

# **Clean Energy Fund New Construction Program Commercial and Multifamily Direct Impact Evaluation – Phase Two**

## ***Final Executive Summary***

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# 1 Executive Summary

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The New York State Energy Research and Development Authority (NYSERDA) developed the New Construction Program (NCP) to accelerate market adoption of efficiency, renewables, and electrification in new or substantially remodeled buildings across New York and move the market closer to net-zero-energy (NZE)<sup>1</sup> or carbon-neutral performance. This executive summary documents evaluation findings and recommendations from the second phase of the NCP evaluation. While all three sectors in the NCP will be evaluated over the three-year contract period, the commercial and multifamily sectors are the focus of this report.

## 1.1 NCP market indicator assessment objective and approach

For the NCP, the Clean Energy Fund Investment Plan has identified output and outcome metrics to track progress toward the Program’s goals over time. The Evaluation Contractor Team examined the outcome metrics, which include the Commercial and Multifamily Program direct impacts evaluated in this Phase Two study.<sup>2</sup> NYSEDA has issued 11 PONs and RFPs in support of its New Construction Program since 2016. Overall, 210 projects were identified as complete between 2016 and 2022. The sample of projects selected for EM&V activities were stratified based on size (savings) using Stratified Ratio Estimation and total MMBtu (not source) as a combined electric and natural gas metric.

**Table 1-1. Final Phase Two population and sample**

Sector	Population			Sample		
	Projects	Electric savings (MWh)	Natural gas savings (MMBtu)	Projects	Electric savings (MWh)	Natural gas savings (MMBtu)
Multifamily	170	15,821	148,515	39	6,237	66,012
Commercial	40	18,437	57,536	21	14,854	44,807
Total	210	34,258	206,051	60	21,091	110,819

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<sup>1</sup> NZE performance or building is an energy-efficient building where, on a source energy basis, the actual annual delivered energy is less than or equal to the on-site renewable exported energy. Survey data was used to determine whether a property is NZE.

<sup>2</sup> The team will supplement the findings laid out in this report in the third and final phase of this evaluation with sample added as needed to establish final direct impact estimates.

## 1.2 Impact evaluation objective and approach

The commercial and multifamily sectors were the focus of this second phase of study.<sup>3</sup> Table 1-2 provides the objectives, evaluation questions, and overview of data and methods completed.

**Table 1-2. NCP evaluation objectives, research questions, and data sources**

Objective	Evaluation questions	Data sources and analytic methods
Evaluate verified gross energy impacts	What is the annualized evaluated gross energy savings based on electric (kWh) and fuel savings (MMBtu) at customer sites?	Energy modeling (IPMVP Option A or D) with inputs from survey data, secondary data, billing data, and operational data supplied by building control systems (Impact Contractor)
Verified gross savings realization rate (VGS RR)	What is the ratio of the sum of evaluated savings divided by the sum of the program-reported savings?	Statistical expansion of sample results to final population of program activity (Impact Contractor)

The direct impacts evaluation approach included five activities, all performed on the 60 projects (see Table 1-1). The following steps were taken for each sampled project<sup>4</sup>.

- First, the team categorized each project based on availability of information (e.g., models, backup documentation, gross savings, non-modeled savings).
- Second, the team checked that proper baseline (building code at the time of permitting) was appropriately applied to sampled projects, with adjustments made as necessary.
- Third, the team conducted weather normalization on project-specific utility consumption data, including a regression against the actual weather data for the specific project location.
- Fourth, the team reviewed project documentation available for each project and compared key model parameters (envelope, lighting, HVAC, domestic hot water, ventilation, etc.) to them to check model representativeness and identify significant discrepancies.
- Fifth, the team attempted technical interviews for all sampled project to make as-built model adjustments. The team completed technical interviews at 18 multifamily and 11 commercial projects, which were supplemented by on-sites at five of them.

The results of these activities were statistically weighted and combined to produce the electric and gas Verified Gross Savings (VGS) and VGSRR.

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<sup>3</sup> Single-family impact results were provided in June 2022 as part of Phase One work with a follow-up single-family baseline review with updated VGS RRs completed on May 25, 2023. The Phase One report can be found at [New Construction - NYSERDA](#)

<sup>4</sup> A Project is a single customer or participant that combines one or more buildings within the same general location.

### 1.3 Direct impact findings and recommendations

Table 1-3 provides the gross savings, interim verified gross savings, realization rates, and accompanying relative precisions for both electric and natural gas fuels for the three building sectors for which a realization rate was developed (commercial projects overall and breaking out high-rise and low-rise projects). This information is provided to show performance by multifamily sector (low-rise vs high-rise) with interim overall multifamily and commercial impacts provided in the following table. Overall, results of the study showed that performance across all segments supported program estimated savings claims. Within the multifamily sector, high-rise multifamily projects showed better performance with a poorer precision than low-rise multifamily projects; low-rise multifamily projects showed similar performance and precision as commercial projects.

**Table 1-3. Interim savings and realization rates by fuel and sector**

Fuel	Sector	Gross savings	Interim verified gross savings	Realization rate	Relative precision at 90% confidence
Electric (MWh)	Commercial	18,437	18,221	98.8%	±7.9%
	High-Rise	6,081	7,205	118.5%	±16.3%
	Low-Rise	9,740	8,954	91.9%	±6.3%
Natural gas (MMBtu)	Commercial	57,536	70,297	122.2%	±10.3%
	High-Rise	53,066	76,426	144.0%	±16.6%
	Low-Rise	95,449	84,578	88.6%	±8.5%

Table 1-4 provides results for commercial and multifamily (as an aggregate of both low- and high-rise projects), and overall results. As noted above, the interim results shown here indicate that the performance of these programs has been very good, with realization rates of just under 101% for electric savings and just over 112% for natural gas, supporting savings estimates of 34,380 MWh and 231,301 MMBtu.

**Table 1-4. Interim savings and realization rates by fuel and program**

Fuel	Sector	Gross savings	Interim verified gross savings	Realization rate	Relative precision at 90% confidence
Electric (MWh)	Commercial	18,437	18,221	98.8%	±7.9%
	Multifamily	15,821	16,159	103.2%	±8.8%
	Total	34,258	34,380	100.8%	±5.8%
Natural gas (MMBtu)	Commercial	57,536	70,297	122.2%	±10.3%
	Multifamily	148,515	161,004	108.4%	±10.5%
	Total	206,051	231,301	112.3%	±8.1%

Through the activities conducted during the Phase Two period of study and assessing the results of that work, the Evaluation Contractor Team identified several key findings and recommendations for consideration.

**Finding 1.** The interim results largely support program savings claims with realization rates for commercial and multifamily between 99% and 122% of gross savings. These results provide an evaluated savings of 34,380 MWh and 231,301 MMBtu of natural gas savings for commercial and multifamily projects combined. Note that these interim results will be updated in final overall results, which will be produced as part of Phase Three, and which may include expanded review of some projects from this (Phase Two) sample.

**Finding 2.** Fifteen of 58 sampled projects did not have available energy models to support savings claims. The PONs for these programs required the submission of energy models as appropriate, indicating that these were captured at the time the projects were completed. A transition between NYSERDA project data management platforms in 2023 may have affected the availability of this data and thus how many energy models were readily available to the Evaluation Contractor Team. Their presence in files provides the basis for verifying savings as part of impact evaluation work as well as general support for NYSERDA to ensure the accuracy of gross savings claims and performing internal QA/QC activities. The study also observed that gross savings were not always substantiated by project documentation.

**Recommendation 1:** The Evaluation Contractor Team recommends an audit of completed projects as part of closeout to ensure all required documents and models have been received, accurately transcribed into the tracking system, and properly filed for later access. Availability of key project documentation such as model files is critical for quality control and to verify gross savings estimates. These files are also an essential element in performing the impact evaluation work needed to support program claims.

- **NYSERDA Response to Recommendation 1: Pending.** NYSERDA New Construction Program will review this recommendation and discuss with staff to ensure that all of the required documents are collected and saved. The reinforcement of this and change in process may eliminate the need for a regular audit exercise.

**Finding 3.** Reviewed energy models were generally found to be representative of the treated buildings. Of the 43 models reviewed by the Evaluation Contractor Team, 37 accurately represented the completed project. Most discrepancies found in the models and project documentation were minor, with only six models showing significant discrepancies in system types, schedules, or setpoints.

**Finding 4.** Modeled codes used in energy savings baselines were correctly applied in most cases. Differences in energy performance of compliant buildings between building code cycles varies. While observed differences between more recent code changes has been estimated to have a smaller impact (estimated at approximately a 2% difference in energy performance), differences can be much more notable between older code cycles. For example, the difference at one project with older code changes was significant (this mis-application of baseline reduced the claimable energy savings by 24%).

**Finding 5.** Several high-rise multifamily projects were modeled in eQuest, which did not use the energy model results in the gross savings and instead used deemed savings estimates. These gross estimates were found to be highly variable compared to verified gross savings, introducing more uncertainty around project-level savings estimates.

**Recommendation 2:** The Evaluation Contractor Team recommends using project-specific energy models where available as the basis for gross savings estimates and only using deemed savings estimates where energy models are not available.

- **NYSERDA Response to Recommendation 2: Pending.** NYSERDA New Construction Program will review this recommendation and discuss with staff to ensure that project-specific energy models are used whenever possible. The findings presented here indicate a need to rely on the energy modeling technique to gather more accurate saving information.