



NYSERDA COMMERCIAL/INDUSTRIAL NATURAL GAS MARKET CHARACTERIZATION

Prepared for:

New York State Energy Research and Development
Authority



Navigant Consulting, Inc.
1375 Walnut Street
Suite 200
Boulder, CO 80302

303.728.2500
www.navigant.com

October 3, 2012



Table of Contents

ES	Executive Summary	6
ES.1	Introduction and Background.....	6
ES.2	Data Sources and Methods.....	6
ES.3	Macro Drivers of The New York Natural Gas Energy Efficiency Technology Market.....	6
ES.4	Natural Gas Service Supply Chain Analysis.....	8
ES.5	Utility Natural Gas Efficiency Program Analysis	9
ES.6	Suggestions for Consideration.....	11
1	Introduction and Background.....	14
1.1	Evaluation Objectives and Challenges.....	14
1.2	Report Format	15
2	Methods and Data Source.....	16
3	Macro Drivers in the New York Natural Gas Efficiency Technology Market	18
3.1	Methodology	18
3.2	Natural Gas Buying Behavior in New York.....	18
3.2.1	Natural Gas Buying Trend and Consumption by Sector	18
3.2.2	New York C&I Natural Gas Use by End-use and Industry	24
3.2.3	Natural Gas Energy Efficiency Potential in the C&I Sector	28
3.3	New York Natural Gas Efficiency Standards and Codes.....	29
3.3.1	Energy Efficiency Portfolio Standards (EEPS)	30
3.3.2	Energy Conservation Construction Code of New York State 2010 (ECCNYS).....	32
3.3.3	Regional Greenhouse Gas Initiative (RGGI)	34
3.4	Natural Gas Efficiency Technology Trends.....	35
3.4.1	Natural Gas Efficiency Technology Trends in the Chemical Industry.....	35
3.4.2	Natural Gas Efficiency Technology Trends in the Primary Metal Industry	37
3.4.3	Cross-cutting Natural Gas Efficiency Technology Trends in the Commercial Sector.....	38
3.4.4	Cross-cutting Natural Gas Efficiency Technology Trends in the Industrial Sector.....	39
4	The Natural Gas Service Supply Chain Analysis.....	40
4.1	Definitions.....	40
4.2	Methodology	42
4.3	Preliminary Findings	43
4.3.1	ESCOs.....	43
4.3.2	Natural Gas Equipment Paths to Market	45
4.3.3	Natural Gas System Installer Interview Findings	50
5	Utility Natural Gas Efficiency Program Analysis	57



5.1 Approach and Methodology	58
5.2 Secondary Research: Summary of Findings.....	58
5.3 Commission Approved Gas Program Costs and Savings Targets.....	61
5.4 Scorecard Results Reported as of November 2011	63
5.5 Utility Information.....	63
5.6 Primary Research: Summary of Findings.....	63
6 Suggestions for Consideration	64

List of Figures

Figure 1. New York Natural Gas Consumption by Sector (1997-2009).....	19
Figure 2. Monthly Commercial Natural Gas Consumption in New York.....	19
Figure 3. New York Winter Temperature Trend 1997-2011	20
Figure 4. New York Summer Temperature Trend 1997-2010.....	20
Figure 5. Natural Gas Consumption in New York by Sector in 2010.....	21
Figure 6. Value of Shipments per Establishment for Manufacturing in the U.S., 2007.....	22
Figure 7. Natural Gas Use Forecast of the Mid-Atlantic Region 2010-2035.....	22
Figure 8. Map of Upstate and Downstate New York	23
Figure 9. A Map of Value of Shipments per Establishment for Manufacturing in New York, 2007.....	24
Figure 10. Natural Gas Use by End-use Comparing the New York and National Commercial Sectors in 2007.....	24
Figure 11. Number of Cooling Degree Days Nationally and in New York, 2000-2010.....	25
Figure 12. Number of Heating Degree Days Nationally and in New York, 2000-2010	26
Figure 13. Natural Gas Use in New York Commercial Buildings in 2007.....	26
Figure 14. Distribution of New York Industrial Gas Annual Consumption in 2007.....	27
Figure 15. Monthly Natural Gas Use in the New York Industrial Sector 2005-2010.....	28
Figure 16. Economic Potential Natural Gas Savings in the Commercial Sector by 2016, Total= 123,339 Thousand Dekatherms (Mdth)	28
Figure 17. Economic Potential Natural Gas Savings from Industrial Sector by 2016, Total= 39,000 Thousand Dekatherms (Mdth)	29
Figure 18. Distribution of Target Savings by Program Administrator; Total= 817 Mdth.....	31
Figure 19. Comparison of Dekatherm Target to Acquired Plus Committed Savings through Dec. 2011 in the C&I Sector	Error! Bookmark not defined.
Figure 20. General Chemical Processing Flow Diagram.....	36
Figure 21. Major Steps in a Typical ESPC Project	41
Figure 22. Small to Medium Size Companies Operating in New York	44

Figure 23. Medium to Large Size Companies Operating in New York	44
Figure 24. Total Sales Volume of Companies Operating in New York.....	45
Figure 25. Natural Gas Equipment Paths to Market Flowchart.....	47
Figure 26. Commercial Natural Gas Consumption by End Use (2007)	49
Figure 27. Industrial Natural Gas Consumption by End Use (2007).....	49
Figure 28. Map of Utilities in the State of New York.....	57

List of Tables

Table 1. Summary of Target Acquired and Committed and Budget for EEPS Gas C&I Programs for Program Year 2011	31
Table 2. New York Energy End Use and Percentage Savings after Adoption of the ECCCNYIS	34
Table 3. The U.S. Chemical Industry Profile.....	35
Table 4. Potential Natural Gas Savings of the U.S. Chemical Industry by 2020	36
Table 5. Primary Metal Sector Profile.....	37
Table 6: Prescriptive Rebates Offered by Utility	60
Table 7. Ratepayer Cost: NYSERDA vs. Utilities.....	61
Table 8. Programs as Reported in Scorecards	62

ES.1 Introduction and Background

In June 2008, the New York State Public Service Commission (PSC) established the State’s Energy Efficiency Portfolio Standard (EEPS) and approved a subset of efficiency programs to commence immediately. A subsequent series of PSC Orders issued during the latter half of 2009 authorized NYSERDA to further expand and add to its efficiency program offerings. In addition to the electric System Benefits Charge (SBC), the PSC commenced collection of a natural gas SBC in order to allow NYSERDA and other program administrators to broaden or begin offering programs for gas efficiency measures.

To date, NYSERDA has had good success engaging the C&I market with its natural gas efficiency program offerings. Participation levels vary across program type, market sector, and geography and some NYSERDA staff perceive that customers may currently be more attracted to utility natural gas efficiency program offerings than NYSERDA offerings. In addition, NYSERDA staff indicates that they have limited knowledge regarding the key players in the C&I natural gas market including the large customers who may be eligible to participate in the NYSERDA programs. Thus, NYSERDA requested that the Market Characterization and Assessment (MCA) evaluation team conduct a C&I natural gas market characterization to generate information regarding these topics as well as broader market conditions to help inform the development of its natural gas efficiency program offerings for non-residential customers.

ES.2 Data Sources and Methods

In addition to comprehensive literature and program reviews specific to the New York C&I natural gas efficiency market, Navigant conducted in-depth interviews with NYSERDA staff, utility staff, representatives from Energy Service Companies (ESCOs) providing natural gas efficiency services to C&I customers in New York, and natural gas equipment installers.

ES.3 Macro Drivers of The New York Natural Gas Energy Efficiency Technology Market

Navigant conducted an analysis of the macro drivers of the natural gas efficiency technology market in New York to support NYSERDA in its efforts to increase the effectiveness of its C&I programs. Key findings from this analysis are articulated below.

- Natural gas prices are the primary factor in determining the financial attractiveness of adopting energy efficient technologies.
 - Low natural gas prices have lengthened the payback period for energy efficient technologies, which has, in turn, limited demand for the technologies.

- Natural gas consumption is another key driver that influences the adoption of efficient technologies.
 - Economic growth is one driver of consumption. The 2008 economic downturn reduced natural gas consumption in the C&I sector in New York. Reduced consumption leads to

reduced energy costs. These lower energy costs decrease the attractiveness of efficient technologies.

- Weather is another factor influencing natural gas consumption. Winter temperatures in New York are expected to decrease in the future, causing an increase in natural gas consumption.
 - Overall, natural gas consumption in the C&I sector is projected to grow slowly over the next 25 years; 1% per year in the commercial sector and 2% per year in the industrial sector. Such a slow rate of growth is unlikely to drive major adoption of energy efficient gas equipment on its own.
- With low natural gas prices and fairly flat consumption levels, market adoption of efficient technologies is limited without market interventions. Consequently, New York has implemented codes, standards, and policies to encourage adoption.
- The EEPS provided \$130 million in annual natural gas efficiency program funding from 2009-2011, of which 40.6% was reserved for C&I programs.
 - The recently enacted building code, Energy Conservation Construction Code of New York State 2010 (ECCCNYS), aims to reduce natural gas intensity by 12% from baseline (IECC 2003) in nonresidential buildings, helping to drive the adoption of natural gas energy efficiency technologies.
 - The Regional Greenhouse Gas Initiative (RGGI) is a market-based program to reduce greenhouse gas emissions in the U.S. The Mid-Atlantic States have capped the carbon dioxide (CO₂) emissions from the power sector by 10 percent by 2018 (2006 baseline). As of December 31, 2010, New York has received as much as \$282 million from CO₂ allowances auctions. Since then, RGGI has saved 3,926 MMBtu of natural gas annually.
 - Comparing the amount of savings from 1) the EEPS program target and 2) codes and standards to the total economic potential yields insights to the magnitude of effects due to the two market drivers. The total natural gas economic efficiency potential in the C&I sector in 2016 is 162 Bcf. Natural gas savings from the EEPS program is targeted to be 30.26 Bcf while savings from codes and standards is projected to be 19.28 Bcf in 2016. Savings from EEPS and ECCCNYS represent 31% of the total economic potential in the New York C&I Sector. The economic potential does not factor in program eligibility which will decrease the amount of economic potential available to program administrators.
- The New York commercial and industrial sectors represent 25% and 6% of the total natural gas consumption in New York, respectively. As such, these sectors represent a significant target for NYSERDA's energy efficiency efforts.
- In the commercial sector, space heating is the largest end-use of natural gas, accounting for 54% of total consumption. Moreover, space heating has the greatest economic natural gas efficiency potential.
 - As offices and retail are the largest consumers of natural gas in the commercial sector, they represent a major opportunity for efficiency programs.

- Industries such as chemicals and metals are very energy intensive and are the largest industrial users of natural gas in New York. These industries may represent an attractive target for NYSERDA’s energy efficiency improvements.
- Technology trends
 - Boiler tune-ups and steam trap maintenance comprise approximately 57% of New York’s natural gas economic efficiency potential. Super boiler technology is rated as one of the most promising emerging technologies by the Department of Energy Industrial Technology Program (ITP). Eighty percent of the boilers in the market are forecasted to be updated with efficient technology by 2025.

ES.4 Natural Gas Service Supply Chain Analysis

To help NYSERDA increase its effectiveness in targeting potential participants in its C&I gas efficiency programs, Navigant analyzed the various paths to market for gas efficiency systems, the key influencers in specifying system and incentive options, and industry attitudes towards NYSERDA’s gas efficiency program offerings vis-à-vis those of utilities.

- System Paths to Market
 - While larger companies amongst the C&I energy end-users might have in-house staff specializing in comprehensive energy efficiency retrofits, smaller C&I energy end-users tend to lack core competencies in designing and installing comprehensive energy efficiency retrofits. Choosing appropriate equipment and modifying complex building systems (e.g., electrical or HVAC) requires specialized knowledge and skill sets that most end-users do not possess among their in-house staff.
 - There are several primary paths to market for natural gas systems, which may include but are not limited to: manufacturers’ national accounts, wholesalers, mechanical contractors, and general contractors.¹
- System and Incentive Specification
 - In interviews with equipment installers, it was found that contractors themselves will specify the natural gas equipment to be installed, including the efficiency level, in most instances (87% of the time on average). The professional(s) in charge of system design will typically have the most influence on equipment purchasing decisions.
 - 83% of the installers surveyed recommend high efficiency system options to their customers 90% of the time or greater.
 - 78% of installers indicated that they research and recommend gas efficiency incentives such as incentives for the installed system very frequently whereas the remaining 22% of respondents only looked into gas efficiency incentives on a quarterly basis or more.
 - Smaller firms may lack the resources to stay updated on the most current incentives available whereas larger firms are better versed to provide customers with the most recent information.

¹ U.S. Department of Energy.

- Attitudes Toward NYSERDA Offerings
 - 83% of system installation firms surveyed were aware of NYSERDA’s offerings. For the firms that were aware of NYSERDA’s offerings, 67% added that they were confused about the different programs under which NYSERDA provides funding for gas efficiency projects.
 - Larger C&I sector respondents indicated that they prefer NYSERDA due to incentive package comprehensiveness for larger projects or projects spanning multiple years.
 - For mid-to-small sized equipment installation firms, easy filing process is the most important factor driving incentive recommendations between NYSERDA and other funding sources (e.g., utilities). Larger firms tend to gravitate towards programs with calendar year stability and informational outreach. Other factors driving incentive source decisions are as follows:
 - *Ability of the program representative to answer questions:* The ability of the program representative to answer questions is complementary to simplifying the incentive filing process. Many of the ambiguities associated with the incentive filing process may be substantially reduced through the ability of program representatives to concretely answer questions regarding the programs and the incentives offered therein. This is especially important for performance-based incentive offerings which are often subject to a non-trivial (e.g., 40%) withholding of the total incentive amount until after NYSERDA receives and approves the final project measurement and verification (M&V) report.
 - *Value of the incentive:* Incentives drive customer decisions. Conversely, respondents also believed that the value of the incentive should be just enough to sway the decision of the customer towards purchasing high efficiency equipment and address free-ridership concerns.
 - *Stability of the incentive:* Larger projects may span multiple calendar years. As such, many firms look for incentives that still qualify the installed equipment years from initial project design.
 - *Any long term obligation for measurement and verification:* While M&V is a vital process to quantify the value and capture the progress of energy efficiency programs, customers and equipment installers are not keen on multi-year performance verification or ongoing reporting requirements. Respondents indicated that both installation firms and customers oftentimes prefer the energy M&V process to be short and unobtrusive.

ES.5 Utility Natural Gas Efficiency Program Analysis

As natural gas consumers in the C&I sector can often choose incentives from either NYSERDA or their local utility, it is important to understand the competitiveness of NYSERDA’s program offerings. To this end, Navigant compared NYSERDA’s custom and prescriptive natural gas efficiency offerings with those of the major utilities in New York.

- Custom Incentive Programs

- NYSERDA has been successful in engaging large industrial customers in its performance-based Industrial and Process Efficiency (IPE) program, as verified through installer interviews. Smaller projects may favor utility programs due to perceived ease of participation and lower level of effort required.
 - All large utilities, except for Central Hudson, offer custom incentive programs to their C&I natural gas customers. All utility custom incentive programs require either preapproval or prescreening. Utilities reserve the right to perform equipment inspections as necessary.
 - ConEdison’s and National Grid’s custom programs are performance-based. NYSEG does not provide incentive information for its custom program, but instead refers the customer to an Energy Solutions Representative.
- Prescriptive Incentive Amounts: NYSERDA vs. Utilities
- Utility incentive offerings for C&I prescriptive natural gas efficiency measures are generally, but not always, higher than NYSERDA incentives.
 - National Grid’s offerings are the highest, ranging from \$200 to \$7,500 more than NYSERDA’s.
 - Con Edison’s offerings are similar to those offered by NYSERDA. Starting on June 1st, 2011, Con Edison increased incentive levels for water boilers across efficiency tiers and all size ranges. This resulted in available incentives that are \$400 to \$11,500 more than NYSERDA’s.
 - National Fuel’s prescriptive and custom incentive programs are administered in partnership with NYSERDA so their offerings do not differ.
- Ratepayer Cost: NYSERDA vs. Utilities
- Navigant compared the ratepayer cost of each utility program to NYSERDA’s (see Table 7). Program cost per unit of natural gas saved by all program administrators (PAs) ranges from \$12.27 to \$125.86. NYSERDA’s program cost per unit of natural gas saved is the lowest among all PAs.
- Measurement and Verification: NYSERDA vs. Utilities
- NYSERDA requires measurement and verification for its performance based programs, but only performs M&V on the largest projects. Utilities do not require but rather reserve the right to conduct pre and/or post inspections. Requiring inspections—even if they are not performed—could deter customer participation. Utilities that do not generally require inspections may see more participation.
- Existing Facilities vs. New Construction
- Most of the publicly available data on utility gas efficiency programs focuses on programs targeting existing facilities. Neither NYSEG nor ConEdison allow newly constructed facilities to participate in their C&I gas efficiency programs. National Grid offers a separate program for new construction, information for which was unavailable. Central Hudson does not mention new construction in their prescriptive program.

In addition to reviewing utility gas efficiency program offerings, Navigant also interviewed staff at the three utilities who responded to the interview request.

- Utility View of C&I Natural Gas Efficiency Market
 - Utility staff noted that while they have had considerable success on the electric side of energy efficiency programs, there have been difficulties on the gas side. Given that the low price of natural gas has reduced the attractiveness of the business case for gas equipment improvements, the sense of urgency on the part of C&I customers is diminished. The capital investment required for many improvements, such as the replacement of large boilers, is very high. In many of these cases, incentives are not of a sufficient amount to compel C&I customers to change out equipment. Rather than investing in large equipment like boilers, some customers are investing in controls where, in some cases, substantial savings are to be had.
- Utility C&I Natural Gas Efficiency Programs
 - The utilities interviewed cited that the majority of their C&I incentives go toward boilers and furnaces for space and hot water heating.
 - No other trends were consistent across the surveyed utilities.
- Utility Programs vs. NYSERDA Programs
 - Utility staff acknowledged in Navigant interviews that customers can become confused when exploring gas efficiency incentives as both NYSERDA and utilities offer these incentives. More sophisticated customers will “shop around” by bidding projects to both NYSERDA and their local utility. This can create inefficiencies for both NYSERDA and the utilities. Customers without the appropriate in-house staff may be upset at having to do their own “homework” to determine which incentive option presents the best value proposition for them.
 - Given the overlap in programs, one utility proposed that the utilities and NYSERDA should consider differentiating their programs.

ES.6 Suggestions for Consideration

NYSERDA’s success in the large C&I segment is well recognized by its customers. Results from installer interviews reveal that large C&I customers are very satisfied with NYSERDA’s performance-based offerings. The findings of this study suggest that NYSERDA should continue and expand its current efforts in the large C&I customer segment.

Customers drawn to pre-qualified incentives tend to have less capacity to devote time and effort towards the incentive application and EM&V processes; these customers gravitate towards utility prescriptive offerings due to a perceived lower time commitment. If NYSERDA chooses to further engage customers favoring pre-qualified incentives, it may wish to consider the incentive selection factors identified in this study to help develop strategies which increase the visibility and attractiveness of NYSERDA’s offering to this customer segment.

Navigant has summarized suggestions for consideration categorized for marketing programs, processes, and future research topics:

Marketing suggestions

- **Continue and increase contractor outreach:** NYSERDA hosts brown bag sessions to educate contractors on the incentive application process. NYSERDA's brown bag sessions and on-site visits have been well received and are considered very beneficial and engaging by equipment installation firms of all sizes.
- **Provide tangible marketing materials:** NYSERDA should provide tangible marketing materials (e.g. program brochures) to explain NYSERDA's programs to customers. This approach is effective for reaching small to mid-size customers.
- **Direct marketing to energy intensive industries:** Chemical and metals industries are energy-intensive and are the largest industrial users of natural gas in New York. These industries might be an attractive market for NYSERDA and NYSERDA should use the IPE and other direct outreach channels to increase engagement from customers in this sector. This is an effective marketing approach to reach large industrial customers which are the target market for the Industrial and Process Efficiency (IPE) program.

Program process suggestions:

- **Increase understanding of factors driving customers' choice of programs:** Installers indicate that time commitment and incentive amounts are the main drivers for choosing an energy efficiency program. Most utilities have shorter pre-qualified incentive processes because they have centralized billing systems in place which directly reference customer account information during the application process. While it is the SBC determination that causes longer processing time for NYSERDA incentives, in general, customers are more drawn to programs requiring less paperwork and time commitment. However, time commitment from customers and program administrators is necessary for evaluation, measurement, and verification (EM&V) which is essential to long-term savings and quality control.
- **Continue with performance-based incentives and explore options to modify pre-qualified incentives to further engage small to mid-size customers:** NYSERDA currently offers both performance-based and pre-qualified incentives. NYSERDA's performance-based incentive has been successful among large C&I customers. Small to mid-size customers choosing pre-qualified incentives tend to have less capacity to devote time and effort towards the incentive application and EM&V processes. As such, some small to mid-size customers may gravitate towards choosing utility offerings due to a perceived lower time commitment. To further engage small to mid-size customers, NYSERDA could explore alternative pre-qualified incentive structures such as offering bonus incentives to pre-qualified customers after performance verification resulting from the M&V process. The eligibility of a bonus may motivate customers to participate in the M&V process and make customers more receptive to a longer participation process.

Future research topics:

This study was conceived as a high-level effort to provide NYSERDA with additional information regarding the market for natural gas incentive offerings in the C&I sector. Should NYSERDA perceive a

need for more targeted information in this market, Navigant has identified the following items that may be of interest to NYSERDA evaluation planners and program staff.

- **End-user interviews:** The interviews conducted for this study focused on equipment installers. End-users were not interviewed. Future research focusing on end-users' experiences with NYSERDA programs could be conducted to enrich the study with more perspectives.
- **Program eligibility research:** Research large customer base to determine the percentage of customers that has interruptible gas service and is therefore ineligible to participate in NYSERDA programs. Having information on customer program eligibility could help NYSERDA efficiently target potential customers.
- **Ratepayer cost research:** It is critical for PAs to keep ratepayer cost as low as possible while delivering valuable program offerings. Much value can be derived by monitoring and comparing the cost of energy saved by each program administrator to pinpoint and improve the efficiency of using ratepayer contributions.
- **Impact of codes and standards on natural gas efficiency savings potential:** As described in this study, the ECCCNYC was only recently adopted. As such, the impact of codes and standards on savings potential has not been well studied. Understanding the impact of codes and standards is critical as it could have implications on program administrators' opportunities to achieve goals and targets.
- **Additional utility interviews:** Only a few utility contacts were available for comment in this study. Further study focusing on the perspective of utilities regarding their collaboration with NYSERDA would be valuable.
- **Online program comparison tool:** Survey respondents of all sizes indicated that a large source of confusion regarding programs stems from the lack of a centralized database or webpage for efficiency program research. This requires contractors and, to a lesser extent, customers to spend time and effort comparing existing program offerings and associated requirements across multiple sources. The DPS should consider conducting additional research to determine market interest in and the likely viability of an online program features and services comparison tool to help contractors and customers reduce time spent on program research. The suggested web tool is similar to the New Jersey Clean Energy Program website where information from various programs can be easily accessed on the same platform.² An additional example is the online energy efficiency program identification tool developed by unwaste.org.

² www.njcleanenergy.com/main/rebates-and-promotions.

1 Introduction and Background

The **New York Energy \$martSM** Program administered by NYSERDA was initiated in 1998 by order of the New York State Public Service Commission (PSC) and embodies three funding cycles. The Program portfolio consists of numerous initiatives promoting energy efficiency and demand management, facilitating renewable energy development, providing energy services to low-income New Yorkers, and conducting research and development. The activities pursued by the Program include disseminating information to increase consumer energy awareness, marketing, providing financial incentives, developing and testing new products, commercializing new technologies, and gathering data and information.

In June 2008, the PSC established the State’s Energy Efficiency Portfolio Standard (EEPS) and approved a subset of “Fast Track” efficiency programs to commence immediately. A subsequent series of PSC Orders issued during the latter half of 2009 authorized NYSERDA to further expand and add to its programs. In addition to the electric System Benefits Charge (SBC), the PSC commenced collection of a natural gas SBC in order to allow NYSERDA and other program administrators to broaden or begin offering programs for gas efficiency measures. In total, the additional program approvals constitute approximately \$689.4 million in funding through 2011, including nearly \$27 million in commercial & industrial (C&I) natural gas efficiency funding.

To date, NYSERDA has had good success engaging the C&I market with its natural gas efficiency program offerings. Participation levels vary across program type, market sector, and geography, and some NYSERDA staff perceive that customers may currently be more attracted to utility natural gas efficiency program offerings than NYSERDA offerings. In addition, NYSERDA staff indicate that they have limited knowledge regarding the key players in the C&I natural gas market including the large customers who may be eligible to participate in the NYSERDA programs. Thus, NYSERDA requested that the Market Characterization and Assessment (MCA) evaluation team conduct a C&I natural gas market characterization to generate information regarding these topics as well as broader market conditions to help inform the development of its natural gas efficiency program offerings for non-residential customers.

1.1 *Evaluation Objectives and Challenges*

Evaluation Challenges

While this report presents a comprehensive view on the overall natural gas efficiency market in New York through market, supply chain, and utility perspectives, Navigant recognizes the following study limitations:

- The results of this study are based on internal expertise, desk research, and interviews with equipment installers and utilities. The perspectives offered by equipment installers and utilities during the interviews were objectively summarized. Claims made by respondents should be taken as informative and not literal until further verification.
- This study focuses on the upstream of the natural gas energy efficiency supply chain. End-users were not interviewed. Interviewing end-users could enrich the study with more perspectives; however, it is out of the scope of this study.

- While we captured the current state of Utility programs at the start of the project, programs may have changed since then. In addition, other programs were already in transition- such as ConEdison's increase in incentives in June 2011.
- Scorecard obtained from DPS at the time of this study only ran through December of 2011. With the delay in filing of scorecards, Navigant was not able to obtain full year results. Additionally, some scorecards were not completely filled out by the Utility.

1.2 Report Format

This report begins by describing and characterizing the New York natural gas efficiency market by analyzing key macro drivers in New York. After a discussion of the overall natural gas efficiency trend in New York, the report delves into delineating the structure of natural gas equipment installers with focus on describing the pathways in which natural gas energy efficiency technology enters the New York market. Through interviews with installers, Navigant identifies the barriers to participate in NYSERDA's program while evaluating program awareness and users' perception of NYSERDA's programs. Complementing the analysis on NYSERDA's program is the evaluation and comparison of NYSERDA's program to C&I natural gas efficiency programs offered by utilities.

2 Methods and Data Source

Methods

The MCA team conducted secondary research, identifying and analyzing existing information that can contribute to a greater understanding of the natural gas energy efficiency services delivery market. In addition to comprehensive literature and program reviews specific to the C&I natural gas efficiency market in New York, Navigant conducted in-depth interviews with NYSERDA staff, utility staff running natural gas efficiency programs, representatives from Energy Service Companies (ESCOs) providing natural gas efficiency services to C&I customers in New York, and natural gas equipment installers. The timeframe available to complete this study precluded broader data collection efforts with end-use customers of natural gas equipment at customer sites. Thus, NYSERDA and the MCA team view the study as a first step exploration of the relevant market and the results can be used by NYSERDA to develop subsequent evaluation activities as needed to inform ongoing program evolution.

Data Sources

Navigant relied on publicly available sources for inputs to the market characterization analysis; secondary data sources include but are not limited to:

- » New York State Energy Research and Development Authority (NYSERDA) reports
- » Energy Information Administration (EIA) data and reports
- » U.S. Department of Energy (DOE) website and reports
- » National Oceanic and Atmospheric Administration (NOAA) data
- » U.S. Bureau of Census data
- » Utility websites
- » New York State Public Service Commission website and reports (e.g. Natural Gas Energy Efficiency Resource Development Potential in New York, 2006)

Data sources for identifying ESCOs and equipment installers operating in New York used for this research included the National Association of Energy Service Companies website (NAESCO³), the New York State Public Service Commission⁴ website, and ESCO market industry reports. To determine the appropriate SIC codes for equipment installer identification, an unbiased sample of contracting firms with company websites was taken from local utility lists of contractors who have successfully filed for rebates. The selection was indiscriminate and distributed across New York counties. The research team combined internal expertise of ESCOs with information gathered through the secondary research to procure a list of companies operating in New York with the following SIC codes.

- a. 171131 : ENERGY MANAGEMENT SYSTEMS & PRODUCTS
- b. 521136 : ENERGY CONSERVATION PRODS-SVCS-SYSTEMS
- c. 874212 : ENERGY CONSERVATION & MGMT CONSULTANTS
- d. 382204 : CONTROLS CONTROL SYSTEMS/REGULATORS-FRS
- e. 492501 : GAS COMPANIES

³ <http://www.naesco.org/>

⁴ <http://www.dps.state.ny.us/>

- f. 361303 : CONTROL PANELS (MFRS)
- g. 671904 : UTILITIES-HOLDING COMPANIES
- h. 359915 : MANUFACTURERS DISTRS & INDL PRODUCTS
- i. 356907 : AUTOMATION SYSTEMS & EQUIPMENT-MFRS
- j. 382304 : COMBUSTION CONTROLS (MFRS)
- k. 493198 : ELECTRIC & OTHER SERVICES-COMBINED
- l. 382202 : ENERGY EQUIPMENT SYSTEMS-SUPPLIES (MFRS)
- m. 873111 : ENVIRONMENTAL & ECOLOGICAL SERVICES
- n. 358598 : AIR CONDITIONING/HTG/REFRIG EQUIP (MFRS)
- o. 871150 : ENGINEERS-ENERGY MANAGEMENT
- p. 507506 : ELECTRIC HEATING EQUIP & SYSTEMS (WHLS)
- q. 171117 : AIR CONDITIONING CONTRACTORS & SYSTEMS
- r. 507417 : STEAM TRAPS (WHLS)
- s. 349498 : VALVES & PIPE FITTINGS NEC (MFRS)
- t. 171102 : HEATING CONTRACTORS
- u. 171118 : BOILERS-REPAIRING & CLEANING

The sample sizes associated with the interviews conducted for the study were not intended to meet rigorous statistical precision levels; rather, the interviews were intended to be qualitative in nature to generate information regarding current and anticipated market characteristics.

3 Macro Drivers in the New York Natural Gas Efficiency Technology Market

This section provides an overview of the New York Commercial & Industrial (C&I) natural gas efficiency market by examining macro factors contributing to the overall adoption of natural gas efficiency technology in New York. The macro drivers of the New York natural gas efficiency market are characterized by three main categories: natural gas buying behavior, codes and standards, and natural gas efficiency technology trends.

3.1 Methodology

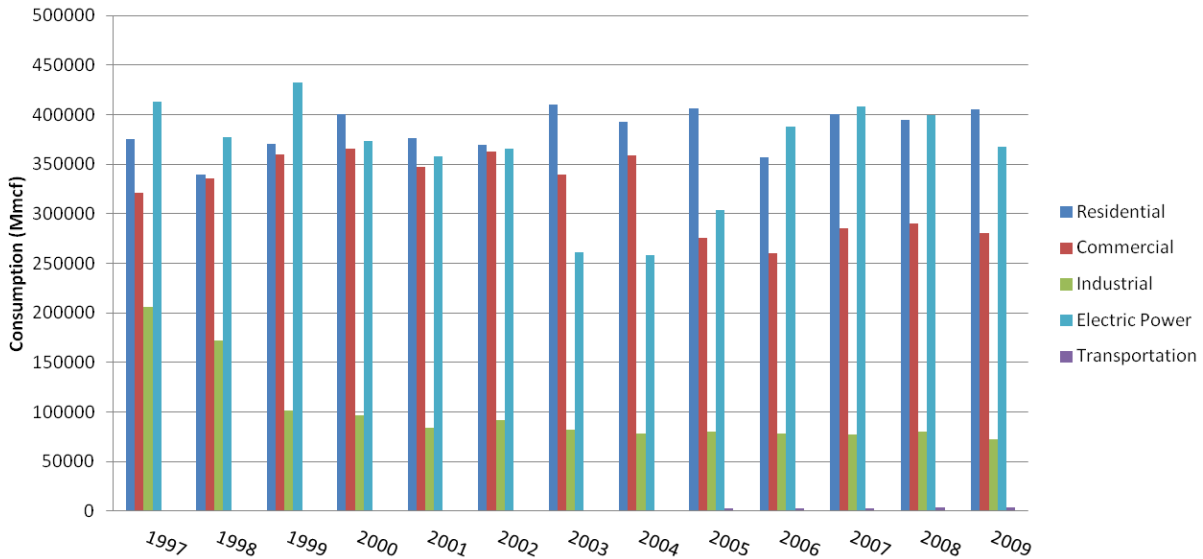
Navigant conducted research on the C&I natural gas efficiency market in New York using data and reports sourced from various agencies such as the New York State Energy Research and Development Authority (NYSERDA), Energy Information Administration (EIA), U.S. Department of Energy (DOE), National Oceanic and Atmospheric Administration (NOAA), and the U.S. Bureau of Census. The research allowed Navigant to identify influential macro drivers in the market and focus efforts on the selected drivers. The natural gas efficiency technology trend analysis was guided by the New York C&I market characteristics to ensure that the research is most relevant to New York.

3.2 Natural Gas Buying Behavior in New York

3.2.1 Natural Gas Buying Trend and Consumption by Sector

Natural gas consumption in New York can be attributed to five sectors: residential, commercial, industrial, electric power, and transportation. Historical natural gas consumption trends show that residential sector consumption remained relatively stable in the past decade while industrial natural gas consumption has declined (Figure 1). A downward trend is observed in the commercial sector natural gas consumption in the early 2000s, followed by a slight increase since 2005. The residential sector remains the biggest consumer of natural gas in New York followed by the electric power sector. Total natural gas consumption in New York amounted to 1,142 Bcf in 2009, which translated to an 8 percent total consumption decline since 2000.

Figure 1. New York Natural Gas Consumption by Sector (1997-2009)

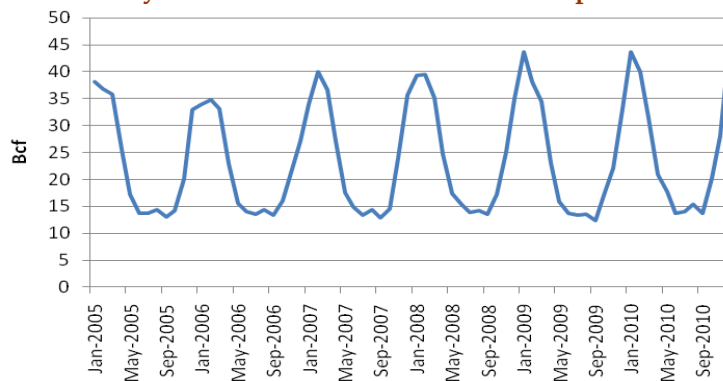


Source: U.S. Energy Information Administration, Annual Energy Outlook 2011

According to the U.S. Energy Information Administration (EIA), natural gas demand is related to many factors including economic growth, winter and summer weather, and oil prices. Strong economic growth can drive up natural gas demand as the demand is directly related to commercial and industrial sectors output. Since space heating is one of the biggest end-users of natural gas, cooler winters will drive up natural gas demand. Generally, when oil prices are high, demand for natural gas will increase as natural gas can be used as a substitute for petroleum.

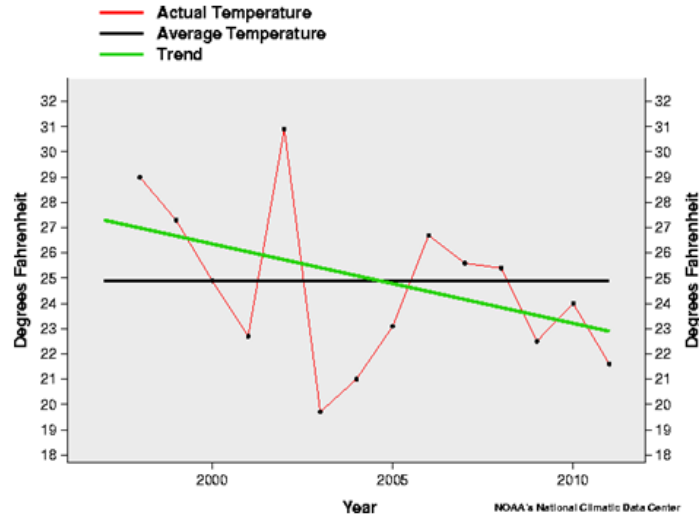
Natural gas use in New York is seasonal, peaking in the winter when natural gas demand for space heating is the highest. Intuitively, natural gas demand is lowest during the summer months (Figure 2). This natural gas consumption trend is correlated with the New York weather trend (Figure 3); the winter temperature of New York has been decreasing by an average of 3.07°F per decade, contributing to the upward trend in winter natural gas consumption in New York. Compared to the winter trend, the New York summer natural gas consumption trend is more stable over the years. There are fewer temperature fluctuations in summer than in winter; New York summers are trending to increase in temperature by 0.69°F per decade (Figure 4). The New York weather trend hints that natural gas use during winter will continue to increase in the future.

Figure 2. Monthly Commercial Natural Gas Consumption in New York



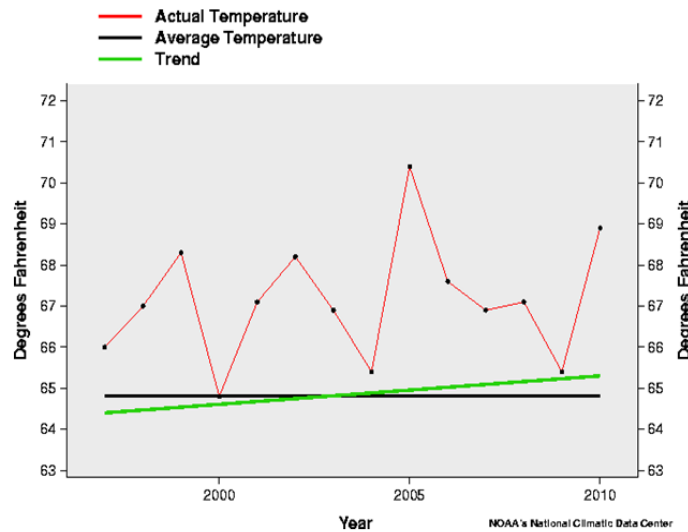
Source: Energy Information Administration, Annual Energy Outlook 2011

Figure 3. New York Winter Temperature Trend 1997-2011
 Winter (Dec-Feb) 1997 - 2011 Trend = $-3.07 \text{ deg}^\circ\text{F} / \text{Decade}$



Source: NOAA National Climatic Data Center, 2011

Figure 4. New York Summer Temperature Trend 1997-2010
 Summer (Jun-Aug) 1997 - 2010 Trend = $0.69 \text{ deg}^\circ\text{F} / \text{Decade}$

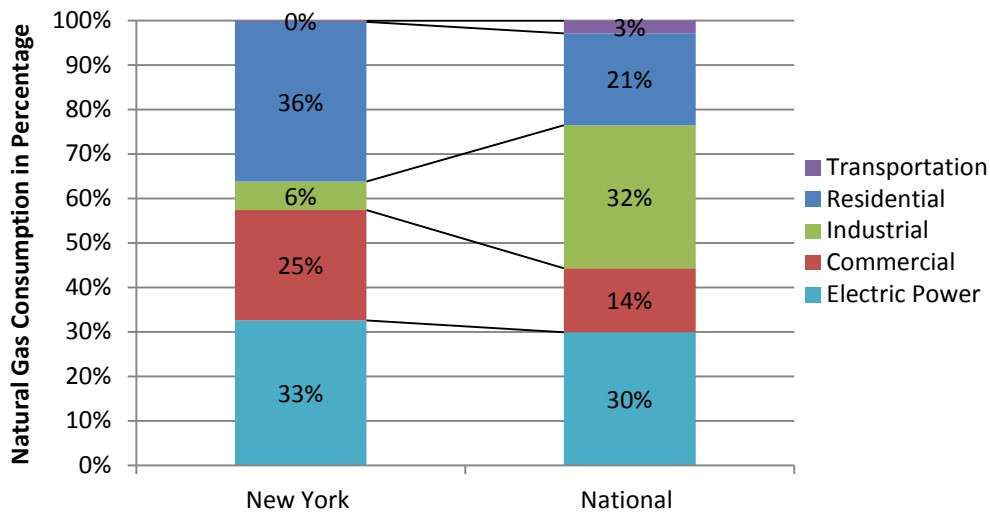


Source: NOAA National Climatic Data Center, 2011

As shown in Figure 5, the residential and electric power sectors are the biggest consumers of natural gas in New York accounting for 36% and 33% of total natural gas consumption respectively. The commercial sector consumed a significant portion of natural gas, making up 25% of total consumption, while the

industrial sector consumed 6% of the total in 2009. New York has a different natural gas consumption pattern when compared to the national natural gas consumption trend. Nationally, the industrial sector is the biggest natural gas consumer in the U.S followed by the electric power sector. The national electric power sector natural gas consumption is forecast to surpass the industrial sector consumption mostly due to the recent economic downturn, which slowed industrial production, as well as new extraction techniques which have expanded available domestic supplies and accelerated the use of natural gas as a fuel in electric power plants. Residential sector consumption is less significant at the national level than in the New York region. Nationally, industrial and electric power use will continue to drive future natural gas demand growth.

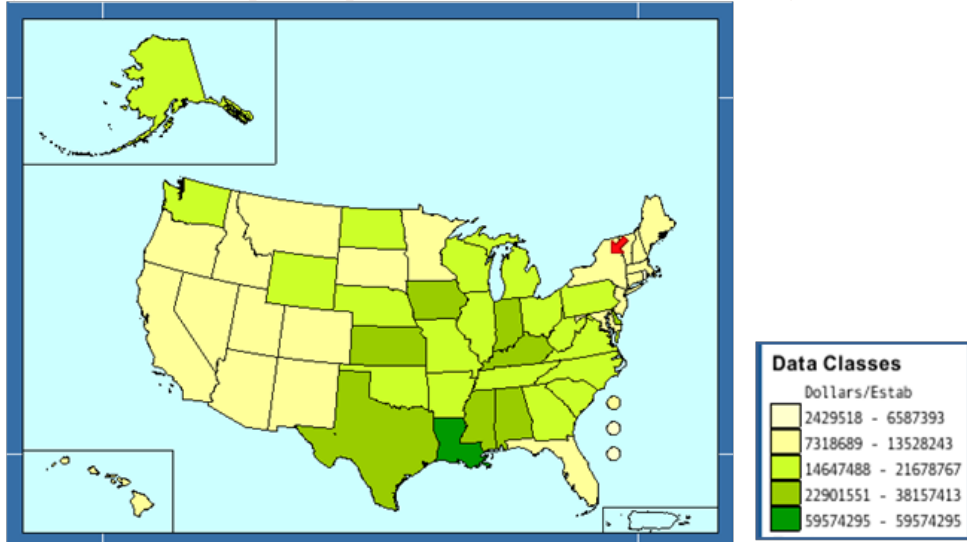
Figure 5. Natural Gas Consumption in New York by Sector in 2010



Source: U.S. Energy Information Administration, 2011

The difference in natural gas consumption patterns between New York and the national average could be explained by the difference in industrial activity in New York compared to the national average. As stated in the 2009 New York State Energy Plan, industrial manufacturing capacity has been leaving New York. The value of shipments is directly related to production. As manufacturing capacity decreases, value of shipments decreases. The value of shipments per establishment for manufacturing in New York is less than that of other states (Figure 6). In addition, New York is moving away from energy intensive manufacturing processes towards less energy intensive processes. The combination of the two phenomena results in lower industrial activity in New York compared to the national average.

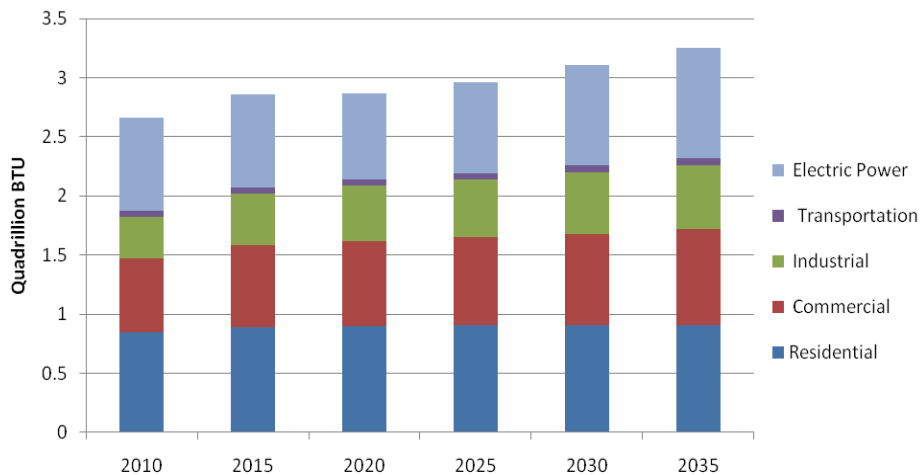
Figure 6. Value of Shipments per Establishment for Manufacturing in the U.S., 2007



Source: U.S. Bureau of Census, 2007 Economic Census

The U.S. Energy Information Administration (EIA) projects a slight growth in natural gas consumption across all sectors for the next 25 years in the Mid-Atlantic Region. The commercial sector natural gas consumption is forecasted to have a 1% growth per year, while the industrial sector natural gas consumption will grow by 2% each year (Figure 7). The projected growth rate assumes economic recovery, expecting future production to increase in both commercial and industrial sectors; as a result, natural gas consumption will also increase in the coming years. The projection does not assume revolutionary or breakthrough natural gas technologies. Shale gas is expected to ensure a steadily increasing supply of natural gas, ensuring that the U.S. natural gas supply is able to meet future natural gas demand. The implication of an abundant supply of natural gas is that the price of natural gas will remain low for the foreseeable future; therefore, natural gas demand will not be restricted by high natural gas price.

Figure 7. Natural Gas Use Forecast of the Mid-Atlantic Region 2010-2035



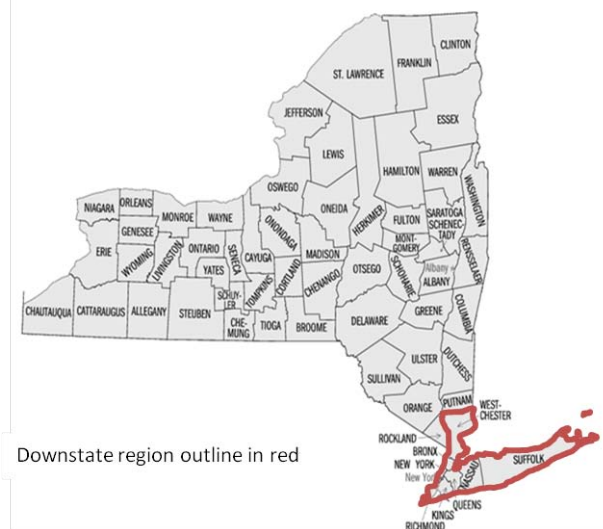
Source: Energy Information Administration, Annual Energy Outlook 2011

Compared to past commercial and industrial natural gas consumption patterns, the projected C&I natural gas growth rates in the Mid-Atlantic region are conservative but optimistic. Commercial natural gas demand declined 3.2% from 2008-2009; however, growth rates had been mostly positive in the past decade with occasional negative growth. Natural gas demand growth in the New York industrial sector experienced more volatility than the commercial sector. Industrial natural gas demand growth ranged from -12% to 9.2% within the past decade. The industrial sector experienced a 9.8% demand contraction in 2009 due to the economic downturn. The C&I sector natural gas consumption is forecasted to resume growth when the U.S. economy recovers.

The national long-term commercial sector natural gas demand growth is driven by increasing commercial floorspace (+37%); however, energy intensity in the commercial sector is forecasted to decline by 3% by 2035. EIA projected a decrease in energy intensity based on a hybrid engineering and statistical approach of CBECs consumption data. Some key assumptions include the improvement in building shells and retrofits of equipment, resulting in more efficient commercial buildings. A decline in energy intensity might slow natural gas demand growth. The main drivers of natural gas consumption in the U.S. industrial sector are projected to be increasing combined heat-and-power generation (+187 %), increasing output of gas-intensive industry (+30 %), and lower gas prices.

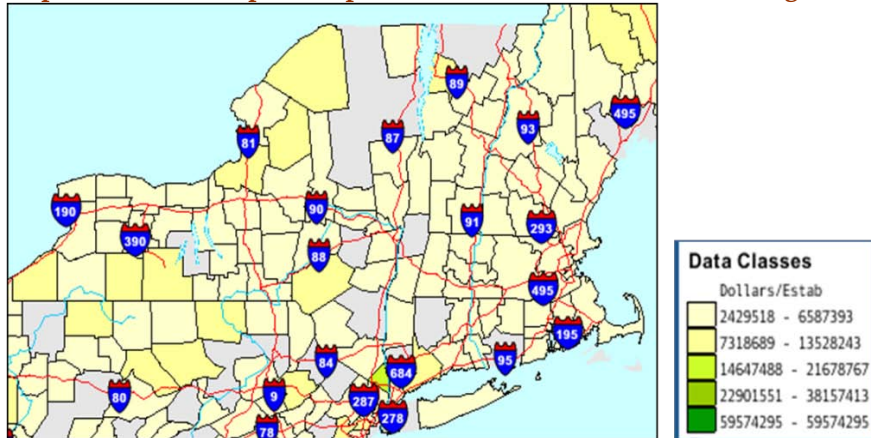
By NYSERDA’s definition, upstate regions include: Western New York, Southern Tier, North Country, Central New York, Capital Region, Mid-Hudson and Finger Lakes. Downstate region refers to Bronx, Kings, Queens and Richmond, New York, and Westchester, and Long Island (Figure 8). Figure 9 is a thematic map of value of manufacturing shipments in the State of New York and the figure shows more manufacturing shipments in upstate New York than downstate New York. It is important to note that because of the different industrial activities in the upstate region, industrial natural gas use will mostly concentrate in the upstate region where more energy intensive industries are located. These energy intensive industries include chemical manufacturing, primary metal manufacturing, food manufacturing, and paper manufacturing.

Figure 8. Map of Upstate and Downstate New York



Source: U.S. Census Bureau

Figure 9. A Map of Value of Shipments per Establishment for Manufacturing in New York, 2007



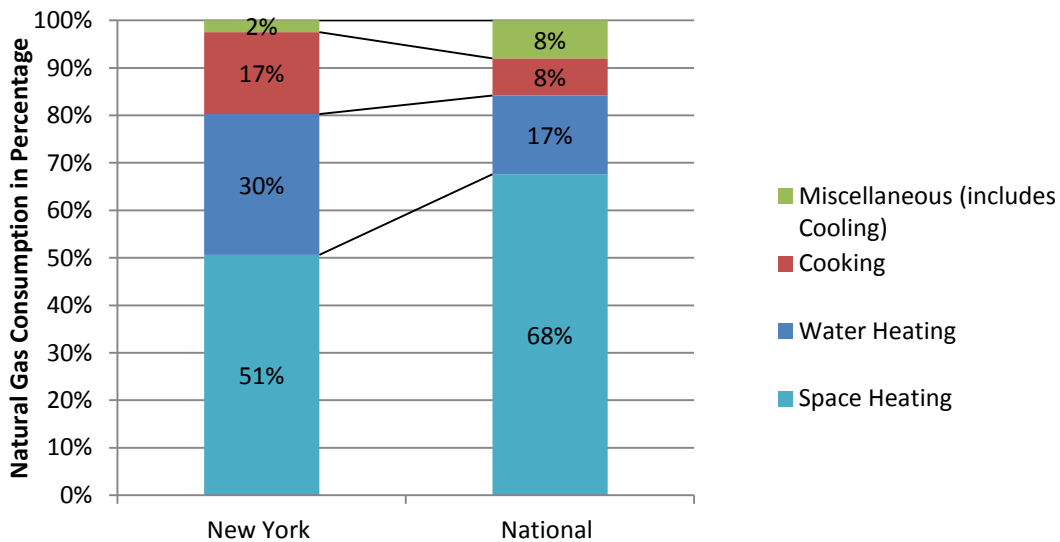
Source: U.S. Bureau of Census, 2007 Economic Census

3.2.2 New York C&I Natural Gas Use by End-use and Industry

New York Commercial Natural Gas Use by End-use

Space heating, water heating, and cooking are the three largest end-uses of natural gas in the New York commercial sector (Figure 10), which coincides with the national commercial natural gas usage pattern. The three end-uses account for approximately 97% of the total natural gas consumption in the commercial sector while cooling contributes to 2% of the total usage in New York.

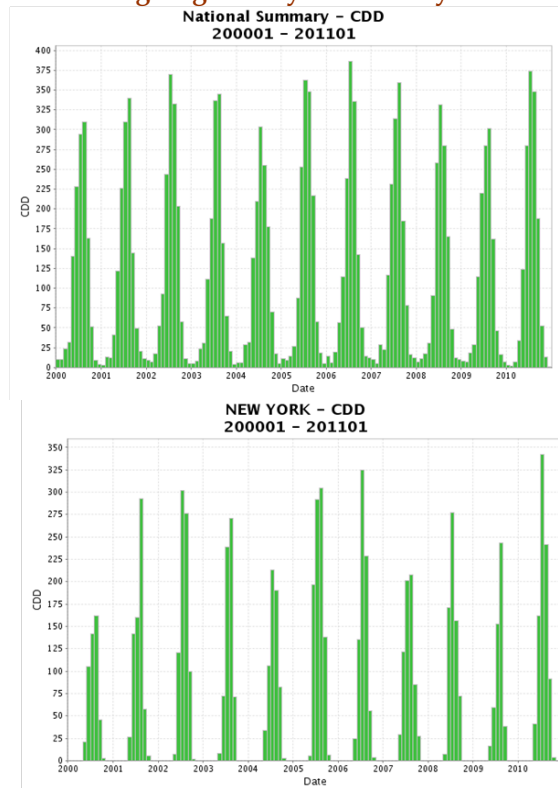
Figure 10. Natural Gas Use by End-use Comparing the New York and National Commercial Sectors in 2007



Source: NYSERDA report prepared by Optimal Energy in 2006; Energy Information Administration, CBECS, released in 2008

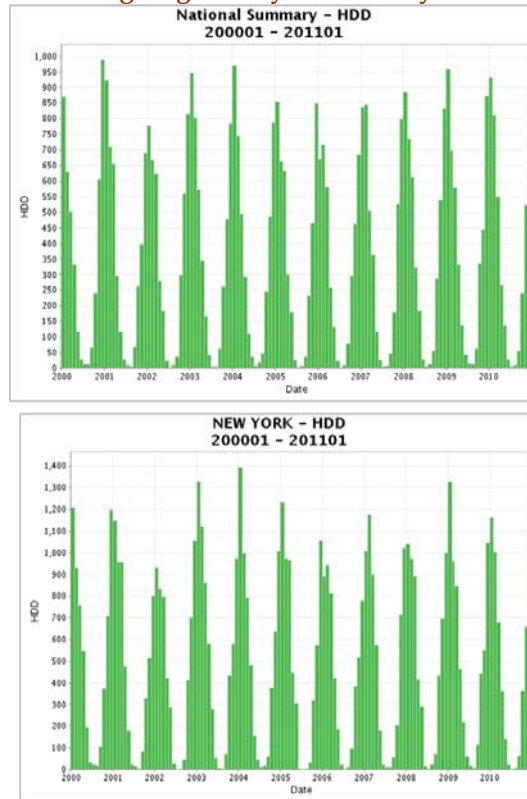
The natural gas consumption pattern by end-use in New York is more similar than different when compared to the national average, except New York has less cooling needs than the national average. The difference in cooling needs can be explained by weather patterns. Figure 11 compares the number of Cooling Degree Days (CDDs) nationally and in New York. New York has significantly fewer CDDs than the national average, thereby explaining the lesser natural gas needs for cooling end uses. Contrarily, the number of Heating Degree Days in New York is very similar to the national average, explaining the similarity in natural gas demand for space heating and water heating (Figure 12).

Figure 11. Number of Cooling Degree Days Nationally and in New York, 2000-2010



Source: NOAA Satellite Services, 2011

Figure 12. Number of Heating Degree Days Nationally and in New York, 2000-2010

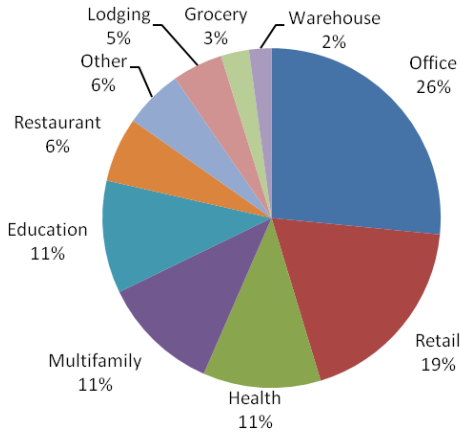


Source: NOAA Satellite Services, 2011

The commercial sector can be categorized into ten building types. Among all building types, office and retail buildings are the largest users of natural gas. Education, Health, and Multifamily buildings are the next biggest natural gas consumers (Figure 13).

Understanding the composition of end-users helps to determine natural gas efficiency potential and where the biggest impact can be made when applying natural gas efficiency measures.

Figure 13. Natural Gas Use in New York Commercial Buildings in 2007



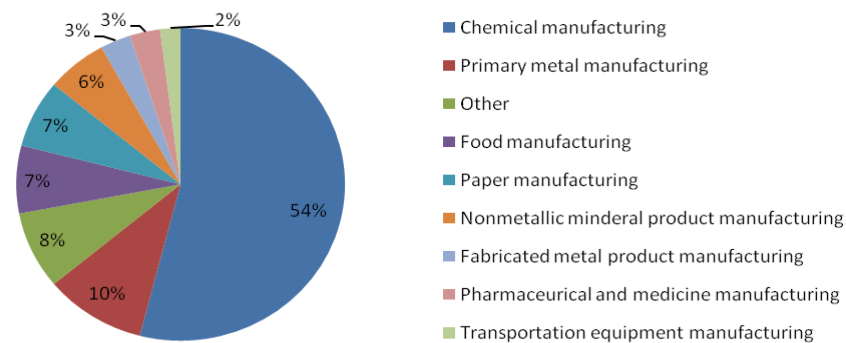
Source: NYSERDA Report prepared by Optimal Energy in 2006

Industrial Natural Gas Use by Industry

New York ranks 25th out of the 50 states in industrial natural gas use. The industrial natural gas consumption pattern in the upstate region is different from the pattern in the downstate region. The primary sectors of gas consumption are gas-intensive industries such as chemical manufacturing (54%), primary metal (10%), food manufacturing (7%), and paper manufacturing (7%). Natural gas consumption in the downstate region concentrates on apparel fabrication, metals fabrication, and food production. Most industrial natural gas consumption is concentrated in the upstate region.

Figure 14 disaggregates natural gas consumption in New York by industrial sector; the chemical industry consumes 54% of the total natural gas in the New York industrial sector. The industrial sector natural gas consumption can be captured in three end-use categories, which are direct process, direct non-process, and boiler fuel. Most of the natural gas consumption goes to direct process (49%) and boiler fuel (46%). Direct non-process uses only 5% of the total industrial sector natural gas. Natural gas is utilized as a boiler fuel to mainly produce steam and hot water used in industrial processes and for building conditioning. Direct process applications include cooking, melting, or drying while direct non-process applications are mostly used for fired-unit space heaters.

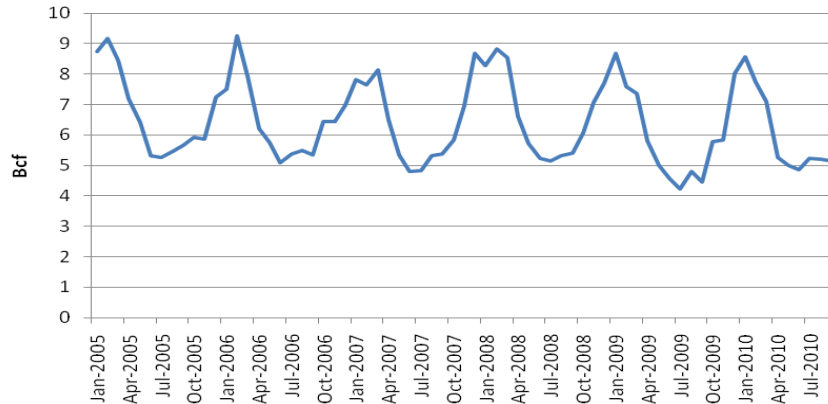
Figure 14. Distribution of New York Industrial Gas Annual Consumption in 2007



Source: NYSERDA Report prepared by Optimal Energy (2006)

Similar to commercial natural gas use, the New York industrial natural gas usage pattern is seasonal. The industrial sector consumes more natural gas during the winter than other seasons (Figure 15).

Figure 15. Monthly Natural Gas Use in the New York Industrial Sector 2005-2010



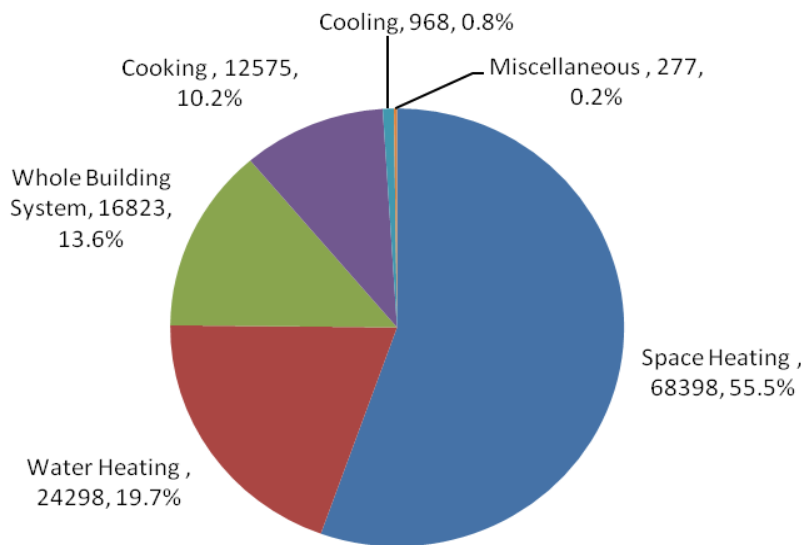
Source: Energy Information Administration, Annual Energy Outlook 2011

3.2.3 Natural Gas Energy Efficiency Potential in the C&I Sector

Commercial Natural Gas Efficiency Potential

As described in the previous sections, the largest end-use for natural gas in the commercial sector in New York is space heating. Figure 16 shows the economic potential for commercial savings by end-use. Energy efficiency technologies applied to the space and water heating end-uses will yield the most impact. More economic natural gas efficiency potential lies in replacement, remodeling and retrofit of buildings than in new construction. Office and retail buildings account for half of the economic natural gas efficiency opportunities as they are the largest users of commercial natural gas (Figure 13).

Figure 16. Economic Potential Natural Gas Savings in the Commercial Sector by 2016, Total= 123,339 Thousand Dekatherms (Mdt)



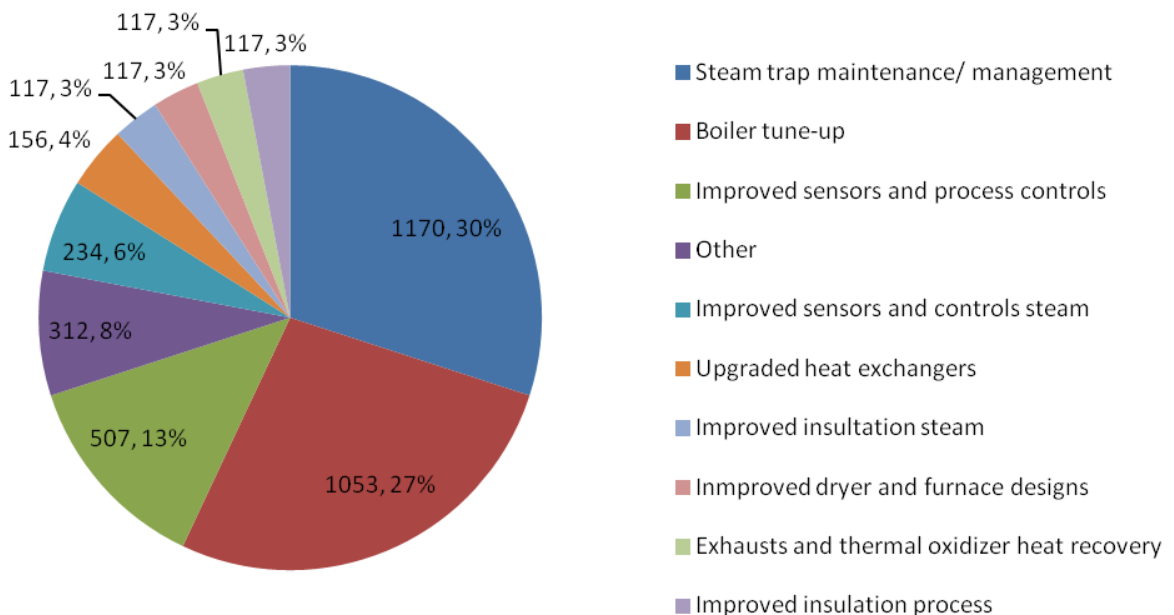
*Program eligibility has not been taken into account for the economic potential analysis, The available savings for program administrators is less than stated due to program ineligibility of interruptible customers.

Source: NYSERDA Report prepared by Optimal Energy (2006)

Industrial Economic Natural Gas Efficiency Potential

Figure 17 presents the economic natural gas potential in the New York industrial sector. Many industrial natural gas efficiency technologies target the major natural gas end-uses in the industrial sector—boiler fuel and direct process. Steam trap maintenance and boiler tune-up represent more than 50% of the industrial economic natural gas efficiency potential. Boiler fuel and direct non-process efficiency technology is applicable across the industrial sector and commercial sector. Some examples of technology falling under this category include feedwater preheaters and improved dryer and furnace designs in addition to boiler tune-up. On the other hand, direct process natural gas efficiency technology should be specific to each industry.

Figure 17. Economic Potential Natural Gas Savings from Industrial Sector by 2016, Total= 39,000 Thousand Dekatherms (Mdt)



*Program eligibility has not been taken into account for the economic potential analysis. The available savings for program administrators is less than stated due to program ineligibility of interruptible customers.

Source: NYSERDA Report prepared by Optimal Energy (2006)

3.3 New York Natural Gas Efficiency Standards and Codes

Natural gas efficiency standards and codes act as primary drivers of the New York natural gas efficiency technology market, especially in the C&I sector where capital investment for efficiency technology is high and incentives play an important role in natural gas efficiency technology adoption. The three main state policies driving the New York natural gas efficiency technology market are the Energy Efficiency Portfolio Standard (EEPS), Energy Conservation Construction Code of New York State 2010 (ECCCNYS), and the Regional Greenhouse Gas Initiative (RGGI). Each of these policies is discussed below.

3.3.1 Energy Efficiency Portfolio Standards (EEPS)

In May 2007, the New York Public Service Commission (PSC) issued an order to develop an Energy Efficiency Portfolio Standard, which established targets and standards for both Electric and Natural Gas efficiency in the State of New York. Another order was issued in June 2008 detailing the development of natural gas efficiency program targets and program funding. In May 2009, the PSC finalized the target for natural gas efficiency in the “2009 EEPS Gas Order”. The annual efficiency target was 4.35 billion cubic feet (Bcf) from 2009-2011, and 3.45 Bcf annually for 2012-2020. Program related gas savings are expected to reach 44 Bcf annually by 2020. Combined with natural gas efficiency from other sources such as codes and standards, the total savings could potentially reach 112 Bcf per year. If such a target is met, a gas savings of 14.7% from forecast usage would be realized by 2020. To put the EEPS efficiency target in perspective of the total natural gas economic efficiency potential in the C&I sector, natural gas savings from the EEPS program are targeted to be 30.26 Bcf in 2016⁵ while the economic potential is estimated to be 162 Bcf in 2016⁶. The savings targets of all EEPS programs represent 20% of the total economic potential in the C&I sector. Program eligibility is not factored into the economic potential analysis. Since interruptible customers do not pay the SBC surcharge, they are ineligible for EEPS programs. The available savings to program administrators is lower than the stated economic potential. The annual cost of program funding is projected to be \$130 million, of which 40.6% is allocated to commercial and industrial natural gas efficiency programs. A total of 21 natural gas programs are currently offered by NYSERDA and utilities in the EEPS portfolio. The gas programs include efficiency evaluations of gas space and water heating systems, technical assistance, and financial incentives to better integrate natural gas usage in heating systems and commercial/industrial processes (see discussion of utility program offerings in Section 5). The natural gas efficiency programs are funded through a System Benefit Charge (SBC) collected from gas customers. Since the efficiency programs are achieving “satisfactory progress” according to the PSC, the surcharges are anticipated to be maintained until the end of 2015 according to the “Order Authorizing Efficiency Programs, Revising Incentive Mechanism, and Establishing a Surcharge Schedule” published by the PSC in October, 2011.⁴ New York State Energy Research and Development Authority (NYSERDA) and state utilities are charged to administer the natural gas energy efficiency programs.⁷ The PSC allocated 56.1% and 43.9% of EEPS’ gas efficiency budget to utilities and NYSERDA, respectively (Table 1).⁸ Figure 18 shows the scale of targets by PAs, NYSERDA’s target constitutes approximately 50 percent of the total target for all PAs.

⁵ Energy Efficiency Portfolio Standard Program Review White Paper, PSC, 2011

⁶ NYSERDA Report prepared by Optimal Energy (2006)

⁷ CASE 07-M-0548 Energy Efficiency Portfolio Standard (EEPS), issued June 23, 2008

⁸ Subsequent to the original order, additional gas re-balancing funds were allocated to NYSERDA. This budget does not reflect the true total

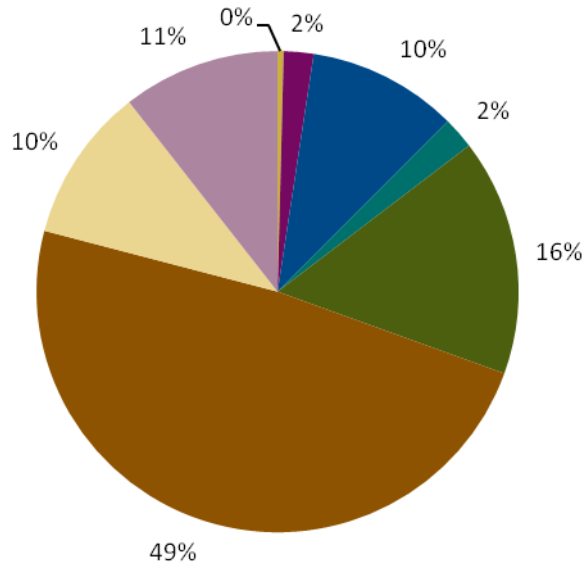
Table 1. Summary of Target Acquired and Committed and Budget for EEPS Gas C&I Programs for Program Year 2011

Program Administrator	Acquired and Committed (Dth)	Total Budget*	\$/Dth Saved
NYSERDA	2,239,843.10	\$27,481,909	\$12.27
Niagara Mohawk	109,233.50	\$6,128,068	\$56.10
RG&E	19,824.30	\$1,159,114	\$58.47
Con Edison	131,360.70	\$8,642,212	\$65.79
KED-LI	151,254.50	\$11,136,463	\$73.63
NYSEG	15,352.50	\$1,166,280	\$75.97
KED-NY	87,113.10	\$6,714,408	\$77.08
Central Hudson	1,870.00	\$235,350	\$125.86
Total	2,755,851.70	\$62,663,804	

*Assumes total budget is spent through 2011 including total expenditures and committed funds. Refer to Table 8 for the list of programs included in this analysis.

Source: Utility and NYSERDA Scorecard reports (only C&I programs were included in the analysis)

Figure 18. Distribution of Target Savings by Program Administrator; Total= 817 Mdth



Central Hudson ■ NYSEG ■ KEDNY ■ RGE ■ KEDLI ■ NYSERDA ■ Niagara Mohawk ■ Con Edison
 Source: Utility 2011 annual scorecards and NYSERDA quarterly scorecards, 2011

Both Central Hudson and NYSEG did not meet their targets while all other Program Administrators exceeded their savings targets. Committed savings are a result of approved projects, which have not yet been acquired due to the length of some projects.

According to the PSC's EEPS program review, acquired gas savings fall short of the efficiency target due to issues such as the 2008 economic downturn and timing related to the start-up of programs. Some programs need a period of time before savings can be realized. For example, NYSERDA reported that the Industrial and Process Efficiency (IPE) program would need two years to ramp up and achieve savings from committed projects. As a result, most natural gas savings are committed but cannot be realized immediately.

Program administrators have identified barriers to attaining the gas savings target. Con Edison reported that the weak economy made it difficult for its C&I customers to invest in efficiency projects; this concern was commonly voiced by all program administrators. Program administrators also recognized that although there has been interest in the large industrial gas programs that offer incentives for custom projects, larger customers are interruptible service customers who are not eligible for the EEPS program. Another observation made by program administrators is that C&I customers often favor prescriptive rebates over custom rebates.

Some program administrators believe that competition among similar programs offered by different administrators lowered program participation for some programs. Niagara Mohawk reported that its Energy Initiative Electric and Gas Mid-Sized Program had a lower participation rate than expected because NYSERDA offers a similar program to the same customers. NYSERDA also acquired many potential customers for its agricultural program before Niagara Mohawk could launch its agricultural pilot program. KEDNY/KEDLI raised the same concern regarding competition among program administrators, especially with large industrial accounts, as the numbers of potential customers and eligible projects in the territory were limited.

Pertaining to gas efficiency commercial programs, lessons learned mainly involve process improvement such as improving application and rebate processing, being able to better target potential customers, and increasing training of program staff to improve response to customer inquiries and concerns. For example, Central Hudson restructured its Small Commercial Program after conducting a process evaluation and noted that the program showed significant improvement after restructuring⁹.

As more programs were launched and improved, natural gas savings increased. Natural gas efficiency programs administered by state utilities and NYSERDA are expected to drive the adoption of natural gas efficiency technologies in New York until 2020.

3.3.2 Energy Conservation Construction Code of New York State 2010 (ECCNYS)

With the adoption of the Energy Conservation Construction Code of New York State 2010 (ECCCNYS) on December 28, 2010, New York State is committed to ensuring at least 90% of residential and commercial buildings comply with the ECCCNYS by 2017. The ECCCNYS addresses the design and construction of energy-efficient building envelopes. The code establishes minimum requirements for energy-efficient buildings using prescriptive and performance-related provisions. The ECCCNYS follows ASHRAE 90.1 2007, a standard developed by the American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE).¹⁰ The implementation of ECCCNYS will reduce the energy intensity of buildings. Table 2 summarizes the energy intensity reduction potential when ECCCNYS is adopted. Natural gas savings in different parts of New York vary from 12-16 percent after the building code is adopted. C&I

⁹ Energy Efficiency Portfolio Standard Program Review White Paper, PSC, 2011

¹⁰ http://www.dos.state.ny.us/DCEA/energycode_code.html

natural gas efficiency technologies that are affected by the code include commercial washers and furnaces.

To put the magnitude of savings from codes and standards in the perspective of the total economic natural gas efficiency potential in the C&I sector, the estimated savings from codes and standards is 19.28 Bcf in 2016¹¹ while the economic potential is estimated to be 162 Bcf¹². Codes and standards represent 12% of the total economic potential in 2016. Though codes and standards reduce the availability of economical efficiency potential for EEPS gas programs, the majority of economical savings potential is still available. The effect of codes and standards on opportunities for EEPS gas programs to meet their targets is not substantial.

Table 2. New York Energy End Use and Percentage Savings after Adoption of the ECCCNY

Building Prototype	Location	IECC 2003	90.1-2007	Savings
		(Baseline)	(ECCCNY)	
		Energy Use Intensity (kWh/sf/yr)		
Nonresidential	New York City	5.42	4.76	12.18%
Residential	New York City	17.04	13.89	18.49%
Semiheated	New York City	16.53	16.39	0.85%
Nonresidential	Albany	7.57	6.38	15.72%
Residential	Albany	21.46	18.92	11.84%
Semiheated	Albany	21.38	21.27	0.51%
Nonresidential	Binghamton	7.9	6.62	16.20%
Residential	Binghamton	22.94	20.44	10.90%
Semiheated	Binghamton	24.64	24.51	0.53%

Source: Department of State, Division of Code Enforcement & Administration (2011)

3.3.3 Regional Greenhouse Gas Initiative (RGGI)

The RGGI is a market-based program to reduce greenhouse gas emissions in the U.S. The Mid-Atlantic States have capped the carbon dioxide (CO₂) emissions from the power sector by 10 percent by 2018. As a member of the RGGI, New York sells emission allowances and the proceeds go to programs that will reduce greenhouse gas emissions. Energy efficiency, renewable energy, and clean technologies programs are all recipients of the RGGI funds.

The Department of Environmental Conservation (DEC) and NYSERDA are responsible for regulating the Budget Trading Program for implementing RGGI. As of December 31, 2010, New York has received as much as \$282 million from CO₂ allowances auctions. The Commercial, Industrial, Municipal, and Institutional (CIMI) program under RGGI funds statewide programs promoting energy efficiency and maintenance improvement to reduce energy use.

¹¹ Energy Efficiency Portfolio Standard Program Review White Paper, PSC, 2011

¹² NYSERDA Report prepared by Optimal Energy (2006)

3.4 Natural Gas Efficiency Technology Trends

Industrial natural gas efficiency technology can be divided into two categories—industry-focused technologies and cross-cutting technologies. Industry-focused technologies target direct process energy use specific to industries while cross-cutting technologies can be applied across the C&I sectors. The following section first discusses natural gas efficiency technology trends of the two major industrial natural gas consumers in New York. A discussion of cross-cutting natural gas efficiency technology follows.

Revisiting the New York industrial sector, the top consumers of natural gas in the New York industrial sector are the chemical industry (54%) and the primary metal industry (10%), both of which are energy-intensive industries. The characteristic of energy-intensive industries is the limitation in the choice of fuels and feedstock used in their processes. Opportunities for energy efficiency improvements are very process and industry specific. The DOE Office of Energy Efficiency and Renewable Energy’s (EERE)’s Industrial Technologies Program (ITP) identifies promising emerging natural gas efficiency technologies in energy-intensive industries and offers subprograms that support and help integrate emerging technologies into these industries.

3.4.1 Natural Gas Efficiency Technology Trends in the Chemical Industry

The United States is the largest chemical producer in the world, contributing to 21% of the world’s total chemical production. The chemical industry is the second largest energy consumer within the U.S. industrial sector. The following is a snapshot of the U.S. chemical industry:

Table 3. The U.S. Chemical Industry Profile

Economics	Contributes over \$214 billion to the U.S. GDP in 2007 (2% of total GDP in the U.S.). Exports \$154 billion worth of products in 2007. The industry continues to grow.
Geography	Most of the basic chemical production is concentrated along the Gulf Coast, where petroleum and natural gas feedstock are available in refineries. Production of other products, such as plastics, pharmaceuticals, and fertilizers is more widely dispersed among the states.
Energy	6.6% of total U.S. domestic energy use. 58% of the chemical industry energy use goes to fuel, power, and electricity generation; the remaining 42% energy use goes to feedstock.
Markets	Over 70,000 products in consumer goods and inputs to other sectors such as the agriculture, manufacturing, construction, and service industries.
Research and Development	Spent \$27.3 billion on research and development in 2007, most of which was spent on product development, with slight increase in applied research and decrease in basic research. The increased importance of environmental compliance demands additional research funding in this area.
Employment	Directly supports over 860,000 employees; salary in 2007 amounted to \$89.5 million. In New York alone, the chemical manufacturing sector hired 42,558 employees in 2009.

Source: DOE Office of Energy Efficiency and Renewable Energy’s (EERE’s) Industrial Technologies Program (ITP) 2007

As indicated in the latest ITP Chemical Industry Review (2005), energy consumption patterns in the chemical industry are moving along the pathway of trading off capacity for energy. The chemical industry will also witness an increasing amount of micro-processing. In general, the chemical industry is most interested in technologies that improve reaction efficiencies and technologies that help reduce cost and can be implemented quickly.

There are four focus areas within the ITP chemical industry subprogram portfolio: reactions, separations, enabling technologies, and alternative feedstocks. These areas are selected by a group of ITP experts by balancing the chemical industry’s needs and the level of development of emerging efficiency technology. If the portfolio is carried out successfully, a 20% reduction of energy usage in the chemical industry will be realized by 2020. As shown in Table 4, natural gas savings potential of the U.S. chemical industry is 128.2 TBtu per year by 2020.

Table 4. Potential Natural Gas Savings of the U.S. Chemical Industry by 2020

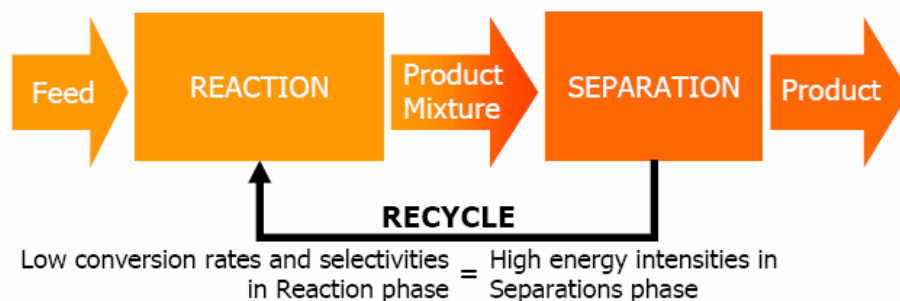
Focus Area	2020 Natural Gas Savings (TBtu/ year)
Reactions	78.2
Separations	35.2
Enabling Technologies	14.8
Total	128.2

Source: EERE ITP Chemicals Portfolio Review Fiscal year 2005

Reaction efficiency technology is prioritized as the top focus area as most chemical processes begin with a reaction and the process is energy intensive; some topics under this category are oxidation reactions, process synthesis, biocatalysis, and micro-reactors.

The separation process comes after the reaction process and represents when the desired product is separated from the unreacted feedstock and the unwanted byproducts (Figure 20). The unreacted feedstock is recycled back to the loop; this process is energy intensive as moving liquids and gas requires pumping or compressing processes which consumes natural gas and electricity. New alternative separation technologies will be investigated especially in distillation processes.

Figure 19. General Chemical Processing Flow Diagram



Source: EERE ITP Chemicals Portfolio Review Fiscal year 2005

3.4.2 Natural Gas Efficiency Technology Trends in the Primary Metal Industry

The primary metal manufacturing sector includes industries that smelt and/or refine ferrous and nonferrous metals from ore, pig or scrap. Metal alloys and superalloys manufacturers also fall under the primary metal manufacturing sector. Steel and aluminum manufacturing and iron casting are the main consumers of natural gas in the primary metal sector as smelting and refining requires large amount of heat input and therefore are natural gas intensive. The following table presents the industry profile of the primary metal industry in the United States:

Table 5. Primary Metal Sector Profile

	Aluminum	Steel	Metal Casting
Economics	Combined sales of \$230 billion per year, the largest 50 companies in this industry contribute to 60 percent of the overall industry revenue.		
Geography	Concentrates in the Pacific Northwest and Ohio	Concentrates in the Great Lakes region, including Indiana, Illinois, Ohio, Pennsylvania, Michigan, and New York. These States produce over 80% of the nation's steel output.	Concentrates in the Midwest, Southeast, and California, with the majority of the capacity in Ohio, Wisconsin, Michigan, Indiana, and Illinois. Foundry locations are usually sited near raw materials, water, and transportation.
Energy	Reduced energy intensity by over two thirds over the past 40 years. Energy use amounts to 340 TBtu per year. Over half of aluminum industry facilities conduct energy-management activities.	Heavily relies on natural gas and coal for fuel. The production of molten steel mainly involves process heating operations consuming natural gas and coal. Process heating accounts for more than 80% of the industry's energy use. Energy intensity has been reducing; 45% less energy is needed to produce a unit of output compared to 1975.	Uses 157 TBtu per year. The most energy-intensive process is the melting of metal, consuming 55% of the industry's total energy cost. Core making, mold making, heat treatment, and post-cast activities are other energy-intensive activities.
Markets	Transportation, containers and packaging, and construction	Construction, transportation, appliances	Transportation, oil field machinery, power generation equipment pipes, construction
Development	Growth of secondary metal production using recycled aluminum products.	Developed to become the most recycled material in North America, 67% of steel is being recycled.	One of the largest recyclers in the U.S. saving about 15-20 million tons of scrap metal from disposal in landfills and junkyards each year.
Employment	62,716 employees in 2006	100,000 employees in 2006	163,000 employees in 2006

Source: DOE Office of Energy Efficiency and Renewable Energy's (EERE's) Industrial Technologies Program (ITP) 2007

The steel industry is the most relevant primary metal industry to the State of New York. Energy costs account for about 20 percent of the total steel manufacturing cost. Natural gas meets 27 percent of the sector’s energy requirement.¹³ Due to the growth of the nonferrous casting segment, which prefers natural gas-driven melting technologies, the importance of natural gas as a fuel will remain. Reducing natural gas requirements with technologies has been one of the R&D focuses in the steel industry.

Basic oxygen furnace (BOF) and electric arc furnace (EAF) are the two types of furnaces utilized by the steel manufacturing industry for steel production. The energy use profiles vary depending on the raw material and technology employed. Among all processes in steel making, iron making is the most energy-intensive process in the production of steel.¹⁴

The steel sector is listed as an energy-intensive industry under the DOE’s ITP program. The energy efficiency target for the steel industry is to reduce energy intensity by 30 percent by 2020. To meet the target, the commercialization of more than 10 industrial energy efficiency technologies through research, development & demonstration (RD&D) partnerships is required.

The DOE and American Iron and Steel Institute (AISI) assessed the opportunities for reducing energy intensity within the steel making sector. There are five main opportunities: cleaner fuels, increased CHP, equipment retrofit/replacement, process improvement, and R&D. Among the five areas, the DOE and AISI ranked R&D followed by process improvement as the most possible opportunities to reduce energy intensity in the steel industry.

R&D opportunities for advanced efficient melting technologies have the most potential given the energy requirements of the melting processes. The steel industry is more likely to adopt retrofit technologies than replacement technologies as the capital investments for retrofit technologies are lower and new furnaces require state permits. Some of the examples of retrofit natural gas efficiency technologies are: oxygen-enriched fuel combustion, charge preheating, molten metal deliver, and heat recovery from flue gases. The greatest barrier of implementing emerging technologies is the increasing reluctance of the industry to take on risks and costs associated with developing and implementing new technologies. Smaller facilities may not be able to engage in energy-savings opportunities that are cost effective for larger-scale operations. Last but not least, diversity of the industry limits the applicability of cross-cutting technologies, which means each facility will have to be retrofitted on a case-by-case basis.

Process improvement provides natural gas efficiency opportunities through the metal casting operations. Some examples are: implementation of energy management best practices, optimizing scheduling, scrap cleaning, and improving casting yield.

The DOE and AISI forecast that natural gas use in the steel industry will decline by 36 percent by 2020 under the best-case scenario where all economic natural gas efficiency opportunities are realized.

3.4.3 Cross-cutting Natural Gas Efficiency Technology Trends in the Commercial Sector

With the 2008 economic downturn, energy efficiency focuses in the commercial sector shifted from new construction to renovation projects, which require less capital investment. Natural gas efficiency

¹³ Energy Trends in Selected Manufacturing Sectors: Opportunities and Challenges for Environmentally Preferable Energy Outcomes. Environmental Protection Agency March, 2007

¹⁴ Steel Industry Technology Roadmap, EERE, ITP

technology development trends will cater to opportunities in existing buildings in both short-term and long-term projections. In New York, space heating, water heating, and cooking make up 97% of the total natural gas consumption. Cross-cutting emerging technologies that align with the above-mentioned enduses include: commercial boilers, combination space/water heaters, efficient fryers and cooking equipment, and high-efficiency tank and tankless technologies.

3.4.4 Cross-cutting Natural Gas Efficiency Technology Trends in the Industrial Sector

As mentioned in the industrial natural gas efficiency potential section of this report, boiler fuel accounts for 46% of the total natural gas use in the New York industrial sector. Steam trap maintenance and boiler tune-up technologies are cross-cutting and add up to more than 50% of the industrial economic natural gas efficiency potential in New York.

The New York natural gas efficiency potential coincides with the national cross-cutting natural gas efficiency technology trend. Referencing the ITP’s Technology Roadmap for Industrial Energy Systems¹⁵, the top opportunities to reduce and/or recover energy loss are: waste heat recovery from industrial gases and liquids, advanced industrial boilers, heat recovery for drying process, and steam best practices. In summary, improving boilers and recovering waste heat will remain as the focuses of technology development in the U.S. cross-cutting industrial natural gas efficiency technology field.

More efficient boilers or “super boilers” are now under development; heavy steam users in the commercial and industrial sector benefit the most from super boiler innovations. Heavy steam-using industries in New York encompass the chemical, food processing, and textile industries. Some technologies under this sector are: high intensity heat transfer, smart control systems, efficient preheating, and flame radiation. The Super Boiler technology combines several innovations to achieve optimum efficiency. Using conservative assumptions, the ITP forecasted a 35% potential accessible market where 70% of the accessible market would be penetrated by 2025. Market segments in the boiler market that are not impacted by the Super Boiler technology will be impacted by other advanced technologies. By 2025, 80% of the total boiler market will be renovated by efficiency measures. If the assumptions were correct, up to 415.87 bcf of natural gas can be directly displaced per year by 2025.

¹⁵ http://www1.eere.energy.gov/industry/intensiveprocesses/pdfs/reduction_roadmap.pdf

4 The Natural Gas Service Supply Chain Analysis

This section provides an analysis of the Energy Service Companies (ESCOs) and the natural gas system installers operating in New York State. The discussion is organized in three sections:

- Definitions
- Methodology
- Preliminary Findings

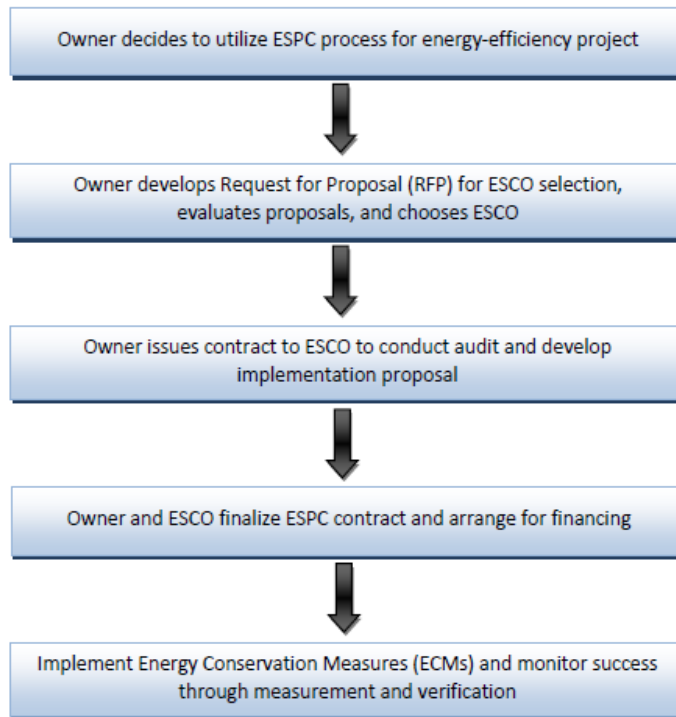
4.1 Definitions

The energy efficiency services sector is comprised of different business types and capabilities, all linked in some capacity to the design and delivery of retrofit and new construction projects to energy end users. Different companies may offer anywhere from one specific service (e.g., lighting installation) to an entire suite of services (e.g., system design, equipment installation, incentive filing). The following definitions describe the characteristics and supply chain roles of ESCOs and system installers.

Energy Service Companies (ESCOs): These are companies that develop, install, and arrange financing for projects designed to improve the energy efficiency and maintenance costs for facilities. ESCOs provide end-use customers with a complete suite of services related to energy efficiency retrofits and new construction – from initial conception, financing and pricing to engineering and system installation, in addition to measurement, monitoring and verification of energy savings. However, the key difference between an ESCO and any other firm that performs energy efficiency services is the ESCO’s ability to offer a performance contracting mechanism. The performance contract mechanism is a turnkey service, sometimes compared to design/build construction contracting, which provides customers with a comprehensive set of energy efficiency, renewable energy and distributed generation measures. These services are often accompanied with guarantees that the savings produced by a project will be sufficient to finance the full cost of the project.

Energy Savings Performance Contracting (ESPC): The ESPC process in itself is outlined by the U.S. Department of Energy (DOE) as a channel through which commercial and industrial facility owners may partner with a natural gas energy service company (ESCO), and work together towards implementing energy efficient equipment upgrades. Once selected by a facility owner, the ESCO conducts energy audits, develops an implementation proposal, and arranges for equipment financing. The benefit of this arrangement includes guaranteed energy conservation through post-installation measurement and verification performed by the ESCO. In this scenario, ESCOs maintain a strong influence on equipment purchasing decisions given their professional expertise in understanding the technical requirements of system design and knowledge of the efficiency financing market. The following are the major steps in a typical ESPC project as outlined by DOE:

Figure 20. Major Steps in a Typical ESPC Project¹⁶



This savings-based project finance approach enables the ESCO to provide a unique and attractive offering to customers and to secure relatively large projects that otherwise would have trouble procuring funding. From the end-use customers’ point of view, a performance contract provides a vehicle to implement a retrofit project with little to no upfront capital investment.

Natural Gas System Installers: For the New York area, a general contractor’s license is required by the NY Department of State to perform installation and maintenance work on natural gas equipment. Additionally, a master plumbing licensure is required for work on high-pressure natural gas lines. Licensed general contractors operating in the state of New York are regulated at the local level broken down by counties, with New York City (NYC) functioning as a separate entity under the New York City Department of Buildings. According to the New York State Chief Information Officer/Office for Technology (CIO/OFT), there does not exist a centralized state list of all general contractors operating in New York.

There are 62 counties in New York, of which some do not require local registration to perform contractor work. While some regulated utilities such as Consolidated Edison and National Fuel Gas do provide lists of natural gas installers and equipment suppliers operating in their respective service territories, the vast majority of utilities advise the consumer to source a local system installer to perform the required labor.

The results of these findings indicate that analyzing the number and capacity of natural gas system installers operating in New York is not a clear-cut task due to data fragmentation of system installer information across New York State counties. There are, however, alternative identifiers which may be

¹⁶ U.S. Department of Energy- Energy Savings Performance Contracting (ESPC)- The ESPC Process

utilized to characterize the number of capable system installers for natural gas equipment operating in New York. Various methods to determine this value include utilization of Federal ID numbers, Standard Industry Classification codes (SIC), and Insurance Certificates, which are required by all licensed natural gas system installers to legally operate. The following are several commonalities between most natural gas installation firms:

- » **Services Offered:** Engineering (including system design & sizing), Maintenance, Installation, and Conversions from electric or oil to natural gas or dual-fuel (boilers & heaters). The majority of system installers who perform residential services also perform light commercial and industrial services ranging from corporate buildings to restaurants and schools. Larger implementation firms typically deal solely with light to heavy commercial and industrial operations.
- » **Service Area:** Depending on the size of the firm, offices may be singular or multiple covering either a single service area or multiple counties. Smaller firms typically operate in a locale which is oftentimes explicitly stated and specific to their licensing region, whereas larger firms will typically have the additional resources to cover a much greater breadth of locale and customers.
- » **Industry Characterization:** Given the local administration of contractor licensures in the state of New York with consideration given to the wide range of services offered across the sample population, an effective method to characterize these contractor firms may be performed via company size and/or service area analysis.

4.2 Methodology

This section relied on secondary research to identify ESCOs and system installers operating in New York. Data sources used for this research include the National Association of Energy Service Companies website (NAESCO¹⁷), the New York State Public Service Commission¹⁸ website, and ESCO market industry reports. To determine the appropriate SIC codes for equipment installer identification, an unbiased sample of contracting firms with company websites was taken from local utility lists of heating contractors who have participated in the utility natural gas programs. The selection was indiscriminate and distributed across counties. The research team combined internal expertise of ESCOs with information gathered through secondary research to procure a list of companies operating in New York with the following SIC codes:

- a. 171131 : ENERGY MANAGEMENT SYSTEMS & PRODUCTS
- b. 521136 : ENERGY CONSERVATION PRODS-SVCS-SYSTEMS
- c. 874212 : ENERGY CONSERVATION & MGMT CONSULTANTS
- d. 382204 : CONTROLS CONTROL SYSTEMS/REGULATORS-MFRS
- e. 492501 : GAS COMPANIES
- f. 361303 : CONTROL PANELS (MFRS)
- g. 671904 : UTILITIES-HOLDING COMPANIES
- h. 359915 : MANUFACTURERS DISTRS & INDL PRODUCTS
- i. 356907 : AUTOMATION SYSTEMS & EQUIPMENT-MFRS
- j. 382304 : COMBUSTION CONTROLS (MFRS)

¹⁷ <http://www.naesco.org/>

¹⁸ <http://www.dps.state.ny.us/>

- k. 493198 : ELECTRIC & OTHER SERVICES-COMBINED
- l. 382202 : ENERGY EQUIPMENT SYSTEMS-SUPPLIES (MFRS)
- m. 873111 : ENVIRONMENTAL & ECOLOGICAL SERVICES
- n. 358598 : AIR CONDITIONING/HTG/REFRIG EQUIP (MFRS)
- o. 871150 : ENGINEERS-ENERGY MANAGEMENT
- p. 507506 : ELECTRIC HEATING EQUIP & SYSTEMS (WHLS)
- q. 171117 : AIR CONDITIONING CONTRACTORS & SYSTEMS
- r. 507417 : STEAM TRAPS (WHLS)
- s. 349498 : VALVES & PIPE FITTINGS NEC (MFRS)
- t. 171102 : HEATING CONTRACTORS
- u. 171118 : BOILERS-REPAIRING & CLEANING

The resulting selection has a population size of 4,810 records and includes number of employees and sales volume figures. Approximately 25 percent of these companies were identified as natural gas equipment installation and energy service firms.

4.3 Preliminary Findings

This section presents the preliminary findings of the identification of ESCOs and natural gas system installers in New York. These preliminary findings are based on secondary research and in depth interviews. It should be noted that clearly dividing ESCOs from equipment manufacturers and other firms offering energy services is difficult due to overlap in business practices. For this reason, best professional judgment was utilized to draw the divisions.

This discussion is organized into three sections:

- » **ESCOs:** includes a discussion about the structure of the ESCOs industry
- » **Natural Gas Equipment Path to Market:** illustrates natural gas equipment paths to market downstream from manufacturing operations
- » **System Installers Interview Findings:** summarizes ESCO and natural gas equipment installer findings and offers suggestions for NYSERDA program improvement

4.3.1 ESCOs

For most Commercial & Industrial (C&I) energy end-users, designing and installing comprehensive energy efficiency retrofits falls beyond the organizations' core competencies. Choosing appropriate equipment and modifying complex building systems (e.g., electrical or HVAC) requires specialized knowledge and skill sets that most end-users do not possess among their in-house staff. The market for retrofit projects has responded, with a variety of companies offering efficient products and services along the supply chain. Most of the companies have specialized knowledge in the following sectors: HVAC systems, boilers, energy management systems and products, and heating and cooling systems. These companies vary considerably in both volume of sales and number of employees. Larger ESCOs may have service areas outside of New York including neighboring states or, potentially, complete national coverage. Around 99 percent of the companies have less than 100 employees, while 87 percent have less than 20 employees (Figure 22). Figure 23 shows that approximately 60 firms (1.2% of the total population) have more than 100 employees.

Figure 21. Small to Medium Size Companies Operating in New York¹⁹

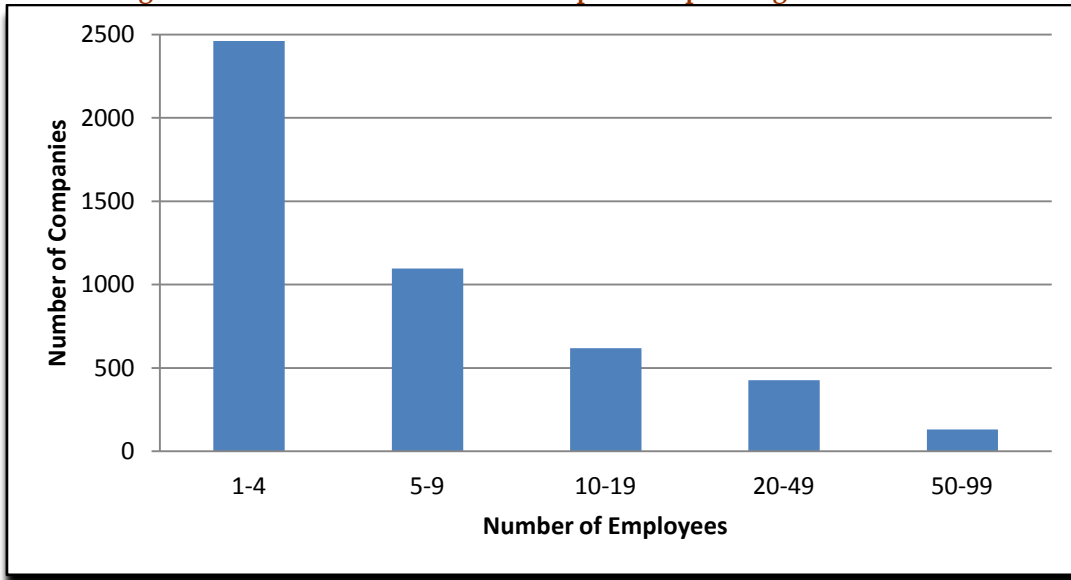


Figure 22. Medium to Large Size Companies Operating in New York²⁰

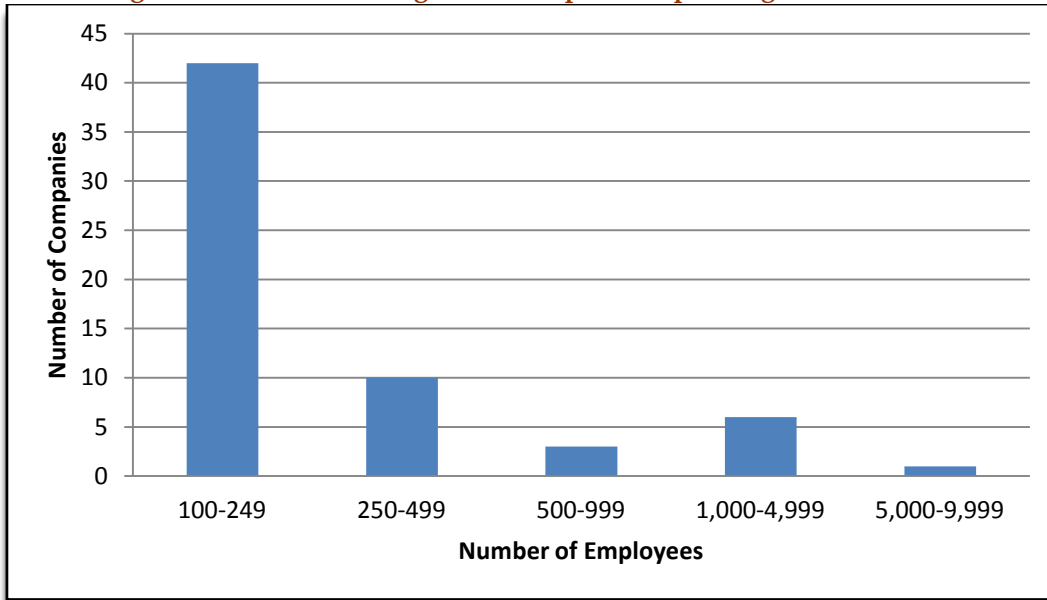
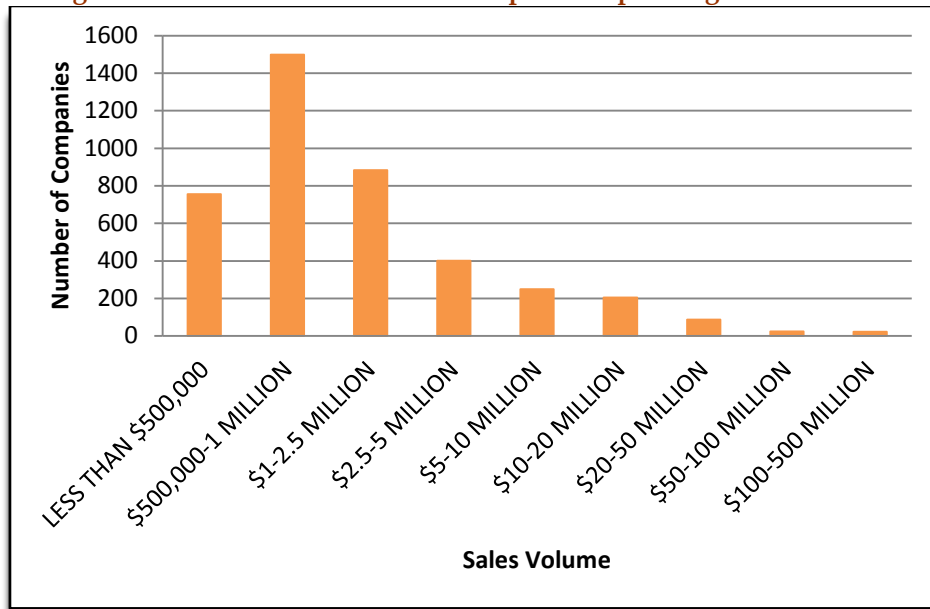


Figure 24 shows that around half of the companies in the population reported annual sales volumes of less than 1 million dollars while 37 percent of the companies reported annual sales between 1 million and 10 million dollars. Only nine percent of the companies reported annual sales figures above 10 million dollars and within this group just one percent reported annual sales above 100 million dollars. Energy efficiency often represents only a portion of many of these firms’ revenues or service offerings. For others, retrofit projects may drive the majority of their business.

¹⁹ SIC Code Analysis (list procured from infogroup.com)

²⁰ SIC Code Analysis (list procured from infogroup.com)

Figure 23. Total Sales Volume of Companies Operating in New York²¹



4.3.2 Natural Gas Equipment Paths to Market

Overview and Definitions for NG Equipment Distribution Channels

There are several general primary channels of equipment distribution downstream from manufacturing operations including manufacturers’ national accounts, wholesalers, mechanical contractors, and general contractors (DOE) (Figure 25). Specifically, national account distribution channels allow the end-consumer of the natural gas equipment to directly purchase and have their equipment installed through a single point of contact with a national account representative. Wholesalers typically cater directly to contractors or installation firms but may also ship equipment to smaller mercantile/retail businesses. Mercantile/retail businesses include but are not limited to: Catalogue/E-Commerce operations, Private Label Vendors, and National Retailers. In the context of this report:

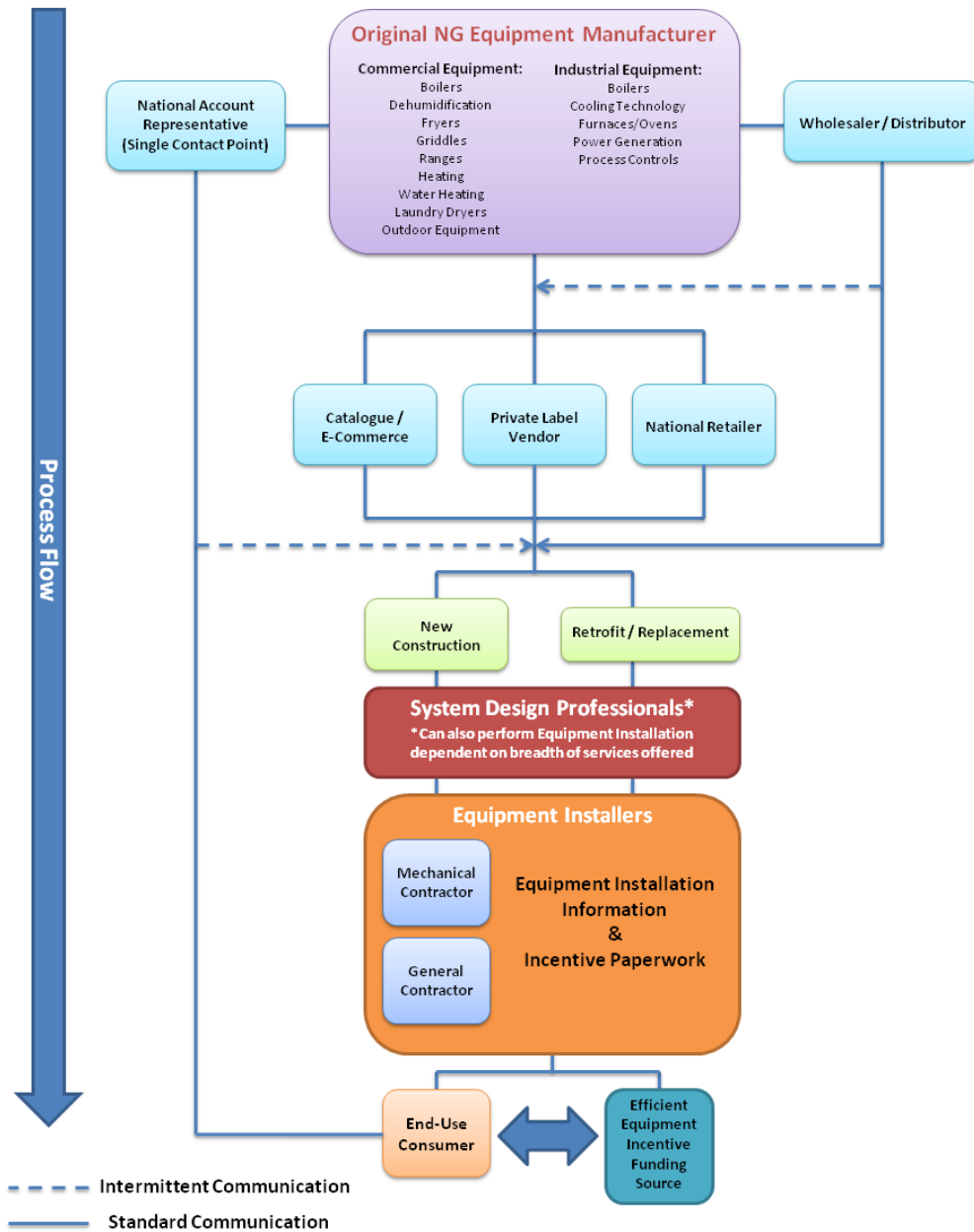
- » **Catalogue/E-Commerce** operations are defined as businesses which utilize a marketing medium such as paper publications or the internet to exchange goods, information, products, or services.
- » **Private Label Vendors** are defined as businesses which acquire and rebrand goods from a manufacturer or wholesaler/distributor.
- » **National Retailers** are defined as businesses with branches across the country with the capacity to sell goods at full price to customers.

These smaller mercantile operations are not limited to only dealing with wholesalers and may also procure equipment direct from the manufacturer. It should be noted that clearly differentiating one operation from another is difficult due to overlap in business practices between the three aforementioned paths to market. For example, Superior Products is a private label vendor of natural gas cooking

²¹ SIC Code Analysis (list procured from infogroup.com)

equipment. While they do act as a private label vendor, Superior Products also has walk-in wholesale outlet centers in addition to e-commerce operations through U.S. Foodservice Equipment & Supplies and other e-commerce businesses. Moreover, HVAC technicians and firms may also choose to rebrand natural gas equipment under their own company names. This is performed as a means of building “their” brand (i.e., selling the natural gas equipment also means selling the quality of their installation/services) and classifies them as a private label vendor. This is primarily performed to promote repeat customers as an end-user is more likely to contact the company branded on the installed equipment for services. Figure 25 provides a graphical representation of the abovementioned natural gas equipment paths to market including an overview of the general players and processes involved:

Figure 24. Natural Gas Equipment Paths to Market Flowchart



Key Players and Influences on Equipment Purchasing Decisions

When purchasing new, retrofit, or replacement commercial and industrial natural gas equipment, consumers face several major influences towards purchasing decisions. Major utility providers have a strong influence on equipment purchases based on equipment nameplate efficiencies. For example, Consolidated Edison of New York (Con Edison) will only offer incentives for equipment which matches their desired nameplate energy savings criteria. There are two major points of contact the consumer may utilize to acquire new equipment:

- 1) Approach a national account representative
- 2) Approach a licensed contractor

For new construction, a general contractor will size the system and offer suggestions to the end-use consumer for appropriate natural gas equipment in addition to installation.

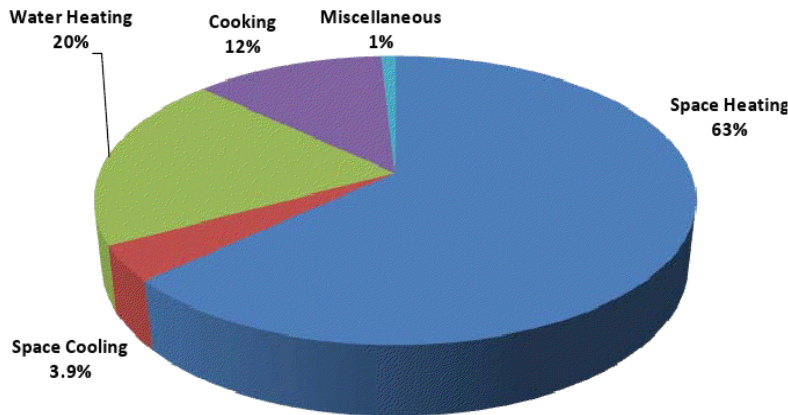
Retrofit/replacement systems operate under a similar principle to new construction, but more individuals are involved in the process and a specialty mechanical contractor will typically be called in to perform or suggest the necessary mechanical changes which will be required for proper installation. For both new and retrofit/replacement scenarios, the contractor is in charge of sourcing the consumers' desired equipment which may be delivered from wholesalers or mercantile/retail businesses. As with new construction, the contractor(s) associated with the project may offer suggestions for preferred equipment based on application, sizing, and energy savings to the consumer in addition to required technical and legal documentation of work performed. Contractors may typically also provide information to the consumer regarding available incentives for installation of high-efficiency equipment.

Some local distribution companies also maintain lists of preferred equipment and natural gas providers. For both new and retrofit/replacement scenarios, the contractor or installation firm is typically in charge of filing for incentives in the state of New York if all installation requirements of the natural gas energy service company (ESCO) or local distribution company are met. Smaller to mid-sized end-use consumers are typically not well-versed with the incentive filing process and are unaware of what incentives are available for their equipment. In these cases, the end-use consumer will have an incentive in mind for which they would like the contractor to file. Larger end-use consumers will typically have the resources available to make informed decisions during the incentive filing process and may approach the equipment system installers with information regarding which incentive package the installation firm should file for.

Specialty Industries and Influences on Equipment Purchasing Decisions

For specialty industries such as foodservice or laundry operations, there exist several additional paths for equipment to reach the end-use consumer. While there are distinct differences between individual industries, the ultimate result of additional equipment paths to market is an increase of entities involved throughout the equipment procurement process. For reference, inset below Figure 26 and Figure 27 are graphics illustrating gas consumption by end-uses for the commercial and industrial sectors. Bearing in mind that commercial laundry and foodservice operations consume natural gas for space conditioning and water heating in addition to proprietary process equipment, the usage profiles for these facilities may be comparatively large depending on the size of the facility and therefore represent a viable market segment for natural gas efficiency.

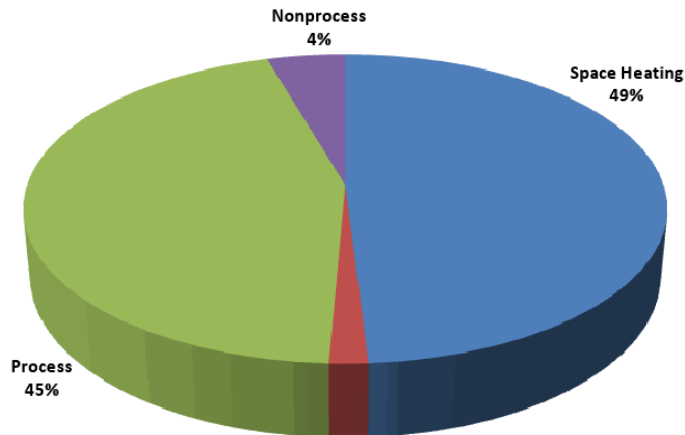
Figure 25. Commercial Natural Gas Consumption by End Use (2007)
Commercial Gas Consumption by End Use, 2007



Source: Energy Efficiency Potential Study for Consolidated Edison Company of New York, Inc. Volume 3: Gas Potential Report (Final Report)

Figure 26. Industrial Natural Gas Consumption by End Use (2007)

Industrial Gas Use in 2007 by End Use



Source: Energy Efficiency Potential Study for Consolidated Edison Company of New York, Inc. Volume 3: Gas Potential Report (Final Report)

In commercial foodservice operations designers, bulk-buying groups, contractors, and used equipment sellers will be involved in the equipment allocation and installation process. Bulk-purchasing groups (or group buyers) are set up through franchises for independent owners whom are the participants. Bulk-purchasing of equipment occurs directly from the manufacturer and offers savings to the end-use consumer. Designers are involved in the aesthetic or functional design process of the consumer establishment and occasionally act as a medium in which equipment from the manufacturer passes through prior to approval from the end-use consumer and subsequent installation. Contractors will offer suggestions to the end-use consumer for equipment which will meet functional requirements in addition to equipment installation. Used equipment sellers are as they suggest and act as a 3rd party distributor of used equipment for restaurant or franchise owners.

Commercial laundry operations also incorporate additional entities in the equipment distribution chain. Commercial laundry operations target a wide range of commercial establishments and include but are not limited to: apartments, residence halls, condominiums, cooperatives, hotels, motels, military installations, campgrounds, RV parks, senior citizen residences, truck stops, and marinas. The most notable individuals involved in the equipment procurement process are route operators, Laundromats, and private/institutional building managers. Route operators purchase machines direct from the manufacturer and operate as a leasing business. Private/institutional building managers may either choose to lease equipment from the route operators or purchase their equipment direct from a wholesaler/distributor. Laundromats purchase their equipment directly from a wholesaler/distributor. As route operators function as a leasing business, only the building managers and Laundromats deal directly with the natural gas providers and pay the associated utility bills. All natural gas laundry equipment must still be installed by a licensed contractor and meet utility defined energy savings profiles to be eligible for high-efficiency incentives.

High-efficiency options are available in the commercial foodservice and laundry market segments, and represent considerable savings over standard efficiency equipment. Based on the findings in this section, it is advisable that NYSERDA focus educational outreach efforts towards contractors and business owners. Given the increased entities involved in the equipment decision and procurement process in addition to the wide range of equipment options available; educational awareness of natural gas efficiency would be most effectively implemented at the equipment installer and end-use consumer level.

4.3.3 Natural Gas System Installer Interview Findings

Navigant completed 18 interviews with natural gas ESCOs and Equipment Installers operating within New York. Twelve of the 18 interviewed implementation firms indicated that they had worked with NYSERDA before in the commercial and/or industrial natural gas sectors while the remaining 6 primarily dealt with local utility C&I natural gas incentive programs. The operational lifetime of these firms ranges between one and 66 years with a median age of 23 years. More than 80,000 installed pieces of C&I equipment within New York are represented by these firms. Given that the interviews targeted activity in the commercial and industrial (C&I) sectors and 67% of the firms also serve other sectors, an overall correlation between firm size and the number of C&I systems installed does not exist. Although some respondents indicated that they installed and serviced all types of C&I natural gas equipment, 75% of respondents indicated that they performed installation and service largely for furnaces and boilers. As indicated by the respondents, the natural gas utilities represented by these firms include but are not limited to the following: National Grid, National Fuel, ConEdison, Central Hudson, Orange & Rockland, NYSEG (formerly Niagara Mohawk), RG&E, and some smaller local utilities. The majority of larger firms indicated that their business operations have complete New York coverage in addition to varying degrees of national presence.

The results contained within this section are solely based on natural gas ESCO and Equipment Installers operating within New York State. Given the small sample size of firms interviewed relative to all C&I natural gas equipment implementation firms identified as operating within New York State, the results contained within this section should be considered anecdotal findings and interpreted as such. A recommendation for future research to complement the results of this study could be to conduct end-user interviews which would provide additional perspectives on the overall program influence.

Natural Gas System Installer Interview Results

Survey respondents reported that they specify the natural gas equipment types and technical specifications to be installed including the capacity and efficiency rating 87% of the time on average. The professional in charge of system design will typically have the most influence on equipment purchasing decisions, and 83% of respondents recommend high-efficiency equipment options to their customers 90% of the time or greater. Depending on project requirements, the professional(s) may be architects and/or engineers external to the installation firm. This scenario is typically encountered for large C&I spec jobs where the system has already been designed and the equipment specifications already defined. Alternatively, the professional(s) may be internal to the installation firm for projects in which the system must be designed or altered. For both scenarios, engineering decisions ensuring installed equipment will adequately handle system loads will typically take precedence over energy efficiency considerations for large commercial and industrial operations. For non-spec jobs, in the rare instances where the equipment installer does not specify the equipment to be installed, the customer will specify the desired equipment.

Respondents researched and recommended gas efficiency incentives for the installed equipment 70% of the time on average. Many smaller firms lack the resources to stay updated on the most current incentives available whereas larger firms are better versed to provide customers with the most recent information. In the rare instances when the installation firm does not recommend specific incentives, the customer will manage the selection. It should be noted that in this latter instance, the contractor or installation firm may still be involved in the process by providing the customer with technical documentation or performance measurement and verification of the installed equipment dependent on incentive filing requirements.

Program awareness plays a key role in equipment purchasing decisions. With regards to NYSERDA's natural gas energy efficiency programs for the C&I sectors, it was found that 83% of respondents were aware of NYSERDA's offerings. For the firms that were aware of NYSERDA's offerings, 67% added that they were confused about the different programs under which NYSERDA provides funding for gas efficiency projects. Generally, both small and large firm representatives commented that the factors driving incentive recommendations between NYSERDA or local utilities were as follows (in no particular order):

- a) Ease of the filing process
- b) Ability of the representative to answer questions
- c) Value of the incentive
- d) Stability of the incentive
- e) Any long-term obligation for measurement and verification

With regards to the findings above, points A and B complement one another and are important to address for contractor program awareness. Respondents commented that many of the ambiguities associated with the incentive filing process may be substantially reduced through the ability of project financing source representatives to answer questions regarding the programs. Some firms mentioned instances in which they had contacted NYSERDA and local utility representatives with questions, but were unable to have all of their questions answered with concrete responses. Some examples of these questions for both NYSERDA and local distribution companies would be current program offerings, how to become an approved contractor, and the incentive application process in general.

Concerning point C, respondents unanimously agreed that incentives drive customer decisions to purchase and install high-efficiency natural gas equipment in the C&I sectors. Conversely, many of these

respondents also shared the sentiment that while the value of the incentives should be great, they should be just enough to sway the decision of the customer towards purchasing high-efficiency equipment which aids in addressing free-ridership concerns.

Addressing point D, larger projects may span multiple calendar years. As such, extended project deadlines require additional attention to equipment selection during project design, and many installation firms look for stability in incentives between calendar years. Utility-sponsored incentive programs frequently change between calendar years which can be troublesome as qualifying equipment selected during the project design phase may no longer qualify for incentives at the end of an extended contract term. It was however pointed out by many larger respondents (with sales volumes including and exceeding \$2.5-5 million per year) that NYSERDA programs are more desirable for long-term projects as program changes are not necessarily implemented between calendar years, and many changes still qualify equipment selected prior to program changes.

For point E, respondents indicated that customers oftentimes prefer the measurement and verification (M&V) process to be short and unobtrusive. Nevertheless, it was also mentioned on numerous occasions that if a customer must choose an incentive with a greater return on it, then they would be more willing to go through a multi-year (M&V) process.

Natural Gas System Installer Interview Feedback

Compared to incentive offerings by NYSERDA, more than half of the respondents considered local utility incentives to be more attractive for smaller projects or projects involving yearly natural gas usages of 12,000 Mcf or less. This usage profile would correspond to prescriptive incentives for NYSERDA's Existing Facilities Program. Most of the respondents who shared this sentiment expressed that the process to file for local utility incentives is usually accomplished through the customer's local utility account number. The existence of centralized utility billing systems drastically reduces the effort required by the contractor to file for incentives. In these instances, typically only paperwork documenting the installed equipment is required to be produced by the contractor to retrieve prescriptive incentives for the customer. Given the large volume of projects installation firms see on a yearly basis, this reduction in effort through centralized billing and prescriptive incentives is substantial enough to sway the decision from recommending NYSERDA incentive program offerings to recommending local utility program. As an extreme, some of the smaller firms surveyed had in-house staff whose major responsibilities involved filing paperwork for incentives. At a price point, however, all respondents considered NYSERDA incentives as comparable to those offered by local utility programs for prescriptive incentives.

For larger C&I customers and projects, the majority of respondents who have previously dealt with NYSERDA preferred NYSERDA's offerings over local utility programs. The usage profile for these larger projects would be 12,000 Mcf yearly natural gas consumption or greater, which corresponds to non-prescriptive incentives from NYSERDA's Existing Facilities Program. The reasoning for this as provided by the survey respondents is that NYSERDA provides more comprehensive incentive packages over local utilities for larger projects.

With regards to incentive package comprehensiveness, it is important to note that there is an apparent divide amongst respondents with regards to prescriptive and performance-based incentives. Some system installers believed that incentive funding sources should gravitate increasingly towards performance-based incentives due to the current state of the efficiency market, which is not placing enough emphasis on comprehensive energy solutions including building energy audits. The shared

sentiment for these firms is that, for prescriptive-based programs, the reward for a simple replacement is the same as a comprehensive solution. This does not sufficiently address free ridership, which occurs when the customer needs a replacement and realizes that there is incentive funding available for the system. Conversely, other system installation firms believe that incentive programs should gravitate more towards prescriptive programs as performance-based incentives require excessive added effort from both the installation firm and the customer. Respondents who shared this sentiment expressed that additional confusion and paperwork have oftentimes stemmed from performance-based programs. As an extreme, some respondents who have used both NYSERDA and local utility programs mentioned that if a building owner needs a quick turnaround on a project then NYSERDA incentives are not typically selected because the process is perceived to be complicated and time consuming.

The majority of respondents were content with NYSERDA’s administration of incentives based on verified installed system performance, but were not as enthusiastic regarding the ongoing reporting requirement which was described by one respondent as onerous. Moreover, respondents indicated that much of the confusion experienced when applying for incentives through NYSERDA comes from equipment definitions. For example, in a single facility there may be 15 different sizes of boilers of which each boiler could have differing nameplate efficiencies and expected energy savings. The confusion for this scenario comes from the installation firm that must file the paperwork for each piece of equipment, which can become extremely time-consuming and cumbersome for the contractor. The difficulty of this exercise is further compounded when ongoing energy measurement and verification is required from the contractor and customer.

Suggestions for Improvement Made by System Installers²²

During the course of the interviews, numerous suggestions were offered by respondents to reduce ambiguity and promote NYSERDA program adoption. Root causes of NYSERDA C&I program confusion and criticisms were identified, and the most prominently recurring suggestions provided by the respondents are outlined below:

- a) Change the requirement from Building Performance Institute (BPI) to North American Technician Excellence (NATE) or an equivalent certification closer to the scope of a contractor’s practice to become a NYSERDA-approved contractor
- b) Make incentive forms shorter and easier to understand. (Most utilities do this particularly well, but also have centralized billing systems in place which may directly reference customer account information.)
- c) Track and address external changes in a timely fashion such as difficulty in retrieving customer billing data which may affect designed program operation.
- d) Reorganize all NYSERDA C&I natural gas efficiency programs under a single umbrella program or offer a single program for each type of project
- e) Consolidate and/or compare all current incentives available across New York into a single webpage or source for simple comparison of all funding resources for contractors and customers

²² These suggestions were made by equipment installers and are provided for informational purposes only – they are not intended to be interpreted as formal recommendations made by Navigant.

f) Improve payment timing

Addressing point A, it was found that the majority of smaller firms interviewed lacked the appropriate funding or resources to participate in and complete the BPI certification process. Representatives from these smaller firms, including those which had staff with BPI certification, commented that alternate routes to becoming a NYSERDA-approved contractor should exist. One recurring suggestion to bypass the BPI certification process could be to require contractors to participate in the NATE certification process, which is less financially demanding and more applicable to the scope of light commercial HVAC work performed by many smaller installation firms. For these reasons, many smaller firms preferred local utility incentive programs. The primary reasoning provided by most respondents was that the qualification processes to become an approved or recommended utility contractor are minimal in effort and upfront financial investment. Oftentimes local utilities only require documentation of work performed and/or customer satisfaction surveys for installation firms to become preferred contractors. Ideally, tailoring the required certification process more closely with the scope of work performed by the contractor would be desirable to increase NYSERDA program adoption. While measurement and verification is a vital process to quantify the value and capture the progress of energy efficiency program, it requires effort from contractors.

Common sources of nuisance for all respondents are represented by points B and C. All respondents indicated a high level of confusion and difficulty surrounding the paperwork filing process for incentives for both utility and NYSERDA programs. For NYSERDA programs, these sources of confusion may stem from causes internal or external to the program design. For example, one respondent applied to NYSERDA's Existing Facilities Program and was required to send documentation to confirm the firm pays the System Benefits Charge. However, the firm's utility did not identify this information, presenting the firm with a lengthy process to obtain this information from the utility. In this situation, a substantial amount of effort external to NYSERDA's Existing Facilities Program is being put forth by the contracting firm during the incentive filing process. An example of an internally contributing factor to paperwork confusion and difficulty was voiced by a firm which, at the time of the interview, filed for approximately 20 NYSERDA incentives per month. This respondent mentioned that they were having issues with rescinded applications from a company administering NYSERDA incentives in their service area. The claim stated was that customer applications were rescinded over small details that do not have much impact on how much energy the project will save. The incidents illustrated above are fairly specific, but the major takeaways for this point are that NYSERDA should continue to be proactive in addressing program participant claims for internal factors, and remain cognizant of the potential for detrimental external factors outside of NYSERDA's control such as the example listed above which will inherently affect program perception.

Points D and E are complementary in that they both represent a consolidation and simplification of the incentive selection process. Many respondents noted that a substantial area of confusion when dealing with incentives stems from the multitude of programs available on the market from various funding sources. Common complaints regarding these points include confusion when comparing incentive packages due to information dispersion across various sources, and confusion when attempting to identify what incentive packages installed equipment will qualify for. Therefore, a general suggestion for improvement is that the DPS should consider conducting additional research to determine market interest in and the likely viability of an online program comparison tool to help contractors and customers reduce time spent on incentive research. Specifically, for NYSERDA programs, a suggestion for improvement could be to consolidate natural gas efficiency programs under a single umbrella

program or alternatively offer a single program for each type of project such as HVAC, Water Heating, Process, etc. As an example, the Existing Facilities Program currently offers two primary forms of incentives within the program: prescriptive and performance-based. An option to simplify this program could be to administer fixed prescriptive incentives based on the nameplate efficiency of the equipment itself followed by additional variable incentives based on verified energy savings. Taking this suggestion a step further and capturing the efficiency market desire for M&V transparency, NYSERDA could administer these incentives annually dependent on measured performance for each subsequent year (e.g. after year 1, 2, 3, etc.). Irrespective of any route taken to streamline NYSERDA programs, a balance must be maintained between ease of use, program transparency, and financial reward.

For point F, firms of all sizes criticized the long wait times for incentives to appear after paperwork approval. Multiple firms listed examples of month to half-year long waiting periods before delivery of the incentive. As an example, affected respondents commented on numerous occasions that they had to put forth financial assets to complete a project and were not reimbursed by NYSERDA until months after project completion. Given these circumstances, it is recommended that NYSERDA consider options for streamlining the incentive distribution process for improved customer and contractor relations.

Given these findings for drivers of equipment specification and incentives, it is also advisable that NYSERDA continue or increase contractor outreach. Potential channels for this outreach could include brown bag sessions, on-site visits, or mailings to installation firms of all sizes. Respondents representing smaller firms commented that they would like to have tangible materials in hand such as pamphlets or newsletters when recommending incentives to a customer. This ability for the contractor to distribute or reference physical media when attempting to sell their services can also serve as a powerful tool in marketing NYSERDA programs and general natural gas efficiency awareness. Both small and large firms praised NYSERDA for their ongoing efforts to reach out to contractors, but commented that more educational outreach is required to reduce or eliminate confusion during the incentive filing process. Therefore, NYSERDA should increase marketing of their programs and make information increasingly digitally and physically available for interested parties. The majority of firms interviewed expressed concern that the levels of confusion regarding and incentives are currently moderately to fairly high. These respondents were pleased that NYSERDA is actively involved in collecting feedback regarding its programs and is working to improve them.

Natural Gas Efficiency Market Trends

There were a wide range of perspectives and insights into recent natural gas efficiency market trends offered during the interview process. Firms of all sizes commented that the number of companies offering energy efficiency services has increased over the last five years due to an increased availability of efficient technology options for customers. While this is a positive trend, respondents also tended to comment that many of these energy efficiency service companies have commoditized the market such that building/facility owners desiring energy services are looking more for low cost over expertise (lowest bidder vs. quality of service).

From a technological point of view, most respondents observed a general trend towards recommending and installing more efficient equipment as a result of consumer demand. However, as a counterstatement, some respondents also observed a shift in the commodity market towards lower overall costs of natural gas. This affects the implementation of equipment as consumers are more willing to install high efficiency equipment if the cost of energy is great. The only specific technology trend noted

was a shift to infrared (IR) heating in garage/warehouse applications as opposed to forced air or other available technologies.

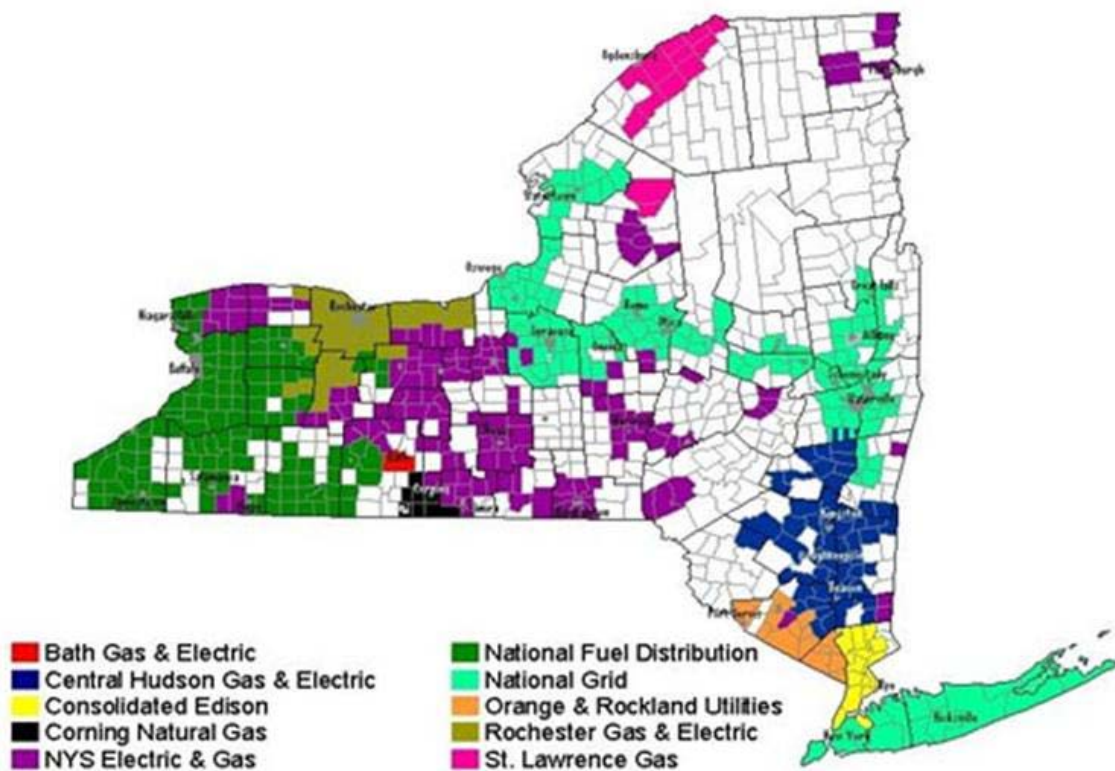
It was also noted from a survey respondent that local utilities have recently started hiring outside consulting firms to spearhead the implementation of their projects.

5 Utility Natural Gas Efficiency Program Analysis

Navigant conducted primary and secondary research to better understand utility C&I offerings for natural gas energy efficiency in New York. The secondary research comprised the great majority of the research effort. Navigant conducted a thorough review of relevant filings to identify and analyze utility natural gas energy efficiency incentive offerings. These documents are hosted by the New York State Public Service Commission. Relevant files include Orders by the New York Public Service Commission and monthly Scorecard reports submitted by gas utilities to the Commission. In terms of primary research, Navigant conducted interviews with representatives from three utilities. The remainder did not respond to the interview requests.

The following is a map of natural gas utilities in the State of New York:

Figure 27. Map of Utilities in the State of New York



Source: http://www.northeastgas.org/index.php?option=com_content&task=view&id=116

5.1 Approach and Methodology

Files and documents used in the analysis can be found on the New York State Public Service Commission website.²³ Two cases are of particular interest as they pertain to the Energy Efficiency Portfolio Standard (EEPS) program for New York State. The EEPS program was established on June 23, 2008 by the Commission and encourages cost-effective energy efficiency programs. Case 07-M-0548 is titled “Proceeding on Motion of the Commission Regarding an Energy Efficiency Portfolio Standard” and includes both gas and electric programs. Case 09-G-0363 pertains to “Petitions for Approval of Energy Efficiency Portfolio Standard (EEPS) Gas Energy Efficiency Programs.”

Sources used in this section include publicly available information such as utility websites, rebate applications, marketing documents, annual reports, and relevant past studies. Navigant researched the offerings of the five major gas utilities operating in New York: Central Hudson, Consolidated Edison (including its Orange and Rockland Utilities subsidiary), National Grid, National Fuel, and Iberdrola USA (New York State Electric & Gas and Rochester Gas & Electric). Each utility has been thoroughly researched and all incentives offered are compared with NYSERDA’s offerings.

Primary Research Navigant developed an interview guide for discussions with utilities. This guide was reviewed by NYSERDA staff and can be found in the appendix of this document. Navigant then contacted staff within the gas efficiency programs each of the state’s major utilities. Multiple attempts were made to interview staff at each utility. In the end, representatives from three utilities responded and interviews were conducted with each.

5.2 Secondary Research: Summary of Findings

Custom Incentive Programs: NYSERDA vs. Utilities

NYSERDA has been successful in engaging large industrial customers in its performance-based Industrial and Process Efficiency (IPE) program as verified through installer interviews. Smaller projects may favor utility programs due to perceived ease of participation and lower level of effort required.

All large utilities, except for Central Hudson, offer custom rebate programs to their commercial and industrial natural gas customers. All utility custom rebate programs require either preapproval or prescreening. Utilities reserve the right to perform inspections as necessary.

ConEdison’s and National Grid’s custom programs are performance-based. NYSEG does not provide incentive information for its custom program, but instead refers the customer to an Energy Solutions Representative.

Prescriptive Incentive Amounts: NYSERDA vs. Utilities

Utility incentive offerings for prescriptive commercial and industrial natural gas energy efficiency measures are generally higher than NYSERDA incentives. Table 6 provides an overview of high efficiency furnace and boilers offered by the five large utilities versus those offered by NYSERDA.

National Grid’s offerings are the highest, ranging from \$200 to \$7,500 more than NYSERDA’s.

²³ <http://documents.dps.ny.gov/public/Common/PublicDocuments.aspx?PublicDocs=1>

ConEdison's offerings are similar to those offered by NYSERDA. On June 1st, 2011, ConEdison increased incentive levels for water boilers across both efficiency tiers and all size ranges. This resulted in available rebates that are \$400 to \$11,500 more than NYSERDA's.

National Fuel's prescriptive and custom rebate programs are administered in partnership with NYSERDA so their offerings do not differ.

Table 6: Prescriptive Rebates Offered by Utility

Measure			NYSERDA Incentive	Utility Incentive Amount				
Equipment Type	Size	Efficiency		Con Edison	NYSEG/RGE	National Grid	National Fuel	Central Hudson
Gas Furnace	≤300 MBH	90% AFUE	\$500	\$500	\$100**	\$200*	\$500	\$500
Gas Unit Heater	≤300 MBH	90% Thermal Efficiency	\$1,000	-	-	\$500	\$1,000	-
Hot Water Boiler	≤300 MBH	85% AFUE	\$600	\$700	\$500	\$800	\$600	\$800
Hot Water Boiler	>300 to ≤500 MBH	85% Thermal Efficiency	\$750	\$750	\$1,000	\$1,600	\$750	-
Hot Water Boiler	>500 to ≤1000 MBH	85% Thermal Efficiency	\$1,500	\$1,500	\$2,000	\$2,000	\$1,500	-
Hot Water Boiler	>1000 to ≤1700 MBH	85% Thermal Efficiency	\$2,500	\$2,500	\$3,000	\$2,800	\$2,500	-
Hot Water Boiler	>1700 MBH	85% Thermal Efficiency	\$3,000	\$2,500	\$4,000	\$4,000	\$3,000	-
Hot Water Boiler	≤300 MBH	90% AFUE	\$1,000	\$1,400	\$1,000	\$1,600*	\$1,000	\$1,200
Hot Water Boiler	>300 to ≤500 MBH	90% Thermal Efficiency	\$1,500	\$1,500	\$1,500	\$2,400*	\$1,500	-
Hot Water Boiler	>500 to ≤1000 MBH	90% Thermal Efficiency	\$2,500	\$2,500	\$3,000	\$4,000*	\$2,500	-
Hot Water Boiler	>1000 to ≤1700 MBH	90% Thermal Efficiency	\$3,500	\$3,500	\$4,500	\$8,000*	\$3,500	-
Hot Water Boiler	>1700 MBH	90% Thermal Efficiency	\$4,500	\$3,500	\$6,000	\$12,000*	\$4,500	-
Steam Boiler	>300 to ≤2500 MBH	79% Thermal Efficiency	\$1/MBH	\$2/MBH	-	-	\$1/MBH	-
Steam Boiler	>2500 to ≤10000 MBH	80% Thermal Efficiency	\$1/MBH	\$2/MBH	-	-	\$1/MBH	-
Steam Boiler	≤300 MBH	82% AFUE	\$600	\$700	\$200	\$600	\$600	\$800

*92% AFUE requirement for ≤300 MBH units and 92% Thermal efficiency requirement for units >300MBH

**NYSEG/RGE's rebate for gas furnace is limited to units 150 MBH or less in size.

Note: **RED** colored costs indicate NYSEDA's incentive is lower than the Utility's
GREEN colored costs indicate NYSEDA's incentive is greater than the Utility's

5.3 Commission Approved Gas Program Costs and Savings Targets

Through various orders, the New York Public Service Commission has approved Utility and NYSERDA programs. The approved programs have prescribed savings targets and budgets for each year. Approved budgets generally reserve 5% of the total budget for evaluation and M&V activities. Program and administration costs are 95% of total approved budgets. For Corning and St. Lawrence programs, 17% of total cost is reserved for administration and marketing considering their small size.

Ratepayer Cost: NYSERDA vs. Utilities

Navigant compared the ratepayer cost of each utility program to NYSERDA's in Table 7. Costs per unit of natural gas saved by all PAs ranges from \$12.27 to \$125.86 assuming that the total budgets were spent by the end of the year. NYSERDA's cost per unit of natural gas saved is the lowest among all PAs.

Table 7. Ratepayer Cost: NYSERDA vs. Utilities

Program Administrator	Acquired and Committed (Dth)	Total Budget*	\$/Dth Saved
NYSERDA	2,239,843.10	\$27,481,909	\$12.27
Niagara Mohawk	109,233.50	\$6,128,068	\$56.10
RG&E	19,824.30	\$1,159,114	\$58.47
Con Edison	131,360.70	\$8,642,212	\$65.79
KED-LI	151,254.50	\$11,136,463	\$73.63
NYSEG	15,352.50	\$1,166,280	\$75.97
KED-NY	87,113.10	\$6,714,408	\$77.08
Central Hudson	1,870.00	\$235,350	\$125.86
Total	2,755,851.70	\$62,663,804	
*Assumes total budget is spent through 2011 including total expenditures and committed funds. Refer to Table 8 for the list of programs included in this analysis.			

Source: Utility and NYSERDA Scorecard reports (only C&I programs were included in the analysis)

Table 8 lists all programs by each PA as it was reported in scorecards. These C&I programs were included in the analysis of ratepayer costs above.

Table 8. Programs as Reported in Scorecards

Program Administrator	Program
NYSEG	NYSEG Non-Res C&I Prescriptive NYSEG Non-Res C&I Custom
RG&E	RGE Non-Res C&I Prescriptive RGE Non-Res C&I Custom
KEDLI	Industrial Program Commercial Energy Efficiency Program
KEDNY	Industrial Program Commercial Energy Efficiency Program
NYSERDA	All Business and Institutional Programs: Existing Facilities - Gas Flexible Technical (FlexTech) Assistance Program Industrial and Process Efficiency Program - Gas High Performance New Construction Agriculture - Gas
Central Hudson	Commercial Natural Gas Program
ConEd	C&I Equip Rebate Gas Program Custom Gas Efficiency Program
Niagara Mohawk	Energy Initiative - Large Industrial Gas Program Energy Initiative - Mid-Sized Gas Program Commercial High Efficiency Heating and Water Heating Program

Measurement and Verification: NYSERDA vs. Utilities

NYSERDA requires measurement and verification for their performance based programs, but only performs M&V on their largest projects. Utilities do not require but rather reserve the right to conduct pre and/or post inspections. Requiring inspections – even if they are not performed – could deter customer participation. Utilities that do not generally require inspections may see more participation.

Existing Facilities vs. New Construction

Most of the publicly available data on utility gas efficiency programs focuses on existing facilities programs. Neither NYSEG nor ConEdison offer natural gas incentives for new construction. National Grid offers a separate program for new construction, information for which was unavailable. Central Hudson does not mention new construction in their prescriptive program.

5.4 Scorecard Results Reported as of November 2011

The Commission, in an order dated January 16, 2009, required Utilities to report monthly and annually on the status of each program. The monthly Scorecards are due 30 days after the close of each month while annual Scorecards are expected within 90 days at the close of each year. Scorecard results, including therms acquired to date, percent of total program goals achieved, budgets, and expenditures, for each program can be located on the DPS website.

5.5 Utility Information

Utility background, program offerings, program eligibility requirements and program awareness information for the five major utilities can be found in Appendix A.

5.6 Primary Research: Summary of Findings

Utility View of C&I Natural Gas Efficiency Market

Utility staff noted that while they have had considerable success on the electric side of energy efficiency programs, there have been difficulties on the gas side. Given that the low price of natural gas has reduced the attractiveness of the business case for gas equipment improvements, the sense of urgency on the part of C&I customers is much less. The capital investment required for improvements, such as the replacement of large boilers, is very high. In many cases, rebates are not of a sufficient amount to compel C&I customers to change out equipment. Rather than investing in large equipment like boilers, some customers are investing in controls where, in some cases, substantial savings are to be had.

Utility C&I Natural Gas Efficiency Programs

The utilities interviewed cited that the majority of their C&I incentives go toward boilers and furnaces for space and hot water heating.

No other trends were consistent across the surveyed utilities.

Utility Programs vs. NYSERDA Programs

Utility staff acknowledged that customers can become confused when exploring gas efficiency incentives as both NYSERDA and utilities offer these incentives. More sophisticated customers will “shop around” by bidding project to both NYSERDA and their local utility – playing one off against the other. This can create increased inefficiencies for both NYSERDA and utilities. Customers without the appropriate in-house staff may be upset at having to do their own “homework” in-house.

- Given the overlap in programs, one utility proposed that the utilities and NYSERDA should consider differentiating their programs.

6 Suggestions for Consideration

NYSERDA's success in the large C&I segment is well recognized by its customers. Results from installer interviews reveal that large C&I customers are very satisfied with NYSERDA's performance-based offerings. The findings of this study suggest that NYSERDA should continue and expand its current efforts in the large C&I customer segment.

Customers drawn to pre-qualified incentives tend to have less capacity to devote time and effort towards the incentive application and EM&V processes; these customers gravitate towards utility prescriptive offerings due to a perceived lower time commitment. If NYSERDA chooses to further engage customers favoring pre-qualified incentives, it may wish to consider the incentive selection factors identified in this study to help develop strategies which increase the visibility and attractiveness of NYSERDA's offering to this customer segment.

Navigant has summarized suggestions for consideration categorized for marketing programs, processes, and future research topics:

Marketing suggestions:

- **Continue and increase contractor outreach:** NYSERDA hosts brown bag sessions to educate contractors on the incentive application process. NYSERDA's brown bag sessions and on-site visits have been well received and are considered very beneficial and engaging by equipment installation firms of all sizes.
- **Provide tangible marketing materials:** NYSERDA should provide tangible marketing materials (e.g. program brochures) to explain NYSERDA's programs to customers. This approach is effective for reaching small to mid-size customers.
- **Direct marketing to energy intensive industries:** Chemical and metals industries are energy-intensive and are the largest industrial users of natural gas in New York. These industries might be an attractive market for NYSERDA and NYSERDA should use the IPE and other direct outreach channels to increase engagement from customers in this sector. This is an effective marketing approach to reach large industrial customers which are the target market for the Industrial and Process Efficiency (IPE) program.

Program process suggestions:

- **Increase understanding of factors driving customers' choice of programs:** Installers indicate that time commitment and incentive amounts are the main drivers for choosing an energy efficiency program. Most utilities have shorter pre-qualified incentive processes because they have centralized billing systems in place which directly reference customer account information during the application process. While it is the SBC determination that causes longer processing time for NYSERDA incentives, in general, customers are more drawn to programs requiring less paperwork and time commitment. However, time commitment from customers and program administrators is necessary for evaluation, measurement, and verification (EM&V) which is essential to long-term savings and quality control.

- **Continue with performance-based incentives and explore options to modify pre-qualified incentives to further engage small to mid-size customers:** NYSERDA currently offers both performance-based and pre-qualified incentives. NYSERDA's performance-based incentive has been successful among large C&I customers. Small to mid-size customers choosing pre-qualified incentives tend to have less capacity to devote time and effort towards the incentive application and EM&V processes. As such, some small to mid-size customers may gravitate towards choosing utility offerings due to a perceived lower time commitment. To further engage small to mid-size customers, NYSERDA could explore alternative pre-qualified incentive structures such as offering bonus incentives to pre-qualified customers after performance verification resulting from the M&V process. The eligibility of a bonus may motivate customers to participate in the M&V process and make customers more receptive to a longer participation process.

Future research topics:

This study was conceived as a high-level effort to provide NYSERDA with additional information regarding the market for natural gas incentive offerings in the C&I sector. Should NYSERDA perceive a need for more targeted information in this market, Navigant has identified the following items that may be of interest to NYSERDA evaluation planners and program staff.

- **End-user interviews:** The interviews conducted for this study focused on equipment installers. End-users were not interviewed. Future research focusing on end-users' experiences with NYSERDA programs could be conducted to enrich the study with more perspectives.
- **Program eligibility research:** Research large customer base to determine the percentage of customers that has interruptible gas service and is therefore ineligible to participate in NYSERDA programs. Having information on customer program eligibility could help NYSERDA efficiently target potential customers.
- **Ratepayer cost research:** It is critical for PAs to keep ratepayer cost as low as possible while delivering valuable program offerings. Much value can be derived by monitoring and comparing the cost of energy saved by each program administrator to pinpoint and improve the efficiency of using ratepayer contributions.
- **Impact of codes and standards on natural gas efficiency savings potential:** As described in this study, the ECCCNYC was only recently adopted. As such, the impact of codes and standards on savings potential has not been well studied. Understanding the impact of codes and standards is critical as it could have implications on program administrators' opportunities to achieve goals and targets.
- **Additional utility interviews:** Only a few utility contacts were available for comment in this study. Further study focusing on the perspective of utilities regarding their collaboration with NYSERDA would be valuable.
- **Online program comparison tool:** Survey respondents of all sizes indicated that a large source of confusion regarding programs stems from the lack of a centralized database or webpage for efficiency program research. This requires contractors and, to a lesser extent, customers to spend time and effort comparing existing program offerings and associated requirements across multiple sources. The DPS should consider conducting additional research to determine market interest in and the likely viability of an online program features and services comparison tool to help contractors and customers reduce time spent on program research. The suggested web tool

is similar to the New Jersey Clean Energy Program website where information from various programs can be easily accessed on the same website.²⁴ An additional example is the online energy efficiency program identification tool developed by unwaste.org.

²⁴ www.njcleanenergy.com/main/rebates-and-promotions.
New York State Energy Research and Development Authority
COMMERCIAL/INDUSTRIAL NATURAL GAS MARKET CHARACTERIZATION DRAFT