HAVE THEM STATE WHICH ONE]
02 NO
96 REFUSED
97 DON'T KNOW

A3b. Are you currently, or have you previously been a Technical Service Provider for NYSERDA's FlexTech program?

01 YES, CURRENT FLEXTECH TECHNICAL SERVICE PROVIDER
02 YES, FORMER FLEXTECH TECHNICAL SERVICE PROVIDER
03 NO
96 REFUSED
97 DON'T KNOW

[IF A3b = 01, ASK A3c]

A3c. In your role as a NYSERDA FlexTech Technical Service Provider during the past year, has your firm identified any potential projects for NYSERDA's IPE program for any of your FlexTech customers?

01 YES
02 NO
96 REFUSED
96 DON'T KNOW

B. Supply of Qualified Technical Service Providers

Now I would like to ask you some questions regarding Technical Service Providers in NY that provide **process improvement services**. These service providers help customers identify and implement approaches to reduce energy use per unit of production while providing important cost reduction, product quality, reduced re-work and associated waste reduction or labor benefits. Please answer questions thinking only about these specific types of process efficiency improvement service providers.

B1. How capable is the market to provide process efficiency improvement services: very, somewhat, not too, or not at all capable? [READ IF NECESSARY: By 'capable' we mean there are a sufficient number of technically competent individuals or firms to serve the New York market.]

01 VERY
02 SOMEWHAT
03 NOT TOO
04 NOT AT ALL
96 REFUSED
97 DON'T KNOW

B2. In your opinion, has the **NUMBER** of active process improvement Technical Service Providers in New York state increased, decreased or stayed the same over the past three years?

01 INCREASED
02 DECREASED
03 STAYED THE SAME
96 REFUSED
97 DON'T KNOW

[ASK B2a IF B2 = 01, ELSE SKIP TO B2b.]

B2a. Why do you think the number has **increased**? [DO NOT READ. CODE ALL THAT APPLY]

01 INCREASED MARKET OPPORTUNITY
02 CONCERNS ABOUT CLIMATE CHANGE
03 INCREASED DESIRE TO BE "GREEN"
04 REGULATORY CHANGES (NY-SPECIFIC/NATIONAL)
05 OTHER (SPECIFY)
96 REFUSED
97 DON'T KNOW

[ASK B2b if B2 = 02, ELSE SKIP TO B3]

B2b. Why do you think the number has **decreased?** [DO NOT READ. CODE ALL THAT APPLY]

01 DECREASED MARKET OPPORTUNITY
02 LACK OF CAPITAL FOR INVESMENT
03 PROGRAM CHANGES
04 PROGRAM BUREAUCRACY CHANGES
95 OTHER (SPECIFY)
96 REFUSED
97 DON'T KNOW

B3a. In your opinion, how qualified are NY Technical Service Providers to implement effective process efficiency improvement projects: very, somewhat, not too, or not at all qualified?

01 VERY
02 SOMEWHAT
03 NOT TOO
04 NOT AT ALL
96 REFUSED
97 DON'T KNOW

B3b. In your opinion, have the **TECHNICAL CAPABILITIES** of process improvement technical service providers in New York State increased, decreased or stayed the same over the past three years? [READ IF NECESSARY: Technical capabilities refer to provider expertise, scope of service offerings, technical knowledge and work quality related to complex industrial and process (including data center) project opportunities].

01 INCREASED
02 DECREASED
03 STAYED THE SAME
96 REFUSED
97 DON'T KNOW

B3c. In your opinion, how often do the projects being worked on by Technical Service Providers for industrial, manufacturing and data center customers in New York, include focus on specific process efficiency improvement strategies: often, sometimes, rarely, or never?

01 OFTEN
02 SOMETIMES
03 RARELY
04 NEVER
96 REFUSED
97 DON'T KNOW

C. Current Levels of Familiarity and Perceptions

C1. How familiar are you with technologies and procedures available for improving the energy efficiency of industrial and manufacturing systems and processes: very, somewhat, not too, or not at all familiar?

01 VERY
02 SOMEWHAT
03 NOT TOO
04 NOT AT ALL
96 REFUSED
97 DON'T KNOW

C1a. How confident are you in the overall performance of these technologies and procedures: very, somewhat, not too, or not at all confident?

01 VERY
02 SOMEWHAT
03 NOT TOO
04 NOT AT ALL
96 REFUSED
97 DON'T KNOW

C2. I'm going to read you a list of potential benefits of implementing process efficiency improvement projects. If implemented, how confident are you that each benefit will persist over time: very, somewhat, not too, or not at all confident? First, [INSERT ITEMS a-g]…
[READ IF NECESSARY: HOW CONFIDENT ARE YOU THAT THIS BENEFIT WILL PERSIST OVER TIME?]

a. Cost savings
b. Energy or demand savings
c. Productivity improvements
d. Product quality improvements
e. Reliability improvements
f. Water use and/or waste stream reductions
g. Emission reductions

01 VERY CONFIDENT
02 SOMEWHAT CONFIDENT
03 NOT TOO CONFIDENT
04 NOT AT ALL CONFIDENT
96 REFUSED
97 DON'T KNOW
98 NOT APPLICABLE

C4. Thinking about your own company's business priorities, how important is the sale of **energy efficiency** products and services, compared to the sale of less efficient (standard) products and services? Is the sale of energy efficiency products and services much more important, somewhat more, about as important, somewhat less or much less important than the sale of standard efficiency products and services?

01 MUCH MORE IMPORTANT
02 SOMEWHAT MORE IMPORTANT
03 ABOUT AS IMPORTANT
04 SOMEWHAT LESS IMPORTANT
05 MUCH LESS IMPORTANT
96 REFUSED
97 DON'T KNOW

C5. When marketing or providing services to your customers, how often does your company promote the benefits of reducing energy demand and consumption achievable through process improvements: always, often, sometimes, rarely, or never?

01 ALWAYS
02 OFTEN
03 SOMETIMES
04 RARELY
05 NEVER
96 REFUSED
97 DON'T KNOW

C6. When marketing or providing services to your customers, how often does your company promote the benefits of reduced production costs or productivity improvements achievable through process improvements: always, often, sometimes, rarely, or never?

01 ALWAYS
02 OFTEN
03 SOMETIMES
04 RARELY
05 NEVER
96 REFUSED
97 DON'T KNOW

Now I'd like to talk about your customers for whom you provide technical services.

C7. How important do your customers think it is to reduce energy demand and consumption in their facilities: very, somewhat, not too, or not at all important?

01 VERY IMPORTANT
02 SOMEWHAT IMPORTANT
03 NOT TOO IMPORTANT
04 NOT AT ALL IMPORTANT
96 REFUSED
97 DON'T KNOW

C8. How often would you say that your industrial customers view process improvement projects as "energy" projects: always, often, sometimes, rarely, or never? [READ IF NECESSARY "Energy" projects refer to projects where the energy consumption of the project's equipment plays a role in the selection and design of the project.]

01 ALWAYS
02 OFTEN
03 SOMETIMES
04 RARELY
05 NEVER
96 REFUSED
97 DON'T KNOW

C9. I'm going to read you a list of some industrial or manufacturing systems and processes. Please tell me which ones your company has worked with. Does your company have experience providing technical services support for [INSERT ITEMS (a-n)]:

a. Raw materials extraction or processes?
b. Materials storage or handling?
c. Data storage or processing?
d. Product manufacturing?
e. Separation?
f. Assembly?
g. Process heating? [READ IF NECESSARY: including baking, drying, etc.]
h. Process cooling? [READ IF NECESSARY: including refrigeration, freezing, etc.]
i. Product finishing?
j. Product testing?
k. Packaging or distribution?
l. Warehousing?
m. Transportation, including conveyors, lifts, etc?
n. Water or waste treatment? [READ IF NECESSARY: pre and post processing]

01 YES
02 NO
96 REFUSED
97 DON'T KNOW

C10. For each of industrial and manufacturing system and process that your company has experience with, please tell me how energy efficient that system or process typically is in the facilities where you provide technical services—very energy efficient, somewhat, not too, or not at all energy efficient? By energy efficient, we mean that the system or process uses at last 10% less energy than otherwise would be used if standard technologies or procedures were in place. First, [INSERT ITEMS FROM C9a-n = 01, YES]: [READ IF NECESSARY: How energy efficient is this system or process typically in the facilities where you provide services?]

a. Raw materials extraction or process?
b. Materials storage or handling?
c. Data storage or processing?
d. Product manufacturing?
e. Separation?
f. Assembly?
g. Process heating? [READ IF NECESSARY: including baking, drying, etc.]
h. Process cooling? [READ IF NECESSARY: including refrigeration, freezing, etc.]
i. Product finishing?
j. Product testing?
k. Packaging or distribution?
l. Warehousing?
m. Transportation, including conveyors, lifts, etc.?
n. Water or waste treatment? [READ IF NECESSARY: pre and post processing

01 VERY ENERGY EFFICIENT
02 SOMEWHAT ENERGY EFFICIENT
03 NOT TOO ENERGY EFFICIENT
04 NOT AT ALL ENERGY EFFICIENT
96 REFUSED
97 DON'T KNOW

[ASK C11 IF AT LEAST 1 RESPONSE FROM C10 = 01 OR 02, ELSE SKIP TO D1]

C11. I would like to understand what types of efficiency elements are being incorporated within these systems and processes. Do they include [INSERT ITEMS (a-f)]: ROTATE ITEMS?

a. Efficient pumps or motors
b. Efficient compressed air systems
c. Efficient process heating or cooling
d. Lean practices, which are operational strategies designed to reduce waste, costs, and lead times during production]
e. Combined heat and power
f. Load shifting or demand response

01 YES
02 NO
96 REFUSED
97 DON'T KNOW

D. Current Barriers Impacting Investment

D1. I'm going to read you a list of potential barriers that may prevent your customers from incorporating energy efficiency into their process improvement projects. For each, please tell me if it is a "major barrier", a "minor barrier" or "not a barrier" to incorporating energy efficiency into these projects. First, [INSERT ITEMS (a-g)]… [READ IF NECESSARY: Is this a barrier to incorporating energy efficiency into process improvement projects?]

a. Lack of **internal** awareness regarding energy efficiency features, products or services [READ IF NECESSARY: "Internal" refers to individuals within your customers' particular organizations].
b. Lack of **external** awareness regarding energy efficiency features, products or services [READ IF NECESSARY: "External" refers to individuals outside of your customers' organizations].
c. Lack of energy efficiency expertise among process engineers or equipment salesmen and installers.
d. Competing demands for capital.
e. Placing a low value on energy efficiency and sustainability.
f. Conflicting NYISO, NYSERDA, and utility programs.
g. Eligibility issues associated with specific programs.

01 MAJOR BARRIER
02 MINOR BARRIER
03 NOT A BARRIER
96 REFUSED
97 DON'T KNOW

[ASK D2 IF MORE THAN 1 D1a-g RESPONSE = 01, SKIP TO SECTION E IF ONLY 1 D1a-g = 01]
[PROGRAM AVAILABLE CHOICES 01-07 ONLY IF RELATED a-g D1 OPTION = 01]

D2. In the question just answered, you mentioned that [READ LIST OF D1 a-g RESPONSES THAT = 1] were "MAJOR barriers" to incorporating energy efficiency into capital improvement projects] Which of these barriers is typically the **largest** barrier for your customers' organizations? ACCEPT ONLY ONE CHOICE]

01 Lack of **internal** energy efficiency awareness.
02 Lack of **external** energy efficiency awareness.
03 Lack of energy efficiency expertise.
04 Competing demands for capital.
05 Undervaluing energy efficiency and sustainability.
06 Conflicting NYISO, NYSERDA, and utility programs.
07 Eligibility issues associated with specific programs.
96 REFUSED
97 DON'T KNOW

E. Customer Decision Making Process and Structure of Relationships with TSPs

E1. Which of the following three statements best describes **how** your company's customers **most typically** pursue outside assistance regarding process improvement projects? [READ LIST] [ACCEPT ONLY ONE RESPONSE]

01 They actively research and contact service providers on their own.
02 They reach out to service providers only after receiving marketing efforts, a business referral, or seeing advertising.
03 They do not seek outside assistance for these projects.
96 REFUSED
97 DON'T KNOW

E2. Which of the following statements best describes **when** your company's customers' **most typically** pursue outside assistance regarding process improvement projects?
01 They pursue help from the **beginning** of each project.
02 They pursue help at a **standard point** for each project.
03 They **do not** have a set schedule of when to pursue help.
96 REFUSED
97 DON'T KNOW

E3 Do your customers typically request help in any of the following areas? First, with [INSERT ITEMS (a-d)]…?

a. Project design
b. Equipment selection
c. Equipment installation
d. Financial issues
   01 YES
   02 NO
   96 REFUSED
   97 DON'T KNOW

E4. At what level in your customers' organizations do you believe decisions are made regarding the need for and design and implementation of process improvement projects: at the local or facility level, or at the corporate office level?

01 LOCAL/FACILITY LEVEL
02 CORPORATE OFFICE LEVEL
96 REFUSED
98 DON'T KNOW

F. Awareness of Process Efficiency Improvement Projects in the State

F1. How often do you see successful process efficiency improvement projects featured in marketing efforts, industry publications, or trade journals: often, sometimes, rarely, or never?

01 OFTEN
02 SOMETIMES
03 RARELY
04 NEVER
96 REFUSED
97 DON'T KNOW

F2. In your opinion, has the number of process improvement projects incorporating technology advancements, energy efficiency, or demand response design awareness within New York State increased, decreased or stayed the same over the past three years?

01 INCREASED
02 DECREASED
03 STAYED THE SAME
96 REFUSED
97 DON'T KNOW

[ASK F3a IF F3 = 01, ELSE SKIP TO F3b.]

F2a. Why do you think the number has increased? [DO NOT READ. CODE ALL THAT APPLY]

01 INCREASED MARKET OPPORTUNITY
02 CONCERNS ABOUT CLIMATE CHANGE
03 INCREASED DESIRE TO BE "GREEN"
04 REGULATORY CHANGE (NY-SPECIFIC/NATIONAL)
05 OTHER (SPECIFY)
96 REFUSED
97 DON'T KNOW

[ASK F3b if F3 = 02, ELSE SKIP TO SECTION G]

F2b. Why do you think the number has **decreased?** [DO NOT READ. CODE ALL THAT APPLY]

01 DECREASED MARKET OPPORTUNITY
02 LACK OF CAPITAL FOR INVESMENT
03 PROGRAM CHANGES
04 PROGRAM BUREAUCRACY CHANGES
05 OTHER (SPECIFY)
96 REFUSED
97 DON'T KNOW

G. Firmographic Information

Finally, I have just a few remaining questions about your firm.

G1. How would you characterize your business? Would you say it is an . . .?

01 Energy Consulting Firm
02 Engineering Firm
03 Energy Service Company (ESCO)
04 Other [SPECIFY]

G1a. Do you primarily serve **downstate** New York (the 5 boroughs of New York City plus the Westchester area) or **upstate** New York?

01 DOWNSTATE
02 UPSTATE
03 BOTH (VOL)
96 REFUSED
97 DON'T KNOW

G1b. Does your firm specialize in any particular end uses or customer/industry type?

01 YES [SPECIFY]
02 NO
97 REFUSED
97 DON'T KNOW

G4. Does your company provide evaluation and/or design support for energy efficient upgrades to processes or systems to its customers?

01 YES
02 NO
96 REFUSED
97 DON'T KNOW

G5. About how long has your company been in business?

01 [RECORD NUMBER OF YEARS]
02 [RECORD YEAR ESTABLISHED]
96 REFUSED
97 DON'T KNOW

G6. Is your company independent or part of a larger company?

01 INDEPENDENT
02 PART OF A LARGER COMPANY
03 OTHER (SPECIFY)
96 REFUSED
97 DON'T KNOW

G7. About how many offices are owned or operated by your company in New York State?

01 [RECORD APPROXIMATE # OF OFFICE LOCATIONS IN NY]
96 REFUSED
97 DON'T KNOW

G9. Approximately how many full time employees does your company employ at all of its locations in New York State?

01 [RECORD NUMBER]
96 REFUSED
97 DON'T KNOW

G10. Has this number increased, decreased or stayed about the same over the past five years?

01 INCREASED
02 DECREASED
03 STAYED THE SAME
96 REFUSED
97 DON'T KNOW

G11. Does your company have customers in any of the following industry sectors? [INSERT ITEMS A-F].

a CHEMICALS (INCLUDING PHARMACEUTICALS)
b PRINTING AND PUBLISHING
c TRANSPORTATION (INCLUDING AUTOMOTIVE)
d FOOD PROCESSING
e FOREST PRODUCT MANUFACTURING
f DATA CENTER

1 YES
2 NO
96 REFUSED
97 DON'T KNOW

[ASK IF bp = 01; ELSE SKIP TO V1]

G12. In the next few weeks, we will be conducting a 15-minute survey for NYSERDA's Business Partners Program. Could you please tell me who at your firm we should talk to about your firm's commercial lighting work?

01 [RECORD NAME, PHONE, TITLE]
96 REFUSED
97 DON'T KNOW

Verification:

V1. Now, just for verification purposes, can I please have your full name? [READ IF NECESSARY: We just need this so my supervisor can verify I completed this survey].

01 [RECORD NAME]
96 REFUSED
97 DON'T KNOW

V2. And what is your title?

01 [RECORD TITLE]
96 REFUSED
97 DON'T KNOW

V3. And finally, what is the best phone number to reach you?

01 [RECORD PHONE NUMBER]
96 REFUSED
97 DON'T KNOW

That concludes our survey.
Thanks so much for your time and opinions. Please note that you might be contacted again in the future as part of evaluations of other NYSERDA efforts. So thanks in advance for that input as well.

APPENDIX E

List of Six Largest Firms within Each Industrial and Process Efficiency Targeted Industry Area

One objective of the Industrial and Process Efficiency Marketing Characterization effort is to identify a priority list of facilities (the six largest firms), by industry, to target the Industrial and Process Efficiency program. Criteria that best fit the industry was used to develop individual lists; for example, number of employees or annual sales for chemical/pharmaceutical industries (the size of facility was not available), and acres over mining life and current acres mined for mining, and size of population for wastewater facilities.

MINING

Criteria: Current permitted mining acres

Name: Cargill Inc.

Location: Multiple counties

Product: Salt

Current permitted acres: 9260

Name: Hanson Aggregates, NY LLC

Location: Onondaga

Product: Limestone

Current permitted acres: 839

Name: Lafarge Building Materials

Location: Albany

Product: Limestone

Current permitted acres: 745

Name: American Rock Salt

Location: Livingston

Product: Salt

Current permitted acres: 672

Name: St. Lawrence Zinc Co.

Location: St. Lawrence

Product: Zinc

Current permitted acres: 432

Name: Holcim US Inc.

Location: Greene

Product: Limestone

Current permitted acres: 318

WASTEWATER

Criteria: Population served by facility

List identifies facilities throughout NY State and also those within NY City

Name: Nassau County D.P.W.

County: Nassau

Details: Built 1973, Updated 1983

Population served: 550,000

Name: Bay Park STP Reynolds channel

County: Nassau

Details: Built 1949, Updated 1983

Population served: 507,000

Name: Monroe County Department/Frank E Van Lare STP

County: Monroe

Details: Built 1917, Updated 1975

Population served: 462,224

Name: Rockland County Server/Hudson River

County: Rockland

Details: Built 1968, Updated 1980

Population served: 157,707

Name: Albany County Server/Hudson River

County: Albany

Details: Built 1974, Updated n/a

Population served: 120,000

Name: Amherst Tonawanda Creek/Erie County

County: Erie

Details: Built 1965/Updated 1980

Population served: 115,000

TRANSPORTATION

Criteria: Number of Employees and Sq. Ft. of facility

Name: Delphi corporation, Tech Center

County: Niagara

Number of Employees: 2,000

Sq.Ft. of Facility: 7,400,000

Product: Motor vehicle parts and accessories

Name: BorgWarner Morse Tec., Inc.

County: Tompkins

Number of Employees: 1,600

Sq.Ft. of Facility: 750,000

Product: Motor vehicle parts and accessories

Name: Magana Power Train – Syracuse

County: Onondaga

Number of Employees: 1300

Sq.Ft. of Facility: 1,700,000

Product: Motor vehicle parts and accessories

Name: Alston Transportation, Inc.

County: Steuben

Number of Employees: 1300

Sq.Ft. of Facility: 500,000

Product: Railroad Equipment

Name: Schweizer Aircraft Corporation

County: Chemung

Number of Employees: 1022

Sq.Ft. of Facility: 350,539

Product: Aircraft parts and equipment

Name: Daimler Buses, N.A.

County: Oneida

Number of Employees: 590

Sq.Ft. of Facility: 167,700

Product: Truck, bus and car parts

FOREST PRODUCT MANUFACTURING

Criteria: Number of Employees, Sq. Ft. of Facility (when available) and Annual Sales

Name: Finch paper

County: Warren

Number of Employees: 740

Sq. Ft. of Facility: n/a

Annual Sales: $200 million – $499 million

Product: Paper and paper converting products

Name: Huhtamaki, Inc.

County: Oswego

Number of Employees: 600

Sq. Ft. of Facility: 847,279

Annual Sales: $20 million - $50 million

Product: Printed paper products

Name: International Paper

County: Essex

Number of Employees: 625

Sq. Ft. of Facility: n/a

Annual Sales: $100 million - $499 milllion

Product: Pulp, paper and paper boards

Name: Liberty Enterprises

County: Montgomery

Number of Employees: 800

Sq. Ft. of Facility: n/a

Annual Sales: $5 million to $6 million

Product: Pulp, paper and paper boards

Name: Nice-Pak Products

County: Rockland

Number of Employees: 600

Sq. Ft. of Facility: 175,000

Annual Sales: $100 million - $499 million

Product: Sanitary paper products

LOGGING

Criteria: Number of employees and annual sales

Name: Seaway Timber Harvesting

County: St. Lawrence

Number of Employees: 90

Annual Sales: $ 1 million - $5 million

Distribution: International

Name: Lizotte Logging, Inc.

County: Franklin

Number of Employees: 21

Annual Sales: n/a

Distribution: Local

Name: Carter Logging

County: Clinton

Number of Employees: 20

Annual Sales: $1 million – $2.5 million

Distribution: Local

Name: Richards Logging

County: Franklin

Number of Employees: 18

Annual Sales: $2.5 million - $5 million

Distribution: Regional

Name: J&S Logging

County: St. Lawrence

Number of Employees: 17

Annual Sales: n/a

Distribution: Local

Name: Leatherstocking Timber Products

County: Otsego

Number of Employees: 15

Annual Sales: $1 million – $2.5 million

Distribution: National

FOOD

Criteria: Number of Employees

Name: Pepsi Beverages Co.

County: Westchester

Number of Employees: 1400

Annual Sales: $19 billion – $19.9 billion

Product: Bottle and can soft drinks

Name: Rich Products

County: Erie

Number of Employees: 650

Annual Sales: $2.8 billion – $4.9 billion

Product: Frozen specialties, bakery products (not bread) and fish

Name: Carriage House

County: Chautauqua

Number of Employees: 600

Annual Sales: $450 million - $499 million

Product: Canned fruit and veggies

Name: Anheuser Bush

County: Onondaga

Number of Employees: 600

Annual Sales: $200 million - $499 million

Product: Malt beverages

Name: Pepsi-Cola Bottling Company of NY

County: Queens

Number of Employees: 900

Annual Sales: $100 million - $200 million

Product: Bottle and can soft drinks

PHARMACEUTICAL/CHEMICAL

Criteria: Number of Employees

Pharmaceutical and chemical facilities are combined due to the cross-industry product production in various facilities.

Name: NBTY Inc.

County: Suffolk

Number of Employees: 550

Annual Sales: $1.19 billion

Product: Vitamins and supplements

Name: Ciba Corporation

County: Westchester

Number of Employees: 500

Annual Sales: $4 billion

Product: Pharmaceutical preparations, gum and wood chemicals

Name: APP Pharmaceuticals

County: Erie

Number of Employees: 600

Annual Sales: $200 million - $499 million

Product: Pharmaceutical preparations

Name: Bristol Myers Squibb

County: Onondaga

Number of Employees: 600

Annual Sales: $160 million

Product: Pharmaceutical preparations

Name: Covidien

County: Delaware

Number of Employees: 700

Annual Sales: $25 million - $100 million

Product: Pharmaceutical preparations

Name: Praxiar

County: Erie

Number of Employees: 1200

Annual Sales: $200 million - $499 million

Product: Industrial gases

APPENDIX F

NYPA Power For Jobs Participants

New York Power Authority

Power for Jobs - Extended Benefits

As of May 11, 2010						Allocation	Total
Line	Company	Address	City	Zip	County	KW	Jobs
1	3M	305 Sawyer Ave	Tonawanda	14150	Erie	2,000	352
2	92nd Street YM-YWHA	1395 Lexington Ave.	New York	10128	New York	200	836
3	A. L. Bazzini	200 Food Court Drive	Bronx	10474	Bronx	125	118
4	A. Stein Meat Products, Inc.	5600 First Ave	Brooklyn	11220	Kings	120	45
5	Accumed Technologies, Inc.	150 Bud Mil Drive	Buffalo	14202	Erie	100	202
6	Acme Architectural Products, Inc.	513 Porter Avenue	Brooklyn	11222	Kings	620	340
7	Acme Smoked Fish Corp.	26-56 Gem Street	Brooklyn	11222	Kings	400	138
8	AEC Johnson & Hoffman	40 Voice Road	Carle Place	11514	Nassau	225	66
9	Aerospace Avionics	1000 MacArthur Mem. Hwy.	Bohemia	11716	Suffolk	650	241
10	Agri-Mark, Inc	P.O. Box 900	Chateaugay	12920	Franklin	500	114
11	Air-Flo Manufacturing	1 Main St.- P.O Box 289	Prattsburgh	14873	Steuben	130	78
12	Airsep Corporation	401 Creekside Drive	Buffalo	14228	Erie	650	268
13	Albany Institute of History & Art	125 Washington Avenue	Albany	12210	Albany	150	19
14	Albany International Corp.	1373 Broadway	Albany	12201	Albany	750	192
15	Albany International Corp.	156 South Main St	Homer	13077	Cortland	1,000	108
16	Albany Molecular Research, Inc.	21 Corporate Circle	Albany	12203	Albany	600	398
17	Alken Industries Inc.	2175 Fifth Avenue	Ronkonkoma	11779	Suffolk	125	70

18	Alliance Innovative Manufacturing, Inc	1 Alliance Drive	Lackawanna	14218	Erie	50	31
19	Allied Frozen Storage, Inc.	2501 Broadway	Buffalo	14227	Erie	400	29
20	Alvin J. Bart & Sons	333 Johnson Avenue	Brooklyn	11206	Kings	500	105
21	American Ballet Theater	890 Broadway 3rd Floor	New York	10003	New York	20	230
22	American Cancer Society	19 West 56th Street	New York	10019	New York	80	71
23	American Folk Art Museum	1414 Ave of the Americas	New York	10019	New York	50	43
24	American Indian Community House	708 Broadway	New York	10003	New York	35	32
25	American Technical Ceramics	One Norden Lane	Huntington Station	11746	Suffolk	200	289
26	Ametek Hughes-Treitler	300 Endo Blvd.	Garden City	11530	Nassau	500	161
27	AMF Bowling Inc.	7412 Utica Blvd.	Lowville	13367	Lewis	500	109
28	AMRI Rensselaer, Inc	33 Riverside Ave.	Rensselaer	12144	Rensselaer	1,000	267
29	Amsterdam Printing & Litho	166 Wallins Corners Road	Amsterdam	12010	Montgomery	430	528
30	Anaren Microwave, Inc.	6635 Kirkville Road	E. Syracuse	13057	Onondaga	750	444
31	Anoplate Corp.	459 Pulaski St.	Syracuse	13204	Onondaga	450	195
32	Applied Energy Solutions	366 Maple St.	Caledonia	14423	Livingston	300	48
33	Arkwin Industries	686 Main Street	Westbury	11590	Nassau	700	333
34	Ascension Industries	1254 Erie Avenue	North Tonawanda	14120	Niagara	230	136
35	Asia Society	725 Park Ave.	New York	10021	New York	225	143
36	Associated Brands, Inc	4001 Saltworks Road	Medina	14103	Orleans	1,000	300
37	AT&T	440 Hamilton Avenue	White Plains	10601	Westchester	560	530
38	AT&T	250 South Clinton St	Syracuse	13202	Onondaga	350	250
39	Atofina Chemicals, Inc.	PO Box 188	Geneseo	14454	Livingston	850	95
40	Auburn Vacuum Forming Co., Inc.	40 York Street P.O. Box 489	Auburn	13021	Cayuga	88	15
41	Audio Sears	2 South Street	Stamford	12167	Delaware	190	79
42	B.H. Aircraft Company, Inc	2230 Smith Town Ave	Ronkonkoma	11779	Suffolk	400	68

43	Ballet Hispanico	167 West 89th Street	New York	10024	New York	15	58
44	Bank of New York	6023 Airport Rd	Oriskany	13424	Oneida	500	796
45	Bank of New York	75 Park Place, 10th Floor	New York	10286	New York	4,700	6,299
46	Barry Steel Fabrication, Inc.	30 Simonds Street	Lockport	14094	Niagara	50	32
47	Bartell Machinery Systems	6321 Elmer Hill Road	Rome	13440	Oneida	170	138
48	Bassett Hospital of Schoharie Count	178 Grandview Drive	Cobleskill	12043	Schoharie	100	227
49	Batavia Industrial Center	56 Harvester Ave.	Batavia	14020	Genesee	550	260
50	Beaver Falls Sealing Products	9794 Bridge Street	Croghan	13327	Lewis	250	31
51	Beechnut Nutrition Corp.	102 Church Street	Canajoharie	13304	Montgomery	1,500	425
52	Belmont Metals, Inc.	330 Belmont Ave	Brooklyn	11207	Kings	400	81
53	Bestway Enterprises	3877 Luker Road	Cortland	13045	Cortland	75	60
54	Beth Israel Medical Center	323 East 16th Street	New York	10003	New York	3,800	7,639
55	Birds Eye Foods, Inc.	607 Phillips Street	Fulton	13069	Oswego	1,500	310
56	Bison Foods - Div. of Upstate Farms	25 Anderson Road	Buffalo	14255	Erie	500	146
57	Blasch Precision Ceramics	580 Broadway	Albany	12203	Albany	400	64
58	Blue Ridge Foods LLC	3301 Atlantic Ave.	Brooklyn	11208	Kings	800	95
59	Blythedale Children's Hospital	Bradhurst Avenue	Valhalla	10595	Westchester	150	378
60	BOC Edwards Calumatic	2175 Military Road	Tonawanda	14150	Erie	270	130
61	Boreal Water Collection, Inc.	P. O. Box K	Kiamesha Lake	12751	Sullivan	250	35
62	Borg Warner Automotive Morse TEC	800 Warren Road	Ithaca	14850	Tompkins	4,000	814
63	Borg Warner Morse Tech Corp	3690 Luker Road	Cortland	13045	Cortland	1,500	115
64	Bowne & Co	55 Water Street	New York	10041	New York	550	365
65	Bristol-Myers Squibb Company	6000 Thompson Road	East Syracuse	13057	Onondaga	5,000	839
66	Broadridge Financial Solutions, Inc	51 Mercedes Way	Edgewood	11717	Suffolk	1,000	1,546
67	Brodock Press, Inc.	502 Court Street	Utica	13503	Oneida	400	108
68	Bronx-Lebanon Hospital Center	1276 Fulton Avenue	Bronx	10456	Bronx	800	3,242

69	Brooklyn Information and Culture	647 Fulton St	Brooklyn	11217	Kings	50	56
70	Brooks Memorial Hospital	529 Central Avenue	Dunkirk	14048	Chautauqua	400	404
71	Bruce's Bakery	34 Middle Neck Road	Great Neck	11021	Nassau	75	49
72	Buflovak, LLC	750 East Ferry Street	Buffalo	14240	Erie	275	40
73	Burrows Paper Corp.	75 Riverside Ind. Drive	Little Falls	13365	Herkimer	1,000	179
74	Burt Rigid Box, Inc.	58 Browne Street	Oneonta	13820	Otsego	300	33
75	Byrne Dairy, Inc.	240 Oneida Street	Syracuse	13202	Onondaga	300	463
76	C & H Plastics	P.O. Box 398 145 Conger Avenue	Waterville	13480	Oneida	100	39
77	C. R. Bard, Inc.	289 Bay Road	Queensbury	12804	Warren	800	951
78	Cameron Fabricating Corporation	727-731 Blostein Blvd.	Horseheads	14845	Chemung	325	212
79	Candlelight Cabinetry, Inc.	24 Michigan St.	Lockport	14094	Niagara	400	187
80	Canton Potsdam Hospital	50 Leroy Street	Potsdam	13676	St. Lawrence	150	651
81	Caron Fine Wood Products, Inc.	6 Cotton Lane	Champlain	12919	Clinton	15	3
82	Carville National Leather Corp.	10 Knox Ave.	Johnstown	12095	Fulton	200	36
83	Cascades Tissue Group	148 Hudson River Road	Waterford	12118	Saratoga	530	286
84	Cecilware Corp.	43-05 20th Avenue	Long Island City	11105	Queens	300	142
85	Chapin Manufacturing	700 Ellocate Street	Batavia	14021-0549	Genesee	500	171
86	Chapin Watermatics Inc.	740 Water Street	Watertown	13601	Jefferson	325	70
87	Charles T. Sitrin Health Care Cente	2050 Tilden Avenue	New Hartford	13413	Oneida	300	344
88	Cherry Creek Woodcraft Inc.	One Cherry Lane	South Dayton	14138	Cattaraugus	400	67
89	Children's Museum of Manhattan	212 West 83rd Street	New York	10024	New York	110	81
90	Citigroup	388 Greenwich Street	New York	10013	New York	5,000	1,500
91	Clarkson University	8 Clarkson Avenue Box 5537	Potsdam	13699	St. Lawrence	1,500	681
92	Clay Park Labs, Inc.	1700 Bathgate Ave	Bronx	10457	Bronx	1,000	371
93	Climax Manufacturing Co.	30 Champion Street	Carthage	13619	Jefferson	1,500	246

94	Clinton's Ditch Cooperative Company	8478 Pardee Rd.	Cicero	13039	Onondaga	800	169
95	Coca Cola Bottling Co. NY	555 Taxter Road	Elmsford	10532	Westchester	1,250	1,873
96	Codino's Italian Foods, Inc.	704 Corporations Park	Scotia	12302	Schenectady	150	30
97	College of St. Rose	432 Western Avenue	Albany	12203	Albany	450	758
98	Columbia University - Trustees	410 West 118th Street	New York	10027	New York	750	750
99	Comco Plastics, Inc.	98-34 Jamaica Avenue	Richmond Hill	11418	Queens	250	32
100	Conax Buffalo Technologies	2300 Walden Avenue	Buffalo	14225	Erie	75	92
101	Coney Island, USA	1208 Surf Avenue	Brooklyn	11224	Kings	15	15
102	Consumers Beverages, Inc.	2230 South Park Avenue	Buffalo	14220	Erie	220	74
103	Consumers Beverages, Inc.	2230a South Park Avenue	Buffalo	14220	Erie	240	64
104	Continental Food Products, Inc.	31-45 Downing St.	Flushing	11354	Queens	300	55
105	Cooper Hand Tools	45 Cleveland St.	Cortland	13045-2331	Cortland	1,330	103
106	Cooper Industries	7th North and Wolf Street PO Box 4999	Syracuse	13221	Onondaga	2,350	626
107	Corning (Erwin Plant)	Addison Rd	Corning	14831	Steuben	1,500	517
108	Corning, Inc.- (Big Flats)	HP-ME-01 MS22	Big Flats	14831	Chemung	500	128
109	Corning, Inc. (Canton)	334 County Road 16	Canton	14831	St. Lawrence	1,500	173
110	Corning, Inc. (Costar Plant)	275 River Street	Oneonta	14831	Otsego	900	165
111	Corning, Inc. (Northside)	HP-ME-01-MS22	Corning	14831	Steuben	2,500	876
112	Corning, Inc. (SCC & TDM)	HP-ME-01 MS22	Corning	14831	Steuben	500	124
113	Corning, Inc.- (Southside)	HP-ME-01-MS22	Corning	14831	Steuben	1,500	883
114	Corning, Inc. (Sullivan Park)	1 Science Center Drive	Corning	14831	Steuben	3,000	1,791
115	Cortland Line Co., Inc.	3736 Kellogg Road	Cortland	13045	Cortland	450	60
116	Coyne Textile Services	140 Cortland Avenue	Syracuse	13221	Onondaga	250	140
117	Crescent Duck Farm, Inc.	Edgar Avenue PO Box 500	Aquebogue	11931	Suffolk	350	66
118	Crucible Specialty Metals	575 State Fair Boulevard	Syracuse	13201	Onondaga	4,000	682

119	Cumberland Packaging	2 Comberline Street	Brooklyn	11205	Kings	750	374
120	Currier Plastics, Inc.	79 Columbus St	Auburn	13021	Cayuga	300	97
121	Custom Electronics, Inc.	87 Browne Street	Oneonta	13820	Otsego	150	65
122	CWM Chemical Services, LLC	1550 Balmer Road	Model City	14107	Niagara	330	75
123	CWR Manufacturing of CNY, LLC	PO Box 2669	Syracuse	13057	Onondaga	130	4
124	CWS	17 Midland Drive	Norwich	13815	Chenango	150	158
125	Dab-O-Matic Corporation	896 South Columbus Avenue	Mount Vernon	10550	Westchester	150	86
126	DaimlerChrysler Commercial Buses	P.O. Box 748 165 Base Road	Oriskany	13424	Oneida	300	629
127	Dal Tile Corporation	103 South Clark Street	Olean	14760	Cattaraugus	1,000	263
128	Data Device Corporation	105 Wilbur Place	Bohemia	11716	Suffolk	1,300	422
129	Dayton T. Brown	555 Church St	Bohemia	11716	Suffolk	600	204
130	DEC Properties	31 Holland St	Alexandria Bay	13607	Jefferson	110	82
131	Deck Bros., Inc.	222 Chicago Street	Buffalo	14204	Erie	140	24
132	Derrick Corp	590 Duke Road	Cheektowaga	14225	Erie	1,000	427
133	Deutsch Relays, Inc.	55 Engineers Rd	Hauppauge	11788	Suffolk	300	119
134	Di Highway Sign & Structure Corp.	44 Greenman Ave.	New York Mills	13417	Oneida	70	48
135	Dielectric Laboratories, Inc.	2777 US Route 20 E.	Cazenovia	13035	Madison	400	167
136	Diemolding Corporation	125 Rasbach Street	Canastota	13032	Madison	184	82
137	Diller-Quaile School of Music	24 East 95th Street	New York	10128	New York	30	95
138	Display Producers, Inc.	1260 Zerega Ave	Bronx	10462	Bronx	215	97
139	Distributor Data Forms, Inc.	362 Route 13 South	Cortland	13045	Cortland	50	12
140	Diversified Controls & Systems, Inc.	645 Person Street	East Aurora	14052	Erie	25	12
141	Diversified Manufacturing, Inc.	410 Ohio Street	Lockport	14094	Niagara	255	110
142	Divine Brothers Company	200 Seward Ave.	Utica	13505	Oneida	250	78
143	Dontis Produce Co.	5600 First Avenue-13	Brooklyn	11220	Kings	50	7

144	Dot Foods, Inc	200 Monarch Road	Liverpool	13088	Onondaga	350	216
145	Downtown Community TV	87 Lafayette Street	New York	10013	New York	15	23
146	Dunmore Corporation	3633 Danbury Rd.	Brewster	10509	Putnam	150	43
147	Dupli Envelopes & Graphics Corp.	P.O. Box 11500	Syracuse	13218	Onondaga	200	130
148	Dynabrade, Inc.	8989 Sheridan Drive	Clarence	14031	Erie	300	147
149	East Harlem Arts & Education Local Devel. Corp	1 East 104th street	New York	10029	New York	60	32
150	Eastern Castings Corp.	2 Pearl Street	Cambridge	12816	Washington	250	14
151	Eastern Niagara Hospital, Inc	521 East Avenue	Lockport	14094	Niagara	350	383
152	Eastman Machine Company	779 Washington Street	Buffalo	14203	Erie	300	87
153	Edison Price Lighting, Inc.	41-50 22nd Street	New York	11101	New York	260	98
154	Edward John Noble Hospital	177 West Barney Street	Gouverneur	13642	St. Lawrence	100	230
155	Egli Machine, Inc.	240 State Hwy #7	Sidney	13838	Delaware	20	27
156	Elaine Kaufman Cultural Center	129 West 67th Street	New York	10023	New York	60	69
157	Elmira Stamping and Manufacturing	1704 Cedar St.	Elmira	14904	Chemung	60	41
158	EMED Company, Inc.	P O Box 369	Buffalo	14240	Erie	250	145
159	Emerson Power Transmission, Corp.	620 South Aurora Street	Ithaca	14850	Tompkins	1,400	293
160	Emhart Glass Mfg., Inc. (Emhart Pow	1140 Sullivan Street	Elmira	14901	Chemung	100	156
161	Empire Coating, Inc.	215 West Avenue	Albion	14411	Orleans	150	69
162	Empire Merchants, LLC	19-50 48th Street	Astoria	11105	Queens	750	879
163	Endicott Interconnect Technologies	1701 North Street, D610	Endicott	13760	Broome	3,500	3,909
164	Enzo Clinical Labs, Inc.	60 Executive Boulevard	Farmingdale	11735	Suffolk	200	369
165	ESCO Turbine Technologies-Syracuse	901 East Genessee St.	Chittenango	13037	Madison	1,250	402
166	Ethox Corp.	251 Seneca Street	Buffalo	14204	Erie	350	113
167	Ethox Corp.	7500 West Henrietta Rd	Rush	14543	Monroe	175	54
168	Ever Fab, Inc.	12928 Big Tree Road	East Aurora	14052	Erie	150	59

169	Faster Form Corp.	126 Industrial Park Drive W. Frankfort Ind. Park	Frankfort	13340	Herkimer	40	34
170	Feldmeier Equipment Inc.	575 East Mill Street	Little Falls	13365	Herkimer	450	157
171	Fermer Precision	114 Johnson Road	Ilion	13357	Herkimer	200	46
172	Fiber Glass Industries Inc.	69 Edson Street	Amsterdam	12010	Montgomery	700	146
173	Finch Pruyn & Company Inc.	1 Glen Street	Glen Falls	12801	Warren	5,000	758
174	Fisher Price	636 Girard Avenue	East Aurora	14052	Erie	1,500	959
175	Fitzpatrick & Weller, Inc.	12 Mill Street PO Box 490	Ellicottville	14731	Cattaraugus	1,000	81
176	Flag Poles, Inc.	95 Gnarled Hollow Road	East Setauket	11733	Suffolk	200	86
177	Flower City Printing, Inc.	1725 Mt. Read Blvd.	Rochester	14606	Monroe	500	302
178	Flower City Printing, Inc.	1725 Mt. Read Blvd.	Rochester	14606	Monroe	650	302
179	Ford Motor Company	S-3663 Lake Shore Road	Buffalo	14219	Erie	5,000	949
180	Fordham University	441 East Fordham Road	Bronx	10458	Bronx	400	992
181	Forsyth Industries	129 Elm Street	East Aurora	14052	Erie	60	10
182	Fort Meat Wholesale	5600 First Ave	Brooklyn	1220	Kings	60	25
183	Frito-Lay, Inc.	10 Spud Road	Binghamton	13904	Broome	1,000	598
184	G L & V Sandy Hill Inc.	27 Allen Street	Hudson Falls	12839	Washington	750	85
185	Gary Plastic Packaging Corp.	1340 Viele Avenue	Bronx	10474	Bronx	800	498
186	Gehring Tricot Corp.	64 Ransom Street	Dolgeville	13329	Herkimer	450	90
187	General Mills	54 South Michigan	Buffalo	14203	Erie	1,000	111
188	General Motors Components Holdings LLC	500 Commerce Dr	Amherst	14228	Erie	150	1,846
189	Gernatt Asphalt Products, Inc.	Richardson Road	Collins	14034	Erie	800	108
190	Ginsberg's Institutional Foods, Inc	PO Box 17 Route 66	Hudson	12534	Columbia	375	215
191	Good Samaritan Hospital	1000 Montauk Highway	West Islip	11795	Suffolk	800	3,071
192	Gorbel Corp.	600 Fisher's Run	Fishers	14453	Ontario	350	152
193	Great Lakes Cheese of New York Inc.	23 Phelps Street	Adams	13605	Jefferson	600	80

194	Greatbatch, Inc.	10,000 Wehrle Drive	Clarence	14031	Erie	780	411
195	Greater Jamaica Development Corp.	90-04 161st Street	Jamaica	11432	Queens	375	144
196	Gurwin Jewish Geriatric Center	68 Hauppauge Road	Commack	11725	Suffolk	500	657
197	H & E Machinery, Inc.	334 Comfort Rd.	Ithaca	14851	Tompkins	350	192
198	H.H. Dobbins Inc.	99 West Ave	Lyndonville	14098	Orleans	250	63
199	Haleakala dba The Kitchen	512 West 19th Street	New York	10011	New York	30	11
200	Hamilton Printing Company	22 Hamilton Avenue	Castleton-on-Hudson	12033	Rensselaer	450	106
201	Hand Held Products dba HHP	700 Vision Drive	Skaneatels Falls	13153	Onondaga	750	285
202	Harmac Medical Products, Inc.	2201 Bailey Avenue	Buffalo	14211	Erie	385	204
203	Hebeler Corporation	2000 Military Roard	Tonawanda	14150	Erie	300	163
204	Helmont Mills	15 Lion Avenue	St. Johnsville	13452	Montgomery	250	77
205	Henry Modell Inc. / Modell's NY Inc	1500 Bassett Ave	Bronx	10461	Bronx	400	175
206	Henry Street Settlement	265 Henry Street	New York	10002	New York	300	649
207	HFW Industries, Inc.	196 Philadelphia Street	Buffalo	14207	Erie	250	54
208	Higbee Inc.	6741 Thompson Road	Syracuse	13221	Onondaga	100	42
209	HMI Metal Powders	2395 Main Street	Clayville	13322	Oneida	500	109
210	Home for Contemporary Theater & Art	145 6th Avenue Front-1	New York	10013	New York	30	19
211	Hudson Valley Hospital Center	1980 Crompond Road	Cortland Manor	10567	Westchester	350	850
212	IEC Electronics Corp.	105 Norton St.	Newark	14513	Wayne	590	262
213	Indium Corporation of America	1676 Lincoln Ave.	Utica	13503	Oneida	600	320
214	Inficon Inc.	Two Technology Place	E. Syracuse	13057	Onondaga	400	208
215	Interface Solutions, Inc.	2885 State Rt 481	Fulton	13069	Oswego	940	99
216	International Business Machines - Rochester	1630 Long Pond Rd.	Rochester	14626	Monroe	1,150	584
217	International Business Machines - Sterling Forest	c/o Grubb & Ellis 26 IBM Rd, Suite 100	Poughkeepsie,	12601	Orange	700	409
218	International Business Machines -	1133 Westchester Ave.	White Plains	10604	Westchester	3,870	1,998

	White Plains						
219	International Fiber Corporation	50 Bridge Street	North Tonawanda	14120	Niagara	350	86
220	Intertek Testing Services	3933 U.S. Route 11	Cortland	13045	Cortland	600	353
221	Intrepid Museum Foundation	Pier 86, W 46th St & 12 Ave	New York	10036	New York	450	179
222	IPAC, Inc.	155 Pine Dr	Amherst	14228	Erie	200	50
223	Isadore A. Rapasadi & Sons, Inc.	500 N. Peterboro Street	Canastota	13032	Madison	75	51
224	ITT Corporation	1500 New Horizons Blvd	North Amityville	11701	Suffolk	2,700	602
225	J.J. Cassone Bakery, Inc.	202 South Regent Street	Port Chester	10573	Westchester	400	201
226	J.P. Morgan/Chase	1985 Marcus Avenue (Triad)	Lake Success	11771	Nassau	1,295	254
227	J.P. Morgan/Chase	900 Stewart Avenue	Uniondale	11553	Nassau	500	673
228	Jacmel Jewelry, Inc.	30-00 47th Avenue	Long Island City	11101	Queens	170	251
229	Jada Precision Plastics Co.	1667 Emerson St	Rochester	14606	Monroe	300	120
230	Jamestown Advanced Products, Inc.	2855 Girts Road	Jamestown	14701	Chautauqua	225	76
231	Jaquith Industries	PO Box 780	Syracuse	13205	Onondaga	150	44
232	John Hassall, Inc.	609-1 Cantiague Rock Road	Westbury	11590	Nassau	450	96
233	John T. Mather Memorial Hospital	75 North Country Road	Port Jefferson	11777-2190	Suffolk	400	1,550
234	Keymark Corporation	1188 Cayadutta Street	Fonda	12068	Montgomery	800	421
235	Keystone Corporation	2929 Main St.	Buffalo	14214	Erie	300	40
236	Kilian Manufacturing Corporation	1728 Burnet Avenue	Syracuse	13217-6974	Onondaga	400	123
237	King Solomon Food, Inc.	5600 First Avenue-12	Brooklyn	11220	Kings	100	21
238	Kingsbrook Jewish Medical Center	David Minkin Plaza 585 Schenectady Avenue	Brooklyn	11203	Kings	1,200	1,837
239	Kintz Plastics, Inc.	1 Caverns Road	Howes Cave	12092	Schoharie	275	94
240	Kips Bay Boys and Girls Club	1930 Randall Avenue	Bronx	10473	Bronx	150	117
241	Kleer-Fax Inc.	750 New Horizons Blvd.	Amityville	11701	Suffolk	200	105

242	Kozy Shack, Inc.	50 Ludy Street P.O. Box 9011	Hicksville	11802	Nassau	1,000	250
243	Kraft Foods - Walton	261 Delaware Street	Walton	13856	Delaware	870	141
244	Kreher's Poultry Farms	5411 Davison Road	Clarence	14031	Erie	350	75
245	Kris-Tech Wire Company	921 Seneca St	Rome	13442	Oneida	200	32
246	Kruysman, Inc.	32-00 Skillman Avenue	Long Island City	11101	Queens	170	158
247	Lancaster Knives, Inc.	165 Court Street	Lancaster	14086	Erie	375	29
248	Leake and Watts Services, Inc.	463 Hawthorne Avenue	Yonkers	10705	Westchester	500	710
249	Lehigh Northeast Cement Company	P.O. Box 440 313 Warren Street	Glens Falls	12801	Warren	1,000	145
250	Lewis County General Hospital	7785 North State Street	Lowville	13367	Lewis	200	458
251	Lincoln Center for the Performing Arts	70 Lincoln Center Plaza	New York	10023	New York	3,000	4,131
252	Little Falls Hospital	140 Burwell Street	Little Falls	13365	Herkimer	200	209
253	Liz Claiborne, Inc.	1441 Broadway	New York	10018	New York	1,500	791
254	Long Beach Medical Center	455 East Bay Drive	Long Beach	11561	Nassau	600	914
255	Long Island Jewish Medical Center	c/o NSUH 300 Community Drive Bldg 6	Manhasset	11030	Nassau	2,000	6,415
256	Losquadro Ice Company	335 Moffat Street	Brooklyn	11237	Kings	330	32
257	Luvata Buffalo, Inc	P.O. Box 981	Buffalo	14240	Erie	5,000	540
258	Lydall Manning	68 George St.	Green Island	12183	Albany	1,100	103
259	Madelaine Chocolates	96-03 Beach Channel Drive	Rockaway Beach	11693	Queens	575	417
260	Maimonides Medical Center	4802 10th Avenue	Brooklyn	11219	Kings	1,350	5,544
261	Maloya Laser Inc.	65 A Mall Drive	Commack	11725	Suffolk	75	23
262	Manhattan School of Music	120 Claremont Ave	New York	10027	New York	200	373
263	Manitoba Corporation	122-130 Central Ave P.O. Box 385	Lancaster	14086	Erie	250	46
264	Manth-Brownell, Inc.	1120 Fyler Road	Kirkville	13082	Madison	700	112
265	Marquardt Switches, Inc.	2711 Rt. 20 East	Cazenovia	13035	Madison	200	211

266	Matt Brewing Company	811 Edwards Street	Utica	13502-4092	Oneida	600	115
267	Mayer Bros. Apple Products, Inc.	3300 Transit Road	West Seneca	14224	Erie	300	87
268	Mayer Brothers Products	1540 Seneca Creek Rd.	Buffalo	14424	Erie	400	157
269	McLane Eastern	2828 McLane Drive	Baldwinsville	13027	Onondaga	800	650
270	Meadwestvaco Corp	101 O'Neil Road	Sidney	13838	Delaware	2,500	911
271	Meloon Foundries, Inc.	1841 Lemoyne Avenue	Syracuse	13201	Onondaga	275	42
272	Memorial Sloan-Kettering Cancer Cen	1275 York Ave.	New York	10021	New York	5,000	9,756
273	Merritt Machinery, LCC	10 Simonds Street	Lockport	14094	Niagara	75	7
274	Met Weld International, LLC	5727 Ostrander Road	Altamont	12009	Albany	100	64
275	Metalico, Inc.	127 Fillmore Ave	Buffalo	14240	Erie	75	58
276	Mid State Raceway, Inc	14 Ruth Street	Vernon	13476	Oneida	200	192
277	Midstate Spring, Inc.	4054 New Cort Avenue	Syracuse	13206	Onondaga	100	26
278	Mill Services, Inc.	P.O. Box 577 128 McArthur Ave.	Cobleskill	12043-0577	Schoharie	300	45
279	Milward Alloys	500 Mill Street	Lockport	14094	Niagara	600	34
280	Miner Institute	P.O. Box 90 1034 Route 191	Chazy	12921	Clinton	150	51
281	Mobil Chemical Company	729 Pittsford - Palmyra Road	Macedon	14502	Wayne	600	157
282	Mohawk LTD.	1 Newell Lane	Chadwicks	13319	Oneida	100	59
283	Mohawk Paper Mills	465 Saratoga St. P.O. Box 497	Cohoes	12047	Albany	2,250	393
284	Montefiore Medical Center	111 East 210th Street	Bronx	10467	Bronx	2,850	17,125
285	Morgood Tools, Inc.	940 Millstead Way P.O. Box 24997	Rochester	14624	Monroe	200	43
286	Morton International	45 Ribaud Ave	Silver Springs	14450	Wyoming	1,000	157
287	Mount Saint Mary's Hospital	5300 Military Road	Lewiston	14092	Niagara	350	726
288	Mount Sinai Medical Center	1 Gustav Levy Place	New York	10029	New York	2,000	10,759
289	Museum of Art & Design	40 West 53th Street	New York	10019	New York	70	44

290	Nathan Littauer Hospital & Nursing Home	99 East State Street	Gloversville	12078	Fulton	400	720
291	National Academy of Design	1083 Fifth Ave	New York	10128	New York	80	25
292	National Pipe and Plastics	3421 Old Vestal Road	Vestal	13850	Broome	1,300	139
293	Natrium Products, Inc.	58 Pendelton Street	Cortland	13045	Cortland	90	21
294	Navilyst Medical Inc.	10 Glens Falls Technical Park	Glens Falls	12801	Warren	650	785
295	New Energy Works	1180 Commercial Drive	Farmington	14425	Ontario	150	90
296	New Museum of Contemporary Art	235 Bowery	New York	10001	New York	50	84
297	New York Blood Center	310 East 67th St	New York	10021	New York	500	291
298	New York College of Podiatric Medic	53 East 124th Street	New York	10035	New York	300	130
299	New York Presbyterian Hospital	525 East 68th Street	New York	10021	New York	5,000	8,923
300	New York University	740 Broadway 6th Fl	New York	10003	New York	1,700	11,660
301	Newport Rochester	705 St. Paul St.	Rochester	14605	Monroe	190	62
302	Niagara Falls Medical Center	621 Tenth Street	Niagara Falls	14302	Niagara	500	878
303	Niagara Fiberboard Inc.	140 Van Buren Street P.O. Box 520	Lockport	14095	Niagara	183	21
304	Niagara Gear Corp.	941 Military Road	Kenmore	14217	Erie	85	31
305	Norampac Industries	1 Main Place	Lancaster	14086	Erie	200	122
306	Norampac New York City, Inc	55-15 Grand Avenue	Maspeth	11378	Queens	600	181
307	Norlite Corp.	628 South Saratoga St.	Cohoes	12047	Albany	500	69
308	North General Hospital	1879 Madison Ave.	New York	10035	New York	400	1,029
309	North Hudson Woodcraft Corp.	North Helmer Avenue	Dolgeville	13329	Herkimer	230	46
310	North Lawrence Dairy, Inc.	22 County Route 52	North Lawrence	12967	St. Lawrence	1,000	144
311	North Shore Health System	600 Community Drive Bldg. 6	Manhasset	11030	Nassau	2,600	6,537
312	Northeast Solite Corp.	1133 Kings Highway	Mount Marion	12456	Ulster	600	57
313	Norwich Aero Products, Inc.	50 O'Hara Drive	Norwich	13815	Chenango	160	122

314	NYSARC, Inc. - Columbia County Chap	Route 217	Mellenville	12544	Columbia	450	121
315	NYU Medical Center	550 1st. Avenue	New York	10016	New York	4,000	12,387
316	Oak-Mitsui, Inc.	80 First Street	Hoosick Falls	12090-1631	Rensselaer	200	57
317	Oberdorfer Industries	6259 Thompson Road	Syracuse	13206	Onondaga	500	60
318	Oehler Industries	242 Elk Street	Buffalo	14240	Erie	80	14
319	Oldcastle Glass	895 Motor Parkway	Hauppauge	11787	Suffolk	250	123
320	Oldcastle Precast Inc	123 County Route 101	South Bethlehem	12161	Albany	160	60
321	Oneida Healthcare Center	321 Genesee Street	Oneida	13421	Madison	300	741
322	Oneida Molded Plastics	104 S. Warner Street	Onieda	13421	Madison	500	131
323	Onondaga Beverage Corp.	7655 Edgecomb Drive	Liverpool	13088	Onondaga	120	124
324	Ontario Knife Company	26 Franklinville	Franklinville	14737	Cattaraugus	250	66
325	Orazio & Sons Meat, Co.	5600 First Avenue-4	Brooklyn	11220	Kings	30	4
326	Osmose Realty Corp	980 Ellicott Street	Buffalo	14209	Erie	300	161
327	Pace University	235 Elm Rd.	Briarcliff Manor	10510	Westchester	800	2,579
328	Paul Bunyan Products, Inc.	7101 New York State Route 281	Preble	13141	Cortland	150	23
329	Paul T. Freund Corp	216 Park Drive	Palmyra	14522	Wayne	375	76
330	PCB Piezotronics, Inc.	3425 Walden Ave.	Depew	14043	Erie	600	465
331	PCI Paper Conversions, Inc.	6761 Thompson Road North	Syracuse	13211	Onondaga	400	134
332	Peak Resorts Inc., dba Greek Peak	2000 NYS Route 392	Cortland	13045	Cortland	2,200	149
333	Pearl Leather Finishers, Inc.	11-21 Industrial Park	Johnstown	12095	Fulton	280	123
334	Pelco Electronic Corp	2747 Route 20 East	Cazenovia	13035	Madison	100	49
335	Pepsi Cola Bottling Company	112-02 15th Ave.	College Point	11356	Queens	2,200	1,098
336	Phelps Memorial Hospital Center	701 North Broadway	Sleepy Hollow	10591	Westchester	450	1,141
337	Pierpont Morgan Library	29 East 36th Street	New York	10016	New York	170	143

338	Pivot Punch Corporation	6550 Campbell Boulevard	Lockport	14094	Niagara	300	71
339	Polymer Conversions	5732 Big Tree Road	Orchard Park	14127	Erie	325	75
340	Power Pallet	500 Sterling Avenue	Schenectady	12306	Schenectady	250	123
341	Precious Plate, Inc.	2124 Liberty Drive	Niagara Falls	14304	Niagara	235	89
342	Precision Systems Mfg., Inc.	4855 Executive Drive	Liverpool	13088	Onondaga	180	67
343	Producto Machine Company - Ring & Pierce-All Div.	2980 Turner Rd., P.O. Box 490	Jamestown	14702	Chautauqua	350	88
344	Quad Graphics, Inc.	56 Duplainville Road	Saratoga Springs	12866-9050	Saratoga	4,000	989
345	Quandt's Food Service Distributors	105 Quist Road	Amsterdam	12010	Montgomery	180	128
346	Quebecor World Buffalo, Inc.	2475 George Urban Blvd.	Depew	14043	Erie	650	675
347	Queensboro Farm Products, Inc.	4 Rasbach Street	Canastota	13032	Madison	500	80
348	R & J Metal Finishing, Inc.	273 Gould Avenue	Depew	14043	Erie	100	15
349	Racemark International, Inc.	One Racemark Way	Malta	12020	Saratoga	150	73
350	Revere Copper Products	One Revere Park	Rome	13440-5561	Oneida	2,000	374
351	Rich Plan Food Service, Inc.	P.O. Box 549 4865 Clinton St.	Clark Mills	13321	Oneida	25	3
352	Richardson Brands Company	101 Erie Blvd.	Canajoharie	13317	Montgomery	600	114
353	Robison & Smith, Inc.	335 North Main Street	Gloversville	12078	Fulton	384	121
354	Rome Specialty Company, Inc.	501 West Embargo St.	Rome	13442	Oneida	135	13
355	RSA Solutions Inc.	6400 Main St.	Amherst	14221	Erie	45	200
356	Ruby Freeman, Inc.	5600 First Avenue-10	Brooklyn	11220	Kings	20	2
357	Ryerson, Inc	3915 Walden Avenue	Lancaster	14086	Erie	500	156
358	S. R. Guggenheim Museum	1071 Fifth Avenue	New York	10128	New York	475	298
359	SABIC Innovative Plastics	1 Noryl Avenue	Selkirk	12158	Albany	5,000	514
360	Sabin Metal Corporation	1647 Wheatland Center Road	Scottsville	14546	Monroe	825	131
361	Sag Harbor Industries	1668 Sag Harbor Turnpike	Sag Harbor	11963	Suffolk	50	40

362	Saint-Gobain	14 McCaffery Street	Hoosick Falls	12090	Rensselaer	225	154
363	Samaritan Medical Center	830 Washington Street	Watertown	13601	Jefferson	600	1,247
364	San-Mar Laboratories Inc.	4 Warehouse Lane	Elmsford	10523	Westchester	250	198
365	Schenectady International, Inc.	P.O. Box 1046	Schenectady	12301	Schenectady	1,500	317
366	Schilling Forge, Inc.	606 Factory Avenue	Syracuse		Onondaga	225	27
367	Schneider Packing Equipment	5370 Guy Young Road	Brewerton	13029	Onondaga	200	146
368	School House Companies	204 County Highway 157	Gloversville	12078	Fulton	200	75
369	Schweizer Aircraft Corp.	1250 Schweizer Road	Horseheads	14845	Chemung	700	1,089
370	Sealing Devices, Inc.	4400 Walden Avenue	Lancaster	14086	Erie	150	159
371	Seneca Foods Corporation	5705 Route 36	Leicester	14481	Livingston	720	112
372	Seneca Foods Corporation	100 Gambee Road	Geneva	14456	Ontario	1,000	290
373	Seneca Foods Corporation	3732 South Main Street	Marion	14481	Wayne	1,100	132
374	Sentry Metal Blast, Inc. (dba Sentry Metal Services)	401 47th Street	Niagara Falls	14072	Niagara	150	25
375	SEPP Management	53 Front Street	Binghamton	13905	Broome	80	19
376	Silver Lake Cookie Co.	141 Freeman Avenue	Islip	11751	Suffolk	400	196
377	Sleepy's (Warehouse)	1000 South Oyster Bay Road	Hicksville	11810	Nassau	300	518
378	Snyder Industries, Inc.	4 Sweeney Street	N. Tonawanda	14120	Niagara	350	104
379	Sorrento Lactalis, Inc.	2375 South Park Avenue	Buffalo	14220	Erie	1,500	461
380	Soucy USA	100 Walnut Street	Champlain	12919	Clinton	400	107
381	Specialized Packaging Radisson, Inc	8800 Sixty Rd.-1	Baldwinsville	13027	Onondaga	180	198
382	Spray Nine Corporation	P.O. Box 290 251 North Comrie Ave	Johnstown	12095	Fulton	300	71
383	St. Joseph's Hospital Health Center	301 Prospect Avenue	Syracuse	13203	Onondaga	1,000	3,158
384	St. Lawrence University	110 Vilas Hall, St. Lawrence University	Canton	13617	St. Lawrence	800	831
385	Standard Manufacturing Co., Inc.	750 Second Avenue	Troy	12182	Rensselaer	15	50

386	Standard Microsystems Corp.	80 Arkay Drive	Hauppauge	11788	Suffolk	1,050	440
387	Staroba Plastic & Metal Products of NY Inc.	42 Edgewod Drive	Holland	14080	Erie	700	76
388	Stature Electric	22543 Fisher Road	Watertown	13601	Jefferson	150	69
389	Stone Construction Equipment Inc.	32 East Main Street	Honeoye	14471	Ontario	300	96
390	Streamline Plastics Co., Inc.	2590 Park Ave	Bronx	10451	Bronx	140	65
391	Suit-Kote Corp.	P.O. Box 5160 1911 Lorings Crossing Road	Cortland	13045	Cortland	1,400	441
392	Symphony Space, Inc.	2537 Broadway	New York	10025	New York	65	54
393	Syracuse Casting Sales Corp.	PO Box 1821	Cicero	13039	Onondaga	300	85
394	Syracuse Heat Treating Corp	7055 Interstate Island Rd.	Syracuse	13209	Onondaga	200	18
395	Syracuse Label Co., Inc.	110 Luther Avenue	Liverpool	13088	Onondaga	200	85
396	Syracuse Plastics, Inc.	7400 Morgan Road	Liverpool	13066	Onondaga	400	43
397	Syracuse University	621 Sky Top Road, Suite 130	Syracuse	13244	Onondaga	2,000	4,648
398	TanaSeybert, LLC	420 W. 25th Street	New York	10001	New York	400	220
399	Taylor Made Products	65 Harrison Street	Gloversville	12078	Fulton	250	164
400	Taylor Metalworks	3925 California Ave	Orchard Park	14127	Erie	400	105
401	The 122 Community Center	150 First Ave	New York	10009	New York	10	31
402	The Beeches of Rome, Inc.	Route 26 North	Rome	13440	Oneida	300	69
403	The Brooklyn Historical Society	128 Pierrepont ST	Brooklyn	11201	Kings	30	17
404	The Educational Alliance	197 East Broadway	New York	10002	New York	230	395
405	The Harlem School of the Arts, Inc.	645 St. Nicholas Avenue	New York	10030	New York	50	115
406	The Jewish Museum	1109 Fifth Avenue	New York	10128	New York	200	146
407	The Joyce Theater Foundation, Inc.	175 Eighth Avenue	New York	10011	New York	150	52
408	The Lawrence Ripak Company, Inc.	165 Field St.	West Babylon	11704	Suffolk	400	131
409	The Moving Image, Inc. - dba Film Forum	209 West Houston Street	New York	10014	New York	35	45

410	The Museum of Modern Art	11 West 53rd Street	New York	10019	New York	1,000	796
411	The Museum of Television & Radio	25 West 52nd Street	New York	10019	New York	200	88
412	The Writers Room	10 Astor Place 6th Floor	New York	10003	New York	15	4
413	Theater for the New City, Inc.	155 First Avenue	New York	10003	New York	30	98
414	Therm Inc.	Hudson Street Extension	Ithaca	14851	Tompkins	900	134
415	Thermold Corp	7059 Harp Road Box 219	Canastota	13032	Madison	130	23
416	Thirteen WNET (Educational Broadcasting Corp	450 West 33rd Street	New York	10001	New York	750	458
417	TMP Technologies, Inc.	1200 Northland Ave.	Buffalo	14215	Erie	150	32
418	TMP Technologies, Inc.	6110 Lamb Road	Wyoming	14591	Wyoming	268	35
419	Tompkins Metal Finishing, Inc.	6 Apollo Drive	Batavia	14020	Genesee	350	76
420	Town Hall Foundation	123 West 43rd Street	New York	10036	New York	70	24
421	Trans World Entertainment	38 Corporate Circle	Albany	12203	Albany	400	491
422	Turbine Engine Components Technologies	2 Halsey Road	Whitesboro	13492	Oneida	1,200	234
423	UJA Federation of New York	130 East 59th St	New York	10022	New York	550	458
424	Ultimate Precision Metal	200 Fin Court	Farmingdale	11735	Suffolk	250	89
425	Ultralife Batteries, Inc.	2000 Technology Parkway	Newark	14513	Wayne	1,440	604
426	UltrePet, LLC	136C Fuller Road	Albany	12205	Albany	600	60
427	Upstate Niagara Cooperative, Inc	25 Anderson Rd	Buffalo	14225	Erie	600	193
428	Vail Ballou Press, Inc.	P.O. Box 1005	Binghamton	13902	Broome	1,800	321
429	Ventre Packaging Co., Inc.	6050 Court Street Road	Syracuse	13206	Onondaga	74	41
430	Verizon	240 E. 38th St., 23rd flr	New York	10016	New York	5,000	2,061
431	Vicks Lithograph & Printing	P.O. Box 270 5166 Commercial Drive	Yorkville	13495	Oneida	750	100
432	W. W. Custom Clad, Inc.	337 East Main Street	Canajoharie	13317	Montgomery	250	44
433	Ward Lumber Co., Inc.	Glen Road	Jay	12941	Essex	140	73
434	Washington Mills Tonawanda, Inc	1000 E. Niagara Street	Tonawanda	14150	Erie	375	49

435	Watson Bowman Acme Corp.	95 Pineview Drive	Amherst	14228	Erie	150	107
436	Welch Allyn Data Collection Inc.	4341 State Street Road	Skaneateles Falls	13153-0220	Onondaga	2,000	1,221
437	Westchester Chapter NYS ARC, Inc.	121 Westmoreland Avenue	White Plains	10606	Westchester	375	597
438	Whitney Museum of American Art	945 Madison Avenue	New York	10021	New York	400	187
439	Women's Housing and Economic Dev Corp	50 East 168th ST	Bronx	10452	Bronx	200	87
440	World Warehouse & Distribution	5 Coton Lane	Champlain	12919	Clinton	150	85
441	XLI Corporation	55 Vanguard Parkway	Rochester	14606	Monroe	175	70
442	Yeshiva University	500 West 185th Street	New York	10033	New York	3,000	4,218
443	Zeluck, Inc.	5300 Kings Highway	Brooklyn	11234	Kings	200	113
	Totals					**294,431**	**239,435**