



NYSERDA

NYSERDA Residential Statewide Baseline Study

Summary

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Mission Statement:

Advance innovative energy solutions in ways that improve New York's economy and environment.

Vision Statement:

Serve as a catalyst – advancing energy innovation, technology, and investment; transforming New York's economy; and empowering people to choose clean and efficient energy as part of their everyday lives.

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Summary

Final Report

Prepared for:

New York State Energy Research and Development Authority

Albany, NY

Carley Murray
Associate Project Manager

Jonathon Steiner
Assistant Project Manager

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Energy efficiency, residential energy efficiency, single-family homes, multifamily homes, HVAC, heating and cooling equipment, market characterization, market assessment, baseline study, technical potential, economic potential, achievable potential

Summary

In 2011 through 2014, NYSERDA, in collaboration with the E2 Working Group¹ Statewide Study Subcommittee led by the New York State Department of Public Service (DPS), conducted a Residential Statewide Baseline 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.

The Residential Statewide Baseline Study has three main components:

- **Residential Baseline Study.** A comprehensive statewide baseline study of the residential market was conducted 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.
- **HVAC Market Assessment.** Data from the Residential Baseline Study component were combined with data from contractor interviews, and distributor sales reports to assess the market for non-electric heating, air conditioning, and water heating equipment. Data on the baseline efficiency of new equipment installed in New York State were gathered during HVAC contractor 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 2013.
- **Residential Potential Study.** Data from the above two components were then used for an analysis of energy efficiency potential. 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.

Comprehensive results of the data collection and analyses are presented in five separate volumes. The key findings, organized by volume, are provided in this summary.

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

Volume 1: Single-Family Report

The Residential Statewide 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).

Key findings include:

- Almost half (48 percent) of New York State's 5.2 million single family homes are located in Climate Zone 4, which is aligned to the Downstate² region of New York State.
- About two-thirds of all homes in New York State, including residential dwelling units in master-metered multifamily buildings, are single-family homes.
- Close to one-quarter of single-family homes are 75 years old or more, which indicate opportunities for weatherization energy savings.
- 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.

Volume 2: Multifamily Report

The Residential Statewide Baseline Study conducted data collection on multifamily tenant units and buildings, including common area equipment for the three climates zones of New York State. Data were first collected via 379 telephone and Web surveys with tenants that were used to help identify multifamily property managers or owners. A total of 219 telephone surveys were then conducted with the property managers or owners. These surveys were followed by on-site inspection and data collection at 67 multifamily buildings.

² Downstate region of New York is comprised of Bronx, Kings, Nassau, New York, Queens, Richmond, Suffolk and Westchester counties.

Key findings include:

- Close to 40 percent of multifamily buildings in Climate Zone 4 are more than 75 years old compared to less than nine percent of the buildings in the other two climate zones.
- About one-quarter of the natural gas central heating systems are over 20 years old, which could be replaced with newer more efficient systems.
- Most tenants report having approximately two computers that are used three to four hours per day.
- Only half of the computers in these tenant units are turned off when not in use, and only 14 percent of tenants saying they use a smart strip.

Volume 3: HVAC Market Assessment

The HVAC Market Assessment is a key component of the Residential Statewide Baseline Study and provides the baseline conditions for residential non-electric heating and water heating equipment, central air conditioning, and heat pumps in New York State. The study focused on units installed in single-family homes with one to four dwelling units, multifamily buildings, or in townhouse-style configurations where individual units have their own heating systems. This market assessment describes where the market is now (based on equipment sold/installed in 2012 and after) and what percent of the equipment currently being sold is high efficiency.

The market assessment uses data from a variety of primary and secondary sources that are specific to the New York State residential space heating and cooling, and water heating markets. A primary source of data was 47 telephone surveys of HVAC contractors to collect data on 2013 sales of HVAC equipment by efficiency levels. The data was confirmed, whenever possible, by comparisons to D&R International, which reported New York State-specific Heating, Air-conditioning and Refrigeration Distributors International (HARDI) sales data for 2013. In addition, the evaluation contractor made comparisons to data on HVAC equipment installed in the past two years from on-site inspections of 179 new construction homes. Data were also included from the on-site inspections of the existing homes that had installed new HVAC equipment in the past two years that included 57 heating systems, 62 cooling systems, and 78 water heaters. Other sources of estimated annual sales data included U.S. Census data for New York State and over 3,000 telephone or Web surveys completed for the residential baseline study with statewide data on type of systems and primary fuels.

Key findings include:

- The vast majority of HVAC contractors who supply heating, cooling, and water heating equipment to residential customers in New York State are small contractors (1 to 10 employees), representing about 90 percent of the businesses that install HVAC equipment in New York State.
- On average, a large contractor (with more than 10 employees) will install about four times as many heating systems annually as a small contractor, but represent only 10% of the businesses working on HVAC equipment.
- At the same time, due to the large number of small contractors, the small contractor group still account for an estimated two-thirds of the total annual sales of heating systems in New York State.
- HVAC Contractor Survey responses indicate both large and small contractors can improve on the amount of testing done to ensure heating and cooling systems are operating most efficiently at time of installation and servicing.
- Most of the large and small contractors said they were not aware of new federal standards that may affect the manufacturing of energy efficient non-electric heating and water heating equipment.

Volume 4: Residential Short-Term Potential Study

Volume 4 presents results from a study of technical, economic, and achievable residential energy efficiency potential in New York State over the next three and five years (2016 and 2018, respectively) from a base year of 2013. As part of a larger Residential Statewide Baseline Study this potential study identifies energy efficiency opportunities within the residential (including non-master-metered multifamily buildings) sector. Recommendations are also presented, where appropriate in light of the State's recent Clean Energy Fund and Reforming Energy Vision proceedings, for potential strategies to pursue those opportunities found to be cost-effective.³ To help inform these models, current electric, natural gas, and other fossil-fueled energy using equipment and related information was collected through a combination of telephone surveys and site visits with residential single-family and multifamily customers located within the State's three climate zones. Sensitivity analyses were also conducted to assess potential impacts of an alternate discount rate, lower installed cost, and increased market penetrations of energy using equipment.

³ Prior to the creation of the E2 Working Group, the former Evaluation Advisory Group held a similar role on this study.

The major findings from the potential analysis indicate substantial achievable potential remains for energy efficiency improvements in New York's residential single-family and multifamily (non-master metered) buildings sectors. Findings include:

- 13.5 percent electric savings by 2018 (5 year), 6.1 percent non-electric savings by 2018, based on Achievable Potential Sensitivity Scenario 1 (lower discount rate of 0.55 percent), eight percent combined electric and non-electric achievable potential by 2018.
- 7.5 percent electric savings by 2016 (3 year), 3.3 percent non-electric savings by 2016, based on Achievable Potential Sensitivity Scenario 1 (lower discount rate of 0.55 percent), 4.3 percent combined electric and non-electric achievable potential by 2016.
- Additional savings, up to 9 percent of combined electric and non-electric energy sales by 2018, could be achieved under more aggressive cost reduction and market penetration scenarios.

Volume 5: Methodology and Data Tables

Volume 5 includes the methodology, data tables, data comparisons, and data weighting for the Single Family, Multifamily and HVAC Market Assessment volumes of the Residential Statewide Baseline study.

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.

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**New York State
Energy Research and
Development Authority**

17 Columbia Circle
Albany, NY 12203-6399

toll free: 866-NYSERDA
local: 518-862-1090
fax: 518-862-1091

info@nyserdera.ny.gov
nyserdera.ny.gov



NYSERDA

State of New York

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New York State Energy Research and Development Authority

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