

**New York State Net Zero Energy
Residential New Construction Baseline Study**

Final Executive Summary

Prepared for:

New York State Energy Research and Development Authority

Albany, New York

Patricia Gonzales
Project Manager

Prepared by:

Research Into Action, Inc.

Portland, Oregon

Marjorie McRae
Benjamin Messer

Notice

This report was prepared by Research Into Action, in the course of performing work contracted for and sponsored by the New York State Energy Research and Development Authority (hereafter the “Sponsor” or NYSERDA). The opinions expressed in this report do not necessarily reflect those of the Sponsor or the State of New York, and reference to any specific product, service, process, or method does not constitute an implied or expressed recommendation or endorsement of it. Further, the Sponsor, the State of New York, and the contractor make no warranties or representations, expressed or implied, as to the fitness for particular purpose or merchantability of any product, apparatus, or service, or the usefulness, completeness, or accuracy of any processes, methods, or other information contained, described, disclosed, or referred to in this report. The Sponsor, the State of New York, and the contractor make no representation that the use of any product, apparatus, process, method, or other information will not infringe privately owned rights and will assume no liability for any loss, injury, or damage resulting from, or occurring in connection with, the use of information constrained, described, disclosed, or referred to in this report.

Table of Contents

NOTICE	i
TABLE OF CONTENTS.....	ii
EXECUTIVE SUMMARY	ES-1
Key Findings.....	ES-2
Methodological Conclusions and Recommendations	ES-2

Executive Summary

The market research team (the team) conducted this study to achieve three research objectives for the New York State Energy Research and Development Authority (NYSERDA) Low-Rise New Construction Residential (LRNC) program. These research objectives are: 1) developing and confirming a New York State low-rise, new construction Net Zero Energy (NZE) residential market model, 2) defining low-rise, new construction NZE residential baseline market metrics to measure and track, and 3) measuring the low-rise, new construction NZE residential baseline market indicators for 2015.

The LRNC encourages and supports the construction of three tiers of new energy efficient single-family and low-rise multifamily dwelling units in New York State. The top tier, and the focus of this study, is NZE homes. The LRNC defines a NZE home as “a grid-connected home that is built to be highly energy efficient and is connected to renewable electric generation, so that the renewable generation offsets all the home’s average annual energy consumption.” A NZE home also has a Home Energy Rating System (HERS) score of 10 or less.

Working from a hypothesized market model the team initially created to inform the research design, the team developed a final model reflecting research findings to illustrate current market conditions. The market model provides an illustration of the relationships among the key actors (such as distributors, builders, and homebuyers), supporting organizations (such as, training, trade, and professional organizations), and processes (such as designing, building, rating, and selling homes) in the New York State NZE market in 2015.

The team also worked with LRNC staff to define 19 measurable and replicable NZE market metrics. The team created 74 market indicators from the metrics, based on market metric definitions and components, over half of which are quantitative, to be derived from close-ended questions or secondary sources. Program staff also wanted qualitative indicators (derived from open-ended questions) to provide market insight that subsequent investigations can explore through quantitative measures.

The team collected and analyzed data to produce baseline estimates of the 74 market indicators for 2015. Key sources and databases the team used to collect data and identify market actors include NYSERDA’s Comprehensive Residential Information Systems (CRIS) database, LRNC staff, published NZE-related studies, marketing research databases like Hoovers and InfoUSA, real estate listing websites like Zillow and Realtor, professional and trade organization websites, and market actors’ websites. The team also conducted interviews and surveys with 12 NZE market actor groups that worked on a NZE home or serviced the NZE market in New York State in 2015. These include architects, design-build firms, builders, and property developers; heating, air-conditioning, and ventilation (HVAC) contractors; solar photovoltaic (PV) contractors; HERS raters; distributors of NZE-needed technologies; building inspectors; training, trade, and professional organizations; NZE homebuyers; and, Non-NZE homebuyers.

Key Findings

The team found that the NZE market has a vertical alignment, with three phases – pre-construction, design and construction, and post-construction – involving different market actors and processes. The pre-construction phase provides a starting point for design and construction, and includes building and product codes, manufacturing and distributing of NZE-needed technologies, and professional training and support for market actors. The design and construction phase consists of designing the building, HVAC system, solar PV system and other components, the selection of materials and equipment, and the construction of the building, including installation of equipment and the home energy rating. The post-construction phase involves the marketing, appraisal, and sell/purchase/rental of the completed NZE home.

The team found 58 training, trade, and professional organizations with at least some focus on NZE residential buildings, technologies, and/or practices. Thirty-three of these organizations provide memberships, 48 provide NZE-related news and research, 43 provide a combined 165 NZE-related training courses online or in the Northeast U.S., 26 offer a combined 41 NZE-related certifications or credentials, and 15 provide a combined 20 high-performance home labels or certifications.

The team identified 13 building inspector offices, 12 architect/designer firms, 13 builder firms, one property developer firm, 11 HVAC contractors, 10 solar PV contractors, and nine HERS raters that worked on at least one NZE home completed in 2015 in New York State. NZE building inspectors comprise 2.2% of the inspector population, NZE architects and builders comprise 0.9% and 0.7% of their respective populations, NZE property developers comprise 0.4% of the developer population, NZE HVAC contractors comprise 0.7% of their population, NZE solar contractors comprise 11.6% of solar contractors, and NZE HERS raters comprise 6.5% of the HERS rater population.

The team located and confirmed 47 single-family NZE homes and 159 multifamily NZE units built in New York State in 2015, and 29 single-family NZE homes and six multifamily NZE units built before 2015. The units built in 2015 comprise 0.3% of all new residential building permits in New York State in 2015. Most of the NZE homes are in the Mid-Hudson and Southern Tier regions of New York State and all the homes had been sold or rented by September 2016.

Methodological Conclusions and Recommendations

Conclusion 1: The large number of market indicators explored in this study required lengthy data collection instruments, which resulted in multiple refusals to respond, some partial interviews, and a few respondents who had to skip questions to save time.

- **Recommendation 1a:** Field shorter data collection instruments in subsequent studies, accomplished either by reducing the number of market indicators to track or by posing different question sets to different subsets of the respondent groups.

- **Recommendation 1b:** Use web survey methods to survey market actors in future studies. NZE homebuyer responses to the web survey were much faster than responses to the phone interviews.

Conclusion 2: Because this is the first (baseline) study in what NYSERDA anticipates to be long term NZE market progress tracking, the team needed to ask several open-ended questions in interviews and surveys to determine the best answer choices to use in close-ended questions for future studies; this resulted in several qualitative baseline market indicators that cannot be generalized to the broader market.

- **Recommendation 2:** Use the categories of responses the team coded from the open-ended interview and survey questions to create close-ended questions and answer choices necessary to estimate quantitative indicators in future studies.

Conclusion 3: The team could not find a reliable and comprehensive source of Non-NZE homebuyers who purchased a newly constructed, non-NZE home in New York State between July 2014 and March 2016 that did not receive incentives through NYSERDA's LRNC program. To achieve enough completed surveys from Non-NZE homebuyers, the team supplemented the list of non-NZE homebuyers it purchased from Experian with NYSERDA's list of non-NZE ENERGY STAR® homes that received LRNC incentives. Most of the completed surveys came from the NYSERDA LRNC list.

- **Recommendation 3a:** Conduct a thorough search through survey centers, realtors, government organizations (e.g. U.S. Department of Housing and Urban Development [HUD], county property tax records), and marketing list providers (e.g. Hoovers, InfoUSA) for a reliable and comprehensive list of Non-NZE homebuyers in New York State who purchased a newly constructed home that did not receive NYSERDA LRNC incentives.
- **Recommendation 3b:** Continue to use NYSERDA's list of Non-NZE ENERGY STAR homes that received incentives through NYSERDA's LRNC program to collect market indicator estimates for comparisons to NZE homebuyers to stay consistent with methods used in this study until a sufficient source of Non-NZE homebuyers is available, at which time another baseline study should be performed for the market indicator estimates obtained from this group.

Conclusion 4: The team also could not find data sources for two market indicator estimates: the population size of market actors working in *residential new construction* in New York State in 2015 and the number of *new homes built and/or sold by building type* in New York State in 2015. The team used proxy measures for both indicators from what data were available: national estimates of the percentage of market actors working in the residential (vs. non-residential) sector, and the number of residential building permits issued by building type.

- **Recommendation 4:** Conduct a thorough search of data sources for these two indicators before relying on the proxy measures used by the team for this study. More data for these indicators may become available in the future.