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NYSERDA Residential Statewide Baseline Study

Volume 1: Single-Family Report

Final Report

July 2015

Report Number 15-07

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Volume 1: Single-Family Report

Final Report

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Abstract for Volume 1

Volume 1 presents the single-family findings from the statewide residential baseline study that was conducted from 2011 to 2014. The study included the single-family and multifamily residential housing segments, including new construction, and a broad range of energy uses and efficiency measures. The overall objective of the study was to understand the residential building stock and associated energy use, including the saturations of energy-consuming equipment (electric, natural gas, and other fuels) and the penetrations of energy efficient equipment, building characteristics, and energy management practices. The study also collected customer household and demographic information that can be correlated with energy usage features. This information will be used to establish more accurate baselines for calculating program energy savings, to estimate the influence of NYSERDA's and other New York State program administrators' activities on the market, and to support program planning in New York State. The residential baseline study conducted data collection on single-family homes for the three climate zones of New York State. Data were first collected through 2,947 telephone and Web surveys that included 659 newly constructed single-family homes. The telephone and Web surveys were followed by data collection during on-site inspections at 700 single-family homes that included 182 newly constructed homes (built 2012 and after). The results of the residential baseline study are presented in five volumes of reports. Single-family is the first of the five volumes.

Keywords

Energy efficiency, single-family homes, market characterization, baseline study

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1 Introduction

1.1 Background and Study Objectives

In 2013 and 2014, NYSERDA, in collaboration with the E2 Working Group[1] Statewide Study Subcommittee led by the New York State Department of Public Service (DPS), conducted a residential statewide baseline study. The NYSERDA evaluation group, in coordination with the lead contractor of this study, Tetra Tech MA, Inc. (Tetra Tech), and its subcontractors, Performance Systems Development (PSD), and GDS Associates, Inc. (GDS), developed and implemented a detailed work plan to complete this study.

This study included the single-family and multifamily residential housing segments and a broad range of energy uses and efficiency measures. The overall objective of the study was to understand the residential building stock and associated energy use, including the saturations of energy-consuming equipment (electric, natural gas, and other fuels) and the penetrations of energy efficient equipment, building characteristics, and energy management practices. The study also collected customer household and demographic information that can be correlated with energy usage features.

Residential energy users throughout New York State were included in the scope of this study. Random samples were drawn individually by each of the major electric utilities' from their residential accounts. Those utility samples represented 90 percent of the State's residential households—most of the remaining 10 percent are served by municipal and cooperative utilities. Samples were designed to ensure some representation in each of the 10 Economic Development Regions, and to meet 90/10 confidence level statewide and for the three climate zones for most data collection activities. Having robust sample sizes at the climate zone level was important to identify differences that should be considered in program planning and to calculate more accurate energy savings for the potential analysis and future program evaluations. In particular, climate zone 4, which is aligned to the Downstate region of New York State, has some very distinct differences from Upstate New York represented by climate zones 5 and 6.

[1] Prior to the creation of the E2 Working Group, the former Evaluation Advisory Group held a similar role on this study.

The information gleaned from this study will be used by NYSERDA, DPS, New York program administrators, and other stakeholders to set more accurate baselines for evaluation purposes and help inform program planning.

The project has three main components:

- **Residential Baseline Study.** The evaluation team conducted a comprehensive statewide baseline study of the residential market across a broad range of customer segments and energy measures, including (1) new and existing single-family buildings (one to four units), and (2) new and existing multifamily buildings (five units or more), including dwelling units, common areas, and whole buildings. Data were first collected through a combination of Web and telephone surveys. On-site inspections and data collection was then completed for a sample of the Web and telephone survey respondents along with residential contact sample lists from other sources as described in the methodology volume.
- **HVAC Market Assessment.** Data were collected in baseline study surveys and on-site inspections, contractor interviews, and from distributor sales reports to assess the market for nonelectric heating, air conditioning, and water heating equipment. Data on the baseline efficiency of new equipment installed in New York State were gathered during HVAC contactor interviews and from D&R International (D&R) which reported New York State-specific Heating, Air-conditioning and Refrigeration Distributors International (HARDI) sales data for 2013l. This information will be used to set more accurate baselines for calculating program energy savings.
- **Residential Potential Study.** The data for the baseline analysis and the HVAC market assessment were then used for the potential analysis. The analysis identified the technical, economical, and achievable residential energy efficiency opportunities in New York over the next three and five years, (2016 and 2018, respectively) relative to base year 2013.

The NYSERDA evaluation group, in coordination with the lead contractor of this study, Tetra Tech MA, Inc. (Tetra Tech) and its subcontractors, Performance Systems Development, ("PSD") and GDS Associates, Inc. (GDS), developed a detailed work plan that was updated during the project. The Residential Baseline Study is composed of five volumes. This first volume provides the highlights of the residential baseline study for the single-family home segment. The other volumes describe the multifamily baseline results (Volume 2), HVAC market assessment (Volume 3), potential analysis (Volume 4), and methodology and data tables (Volume 5).

1.2 Methodology

The methodology for the entire residential statewide baseline study is in Volume 5 (Methodology and Data Tables). This section summarizes the methodology, data comparisons, and data weighting for the single-family component. The sample for the single-family baseline study was primarily populated by a random sample of residential electric utility accounts provided by each of the New York State electric utilities. To target more newly constructed homes in New York, the sample was supplemented with information obtained from the New York State Department of Taxation and Finance, specifically the tax assessor rolls. Telephone and Web surveys were used to recruit homes that would receive more extensive on-site data collection. Incentives were offered for completing a telephone and Web survey or on-site inspection. The data was collected by three climate zones that are shown in Figure 1 and Table 1.

Figure 1. New York State Climate Zone Map

Colors on the map correspond to climate zones shown in Table 1.

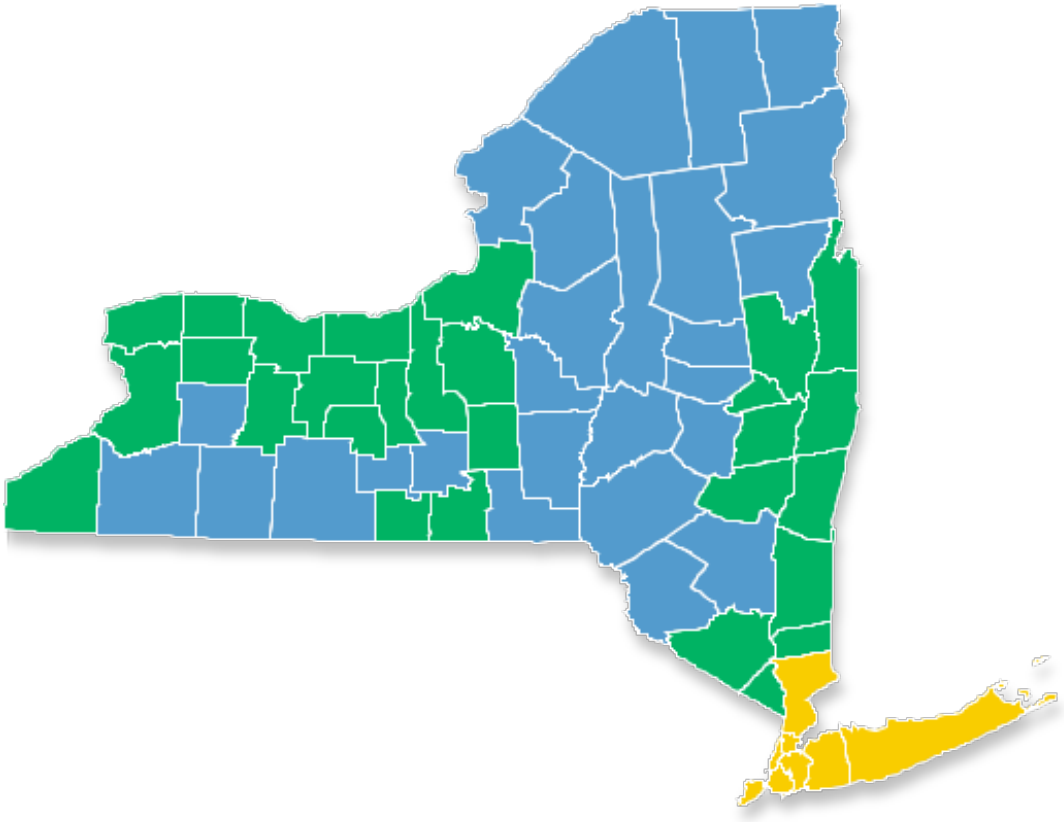


Table 1. New York State Climate Zone by County

Source: http://energycode.pnl.gov/EnergyCodeReqs/?state=New%20York)

Climate Zone 4			
Bronx	Nassau	Queens	Suffolk
Kings	New York	Richmond	Westchester
Climate Zone 5			
Albany	Erie	Ontario	Saratoga
Cayuga	Genesee	Orange	Schenectady
Chautauqua	Greene	Orleans	Seneca
Chemung	Livingston	Oswego	Tioga
Columbia	Monroe	Putnam	Washington
Cortland	Niagara	Rensselaer	Wayne
Dutchess	Onondaga	Rockland	Yates
Climate Zone 6			
Allegany	Franklin	Montgomery	Sullivan
Broome	Fulton	Oneida	Tompkins
Cattaraugus	Hamilton	Otsego	Ulster
Chenango	Herkimer	Schoharie	Warren
Clinton	Jefferson	Schuyler	Wyoming
Delaware	Lewis	St. Lawrence	
Essex	Madison	Steuben	

The single-family baseline study included 2,982 telephone or Web surveys (including 35 on-site mini-surveys conducted during on-site inspections) and 700 on-site inspections. These surveys included both existing homes (those built before 2012) and new construction (those built in 2012 and later). One survey instrument was used for both single-family homeowners or occupants, and multifamily tenants. The responses from tenants are included in the Multifamily Report (Volume 2).

Table 2 through Table 4 summarize the single-family completed surveys and on-site inspections by the 10 Economic Development Regions of New York State, by timeframe of construction (new and existing), and by climate zone.

Table 2. Completions by Region

Region	Single-Family Survey Completes	Completed On-site Inspections
Southern Tier	250	70
Capital District	416	98
Mohawk Valley	305	66
Mid-Hudson	348	67
Long Island	231	53
New York City	201	63
Western New York	328	76
Finger Lakes	347	76
Central New York	258	61
North Country	298	70
Total	**2,982**	**700**

The data collection primarily included a combination of Web and telephone surveys, as well as 35 mini-surveys[2] that were conducted during the on-site inspections. The number of completions by survey method is provided in Table 3 and Table 4. The goal was to reach a 90/10 confidence and precision at the climate zone level for most data collection activities for single-family homes. Where the specific data elements are not at 90/10 confidence and precision, there are notations with the table indicating the confidence and precision levels.

Table 3. Single-Family Completed Surveys by Method

Mode	Climate Zone 4	Climate Zone 5	Climate Zone 6	Total
Phone complete	177	408	328	913
Web complete	299	1,094	641	2,034
In-person mini-survey complete during on-site inspection	35	0	0	35
Total	**511**	**1,502**	**969**	**2,982**

[2] Mini-inspections were conducted with households that were recruited for the on-site inspections and did not complete the telephone or Web survey. The mini-inspections included key questions from the survey, which was not gathered as part of the on-site data collection.

Table 4. Single-Family, Completed On-site Inspections by Construction Timeframe and Climate Zone

Climate Zone	Surveys			On-site Inspections		
	Existing Construction (Before 2012)	New Construction (2012 and After)	Overall Statewide	Existing Construction (Before 2012)	New Construction (2012 and After)	Overall Statewide
Climate zone 4	489	22	511	120	11	131
Climate zone 5	1,021	481	1,502	223	124	347
Climate zone 6	813	156	969	175	47	222
Overall Statewide	**2,323**	**659**	**2,982**	**518**	**182**	**700**

1.3 Data Comparison to New York State Statistics

There were close to 5.2 million single-family units as of 2011 in New York State, according to U.S. Census data (Table 5). Approximately 48 percent of the single-family homes are in climate zone 4, 37 percent are in climate zone 5, and 15 percent are in climate zone 6. The sample for this study was drawn from the investor-owned utilities' residential electric accounts that included single-family homes and multifamily tenant units—a total of 6.9 million accounts. The sample did not include homes that received electricity by municipal utility or cooperatives or other non-utility providers.

The 2011 U.S. Census data reported 7.79 million single-family and multifamily homes in New York State. The Census data includes multifamily units located in master-metered buildings which are included in the utility commercial electric accounts. These master-metered buildings and units were excluded from this study.

Table 5. 2011 New York State Population of Single-Family Units

Source: http://censtats.census.gov/

Region	Single-Family Units (Through 2011)
Capital District	408,798
Central New York	276,393
Finger Lakes	428,074
Long Island	903,024
Mid-Hudson	675,172
Mohawk Valley	195,061
New York City	1,330,238
North Country	173,707
Southern Tier	239,896
Western New York	564,076
Overall Statewide	**5,194,439**

Comparisons of the survey sample data were made to other sources of New York State residential housing data including U.S. Census data[3], the 2009–2013 American Community Survey and the U.S. Energy Information Administration's 2009 Residential Energy Consumption Survey (RECS). These comparisons were to confirm that the final sample was representative of the population of residential households in the state. These data sources typically included all residential homes in New York State, both single-family, representing about two-thirds of all homes, and multifamily. The characteristics of the homes from survey and on-site inspections including age, primary fuels, size of household, and other key variables were very similar to these other sources of New York State data.

Direct comparisons of some demographic data elements were not possible because the questions used to collect data were slightly different. In addition, the respondent groups were not always the same with some surveys directed to occupants and other surveys using contact lists that included homeowners that were not occupants. Finally, the survey data often used categories or ranges of responses, so direct comparisons could not be made to other sources using point estimates. Some key comparisons are provided here, and Volume 5 includes more discussion of comparisons of various data sources.

[3] http://quickfacts.census.gov/qfd/states/36000.html.

Household income in the baseline surveys was comparable (Table 6) to other New York State data sources. The median income from U.S. Census data for the 2009–2013 timeframe for New York State was $58,003. The median range for baseline surveys would be in the $50,000 to $75,000 range for single-family and multifamily households.

Table 6. 2012 Annual Household Income by Climate Zone

Totals may not sum to 100 percent due to rounding.

Source: Single-Family and Tenant survey question D4.

Income	Climate Zone 4	Climate Zone 5	Climate Zone 6	Overall Statewide
Less than $25,000	7.5%	12.0%	14.7%	10.5%
$25,000 to less than $30,000	3.9%	6.1%	7.3%	5.4%
$30,000 to less than $35,000	6.1%	6.3%	5.7%	6.1%
$35,000 to less than $50,000	10.0%	15.1%	15.4%	13.0%
$50,000 to less than $75,000	16.9%	20.3%	21.2%	19.0%
$75,000 to less than $100,000	14.4%	16.8%	16.8%	15.8%
$100,000 to less than $150,000	16.9%	15.5%	11.9%	15.5%
$150,000 to less than $200,000	8.3%	4.5%	4.0%	6.0%
$200,000 or more	16.1%	3.5%	3.1%	8.7%
Respondents (n)	377	1,281	860	2,518

The U.S. Census data for all homes in New York State was close to the baseline survey results for primary heating fuel as well reporting 54.9 percent natural gas and 28.8 percent as fuel oil for primary heating fuels. These numbers compare to the survey data showing 55 percent natural gas and 25 percent fuel oil (Table 7) for single-family. For multifamily, central heating systems primarily used natural gas in 61.5 percent of buildings and fuel oil in 26 percent of buildings. The data collected during the on-site inspections indicate these homes were very close with 60 percent natural gas and 26 percent fuel oil.

Table 7. Primary Heating Fuel by Climate Zone from Surveys and On-site Inspections

Totals may not sum to 100 percent due to rounding.

Source: Single-Family and Tenant survey question H2.

Characteristics	Climate Zone 4	Climate Zone 5	Climate Zone 6	Overall Statewide Surveys	Overall Statewide On-site Inspections
Electricity	6.0%	6.8%	7.2%	6.5%	2.3%
Natural gas from underground pipes	53.2%	64.3%	33.4%	54.5%	60.4%
Propane (bottled gas)	0.8%	9.5%	16.2%	6.9%	5.0%
District Steam	0.3%	0.1%	0%	0.1%	0%
Fuel oil	38.2%	12.8%	22.6%	25.1%	25.8%
Kerosene	0%	0.6%	5.5%	1.2%	0.8%
Wood/wood pellets	0.5%	4.4%	12.7%	4.1%	5.2%
Solar	0%	0.1%	0.1%	0.1%	0%
Geothermal	0.5%	0.6%	0.8%	0.6%	0%
Other, specify (coal)	0.5%	0.8%	1.5%	0.8%	0.6%
Respondents (n)	420	1,451	950	2,821	698

The year the home was built from the telephone and Web survey data compared closely to the data collected during the on-site inspections as well as other New York State data. Single-family respondents reported 28 percent of homes were built in 1939 or earlier and 36.5 percent homes were built before 1950 (Table 8). The data collected during the on-site inspection compares closely to the surveys at 33.9 percent built in 1939 or earlier and 40.9 percent built before 1950. The age of homes collected in this study are similar to the age of homes reported out in the 2009-2013 American Community Survey showing 33.2 percent of all NYS homes (single-family and multifamily) for that timeframe were built in 1939 or earlier (41.9 percent before 1950). Another source, the 2009 Residential Energy Consumption Survey showed that 36 percent of all NYS homes were built in 1939 or earlier (39 percent of homes were built before 1950). The property owner and manager surveys indicated that 32 percent of multifamily buildings were built in 1939 or earlier (39 percent before 1950).

Table 8. Age of Single-Family Building Stock by Climate Zone for Surveys and On-site Inspections

Totals may not sum to 100 percent due to rounding.

Source: Single-Family and Tenant survey question B7.

Year	Climate Zone 4	Climate Zone 5	Climate Zone 6	Overall Statewide Survey Responses	Overall Statewide On-site Inspection Data
1939 or earlier	26.0%	28.1%	32.6%	28.0%	33.9%
1940 to 1949	11.1%	7.1%	5.6%	8.5%	7.0%
1950 to 1959	22.0%	13.9%	10.6%	16.8%	16.9%
1960 to 1969	13.1%	10.7%	7.9%	11.3%	10.8%
1970 to 1979	7.6%	12.3%	9.6%	9.8%	8.1%
1980 to 1989	6.1%	9.2%	11.6%	8.3%	8.8%
1990 to 1999	5.1%	7.7%	8.7%	6.7%	7.3%
2000 to 2009	6.8%	7.5%	9.4%	7.5%	5.3%
2010	0.5%	0.6%	1.0%	0.6%	0.1%
2011	1.5%	2.6%	2.7%	2.2%	1.1%
2012	0.1%	0.2%	0.1%	0.2%	0.6%
2013	0%	0.1%	0.1%	0.1%	0.1%
2014	0%	0%	0%	0%	0%
Respondents (n)	417	1,439	928	2,784	698

There were some differences in comparing the survey responses to the data collected during the on-site inspection in some individual category breakouts of square footage. Although the combined categories from 1,000 to 2,500 square feet, which included the majority of homes, were very close at 67.0 percent for surveys and 65.5 percent for on-site inspection data of single-family homes. U.S. Census data shows 1,832 square feet on average for all New York State homes, although one-third of homes are tenant units that are typically less than 1,500 square feet. Self-reports do tend to be less accurate than observations by trained inspectors who actually measure the square footage of the home. As a result, the analysis uses the on-site inspection data where it was important to have accurate data on building shell, equipment types and efficiencies for baselines and potential analysis.

As is common in a study of this type, some respondent demographics and variables, most notably education level, differed from the overall population demographics. Each of these differences was thoroughly examined by the study team in order to investigate the level of potential bias and whether weighting would be appropriate.

Differences in the sample vs. population demographics that existed could not be conclusively identified nor appropriately corrected for weighting, so no such adjustments were made in the results. The study team believes that some of the observed difference could be explained by the varied ways in which data were collected for this study and the population benchmark studies. For example, this study estimates that 34% of households or building units have at least one household member with a graduate degree. In comparison, about 14.5 percent of individuals directly responding to the Census surveys have graduate degrees themselves. The large difference may reflect survey bias, or it may simply reflect that this study is measuring the highest level of education across all household members while the Census is measuring highest level of education of a single individual.

Furthermore, many of the demographic variables that differed between the sample and the population are characteristic of the respondent rather than the building or household, which was the unit of analysis in the study. Key characteristics of buildings within this study sample, namely age of home, primary heating fuel, square footage, number of bedrooms, number of occupants, and average annual fuel use compare closely with the population benchmark sources, and strongly support this study's representativeness of NYS residential building stock.

Through identifying and analyzing these differences, the study team has noted improvements to be made if this study is repeated in the future, to better isolate true differences between the sample and the population and aide in weighting, if needed.

1.4 Data Weighting

The geographic data on housing units in New York State provided totally comparable data on housing units. In addition, the weighted survey results matched very closely to other New York State data sources on the key housing characteristics that would be most important to potential analysis and program planning.

The data sampling began with the utility electric records. The sample was drawn randomly and proportionally to residential accounts in individual counties for each service area. For weighting purposes, each group of sample respondents was rolled up by county to the three climate zones in New York State. Weights were developed using the population of the same types of housing units in the counties rolled up to the climate zone level for each segment. The segments are single-family existing, single-family new homes, and multifamily tenant units and buildings.

The final weights for the single-family and tenant baseline survey respondents by new and existing construction are shown in Table A-6 and Table A-7 of Appendix A.

1.5 Summary of Major Findings

This section provides detailed data on the single-family sector including characteristics of the home structure, energy using equipment, and energy behavior. All of the key findings are described in this report, but this section lists some of the major findings that have specific implications for program planning.

Overall population: Almost half (48 percent) of New York State's 5.2 million single-family homes are located in climate zone 4, which includes New York City and Long Island regions, and Westchester County. Over one-third (37 percent) are in climate zone 5. About two-thirds of all homes in New York State are single-family homes, including residential dwelling units in master-metered multifamily buildings.

Home characteristics: Close to one-quarter of single-family homes are 75 years old or more, which indicate opportunities for weatherization energy savings. Only approximately 0.2 percent of the homes were new construction (built 2012 and after). Over half of the new homes are single-family detached homes. Survey respondents report that new homes are larger with 63 percent of homes over 2,000 square feet compared to homes built before 2012 with 35 percent over 2,000 square feet.

Heating equipment: The typical heating system in single-family new and existing homes is a central forced air system usually fueled by natural gas for most climate zones. Statewide, new homes have more propane (bottled gas) as a primary heating fuel than existing homes with 24 percent in new homes compared to 7 percent in existing homes. At the same time, fuel oil use for heating in existing homes was 25 percent compared to 5 percent in new homes, so it appears that propane gas is replacing fuel oil for primary heating systems in new homes. Thus, it could be beneficial to coordinate with propane gas

suppliers on installation of efficient heating systems in new construction. Geothermal has also become more popular as a primary heating fuel in new homes with 11.5 percent of new homes using this technology as their primary heating system. There is considerable opportunity for more efficient heating systems to be installed with about 20 percent of natural gas systems and 29 percent of fuel oil systems being more than 20 years old.

Cooling equipment: Eighty-five percent of single-family homes have air conditioning. Among homes with air conditioning, the majority of cooling equipment (48 percent) is room or window air conditioners. More new construction homes (76 percent) have a central air conditioner, compared to only 35 percent of existing homes. That increase in central air conditioning in new construction could be targeted with high efficiency units that are not being installed at this time. Although new homes are likely to install at least 13 SEER, the majority of central air conditioning equipment is not high efficiency (14.5 SEER or more). In addition, according to the observations made during the on-site inspections, there are still considerable electric savings available with 12 percent of existing air conditioners being more than 20 years old statewide. Opportunities may exist to encourage customers to replace older air conditioners with new more energy efficient equipment.

Water heating equipment: New York State homes primarily have storage tank water heaters (73 percent) although space-heating boilers with storage tanks for water heating are at 22 percent. Less than 5 percent are other types including tankless water heaters and heat pump water heaters. More than half (54 percent) of the homes use natural gas to fuel their water heater. Climate zone 6 is unique in that electricity is used the most of all fuels for water heating (41.5 percent) and natural gas is used to fuel about 28.8 percent of water heaters. Propane gas and fuel oil account for fueling about 28 percent of water heaters in climate zone 6. Water heating fuels in new homes are showing similar shifts in market share from fuel oil to propane (bottled gas). Fuel oil is used in less than 5 percent of new home water heaters compared to 18 percent of existing home water heaters. At the same time, propane gas increased from 7 percent in existing homes to over 21 percent in new homes. This number seems to indicate value in working with propane suppliers to promote energy efficient water heaters.

Weatherization: Fiberglass batts were used most often for wall and foundation insulation type. Existing homes have considerable opportunities for improving the quality of the insulation compared to new homes. About 42 percent of all homes have no foundation insulation and almost 7 percent of all homes have no wall insulation. Door weather stripping was found to be lacking or poor for one out of five doors in existing homes.

Lighting equipment: Single-family survey respondents report homes have about nine light bulbs on average that are used two or more hours per day. More than one-third of the bulbs are incandescent. Although most incandescent bulbs will eventually phase out with Energy Independence and Security Act (EISA) of 2007, there are still opportunities for lighting energy savings. Based on the on-site inspection data, dining rooms appear to have more lighting that is incandescent, thus, it may be important to target decorative lighting fixtures for future program offerings because some of these types of lighting are not subject to EISA. The laundry, garage, and utility areas have over 25 percent of the lights that are T12 lamps, which could be another lighting target for efficient equipment.

Pool pumps: About 16 percent of single-family attached or detached homes have a swimming pool. Among the pools with a pool pump, the on-site inspections showed that only 14 percent were clearly high efficiency. Though all areas of potential need to be weighed, this offers another opportunity for promoting the use of energy efficient pool pumps possibly through businesses that sell, install, and service swimming pools.

Appliances: Appliances still offer savings opportunities although the survey respondents tend to self-report higher numbers (30 to 50 percent more) that are ENERGY STAR® appliances than those reported from on-site observations. Of the people surveyed, 93 percent are familiar with ENERGY STAR® and report that over 70 percent of their refrigerators, freezers, and dishwashers less than 10 years old are ENERGY STAR rated. On-site inspectors recorded that less than 55 percent of dishwashers and 25 percent of all refrigerators and freezers, regardless of age, are ENERGY STAR. For all homes, the average age for refrigerators from the on-site inspections is 10 years old and freezers are on average 12 years old. Natural gas is used for cooking in half of all homes in New York State although only 32 percent of homes use natural gas for clothes drying.

Computers: The average home has 1.9 desktop or laptop computers. Climate zone 4 homes have the most computers. About half of survey respondents said that they turn off their computers when not in use. Less than 14 percent of the homes use a smart strip to turn off their computers, office equipment, or other equipment when inactive for a period. Smart strips could be promoted to all homes while others should be encouraged to power off computers and other office equipment when not in use.

Televisions and other plug loads: There are about 2.6 televisions per home in New York State and the number does not vary much by climate zone. LCD/LED televisions are the most common with about half of the televisions being LCD/LED, and among those aware of ENERGY STAR, respondents report that about 85 percent of all LCD/LEDs are ENERGY STAR rated. Approximately 20 percent are standard televisions, which are typically high-energy users that could be targeted with energy efficient new products. At least one out of every two households have DVD players, video gaming systems, and stereos. Homes also have one or more cable/satellite set top boxes, cell phones, and cordless phones. Together, these plug loads account for an increasing share of electric usage in homes that program administrators should consider for consumer education and promotion of ENERGY STAR versions or ENERGY STAR recognition when available for electronics.

Energy efficiency programs and measures: Almost half of single-family homes may not be aware of energy efficiency programs available to them from NYSERDA or the utility. Less than 15 percent (12.2 percent) reported participating in an energy efficiency program. Among those who had participated, the most frequently installed equipment was insulation or weatherization measures (34.7 percent), heating equipment (21.5 percent), and lighting (20.8 percent). Among those homes who have not yet participated in a program, the main reason was lack of awareness of programs (51 percent).

2 Key Findings

2.1 Profiles of Typical New York State Homes

Profiles of typical homes built before 2012 (existing homes) and after 2012 (new homes) are described in this section.

2.1.1 Existing Construction Homes (Before 2012)

On average, the majority of existing homes (built before 2012) are less than 2,000 square feet, with 2.8 occupants and about three bedrooms. There are some distinct differences by climate zone (Table 9). Climate zone 4 existing home survey respondents have higher incomes and higher education levels. Comparable data for surveys and U.S. Census data in the table include age of home, square footage, number of bedrooms, annual energy consumption, number of occupants, and household income. Data from other NYS sources are shown, but are not directly comparable due to different populations, survey questions, or other factors.

Table 9. Existing Construction (Built Before 2012): Typical Single-Family Home Profile

SF is single family and MF is multifamily.

*Source: * Single-Family and Tenant survey (telephone and Web), ** Utility records, ***2009 RECS, 2009-2013 American Community Survey 5-Year Estimates*

Category	Climate Zone 4	Climate Zone 5	Climate Zone 6	Overall Statewide	Other NYS Data Sources All Homes (Single-Family & Multifamily)***
Home year built – 1939 or earlier*	26.1%	28.2%	32.7%	28.0%	33.2%
Home square feet – less than 2,000*	61.5%	67.9%	68.4%	65.3%	1,832 sq ft (average)
Average number of bedrooms*	3.2	3.1	3.0	3.1	31.6% 3-bedrooms
Most common house type – Single-family detached house*	62.8%	78.8%	81.0%	71.7%	42.0% All Homes (SF & MF)
Annual energy consumption – 6,001 to 12,000 kWh**	37.5%	44.0%	39.6%	40.4%	6,200 kWh average of all homes
Occupancy tenure – own/buying*	77.3%	83.6%	87.1%	81.2%	54% owner-occupied (SF & MF)
Average number of occupants*	3.1	2.5	2.5	2.8	2.76 owner-occupied homes
Annual household income - $75,000 or more*	55.7%	40.2%	35.7%	46.0%	$58,003 median income
Highest education level in the household – graduate degree*	41.4%	29.2%	24.6%	33.9%	14.5% of individual respondents 25 years or older

2.1.2 New Construction Homes (2012 or later)

New homes (built 2012 and after) are larger, and have higher household incomes with slightly more educated occupants than homes built before 2012. As with existing homes, there are distinct differences between climate zones. Climate zone 4 new homes in the sample are larger and have higher income levels than the other two climate zones. The sample size of new homes in climate zone 4 is small and should not be considered representative of that population of new homes. Comparable data from other New York State sources were not available on new construction homes.

Table 10. New Construction (Built 2012 and Later): Typical Home Profile

*Source: * Single-Family and Tenant survey (telephone and Web). Climate zone 4 results may not be representative of the population due to the small size of new homes in that climate zone. ** SF on-site inspections. *** Computed based on survey self-report of annual consumption in dollars divided by $0.183 average per kWh. Climate zone 4 consumption data may be too high using this approach because their average per kWh should be higher.*

Category	Climate Zone 4	Climate Zone 5	Climate Zone 6	Overall Statewide
Average HERs rating**	66.9	68.6	71.0	68.5
Home age – built in 2012*	63.6%	71.1%	59.9%	67.0%
Home square footage– less than 2,000*	18.2%	38.4%	61.5%	36.8%
Average number of bedrooms*	3.6	3.3	3.0	3.3
Most common house type – Single-family detached house*	100.0%`	90.0%	94.3%	93.6%
Annual energy consumption –5,470 to 8,202***	14.3%	35.2%	35.4%	29.2%
Occupancy tenure – own/buying*	100.0%	99.8%	98.7%	99.7%
Average number of occupants	2.9	2.9	2.8	2.9
Annual household income - $75,000 or more*	87.5%	75.6%	60.1%	75.6%
Highest education level in household – graduate degree*	45.5%	45.4%	38.5%	44.2%

2.2 Building Characteristics

Close to one-quarter of single-family home survey respondents reported their home as being 75 years old or more. Very few single-family homes were new construction homes (0.2 percent—built in 2012 or later). About one in five survey respondents in climate zone 4 could not report on the age of their home (Table 11).

The majority of new homes built 2012 to 2014 are single-family detached homes as shown in Figure 2.

Table 11. Age of Building Stock by Climate Zone

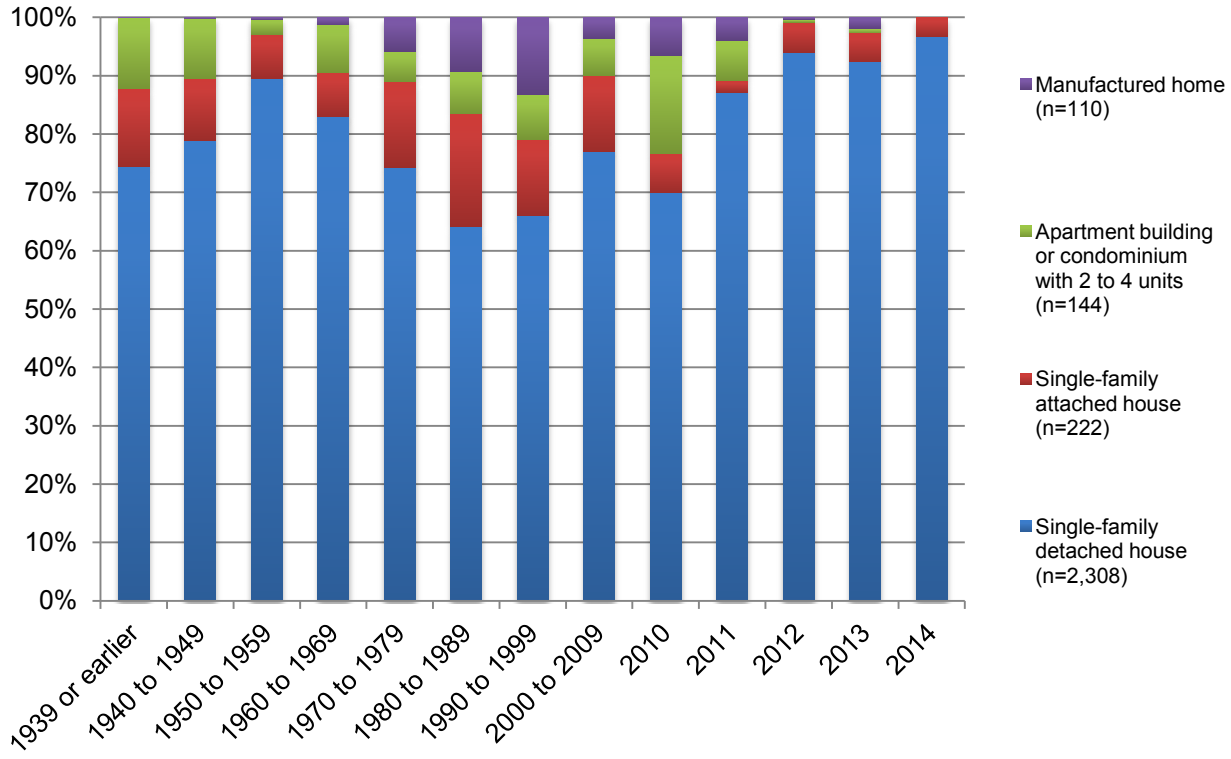
Totals may not sum to 100 percent due to rounding.

Source: Single-Family and Tenant survey question B7

Year	Climate Zone 4	Climate Zone 5	Climate Zone 6	Overall Statewide
Don't know	19.2%	6.2%	4.9%	12.0%
1939 or earlier	21.0%	26.4%	31.0%	24.6%
1940 to 1949	9.0%	6.6%	5.3%	7.5%
1950 to 1959	17.8%	13.1%	10.1%	14.8%
1960 to 1969	10.6%	10.1%	7.5%	9.9%
1970 to 1979	6.1%	11.5%	9.1%	8.7%
1980 to 1989	4.9%	8.6%	11.1%	7.3%
1990 to 1999	4.1%	7.2%	8.2%	5.9%
2000 to 2009	5.5%	7.0%	9.0%	6.6%
2010	0.4%	0.6%	1.0%	0.6%
2011	1.2%	2.4%	2.6%	1.9%
2012	0.1%	0.2%	0.1%	0.1%
2013	0%	0.1%	0.1%	0.1%
2014	0%	0%	0%	0%
Respondents (n)	511	1,502	968	2,981

Figure 2. Types of Homes by Year Built Statewide

Source: Single-Family and Tenant survey questions B7 and B3



Existing construction homes (built before 2012) are typically smaller than new homes with 55 percent or more (65.3 percent from surveys and 54.7 percent from observations made during the on-site inspections) being less than 2,000 square feet (Table 12). This data compares to less than 40 percent of homes built in 2012 or later being less than 2,000 square feet (Table 13), based on survey (36.9 percent) and on-site inspection data (31.5 percent). Home square footage is collected on-site by a professional will be more accurate than a self-report, although most home square footage ranges are similar. The three ranges with the most homes (from 1,000 up to 2,500 square feet) are comparable for the survey and the on-site inspection observations with 65.5 percent for the on-site inspections and 67.7 percent for the telephone and Web surveys.

Table 12. Existing Construction: Square Footage by Climate Zone

Totals may not sum to 100 percent due to rounding.

Source: Single-Family and Tenant survey questions B5 and B5a.

Square Footage	Survey Responses				On-site Inspection Data Overall Statewide
	Climate Zone 4	Climate Zone 5	Climate Zone 6	Overall Statewide	
Less than 1,000 square feet	14.3%	13.0%	17.4%	14.3%	10.1%
1,000 to less than 1,500 square feet	19.1%	26.2%	27.3%	23.4%	20.6%
1,500 to less than 2,000 square feet	28.0%	28.7%	23.7%	27.6%	24.0%
2,000 to less than 2,500 square feet	16.2%	17.1%	17.4%	16.7%	20.9%
2,500 to less than 3,000 square feet	9.2%	6.3%	6.4%	7.5%	9.7%
3,000 to less than 4,000 square feet	9.2%	5.4%	4.9%	6.9%	8.6%
4,000 or more square feet	4.0%	3.3%	2.7%	3.5%	6.2%
Respondents (n)	371	938	729	2,038	517

New homes in climate zone 6 were much smaller with only 17 percent being 2,500 square feet or more. Climate zone 4 has 22 respondents, which is slightly better than an 80/15 confidence and precision (Table 13). The recommended sample size for statistical significance is a sample size of at least 31 for a confidence and precision of 90/15. Table 13 identifies when the population falls below 90/10 confidence/precision and likely is not a good enough sample size to be representative of the population in that strata.

Table 13. New Construction: Square Footage by Climate Zone

Source: Single-Family and Tenant survey questions B5 and B5a. Totals may not sum to 100 percent due to rounding. Climate zone 4 may not be representative of that population due to small sample size. The sample size for climate zone 4 is small and less than 90/15 confidence/precision so not considered a good representative sample for that climate zone.

Square Footage	Survey Responses				On-site Inspection Data Overall Statewide
	Climate Zone 4	Climate Zone 5	Climate Zone 6	Overall Statewide	
Less than 1,000 square feet	0%	1.3%	3.8%	1.4%	0.8%
1,000 to less than 1,500 square feet	0%	10.9%	26.9%	10.7%	10.8%
1,500 to less than 2,000 square feet	18.2%	26.2%	30.8%	24.8%	19.9%
2,000 to less than 2,500 square feet	9.1%	29.6%	21.8%	22.4%	21.8%
2,500 to less than 3,000 square feet	27.3%	16.8%	7.1%	18.0%	14.5%
3,000 to less than 4,000 square feet	22.7%	13.0%	7.7%	14.8%	21.7%
4,000 or more square feet	22.7%	2.3%	1.9%	8.0%	10.5%
Respondents (n)	22	477	156	655	182

2.3 Energy Consumption by Household Age and Size

The largest share of existing family homes have an annual kilowatt-hour (kWh) consumption of 6,001 to 12,000 kWh (Table 14). Climate zone 4 has the largest percentage of existing homes using less than 6,000 kWh annually (43.4 percent for climate zone 4, 35 percent of climate zone 5, and 39 percent of climate zone 6).

Table 14. Existing Construction: Annual Kilowatt-Hour Consumption by Climate Zone

Totals may not sum to 100 percent due to rounding.

Source: Utility Provided kWh

kWh Consumption	Climate Zone 4	Climate Zone 5	Climate Zone 6	Overall Statewide
500 kWh or less	0.7%	1.1%	4.1%	1.4%
501 to 2,500 kWh	9.4%	6.4%	10.0%	8.3%
2,501 to 6,000 kWh	33.3%	27.4%	25.1%	29.7%
6,001 to 12,000 kWh	37.5%	44.0%	39.6%	40.4%
12,001 to 20,000 kWh	14.5%	18.0%	15.8%	16.1%
20,000 kWh or more	4.7%	3.1%	5.3%	4.1%
Respondents (n)	448	983	777	2,208

Table 15 represents the annual kWh consumption of households by climate zone for new construction homes. Many new construction homes were sampled from New York State Tax and Finance records, which did not include energy consumption information. In these cases, the respondents were asked to report the dollar amount of their annual electricity use. This was then converted to broad consumption ranges. Climate zone 4 was a small sample of 21 and may not be representative of the population.

Table 15. New Construction: Estimated Annual Electric Costs by Climate Zone

Totals may not sum to 100 percent due to rounding. Climate zone 4 may not be representative of the population in making comparisons due to the small sample size (80/15 confidence/precision).

Source: Single-Family and Tenant survey question U14.

Annual Electric Costs	Climate Zone 4	Climate Zone 5	Climate Zone 6	Overall Statewide
$500 or less	4.8%	4.5%	9.7%	5.5%
$501–$1,000	4.8%	26.9%	25.7%	20.3%
$1,001–$1,500	14.3%	35.2%	35.4%	29.2%
$1,501–$2,000	23.8%	16.5%	15.3%	18.4%
$2,001–$2,500	14.3%	9.3%	6.9%	10.3%
$2,501–$3,000	9.5%	3.4%	3.5%	5.2%
$3,001–$3,500	0%	2.5%	0.7%	1.5%
$3,501–$4,000	4.8%	0.5%	1.4%	1.9%
$4,000 or more	23.8%	1.4%	1.4%	7.8%
Respondents (n)	21	443	144	608

2.4 Heating Equipment

Central forced air systems primarily fueled by natural gas is the most prevalent type of heating system for new and existing homes and for most climate zones. Steam/hot water systems are the primary type of system for climate zone 4. Supplemental heating fuels are used in about six percent of homes and are primarily electricity, propane, fuel oil, and wood (Table 16).

Table 16. Statewide: Heating Equipment Characteristics by Climate Zone

Source: Single-Family and Tenant survey questions H3, H4, H2, H8.

Characteristics	Construction Type		Climate Zone			Overall Statewide
	New Construction (2012 or after)	Existing Construction (Before 2012)	Climate Zone 4	Climate Zone 5	Climate Zone 6	
Most common system type	Central forced air furnace with ducts to individual rooms	Central forced air furnace with ducts to individual rooms	Steam/hot water system with radiators or pipes in each room	Central forced air furnace with ducts to individual rooms	Central forced air furnace with ducts to individual rooms	Central forced air furnace with ducts to individual rooms
Equipment age (most prevalent age group)	Less than 2 years old	5 to 9 years old	5 to 9 years old	5 to 9 years old	5 to 9 years old	5 to 9 years old
Primary fuel (most prevalent)	Natural gas from underground pipes	Natural gas from underground pipes	Natural gas from underground pipes	Natural gas from underground pipes	Natural gas from underground pipes	Natural gas from underground pipes
Uses supplemental heating fuel	4.6%	6.2%	3.3%	7.0%	12.2%	6.2%

As shown Table 17, central forced air heating systems are much more prevalent in new construction homes (over 75 percent). About 45 percent of existing homes have a central forced air furnace and a sizeable percentage (about 28 percent) have a steam/hot water system.

Table 17. Statewide: Heating System Type by Construction Type

Source: Single-Family and Tenant survey question H3

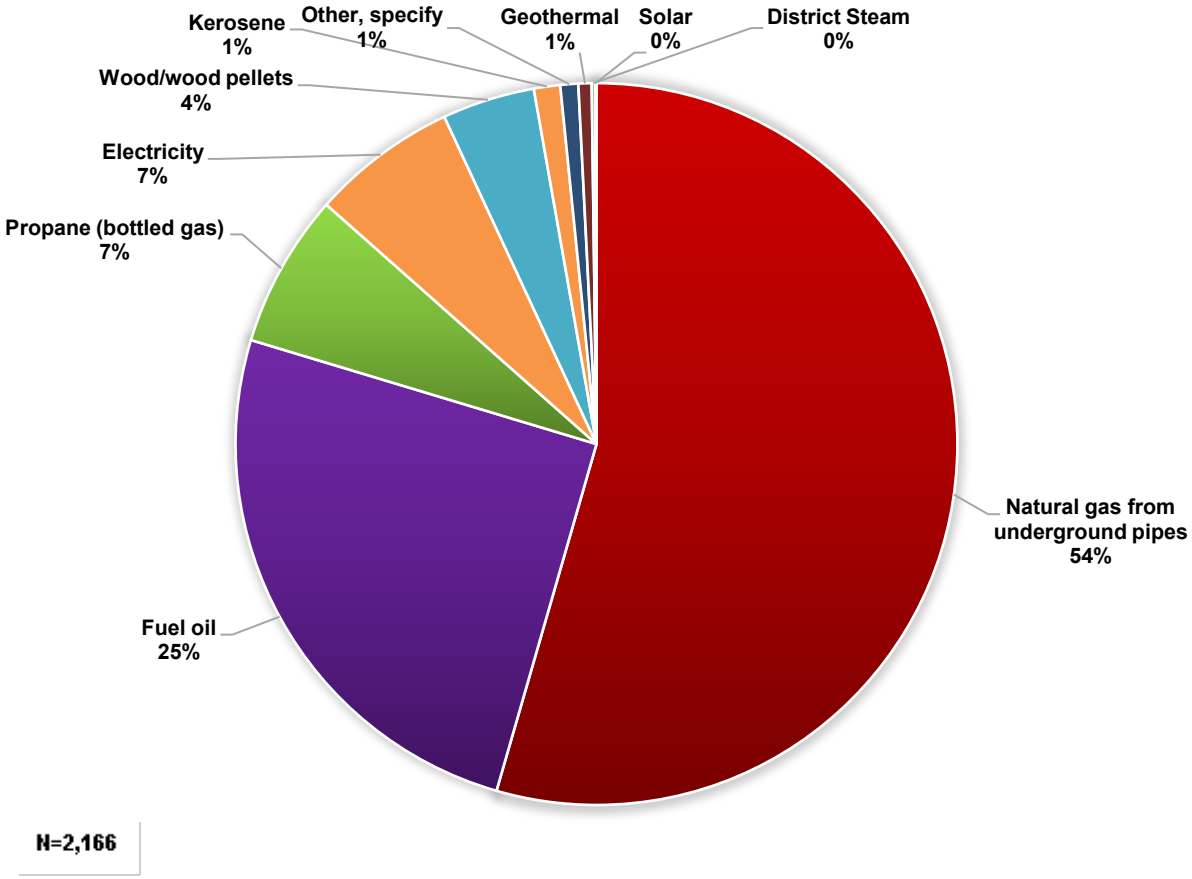
System Type	New Construction (Built 2012 or Later)	Existing Construction (Built Prior to 2012)	Overall Statewide
Central forced air furnace with ducts to individual rooms	76.7%	45.8%	45.9%
Steam/hot water system with radiators or pipes in each room	4.6%	28.0%	27.9%
District steam with radiators or pipes in each room	0%	0.9%	0.9%
Air source heat pump	0.5%	0.8%	0.8%
Ground source heat pump	7.2%	0.7%	0.7%
Baseboard heat	6.5%	17.6%	17.6%
Heating stove burning wood or coal	1.4%	2.6%	2.6%
Fireplace	0%	0.5%	0.5%
Portable electric heater	0.1%	0.6%	0.6%
Portable kerosene heater	0%	0.2%	0.2%
Solar panels	0.1%	0%	0%
Other, specify	2.9%	2.3%	2.3%
Respondents (n)	656	2168	2824

Statewide for all single-family homes, over half are heated primarily with natural gas, followed by fuel oil (25 percent), and then propane (bottled gas) and electricity have 7 percent share of primary heating fuels each (Figure 3).

Figure 3. Statewide: Existing Construction Primary Heating Fuel Type

Totals may not sum to 100 percent due to rounding.

Source: Single-Family and Tenant survey question H2.



For homes built before 2012, there are some major differences in heating fuels by climate zone (Table 18 and Table 19). Climate zone 4 has the highest percentage of heating systems using fuel oil (38 percent). Climate zone 5 has the highest percentage of heating systems using natural gas (64 percent) and climate zone 6 has the most use of propane (bottled gas) for heating with 16 percent. Of the three zones, climate zone 6 uses the most wood/wood pellets as a primary heating fuel with nearly 13 percent.

Table 18. Existing Construction: Primary Heating Fuel by Climate Zone

Totals may not sum to 100 percent due to rounding.

Source: Single-Family and Tenant survey question H2.

Primary Heating Fuel	Climate Zone 4	Climate Zone 5	Climate Zone 6	Overall Statewide
Natural gas from underground pipes	53.3%	64.2%	33.5%	54.5%
Fuel oil	38.2%	12.8%	22.6%	25.2%
Propane (bottled gas)	0.8%	9.5%	16.1%	6.9%
Electricity	6.0%	6.8%	7.2%	6.5%
Wood/wood pellets	0.5%	4.4%	12.7%	4.1%
Kerosene	0%	0.6%	5.5%	1.2%
Other, specify	0.5%	0.8%	1.5%	0.8%
Geothermal	0.5%	0.6%	0.8%	0.6%
District steam	0.3%	0.1%	0%	0.1%
Solar[a]	0%	0.1%	0.1%	0.1%
Respondents (n)	398	973	795	2,166

[a] The telephone and Web survey did not differentiate between active and passive solar. Solar (and geothermal) may be fueled by electricity, but were reported separately due to the unique nature of the systems.

New homes built after 2012 have more propane (bottled gas) as a primary heating fuel (24 percent) displacing the market share of fuel oil that is only used as the primary heating fuel in about 5 percent of new homes. The change may be because of the greater accessibility of propane (bottled gas) compared to natural gas in areas where new homes are being developed. Propane use is highest in new construction homes in climate zone 6 (54 percent). Geothermal is also more popular as a primary heating fuel in new homes with 11.5 percent. Statewide, geothermal is most prevalent in climate zone 4 (27 percent) survey respondents, but the sample size is too small with 22 to be representative of that population.

Table 19. New Construction: Heating Fuel by Climate Zone

Totals may not sum to 100 percent due to rounding. The sample size for climate zone 4 is small (at 80/15 confidence/precision) so comparisons between climate zones may not be valid. The telephone and Web survey did not differentiate between active and passive solar.

Source: Single-Family and Tenant survey question H2.

Primary Heating Fuel	Climate Zone 4	Climate Zone 5	Climate Zone 6	Overall Statewide
Natural gas from underground pipes	36.4%	69.7%	16.8%	50.9%
Propane (bottled gas)	22.7%	14.4%	54.2%	23.8%
Geothermal	27.3%	5.6%	4.5%	11.5%
Electricity	0%	5.9%	14.8%	5.8%
Fuel oil	13.6%	1.7%	1.9%	5.1%
Wood/wood pellets	0%	2.3%	7.1%	2.5%
Solar	0%	0.4%	0%	0.2%
Kerosene	0%	0%	0.6%	0.1%
Respondents (n)	22	478	155	655

There is considerable opportunity for more efficient heating systems to be installed in existing construction. About 20 percent of natural gas systems and 29 percent of fuel oil systems are more than 20 years old (Table 20). Overall, roughly 22 percent of all existing construction heating systems are 20 years or older, so 1 out of 5 homes have heating systems that are near replacement and could install higher efficiency equipment at this opportunity.

Table 20. Existing Construction: Age of Primary Heating System by Primary Heating Fuel Type

Totals may not sum to 100 percent due to rounding.

Source: Single-Family and Tenant survey questions H4 and H2.

Primary Heating System Age	Natural Gas	Fuel Oil	Propane	Electricity	Other	Overall statewide
Less than 2 years old	12.6%	7.1%	11.4%	10.0%	6.6%	10.5%
2 to 4 years old	16.8%	9.6%	20.5%	18.0%	26.0%	15.9%
5 to 9 years old	24.6%	23.5%	29.6%	16.0%	25.2%	24.2%
10 to 14 years old	17.5%	20.3%	14.8%	16.4%	9.3%	17.4%
15 to 19 years old	8.7%	10.8%	8.8%	10.4%	10.6%	9.5%
20 years old or more	19.6%	28.7%	14.8%	29.2%	22.3%	22.4%
Respondents (n)	1,003	428	208	124	221	1,984

As shown in Table 21, the majority of natural gas and propane (bottled gas) heating systems statewide are central forced air. Almost one-third of electric heating systems are reported to also be forced air systems.

Table 21. Existing Construction: Primary Heating System by Primary Heating Fuel Type

Totals may not sum to 100 percent due to rounding.

Source: Single-Family and Tenant survey question H3.

Primary Heating System	Natural Gas	Oil	Propane	Electricity	Other	Overall Statewide
Central forced air furnace with ducts to individual rooms	55.3%	27.4%	66.4%	32.4%	30.7%	45.9%
Steam/hot water system with radiators or pipes in each room	31.0%	36.6%	8.3%	10.0%	7.3%	27.9%
Baseboard heat	10.2%	33.6%	10.2%	38.3%	8.2%	17.8%
Heating stove burning wood or coal	0.1%	0.1%	1.8%	0.3%	36.4%	2.7%
Other, specify	1.9%	1.2%	10.8%	1.3%	2.5%	2.3%
District steam with radiators or pipes in each room	0.9%	0.9%	0%	0%	0%	0.7%
Air source heat pump	0.4%	0.3%	0.3%	6.3%	0.9%	0.8%
Ground source heat pump	0.2%	0%	0%	2.0%	6.7%	0.7%
Fireplace	0.1%	0%	2.2%	1.3%	3.5%	0.5%
Portable electric heater	0%	0%	0%	8.0%	0%	0.5%
Portable kerosene heater	0%	0%	0%	0%	3.5%	0.2%
Solar panels	0%	0%	0%	0%	0.3%	0%
Respondents (n)	1,091	454	221	143	230	2,139

For new homes built in 2012 and after, the majority of systems for all fuel types except “other” are central forced air systems. Because the results for cooling systems show that the majority of new homes are also installing central air conditioning (76 percent), the prevalence of duct heating systems is not surprising (Table 22).

Table 22. New Construction: Primary Heating System by Primary Heating Fuel Type

Totals may not sum to 100 percent due to rounding. Sample size for Oil is about 80/20 confidence/precision with small sample size of 14.

Source: Single-Family and Tenant survey question H3.

Primary Heating System	Natural Gas	Oil	Propane	Electricity	Other	Overall Statewide
Central forced air furnace with ducts to individual rooms	93.4%	61.5%	78.4%	46.9%	28.0%	76.7%
Ground source heat pump	0%	0%	0%	0%	54.6%	7.3%
Baseboard heat	3.9%	36.3%	2.9%	31.4%	0.9%	6.5%
Steam/hot water system with radiators or pipes in each room	2.2%	2.2%	10.5%	3.9%	3.5%	4.5%
Other, specify	0.4%	0%	7.7%	7.9%	2.6%	2.9%
Heating stove burning wood or coal	0%	0%	0.5%	0%	9.5%	1.4%
Air source heat pump	0%	0%	0%	7.9%	0%	0.5%
Portable electric heater	0%	0%	0%	2.0%	0%	0.1%
Solar panels	0%	0%	0%	0%	0.9%	0.1%
Respondents (n)	365	14	158	51	64	652

Statewide, primary heat fuel use for mobile homes differs from other single-family homes. As shown in Table 23, mobile homes are more likely than other single-family homes to be fueled by propane (36 percent) and electricity (18 percent).

Table 23. Statewide: Primary Heating Fuel by Dwelling Unit Type

Source: Single-Family and Tenant survey questions H2 and B3. Totals may not sum to 100 percent due to rounding.

Primary Heating Fuel	Single-Family Detached House	Single-Family Attached House	Apartment Building or Condominium with 2 to 4 Units	Mobile Home	Overall Statewide
Natural gas from underground pipes	51.4%	70.9%	75.0%	22.2%	54.5%
Fuel oil	28.8%	15.3%	4.2%	13.6%	25.1%
Propane (bottled gas)	7.2%	1.6%	0.3%	35.7%	6.9%
Electricity	5.1%	10.6%	19.4%	1.4%	6.5%
Wood/wood pellets	4.8%	0.8%	0.7%	8.5%	4.1%
Kerosene	0.8%	0%	0.3%	17.8%	1.2%
Other, specify	1.0%	0.2%	0%	0.7%	0.8%
Geothermal	0.7%	0.3%	0%	0%	0.6%
District steam	0.2%	0%	0%	0%	0.1%
Solar	0%	0.3%	0%	0%	0.1%
Respondents (n)	2,339	245	124	113	2,821

Close to half of all homes reported that they have a heating system tune-up done annually on their heating system by a heating contractor (Table 24). One-third do not have annual tune-ups done. An analysis of potential savings is needed to determine savings opportunities.

Table 24. Statewide: Heating System Tune-up by Climate Zone

Totals may not sum to 100 percent due to rounding. Heating system types were excluded if they were not a: central forced air furnace with ducts, steam/hot water system, district steam, air source heat pump, or ground source heat pump.

Source: Single-Family and Tenant survey question H6.

Heating System Tune-up	Climate Zone 4	Climate Zone 5	Climate Zone 6	Overall Statewide
Yes, done by a heating contractor	58.9%	42.0%	49.4%	49.7%
No	29.4%	39.4%	32.3%	34.4%
Yes, done by someone in the household	7.5%	15.8%	17.2%	12.8%
Yes, done by landlord	4.1%	2.8%	1.1%	3.1%
Respondents (n)	283	1,203	665	2,151

2.5 Cooling Equipment

Eighty-five percent of single-family home respondents report having some type of air conditioning. Air conditioning use is highest in climate zone 4 (93 percent) and lowest in climate zone 6 (68 percent). Among those that have air conditioning, room or window air conditioners are most common, followed by a central air conditioning system. The majority of cooling equipment in New York State homes (48 percent) are room or window air conditioning while 35 percent of all homes have central air conditioning, as shown in Table 25 and Table 26.

Table 25. Statewide: Presence and Type of Air Condition by Climate Zone

Totals may not sum to 100 percent due to rounding.

Source: Single-Family and Tenant survey questions H9 and H11.

Presence and Type of Air Conditioning	Climate Zone 4	Climate Zone 5	Climate Zone 6	Overall Statewide
Room or window air conditioner	51.9%	42.4%	50.2%	47.9%
Central air conditioning	38.3%	38.0%	16.1%	34.7%
No air conditioning	7.3%	17.8%	32.2%	15.4%
Heat pump	1.6%	1.6%	1.2%	1.5%
Other	0.9%	0.3%	0.2%	0.6%
Respondents (n)	474	1,496	968	2,938

Table 26. Statewide: Presence and Type of Air Conditioning by Construction Type

Totals may not sum to 100 percent due to rounding.

Source: Single-Family and Tenant survey questions H9 and H11.

Presence and Type of Air Conditioning	New Construction - Built 2012 or Later	Existing Construction - Built Prior to 2012	Overall Statewide
Room or window air conditioner	6.4%	47.9%	47.9%
Central air conditioning	75.9%	34.6%	34.7%
No air conditioning	11.0%	15.4%	15.4%
Heat pump	4.6%	1.5%	1.5%
Other	2.2%	0.5%	0.6%
Respondents (n)	660	2,278	2,938

Among homes with air conditioning, single-family attached and detached homes are more likely than apartments or mobile homes to have a central system; apartments are more likely to have room or window units. Single-family attached homes are more likely (87 percent) than other types of homes to have air conditioning systems, and mobile homes are least likely to have air conditioning (68 percent).

Table 27. Statewide: Presence and Type of Air Conditioning System by Dwelling Unit Type

Source: Single-Family and Tenant survey questions H9 and H11. Totals may not sum to 100 percent due to rounding.

Presence and Type of Air Conditioning	Single-Family Detached House	Single-Family Attached House	Apartment Building or condominium With 2 to 4 units	Mobile Home	Overall Statewide
Room or window air conditioner	42.8%	57.2%	69.2%	53.5%	47.9%
Central air conditioning	40.3%	28.0%	9.6%	14.8%	34.7%
No air conditioning	14.6%	12.7%	19.9%	31.7%	15.4%
Heat pump	1.5%	2.1%	1.2%	0%	1.5%
Other	0.8%	0%	0%	0%	0.6%
Respondents (n)	2,359	258	207	114	2,938

The people surveyed reported the majority of air conditioners (73 percent) in New York State are less than ten years old with 43 percent being less than five years old. Table 28 shows that age by climate zone, reported by baseline survey respondents, does not vary greatly.

Table 28. Statewide: Age of Primary Air Conditioning System by Climate Zone

Totals may not sum to 100 percent due to rounding.

Source: Single-Family and Tenant survey question H12.

Air Conditioning System Age	Climate Zone 4	Climate Zone 5	Climate Zone 6	Overall Statewide
Less than 2 years old	15.9%	14.8%	19.4%	15.9%
2 to 4 years old	25.9%	27.2%	28.3%	26.7%
5 to 9 years old	33.1%	27.9%	30.2%	30.7%
10 to 14 years old	14.7%	17.7%	14.7%	15.9%
15 to 19 years old	4.7%	6.3%	4.4%	5.3%
20 years old or more	5.7%	6.0%	3.1%	5.5%
Respondents (n)	407	1,210	616	2,233

The on-site inspection data shows a different distribution by type of air conditioning. The observations made during the on-site inspections for air conditioners indicate slightly more units less than two years old (Table 29 through Table 31), and the type of cooling equipment varies by climate zone (Table 32). Among those with air conditioning, climate zone 6 has much less central air conditioning (20 percent) than climate zones 4 and 5 (38 and 50 percent, respectively). More than six percent of cooling systems are mini-split systems in two of the climate zones with much less (1.6 percent) in climate zone 5. Climate zone 4 is showing a small percentage of air source heat pumps with three percent.

Table 29. Statewide: HVAC Cooling Equipment Age by Climate Zone

Totals may not sum to 100 percent due to rounding.

Source: Single-family on-site inspection question HVAC_Cooling_Year.

Age	On-site Inspections Climate Zone 4	On-site Inspections Climate Zone 5	On-site Inspections Climate Zone 6	On-site Inspections Overall Statewide	Telephone and Web Survey Statewide
Less than 2 years old	21.7%	18.3%	13.9%	19.5%	15.9%
2 to 4 years old	11.8%	10.9%	19.6%	12.3%	26.7%
5 to 9 years old	28.4%	20.7%	32.3%	25.8%	30.7%
10 to 14 years old	15.7%	21.8%	17.6%	18.3%	15.9%
15 to 19 years old	10.8%	15.3%	4.9%	11.9%	5.3%
20 or more years old	11.7%	13.1%	11.7%	12.3%	5.5%
Respondents (n)	113	294	131	538	2,233

Most (85 percent) of the new construction homes (built 2012 and after) surveyed that have air conditioning reported a central air conditioning system. This is twice as many as existing homes built before 2012.

Table 30. Statewide: Primary Type of Air Conditioning System by Construction Type

Totals may not sum to 100 percent due to rounding.

Source: Single-Family and Tenant survey question H11.

Primary AC System Type	New Construction - Built 2012 or Later	Existing Construction - Built Prior to 2012	Overall Statewide
Room or window air conditioner	7.1%	56.7%	56.6%
Central air conditioning system	85.3%	40.9%	41.0%
Heat pump	5.1%	1.8%	1.8%
Other, specify	2.4%	0.7%	0.7%
Respondents (n)	563	1,803	2,366

Table 31. Statewide: HVAC Cooling Equipment Age by Heating System Type

Totals may not sum to 100 percent due to rounding. Sample sizes are small for some system types—31 responses are needed for 90/15 confidence precision or better.

Source: Single-family on-site inspection questions HVAC_Cooling_Year and HVAC_Cooling_Systemtype.

Age	Air Source Heat Pump	Central AC	Ground Source Heat Pump	Mini Split AC	Room Free Standing AC	Room Sleeve AC	Room Window AC	Overall Statewide
Less than 2 years old	58.1%	13.3%	57.3%	64.0%	65.1%	8.9%	18.1%	19.4%
2 to 4 years old	0%	8.6%	0%	21.4%	8.8%	12.2%	16.3%	12.4%
5 to 9 years old	28.9%	23.5%	34.8%	12.4%	26.1%	13.6%	32.1%	26.0%
10 to 14 years old	12.9%	20.1%	0%	0%	0%	24.5%	19.2%	18.5%
15 to 19 years old	0%	16.7%	0%	2.3%	0%	15.0%	7.8%	11.5%
20 or more years old	0%	17.8%	7.8%	0%	0%	25.8%	6.5%	12.3%
Respondents (n)	9	271	22	18	7	20	186	533

Table 32. Statewide: Cooling Equipment Type by Climate Zone

Totals may not sum to 100 percent due to rounding.

Source: Single-family on-site inspection question HVAC_Cooling_SystemType.

Type of Cooling System	Climate Zone 4	Climate Zone 5	Climate Zone 6	Overall Statewide
Room window Air Conditioner	35.6%	42.1%	66.6%	41.8%
Central Air Conditioner	37.7%	52.0%	19.5%	41.3%
Room sleeve Air Conditioner	14.8%	1.1%	1.9%	7.8%
Mini split Air Conditioner	6.9%	1.6%	6.5%	4.7%
Air source heat pump	3.0%	0.5%	0%	1.7%
Ground source heat pump	1.0%	1.6%	1.9%	1.4%
Room free standing Air Conditioner	1.0%	1.1%	3.7%	1.3%
Respondents (n)	112	298	135	545

Among existing construction households with air conditioning from the on-site inspections, they are evenly split by room/window and central systems (both about 41 percent; Table 33). New construction homes are most likely to have a central system (75 percent) followed by a ground source heat pump (18 percent).

Table 33. Statewide: Cooling Equipment Type by Construction Type

Totals may not sum to 100 percent due to rounding. AC is air conditioning.

Source: Single-family on-site inspection question HVAC_Cooling_SystemType.

System Type	Existing Construction (Built Prior to 2012)	New Construction (Built in 2012 or Later)	Overall Statewide
Room window Air Conditioner	41.9%	4.1%	41.8%
Central Air Conditioner	41.2%	74.7%	41.3%
Room sleeve Air Conditioner	7.8%	0.4%	7.8%
Mini split Air Conditioner	4.7%	0.5%	4.7%
Air source heat pump	1.6%	2.3%	1.7%
Ground source heat pump	1.3%	17.6%	1.4%
Room free standing Air Conditioner	1.3%	0.4%	1.3%
Respondents (n)	396	149	545

On-site inspectors found central air conditioning with very high efficiency (Tier 3: 16 SEER rating and above) in climate zone 5 (12 percent compared to none in the other two climate zones; Table 34).

Table 34. Statewide: Central Air Conditioner SEER Rating by Climate Zone

Totals may not sum to 100 percent due to rounding. Climate zone 4 (90/15) and climate zone 6 (90/20) do not meet 90/10 confidence/precision due to small sample sizes.

Source: Single-family on-site inspection question HVAC_Cooling_RatedEfficiency.

SEER	Climate Zone 4	Climate Zone 5	Climate Zone 6	Overall Statewide
8	3.3%	2.7%	8.3%	3.2%
9	3.3%	2.7%	0%	2.9%
10	13.3%	33.6%	24.8%	24.0%
11	0%	2.7%	0%	1.4%
12	23.3%	5.4%	0%	13.3%
12.5	0%	1.3%	0%	0.7%
13	36.7%	28.7%	50.2%	33.2%
13.5	3.3%	1.4%	8.3%	2.6%
14	10.0%	5.4%	0.1%	7.3%
14.5	3.4%	1.4%	8.3%	2.6%
15	0%	2.7%	0%	1.4%
15.5	3.3%	0%	0%	1.5%
16	0%	5.4%	0%	2.7%
16.5	0%	1.3%	0%	0.7%
17	0%	2.7%	0%	1.4%
18	0%	1.3%	0%	0.7%
19	0%	1.3%	0%	0.7%
Respondents (n)	37	170	23	230

Although new homes are likely to install at least 13 SEER or higher, the majority of central air conditioning equipment for existing homes is not high efficiency (Table 35). More details on efficiency levels of new equipment are provided in the HVAC Market Assessment Volume 3.

Table 35. Statewide: Central AC SEER Rating by Construction Type

Totals may not sum to 100 percent due to rounding.

Source: Single-family on-site inspection question HVAC_Cooling_RatedEfficiency.

SEER	Existing Construction (Built Prior to 2012)	New Construction (Built in 2012 or Later)	Overall Statewide
8	3.2%	0%	3.2%
9	2.9%	0%	2.9%
10	24.1%	0%	24.0%
11	1.4%	0%	1.4%
12	13.4%	0%	13.3%
12.5	0.7%	0%	0.7%
13	33.0%	65.2%	33.2%
13.25	0%	0.7%	0%
13.5	2.5%	5.4%	2.6%
14	7.3%	12.1%	7.3%
14.5	2.5%	9.9%	2.6%
15	1.4%	0%	1.4%
15.5	1.5%	0.7%	1.5%
16	2.7%	6.0%	2.7%
16.5	0.7%	0%	0.7%
17	1.4%	0%	1.4%
18	0.7%	0%	0.7%
19	0.7%	0%	0.7%
Respondents (n)	116	114	230

The majority of new homes built after 2012 (79 percent) installed room/window air conditioners that were 10.7–10.8 EER rating (Table 36). But there are only nine homes in the sample, so these results are not representative of the population.

Table 36. Statewide: Room or Window AC EER Rating by Construction Type

Totals may not sum to 100 percent due to rounding. New construction with room and window AC sample of 9 is likely not representative of the population.

Source: Single-family on-site inspection question HVAC_Cooling_RatedEfficiency.

EER	Existing Construction (Built Prior to 2012)	New Construction (Built in 2012 or Later)	Overall Statewide
6	1.7%	0%	1.7%
7	3.2%	0%	3.2%
8	4.6%	0%	4.6%
8.5	1.1%	0%	1.1%
8.6	0.4%	0%	0.4%
9	0.8%	0%	0.8%
9.2	1.5%	0%	1.5%
9.5	1.1%	0%	1.1%
9.7	30.4%	10.8%	30.4%
9.8	14.4%	10.8%	14.4%
10	9.1%	0%	9.1%
10.7	11.4%	33.9%	11.4%
10.8	18.4%	44.6%	18.4%
11	1.5%	0%	1.5%
11.2	0.4%	0%	0.4%
Respondents (n)	123	9	132

More than half of the single-family households surveyed said that they had annual tune-ups conducted for their air conditioning systems (Table 37). Most of the tune-ups were conducted by air conditioning contractors.

Table 37. Statewide: Annual AC Tune-up by Climate Zone

Totals may not sum to 100 percent due to rounding. Respondents with room or wall air conditioners were not asked this question.

Source: Single-Family and Tenant survey question H14.

	Climate Zone 4	Climate Zone 5	Climate Zone 6	Overall Statewide
Yes, done by an air conditioning contractor	50.0%	39.0%	41.8%	44.6%
No	41.3%	47.3%	46.2%	44.3%
Yes, done by someone in the household	8.1%	12.7%	11.9%	10.4%
Yes, done by landlord	0.6%	1.0%	0%	0.7%
Respondents (n)	191	774	189	1,154

2.6 Water Heating

Over half (54 percent) of the single-family respondents said they use natural gas for their water heating fuel. Climate zone 6 was unique in that electricity was used the most of all fuels for water heating with 41.5 percent. Propane gas and fuel oil combined were used as much as natural gas for heating water in climate zone 6 (Table 38).

Table 38. Statewide: Water Heating Fuel Type by Climate Zone

Totals may not sum to 100 percent due to rounding.

Source: Single-Family and Tenant survey question WH3.

Water Heating Fuel Type	Climate Zone 4	Climate Zone 5	Climate Zone 6	Overall Statewide
Natural gas from underground pipes	55.8%	61.9%	28.8%	53.7%
Electricity	9.8%	21.5%	41.5%	20.1%
Fuel oil	33.0%	6.8%	10.6%	18.2%
Propane (bottled gas)	1.1%	9.2%	17.2%	7.2%
Other, specify	0%	0.4%	1.4%	0.4%
Solar	0.3%	0.1%	0.1%	0.2%
Kerosene	0%	0.1%	0.4%	0.1%
Respondents (n)	390	1,416	931	2,737

For new homes built 2012 and after, natural gas is used the most overall for water heating, but propane (bottled gas) has a much larger market share with more than 20 percent (Table 39). Once again for new homes, climate zone 6 was quite different with propane (bottled gas) and electricity each accounting for about 40 percent (or a total of 82 percent) of water heater fuel type.

Table 39. New Construction (2012 and After) Water Heating Fuel by Climate Zone

Totals may not sum to 100 percent due to rounding. Climate zone 4 may not be representative of that population due to small sample size (90/20 confidence/precision).

Source: Single-Family and Tenant survey question WH3.

Water Heating Fuel Type	Climate Zone 4	Climate Zone 5	Climate Zone 6	Overall Statewide
Natural gas from underground pipes	33.3%	63.4%	15.0%	46.3%
Electricity	19.0%	18.3%	39.9%	22.4%
Propane (bottled gas)	23.8%	13.4%	42.5%	21.5%
Fuel oil	14.3%	1.3%	0.7%	4.8%
Other, specify	4.8%	2.8%	2.0%	3.2%
Solar	4.8%	0.9%	0%	1.8%
Respondents (n)	21	464	153	638

As shown in Table 40, propane gas is gaining market share (21.5 percent) in new homes while fuel oil has lost considerable market share going from 18.2 percent in existing homes to less than 5 percent in new homes.

Table 40. Water Heating Fuel Type by Construction Type

Totals may not sum to 100 percent due to rounding.

Source: Single-Family and Tenant survey question WH3.

Water Heating Fuel Type	Existing Construction - Built Prior to 2012	New Construction - Built 2012 or Later	Overall Statewide
Natural gas from underground pipes	53.8%	46.3%	53.7%
Electricity	20.1%	22.4%	20.1%
Fuel oil	18.2%	4.8%	18.2%
Propane (bottled gas)	7.2%	21.5%	7.2%
Other, specify	0.4%	3.2%	0.4%
Solar	0.2%	1.8%	0.2%
Kerosene	0.1%	0%	0.1%
Respondents (n)	2,099	638	2,737

According to the on-site inspection data, the largest share of water heater types in New York State homes are storage tank water heaters (73 percent) although space heating boilers with storage tanks for water heating are next with over 20 percent (Table 41). Type of water heat varies by climate zone.

Table 41. Statewide: Water Heater Type from On-site Inspections

Totals may not sum to 100 percent due to rounding. Data not captured or N/As were dropped from analysis.

Source: Single-family on-site inspection question DHW_Equipment_Waterheatertype.

Water Heater Type	Climate Zone 4	Climate Zone 5	Climate Zone 6	Overall Statewide
Storage tank water heater	59.3%	88.6%	76.4%	73.2%
Space-heating boiler with storage tank, coil, tankless coil, indirect water heaters	39.8%	6.4%	12.7%	22.7%
Instantaneous tankless water heater	0.9%	4.6%	10.4%	3.7%
Heat pump water heater	0%	0.5%	0.6%	0.3%
Geo-thermal heat pump with water heating[a]	0%	0%	0%	0%
Respondents (n)	127	344	221	692

[a] The statewide number is likely not zero but is much less than 1 percent based on programs available for new construction. It is likely that there were no geo-thermal heat pump water heating systems in the on-site sample for this study.

Volume 3 provides details on water heaters installed in existing homes and in new homes in 2012 and after. Information includes type of water heater, fuel, and efficiency levels.

2.7 Building Shell

Based on the on-site inspections, approximately 77 percent of all foundation space in New York State is not insulated (Table 42). Slightly more than 83 percent of foundation space in the most populated geographic area in New York State, climate zone 4, does not have any type of insulation. Based on the foundation and percentage of all insulation types, fiberglass batts are used the most (16 percent of homes).

About 72 percent of foundations in homes built since 2012 have some insulation—only 28.3 percent of foundation space has no insulation. According to Table 43, the highest percentage of all foundation insulation type is fiberglass batts (16 percent of all foundation walls).

Table 42. Statewide: Percentage of Foundation with Insulation Type by Climate Zone

Totals may not sum to 100 percent due to rounding. Data not captured or N/As were dropped from analysis. The reported (n) may not equal the number of households as households may not have a measure or may have more than one.

Source: Single-family on-site inspection questions Interior_or_cavity_insType and exterior_or_cont_insType.

Type	Climate Zone 4	Climate Zone 5	Climate Zone 6	Overall Statewide
None	83.5%	70.4%	76.7%	77.3%
Fiberglass Batts	15.1%	19.0%	11.9%	16.2%
XPS	0%	2.5%	4.9%	1.7%
Polyisocyanurate	0%	2.7%	2.5%	1.5%
Fiberglass Blanket	0.1%	3.2%	0%	1.3%
EPS	0%	0.8%	2.2%	0.7%
Spray Foam	0%	0.8%	1.6%	0.6%
Fiberglass Board	0.8%	0.0%	0.2%	0.4%
Foilfaced Fiberglass	0.5%	0.1%	0%	0.2%
Insulated Concrete	0%	0.5%	0%	0.2%
Fiberglass Fill	0%	0%	0%	0%
Draped Fiberglass	0%	0%	0%	0%
Rock Wool	0%	0%	0%	0%
Cellulose	0%	0%	0%	0%
Insulation Type (n)	119	334	203	656

Table 43. Percentage of Foundation Insulation with Insulation Type by Construction Type

Totals may not sum to 100 percent due to rounding. Data not captured or N/As were dropped from analysis. The reported (n) may not equal the number of households as households may not have a measure or may have more than one.

Source: Baseline Single-family on-site inspection questions Interior_or_cavity_insType and exterior_or_cont_insType.

Type	Existing Construction - Built Prior to 2012	New Construction - Built 2012 or Later	Overall Statewide
None	77.4%	28.3%	77.3%
Fiberglass Batts	16.1%	41.5%	16.2%
XPS	1.7%	12.5%	1.7%
Polyisocyanurate	1.4%	2.6%	1.5%
Fiberglass Blanket	1.3%	5.2%	1.3%
EPS	0.6%	3.1%	0.7%
Spray Foam	0.6%	2.2%	0.6%
Fiberglass Board	0.4%	0%	0.4%
Foilfaced Fiberglass	0.2%	0%	0.2%
Insulated Concrete	0.2%	0%	0.2%
Fiberglass Fill	0%	1.9%	0%
Draped Fiberglass	0%	1.4%	0%
Rock Wool	0%	0.8%	0%
Cellulose	0%	0.4%	0%
Insulation Type (n)	482	174	656

Approximately 18 percent of wall space was found to have no insulation installed during the on-site inspection. Only one home constructed since 1955 had completely uninsulated walls. Those homes with wall insulation are primarily using fiberglass batts (66 percent of the wall space).

Table 44. Statewide: Percentage of Walls With Insulation Type by Climate Zone

Totals may not sum to 100 percent due to rounding. Data not captured or N/As were dropped from analysis. The reported (n) may not equal the number of households as households may not have a measure or may have more than one.

Source: Single-family on-site inspection questions Interior_or_cavity_insType and exterior_or_cont_insType.

Insulation	Climate Zone 4	Climate Zone 5	Climate Zone 6	Overall Statewide
Fiberglass Batts	65.3%	66.7%	68.3%	66.3%
None	26.4%	11.0%	10.9%	18.1%
Cellulose	2.2%	15.6%	14.2%	9.2%
Fiberglass Fill	2.5%	0.8%	1.1%	1.6%
Paper	1.5%	0.9%	0.0%	1.1%
Spray Foam	0.8%	0.9%	1.8%	1.0%
Rock Wool	0.6%	0.4%	0.9%	0.6%
Polyisocyanurate	0.0%	1.2%	0.7%	0.6%
Vermiculite	0.8%	0.0%	0.9%	0.5%
XPS	0%	0.8%	0.4%	0.4%
EPS	0%	0.4%	0%	0.2%
Foilfaced Fiberglass	0%	0.4%	0%	0.2%
Cotton Batts	0%	0.4%	0%	0.2%
Urethane	0%	0.4%	0%	0.1%
Foam	0%	0%	0.4%	0.1%
Brick	0%	0%	0.3%	0%
Air	0%	0%	0.2%	0%
Insulation Type (n)	131	347	220	698

Almost all walls in home built in 2012 and later have some wall insulation (98 percent of walls). Fiberglass batts are used most often (72 percent of walls) with the second most prevalent type of wall insulation being spray foam with slightly more than 20 percent of walls in new homes (Table 45).

Table 45. New Construction: Percentage of Wall with Insulation Type

Totals may not sum to 100 percent due to rounding. Climate zone 4 may not be representative of the population because of the small sample size (80/20 confidence/precision). Data not captured or N/As were dropped from analysis. The reported (n) may not equal the number of households as households may not have a measure or may have more than one.

Source: Single-family on-site inspection questions Interior_or_cavity_insType and exterior_or_cont_insType.

Insulation	Climate Zone 4	Climate Zone 5	Climate Zone 6	Overall Statewide
Fiberglass Batts	50.0%	84.4%	60.4%	71.7%
Spray Foam	48.9%	9.5%	21.3%	21.1%
None	1.1%	2.0%	3.4%	2.0%
Cellulose	0%	1.6%	4.3%	1.7%
Rock Wool	0%	0%	6.4%	1.2%
Fiberglass Fill	0%	1.8%	0%	1.0%
XPS	0%	0.8%	2.1%	0.9%
Polyisocyanurate	0%	0%	2.1%	0.4%
Insulation Type (n)	9	124	47	180

Most homes have floor insulation at Grade III that are fiberglass batts (Table 46).

Table 46. Statewide: Grade of Floor Insulation by Type

Totals may not sum to 100 percent due to rounding. Data not captured or N/As were dropped from analysis. The reported (n) may not equal the number of households as households may not have a measure or may have more than one.

Source: Single-family on-site inspection questions Interior_or_cavity_insType, interior_or_cavity_insGrade, exterior_or_cont_insType, and exterior_or_cont_insGrade.

Type	Grade I	Grade II	Grade III	Sub Grade III	Overall Statewide
Fiberglass Batts	21.5%	69.3%	85.1%	89.1%	73.9%
Fiberglass Fill	24.8%	8.3%	3.5%	1.6%	7.0%
Fiberglass Belly Wrap	8.3%	7.3%	2.8%	7.8%	5.4%
Spray Foam	14.0%	6.1%	1.8%	0%	4.2%
XPS	3.3%	4.4%	3.5%	0%	3.4%
Polyisocyanurate	17.4%	0%	0%	1.6%	1.9%
Cellulose	2.5%	1.5%	1.8%	0%	1.5%
Other	0%	2.4%	1.6%	0%	1.5%
Radiant Barrier	8.3%	0.7%	0%	0%	1.1%
Insulation Types (n)	25	86	101	22	234

The average HERS Index score conducted on 179 new homes was 69.1 (Table 47). Because only 11 were done in climate zone 4, it is not reasonable to make comparisons by climate zone.

Table 47. New Construction: Average Home Energy Rating (HERS Index Score)

Climate zone 4 may not be representative of the population because of the small sample size. (80/20 confidence/precision). Climate zone 6 is about a 90/13 confidence/precision.

Source: Single-family on-site inspection question General_HERSScore.

	Climate Zone 4	Climate Zone 5	Climate Zone 6	Overall Statewide
New Construction	66.9	68.6	71.0	69.1
Respondents (n)	11	122	46	179

The door weather-stripping was typically rated as good (53 percent of homes statewide). Less than eight percent of the doors had no weather-stripping (Table 48).

Table 48. Statewide: Installation Quality of Door Weather-stripping

Totals may not sum to 100 percent due to rounding. Data not captured or N/As were dropped from analysis. The reported (n) may not equal the number of households as households may not have a measure or may have more than one.

Source: Single-family on-site inspection question Envelope_Door_WeatherStripping.

Quality	Climate Zone 4	Climate Zone 5	Climate Zone 6	Overall Statewide
Good	50.0%	55.6%	54.2%	52.8%
Fair	28.6%	24.3%	23.7%	26.3%
Poor	11.6%	14.1%	17.0%	13.3%
None	9.8%	5.9%	5.0%	7.6%
Doors (n)	298	813	474	1585

For new homes, the quality of door weather-stripping was rated as good in 96 percent of the homes (Table 49). Less than two percent of doors did not have door weather stripping according to the observations made during the on-site inspections.

Table 49. New Construction: Installation Quality of Door Weather-stripping

Totals may not sum to 100 percent due to rounding. Data not captured or N/As were dropped from analysis. Climate zone 4 may not be representative of the population because of the small sample size (90/20 confidence/precision). The reported (n) may not equal the number of households as households may not have a measure or may have more than one.

Source: Single-family on-site inspection question Envelope_Door_WeatherStripping.

Quality	Climate Zone 4	Climate Zone 5	Climate Zone 6	Overall Statewide
Good	95.5%	96.4%	97.4%	96.4%
None	4.5%	0.7%	1.7%	1.8%
Fair	0%	2.6%	0.9%	1.7%
Poor	0%	0.3%	0%	0.2%
Doors (n)	22	305	117	444

2.8 Lighting Equipment

On average, respondents reported that slightly more than nine light bulbs were used two or more hours per day in single-family homes. More than one-third of them are incandescent bulbs showing there are still opportunities for energy savings (Table 50).

Table 50. Statewide: Average Number of Light Bulbs Used Two or More Hours per day Inside Home by Climate Zone

Source: Single-Family and Tenant survey questions L5a, L5b, L5c

Bulb Type		Climate Zone 4	Climate Zone 5	Climate Zone 6	Overall Statewide
CFLs/LEDs	Mean	5.3	4.8	4.7	5.0
	Respondents (n)	469	1,490	962	2,921
Incandescent	Mean	3.3	3.3	3.0	3.3
	Respondents (n)	469	1,491	962	2,922
Other bulbs	Mean	1.5	1.3	1.1	1.3
	Respondents (n)	469	1,491	962	2,922

Table 51 compares light bulb types by climate zones based on the on-site inspections that looked at all light bulbs, not just light bulbs used more than two hours a day. There does not seem to be any significant difference by climate zone on type of light bulbs, but the number of incandescent lights are over half. As shown in Table 52, new homes are more likely to have efficient bulbs, which demonstrates that inefficient bulbs are being phased out as EISA is fully implemented.

Table 51. Statewide: Distribution of Lamp Type by Climate Zone

LEDs are a count of bulbs and not fixtures or diodes. Totals may not sum to 100 percent due to rounding.

Source: Single-family on-site inspection questions Lighting_Efficient_Bulbs_Count to Lighting_T12_Count.

Type	Climate Zone 4	Climate Zone 5	Climate Zone 6	Overall Statewide
Incandescent	51.2%	55.1%	54.7%	53.0%
CFL/LED	27.5%	32.2%	33.1%	29.9%
Halogen	11.3%	2.7%	3.8%	7.2%
T12	7.3%	8.7%	7.1%	7.8%
Other	2.7%	1.3%	1.3%	2.0%
Respondents (n)	131	347	222	700

Table 52. Distribution of Lamp Type by Construction Type

Totals may not sum to 100 percent due to rounding.

Source: Single-family on-site inspection questions Lighting_Efficient_Bulbs_Count to Lighting_T12_Count.

Type	New Construction	Existing Construction	Overall Statewide
Incandescent	42.4%	53.1%	53.0%
CFL/LED	44.0%	29.9%	29.9%
Halogen	6.8%	7.3%	7.2%
T12	5.7%	7.8%	7.8%
Other	1.1%	2.0%	2.0%
Respondents (n)	182	518	700

In looking at types of lighting by room location, the type of lighting differs most in kitchens where there are more halogen and less incandescent lights. Dining rooms appear to have more incandescent lighting, most likely because of decorative lighting fixtures. More than 25 percent of the lights in laundry, garage, and utility areas have T12 bulbs (Table 53). These areas offer an opportunity for more efficient lighting.

Table 53. Existing Construction: Lamps by Type and Room Location

Totals may not sum to 100 percent due to rounding.

Source: Single-family on-site inspection questions Lighting_Efficient_Bulbs_Count to Lighting_T12_Count, Lighting_Unit.

Room	Incandescent	CFL/LED	T12	Halogen	Other
Bathroom	63.0%	28.8%	1.8%	5.5%	0.9%
Bedroom	57.4%	36.4%	1.8%	3.9%	0.4%
Closet	53.2%	28.9%	9.9%	2.6%	5.3%
Den/office	52.7%	29.7%	9.2%	5.8%	2.5%
Dining room	72.3%	21.4%	0.3%	5.2%	0.8%
Entryway	60.0%	30.4%	0.3%	9.3%	0%
Exterior	60.3%	26.9%	0.1%	7.4%	5.4%
Garage	50.6%	19.8%	27.7%	1.8%	0.1%
Hallway	54.9%	31.5%	0.7%	6.5%	6.4%
Kitchen	39.6%	30.8%	6.2%	20.0%	3.4%
Laundry	39.1%	31.0%	25.1%	4.3%	0.5%
Living room	56.6%	30.7%	2.9%	8.4%	1.4%
Other	50.7%	26.9%	15.5%	5.4%	1.5%
Utility	32.1%	26.5%	37.6%	2.1%	1.8%
Total	53.1%	29.9%	7.8%	7.3%	2.0%

In new homes, on-site inspectors report 44 percent of the light bulbs are compact fluorescent lights (CFL) or light-emitting diodes (LEDs). At the same time, 42 percent of the light bulbs are still incandescent lighting throughout the home (over one-third or more in all locations) that could be replaced with more efficient lighting (Table 54).

Table 54. New Construction: Lamps by Type and Room Location

Totals may not sum to 100 percent due to rounding.

Source: Single-family on-site inspection questions Lighting_Efficient_Bulbs_Count to Lighting_T12_Count, Lighting_Unit.

Room	Incandescent	CFL/LED	T12	Halogen	Other
Bathroom	47.4%	47.1%	1.3%	4.1%	0%
Bedroom	47.8%	43.5%	1.0%	7.1%	0.6%
Closet	34.1%	42.2%	21.2%	1.5%	1.0%
Den/office	37.2%	42.3%	7.1%	13.1%	0.2%
Dining room	54.9%	36.5%	0.5%	4.1%	4.0%
Entryway	51.5%	42.2%	2.7%	0%	3.6%
Exterior	38.8%	45.7%	0%	12.7%	2.8%
Garage	34.4%	26.6%	38.1%	0%	0.8%
Hallway	46.8%	47.4%	0%	4.9%	0.9%
Kitchen	32.9%	52.1%	3.5%	10.6%	0.9%
Laundry	35.8%	55.4%	5.0%	3.3%	0.4%
Living room	48.0%	38.2%	0.5%	12.9%	0.5%
Other	40.0%	40.4%	12.5%	7.1%	0%
Utility	35.1%	43.9%	18.7%	0.5%	1.7%
Total	42.4%	44.0%	5.7%	6.8%	1.1%

2.9 Appliances

This section includes data on kitchen appliances and laundry equipment including the mean number in homes and the percentage that are energy efficient.

2.9.1 Appliance Prevalence, Efficiency, Age, and Other Characteristics

More than one-fourth of households (28 percent) have a secondary full-sized or compact refrigerator plugged in and running in their home. Secondary refrigerators are most common in climate zone 4 (30 percent).

Over one-fourth of single-family respondents (28 percent) also report having a standalone freezer plugged in and running in their home this varies considerably by climate zone—19 percent in climate zone 4, 33 percent in climate zone 5, and 41 percent in climate zone 6.

Almost 70 percent of respondents have an automatic dishwasher. Dishwashers are most prevalent in climate zone 4 (73 percent) and least prevalent in climate zone 6 (61 percent).

Ninety-two percent of respondents living in single-family attached or detached homes report having a clothes washer in their home. This number compares to 38 percent of respondents living in a two- to four-unit apartment or condominium building.

Among the 93 percent of households familiar with ENERGY STAR, the majority of respondents (over 70 percent of them) report that their heating and cooling equipment and appliances that are less than 10 years old are ENERGY STAR qualified. As shown in Table 55, the on-site inspections generally showed a lower percentage of ENERGY STAR equipment less than 10 years old, and even lower when based on percentage of all appliances and equipment regardless of age. The decision was made for the single-family surveys to ask about appliances and equipment that were less than 10 years old, because older equipment, even if ENERGY STAR is not energy efficient by today's standards. In addition, the survey respondents were expected to be able to answer more accurately about ENERGY STAR for newer equipment than for equipment over 10 years old.

Table 55. Statewide: Percent of Primary Units that are ENERGY STAR by Climate Zone if Equipment is Less than 10 Years Old

Dishwasher year of manufacturer was not gathered during the on-site inspection, so percentage ENERGY STAR is of all dishwashers, not exclusively dishwashers less than 10 years old.

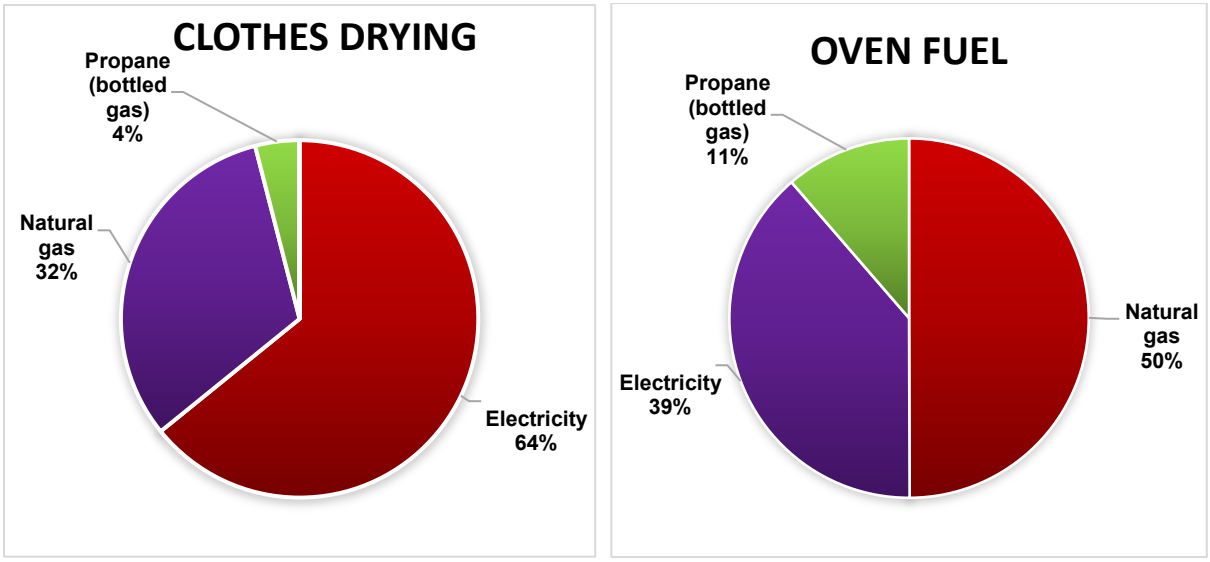
Source: Single-Family and Tenant survey questions H5, H19, H13, WH10, K7, K17a, C6b, C10, P2b, A13c.

Equipment and Survey Responses for % of Equipment Less than 10 Years Old that are ENERGY STAR		Self-reported Responses from Telephone and Web Survey Data				On-site inspection data - Statewide Less than 10 Years Old (& All)
		Climate Zone 4	Climate Zone 5	Climate Zone 6	Overall Statewide	
Primary heating system	% ENERGY STAR	77.9%	73.6%	66.0%	74.1%	58.6% (33.9% All)
	Respondents (n)	153	762	388	1,303	579
Programmable thermostat	% installed	71.3%	68.1%	53.5%	67.2%	NA
	Respondents (n)	474	1,498	968	2,940	NA
Primary cooling system	% ENERGY STAR	86.5%	83.9%	85.9%	85.4%	NA
	Respondents (n)	225	766	385	1,376	NA
Dishwasher	% ENERGY STAR	85.9%	84.2%	84.4%	85.0%	54.0%
	Respondents (n)	203	782	398	1,383	402
Refrigerator	% ENERGY STAR	70.3%	71.0%	72.2%	70.9%	38.2% (24% All)
	Respondents (n)	271	975	562	1,808	551
Standalone freezer	% ENERGY STAR	74.3%	73.5%	80.6%	75.4%	37.0% (18.3% All)
	Respondents (n)	37	220	181	438	151
Clothes washer	% ENERGY STAR	87.0%	84.8%	86.5%	86.0%	69.8% (50.2% All)
	Respondents (n)	242	939	543	1,724	498
Clothes dryer - heat pump dryer	% installed	3.3%	1.7%	2.4%	2.5%	NA
	Respondents (n)	316	1,229	764	2,309	NA

Although natural gas is used for cooking in half of the homes in New York State, only 32 percent of those homes use natural gas for clothes drying (Figure 4).

Figure 4. Statewide: Clothes Drying and Oven Fuel Use Percentages

Source: Single-Family and Tenant survey questions C8, K2.



Climate zone 6 has the highest percentage of propane (bottled gas) with over one-quarter (nearly 29 percent) of the cooking fuels (Table 56). Electric dryers have a much higher market share in climate zone 6 with over 81 percent compared to 66 percent or less in the other two climate zones.

Table 56. Statewide: Cooking and Clothes Drying Fuel Use by Climate Zone

Source: Single-Family and Tenant survey questions C8, K2.

Appliance Type		Climate Zone 4	Climate Zone 5	Climate Zone 6	Overall Statewide
Clothes dryer fuel	Electricity	55.2%	66.2%	81.4%	64.2%
	Natural gas from underground pipes	42.2%	30.0%	10.5%	31.8%
	Propane (bottled gas)	2.6%	3.7%	8.1%	4.0%
	Other, specify	0%	0.1%	0%	0%
	Respondents (n)	370	1393	841	2604
Oven fuel	Natural gas	65.3%	41.7%	22.3%	49.3%
	Electricity	25.7%	46.2%	47.8%	37.2%
	Propane	6.1%	10.1%	27.4%	11.0%
	Electricity + Natural gas	2.6%	1.1%	1.1%	1.8%
	Electricity + Propane	0.2%	0.7%	1.1%	0.5%
	Electricity + Wood	0%	0.1%	0%	0%
	Electricity, Natural gas + Oil	0%	0.1%	0%	0%
	Electricity, Natural gas + Coal	0%	0%	0.1%	0%
	Wood	0%	0%	0.1%	0%
	Oil	0%	0%	0.1%	0%
	Respondents (n)	437	1326	875	2638

The average age of refrigerators is about 10 years old, which shows there are still considerable opportunities to promote replacement with more efficient units (Table 57).

Table 57. Statewide: Average Refrigerator Year of Manufacturer per Household by Climate Zone

Totals may not sum to 100 percent due to rounding. The reported (n) may not equal the number of households as households may not have a measure or may have more than one.

Source: Single-family on-site inspection questions YrMfr and appliancecategory_c.

Age	Climate Zone 4	Climate Zone 5	Climate Zone 6	Overall Statewide
Less than 2 years old	15.4%	10.1%	13.6%	13.1%
2 to 4 years old	16.0%	13.8%	13.4%	14.8%
5 to 9 years old	27.5%	28.0%	27.7%	27.7%
10 to 14 years old	19.2%	22.7%	20.8%	20.8%
15 to 19 years old	10.9%	11.7%	8.8%	10.9%
20 or more years old	10.9%	13.8%	15.7%	12.7%
Average year of manufacturer	2005	2003	2003	2004
Refrigerators (n)	170	445	273	888

The average age of freezers is 12 years old, with the majority of freezers (23 percent) being 10 to 14 years old, and nearly 55 percent being 10 years or older. More than 25 percent of freezers in climate zones 5 and 6 are 15 years of age or more. These offer opportunities for early replacement with more efficient models (Table 58).

Table 58. Statewide: Average Age of Standalone Freezers by Climate Zone

Source: Single-Family and Tenant survey questions K15a, K15b, K15c.

Freezer Type		Climate zone 4	Climate zone 5	Climate zone 6	Overall statewide
First standalone freezer	Mean	10.0	17.4	3.0	10.0
	Respondents (n)	5	3	2	10
Second standalone freezer	Mean	-	-	-	-
	Respondents (n)	0	0	0	0
Third standalone freezer	Mean	-	-	-	-
	Respondents (n)	0	0	0	0

Table 59. Statewide: Average Freezer Year of Manufacturer per Household by Climate Zone

Totals may not sum to 100 percent due to rounding. Climate zone 4 may not be representative of the population (90/20 confidence/precision). The reported (n) may not equal the number of households as households may not have a measure or may have more than one.

Source: Single-family on-site inspection questions YrMfr and appliancecategory_c.

Age	Climate Zone 4	Climate Zone 5	Climate Zone 6	Overall Statewide
Less than 2 years old	31.2%	8.4%	21.1%	16.6%
2 to 4 years old	31.2%	11.9%	5.2%	14.7%
5 to 9 years old	6.3%	16.7%	15.8%	14.1%
10 to 14 years old	25.0%	20.2%	27.6%	23.1%
15 to 19 years old	6.2%	15.5%	5.3%	10.9%
20 or more years old	0%	27.4%	25.0%	20.6%
Average year of manufacturer	2008	1999	2002	2002
Freezers (n)	17	131	99	247

The average age of humidifiers is nine years old, with climate zone 4 showing the oldest humidifiers for replacement purposes (Table 60).

Table 60. Statewide: Average Humidifier Year of Manufacturer per Household by Climate Zone

Climate zone 4 (80/20 confidence/precision) and climate zone 6 (90/14 confidence/precision) may not be representative of the population. The reported (n) may not equal the number of households as households may not have a measure or may have more than one.

Source: Single-family on-site inspection questions YrMfr and Appliancecategory_c.

	Climate Zone 4	Climate Zone 5	Climate Zone 6	Overall Statewide
Mean	2003	2006	2008	2005
Humidifiers (n)	12	79	29	120

2.10 Pools and Hot Tubs

Slightly more than 16 percent of single-family attached or detached homes have a swimming pool in New York State. Among the households with a pool pump, the on-site inspectors could only identify about 14 percent as being high efficiency (Table 61 and Table 62). A small percentage of the pools are heated. Another 11 percent of homes have a hot tub, spa, or jetted pool.

Table 61. Statewide: Pool Heated by Climate Zone

Totals may not sum to 100 percent due to rounding. The reported (n) may not equal the number of households as households may not have a measure or may have more than one. Climate zone data may not be representative of the populations due to small sample sizes. To achieve a 90/15 confidence precision a total of 31 responses are needed. The confidence precision of a sample size of 19 is at 80/15.

Source: Single-family on-site inspection questions PoolHotTub_Heated and appliancecategory_c.

	Climate Zone 4	Climate Zone 5	Climate Zone 6	Overall Statewide
No	85.6%	81.8%	82.4%	83.5%
Yes	14.4%	18.2%	17.6%	16.5%
Pools (n)	17	41	19	77

Table 62. Statewide: Pool Pump High Efficiency by Climate Zone

Totals may not sum to 100 percent due to rounding. The reported (n) may not equal the number of households as households may not have a measure or may have more than one. To achieve a 90/15 confidence precision a total of 31 responses are needed. The confidence precision of a sample size of 19 is at 80/15.

Source: Single-family on-site inspection questions PoolHotTub_HighEfficiencyPump and appliancecategory_c.

	Climate Zone 4	Climate Zone 5	Climate Zone 6	Overall Statewide
No	28.5%	56.2%	52.9%	43.7%
Unclear	50.0%	34.4%	47.1%	42.7%
Yes	21.5%	9.4%	0%	13.5%
Pool pumps (n)	17	40	19	76

2.11 Plug Loads—Office, Communication, and Entertainment

This section provides information on numbers of plug load equipment that include office equipment, communication equipment, and entertainment devices.

2.11.1 Office Equipment

Homes in New York State average almost two desktop and laptop computers per home with climate zone 4 having more than two on average (Table 63). In addition, homes average 0.8 tablet computers.

Average hours of use per day for desktops and laptops is over three hours per day (Table 64).

Only about one-half of respondents report shutting down their computer when not in use (Table 65).

Table 63. Statewide: Average Number of Computers per Household by Climate Zone

Source: Single-Family and Tenant survey questions A7a, A7b, A7c

	Climate Zone 4	Climate Zone 5	Climate Zone 6	Overall Statewide
Mean	2.2	1.8	1.6	1.9
Respondents (n)	510	1,498	960	2,968

Table 64. Statewide: Average Number of Hours Computer Used Per Day by Climate Zone

Source: Single-Family and Tenant survey question A9a, A9b

		Climate Zone 4	Climate Zone 5	Climate Zone 6	Overall Statewide
Desktop computer	Mean	3.2	3.0	3.2	3.1
	Respondents (n)	301	765	460	1,526
Laptop computer	Mean	3.3	2.9	3.3	3.2
	Respondents (n)	403	1,147	658	2,208

Table 65. Statewide: Typically Shutdown Computer by Climate Zone

Totals may not sum to 100 percent due to rounding.

Source: Single-Family and Tenant survey question A10.

	Climate Zone 4	Climate Zone 5	Climate Zone 6	Overall Statewide
Yes	51.2%	55.0%	52.8%	52.9%
No	48.8%	45.0%	47.2%	47.1%
Respondents (n)	469	1381	828	2678

Less than 14 percent of the homes use a smart strip to turn off their computer when inactive for a period of time (Table 66). Most of these strips are Tier 1 that turn off office equipment when the computer is powered off or goes to sleep.

Table 66. Statewide: Smart Strips by Climate Zone

Totals may not sum to 100 percent due to rounding. Sample sizes are small for climate zone 4 but meets 90/12 confidence/precision.

Source: Single-Family and Tenant survey questions A8, A8a.

		Climate Zone 4	Climate Zone 5	Climate Zone 6	Overall Statewide
Use smart strip	Yes	15.1%	12.5%	14.0%	13.9%
	Respondents (n)	452	1,439	940	2,831
Type of smart strip	Tier 1 smart strip that may turn off when your computer is powered off or goes to sleep	84.4%	86.2%	82.3%	84.6%
	Tier 2 smart strip that turns off when you leave or is programmed to turn off at a certain time	4.5%	7.7%	12.6%	6.9%
	Both Tier 1 and Tier 2 smart strip	11.1%	6.1%	5.1%	8.5%
	Respondents (n)	51	93	88	232

2.12 Televisions and Entertainment Equipment

There are approximately 2.6 televisions per home in New York State, and the number does not vary much by climate zone. Over half of the televisions are LCD/LED, although nearly one in five is a standard television. Among households with an LCD/LED television, 85 percent report that it is ENERGY STAR (Table 67 and Table 68).

Table 67. Statewide: Average Number of TVs per Household by Climate Zone

Source: Single-family on-site inspection questions Units and Appliancecategory_c.

	Climate Zone 4	Climate Zone 5	Climate Zone 6	Overall Statewide
Mean	2.8	2.6	2.3	2.6
Respondents (n)	473	1471	835	2779

Table 68. Statewide: Average Number of TVs (by Type) by Climate Zone

Source: Single-Family and Tenant survey question A2

TV Type		Climate Zone 4	Climate Zone 5	Climate Zone 6	Overall Statewide
Standard	Mean	0.5	0.6	0.6	0.6
	Respondents (n)	473	1498	967	2938
Flat screen Plasma	Mean	0.4	0.3	0.3	0.3
	Respondents (n)	473	1498	967	2938
Flat screen LCD/LED	Mean	1.6	1.5	1.2	1.5
	Respondents (n)	473	1498	967	2938
Rear projection	Mean	0	0	0	0
	Respondents (n)	473	1498	967	2938
Flat screen of unknown type	Mean	0.3	0.2	0.2	0.2
	Respondents (n)	473	1471	835	2779

At least one out of every two households has DVD players, video gaming systems, and stereos. Homes also have one or more cable/satellite set top boxes, cell phones, and cordless phones (Table 69).

Table 69. Statewide: Plug Load Equipment by Type - Average Number per Household and Percent ENERGY STAR by Climate Zone

Source: Single-Family and Tenant survey questions A12c, A12d, A13a, A12f, A12a, A13i, A12i, A12j, A12k, A13d

Equipment		Climate Zone 4	Climate Zone 5	Climate Zone 6	Overall Statewide
DVD/Blu-Ray player	Mean	0.8	0.9	0.8	0.8
VCR	Mean	0.4	0.3	0.3	0.3
Video gaming system	Mean	0.7	0.7	0.6	0.6
Cable, satellite, set-top box	Mean	1.3	0.6	0.7	1.0
Cell phone & smart phones	Mean	2.3	1.9	1.7	2.1
Cordless phones	Mean	1.8	1.2	1.3	1.5
Stereo system	Mean	0.6	0.6	0.6	0.6
Respondents (n)		510	1,495	958	2,963

2.13 Energy Efficiency Program Awareness and Participation

As shown in Table 70, less than 15 percent (12.2 percent) reported participating in an energy efficiency program. Among the energy efficiency program participants, the most frequently installed equipment was insulation or weatherization measures (34.7 percent), heating equipment (21.5 percent), and lighting (20.8 percent). Among those who have not yet participated in a program, the main reason was lack of awareness of programs (51 percent).

Table 70. Awareness of and Participation in Energy Efficiency Programs by Climate Zone

Source: Single-Family and Tenant survey questions U8, U9, U10

		Climate Zone 4	Climate Zone 5	Climate Zone 6	Overall Statewide
Participated in energy efficiency program	Yes	12.1%	12.9%	10.5%	12.2%
	No	87.9%	87.1%	89.5%	87.8%
	Respondents (n)	509	1493	969	2,971
Equipment purchased/recycled through program	Insulation or weatherization measures	26.8%	39.8%	46.9%	34.7%
	Heating equipment	16.2%	25.2%	28.4%	21.5%
	AC equipment	14.4%	16.3%	3.7%	13.7%
	Lighting	21.4%	20.3%	19.8%	20.8%
	Water heating equipment	9.0%	9.8%	17.3%	10.4%
	Clothes washer	5.4%	4.9%	4.9%	5.1%
	Appliances	1.8%	13.0%	11.1%	7.6%
	Refrigerator or freezer recycling	17.8%	18.7%	22.2%	18.8%
	Other	21.5%	23.6%	24.7%	22.8%
	Respondents (n)	60	147	86	293
Reason for not participating in program	Am not aware of any	54.7%	48.7%	48.3%	51.4%
	Do not need anything done	13.3%	17.2%	17.8%	15.5%
	Don't know who to contact to participate	14.2%	15.4%	13.4%	14.5%
	Can't afford to install new equipment	15.9%	22.3%	21.1%	19.1%
	My energy bills aren't that high	9.6%	14.2%	19.8%	12.9%
	I rent	14.0%	11.5%	8.0%	12.1%
	Other	8.2%	5.6%	6.8%	7.0%
	Too busy	10.7%	8.3%	4.7%	8.9%
	Recently moved	4.3%	6.7%	3.3%	5.0%
	Respondents (n)	446	1327	876	2,649

Appendix A: Detailed Methodology

Volume 5: Methodology and Data Tables describes the methodology for single-family home data collection.

A.1 Summary of Approach

A combination of telephone and Web surveys were conducted with a sample of existing and new construction residential single-family building occupants and multifamily tenants. The original sample was drawn from the electric utility residential customer information systems and supplemented with tax and finance data to for newly constructed homes. The key objectives of the surveys were to provide up-to-date, self-reported estimates of equipment types, fuel types and uses, vintages, and efficiencies, as well as information on building characteristics, demographics, homeowner energy consumption attitudes and behaviors, participation in energy efficiency programs, and market barriers.

The telephone and Web surveys were also used to recruit single-family homes for on-site inspections. In addition, the tenants included in these surveys were also asked for contact information for their property owners or managers to recruit them for the property manager or owner surveys and on-site inspections.

One telephone and Web survey instrument was used for both single-family home owners or occupants and multifamily tenants. The tenant responses were indicative of multifamily units and are included in the multifamily baseline volume. Tetra Tech developed the draft survey instruments with input from NYSERDA's evaluation and program staff, the New York State Department of Public Service and the E2 Working Group. All draft survey instruments were reviewed and approved by NYSERDA prior to pretesting. Tetra Tech then conducted a pretest of each survey instrument and made revisions to the questions to address any issues identified.

Notification letters were sent out by NYSERDA to potential survey respondents in advance of the survey. The letter provided sampled households with a telephone number, website, and a unique identification number to access and complete the survey via telephone or online. Tetra Tech then attempted to call all households who did not respond to the survey via the Web. NYSERDA followed up these attempts with email reminders, where email addresses had been provided in the utility customer records. Tetra Tech conducted the telephone surveys from the Tetra Tech in-house computer assisted telephone interviewing

(CATI) lab. Tetra Tech used multiple call-back attempts, mailings, and emails to reach the appropriate respondent in order to increase the survey response rate and minimize the potential for nonresponse bias. The Web survey option was added early in the study to increase the response rate of the survey participants, which proved to be successful because more than half of the survey completes are the result of the Web survey option.

Although Tetra Tech originally proposed a cash incentive be provided with the advance letter survey mailings to encourage those contacted to complete the survey, this approach did not meet NYSERDA requirements for incentive delivery and tracking. After exploring multiple other options, Tetra Tech and NYSERDA agreed to use Amazon gift cards as the incentive. Tetra Tech purchased, in bulk and advance, the supply of gift cards needed for this study. Tetra Tech used in-house mailing to send the $20 gift card via U.S. Postal Service Priority Mail to participants who completed either the telephone or Web survey. If requested, the survey respondents were provided with an optional pre-paid Visa card.

A.2 Sampling Strategy

The sample for the single-family baseline study was primarily populated by a random sample of residential electric utility accounts provided by each of the IOUs. The telephone and Web surveys were also used to recruit homes that would receive more extensive on-site inspection.

The sample strategy was informed by reviews of other residential baseline studies, as well as numerous meetings with NYSERDA's evaluation and program staff, DPS, IOU staff, and other NYSERDA evaluation contractors who were planning research in New York State. The Tetra Tech Evaluation Team also considered various data collection methods in developing a final sampling strategy. Because the nonparticipant utility customer data was initially inaccessible, the data collection methods included a random digit dialing (RDD) approach for a telephone survey and purchasing an address-based database for a mail survey approach. Ultimately, the Tetra Tech Team and NYSERDA Evaluation determined that the optimal study approach was to use nonparticipant customer contact (telephone and email where available) and annual electric usage information provided by New York State's IOUs to develop a sample of residential customers. The IOUs represented 90 percent of the homes in New York State—the rest are primarily customers of municipal and cooperative electric utilities.

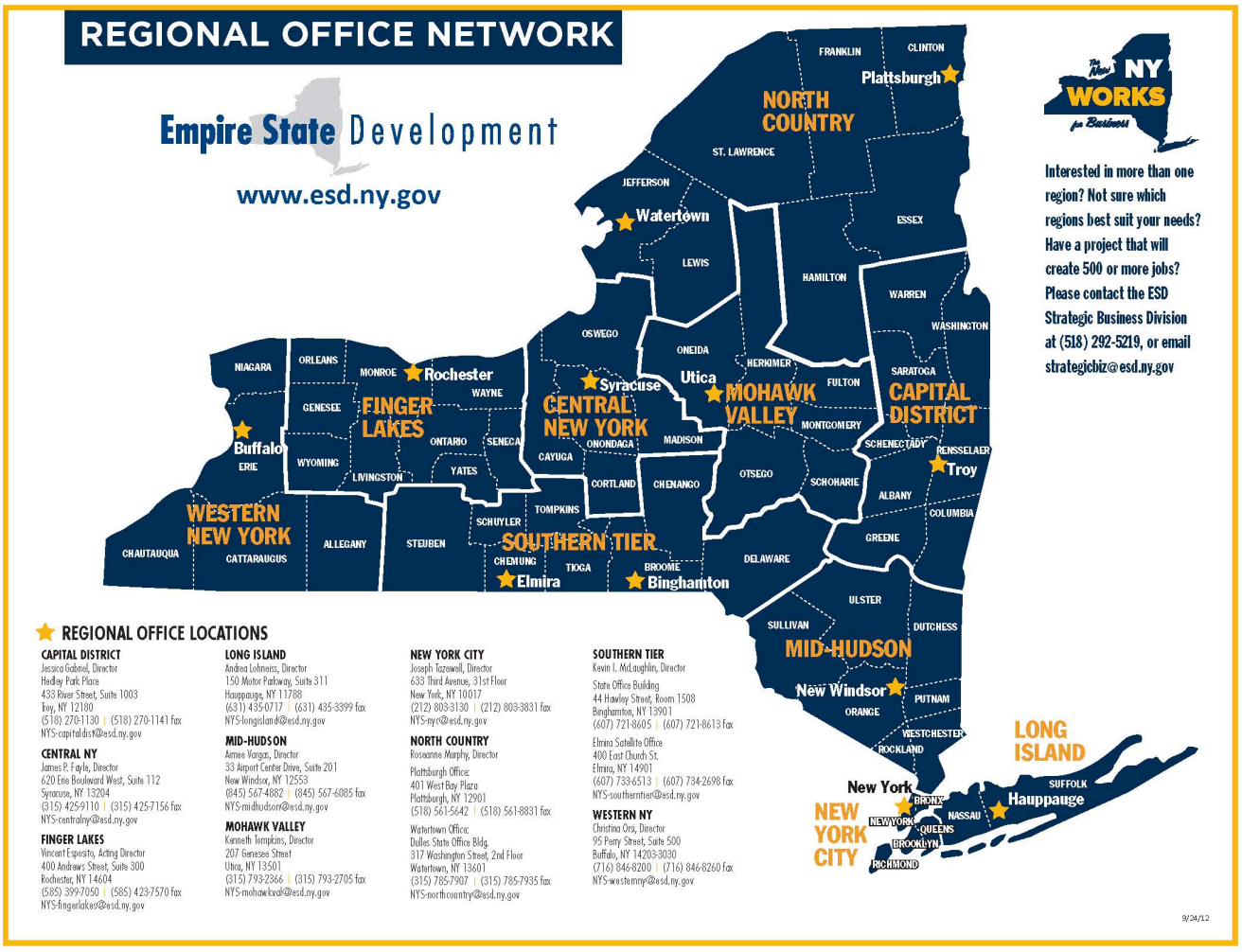
For NYSERDA to access the nonparticipant customer contact information, DPS revisited its Customer Data Guidelines. This revision was finalized on December 21, 2012. This revision to the guidelines was necessary to clarify the process for maintaining the confidentiality of customer data. In particular, the change would specifically allow access to customer energy consumption data that would be analyzed to develop a sampling strategy and sample. The revised guidelines allowed NYSERDA and its evaluation contractors to obtain nonparticipant contact information under the same circumstances and restrictions as utility program administrators.

Another consideration in designing the sampling was the optimal geographic stratification of the sample. A regional stratification was necessary to ensure adequate representation across the State for different housing types and fuel uses. For the telephone and Web survey of single-family households and multifamily tenants, the Tetra Tech team recommended drawing the sample by the 10 Economic Development Regions in New York (Figure A-1). The intent was to ensure that the study had coverage across all geographic areas of the state while meeting the 90/10 confidence and precision at the climate zone and statewide levels.

Sampling by the 10 Economic Development Regions provided a comprehensive statewide baseline assessment of the residential market across a range of customer segments, fuel uses, and energy measures. The alternative approach was a proportional sample at the statewide level that would result in an unbalanced focus on the New York City and Long Island Economic Development Regions. The counties within these 10 Economic Development Regions were also mapped to the three New York climate zones used in potential study in Volume 4 of this study.

Figure A-1. New York Economic Development Regions

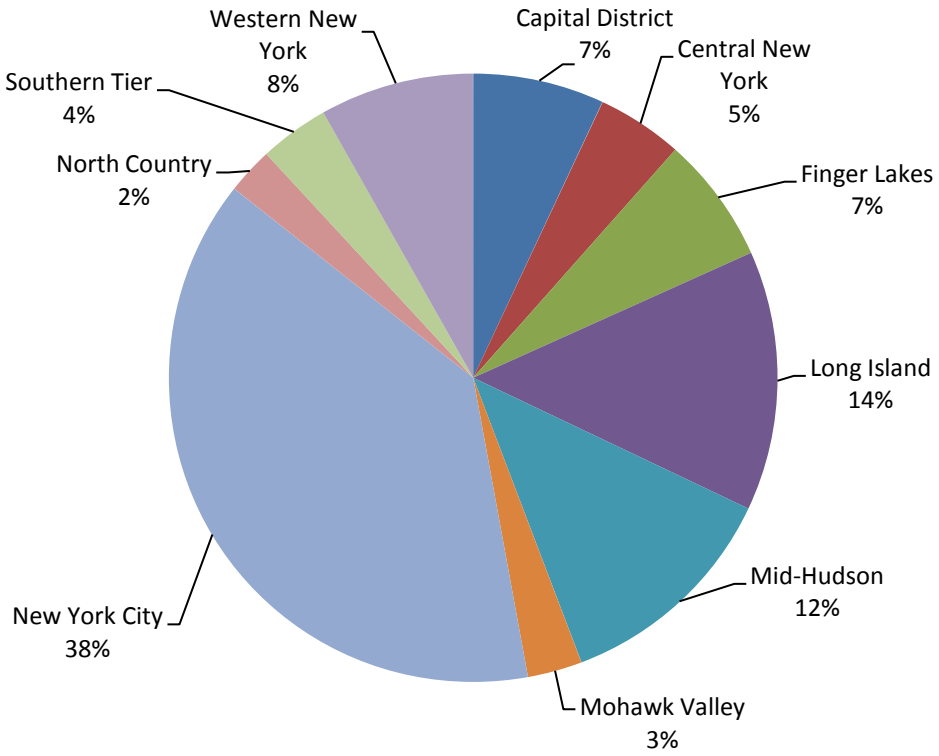
Source: Empire State Development (www.esd.ny.gov)



As a first step to determining the sample design, the Tetra Tech Team requested and received from the electric IOUs aggregate information on the number of residential, individually metered (or submetered) electric accounts (Phase I Data Request). The information was requested by county, as counties map to the 10 New York Economic Development Regions, as well as the three New York climate zones. The aggregate information from each electric IOU by county was then combined and rolled up to Economic Development Region and the statewide level, which is shown in Figure A-2. The total electric accounts were also compared to the total households provided in the 2009 U.S. Census data to confirm that the counts were accurate.

Figure A-2. Distribution of Residential Electric Accounts by Economic Development Region in New York

Source: Phase 1 Data Request



The Phase I Data Request outlined the format of the data including the need for the electric IOUs to categorize their residential electric accounts by single-family versus multifamily, as well as new versus existing construction. New construction was defined as being completed in 2012 or later. Three of the seven utilities were able to identify and provide counts of multifamily units, while only one utility was able to accurately provide counts of new construction.

Because some electric IOUs were not able to provide the additional breakdown of total residential customers by multifamily and new construction, the Tetra Tech Team requested a random sample of residential customers by County from each utility with no additional pre-stratification other than by Economic Development Region (Phase II data request).[4] The data formats varied significantly by utility, making it difficult to compare or combine data sets without additional work.

[4] Program participants should be included in the sample, as they are part of the statewide population.

Based on discussions with Con Edison and feedback regarding the productivity of samples for other studies conducted in the New York City region, the sample points requested for their service area were initially doubled. Late in the study, an additional 5,000 residential customer accounts were requested of and provided by Con Edison. To expedite completion of the on-site inspections in New York City, this additional sample of households from Con Edison were not required to complete the telephone or Web survey in advance. Instead, a "mini-survey" was completed by the inspector while doing on-site inspections at 35 homes in New York City.

Preliminary discussions with the utilities indicated the most constant indication of new construction across utilities was the meter set date. Tetra Tech attempted to pre-stratify the sample for new construction single-family homes using this variable, but found that data element did not align with actual newly constructed homes (constructed in 2012 or newer). To ensure a sufficient sample of new homes were included, particularly for the on-site inspections, the new construction sample was supplemented with tax assessment roll information obtained by NYSERDA from the New York State Department of Taxation and Finance for years 2011, 2012, and 2013 for all regions except New York City (because of the file structure).

A.3 Response Rates

The study originally proposed achieving 200 completed telephone surveys in each of the 10 New York Economic Development Regions across single-family and multifamily tenant accounts. As shown in Table A-1, the single-family baseline study completed 2,982 telephone or Web surveys with single-family homeowners or occupants. These respondents included both existing homes (built before 2012) and new construction (built in 2012 and later). After a Web option was added to the single-family and tenant surveys, the majority of respondents (69 percent) opted to complete the survey via the Web (Table A-2). Table A-3 illustrates that the single-family and tenant survey response rate was 13.6 percent. Despite offering two different modes for response (Web and follow-up telephone surveys) and a post-paid incentive ($20 gift card), the response rate to the single-family and tenant survey was lower than anticipated. Other baseline surveys that the evaluation team has been involved with have seen response rates ranging from 30 to 50 percent. However, those surveys were a different mode (mail survey), had a pre-paid cash incentive ($5), and were significantly shorter in length. In addition, those other studies were also conducted in states where response rates are typically higher, and the surveys were sponsored by the customers' utility.

Table A-1. Single-Family Survey Completes by Method

	Region										Total
	Capital District	Central New York	Finger Lakes	Long Island	Mid-Hudson	Mohawk Valley	New York City	North Country	Southern Tier	Western New York	
Phone complete	119	63	88	83	101	101	64	87	121	86	913
Web complete	297	195	259	148	247	204	102	211	129	242	2,034
In-person mini-survey completed during on-site inspections	0	0	0	0	0	0	35	0	0	0	35
Total	**416**	**258**	**347**	**231**	**348**	**305**	**201**	**298**	**250**	**328**	**2,982**

Table A-2. Tenant Survey Completes by Method

	Region										Total
	Capital District	Central New York	Finger Lakes	Long Island	Mid-Hudson	Mohawk Valley	New York City	North Country	Southern Tier	Western New York	
Phone complete	14	3	8	7	11	3	68	0	7	7	128
Web complete	15	6	12	11	27	9	143	8	14	6	251
Total	**29**	**9**	**20**	**18**	**38**	**12**	**211**	**8**	**21**	**13**	**379**

Table A-3. Single-Family and Tenant Survey Disposition and Response Rate*

	Region										
	Capital District	Central New York	Finger Lakes	Long Island	Mid-Hudson	Mohawk Valley	New York City	North Country	Southern Tier	Western New York	Total
Complete - phone	133	66	96	90	112	104	132	87	128	93	1,041
Complete - Web	312	201	271	159	274	213	245	219	143	248	2,285
Partial	14	1	3	5	7	10	10	5	7	5	67
Refusal	286	200	157	361	309	215	421	151	129	138	2,367
Invalid phone number	139	102	150	405	242	156	486	136	89	126	2,031
Business line	14	9	14	16	22	9	35	15	6	20	160
Language barrier	1	2	2	13	28	4	149	1	0	2	202
Ineligible - deceased or incapable	6	6	3	15	7	7	16	3	0	8	71
No longer living at address	33	15	19	23	21	17	40	26	24	17	235
Active sample - no answer, busy, callback, answering machine	2,145	1,455	1,847	2,057	1,972	1,443	2,272	1,051	370	1,475	16,087
Total	3,083	2,057	2,562	3,144	2,994	2,178	3,806	1,694	896	2,132	24,546
Response rate	**14.4%**	**13%**	**14.3%**	**7.9%**	**12.9%**	**14.6%**	**9.9%**	**18.1%**	**30.2%**	**16%**	**13.6%**
Cooperation rate	**15.4%**	**13.9%**	**15.5%**	**9.3%**	**14.4%**	**16.0%**	**12.2%**	**20.2%**	**34.9%**	**17.4%**	**15.2%**

* Response rate is calculated by the number of telephone survey and Web completes divided by total sample. Cooperation rate is calculated by the number of telephone and Web survey completes divided by total sample minus invalid phone number, residential line, and ineligible cases.

The primary data collection via telephone and Web surveys commenced on November 4, 2013, and continued until April 3, 2014. Although the initial survey deployment schedule included a brief hiatus between regions, because the productivity of the sample was lower than anticipated, the evaluation team modified the approach to lessen the time between regional deployments. The intent was to complete each region before moving on to another, however, the surveys were driven by the on-site inspection schedule and ensuring a sufficient number of recruits from the surveys to reach the target number of on-site inspections in the region. The continuous deployment of telephone and Web surveys assisted in managing the workload and staffing of the CATI lab.

A.4 Weighting

By understanding how many households in the population were assigned to each strata and knowing how many completed surveys were obtained for each, the evaluation team developed analysis weights so that the data can be reported accurately for the region and state. The population counts and survey completes are used to weight the telephone and Web survey data to ensure that it accurately reflects the original population distribution by climate zone.

All surveys experience some degree of nonresponse. Because nonrespondents may differ from respondents in terms of the variables collected in the survey, the occurrence of nonresponse can indicate bias within survey results.

To check for potential bias, the evaluation team compared weighted distributions to results from other surveys and administrative data sources. Across a wide number of building characteristics (i.e., age of home, primary heating fuel, square footage, number of bedrooms, number of occupants, household income, average annual fuel use), the marginal distribution of the sampling weights was in agreement with known auxiliary information from other sources. Overall, these comparisons suggest the study results are representative of the entire population of buildings in New York State.

As is common in a study of this type, some respondent demographic variables, most notably education level, differed from the overall population demographics. Each of these differences was thoroughly examined by the study team in order to investigate the level of potential bias and whether weighting would be appropriate.

Differences in the sample vs. population demographics that existed could not be conclusively identified nor appropriately corrected for in weighting, so no such adjustments were made in the results. The study team believes that some of the observed difference could be explained by the varied ways in which data were collected for this study and the population benchmark studies. For example, this study estimates that 34 percent of households or building units have at least one household member with a graduate degree. In comparison, about 14.5 percent of individuals directly responding to the Census surveys have graduate degrees themselves. The large difference may reflect survey bias, or it may simply reflect that this study is measuring the highest level of education across all household members while the Census is measuring highest level of education of a single individual.

Furthermore, many of the demographic variables that differed between the sample and the population are characteristic of the respondent rather than the building or household, which was the unit of analysis in this study. Key characteristics of buildings within this study sample, namely age of home, primary heating fuel, square footage, number of bedrooms, number of occupants, and average annual fuel use compare closely with population benchmark sources, and strongly support this study's representativeness of NYS residential building stock.

Through identifying and analyzing these differences, the study team has noted improvements to be made if this study is repeated in the future, to better isolate true differences between the sample and the population and aide in weighting if needed.

The final weights for the single-family and tenant baseline survey respondents are shown in Table A-4 and Table A-5.

Table A-4. Single-Family and Tenant Survey Weights: New Construction

Climate Zone	Population		Single-Family and Tenant Survey Completes		Single-Family and Tenant Weights	
	Number of Units in Single-Family Buildings	Number of Units in Multifamily Buildings	Number of Units in Single-Family Buildings	Number of Units in Multifamily Buildings	Number of Units in Single-Family Buildings	Number of Units in Multifamily Buildings
	(1–4 units)	(5+ units)	(1–4 units)	(5+ units)	(1–4 units)	(5+ units)
Climate zone 4	2,255,727	1,695,304	489	249	4,612.94	6,808.45
Climate zone 5	1,874,097	252,074	1,021	74	1,835.55	3,406.40
Climate zone 6	740,527	90,501	812	45	911.98	2,011.14
Total	**4,870,350**	**2,037,880**	**2,322**	**368**	**-**	**-**

Table A-5. Single-Family and Tenant Survey Weights: Existing Construction

Climate Zone	Population		Single-Family and Tenant Survey Completes		Single-Family and Tenant Weights	
	Number of Units in Single-Family Buildings	Number of Units in Multifamily Buildings	Number of Units in Single-Family Buildings	Number of Units in Multifamily Buildings	Number of Units in Single-Family Buildings	Number of Units in Multifamily Buildings
	(1–4 units)	(5+ units)	(1–4 units)	(5+ units)	(1–4 units)	(5+ units)
Climate zone 4	2,255,727	1,695,304	489	249	4,612.94	6,808.45
Climate zone 5	1,874,097	252,074	1,021	74	1,835.55	3,406.40
Climate zone 6	740,527	90,501	812	45	911.98	2,011.14
Total	**4,870,350**	**2,037,880**	**2,322**	**368**	**-**	**-**

A.5 Data Limitations and Suggestions for Future Studies

The limitations of a study are those characteristics of design or methodology that impacted or influenced the application or interpretation of the results. This section presents the barriers and approaches used to overcome them. Additionally, this section presents the constraints on applicability of the findings of the Residential Statewide Baseline Study and makes recommendations for the future should this study be replicated.

The following were elements of the methodology that worked well for this study:

- The regional sampling approach, using the Economic Development Regions, was useful to ensure all areas of the State had reasonable representation in the data collection.
- DPS revised its Customer Data Guidelines on December 21, 2012, authorizing NYSERDA access to nonparticipant residential consumption data. The original sampling plan for this study explored utilizing Random Digit Dial and a purchased sample. Although working through the revision to the Customer Data Guidelines delayed the start of the project, the authorization allowed the evaluation team to use the optimal approach of obtaining random samples from each of the IOU's residential customer accounts.
- Amazon gift cards were used as the post-paid incentive because this approach met NYSERDA requirements for incentive delivery and tracking. Despite the fact that Amazon is a single vendor, they sell products from thousands of vendors. Less than one percent of households requested that they receive a pre-paid Visa card rather than an Amazon gift card.
- The multi-mode study was optimal. The evaluation team used a telephone and Web survey combination. Approximately 60 percent of completed surveys resulted from the Web with the remainder from the phone. Given the increasing reluctance of respondents to participate in telephone surveys, a future study should consider a Web and mail combination. The cost per complete for telephone surveys is higher than a Web survey, but a mail survey would ensure that those who do not use the Internet would be covered as well. In addition, the multi-mode method would allow for comparison of the demographics of respondents from each method to other data sources.
- The nested sample approach of using the telephone and Web surveys to assess interest in participating in the on-site inspection was helpful for recruiting purposes by providing interested respondents. In addition, it provided an opportunity to compare self-reported information to the observations made during the on-site inspections for some key variables. While providing rich data for analysis, having to complete the surveys first did slow down the schedule for on-site inspections and increased the length of the study.

Some of the data limitations and suggested changes for future studies are as follows:

- The new construction survey targets should be established after an analysis of new construction estimates by region. Data on building permits could be used as a proxy although the permits do not always result in a completed new home. New construction quotas were very difficult to achieve given that the IOUs could not stratify the population by date of construction. In most cases, the target completes were too high for the region given the percentage of the newly constructed homes in the population. Given the differences by climate zone, it would still be necessary to establish quotas with oversampling to ensure reporting at a 90/10 confidence and precision by climate zone instead of using a random proportional sampling approach.

- The tax assessor's data from the New York State Department of Taxation and Finance should be acquired and used as one source of new construction households in future studies. Other sources should be explored as well because the tax assessment data could not be used for all areas of the State and it only contained mailing addresses for tax purposes (not phone numbers or email addresses). The file for New York City was in a different format and did not have a way to flag year built.
- For future studies, the evaluation team recommends ensuring that email addresses are gathered as part of the sample. Web surveys are an economic and efficient way to send survey invites and survey reminders. NYSERDA sent email invitations to people with email addresses and then sent an email reminder about a week later. These contacts were in addition to the postal letter that was mailed and telephone call attempts.
- The response rates varied from 7 to 30 percent by region. For future studies, the starting sample size should be adjusted accordingly by region to reflect those response rates. In particular, the New York City region had very low response rates and although the initial sample was double the rest of the regions, it was necessary to go back and request another sample late in the data collection.
- In terms of best times to collect survey data, response rates to the survey were lowest of any point in the survey period around the Christmas and New Year holidays.
- NYSERDA is moving away from offering financial incentives and that will affect the response rates for surveys, particularly for nonparticipants in these types of general population surveys. Future studies should consider other options and identify value propositions to motivate residential homeowners and occupants to participate in these types of studies.
- Survey question wording for key data points should be compared to auxiliary sources, such as U.S. Census data, that may be used for comparison to determine any sample bias. For example, there is some indication that survey respondents may have much higher education attainment in their household than the general population. Given the differences in how the questions were asked in auxiliary data sources, it was not possible to determine the level of bias and weight data accordingly. At the same time, the key characteristics of homes for baseline and potential estimates did not vary from these other sources as described in Table 1 of Volume 1.

A.6 Single-Family On-Site Data Collection

A.6.1 Summary of Approach

Performance Systems Development (PSD), under the direction of Tetra Tech, conducted on-site inspections at a subset of existing and newly constructed single-family homes that participated in the telephone or Web surveys. PSD conducted the on-site inspections to meet targets by region as determined in the sample design. Although the original approach was to complete a region before moving on to the next, it was necessary to go back to some of the regions to meet quotas by climate zone and to enter multiple regions simultaneously. All scheduling for the on-site inspections was conducted by personnel with at least one year's relevant experience.

Some of the types of data that were collected during the on-site inspections included:

- Heating and cooling systems and water heaters—number and types, age, size, fuel type, set points, efficiency levels, controls, and other nameplate data.
- Other appliances—number and types, age, fuel type, ENERGY STAR, features that affect energy efficiency, usage patterns.
- Building shell characteristics.
- Lighting.
- Plug loads (consumer electronics and office equipment)—types, numbers, behavioral characteristics.
- Air leakage assessment.
- Renewables (i.e., number, types, age).

Tetra Tech customized its secure Web-based tool to manage recruiting and scheduling needs for the telephone survey respondents who were screened and pre-recruited to participate in an on-site inspection. The scheduling tool was designed to manage information collected in the telephone and Web survey, provide prospective information on on-site inspection participants; manage on-site inspection recruitment call attempts and dispositions; and view schedule availability by day, city, and technician. In addition, the scheduling tool was used to schedule an on-site inspection at a specified date and time, and notify staff and/or inspectors via email if an on-site inspection had been scheduled, rescheduled, or cancelled.

Personnel conducting the on-site inspections were required to successfully complete proper training and have relevant experience necessary to conduct a comprehensive assessment of the home. Completion of HERS Rater Building Performance Institute (BPI) Building Analyst training programs were a prerequisite for all on-site inspectors who would be collecting data from new construction homes. Additional mandatory project-specific training for on-site inspectors on specific data collection needs and procedures were led by PSD certified trainers. Full-day training sessions for two different groups were conducted before the inspectors began the on-site data inspections—one in Ithaca and one in Albany, NY. In addition, an experienced PSD staff member went on at least one on-site inspection with each inspector for further training and as part of the QA/QC process. Certified Home Energy Rating System (HERS) Raters were used for new construction on-site inspections, and these raters were responsible for developing and submitting a final energy rating for each home.

In addition, PSD staff implemented a QA/QC process to verify that the on-site inspectors were meeting standards of performance for the on-site inspections, and that the data collected were accurate and reliable. QA protocols included: (1) QA on-site inspection for first on-site inspection with each inspector; (2) surprise ride-along on five percent of the on-site inspections; and (3) on-going desktop reviews of all data collected during the on-site inspection.

The evaluation team also worked with NYSERDA, DPS, the E2 Working Group subcommittee, and other stakeholders to finalize policies and procedures on how to address any health and safety issues identified during the on-site inspection. A health and safety checklist was developed and used for the on-site inspections and specific protocols for reporting and/or escalation of issues was developed and deployed. As inspections were not comprehensive home assessments, and a scope of work was not developed or implemented, standard BPI requirements were followed for the specific elements that were included in the on-site inspections.

PSD and GDS led the on-site inspections for single-family and multifamily respectively. In that role, the two firms ensured the on-site inspectors collected and recorded all agreed upon on-site data, including duct blaster and blower door test results (where applicable). Blower door tests were not conducted during the on-site inspections where BPI standards would preclude such testing or when the structure of the home would make it difficult to produce reliable results.

The inspectors used a tablet-based, pre-programmed, and approved version of the on-site inspection data collection tool. Tablet, server, and data storage and transfer security protocols were established, checked on each device, and enforced per NYSERDA security requirements. The on-site inspector uploaded the site-specific information directly to a secure server using NYSERDA security protocols. The server was hosted in a secure data center with both network and physical protections to prevent unauthorized access. Secure backups of all electronic data collection were retained for quality verification and project records throughout the on-site inspection and subsequent data analysis and reporting process.

For those agreeing to the on-site inspection, the PSD recruiter provided the respondent information on what to expect and how to prepare for the inspection. The preparation included gathering energy consumption data to determine typical or most recent 12 months of energy usage for electricity, natural gas, and delivered fuels. The homeowner or tenant was reminded before the on-site inspection to have that data available. For delivered fuels, or bulk fuels, the inspector asked the homeowner to call their provider(s) during the on-site inspection to get average annual consumption. This information was recorded directly in the data collection tool. In addition to recording consumption data, inspectors obtained signed billing and consumption data release forms from homeowners or tenants.

Tetra Tech and NYSERDA agreed that Tetra Tech would bulk order Amazon gift cards as an incentive to those agreeing to the on-site inspection. Originally, Tetra Tech planned to express mail a group of the gift cards in advance to the on-site inspectors for each region to hand out after the on-site inspection was complete. The evaluation team decided that the logistics would present some problems in ensuring the packets were delivered while the inspectors were in the field in that location. Tetra Tech and NYSERDA subsequently decided to use Tetra Tech's in-house mailing to deliver the $100 gift cards to participants after completion of the on-site inspection. Tetra Tech tracked the incentives processed and reported the list of incentive recipients for telephone and Web and on-site inspections on a weekly and ad hoc basis.

A.6.2 Sampling Strategy

The Tetra Tech team attempted to recruit and complete 70 on-site single-family homes in each of the 10 Economic Development Regions for a total of 700 on-site inspections. The 700 completed on-site inspections were to include 200 new homes (built 2012 and after). The single-family surveys were used to recruit the homes for on-site data collection based on a purely random sampling strategy that targeted a maximum of 70 on-site inspections per region.

Initially, the approach was designed to reach about 50 existing homes (built before 2012) and 20 new homes (2012 and after) in each of the 10 regions. Those quotas for new homes by region could not be achieved because of the differences in amount of new construction by region and the small number of new homes that could be identified in the E2 Working Group utility billing record samples for each region. As a result, the sampling strategy evolved to a more proportional sampling within each region for those two groups. The target of 70 total on-site inspections by region was still used but the proportion of new and existing home completes were more in-line with the proportion of new construction in that region.

The study did not achieve the 90/10 confidence precision level at the regional level within sub-sectors for a variety of reasons including the available sample, poor response rates in some regions, and the need to shift samples to regions where sufficient new construction homes were available. The limitations to participation are discussed in more detail in the Section A.6.3. However, when rolled up to the State level and by climate zone, the 90/10 confidence level was met.

A.6.3 Response Rates

Based on previous experience recruiting for on-site inspections and more recent studies that became available after the work plan was developed for this study, Tetra Tech found that approximately 50 percent of households will agree to an on-site inspection if offered an incentive. Of those who agree to an on-site inspection, past experience recruiting for several residential studies for other utilities has shown that inspectors are only able to schedule and actually get into about 50 percent of the homes that are recruited. In other words, it would take four survey completes to get one on-site inspection completed. As Table A-6 shows, those numbers are fairly accurate. A total of 2,947 telephone and Web surveys were completed before reaching the 700 single-family on-site inspection target number of completes. Some regions were more difficult than others to identify and recruit single-family homes for the on-site inspection. For example, Long Island was well below the target of 70 per region with only 53 completed on-site inspections despite multiple mailings, and repeated scheduling and recruiting calls over a number of months.

To meet targets, during the last phase of the projects respondents were asked to contact PSD directly if they were interested in an on-site inspection. Of the total mailings, PSD received 115 email and phones responses through the date of writing this report; from these responses, PSD was able to schedule the 21 on-site inspections needed to reach targets.

Scheduling response rates varied by region. The four most common reasons across all regions for refusing to participate in an on-site inspection were:

- Timing and availability (i.e., the timeframe the on-site inspectors would be in the region did not fit with the respondents availability and/or schedule).
- An unwillingness, especially on the part of working homeowners, to commit to the amount of time required for the on-site inspection.

- The requirement to shut off wood or pellet stoves when they were used as the primary or only source of heat.
- A person in the household responded yes to an on-site inspection at the survey stage, but when called to set up appointment, another party in the household declined to participate in an on-site inspection.

About 2.8 percent of homes were not eligible to be scheduled for an on-site inspection as they had no phone number or working phone number, addresses out of the region or state, or were seasonal residences (column "Not Called" in Table A-7).

The team experienced an overall cancellation rate of 6.3 percent. There were 56 cancellations. This cancellation rate varied significantly by region (ranging from two percent to 17 percent), and by type of construction (6.9 percent for existing homes, 4.5 percent for new homes). However, the highest rates of cancellation were associated with the first few months of the study, which spanned Thanksgiving, Christmas, and New Year and before a change in process as described in the next section. Overall, a total of 700 on-site inspections were completed statewide; 518 existing construction and 182 of new construction (Table A-8).

Table A-6. Single-Family Completions by Region

Region	Single-Family Survey Completes	Completed On-site Inspections
Southern Tier	250	70
Capital District	416	98
Mohawk Valley	305	66
Mid-Hudson	348	67
Long Island	231	53
New York City	201	63a
Western New York	328	76
Finger Lakes	347	76
Central New York	258	61
North Country	298	70
Total	2,982a	700

[a] Includes mini-surveys conducted during 35 on-site inspections in the New York City region

Table A-7. Disposition of Single-Family On-Site Inspection Sample by Region

Final Record Status	Callback	Cancelled	Voicemail	Not Called	Refused	Reschedule	Schedule Won't Fit	Completed	Total
Capital District	20	8	61	5	13	2	7	98	214
Central New York	9	1	59	4	9	1		61	144
Finger Lakes	15	1	63	2	8		10	76	175
Long Island	17	4	27		11		4	53	116
Mid-Hudson	17	7	57	8	14		4	67	174
Mohawk Valley	13	5	36	4	7	1	7	66	139
New York City	6	2	19		8	1	3	63	102
North Country	16	2	42	10	13	4	10	70	167
Southern Tier	12	12	22	7	14		5	70	142
Western New York	15	2	51	4	14	1	12	76	175
Status	**140**	**44**	**437**	**44**	**111**	**10**	**62**	**700**	**1,548**

Table A-8. Single-Family Survey or On-site Inspection Completes by Construction Type and Climate Zone

Climate Zone	Surveys			On-Site Inspections		
	Existing Construction (before 2012)	New Construction (2012 and after)	Overall Statewide	Existing Construction (before 2012)	New Construction (2012 and after)	Overall Statewide
Climate zone 4	489	22	511	120	11	131
Climate zone 5	1,021	481	1,502	223	124	347
Climate zone 6	813	156	969	175	47	222
Total state	**2,323**	**659**	**2,982**	**518**	**182**	**700**

A.6.4 Weighting

By understanding how many households in the population were assigned to each strata and knowing how many completed surveys were obtained for each strata, the evaluation team developed analysis weights so that the data can be reported accurately for the region and State. The population counts and survey completes are used to weight the telephone and Web survey data to ensure that it accurately reflects the original population distribution by climate zone.

The final weights for the single-family or tenant baseline survey respondents are shown in Table A-9.

Table A-9. Single-Family On-site Inspection Weights

Climate Zone	Population		Single-Family On-site Inspection Completes		Single-Family On-site Inspection Weights	
	New Construction	Existing Construction	New Construction	Existing Construction	New Construction	Existing Construction
	Number of Units in Single-Family Buildings (1-4 units)	Number of Units in Single-Family Buildings (1-4 units)	Number of Units in Single Family Buildings (1-4 units)	Number of Units in Single-Family Buildings (1-4 units)	Number of Units in Single-Family Buildings (1-4 units)	Number of Units in Single-Family Buildings (1-4 units)
Climate zone 4	2,689	2,255,727	11	120	244.45	18,797.72
Climate zone 5	5,211	1,874,097	124	223	42.02	8,404.02
Climate zone 6	1,725	740,527	47	175	36.7	4,231.58
Total	**9,625**	**4,870,350**	**182**	**518**	**-**	**-**

A.6.5 Data Limitations and Suggestions for Future Studies for On-site Inspection Data Collection

The elements of the methodology that worked well for this study:

- Using certified and trained staff to conduct the on-site inspections was a definite plus given that health and safety was a major concern while in the home. There were no complaints reported by occupants concerning the inspector or the process despite conducting 700 on-site inspections.
- Tetra Tech customized its scheduling tool for this study and it was effective in managing the scheduling and recruiting process for the on-site inspection. Potential recruits for the on-site inspections that were identified during the telephone and Web surveys were easily identified for PSD and GDS using the scheduling tool. The status of on-site inspection recruiting and completes were tracked using the tool to ensure availability of on-site inspectors. Exports allowed for mapping to enhance the effectiveness of scheduling and automated triggered emails to respondents and inspectors further increased the effectiveness, efficiency, and yield of on-site inspection scheduling.
- Inspectors owned their own schedules: once scheduled, inspectors were responsible for confirming with the homeowner and handling any reschedules of on-site inspections. This process was initiated several weeks into the on-site inspections and is one factor that attributed to the decline in the rate of rescheduling. This helped to manage inspectors and project costs.
- Support and communication: an expert technical team was available around the clock and inspectors were required to be on weekly check-in calls. This level of communication and support enabled most issues to be resolved either on the spot or very quickly.
- PSD's data collection tool and process used during the on-site inspection worked very effectively in collecting data on-site while providing security and electronic transfer of the data from the on-site inspections. Inspectors reported how impressed homeowners were to see the use of electronic tablets, and to sign forms and releases on the tablet. The use of a fully electronic tool also enabled a degree of data richness, with embedded photography and the capturing of notes for specific and unique situations, that will greatly aide subsequent in-depth analyses of the data on specific topics.
- Tool designed from user's perspective: the layout, flow, and functionality of the tool were designed from a field user's perspective. Inspectors reported that this design allowed them to move through a house rapidly and comprehensively—reducing the burden on homeowners.
- Direct mail of incentives ($100 Amazon gift cards) to on-site inspection participants worked well for delivery and tracking purposes, despite the extra expense to the evaluation team. Providing the gift cards in bulk to inspectors to hand out after the on-site inspection was complete was changed to accommodate the complex logistics of getting the gift cards to inspectors while in the field. Future studies may be able to go one-step further and provide a fully electronic solution, with an incentive code being sent electronically post-inspection, or even provided on-site at time that the inspection is completed.

- Continuous software updates; software flexibility while preserving data integrity. The tool was updated multiple times during the course of the on-site inspections, with the most significant update occurring within the first few weeks of production. Updates were focused on increasing the efficiency, accuracy, and ease of use of the tool. This responsiveness and adaptability was well-received. A better approach would be to take one region, or a part of a region, as a pilot to work through the issues that live production inevitably surfaces.

Some of the data limitations and suggested changes for future studies are as follows:

- Statewide on-site inspections should not be conducted during the winter season, if possible. In addition to the travel difficulties, the ability to conduct blower door tests was compromised by the number of wood stoves and other factors affecting safety and comfort of the home occupants. Homeowners were also reluctant to commit the time or let inspectors into their homes around the holidays. In addition, window air conditioner units and other outdoor equipment were typically inaccessible.
- Information to homeowners: a significant number of homeowners desired some kind of information on the energy performance of their home. While the on-site inspections were not designed to be energy audits, being able to provide homeowners with some observations specific to their home may increase recruitment rates and reduce the amount of financial incentive required to get on-site to conduct the inspection, thus reducing cost.
- Expand and enhance automated checks: All inspections went through desktop QA. While this caught many issues, a better approach would be to automate more of the QA and logic checks within the tool itself. For example, there were inconsistencies in the way data was reported including variations in terminology and in comment fields instead of data fields, which slowed down the analysis process at the end of the study.

Level of effort:

- Scheduling: Original estimate for scheduling and associated tasks (updating the scheduling tool, marking completes, responding to inquiries from homeowners and the team) was estimated to take one hour per complete on average. The actual average was 1.4 hours per complete. This was largely because of the reporting and tracking requirements.
- On-site inspection and data reporting times: As shown in Table A-10, while the final required set of data fields and the use of an all-electronic process provided considerable on-site inspection and reporting time efficiencies, these gains were eclipsed by travel time. Although the available sample was representative of the State's population, this meant that in order to meet the target number of completed on-site inspections at homes that were at a considerable distance from others still needed to be scheduled. Future studies may wish to consider the balance between evenly covering the whole state versus allowing greater clustering or density to help manage costs.

Table A-10. Original Time Estimates for Existing and New Homes

Original Estimates	Existing Homes	New Homes
On-site Inspection time	3 hours	4 hours
Reporting & modeling	1 hour	2 hours
Travel	1 hour	1 hour
Actual Average Times	**Existing Homes**	**New Homes**
On-site Inspection time	2–3 hours	2.5–4.5 hours
Reporting & modeling	0.5 hours	1–2 hours
Travel	2–3 hours	2–3 hours

Appendix B: Single-Family/Tenant Survey Instrument

NYSERDA RESIDENTIAL BASELINE STUDY
SINGLE-FAMILY / TENANT CODEBOOK

The survey modules included in this questionnaire are as follows:

- Introduction and Screening
- Building Shell
- ENERGY STAR Awareness
- Kitchen Appliances
- Heating and Cooling
- Water Heating
- Clothes Washing and Drying
- Home Lighting
- Small Household Appliances
- Miscellaneous Equipment
- Utility Company
- Demographics and Recruitment

NOTE:

- Variable names are in bold type.
- A code of (-2) means that the data was not gather because the data was gathered by the in-person mini-survey during an on-site inspection instead of a phone or web survey.
- A code of (-3) means that the respondent's answer did not make sense with the metrics of the question.
- A code of (-4) means there was a system error because of the respondent (in the case of web interviewers) or interviewer (in the case of phone interviews) going back to previous
- questions in the survey and changed a responses that affected subsequent question skips.
- A code of (-5) means a respondent did not get asked that question because of a question being added or changed after fielding or a program skip error.
- A code of (-6) means programmed skip (i.e., a skip that was purposely programmed based
- on skip patterns).
- A code of (-8) means don't know.
- A code of (-9) means refused.
- Questions were asked of all respondents unless indicated otherwise.
- Categories were read to respondents.
- Respondents were allowed to leave questions blank to move forward in the survey. If a question was left blank or all categories of a question were left blank they were coded as -9, refused. If a respondent answered some of the categories empty categories were assumed to be zero.
- Response codes with an asterisk (*) are recoded responses to open-ended questions, or responses added during data cleaning.

Sample and Analysis Variable List

[surveyID] Unique case identifier
[util] Utility
[conty] County
[region] Region
[SampledRegion] Regions chronologically labeled by order sampled
[ClimateZone] Climate zone (4, 5, or 6)

[kwhct] kWh category

0	500 kWh or less
1	501 to 2,500 kWh
2	2,501 to 6,000 kWh
3	6,001 to 12,000 kWh
4	12,001 to 20,000 kWh
5	20,000 kWh or more
-2	Not asked in mini-survey

[thrmc] Therm cat

0	300 or more therms annually
1	300 to 600 therms annually
2	600 to 900 therms annually
3	900 to 1,200 therms annually
4	1,200 to 1,500 therms annually
5	1,500 to 1,800 therms annually
6	1,800 to 2,100 therms annually
7	2,100 or more therms annually
-2	Not asked in mini-survey

[gsrtc] Gas rate code

[sample_type] Origin of initial case data

1 thru 8	Utility data
99	Tax record data

[aapor] Final disposition of case

1100	phone complete
1101	web complete
1103	mini-survey complete

[Construction] Flag of construction type

3	Existing (B7=11, 12, OR 13 AND IF B8spe<2012)]	[IF B7<>11, 12, AND 13 OR IF
1	New B8spe>=2012 OR SKIPPED]	[IF B7=11, 12, OR 13 AND IF

[Dwelling] Flag of dwelling type

1	Single-family	[IF B3=1, 2, 3, 5, 6, OR WAS

[SKIPPED]

2	Tenant	[IF B3=4]

[Recruited] Flag of whether recruited for on-site scheduling or not

0	Not recruited (TENANT)]	[IF D7=3 or D7 NOT ASKED
1	Recruited	[IF D7=1 OR 2]
-6	Programmed skip	[D7 NOT ASKED]

[SurveyWeight] Computed survey weight, based on climate zone, new/existing construction, and single-family or tenant dwelling type

INTRODUCTION

INTRO (web) Thank you for taking time out of your busy schedule to provide information on your household's energy use. As a token of our appreciation for completing this survey, we will be sending you a $20 gift card after you have completed the survey.

We are surveying customers on behalf of New York State Energy Research and Development Authority (NYSERDA) in order to learn more about households' energy using equipment and their opinions on energy use. Please be assured that the information you provide will be kept confidential to the extent permitted by law. NYSERDA's analysis will only use summary level data and will not identify individual respondents or firms. This information will be used to design new products and energy efficiency programs to better help customers meet their energy needs and manage their energy costs.

If you have any questions about the content or use of this survey, you can call NYSERDA toll-free at 1-877-NYSMART (1-877-697-6278) or e-mail info@nyserda.ny.gov

Please enter in the box below the ID located in the upper right corner of the letter from NYSERDA and click "Begin" to enter the survey.

[Footer displayed on every page]

If you would like to complete the survey by phone or are experiencing other technical difficulties, please call Tetra Tech 800-454-5070 or by e-mailing marie.nitschke@tetratech.com.

You may exit the survey at any time and your answers will be saved. Reenter the same ID to come back and complete your survey.

For answers to frequently asked questions Click Here (A new window will open).

Accessibility | Disclaimer | Internet Privacy Policy

INTRO (phone) Hello, my name is _____ and I'm calling on behalf of NYSERDA. May I please speak with [FIRST NAME] [LAST NAME]?

This is not a sales call and we are not trying to change your utility provider. You may have recently received a letter or e-mail regarding an important energy study NYSERDA is conducting to learn more about households' energy using equipment. As a token of our appreciation for participating we'll be sending you a $20 gift card after completion of the survey. Our records show that your survey has not been completed. We would like to complete the survey over the phone. This information will be used to design new products and energy efficiency programs to better help customers meet their energy needs and manage their energy costs.

Please be assured that the information you provide will be kept confidential to the extent permitted by law. NYSERDA's analysis will only use summary level data and will not identify individual respondents or firms. For quality assurance and training purposes this call will be recorded.

[IF NEEDED: If you have any questions about the content or use of this survey, you can call NYSERDA toll-free at 1-877-NYSMART or e-mail info@nyserda.ny.gov]

SCREENER

[Note: Skip for REP=99 added on 2/13/2014.]

S1 [SKIP IF REP=99 (SUPPLEMENTAL NEW CONSTRUCTION SAMPLE)] To confirm, does [UTILITY] provide electric service to your home at [SERVICE ADDRESS]?
(Check one)

1	Yes	[SKIP TO B1]
2	No, utility does not provide my electric service at that address	
3	No, I no longer live at that address	[SKIP TO TERM]
-2	Not asked in mini-survey	
-6	Programmed skip	
-9	Refused	

S1spe Who does provide electric service at [SERVICE ADDRESS]?
(Specify utility below)

[Note: Question added 2/13/2014.]

S2 [SKIP TO B1 IF REP<99 (NOT SUPPLEMENTAL NEW CONSTRUCTION SAMPLE)] How many homes do you own in [COUNTY] county, NY?

__ # of homes [1-50]
-2 Not asked in mini-survey
-6 Programmed skip

[Note: Question added on 2/13/2014.]

S3 [IF S2>1: Please use the home in [COUNTY] county, NY which was most recently built to complete the remainder of the survey and indicate the address below.]
[IF S2<=1: Please indicate the address of this home below]

S3A Address:
S3B City:
S3C State:
S3D Zip:

[THE ADDRESS INDICATED HERE IS USED IN PLACE OF THE SERVICE ADDRESS FOR THE REMAINDER OF THE SURVEY.]

[Note: Question added on 2/13/2014.]

S4 Do you occupy this home at least part of the year, or did your company build this home with the intent to sell it?

1 Occupy this home at least part of the year
2 Built the home with the intent to sell
[TERMINATE]
-2 Not asked in mini-survey
-6 Programmed skip

[Note: Question added on 2/13/2014.]

S5 Which utility company provides electric service to your home at [SERVICE ADDRESS]? *(Check one)*

1 Central Hudson
2 Con Edison (ConEd)
3 Long Island Power Authority (LIPA)
4 National Grid
5 New York State Electric and Gas (NYSEG)
6 Orange & Rockland (O&R)
7 Rochester Gas & Electric (RG&E)
8 None of the above – I no longer live at that address
[TERMINATE]
-2 Not asked in mini-survey
-6 Programmed skip

BUILDING SHELL

B1 The size of your home, the number and type of appliances you own, and the number of people living in your home all affects the way you use energy. In this first set of questions, we would like to get some general information about your home at [SERVICE ADDRESS]. Do you own or rent this home? *(Check one)*

1 Own/buying
2 Rent
3 Occupied without payment of rent (e.g. Living with someone without making payment)
4 Other, specify
-9 Refused

o_B1 [ASK IF B1=4] Description of other type of ownership.

B2 How many months per year is this home usually occupied?
(Enter months below)

__ # of months [0-12]
-9 Refused

B2b [ASK IF B2 <= 9 months] During which seasons of the year is this home usually occupied? (*Select all that apply)*

For B2bc1 through B2bc5
0 Not mentioned
1 Mentioned
-6 Programmed skip
-9 Refused

B2bc1 Spring
B2bc2 Summer
B2bc3 Fall
B2bc4 Winter
B2bc5 Varies (SPECIFY)

o_B2b [ASK IF B2bc5=1] Description of occupation time period.

[Note: Option 2 changed from 'Single-family attached house such as a duplex or townhouse' on 1/30/2014.]

B3 Which of the following best describes this home? *(Check one)*

1 Single-family detached house
2 Single-family attached house such as a duplex, townhouse, or rowhouse
3 Apartment building or condominium with 2 to 4 units
4 Apartment building or condominium with 5 or more units
5 Mobile home
-9 Refused

B3a [ASK IF B3=2, 3 OR 4] Including your unit, how many individual housing units are in your [IF B3=2: in this attached rowhouse/townhouse] [IF B3=3 | 4: apartment or condominium building]? *(Enter number of units below)*

____ # of units [1-2000]
-2 Not asked in mini-survey
-3 Nonsensical answer
-4 Interviewer / respondent error
-6 Programmed skip
-8 Don't know
-9 Refused

B3b [ASK IF B3a = -8] Do you think the total number of housing units in your building is… *(Check one)*

1 Less than 5
2 5-49
3 50-99
4 100 or more
-2 Not asked in mini-survey
-6 Programmed skip
-9 Refused

B3c [SKIP TO B4 IF B3<> 3 AND 4] Not counting the basement, how many stories are there in this apartment or condominium building? **(***Enter number of stories below)*

___ # of stories [1-120]
-2 Not asked in mini-survey
-6 Programmed skip
-9 Refused

B3d Does your apartment or condominium have any shops, restaurants, other retail space, or space used by businesses? *(Check one)*

1 Yes
2 No
-2 Not asked in mini-survey
-6 Programmed skip
-9 Refused

B3e Is there more than one building in this apartment or condominium complex that includes other housing units? *(Check one)*

1 Yes
2 No
-2 Not asked in mini-survey
-6 Programmed skip
-9 Refused

B3f [ASK IF B3e <> 2] In total, how many apartment or condominium buildings are at this location? *(Enter number of buildings below)*

__ # of buildings [1-75]
-2 Not asked in mini-survey
-6 Programmed skip
-9 Refused

B4 How many bedrooms are there in your home? (*Enter number of bedrooms below)*

__ # of bedrooms [0-25]
-2 Not asked in mini-survey
-9 Refused

B5 Not counting an unfinished basement, about how large is your home in square feet? *(Enter square footage of home below)*

_____ square feet [1-113,000]
-3 Nonsensical answer
-8 Don't know
-9 Refused

B5a [ASK IF B5 = -8] Approximately how large is your home in square feet? Please do not include unfinished basements. *(Check one)*

1 Less than 1,000 square feet
2 1,000 to less than 1,500 square feet
3 1,500 to less than 2,000 square feet
4 2,000 to less than 2,500 square feet
5 2,500 to less than 3,000 square feet
6 3,000 to less than 4,000 square feet
7 4,000 or more square feet
-6 Programmed skip
-8 Don't know
-9 Refused

B6 [ASK IF B3 <> 3 OR 4] Does your home have a heated or unheated basement? *(Check one)*

1 Yes, a heated basement
2 Yes, an unheated basement
3 No basement
-2 Not asked in mini-survey
-6 Programmed skip
-8 Don't know
-9 Refused

B7 In approximately what year was your home built? *(Check one)*

1 1939 or earlier
2 1940 to 1949
3 1950 to 1959
4 1960 to 1969
5 1970 to 1979
6 1980 to 1989
7 1990 to 1999
8 2000 to 2009
9 2010
10 2011
11 2012
12 2013
13 2014 (Invisible until 2014)
-8 Don't know
-9 Refused

B8 Has your home undergone any major renovations or additions in the past five years? A major renovation or addition, means construction activities like adding a room, or increasing the size of your home's living space, or reconstruction due to flooding or hurricane. *(Check one)*

1	Yes	
2	No	[SKIP TO B9]
-2	Not asked in mini-survey	
-8	Don't know	[SKIP TO B9]
-9	Refused	

B8spe In what year was this renovation or addition completed? *(Enter year below)*

____	year of renovation	[2008-2014]
-2	Not asked in mini-survey	
-6	Programmed skip	
-9	Refused	

B9 [SKIP TO E1 IF B3 = 2, 3 OR 4] Do you have more than one electric meter at this address? *(Check one)*

1	Yes	
2	No	[SKIP TO E1]
-2	Not asked in mini-survey	
-6	Programmed skip	
-9	Refused	

o_B9b What equipment or building is hooked up to this other electric meter? *(Please specify other equipment or building below)*

ENERGY STAR AWARENESS

E1 Before asking about the energy using equipment in your home, we would like to ask about your familiarity with the ENERGY STAR® logo. The ENERGY STAR® logo is usually a blue and white sticker on an appliance that says "ENERGY STAR®" on it.

Equipment having the ENERGY STAR® logo meets strict energy efficiency guidelines set by the U.S. Environmental Protection Agency and the U.S. Department of Energy. Before now, were you not at all familiar, somewhat familiar, or very familiar with ENERGY STAR® or the ENERGY STAR logo®? (*Check one)*

1	Not at all familiar
2	Somewhat familiar
3	Very familiar
-9	Refused

KITCHEN APPLIANCES

K1 How many of each of the following do you use in your home?
(If none, please enter zero)

For K1a through K1d

__	# of units	[0-9]
-9	Refused	

K1a Microwave ovens
K1b Ovens with burners on top
K1c Separate stove tops
K1d Separate oven units

K2 [SKIP IF K1b = 0 OR -9] What type of fuel does your oven(s) with burners on top use?
(Select all that apply)

For K2c1 through K2c4

0	Not mentioned
1	Mentioned
-6	Programmed skip
-8	Don't know
-9	Refused

K2c1 Electricity
K2c2 Natural gas from underground pipes
K2c3 Propane (bottled gas)
K2c4 Some other fuel, specify

o_K2 [ASK IF K2c4=1] Description of other type of fuel.

K3 [SKIP IF K1c = 0 OR IS -9] What type of fuel does your separate stove top(s) use? *(Select all that apply)*

For K3c1 through K3c4

0	Not mentioned
1	Mentioned
-6	Programmed skip
-8	Don't know
-9	Refused

K3c1 Electricity
K3c2 Natural gas from underground pipes
K3c3 Propane (bottled gas)
K3c4 Some other fuel, specify

o_K3 [ASK IF K3c4=1] Description of other type of fuel.

K4 [SKIP IF K1d=0 OR IS -9] What type of fuel does your separate oven(s) use? *(Select all that apply)*

For K4c1 through K4c4

0 Not mentioned
1 Mentioned
-6 Programmed skip
-8 Don't know
-9 Refused

K4c1 Electricity
K4c2 Natural gas from underground pipes
K4c3 Propane (bottled gas)
K4c4 Some other fuel, specify

o_K4 [ASK IF K4c4=1] Description of other type of fuel.

K5 Which of the following best describes your primary refrigerator? *Please do not include wine coolers.*

1 Full-size with one door
2 Full-size with two doors, top freezer
3 Full-size with two doors, bottom freezer
4 Full-size with two doors, freezer next to the refrigerator (side by side)
5 Full-sized, two refrigerator doors and a freezer door on bottom (French style)
6 Half-size or compact
7 Other, specify
-2 Not asked in mini-survey
-9 Refused

o_K5 [ASK IF K5=7] Description of other type refrigerator.

K5a Does your primary refrigerator have an automatic ice maker? *(Check one)*

1 Yes
2 No
-2 Not asked in mini-survey
-9 Refused

K5b Does your primary refrigerator have a water dispenser? *(Check one)*

1 Yes
2 No
-2 Not asked in mini-survey
-9 Refused

K6 About how old is your primary refrigerator? *(Check one)*

1 Less than 2 years old
2 2 to 4 years old
3 5 to 9 years old
4 10 to 14 years old
5 15 to 19 years old
6 20 years old or more
-2 Not asked in mini-survey
-8 Don't know
-9 Refused

K7 [SKIP IF (E1 <> 2 AND 3) OR (K6 = 4, 5, OR 6,)] Is this refrigerator ENERGY STAR® rated? (e.g. Does it have the ENERGY STAR® logo on it?) *(Check one)*

1 Yes
2 No
-2 Not asked in mini-survey
-6 Programmed skip
-8 Don't know
-9 Refused

K8 Do you have any other full-size or compact refrigerators plugged in and running in your home? Please do not include wine chillers. *(Check one)*

1 Yes
2 No
-2 Not asked in mini-survey
-9 Refused

K9 [SKIP TO K11 IF K8 = 2] How many other refrigerators do you have plugged in and running in your home? *(If none, please enter zero)*

For K9 through K9a

_	# of units	[0-9]
-2	Not asked in mini-survey	
-6	Programmed skip	
-9	Refused	

K9 Full size refrigerators
K9a Compact refrigerators

K10a [SKIP TO K11 IF (K9+K9a) = 0 OR -18] About how old is this second refrigerator? *(Check one)*

1	Less than 2 years old
2	2 to 4 years old
3	5 to 9 years old
4	10 to 14 years old
5	15 to 19 years old
6	20 years old or more
-2	Not asked in mini-survey
-6	Programmed skip
-8	Don't know
-9	Refused

K10b [SKIP TO K11 IF (K9+K9a) = 1 OR -8] About how old is this third refrigerator? *(Check one)*

1	Less than 2 years old
2	2 to 4 years old
3	5 to 9 years old
4	10 to 14 years old
5	15 to 19 years old
6	20 years old or more
-2	Not asked in mini-survey
-6	Programmed skip
-8	Don't know
-9	Refused

K10c [SKIP TO K11 IF (K9+K9a) = 2 OR -8] About how old is this forth refrigerator? *(Check one)*

1 Less than 2 years old
2 2 to 4 years old
3 5 to 9 years old
4 10 to 14 years old
5 15 to 19 years old
6 20 years old or more
-2 Not asked in mini-survey
-6 Programmed skip
-8 Don't know
-9 Refused

K11 How many wine chillers/coolers do you have plugged in and running in your home? (If none, please enter 0) *(Enter number of wine chillers/coolers below)*

_ # of units [0-9]
-2 Not asked in mini-survey
-9 Refused

K11a [SKIP IF (E1 <> 2 AND 3) OR (K11 =0 OR >1 OR MISSING)] Is this wine chiller ENERGY STAR® rated?
(e.g. Does it have the ENERGY STAR® logo on it?) *(Check one)*

1 Yes
3 No
-2 Not asked in mini-survey
-4 Interviewer / respondent error
-6 Programmed skip
-8 Don't know
-9 Refused

K11b [SKIP IF (E1=2 OR 3) OR (K11 =0 OR =1 OR MISSING] Are these wine chillers ENERGY STAR® rated?
(e.g. Do they have the ENERGY STAR® on them?) *(Check one)*

1 Yes, all
2 Yes, some
3 No
-2 Not asked in mini-survey
-6 Programmed skip
-8 Don't know
-9 Refused

K13 Does your household have a standalone freezer plugged in and running, one that is not part of a refrigerator? *(Check one)*

1 Yes
2 No [SKIP TO H1]
-2 Not asked in mini-survey
-9 Refused

K14 How many standalone freezers do you have plugged in and running in your home? *(Enter number of freezers below)*

_ # of units [1-9]
-2 Not asked in mini-survey
-6 Programmed skip
-9 Refused

K15at What type of freezer is this first standalone freezer? *(Check one)*

1 Chest
2 Upright
-2 Not asked in mini-survey
-6 Programmed skip
-9 Refused

K15a And what is the approximate age of this first standalone freezer? *(Please round to the nearest whole number, for an age less than one year please enter 0)*

___ # of years [0-100]
-2 Not asked in mini-survey
-6 Programmed skip
-8 Don't know
-9 Refused

K15bt [SKIP TO K17a IF K14 = 1] What type of freezer is this second standalone freezer? *(Check one)*

1 Chest
2 Upright
-2 Not asked in mini-survey
-6 Programmed skip
-9 Refused

K15b And what is the approximate age of this second standalone freezer? *(Please round to the nearest whole number, for an age less than one year please enter 0)*

___ # of years [0-100]
-2 Not asked in mini-survey
-6 Programmed skip
-8 Don't know
-9 Refused

K15ct [SKIP TO K17b IF K14 = 2] What type of freezer is this third standalone freezer? *(Check one)*

1 Chest
2 Upright
-2 Not asked in mini-survey
-6 Programmed skip
-9 Refused

K15c And what is the approximate age of this third standalone freezer? *(Please round to the nearest whole number, for an age less than one year please enter 0)*

___ # of years [0-100]
-2 Not asked in mini-survey
-6 Programmed skip
-8 Don't know
-9 Refused

[Note: Skip changed to <=9 on 1/27/2014 to match other ENERGY STAR questions.]

K17a [ASK IF K14 = 1 AND (E1 = 2 OR 3) AND (K15a<=9 OR K15a=-8)] Is this standalone freezer ENERGY STAR® rated? (e.g. Does it have the ENERGY STAR® logo on it?)
(Check one)

1 Yes
3 No
-2 Not asked in mini-survey
-6 Programmed skip
-8 Don't know
-9 Refused

[Note: Skip changed to <=9 on 1/27/2014 to match other ENERGY STAR questions.]

K17b [SKIP IF K14=1 OR (E1 <> 2 AND 3) OR (K14=2 AND K15a>9 AND K15a<>-8 AND K15b>9 AND K15b<>-8) OR (K14>2 AND K15a>9 AND K15a<>-8 AND K15b>9 AND K15b<>-8 AND K15c>9 AND K15c<>-8)]
Are these standalone freezers ENERGY STAR® rated? (e.g. Does it have the ENERGY STAR® logo on it?)

1 Yes, all
2 Yes, some
3 No
-2 Not asked in mini-survey
-6 Programmed skip
-8 Don't know
-9 Refused

HEATING AND COOLING

H1 [ASK IF B3 = 3 OR 4] Do you receive your primary heat from a central heating system that is used by other families in your apartment building or condominium building?
(Check one)

1 Yes [SKIP TO H7a]
2 No
-2 Not asked in mini-survey
-6 Programmed skip
-8 Don't know [SKIP TO H7a]
-9 Refused

H2 What is the primary type of fuel used for heating your home? (*Check one)*

1 Electricity
2 Natural gas from underground pipes
3 Propane (bottled gas)
4 District Steam
5 Fuel oil
6 Kerosene
7 Wood/wood pellets
8 Solar
9 Geothermal
10 Other, specify
-2 Not asked in mini-survey
-4 Interviewer / respondent error
-6 Programmed skip
-8 Don't know
-9 Refused

o_H2 [ASK IF H2=10] Description of other type of primary fuel type.

H3 What type of primary heating system do you have in your home? *(Check one)*

1 Central forced air furnace with ducts to individual rooms
2 Steam/hot water system with radiators or pipes in each room (central boiler)
3 District steam with radiators or pipes in each room
4 Air source Heat pump
5 Ground source Heat pump
6 Baseboard heat
7 Heating stove burning wood or coal
8 Fireplace
9 Portable electric heater
10 Portable kerosene heater
11 Solar panels
12 Other, specify
-2 Not asked in mini-survey
-6 Programmed skip
-8 Don't know
-9 Refused

o_H3 [ASK IF H3=12] Description of other type of primary heating system

H4 About how old is your primary heating system? *(Check one)*

1 Less than 2 years old
2 2 to 4 years old
3 5 to 9 years old
4 10 to 14 years old
5 15 to 19 years old
6 20 years old or more
-2 Not asked in mini-survey
-6 Programmed skip
-8 Don't know
-9 Refused

H5 [ASK IF E1 = 2 OR 3 AND H4 <> 4, 5, AND 6] Is your primary heating system ENERGY STAR® rated? (e.g. Does it have the ENERGY STAR® logo on it?)

1 Yes
2 No
-2 Not asked in mini-survey
-4 Interviewer / respondent error
-6 Programmed skip
-8 Don't know
-9 Refused

[Note: Option 5 added 12/10/2014]

H6 Do you usually have a tune up done on your heating system each year by a heating contractor, by someone in your household or by your landlord? *(Check one)*

1 Yes, done by a heating contractor
2 Yes, done by someone in the household
5 Yes, done by landlord
3 No
-2 Not asked in mini-survey
-6 Programmed skip
-8 Don't know
-9 Refused

[Note: H7ap added on 11/26/2013. Question is code -5 for cases completed before 11/26/2013.]

H7a How many wood, natural gas, or electric fireplaces do you use in your home on a regular basis in the winter? *(If none, please enter zero)*

For H7aw through H7ae

_ # of units [0-9]
-2 Not asked in mini-survey
-5 Programming change
-9 Refused

H7aw Wood fireplaces
H7ag Natural gas fireplaces
H7ap Propane fireplaces
H7ae Electric fireplaces

H7 How many of the following do you use in your home on a regular basis in the winter?

(If none, please enter zero)

For H7b through H7d

_ # of units [0-9]
-2 Not asked in mini-survey
-9 Refused

H7b Heat stoves (e.g. wood stove or pellet stove)
H7c Portable electric heaters
H7d Portable kerosene heaters

H8 Do you use any other type of heating fuel to heat your home on a regular basis? *(Check one)*

1 Yes
2 No [SKIP TO H9]
-2 Not asked in mini-survey
-9 Refused

H8a What other fuels do you use on a regular basis to heat with? *(Select all that apply)*

For H8ac1 through H8ac9

0	Not mentioned
1	Mentioned
-2	Not asked in mini-survey
-6	Programmed skip
-9	Refused

H8ac1	Electricity
H8ac2	Natural gas from underground pipes
H8ac3	Propane (bottled gas)
H8ac4	District Steam
H8ac5	Fuel oil
H8ac6	Kerosene
H8ac7	Wood/wood pellets
H8ac8	Solar
H8ac9	Other, specify

o_H8a [ASK IF H8ac9=1] Description of other type of fuel used.

H9 Do you have air conditioning in your home? Please include central air conditioning as well as room or window units. *(Check one)*

1	Yes	
2	No	[SKIP TO H19]
-2	Not asked in mini-survey	
-9	Refused	

H10 [ASK IF B3 = 3 OR 4] Do you receive your air conditioning from a central cooling system that is used by other families in your apartment or condominium building? *(Check one)*

1	Yes	[SKIP TO H15]
2	No	
-2	Not asked in mini-survey	
-6	Programmed skip	
-8	Don't know	[SKIP TO H15]
-9	Refused	

H11 What is the primary type of air conditioning equipment you use in your home? *(Check one)*

1	Central air conditioning system	
2	Room or window air conditioner	
3	Heat pump	
4	Other, specify	[SKIP TO H15]
-2	Not asked in mini-survey	
-6	Programmed skip	
-8	Don't know	
-9	Refused	

o_H11 [ASK IF H11=4] Description of other type of primary air conditioning equipment

H12 About how old is your primary air conditioner system? *(Check one)*

1	Less than 2 years old
2	2 to 4 years old
3	5 to 9 years old
4	10 to 14 years old
5	15 to 19 years old
6	20 years old or more
-2	Not asked in mini-survey
-4	Interviewer / respondent error
-6	Programmed skip
-8	Don't know
-9	Refused

H13 [ASK IF E1 = 2 OR 3 AND H12 <> 4, 5, AND 6] Is your primary air conditioning system ENERGY STAR® rated?
(e.g. Does it have the ENERGY STAR® logo on it?) *(Check one)*

1	Yes
2	No
-2	Not asked in mini-survey
-4	Interviewer / respondent error
-6	Programmed skip
-8	Don't know
-9	Refused

[Note: Option 5 added on 12/10/2013]

H14 [ASK IF H11 = 1 OR 3] Do you usually have a tune up done on your air conditioning system each year by an air conditioning contractor, by someone in your household or by your landlord? *(Check one)*

1 Yes, done by an air conditioning contractor
2 Yes, done by someone in the household
5 Yes, done by landlord
3 No
-2 Not asked in mini-survey
-4 Interviewer / respondent error
-6 Programmed skip
-8 Don't know
-9 Refused

H15 Do you use any other type of air conditioning system to cool your home? Please do not include ventilation systems, such as fans. *(Check one)*

1 Yes
2 No
-2 Not asked in mini-survey
-6 Programmed skip
-9 Refused

H16 [ASK IF H15=1] What other types of air conditioning systems do you use in your home?

(Select all that apply)

For H16c1 through H16c4

0 Not mentioned
1 Mentioned
-2 Not asked in mini-survey
-6 Programmed skip
-9 Refused

H16c1 Central air conditioning system
H16c2 Room or window air conditioner
H16c3 Heat pump
H16c4 Other, specify

o_H16 [ASK IF H16c4=1] Description of other type of air conditioning systems used.

H17 [ASK IF H11 = 2 or H16c2=1] In total, how many room or window air conditioners do you use in your home? *(Enter number of room air conditioners below)*

_ # of units [0-9]
-2 Not asked in mini-survey
-3 Nonsensical answer
-4 Interviewer / respondent error
-6 Programmed skip
-9 Refused

H19 Do you have a programmable thermostat that can control your heating and/or cooling equipment? This type of thermostat can be programmed to automatically adjust the temperature setting at the times of the day or night that you choose. *(Check one)*

1 Yes
2 No [SKIP TO H22]
-2 Not asked in mini-survey
-9 Refused

H20 Is your thermostat typically programmed to automatically change the temperature settings at different times of the day or days of the week, OR do you manually change the temperature as needed? *(Check one)*

1 Programmed to change temperature automatically
2 Manually change the temperature
3 Both
-2 Not asked in mini-survey
-6 Programmed skip
-9 Refused

H22 How many dehumidifiers do you use in your home? *(Enter 0 if do not use any)*

_ # of units [0-9]
-2 Not asked in mini-survey
-9 Refused

H23 About how old is this …
(Check one)

For H23a through H23d

1	Less than 2 years old
2	2 to 4 years old
3	5 to 9 years old
4	10 to 14 years old
5	15 to 19 years old
6	20 years old or more
-2	Not asked in mini-survey
-6	Programmed skip
-8	Don't know
-9	Refused

H23a [SKIP TO H26 IF H22 = 0 OR -9] first dehumidifier?
H23b [SKIP TO H24a IF H22 = 1] second dehumidifier
H23c [SKIP TO H24b IF H22 = 2] third dehumidifier
H23d [SKIP TO H24b IF H22 = 3] fourth dehumidifier

H24a [SKIP IF H22<>1 OR (E1 <> 2 OR 3) OR (H23a = 4, 5, OR 6)]
Is this dehumidifier ENERGY STAR® rated?
(e.g. Does it have the ENERGY STAR® logo?) *(Check one)*

1	Yes
3	No
-2	Not asked in mini-survey
-6	Programmed skip
-8	Don't know
-9	Refused

H24b [SKIP IF H22=1 OR (E1 <> 2 OR 3) OR
{H22=2 AND (H23a>3 AND H23a<>7 AND H23b>3 AND H23b<>7)} **OR**
{H22=3 AND (H23a>3 AND H23a<>7 AND H23b>3 AND H23b<>7 AND H23c=>3 AND H23c<>7)} **OR**
{H22>3 AND (H23a>3 AND H23a<>7 AND H23b>3 AND H23b<>7 AND H23c=>3 AND H23c<>7 AND H23d>3 AND H23d<>7)}]
Are these dehumidifier(s) ENERGY STAR® rated?
(e.g. Does they have the ENERGY STAR® logo on them?) *(Check one)*

1	Yes, all
2	Yes, some
3	No
-2	Not asked in mini-survey
-6	Programmed skip
-8	Don't know
-9	Refused

H26 How many humidifiers do you use in your home? *(Enter 0 if you do not have any)*

_ # of units [0-9]
-2 Not asked in mini-survey
-9 Refused

H27 How many of the following types of ventilation equipment do you have in your home…

(If none, please enter zero)

For H27c through H27a
__ # of units [0-25]
-2 Not asked in mini-survey
-9 Refused

H27c Ceiling fans?
H27d Exhaust fans in the kitchen?
H27e Exhaust fans in the bathrooms or another room?
H27b An attic fan in your home? An attic fan removes air from the attic only.
H27a A whole house fan? A whole-house fan is a type of fan, or exhaust system commonly venting into a building's attic, designed to pull hot air out of the building.

WATER HEATING

WH1 [ASK IF B3 = 3 OR 4] Do you receive your hot water from a central hot water heating system that is used by other families in your apartment or condominium building?
(Check one)

1 Yes [SKIP TO WH6]
2 No
-2 Not asked in mini-survey
-6 Programmed skip
-8 Don't know [SKIP TO WH6]
-9 Refused

WH2 What type of system do you use as your primary water heating system? *(Check one)*

1 Stand-alone storage tank
2 Tankless or on demand water heater
3 Heat pump water heater
4 Part of the heating system boiler
5 Other, specify
-2 Not asked in mini-survey
-6 Programmed skip
-8 Don't know
-9 Refused

o_WH2 [ASK IF WH2=5] Description of other type of primary water heating system used.

WH3 What type of fuel does your primary hot water heater use? *(Check one)*

1 Electricity
2 Natural gas from underground pipes
3 Propane (bottled gas)
4 District Steam
5 Fuel Oil
6 Kerosene
7 Solar
8 Other, specify
-2 Not asked in mini-survey
-6 Programmed skip
-8 Don't know
-9 Refused

o_WH3 [ASK IF WH3=8] Description of other type of primary water heating fuel used.

WH4 About how old is your primary water heating system? *(Check one)*

1 Less than 2 years old
2 2 to 4 years old
3 5 to 9 years old
4 10 to 14 years old
5 15 to 19 years old
6 20 years old or more
-2 Not asked in mini-survey
-6 Programmed skip
-8 Don't know
-9 Refused

WH5 [ASK IF (E1 = 2 OR 3) AND (WH2=1 OR 4) AND (WH4 <> 4, 5, AND 6)]
Is this water heating system ENERGY STAR® rated?
(e.g. Does it have the ENERGY STAR® logo on it?) *(Check one)*

1	Yes	
2	No	
-2	Not asked in mini-survey	
-4	Interviewer / respondent error	
-6	Programmed skip	
-8	Don't know	
-9	Refused	

WH6 [SKIP TO WH8 IF WH2=4] Do you use more than one water heating system in your home? *(Check one)*

1	Yes	
2	No	[SKIP TO WH8]
-2	Not asked in mini-survey	
-6	Programmed skip	
-8	Don't know	[SKIP TO WH8]
-9	Refused	

WH7 What other type of system do you use as your primary water heating system? *(Check one)*

1	Stand-alone storage tank
2	Tankless or on demand water heater
3	Heat pump water heater
4	Part of heating system boiler
5	Other, specify
-2	Not asked in mini-survey
-6	Programmed skip
-9	Refused

o_WH7 [ASK IF WH7=5] Description of other type of water heating system.

WH8 Do you have an automatic dishwasher? *(Check one)*

1	Yes	
2	No	[SKIP TO C1a]
-2	Not asked in mini-survey	
-9	Refused	

WH9 Approximately how old is your primary automatic dishwasher? *(Check one)*

1 Less than 2 years old
2 2 to 4 years old
3 5 to 9 years old
4 10 to 14 years old
5 15 to 19 years old
6 20 years old or more
-2 Not asked in mini-survey
-6 Programmed skip
-8 Don't know
-9 Refused

WH10 [ASK IF (E1 = 2 OR 3) AND WH9 <> 4, 5, OR 6]
Is this automatic dishwasher ENERGY STAR® rated?
(e.g. Does it have the ENERGY STAR® logo on it?) *(Check one)*

1 Yes
2 No
-2 Not asked in mini-survey
-6 Programmed skip
-8 Don't know
-9 Refused

[Note: Allowable number of loads increased to 35 on 12/2/2013]
WH11 Approximately how many loads of dishes does your household wash in a typical week in the automatic dishwasher [If home occupied<12 months a year- , while the home is occupied]? *(Enter number of loads below)*

__ # of loads [0-35]
-2 Not asked in mini-survey
-6 Programmed skip
-9 Refused

CLOTHES WASHING AND DRYING

C1a [SKIP IF B3 = 3 OR 4] Do you have a clothes washer in your home?

1	Yes	[SKIP TO C3]
2	No	[SKIP TO C7a]
-2	Not asked in mini-survey	
-6	Programmed skip	
-9	Refused	

C1b [ASK IF B3 = 3 OR 4] Please Do not include clothes washers that are located in a laundry room of your apartment or condominium building.] (Check one)

1	Yes	
2	No	[SKIP TO C7a]
-2	Not asked in mini-survey	
-6	Programmed skip	
-9	Refused	

[Note: Allowable number of loads increased to 35 on 12/2/2013]

C3 Approximately how many loads of laundry does your household wash in a typical week [If home occupied<12 months a year- , while the home is occupied]? *(Enter number of loads below)*

__	# of loads [0-35]
-2	Not asked in mini-survey
-6	Programmed skip
-8	Don't know
-9	Refused

C4 What water temperature setting do you usually use for the wash cycle of your clothes washer? *(Check one)*

1	Hot
2	Warm
3	Cold
-2	Not asked in mini-survey
-6	Programmed skip
-8	Don't know
-9	Refused

C5 What water temperature setting do you usually use for the rinse cycle of your clothes washer? *(Check one)*

1 Hot
2 Warm
3 Cold
-2 Not asked in mini-survey
-6 Programmed skip
-8 Don't know
-9 Refused

C6 About how old is your primary clothes washer? *(Check one)*

1 Less than 2 years old
2 2 to 4 years old
3 5 to 9 years old
4 10 to 14 years old
5 15 to 19 years old
6 20 years old or more
-2 Not asked in mini-survey
-6 Programmed skip
-8 Don't know
-9 Refused

C6b [ASK IF (E1 = 2 OR 3) AND C6 <> 4, 5, AND 6]
Is this clothes washer ENERGY STAR® rated?
(e.g. Does it have the ENERGY STAR® logo on it?) *(Check one)*

1 Yes
2 No
-2 Not asked in mini-survey
-6 Programmed skip
-8 Don't know
-9 Refused

C7a [SKIP IF B3 = 3 OR 4] Do you have a clothes dryer in your home? *(Check one)*

1 Yes [SKIP TO C8]
2 No [SKIP TO L2]
-2 Not asked in mini-survey
-6 Programmed skip
-9 Refused

C7b [ASK IF B3 = 3 OR 4] Do you have a clothes dryer in your home? Please do not include community clothes dryers that are located in a laundry room of your apartment or condominium building. *(Check one)*

1	Yes	
2	No	[SKIP TO L2]
-2	Not asked in mini-survey	
-6	Programmed skip	
-9	Refused	

C8 What type of fuel does your primary clothes dryer use? *(Check one)*

1	Electricity
2	Natural gas from underground pipes
3	Propane (bottled gas)
4	Other, specify
-2	Not asked in mini-survey
-6	Programmed skip
-8	Don't know
-9	Refused

o_C8 [ASK IF C8=4] Description of other type of fuel used for clothes drying.

C9 About how old is your clothes dryer? *(Check one)*

1	Less than 2 years old
2	2 to 4 years old
3	5 to 9 years old
4	10 to 14 years old
5	15 to 19 years old
6	20 years old or more
-2	Not asked in mini-survey
-6	Programmed skip
-8	Don't know
-9	Refused

C10 Is your clothes dryer a heat pump clothes dryer? A heat pump clothes dryer is a fairly new technology that pulls energy from the air just like a heat pump heating and cooling system. The hot air is not vented but is reused to dry the clothes. They use 50% less energy, but take longer to dry clothes. *(Check one)*

1 Yes
2 No
-2 Not asked in mini-survey
-6 Programmed skip
-8 Don't know
-9 Refused

HOME LIGHTING

L2 Do you use any of the following natural lighting in your home during the day? *(Select all that apply)*

For L2c1 through L2c4
0 Not mentioned
1 Mentioned
-2 Not asked in mini-survey
-6 Programmed skip
-9 Refused

L2c1 Skylights
L2c2 Tubular skylights, also referred to as solar tubes or sun tunnels (What is that?)
L2c3 Large uncovered window areas
L2c4 None of the above

L3 Which of the following types of lighting controls do you use inside or outside your home?

(*Select all that apply)*

For L2c1 through L2c4
0 Not mentioned
1 Mentioned
-2 Not asked in mini-survey
-6 Programmed skip
-9 Refused

L3c1 Dimmer switch
L3c2 3-way bulb
L3c3 Occupancy/motion sensor
L3c4 Timer
L3c5 None of the above

L4 Compact fluorescent light bulbs – also known as CFLs – usually do not look like regular incandescent bulbs. The most common type of CFL is made with a glass tube bent into a spiral shape and fits in a regular light bulb socket. [Picture of CFL] Before today, were you familiar with CFLs? *(Check one)*

1 Yes
2 No
-2 Not asked in mini-survey
-9 Refused

L4a LED light bulbs give off directional light, so the light goes where you aim it. They are also very energy efficient and can work with dimmable switches. [Picture of LED] Before today, were you familiar with LED light bulbs? *(Check one)*

1 Yes
2 No
-2 Not asked in mini-survey
-9 Refused

L5 How many light bulbs inside your home are typically used two or more hours each day?

(Enter number of bulbs below. If none, please enter zero)

For L5a through L5c

__ # of bulbs [0-99]
-2 Not asked in mini-survey
-8 Don't know
-9 Refused

L5a CFL/LED Bulbs
L5b Incandescent Bulbs
L5c Other bulbs

L7 How many light bulbs outside your home are typically used 2 or more hours each day? [IF B3= 2 OR 3 OR 4 – Please include only lights that are controlled from your [HOME TYPE]] *(Enter number of bulbs below)*

__ # of bulbs [0-95]
-2 Not asked in mini-survey
-9 Refused

L8 [ASK IF (L4 OR L4a = 1) AND L7 <> 0 OR -9] How many of the [L7] outdoor lights used two or more hours each day are CFL or LED lights? *(Enter number of bulbs below)*

__	# of bulbs	[0-95]
-2	Not asked in mini-survey	
-6	Programmed skip	
-8	Don't know	
-9	Refused	

POOL AND SPA

P1A [SKIP IF B3 = 3 OR 4] Do you have a swimming pool with a filtering system for your use only? *(Check one)*

1	Yes	[SKIP TO P2]
2	No	[SKIP TO P4a]
-2	Not asked in mini-survey	
-6	Programmed skip	
-9	Refused	

P1B [ASK IF B3 = 3 OR 4] Do you have a swimming pool with a filtering system for your use only? Please do not include a pool that is shared with others in your apartment or condominium complex. *(Check one)*

1	Yes	
2	No	[SKIP TO P4a]
-2	Not asked in mini-survey	
-6	Programmed skip	
-9	Refused	

P2 Do you have a pool pump? *(Check one)*

1	Yes
2	No
-2	Not asked in mini-survey
-6	Programmed skip
-9	Refused

P2b [SKIP TO P3 IF P2 <> 1] Is the pool pump a high efficiency pool pump? *(Check one)*

1 Yes
2 No
-2 Not asked in mini-survey
-6 Programmed skip
-8 Don't know
-9 Refused

P2c Do you have an automatic timer that controls the time of day that your pool pump operates? *(Check one)*

1 Yes
2 No
-2 Not asked in mini-survey
-6 Programmed skip
-9 Refused

P3 Do you have a pool heater? *(Check one)*

1 Yes
2 No [SKIP TO P4a]
-2 Not asked in mini-survey
-6 Programmed skip
-9 Refused

P3b What type of fuel does the pool heater use? *(Check one)*

1 Electricity
2 Natural gas from underground pipes
3 Propane (bottled gas)
4 Solar
5 Other fuel, specify
-2 Not asked in mini-survey
-6 Programmed skip
-8 Don't know
-9 Refused

o_P3b [ASK IF P3b=5] Description of other pool heater fuel.

P4a [SKIP IF B3 = 3 OR 4] Do you have a hot tub, spa, or jetted tub/Jacuzzi for your use only? *(Check one)*

1	Yes	[SKIP TO P5]
2	No	[SKIP TO A2]
-2	Not asked in mini-survey	
-6	Programmed skip	
-9	Refused	

P4b [ASK IF B3 = 3 OR 4] Do you have a hot tub, spa, or jetted tub/Jacuzzi for your use only? Please do not include a community hot tub, spa, or Jacuzzi that is shared with others in your apartment or condominium complex. *(Check one)*

1	Yes	
2	No	[SKIP TO A2]
-2	Not asked in mini-survey	
-6	Programmed skip	
-9	Refused	

P5 What type of fuel is used to heat the water in your hot tub, spa, or jetted tub/Jacuzzi? *(Check one)*

1	Electricity
2	Natural gas from underground pipes
3	Propane (bottled gas)
4	Solar
5	Other fuel, specify
-2	Not asked in mini-survey
-6	Programmed skip
-8	Don’t know
-9	Refused

o_P5 [ASK IF P5=5] Description of other type of fuel used for hot tub heating.

SMALL HOUSEHOLD APPLIANCES

[Note: Option A2e added on 11/11/2013. Cases completed before date are coded -5.]

A2 How many televisions used in your home are of each of the following types? *(If none, please enter zero)*
I'm unsure what type of TV I have? (Click here, a new window will open)

For A2a through A2d

__ # of TVs [0-20]
-2 Not asked in mini-survey
-5 Programming change
-9 Refused

A2a Standard tube TVs
A2b Flat screen Plasma TVs
A2c Flat screen LCD/LED TVs
A2e Flat screen TV of unknown type
A2d Rear projection TVs

[Note: Option A3e added on 11/11/2013. Cases completed before date are coded -5.]

A3 Of the [A2 NUMBER AND TYPE] televisions used in your home, how many are used at least 2 hours every day? *(Enter number of televisions below)*

For A3a through A3d

__ # of TVs used at least 2 hours every day [0-20]
-5 Programming change
-6 Programmed skip
-9 Refused

A3a [SKIP IF A2a = 0 OR -9] Standard tube TVs
A3b [SKIP IF A2b = 0 OR -9] Flat screen Plasma TVs
A3c [SKIP IF A2c = 0 OR -9] Flat screen LCD/LED TVs
A3e [SKIP IF A2e = 0 OR -9] Flat screen TV of unknown type
A3d [SKIP IF A2d = 0 OR -9] Rear Projection TVs

A6 Do you have internet access at home? *(Check one)*

1 Yes
2 No
-2 Not asked in mini-survey
-9 Refused

[Note: Option A7l added on 11/25/2013. Cases completed before date coded as -5]
[Note: A7g changed from 'Combination printer/copier/scanner/fax on 11/25/2013]

A7 How many of each of the following types of computer and home office equipment does your household use? *(If none, please enter zero. Please scroll down to see all computers and home office equipment.)*

For A7a through A7l

__ # of equipment [0-20]
-5 Programming change
-9 Refused

A7a Desktop computer (excluding monitor)
A7d CRT computer monitors (What is a CRT monitor?)
A7e LED/LCD flat screen computer monitors (What is a LED/LCD monitor?)
A7b Laptop computer
A7c iPads, tablet computers
A7f eReaders such as a Kindle or Nook
A7g Combination printer, copier, scanner, or fax
A7h Individual printer
A7i Individual copier
A7j Individual fax machine
A7k Individual scanner
A7l Modems or routers

A7o Any other type of computer or home office equipment?

1 Yes [SPECIFY]
2 No [SKIP TO A8]

o_A7oop [ASK IF A7o=1] Description of other type of computer or office equipment.

A8 Do you use a smart strip in your home to turn off computers, printers, and other equipment when not in use? Smart strips are different from regular power strips. They incorporate additional technologies to automatically disconnect power to equipment when not in use. *(Check one)*

1 Yes
2 No
-2 Not asked in mini-survey
-8 Don't know
-9 Refused

A8a [ASK IF A8 <> 2 AND -8] Do you have a Tier 1 or Tier 2 smart strip, or both? Tier 1 smart strips are controlled by a master outlet and Tier 2 smart strips are controlled by motion sensing or a timer. *(Check one)*

1 Tier 1 smart strip that turn off when your computer is powered off or goes to sleep
2 Tier 2 smart strip that turns off when you leave or is programmed to turn off at a certain time of the night or day
3 Both Tier 1 and Tier 2 smart strip
-2 Not asked in mini-survey
-6 Programmed skip
-8 Don't know
-9 Refused

A9a [SKIP IF A7a = 0 OR -9] About how many hours each day do all residents typically use the desktop computer(s) in your home? *(Enter number of hours below)*

__ # of hours per day on average, per computer [0-24]
-4 Interviewer / respondent error
-6 Programmed skip
-9 Refused

A9b [SKIP IF A7b = 0 OR -9] About how many hours each day do all residents typically use the laptop computer(s) in your home? *(Enter number of hours below)*

__ # of hours per day on average, per computer [0-24]
-4 Interviewer / respondent error
-6 Programmed skip
-9 Refused

A10 [SKIP IF A7a AND A7b = 0 OR -9] When you are not using your computer, do you typically shut down the computer? This is not the same as letting it go to sleep or simply closing the cover. *(Check one)*

1 Yes
2 No
-4 Interviewer / respondent error
-6 Programmed skip
-8 Don't know
-9 Refused

A11 Does anyone in your household work primarily from home? *(Check one)*

1 Yes
2 No
-9 Refused

A11b [SKIP TO A12A IF A11<>1] Including yourself, how many people work from your home?
(Enter number of people below)

__ # of people [1-20]
-6 Programmed skip
-9 Refused

o_A11bb What type of business is this? *(Please describe below)*

[RECORD RESPONSE VERBATIM]

A11c Other than computers, printers, and copiers, what other types of energy-using equipment do you use for your business?

1 No other energy using equipment
2 Specify what types of equipment
-6 Programmed skip
-9 Refused

o_A11c [ASK IF A11C=2] Description of other type of energy-using equipment.

[Note: A12ab Slashes changed to comma or 'or' on 12/2/2013]

A12 How many of each of the following other types of entertainment or telecommunications equipment does your household use?
(If none, please enter zero. Please scroll to see all equipment options.)

For A12ab through A12l
__ # of units [0-20]
-4 Interviewer / respondent error
-9 Refused

A12ab Combination cable, satellite, or set-top box with DVR unit
A12a Cable, satellite, or set-top box (What is a set-top box?)
A12b DVR (for example, TiVo)
A12c DVD/Blu-Ray player or recorder
A12d VCR
A12e Digital converter box
A12f Video gaming system (for example, PS3, PlayStation, Nintendo, XBOX, Wii)
A12g Home theater system
A12h MP3 players (for example, iPod)
A12i Cell phones/Smart phones
A12j Cordless telephones
A12k Stereo system
A12l Digital photo album

A12n Any other type of entertainment or telecommunications equipment?

1 Yes, Specify type below
2 No
-2 Not asked in mini-survey

o_A12no [SKIP IF A12n = 2] Description of other type entertainment or telecommunications equipment.

A13 Do any of your [equipment] have the ENERGY STAR® logo? *(Check one)*

For A13a through A13i

1 Yes
2 No
-4 Interviewer / respondent error
-6 Programmed skip
-8 Don't know
-9 Refused

A13a [ASK IF (E1 = 2 OR 3) AND (A12c OR A12d <> 0 AND -9)] VCRs/DVD players
A13b [ASK IF (E1 = 2 OR 3) AND (A2b <> 0 AND -9)] Plasma TV
A13c [ASK IF (E1 = 2 OR 3) AND (A2c <> 0 AND -9)] LCD/LED TV
A13d [ASK IF (E1 = 2 OR 3) AND (A12k <> 0 AND -9)] Stereo equipment
A13e [ASK IF (E1 = 2 OR 3) AND (A7a <> 0 AND -9)] Desktop computer
A13f [ASK IF (E1 = 2 OR 3) AND (A7b <> 0 AND -9)] Laptop computer
A13g [ASK IF (E1 = 2 OR 3) AND (A7e <> 0 AND -9)] LED/LCD computer monitor
A13h [ASK IF (E1 = 2 OR 3) AND (A7g OR A7h OR A7i OR A7k <> 0 AND -9)] Printer, scanner, OR all-in-one unit
A13i [ASK IF (E1 = 2 OR 3) AND (A12ab OR A12a <> 0 AND -9)] Set-top/cable boxes

MISCELLANEOUS EQUIPMENT

M2 Does anyone in your household have an electric automobile that you charge on your household electric meter? *(Check one)*

1 Yes
2 No
-9 Refused

[Note: Changed from 'Do you have a home security system, including security cameras?' on 1/30/14

A12m Do you have a home security system? This may include a security camera. *(Check one)*

1 Yes
2 No
-9 Refused

M3 Do you use a generator, including natural gas, solar, or wind to supply your electric needs? *(Check one)*

1 Yes
2 No
-9 Refused

M4 Do you have a . . . ? (*Check one for each*)

For M4a though M4f

1 Yes
2 No
-8 Don't know
-9 Refused

M4a Well pump (What is a well pump?)
M4b Sump pump (What is a sump pump?)
M4c Waterbed heater
M4d Natural gas grill
M4e Natural gas fire pit
M4f Radiant floor heating separate from heating system (What is floor heating?)

M5 Does anyone in your household use any other major appliances or equipment in your home that use a lot of energy such as exercise equipment, welding equipment or heavy tools, or equipment used for a home business? *(Check one)*

1 Yes, please specify
2 No
-2 Not asked in mini-survey
-9 Refused

***M5a** [ASK IF M5=1] Description of other type other major appliances or equipment.

For M5ac1 through M5ac16
- 0 Not mentioned
- 1 Mentioned
- -6 Programmed skip

***M5ac1** Air compressor
***M5ac2** Elliptical
***M5ac3** Exercise bike
***M5ac4** Exercise equipment
***M5ac5** Fish tank
***M5ac6** Hair dryer
***M5ac7** Heating pad/blanket
***M5ac8** Musical equipment
***M5ac9** Power tools
***M5ac10** Sauna
***M5ac11** Sewing machine
***M5ac12** Stair climber
***M5ac13** Treadmill
***M5ac14** Water pump
***M5ac15** Welder
***M5ac16** Miscellaneous

o_M5a [ASK IF M5ac16=1] Description of miscellaneous type of other major appliances or equipment.

M6 Does your household use an energy management system? An energy management system provides real-time information on your energy usage and allows you to control temperature settings, turn off lights, and appliances remotely.

- 1 Yes
- 2 No
- -2 Not asked in mini-survey
- -9 Refused

UTILITY COMPANY

U1 [ASK IF {(B1 <> 1, 3, AND 4) OR (B3 = 3 OR 4)} AND HAS NATURAL GAS (K2c2=1, K3c2=1, K4c2=1, H2=2, H7ag>=1, H8ac2=1, WH3=2, C8=2, P3b=2, OR P5=2)]
Does your household pay for natural gas directly to your gas company, or is natural gas included in your rent or condominium fee? *(Check one)*

1	Pay directly to natural gas company
2	Natural gas included in rent or condo fee
-2	Not asked in mini-survey
-4	Interviewer / respondent error
-6	Programmed skip
-9	Refused

U1a [ASK IF U1<>2 AND HAS NATURAL GAS (K2c2=1, K3c2=1, K4c2=1, H2=2, H7ag>=1, H8ac2=1, WH3=2, C8=2, P3b=2, OR P5=2)]
What company provides natural gas service to your home?
(Check one, scroll down to see all service providers)

1	Agway Energy Services, LLC
2	Alpha Gas And Electric, LLC
3	Ambit New York, LLC
4	American Power & Gas LLC
5	Atlantic Energy LLC
6	Bath Electric, Gas & Water System
7	Bluerock Energy, Inc.
8	Central Hudson Gas & Electric Corporation
9	Chautauqua Utilities, Inc.
10	Citizens Choice Energy, LLC
11	Columbia Utilities, LLC
12	Consolidated Edison Company Of N Y, Inc.
13	Constellation Energy Gas Choice, Inc.
14	Corning Natural Gas Corporation
15	Crown Energy Services, Inc
16	Direct Energy Services, LLC
17	Empire State Pipeline
18	Energy Cooperative Of America, Inc.
19	Energy Discounters, LLC
20	Energy Plus Natural Gas LLC
21	Energymark, LLC
22	Family Energy Inc.
23	Filmore Gas Company, Inc.
24	Gateway Energy Services Corporation
25	Hiko Energy LLC
26	Hudson Energy Services, LLC
27	IDT Energy, Inc.
28	IGS Energy

29 Intelligent Energy
30 Just Energy
31 Keyspan Energy Delivery (Long Island)
32 Keyspan Energy Delivery (New York)
33 Major Energy Services
34 N.E.A. Cross Of New York, Inc.
35 National Fuel Gas Distribution Corporation
36 National Fuel Resources, Inc
37 National Grid
38 New Wave Energy Corp.
39 New York Gas & Electric
40 New York State Electric & Gas Corporation
41 Noco Natural Gas LLC
42 North American Power And Gas, LLC
43 Orange And Rockland Utilities, Inc.
44 Plymouth Rock
45 Pro Energy, Inc.
46 Reserve Gas Company, Inc.
47 Rochester Gas & Electric Corporation
48 St. Lawrence Gas Company, Inc.
49 Stand Energy Corporation
50 Utility Expense Reduction LLC
51 Valley Energy, Inc.
52 Village Of Hamburg Municipal Gas Utility
53 Village Of Sloan
54 Woodhull Municipal Gas Company
55 Your Energy Holdings, LLC
56 Other, specify
-2 Not asked in mini-survey
-4 Interviewer / respondent error
-6 Programmed skip
-8 Don't know
-9 Refused

o_U1a [ASK IF U1a=56] Specify other gas utility.

U2a [ASK IF NO NATURAL GAS (K2c2<>1, K3c2<>1, K4c2<>1, H2<>2, (H7ag<1 OR -9), H8ac2<>1, WH3<>2, C8<>2, P3b<>2, AND P5<>2)]
Is natural gas service available on your street?

1 Yes
2 No
-2 Not asked in mini-survey
-4 Interviewer / respondent error
-6 Programmed skip
-8 Don't know
-9 Refused

U2b [ASK IF U2a = 1] Would you be interested in converting to natural gas?

1 Yes
2 No
-2 Not asked in mini-survey
-6 Programmed skip
-9 Refused

U3 [ASK IF (B3 = 3 OR 4) AND HAS FUEL OIL FOR HEATING OR WATER HEATING (H2=5, H8ac5=1 or WH3=5)]
Does your household pay for fuel oil directly, or is it included in your rent or condominium fee?

1 Pay directly
2 Included in rent or condo fee
-2 Not asked in mini-survey
-6 Programmed skip
-9 Refused

U5 [ASK IF (B3 = 3 OR 4) AND HAS PROPANE FOR HEATING OR WATER HEATING (H2=3, H8ac3=1, or WH3=3)]
Does your household pay for propane directly, or is it included in your rent or condominium fee?

1 Pay directly
2 Included in rent or condo fee
-2 Not asked in mini-survey
-6 Programmed skip
-9 Refused

U8 In the past 5 years, has your household participated in any energy efficiency or energy saving programs offered by NYSERDA or your utility company to make your home or appliances more energy efficient? *(Check one)*

1 Yes
2 No
-9 Refused

U9 [ASK IF U8=1] What type of equipment did you install or recycle through a program?

(Select all that apply)

For U9c1 through U9c9

0	Not mentioned
1	Mentioned
-6	Programmed skip
-9	Refused

U9c1	Insulation or weatherization measures
U9c2	Heating equipment
U9c3	Air conditioning equipment
U9c4	Lighting
U9c5	Water heating equipment
U9c6	Clothes washer
U9c7	Appliances
U9c8	Refrigerator or freezer recycling
U9c9	Other, please specify

o_U9 [ASK IF U9=9] Description of other type of equipment.

[Note: Categories 8 and 9 added on 1/20/2014]

U10 [ASK IF U8=2] Why hasn't your household participated in any energy efficiency programs? *(Select all that apply)*

For U10c1 through U10c9

0	Not mentioned
1	Mentioned
-4	Interviewer / respondent error
-6	Programmed skip
-9	Refused

U10c1	Am not aware of any
U10c2	Do not need anything done
U10c3	Don't know who to contact to participate
U10c4	Can't afford to install new equipment/appliances
U10c5	My energy bills are not that high
U10c6	I rent
U10c7	Other, specify
U10c8	Too busy
U10c9	Recently moved to home

o_U10 [ASK IF U10c7=1] Description of other reason why household hasn't participated.

U12 Are you considering replacing or purchasing any of the following in the next five years?

(Select all that apply)

For U12c1 through U12c7
- 0 Not mentioned
- 1 Mentioned
- -9 Refused

U12c1 Insulation or weatherization measures
U12c2 Heating equipment
U12c3 Air conditioning equipment
U12c4 Water heating equipment
U12c5 Clothes washer
U12c6 Appliances
U12c7 None of the above

U13 If there was a program available to you that would help pay for part of the cost for purchasing new energy efficient equipment, which of the following would you consider replacing within the next five years? *(Select all that apply)*

For U13c1 through U13c7
- 0 Not mentioned
- 1 Mentioned
- -9 Refused

U13c1 Insulation or weatherization measures
U13c2 Heating equipment
U13c3 Air conditioning equipment
U13c4 Water heating equipment
U13c5 Clothes washer
U13c6 Appliances
U13c7 None of the above

U14 [SKIP IF REP<>99 (NOT SUPPLEMENTAL NEW CONSTRUCTION SAMPLE)] Please provide your best estimate of the total electric costs your home paid in the last 12 months. Do not include natural gas or other fuels. *(Check one)*

1	$500 or less
2	$501 - $1000
3	$1,001 - $1,500
4	$1,501 - $2,000
5	$2,001 - $2,500
6	$2,501 - $3,000
7	$3,001 - $3,500
8	$3,501 - $4,000
9	$4,000 or more
-2	Not asked in mini-survey
-6	Programmed skip
-8	Don't know
-9	Refused

***U14_Consumption**

[Consumption rate categories calculated by dividing dollar amounts in U14 by 0.183 $/kWh.]

1	2,737 kWh or less
2	2,737 kWh to 5,470 kWh
3	5,470 kWh to 8,202 kWh
4	8,202 kWh to 10,934 kWh
5	10,934 kWh to 13,667 kWh
6	13,667 kWh to 16,399 kWh
7	16,399 kWh to 19,131 kWh
8	19,131 kWh to 21,858 kWh
9	21,858 kWh or more
-2	Not asked in mini-survey
-6	Programmed skip

DEMOGRAPHICS

D2 Some background information about the people living in your household will also help us understand how you use energy. All of your answers will be kept strictly confidential. Including yourself, how many people currently living in your home year-round are in the following age groups? Please exclude anyone who is just visiting, children who may be away at college or those deployed in the military. *(If none, please enter zero)*

For D2_5 through D2_65

__ # of people [0-25]
-2 Not asked in mini-survey
-9 Refused

D2_5 Less than 5 years old
D2_6 6-17 years old
D2_18 18-24 years old
D2_25 25-34 years old
D2_35 35-44 years old
D2_45 45-54 years old
D2_55 55-64 years old
D2_65 65 or older

D3 What is the highest level of education a person still living in your household has completed? *(Check one)*

1 Less than high school
2 Some high school
3 High school graduate or equivalent (e.g., GED)
4 Trade or technical school
5 Some college, no degree
6 College degree (e.g. Bachelor's degree)
7 Some graduate school
8 Graduate degree (e.g. Masters or Doctorate degree)
-2 Not asked in mini-survey
-9 Refused

D4 For classification purposes only, which of the following best describes your household's total income in 2012? *(Check one)*

1	Less than $25,000
2	$25,000–less than $30,000
3	$30,000–less than $35,000
4	$35,000–less than $50,000
5	$50,000–less than $75,000
6	$75,000–less than $100,000
7	$100,000–less than $150,000
8	$150,000–less than $200,000
9	$200,000 or more
-2	Not asked in mini-survey
-9	Prefer not to answer

D5 What is your gender?

1	Male
2	Female
-2	Not asked in mini-survey
-9	Prefer not to answer

[Note: Wording asking for contact info changed on 1/6/2014]

D6 [ASK IF APARTMENT WITH 5 OR MORE UNITS B3=4] As part of this study, we are also talking with property owners and managers to better understand the energy using equipment in common areas. Please provide contact information for the person or firm who has responsibility for your building and/or systems in the common areas (this may be a property owner or manager, landlord, or superintendent). Even if you do not have all pieces of information, please provide as much as you are able. (Enter information below)

D6 Name of apartment complex: _____

D6m Property Owner or Manager's Name:_____

D6t Telephone number (###-###-####): _____

[Note: Time of visit changed from '3-4 hours' to 'two hours' on 12/11/2013.]
[Note: Sentence about fuel cut. Additional reminder about gift card added. Change 'reward card' to gift card. 12/12/2013]

D7 [SKIP TO D9a IF NOT SINGLE-FAMILY (IF B3a>4 AND B3a<=2000) OR B3b>1 OR (B3a=8888 AND B3b = -9) OR (B3=2 OR 4 AND B3a AND B3b = -9)] NYSERDA is offering select households an additional $100 gift card to allow a certified and trained technician to visit their home to gather more detailed information about the home's energy usage. The visit should take about two hours depending on the size, age, and complexity of your home and tests to be performed. By saying yes, you are simply agreeing to be re-contacted within the next couple weeks to hear more details about the visit and set up an appointment. The information gathered will only be reported in aggregate with data from other homes to evaluate and improve energy efficiency programs offered by NYSERDA and your utility. Would you be interested in being a part of this type of visit for an additional $100 gift card? This would be for your home at [SERVICE ADDRESS]. *(Check one)*

1	Yes
2	Possibly, but I need more information
3	No
-2	Not asked in mini-survey
-4	Interviewer / respondent error
-6	Programmed skip
-9	Refused

Note: Updated from mailing address to service address and added a field for State on 12/2/2013.

D8 [ASK IF D7=1 OR 2] Please provide your contact information so we can have someone call you to schedule an appointment. The information that is on file is: [SERVICE ADDRESS], [SERVICE CITY], [SERVICE STATE] [SERVICE ZIP].

D8	First and Last name of person to ask for
D8b	Address
D8c	City
D8h	State
D8d	Zip Code
D8e	Main number
D8f	Secondary number
D8g	E-mail

D9a To ensure your 20 dollar gift card arrives please confirm your mailing address. Is it? [MAILING ADDRESS]

1	Yes	[SKIP TO D9]
2	No	
-2	Not asked in mini-survey	
-9	Refused	

D9 Please enter your correct mailing address:

D9aa Name
D9b Street Address
D9c City
D9d State
D9e Zip code

D9 Additional studies are planned in the near future to gain a better understanding of residential energy use and energy decision making. The goal of these studies is to improve the effectiveness of energy programs to serve New Yorkers. Would you be interested in participating in future energy-related studies? By saying yes, you are simply agreeing to be re-contacted to learn more about these studies.

1 Yes
2 Possibly, but I need more information
3 No
-2 Not asked in mini-survey
-9 Refused

D10 Thank you for your help with this important study. Do you have any comments that you would like to share?

1 Yes [SPECIFY]
2 No comment [END SURVEY]
-2 Not asked in mini-survey
-9 Refused

o_D10 [ASK IF D10=1] Comments from the respondent [END SURVEY]

CLOSE Thank you for your interest in the NYSERDA Residential Baseline Study. We have completed data collection in your area. For more information on this important study or information on energy efficiency programs in your area, please visit http://www.nyserda.ny.gov/energystudyinfo or call toll-free 1-888-NY SMART.

1 Attempted survey after region closed [END SURVEY]

TERM [ASK IF S1=3] Thank you for your interest in the NYSERDA energy study. Because you no longer live at this address, we do not need further information on that home. Please proceed to the next page to find out about ways to save energy in your new home.

1 Ineligible [END SURVEY]

Appendix C: Letters to Single-Family and Tenant Respondents

nyserda
Energy. Innovation. Solutions.

Data Release Authorization Form
NYSERDA Statewide Residential Baseline Study

This form authorizes New York State Energy Research and Development Authority (NYSERDA) and/or its designated representatives to obtain certain utility billing and consumption data, described below, from the identified energy suppliers for use in identifying the performance of the property's energy systems.

PROPERTY INFORMATION			
Property Name:			
Property Address:	City:	State:	Zip:
Contact Name:	Contact Phone:	Contact Email:	

UTILITY INFORMATION	
ELECTRIC	Utility Provider:
	Account #:
NATURAL GAS	Utility Provider:
	Account #:
OTHER	Utility Provider:
	Account #:

As an authorized representative of the property listed above, I hereby authorize the identified energy suppliers to release, to NYSERDA and/or its designated representatives, utility billing and consumption data for the property listed above for the past 60 months. I understand that NYSERDA will use this data to conduct the Statewide Residential Baseline Study to better understand energy patterns and potential energy savings for all New York residential buildings. I further understand that the data will be used only for evaluation purposes, that results will be reported only in the aggregate, and that the data obtained pursuant to the agreement will be treated as confidential to the extent permitted by law.

Signature of Authorized Representative

Date

Print Name

Title

GEN-DRA-rbs-form-1-v1
10/13

Data Release Authorization Form

NYSERDA Statewide Residential Baseline Study

This form authorizes New York State Energy Research and Development Authority (NYSERDA) and/or its designated representatives to obtain certain utility billing and consumption data, described below, from the identified energy suppliers for use in indentifying the performance of the property's energy systems.

Property Name

Property Address | City | State | Zip Code

Contact Name | Contact Phone

Contact E-mail

Electricity	(Please Print Clearly)
Utility Provider:	
Electric Account #:	

Natural Gas	(Please Print Clearly)
Natural Gas Utility Provider:	
Natural Gas Account #:	

Other/Delivered Fuel	(Please Print Clearly)
Fuel Type & Provider:	
Fuel Account #:	

As an authorized representative of the property listed above, I hereby authorize the identified energy suppliers to release, to NYSERDA and/or its designated representatives, utility billing and consumption data for the property listed above for the past 60 months. I understand that NYSERDA will use this data to conduct the Statewide Residential Baseline Study to better understand energy patterns and potential energy savings for all New York residential buildings. I further understand that the data will be used only for evaluation purposes, that results will be reported only in the aggregate, and that the data obtained pursuant to the agreement will be treated as confidential to the extent permitted by law.

Signature of Authorized Representative | Date

Title

New York State Energy Research and Development Authority

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17 Columbia Circle, Albany, NY 12203-6399
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(F) 716-842-0156

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(F) 518-862-1091

West Valley Site Management Program
9030-B Route 219
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14171-9500
(P) 716-942-9960
(F) 716-942-9961

DATE

RECIPIENT
MAILING ADDRESS
MAILING CITY, MAILING STATE MAILING ZIP

CASE ID

Dear CONTACT NAME,

Recently, we sent you a letter inviting you to participate in a study to determine ways to help New York consumers save energy and reduce costs. Your household has been randomly selected to participate in this statewide study to gather information on home energy use in newly constructed homes. Whether you occupy the home as a renter or owner, or have many or few appliances, your feedback is equally important. **We are offering an incentive valued at $20 to those who complete the survey on-line or by telephone as a token of our appreciation**.

If you have already completed the survey online or via telephone, ***thank you***. If you have not yet done so, please log-on to **energystudy.nyserda.ny.gov** before <INSERT DATE> and use the ID number **<INSERT CASE ID>** to enter and complete the survey. The participation in this study is limited and the survey will close once the quota for your region has been met.

To complete the study by phone please call 1-800-454-5070 to speak with an interviewer from Tetra Tech, an independent research firm hired by NYSERDA, who will ask you about your household's energy-using equipment and other factors that affect your energy use.

Upon completion of this survey, your household may be selected to receive an additional incentive. With your permission, a trained and certified engineer will complete a visit to your home to collect additional information on your energy consumption and equipment.

Should you have any questions about this study, please feel free to call NYSERDA customer service at 1-877-NYSMART (1-877-697-6278), email at info@nyserda.ny.gov, or refer to the frequently asked questions at nyserda.ny.gov/energystudyinfo. Thank you in advance for your cooperation with this important study.

Sincerely,

Carley Murray, Associate Project Manager, Evaluation

Si prefiere completar la encuesta en español, por favor llame a 1-800-454-5070 y deje su nombre, número telefónico, y la mejor hora para llamarle.

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If you have already completed the survey online or via telephone, ***thank you***. If you have not yet done so, please log-on to the link below and use the **<INSERT CASE ID>** to complete the study or call 1-800-454-5070 to complete the survey over the phone.

To access the survey on-line visit the following site: **https://energystudy.nyserda.ny.gov** using the ID: **<INSERT CASE ID>**.

If you are unable to complete the survey on-line, an interviewer from Tetra Tech, an independent research firm hired by NYSERDA, will be contacting you in the next couple weeks to ask about your household's energy-using equipment and other factors that affect your energy use.

Upon completion of this survey, your household may be selected to receive an additional incentive. With your permission, a trained and certified engineer will complete a visit to your home to collect additional information on your energy consumption and equipment.

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The New York State Energy Research and Development Authority (NYSERDA) is conducting a statewide residential study to determine ways to help New York consumers save energy and reduce costs. We are currently scheduling on-site surveys of newly constructed, 2012 or later, single family homes located on Long Island. Single family homes for this study include both free standing homes as well as attached homes with no more than one to four family units in the building. Whether you occupy the home as a renter or owner, or are the builder for this home, you may qualify for the study. **As a thank you, for participating in this study, you will receive a $100 incentive. To participate, please contact us with the next two weeks to ensure your eligibility in this study**.

With your permission, a trained and certified Home Energy Rater will complete an energy rating of your home during the visit. They will review your insulation levels, heating and cooling equipment, appliances and conduct two diagnostic tests in order to learn more about how your home uses energy.

Please contact Lauren McFeeley to ensure participation in the study, at Performance Systems Development, at (607) 277-6240 extension 282. You may also reach her by cell phone at (607) 220-8138 or by email at lmcfeeley@psdconsulting.com.

Please be assured that the information collected on your home will be kept confidential to the extent permitted by law. NYSERDA's analysis will not identify individual respondents or homes. Should you have any questions about this study, please feel free to call NYSERDA customer service at 1-877-NYSMART (1-877-697-6278), email at info@nyserda.ny.gov, or refer to the frequently asked questions at www.nyserda.ny.gov/energystudyinfo.

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As a token of our appreciation, we are offering a $20 gift card to those who complete the survey on-line or by telephone. To complete the survey on-line, please go to **https://energystudy.nyserda.ny.gov/** before March 27, 2014 and use the ID number **<INSERT CASE ID>.** The participation in this study is limited and the survey will close once the quota for your region has been met.

Please be assured that the information you provide will be kept confidential to the extent permitted by law. NYSERDA's analysis will not identify individual respondents or firms.

Upon completion of this survey, your household may be selected to receive an additional $100 incentive. With your permission, a trained and certified engineer will complete a visit to your home to collect additional information on your energy consumption and equipment.

Should you have any questions about this study, please feel free to call NYSERDA customer service at 1-877-NYSMART (1-877-697-6278), email at info@nyserda.ny.gov, or refer to the frequently asked questions at www.nyserda.ny.gov/energystudyinfo.

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CASE ID

Dear CONTACT NAME,

The New York State Energy Research and Development Authority (NYSERDA) is conducting a statewide residential study to determine ways to help New York consumers save energy and reduce costs. We are currently scheduling on-site surveys of newly constructed, 2012 or later, single family homes located on Long Island. Single family homes for this study include both free standing homes as well as attached homes with no more than four family units in the building. As the builder of single family homes on Long Island, we are contacting you to see if you have any new homes that would qualify for the study.

With your assistance, a trained technician will visit the home to collect information on energy consumption and equipment. As a thank you, you will receive a **$100 Amazon gift card** at the end of the on-site survey. In addition, a Certified Home Energy Rating System (HERS) rater will complete and provide you with the results of an energy rating of your new home during the visit.

To schedule a visit at one of your new homes, please contact Lauren McFeeley, at Performance Systems Development, at (607) 277-6240 extension 282. You may also reach her by cell phone at (607) 220-8138 or by email at lmcfeeley@psdconsulting.com.

Please be assured that the information collected on your home will be kept confidential to the extent permitted by law. NYSERDA's analysis will not identify individual respondents or homes. Should you have any questions about this study, please feel free to call NYSERDA customer service at 1-877-NYSMART (1-877-697-6278), email at info@nyserda.ny.gov, or refer to the frequently asked questions at www.nyserda.ny.gov/energystudyinfo.

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With your permission, a trained and certified Home Energy Professional will complete an energy rating of your home during the visit. They will review your insulation levels, heating and cooling equipment, appliances and conduct two diagnostic tests in order to learn more about how your home uses energy.

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Sincerely,

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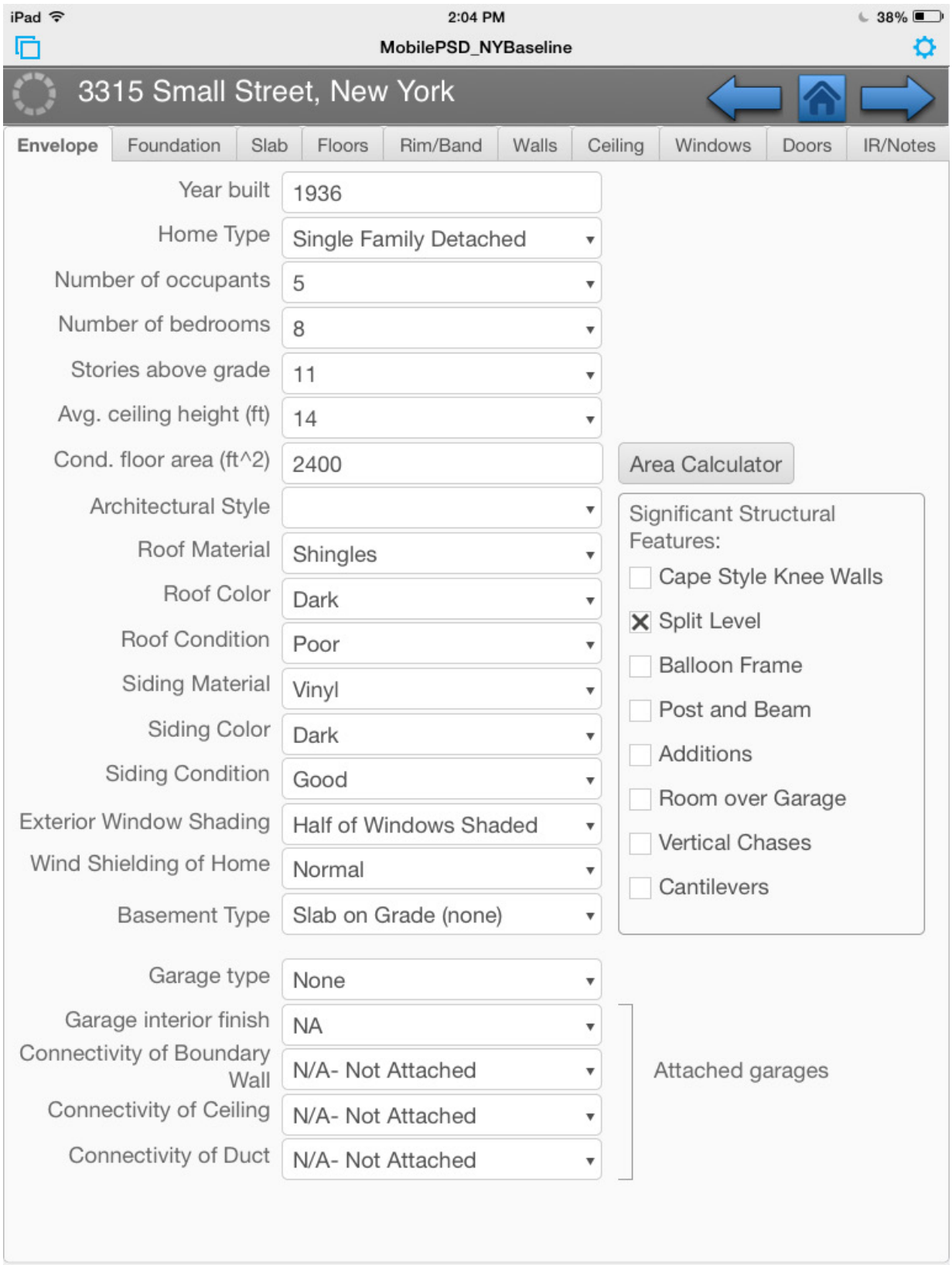
Appendix D: On-site Inspection Data Collection Instrument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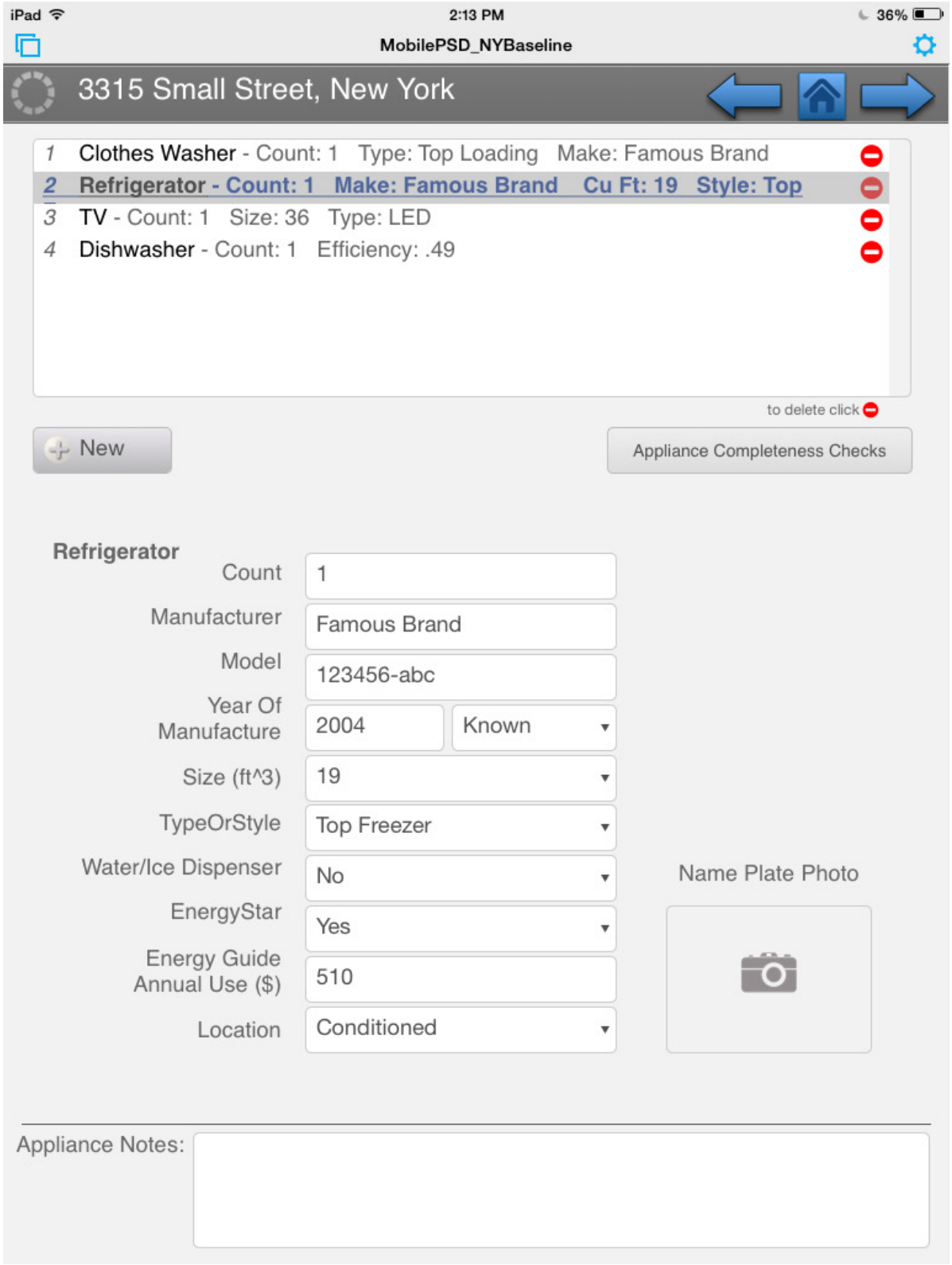
2:04 PM
38%
MobilePSD_NYBaseline
3315 Small Street, New York
Envelope
Foundation
Slab
Floors
Rim/Band
Walls
Ceiling
Windows
Doors
IR/Notes
Year built
1936
Home Type
Single Family Detached
Number of occupants
5
Number of bedrooms
8
Stories above grade
11
Avg. ceiling height (ft)
14
Cond. floor area (ft^2)
2400
Area Calculator
Architectural Style
Roof Material
Shingles
Roof Color
Dark
Roof Condition
Poor
Siding Material
Vinyl
Siding Color
Dark
Siding Condition
Good
Exterior Window Shading
Half of Windows Shaded
Wind Shielding of Home
Normal
Basement Type
Slab on Grade (none)
Significant Structural Features:
Cape Style Knee Walls
Split Level
Balloon Frame
Post and Beam
Additions
Room over Garage
Vertical Chases
Cantilevers
Garage type
None
Garage interior finish
NA
Connectivity of Boundary Wall
N/A- Not Attached
Connectivity of Ceiling
N/A- Not Attached
Connectivity of Duct
N/A- Not Attached
Attached garages


iPad
2:13 PM
36%
MobilePSD_NYBaseline
3315 Small Street, New York
1 Clothes Washer - Count: 1 Type: Top Loading Make: Famous Brand
2 Refrigerator - Count: 1 Make: Famous Brand Cu Ft: 19 Style: Top
3 TV - Count: 1 Size: 36 Type: LED
4 Dishwasher - Count: 1 Efficiency: .49
to delete click
New
Appliance Completeness Checks
Refrigerator
Count
1
Manufacturer
Famous Brand
Model
123456-abc
Year Of Manufacture
2004
Known
Size (ft^3)
19
TypeOrStyle
Top Freezer
Water/Ice Dispenser
No
EnergyStar
Yes
Energy Guide Annual Use ($)
510
Location
Conditioned
Name Plate Photo
Appliance Notes:

NYSERDA, a public benefit corporation, offers objective information and analysis, innovative programs, technical expertise, and support to help New Yorkers increase energy efficiency, save money, use renewable energy, and reduce reliance on fossil fuels. NYSERDA professionals work to protect the environment and create clean-energy jobs. NYSERDA has been developing partnerships to advance innovative energy solutions in New York State since 1975.

To learn more about NYSERDA's programs and funding opportunities, visit nyserda.ny.gov or follow us on Twitter, Facebook, YouTube, or Instagram.

New York State Energy Research and Development Authority

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State of New York
Andrew M. Cuomo, Governor

New York State Energy Research and Development Authority
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