

# **NYSERDA New York State Residential Building Stock Assessment: 2018 On-Site Inspections Overview**

## **General Description**

The Residential Building Stock Assessment (RBSA) published in 2019 is the first update to the 2015 Residential Statewide Baseline Study (RSBS) of New York State. The RBSA was completed using data collected between September 28, 2018 and December 15, 2018. This RBSA on-site inspections data set is intended to be used in conjunction with the RBSA Survey dataset, published separately. The primary objectives of the RBSA is to provide a profile of new and existing homes in the State based on data from a representative sample of homes and to determine changes in building and equipment stock since the 2015 RSBS, including changes in the saturation of energy-consuming equipment (that uses electric, natural gas, and other fuels); key building characteristics such as insulation, windows types, and air leakage rates; and energy management practices. The RBSA also collected customer household and demographic information. Information provided in this study will be used by NYSERDA, the New York State Department of Public Service, energy efficiency program administrators throughout the State, and others for a variety of purposes, such as informing program planning and setting baselines for savings calculations.

## **Data Collection Methodology**

Led by NYSERDA, the project team for the building assessment component of the RBSA included Cadmus as the lead contractor, and PSD and Honeywell as subcontractors. The RBSA characterized single-family homes, which are defined for the study as residential structures comprising one to four living units. While single-family detached homes are by far the most common type of single-family home in the State, the study also collected data on single-family attached homes, such as townhouses, manufactured or mobile homes, and multi-unit buildings. The study was completed using data from online and phone surveys conducted through September 28, 2018 and December 3, 2018. On-site inspections were conducted for a nested sample of survey completions. On-site inspections occurred between October 10, 2018 and December 15, 2018.

The project team first recruited respondents to complete an extensive survey (online or telephone), which collected a variety of data essential to characterizing single-family homes. The survey also asked respondents whether they would be interested in participating in an on-site inspection. Respondents who agreed to the on-site inspection made up the sample frame for recruiting site visit participants.

The 2018 RBSA sample design and recruitment led to the completion of 2,419 surveys (2,223 online and 196 phone) and 456 on-site inspections. The 2018 RBSA sampled by 10 Economic Development Region (EDRs) to ensure that homes were sampled throughout the State and to provide stratified sampling like the 2015 RSBS.

Link to Data Collection Methodology Appendix B: <https://www.nyserdera.ny.gov/-/media/Files/Publications/building-stock-potential-studies/2019-RBSA-appendix-b.pdf>

Link to Survey Instruments Appendix C: <https://www.nyserdera.ny.gov/-/media/Files/Publications/building-stock-potential-studies/2019-RBSA-appendix-c.pdf>

## Statistical and Analytic Issues

The 62 counties within the State vary in climate from Climate Zone 4 to Climate Zone 6. For the purpose of analyzing and presenting results, the 2018 RBSA project team grouped survey and on-site inspection participants into the three climate zones by county.

The analysis for a given characteristic often involved recalculating stratum weights to account for a smaller sample size, because in many cases values for a given characteristic were not known for some of the sampled homes. The project team calculated a new weight for each stratum as the stratum population (which was always the same for that stratum) divided by the number of homes in the sample with observed values. Weights were recalculated only when the subset of homes with observed values were meant to be representative of the population of that stratum. Site weights that assume a full sample size for each stratum are provided for each observation in the 2018 RBSA survey and site visit datasets.

The sampling plan was developed with the goal of achieving 90% confidence and  $\pm 10\%$  precision for most parameters of interest statewide. Precision represents uncertainty with a level of confidence. When the study achieves  $\pm 10\%$  precision at the 90% confidence level, one can be 90% confident that any random sample of the same population would yield a result within  $\pm 10\%$  of the study's result.

Data tables provided in the RBSA Appendix A include error bounds for all values. With a total sample size of 2,419 across the six strata, the precision for survey results easily falls within the target 90/10 for the State and for each stratum except Climate Zone 4 new homes. Even with that stratum, however, the survey sample size of 38 often delivers results within the 90/10 target given the relatively small coefficients of variation for many characteristics in new homes. A more in-depth analysis is available in the appendix sections B.1.8 to B.1.13 at <https://www.nyserda.ny.gov/-/media/Files/Publications/building-stock-potential-studies/2019-RBSA-appendix-c.pdf>.

Despite thorough investigation of the tax assessment roll data, only a small number of quadplexes were identified, and these homes may have been underrepresented in the data.

Insulation values such as type or thickness often cannot be collected during on-site inspections when attic or crawlspaces are inaccessible, or walls cannot be probed. For certain cases, insulation values were inferred based on various criteria, including New York State Building Code requirements, the year the home was built (and corresponding building codes for that year), the county, the heating/cooling equipment efficiency, and the glazing area percentage. Insulation type and/or thickness values were inferred for 38 homes total – 23 existing homes, and 15 new homes. A data source column in the dataset indicates whether the insulation values or a given envelope surface were observed or inferred.

Window U-factors are also not readily available on-site, especially in older homes. Field staff collected only documented U-factor values, but the collected data often represented an estimate instead of specific values. To provide U-factors for energy modeling or other purposes, inferred window U-factor values were used based on the State building code requirements in force at the time of the home's constructions (if any.) Inferred window U-values were applied to 361 existing homes and 18 new homes. A data source column in the dataset indicates whether a given U-factor value was inferred or collected.

Where applicable throughout the dataset, data source columns provide an indication of whether values provided were known, estimated, or inferred.

In isolated cases, survey response options (such as for baseboard heat) failed to adequately distinguish between the relevant technologies or choices.

### **Limitations of Data Use**

The most notable limitation of project data results from the small sample size of only 5 on-site inspections for new homes in Climate Zone 4, which comprises New York City, Long Island, and the Mid-Hudson EDRs. With a sample size of only 5 homes, results for the Climate Zone 4 new homes stratum cannot be considered representative. These observations were ultimately removed from all other calculations to eliminate the possibility of their introducing a significant skew to other results.