

# **Codes and Standards for Carbon Neutral Buildings Initiative Year 4 Market Evaluation Report: Baseline Estimates and Progress Toward Goals**

*Final Report*

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## Notice

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# Acronyms

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ACS	American Community Survey
AHJ	Authorities having jurisdiction
CEF	Clean Energy Fund
CEF CIP	CEF Compiled Investment Plan
CIP	Compiled Investment Plan
CJWG	Climate Justice Working Group
CSCNB	Codes and Standards for Carbon Neutral Buildings
DACs	Disadvantaged communities
DER	Distributed energy resource
ECCCNYS	Energy Conservation Construction Code of New York State
ERV	Energy recovery ventilators
EV	Electric vehicle
FY	Fiscal year
GWh	Gigawatt hour
HRV	Heat recovery ventilators
ICC	International Code Council
IECC	International Energy Conservation Code
MW	Megawatt
NEEP	Northeast Energy Efficiency Partnership
NYS	New York State
NYSERDA	New York State Energy Research and Development Authority
PON	Program Opportunity Notice
PV	Photovoltaic
SBC	System Benefits Charge
T&MD	Technology and Market Development Program

# 1. Introduction

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The Market Evaluation of the Codes and Standards for Carbon Neutral Buildings (CSCNB) Initiative was designed to span five years, with final indirect market impacts determined in Year 5 of the evaluation. This Year 4 report presents the market evaluation team’s evaluation findings for the Initiative based on surveys with participants in NYSERDA-funded trainings, interviews with a longitudinal expert panel of code officials and building professionals from jurisdictions across New York State, and interviews with authorities having jurisdiction (AHJs) participating in the Program Opportunity Notice (PON 4600): Third-Party Support and Advancing Code Compliance Technology Pilot program.

This report also provides a preliminary estimate of Initiative savings, which the market evaluation team will finalize in Year 5 of the evaluation, in 2024.

Through research conducted in Year 4, the team has continued to gather data to estimate final Initiative impacts and to track progress toward the Initiative goals (associated with outputs and outcomes). According to NYSERDA’s Clean Energy Fund (CEF) Compiled Investment Plan (CIP), last revised August 2023,<sup>1</sup> the following goals are set for the end of 2025<sup>2</sup>:

- 20,000 training seats filled
- Four policies or regulations to promote efficiency, flexibility, and decarbonization are developed or updated
- Thirty-five jurisdictions adopt approaches, such as stretch codes or alternative code compliance, advanced by NYSERDA through pilots
- Twenty-eight policies or codes are adopted at the state or local level

## 1.1. Initiative Overview

Through its CSCNB Initiative, NYSERDA aims to overcome barriers impeding code compliance and enforcement, establish a path toward development of a stretch-to-zero energy code, and assist in the

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<sup>1</sup> NYSERDA. August 1, 2023. *Clean Energy Fund Compiled Investment Plans*. Case Number 14-M-0094. <https://www.nyserd.ny.gov/-/media/Project/Nyserda/Files/About/Clean-Energy-Fund/2023-08-01-Clean-Energy-Fund-Compiled-Investment-Plans.pdf>.

<sup>2</sup> In the Year 3 report, the market evaluation team tracked progress toward the previous investment plan’s goals, which were code compliance increases by 8% to 16% throughout New York State, depending on the sector and construction activity; 48,854 individuals receive training; 42 jurisdictions adopt a stretch code; and 16 jurisdictions adopt alternative code compliance structures.

enactment of New York State (NYS) and local energy codes. The Initiative builds on NYSERDA's past efforts to support adoption of energy codes with higher performance goals and to strengthen compliance and enforcement through several activities:

- Providing general support services (such as training) to local jurisdictions statewide as well as customized support services for jurisdictions that pay into the System Benefits Charge (SBC)
- Promoting code development and advancement activities, including stakeholder engagement, market research of stretch codes, and validation of savings from advanced technologies
- Conducting pilot programs to identify barriers and opportunities surrounding code development and advancement, testing alternative code compliance structures, and assessing approaches to stretch and zero energy codes
- Supporting development of the Energy Conservation Construction Code of New York State (ECCCNYS)<sup>3</sup> and local adoption of stretch codes
- Developing a path for future new energy codes that address all aspects of a building's energy use and moves the market toward state-level energy goals in a prompt and supportive way without being disruptive

NYSERDA designed the Initiative activities to increase the percentage of buildings that are energy code-compliant and to accelerate adoption and enactment of energy codes and policies to promote efficiency, flexibility, and decarbonization at the state and local level.

## 1.2. Initiative Changes During Year Four

Major developments in New York State building energy policy, and new data availability, have informed Initiative activities during Year 4. The evolution of NYStretch2020 and NYStretch2023, work toward a new statewide code, and an exploration of analysis of code effects on disadvantaged communities, given these developments, is described below.

### 1.2.1. NYStretch, State Building Energy Policy and the Advanced Energy Code

The rapid growth of new building energy policies in New York State has also affected NYSERDA's development of NYStretch2023. NYStretch2023, now referred to as the Advanced Energy Code, was prepared through engagement with public private stakeholder working groups and a steering committee.

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<sup>3</sup> The ECCCNYS is typically based on the most recent and most energy efficient model codes. For example, the ECCCNYS was updated in May 2020 and is based on the 2018 IECC and ASHRAE 90.1-2016.



Given the City of New York’s Local Law 32 of 2018, which requires the city council to adopt an amendment to the NYC Energy Conservation Code that is up-to-date with the most recent model stretch code published by NYSERDA, city staff were stakeholders in NYStretch-2023 development. NYStretch-2023 was delivered to NYC Department of Buildings in May 2023. NYSERDA started developing NYStretch2023 prior to the release of New York State’s Advanced Building Codes Act<sup>4</sup> and the FY 2024 State Budget. During Year 4, NYSERDA has been assessing how NYStretch2023 could be optimally implemented considering these new policies.

The FY 2024 State Budget requires electrification of major building sectors by December 31, 2025.<sup>5</sup> The Advanced Building Codes, Appliance and Efficiency Standards Act of 2022 amends existing state energy law, requiring the State Fire Prevention and Building Code Council to use its best efforts to adopt amendments to State Energy Code that achieve energy savings greater than the then most current editions of the International Energy Conservation Code (residential buildings) and ASHRAE Standard 90.1 (commercial buildings), at levels recommended by NYSERDA. Throughout 2023, NYSERDA and NYS Department of State have worked to prepare proposed amendments to the ECCCNY-2020, in compliance with energy law, for introduction to the Code Council in 2024.

NYSERDA identified a need to update the requirements of NYStretch2020 to align with the New York State Uniform Fire Prevention and Building Code and Energy Conservation Construction Code (Uniform Code) and, as such, has paused outreach related to it until the update is finalized. This update is referred to as NYStretch2020 v1.1. Final revisions to Version 1.1 are (as of this report) underway, after which the document will go through a final review with the International Code Council (ICC) and NYS Department of State and then be published. NYSERDA has shared plans to conduct outreach to municipalities that had adopted NYStretch 2020 once NYStretch 2020 v1.1 is published.

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<sup>4</sup> Advanced Building Codes, Appliance and Equipment Efficiency Standards Act of 2022 was signed into law by Governor Hochul on July 5, 2022.

<sup>5</sup> The FY2024 State Budget includes requirements for advancing zero emission construction in new buildings seven stories or lower, except large commercial and industrial buildings, by December 31, 2025, and all other new buildings by December 31, 2028. The budget also requires exemptions such as emergency backup and standby power, manufacturing facilities, commercial food establishments, laboratories, car washes, laundromats, hospitals, crematoriums, agricultural buildings, and critical infrastructure. <https://www.nyserda.ny.gov/About/Newsroom/2023-Announcements/2023-05-03-Governor-Hochul-Announces-FY-2024-Budget-Investments-in-Energy-Affordability>

### 1.2.2. Development of Lifecycle Cost-Effectiveness Methodology

The Advanced Building Codes Act of 2022 also amends the means by which the Code Council determines if a proposed revision to the State Energy Code is cost-effective. Energy Law now requires that the Code Council consider: 1. whether the life-cycle costs for a building will be recovered through savings in energy costs over the design life of the building under a life-cycle cost analysis performed under methodology established in regulation by NYSERDA; and 2. secondary or societal effects, such as greenhouse gas reduction, as defined in regulations.<sup>6</sup> Energy law further requires NYSERDA to conduct public meetings on proposed means for analyzing cost effectiveness of Energy Code. These public meetings were conducted in Q4 2023. A Proposed Rule establishing items 1 and 2 above was published in the New York State Register on December 27, 2023. The cost-effectiveness analysis of the next update to State Energy Code will be performed per the final, promulgated rule.

### 1.2.3. Release of Disadvantaged Communities Database

In June 2023, New York State released a dataset identifying areas of the state that meet the criteria for disadvantaged communities (DACs). The market evaluation team's scope was expanded to conduct research on the impact of the energy code on DACs and low-income communities,<sup>7</sup> interview experts to better understand this impact, and explore incorporation of attributed savings for DACs versus non-DACs into the preliminary indirect savings analysis. The NYS Climate Act requires that the State invest or direct resources to ensure that DACs receive at least 35%, with the goal of 40%, of overall benefits of spending on clean energy and energy efficiency programs. The dataset presents a valuable new resource that could be explored further, depending on fit with other DAC-related evaluation activities conducted by NYSERDA, to evaluate the reach of the Initiative, though with some challenges in accurately mapping the Initiative's impact. Section 2.2.1 presents more information about designating attributed savings for DACs and non-DACs. Findings from research and interviews are included as Appendix D.

## 1.3. Summary of Evaluation Objectives and Activities

In Year 2, the market evaluation team developed a methodology under the CEF to estimate the indirect impacts of the Initiative (at the time called Code to Zero). In Year 4, the team reviewed the methodology

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<sup>6</sup> <https://www.nyserra.ny.gov/-/media/Project/Nyserda/Files/Programs/Clean-Resilient-Building-Codes/2023-10-10-Evaluation-Criteria-Public-Meeting-PPT.pdf>

<sup>7</sup> As documented in the *NYSERDA FINAL Disadvantaged Communities (DAC) 2023 Data Dictionary*, criteria for defining disadvantaged communities include indicators related to income, including ranking of the percentage of census tract population (1) earning less than 80% of Area Median Income and (2) with income less than 100% of the Federal Poverty Level. [Final Disadvantaged Communities \(DAC\) 2023 | State of New York \(ny.gov\)](#)

in light of the Initiative’s refiling and made a few adjustments to evaluation activities, including integrating both short- and long-term outcomes into the logic model. The methodology aligns with the multi-year indirect impacts evaluation and, as further described in Appendix F, includes the approach and data inputs required to estimate final Initiative savings in Year 5 of the evaluation. Table 2 lists the objectives and activities that are the key building blocks of the indirect savings methodology.

**Table 1. Year 4 Evaluation Objectives and Activities**

<b>Y4 Evaluation Objective</b>	<b>Y4 Evaluation Activities</b>	<b>Purpose</b>
Determine the percentage of the market complying with the energy code	Longitudinal expert jurisdiction in-depth interviews; training participant surveys	To follow changes in energy code compliance over time and identify market compliance trends
Determine the effectiveness of the Third-Party Support and Advancing Code Compliance Technology Pilot Program (PON 4600)	Alternative Code Compliance Interviews; representative jurisdiction in-depth interviews; training participant surveys	To understand how the pilot program is being used, why participants were motivated to join, and how the pilot is driving energy code compliance
Assess the impact of NYSERDA's training on compliance levels, decision-making, and behavior	Training participant surveys	To recognize how much energy code training and education has influenced the market’s code compliance
Explore the impacts of energy code changes, compliance, and enforcement on DACs	Interviews with experts on DACs and the energy code	To understand best practices for supporting DACs with increasingly stronger energy codes

## 1.4. Challenges to the Year 4 Evaluation

### 1.4.1. Attrition in Jurisdictional Follow-Up Interviews

Throughout the evaluation timeframe, the market evaluation team conducted follow-up jurisdictional interviews with the goal of interviewing the same people over the course of the whole project to see how perspectives changed. During Year 4, the team was unable to schedule interviews with some of the same people because they changed jobs or roles or were too busy. The team resolved this interview attrition for Year 4 by identifying new jurisdictional contacts, but attrition will likely persist in the Year 5 evaluation.

### 1.4.2. Indirect Savings Attribution for DACs Analysis

The market evaluation team also drafted a methodology for segmenting indirect savings into savings attributable to DACs and to non-DACs, but identified some limitations based on availability of data. This methodology is discussed further in Section 2.2.

### 1.4.3. Follow-Up on Challenges to Year 3 Evaluation

At the conclusion of Year 3, the market evaluation team discovered that the training records it collected did not line up with those that implementers reported directly to NYSERDA. Throughout the Initiative, the team has relied on records received directly from training implementers to determine totals for trainings and individuals trained as well as for conducting immediate and follow-up surveys with participants. The team found that the discrepancy was due to a difference in how trainings were counted, as many had two parts. The team reconciled this by counting these as two trainings and sending the training evaluation survey following completion of the second part of the training.

## 2. Progress toward Goals and Initiative Impacts

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NYSERDA revised the outputs and outcomes of the CSCNB Initiative in May 2023, midway through the Year 4 evaluation period. This report documents progress toward the most recently updated goals.

A key goal of the Initiative is to provide NYSERDA-supported training to code officials and building professionals to increase code compliance in the state. As of August 2023, a total of 70,655 trainings (seats filled) have been completed by at least 10,398 code officials and building professionals (some have attended multiple trainings).<sup>8</sup> In surveys, both immediately after training and six months later, training participants reported high satisfaction with the trainings and a greater understanding of the content. They also said they had made changes to day-to-day activities related to code implementation.

Another key goal of the Initiative is to influence local-level policy-makers to adopt approaches to code enforcement that lead to greater code compliance by testing approaches in pilot programs. In 2022, NYSERDA began accepting applications from authorities having jurisdiction (AHJs, or jurisdictions<sup>9</sup>) to participate in a pilot program for alternate code compliance strategies, the Third-Party Support and Advancing Code Compliance Technology Pilot program (PON 4600). This pilot program is intended to encourage jurisdictions to adopt improved technical and online capabilities to support residential and commercial building plan reviews, inspections, and code compliance. This program is also unique in that it reserves 35% of the clean energy funds for communities that meet the criteria of DACs, as defined by New York's Climate Act. In 2023, 10 jurisdictions applied to PON 4600 for third-party support and 12 jurisdictions applied for compliance technology investments. Although participation in the pilot program has been relatively recent, many jurisdictions have reported improved capabilities with code compliance and building plan applications, reviews, and inspections, and capacity for enforcement.

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<sup>8</sup> NYSERDA provided the total number of trainings by email. The number of individuals trained is based on training records received by the market evaluation team from training implementers.

<sup>9</sup> The authorities having jurisdiction (AHJs) participating in the PON 4600 pilot program are referred to as jurisdictions in this report.

Table 3 shows the Initiative’s progress toward the goals presented in the August 2023 CEF Compiled Investment Plans.<sup>10</sup>

**Table 2. Initiative Progress Toward Goals**

Output/ Outcome	Indicator	Baseline	2023 Target (Cumulative)	2023 Progress (Cumulative)
Outputs	Number of seats filled in NYSERDA-supported training	0	12,000	70,665 trainings completed (seats filled) since March 2020 and at least 10,398 unique code officials and building professionals trained
	Number of regulations or policies developed to promote efficiency, flexibility, and decarbonization	0	2	7: NYSERDA developed NYStretch in 2020, is working on NYStretch2020 v1.1, and developed and shared NYStretch2023 (Advanced Energy Code) with the City of New York in 2023. NYSERDA helped NYS develop the ECCCNYS-2020, the All_Electric Building Act, developed policies for building energy grades, benchmarking and performance standards, and policies around preemption between appliance standards, energy code, and uniform code
	Number of entities adopting pilot approaches	0	15	16: NYSERDA identified 13 jurisdictions for Third-Party Support and Advancing Code Compliance Technology Pilot and three jurisdictions for Stretch to Zero pilot
	Number of policies or codes adopted at the state or local level	0	26	43: 42 jurisdictions have adopted stretch codes, and the Codes and Standards Act of 2022 was adopted
Outcomes	Increase in percentage of market complying with the energy code	0%	Increase of 5% compared with business as usual (without Initiative intervention)	8% to 16% increase depending on sector and construction activity since 2015 <sup>a</sup>
	Codes and policies are adopted and enacted faster than they would without NYSERDA’s intervention, as reported by industry experts	Qualitative	Yes	According to jurisdictions adopting alternative code compliance strategies and NYStretch, NYSERDA played a key role in facilitating adoption by developing the model code and providing financial and technical assistance for adoption

<sup>a</sup> Compliance impact of Initiative to be determined in Year 5

<sup>10</sup> See “Codes, Standards, & Other Multisector Focus Area Plan” Pages 8, 9 and 10. Clean Energy Fund Compiled Investment Plans. NYSERDA, August 1, 2023. <https://www.nyserdanyc.org/-/media/Project/Nyserda/Files/About/Clean-Energy-Fund/2023-08-01-Clean-Energy-Fund-Compiled-Investment-Plans.pdf><https://www.nyserdanyc.org/-/media/Project/Nyserda/Files/About/Clean-Energy-Fund/Matter-1600681NYSERDA-CEF-CIP-1-May-2023.pdf>

## 2.1. Initiative Logic Model

NYSERDA updated the Initiative’s logic model in spring 2023 as part of its revision of Initiative outputs and outcomes. The market evaluation team’s Year 3 review of the logic model had included a recommendation to better delineate actual outputs as well as near and long-term outcomes to improve evaluability and, in turn, improve potential for adaptive program management.

Updates were made to the logic model in Year 4, as shown in Table 4:

- Outputs and outcomes of the logic model have been reassessed, and certain outputs—for example, the number of communities participating in pilots—should be reclassified as outcomes.<sup>11</sup> A delineation was also made between short- and long-term outcomes.
- In the previous logic model, the alternative code compliance structure area of market intervention included review of non-pilot jurisdictions adopting alternative code compliance structures, based on the assumption that pilot activity would be mature enough to have caused indirect effects on other jurisdictions. Pilots in this area have just begun in Year 4 of the Initiative; therefore, the methodology has been revised to focus on code compliance in pilot jurisdictions only (rather than in non-pilot jurisdictions).
- State and national code development was originally identified as an area of market intervention, with the intent of capturing savings from supporting code development and enactment at the state level as well as indirect savings from increased stringency of national residential and commercial model codes. This has been refined to focus on NYSERDA’s impact on state codes rather than on national codes.

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<sup>11</sup> Outputs are the direct products of program activities, such as services delivered by the Initiative. Outcomes are specific changes in targeted audiences’ behavior, skills, actions, etc., as a result of the Initiative activities and outputs.

**Table 3. Logic Model Revisions**

	<b>2022 Logic Model</b>	<b>2023 Logic Model</b>
Outputs	<ul style="list-style-type: none"> <li>• Number of training participants (seats filled)</li> <li>• Number of regulations developed<sup>a</sup></li> <li>• Number of entities adopting pilot approaches<sup>a</sup></li> <li>• Number of policies or codes adopted at the state or local level</li> </ul>	<ul style="list-style-type: none"> <li>• Training attendance for both code officials and design and construction professionals; number of seats filled<sup>b</sup></li> <li>• Number of communities adopting pilot approaches; communication with targeted communities</li> <li>• Number of regulations or policies developed or updated to promote efficiency, flexibility, and decarbonization</li> <li>• Number of policies or codes adopted at the state or local level</li> </ul>
Outcomes (Short-term)	<ul style="list-style-type: none"> <li>• 5% increase of buildings in compliance in areas of trainings/resource deployment compared with business as usual under current code</li> <li>• Codes and policies are adopted and enacted faster than they would without NYSERDA's intervention, as reported by industry experts</li> </ul>	<ul style="list-style-type: none"> <li>• Increased percentage of buildings in compliance in areas of trainings/resource deployment compared to Business as Usual under current code</li> <li>• Increased adoption of piloted approaches</li> <li>• Codes and policies that promote efficiency and decarbonization are adopted and enacted faster than they would without NYSERDA's intervention, as reported by industry experts</li> </ul>
Outcomes (Long-term)	<ul style="list-style-type: none"> <li>• N/A</li> </ul>	<ul style="list-style-type: none"> <li>• Drive continuous improvement on New York built environment to support the Climate Act</li> </ul>

<sup>a</sup> No outcomes are associated with this output

<sup>b</sup> Training

## 2.2. Savings Estimates

The CSCNB Initiative has received funding from two sources: originally as part of the Technology and Market Development Program (T&MD) and later from the CEF. In Year 2, the team began estimating preliminary savings attributable to the initiative, with annual allocation based on the percentage of funding coming from the CEF versus the T&MD in each year. The preliminary savings estimation methodology is based on the long-term indirect savings methods, developed in Year 1. The long-term indirect savings methodology (described in the Appendix) is aimed at providing energy savings from the Initiative at the end of a five-year evaluation period. The team will collect data to inform the final evaluation steps.

NYSERDA estimated the percentages of overall program funding that came from the CEF and the T&MD from 2015 through 2023. Table 4, Table 5, and Table 6 show the CSCNB Initiative savings goals and estimated savings associated with CEF and T&MD investments. Each year's savings are distributed according to the percentage of the budget that came from each funding source. Because the CEF



Compiled Investment Plan (CEF CIP) includes prior reported savings estimates, estimates for CEF CIP in Table 4 (GWh) and Table 5 (MW) match estimates for CEF savings from 2017 through 2020. This year’s evaluation has also updated the 2021 and 2022 savings estimates from those reported in the Year 3 evaluation to reflect the latest available data.

**Table 4. Preliminary Initiative Savings Estimates, GWh**

	2015	2016	2017	2018	2019	2020	2021	2022	2023	Cumul. 2015-2023
CEF CIP (GWh)	-	-	0.34	21.59	61.79	52.44	55.58	57.11	57.11	305.96
Total Savings (GWh) <sup>a</sup>	116.8	78.88	88.35	84.19	89.00	53.11	57.25	70.38	70.38	708.42
Percentage Funded by CEF	0%	0%	0%	26%	69%	99%	100%	100%	100%	-
Percentage Funded by T&MD	100%	100%	100%	74%	31%	1%	0%	0%	0%	-
CEF Savings (GWh) per budget allocation	0	0	0.34	21.59	61.79	52.44	57.25	70.38	70.38	334.17
T&MD Savings (GWh) per budget allocation	116.88	78.88	88.01	62.6	27.21	0.67	0	0	0	374.25

<sup>a</sup> The market evaluation team analyzed savings using T&MD Review (2015–2019) & CEF Preliminary Assessment (2020–2023). The T&MD savings review is provided in the Appendix of this report.

**Table 5. Preliminary Initiative Savings Estimates, MW**

	2015	2016	2017	2018	2019	2020	2021	2022	2023
CEF CIP (MW)	-	-	-	-	-	-	-	-	-
Savings (MW) <sup>a</sup>	33.23	22.52	25.01	23.76	25.35	14.90	15.42	18.99	18.99
Percentage Funded by CEF	0%	0%	0%	26%	69%	99%	100%	100%	100%
Percentage Funded by T&MD	100%	100%	100%	74%	31%	1%	0%	0%	0%
CEF Savings (MW) per budget allocation	0.00	0.00	0.10	6.09	17.60	14.71	15.42	18.99	18.99
T&MD Savings (MW) per budget allocation	33.23	22.52	24.91	17.67	7.75	0.19	0	0	0

<sup>a</sup> The market evaluation team analyzed savings using T&MD Review (2015–2019) & CEF Preliminary Assessment (2020–2023). The T&MD savings review is provided in the Appendix of this report.

**Table 6. Preliminary Initiative Savings Estimates, Billion BTU**

	2015	2016	2017	2018	2019	2020	2021	2022	2023	Cumul. 2015-2023
CEF CIP (Billion BTU)	-	-	0.4	25.7	69.90	77.24	82.42	103.57	103.57	462.78
Savings (Billion BTU) <sup>a</sup>	135.4	106.56	103.51	100.13	100.69	78.22	103.21	119.97	119.97	967.67
Percentage Funded by CEF	0%	0%	0%	26%	69%	99%	100%	100%	100%	-
Percentage Funded by T&MD	100%	100%	100%	74%	31%	1%	0%	0%	0%	-
CEF Savings (Billion BTU) after accounting for budget allocation	0	0	0.4	25.68	69.9	77.24	103.21	119.97	119.97	516.38
T&MD Savings (Billion BTU) after accounting for budget allocation	135.4	106.56	103.11	74.45	30.79	0.98	0	0	0	451.29

<sup>a</sup> The market evaluation team analyzed savings using T&MD Review (2015–2019) & CEF Preliminary Assessment (2020–2023). The T&MD savings review is provided in the Appendix of this report.

The estimates shared above are converted to MMBtu and summarized below in Table 7.

**Table 7. Preliminary Initiative Savings Totals Converted to MMBtu**

MMBtu	2015	2016	2017	2018	2019	2020	2021	2022	2023	Cumul. 2015-2023
T&MD and CEF	534,211	375,710	404,973	387,398	404,371	259,439	298,558	360,114	360,114	3,384,888
T&MD Only	534,211	375,710	403,413	288,050	123,634	3,266	-	-	-	1,728,284
CEF Only	-	-	1,560	99,348	280,736	256,173	298,558	360,114	360,114	1,656,604

Below, Table 8 provides a breakdown of savings estimates by impact area; as these estimates were first calculated with Year 2’s establishment of the preliminary savings estimation methodology, they are available for years 2020 forward.

**Table 8. Preliminary Initiative Savings Estimates by Impact Area, 2020-2023**

	Energy Savings Tbtu			
	2020	2021	2022	2023
Stretch Code Adoption	0.02	0.07	0.07	0.07
Training	0.24	0.23	0.29	0.29
Total	0.26	0.30	0.36	0.36

### 2.2.1. Savings in Disadvantaged Communities

As discussed in Section 1.2.4, evaluation of the Initiative in Year 4 has explored the ability to identify savings in disadvantaged communities (DACs) based on the availability of a new database that may be used to evaluate the impacts of activities on New York State's DACs. In March 2023, the Climate Justice Working Group (CJWG) voted to approve and adopt the criteria for identifying DACs, which was followed by the release of a database identifying areas throughout the state that meet the final definition for DACs and supporting analysis to understand the impacts on them.<sup>12</sup> Using data on total population and number of households within DAC-identified versus non-DAC-identified census tracts by county and by climate zone, an initial set of calculations was drafted to estimate the portion of long-term indirect savings occurring within DACs. The market evaluation team used these data to identify the percentage of DAC and non-DAC population of each area affected by training and each jurisdiction adopting stretch codes, two key components for calculating indirect savings. However, the data lacked sufficient granularity, which limited the team's ability to draw meaningful conclusions.

Because DACs are identified by census tracts, which can cross jurisdictional lines and other boundaries used in estimating savings, the team's segmentation isolated counties with DACs and was able to explore proration assignments of savings to DACs using population or building count but did not successfully identify which savings were attributable to DACs or non-DACs in a given county. Further, in creating such a segmentation, the team had to make certain assumptions, including that new construction rates (an input to the savings modeling) would be similar in DACs as well as non-DACs. The team deployed geocoding of the DAC database to American Community Survey (ACS) five-year data to assess whether a relationship could be drawn using building tenure or other building characteristics to estimate a distinct rate of new construction for census tracts with DACs and those without DACs. However, with the data limitations and lack of comprehensive representation on buildings constructed 2015 and later in the ACS five-year dataset, the team was hesitant to draw hard conclusions from this analysis and recommended flagging the relationship between rate of construction and DAC census tract for greater exploration. NYSERDA has also shared that through their contractor, Energy Solutions, they are pursuing the development of a DAC Evaluation Framework as a means to better develop and align future evaluation processes that addresses equity focused priority CPS impacts and benefits and go beyond "place-based" DAC tools and assessments. Hence from a CPS market characterization and evaluation perspective, more

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<sup>12</sup> See the NYSERDA DAC Database Overview, Final Disadvantaged Communities (DAC) 2023. DATA.NY.GOV website accessed 22 Aug 2023. <https://data.ny.gov/Energy-Environment/Final-Disadvantaged-Communities-DAC-2023/2e6c-s6fp>.

work on DAC data related tools will be needed to inform broader state-wide equity and outreach CPS goals. Additional review of this analysis is available in the Appendix.

## 3. Code Compliance Trends

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### 3.1. Initiative Progress

A key goal of the Initiative is for energy code compliance to increase by five percent in New York State compared with a business-as-usual case. The current compliance estimate for commercial new construction is 85%, a small increase over the previous estimate of 83%, but a significant increase compared with the 2015 compliance estimate of 74%. The estimate for residential single-family new construction also increased significantly, from 77% in 2015 to 85% in 2022. Importantly, the estimates reflect compliance during different state energy code cycles, and the Delphi Panel said that there is a drop in compliance when a new code is adopted.<sup>13</sup> Despite these fluctuations, estimated overall code compliance is improving over time.

### 3.2. Code Compliance Estimates

As discussed in previous evaluation reports, compliance estimates have been made based on three Delphi Panels conducted in 2015 by Energy & Resource Solutions (ERS) and in 2020 and 2022 by the market evaluation team. Each panel was conducted under a different version of the ECCCNYs.

Table 9 compares energy code compliance estimates in 2015, 2020, and 2022 for commercial and residential construction as well as the model code versions on which each ECCCNYs version is based. The table shows an increase in estimated energy code compliance, despite more stringent codes having been adopted over time. Compliance estimates have been qualitatively informed by jurisdictional follow-up interviews, discussed in the next section, and will be further assessed in both a fourth Delphi Panel and an Independent Panel in Year 5.

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<sup>13</sup> The Year 1 Delphi Panel study was in the fourth year of the code cycle; the Year 3 Delphi Panel study was in the second year of the code cycle.

**Table 9. Estimated Compliance by Study Year and Code Version**

Building Type	New Construction			Additions and Alterations		
	2015	2020	2022	2015	2020	2022
Study Year	2015	2020	2022	2015	2020	2022
ECCCNYS Version	2010	2016	2020	2010	2016	2020
Based on:	2009 IECC & ASHRAE 90.1-2007	2015 IECC & ASHRAE 90.1-2013	2018 IECC & ASHRAE 90.1-2016	2009 IECC & ASHRAE 90.1-2007	2015 IECC & ASHRAE 90.1-2013	2018 IECC & ASHRAE 90.1-2016
Date Code Implemented	December 2010	October 2016	May 2020	December 2010	October 2016	May 2020
Estimated Commercial Compliance	74%	83%	85%	59% to 68% <sup>a</sup>	70%	84%
Estimated Residential Compliance	77%	77%	85%	62% to 71%	71%	81%

<sup>a</sup> The 2015 ERS Delphi Panel did not provide an estimate for additions and alterations (referred to as renovations), but instead reported that panelists estimated renovation compliance to be 6%–15% worse than new construction compliance. Using this range, addition and alteration compliance increased by 2%–11%.

### 3.3. Longitudinal Expert Panel Assessment

The market evaluation team interviewed six energy code experts from six jurisdictions with a mix of rural, suburban, and urban areas about their experiences with energy code compliance, enforcement, and impacts on DACs. To better understand how market trends and opinions change over time, the team created a pool of possible respondents and has interviewed them over the life of the CSCNB Initiative. Their perspectives differ, depending on their unique role and location. Two people focus on residential buildings, one specializes in commercial buildings, and three have experience with both. Four people focus on new buildings, two in the residential sector and two in the commercial sector. Two have experience with multifamily housing and two specialized in low-income housing.

#### 3.3.1. Code Compliance

The team asked respondents if energy code compliance has increased, decreased, or stayed the same in the residential and commercial sectors for new builds and additions and alterations. They said compliance has varied widely. Five said that compliance in additions and alterations has increased while compliance in new buildings has largely stayed the same. They said it was more difficult for additions and alterations to comply with the energy code, but that this difficulty also provided more room for greater compliance. Several respondents said that new buildings were more likely to be built already in compliance, but that additions and alterations had to be brought up to code using the

*“Additions and alterations do not get as much attention as they should.”*

- Longitudinal jurisdictional respondent

existing building. One respondent commented that due to existing building compliance being based on a percentage increase in energy savings rather than existing plan documents, determining compliance in existing buildings may be more challenging.

The energy code experts stated that challenges to code compliance included the complexity of keeping up with the code’s evolutions, a lack of prioritizing energy codes, and a limited amount of funding for basic

*“Even as an energy consultant, you have to constantly review codes. It is a lot and complexity is a barrier.”*

- Longitudinal jurisdictional respondent

operating needs. Five respondents said that there is still a need for education about the code changes. One said that “Even as an energy consultant, you have to constantly review codes. It is a lot and complexity is a barrier.” Four respondents stated that other codes, especially fire codes, tend to be prioritized over energy codes because of the more direct link to occupant safety. Respondents also said that any change in the energy code can be perceived by the general contracting community as a challenge to compliance and project management. Four respondents said

that financing was a barrier to increased compliance. Stating that smaller, often more rural, communities typically have more limited resources and must work within a smaller budget. These communities with limited resources often share code officials with other municipalities, typically having a code official for only four to six hours per week. Limited funding and staffing also results in constraints on their ability to provide trainings, update outdated paper code compliance systems, and keep up with the required documentation for the new codes.

Respondents suggested ideas to increase compliance, including increased communication with contractors about code changes and their added value, standardizing education materials, and streamlining the application process. To increase knowledge of the code and offset its complexity, four respondents recommended outreach to contractors to explain code changes and the value added by those changes. Two respondents suggested a standardized guide for different building types that includes examples. One respondent suggested using a client relationship management system to increase understanding and compliance on applications.

### 3.4. Training Survey Results for Code Compliance Trends

The Initiative has provided training webinars to code officials and building professionals. As part of evaluating this training, the market evaluation team conducted two rounds of online surveys with training participants, the first immediately after the training and the second six months later.

The team asked follow-up survey respondents to consider the past 12 months and indicate whether they thought that during that time compliance with the energy code in the state had increased, decreased, or stayed the same. Overall, 72% of all respondents said energy code compliance had increased over the past 12 months. Sixty percent of respondents who said that they had observed an increase in code compliance thought the services provided by the NYSERDA technical support and training Initiatives had played a role in this increase, 10% said they did not think the NYSERDA Initiative was a notable contributing factor, and the remaining 29% were undecided.

Respondents who had reported an increase in energy code compliance in the state were also asked to identify other factors they thought had contributed. Respondents identified several factors, including more focus on energy code in planning and permitting (21%), market demand for greater energy efficiency (19%), and improved builders' knowledge about code requirements (18%). Further detail on breakdown by respondent job category and the full list of other factors identified by respondents is provided in the Detailed Survey Results section of the Appendix.



## 4. Code Compliance Support

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In Year 3 of the CSCNB Initiative, NYSERDA invited applications to Program Opportunity Notice (PON) 4600: Third-Party Support and Advancing Code Compliance Technology Pilot program. The overall goals of the pilot program are to support improved technical and online capacities in jurisdictions in relation to residential and commercial building plan reviews and inspections, as well as energy code compliance and enforcement. The market evaluation team reviewed the reports of progress made on these alternate code compliance pilot activities, as well as feedback from the longitudinal expert panel and trainings, where relevant on alternative code compliance resources and utilization.

### 4.1.1. Initiative Progress

Applications for the alternate code compliance pilot through PON 4600 were selected through October 2022. In Year 4, the market evaluation team assessed the progress to date. At the time of the pilot interviews, six jurisdictions were participating in the pilot's Third-Party Support component and six were participating in its Advancing Code Compliance Technology component. As of this report, 10 jurisdictions chose to participate in the Third-Party Support component, with nine continuing their participation, and 12 chose participation in the Advancing Code Compliance Technology component, with 11 continuing their participation.

### 4.1.2. Alternative Code Compliance Pilot Interviews

The market evaluation team conducted interviews by reaching out to the six jurisdictions participating in each of the two components of the PON 4600 pilot, as noted above (as not all jurisdictions participated in both components, this totaled seven discrete jurisdictions). Of the seven, six made themselves available for interviews. Of these, three represent jurisdictions serving DACs, while three do not serve any DAC-designated census tracts. Five reported on participation in both components of pilot and one reported on participation in the Code Compliance Technology component only. The team identified the following key findings from the interviews:

- **Participation in additional activities is challenging for jurisdictions, and jurisdictions benefit from NYSERDA's support.** Most respondent jurisdictions appear to be motivated to participate in the pilot based on clearly identified jurisdictional needs and goals but relied on NYSERDA's support during the application and/or early implementation processes in order to be

able to participate. This is especially true for jurisdictions with limited bandwidth for grant seeking and procurement activities.

- **Positive results in engaging with third-party resources included critical support on complex projects and greater bandwidth.** Negative results included complexity in procurement, limited availability of third parties, and ability of applicants to use the process.
- **Positive results in procuring and implementing new technology included greater efficiency and transparency on requirements for jurisdictional staff and public applicants alike.** Negative results included software learning curves.
- **All jurisdictions were seeing or projecting a positive impact on compliance rates from implementation of both components of PON 4600.** Further analysis is needed to determine changes made to building practices in participating jurisdictions. All of the interviewed jurisdictions reported that it was too early to fully assess the changes to the jurisdiction's building practices and processes. Future interviews to identify progress may be beneficial.

#### *4.1.2.1. Engagement Paths and Motivation to Participate*

The team found that jurisdictions were made aware of the pilot primarily through economic or grants leads supporting their governance and/or through engagement with NYSERDA. One reported learning about PON 4600 at a training, two through NYSERDA outreach, two through an economic or financial advisor, and one was unsure. Of the two jurisdictions that learned of PON 4600 through NYSERDA outreach, one learned of it through an email alert and the other through active engagement with NYSERDA program leads for other programs.

Nearly all jurisdictions reported being motivated to participate by access to funding; nearly all also reported being motivated by specific governmental operational unmet needs. Specific to the two components in PON 4600, two jurisdictions reported interest from having heard positive experiences from implementation of new compliance technology in peer jurisdictions, and one reported positive previous experience using third-party review. One jurisdiction was motivated by improving (operational) efficiency, and one by its pursuit of carbon emissions reductions in buildings. Of the jurisdictions that said specific operational needs motivated their participation, four said their existing software system was antiquated and did not meet their needs. Two reported not having enough bandwidth in their codes offices for the level of attention they wanted to pay to compliance. Three jurisdictions reported the need for additional knowledge—one to support large project review and one to support review of renewables and distributed energy resources (DERs). All three of these jurisdictions served DACs. Other needs reported include stretch code implementation support, modernization of government operations, enabling of

remote operations, and the need for a new software given the jurisdiction's existing software system being sunsetted.

#### 4.1.2.2. *Role of NYSERDA in Participation and Implementation*

Five of six jurisdictions said specific engagement with NYSERDA staff has been critical to their success in application and implementation. All five emphasized NYSERDA's availability for conversations and

*“The most important person was [our NYSERDA contact]; we had many meetings and she was instrumental in pointing out every detail of the grant.”*

- Pilot participant respondent on NYSERDA's role in their jurisdiction's decision to apply

guidance during the application process. Two said NYSERDA was a “cheerleader” and important to their success and that NYSERDA provided positive support and reassurance that it would work with them to ensure that PON's resources fit the needs of their jurisdiction. One jurisdiction said NYSERDA's flexibility during implementation was critical, and three emphasized the importance of NYSERDA's support with implementation documents, including request for proposals (RFPs) for software services and clarifying the opportunity for public access to resources provided through the Third-Party Support component of the PON.

#### 4.1.2.3. *Third-Party Support Component*

At the time of evaluation, all jurisdictions reported having started identification of third parties but only one had used a third party to complete a project review. Three jurisdictions reported challenges, which included access to local prequalified third parties, applicant uptake and utilization of the third-party option, and procurement learning curves.

Reactions to the third-party support were positive by all jurisdictions, largely for the additional bandwidth and support on complex projects (large commercial, multifamily, mixed-use, and innovative green technology projects were named as complex project examples). Reactions from the public were reported as a mix of positive and negative. Positive reactions included faster processing of applications, better knowledge-sharing on energy code requirements, and investment coming to the community. Less positive external reactions included a general dislike of change, tighter enforcement, and the additional fee (required for engagement with a third party in one jurisdiction). All jurisdictions reported that they had experienced or expected to experience an improvement in compliance due to third-party support. Effects on building practices were reported largely as to be determined.

#### 4.1.2.4. *Advancing Code Compliance Technology Component*

Jurisdictions were asked about progress in implementing the technology component, reactions to its implementation both internally and externally with the public, and the effect of its implementation (or possible implementation) on compliance and/or building practices. Three of the six jurisdictions said that the technology had been identified, selected, procured, and implemented and was in the early stages of use (one jurisdiction served DACs and two did not). One jurisdiction that did not serve DACs had begun implementation, but the technology was not yet in use. Two jurisdictions that served DACs were still identifying the appropriate technology and determining the best path for procurement. Four jurisdictions reported technology component implementation was going well, largely due to greater efficiency and capacity for compliance. Two jurisdictions cited challenges in learning new software and migrating data from an antiquated software, and one jurisdiction that served DACs cited concerns over ongoing and unbudgeted software costs.

*“It will demonstrate what they have to do and why they have to do it. Some of these laws have been put in place only recently, so having a quick reference helps everyone. The more information, the better.”*

- Pilot participant respondent on the value of new software with energy code references for plan applicants

All six jurisdictions reporting cited positive internal reactions to the technology component, for reasons including relief of administrative workloads, better communication with the public in both applications and violations, and how the technology helped ease the flow (and mitigate the need for) applicant questions. Two jurisdictions reported negative internal reactions (new software learning curve and data migration challenges due to their previous software’s lack help desk). All six jurisdictions reported positive external responses to the technology component, citing new functionality for applicants, better communication of requirements, and transparency mitigating application questions. All had experienced or expected to experience an improvement in compliance due to third-party support because of improvements in operational efficiency, better coverage of violations, and more transparency of energy code requirements. All also expected and/or had already seen changes in building practices, including faster, better, and automated applications and a new opportunity to educate builders on green technology opportunities. One jurisdiction did not anticipate changes in building practices.

#### 4.1.3. *Alternative Code Compliance Pilot Next Steps*

NYSERDA has said that the goals under this pilot remain the same and that it plans to scale up investment on this effort in Year 5 by working with partnerships—including with the Department of

State, PON technical support contractor NORESKO, and regional alliances such as the Northeast Energy Efficiency Partnership (NEEP)—to revise the RFP and re-release as a PON. Plans for the new PON will allow for coordination with the Department of State as the lead on enforcement. The PON will empower third parties to provide support and for the first time will contain explicit funding reservations for DACs.

More information on the results of each question posed during the interviews on the PON 4600 pilot is included in the Appendix.

#### 4.1.4. Alternative Code Compliance from the Longitudinal Expert Panel

The team asked about the current system of energy code enforcement used in the experts’ jurisdictions across New York State. Four respondents stated that building inspectors and code officials were the main enforcement strategy. REScheck and COMcheck were noted twice in the interviews as part of the

protocol; however, one respondent said that these checks are not as useful from a sustainability viewpoint since they are compliance tools, not design tools. Two respondents said that enforcement currently varies

*“Rural communities do not have the capacity to hire an inspector, but more counties would benefit from it.”*

- Longitudinal jurisdictional respondent

widely based on code official availability, funding, and project type (new build, addition, or alteration). Larger municipalities tend to have bigger offices, more funding, training, and are more likely to have a dedicated code official. Smaller or more rural communities often have more limited resources and must work within a smaller budget and share code officials with other municipalities, typically having a code official for only four to six hours per week.

*“Having access to this grant funding for activities we knew we needed but didn’t have the funding for has been amazing... it’s already changing how we approach code enforcement and permitting.”*

- Pilot participant respondent

Four longitudinal expert panel interviewees said code enforcement was increasing due to the growing familiarity of the codes, more staffing, and penalties for noncompliance. One respondent noted that there has been no change in enforcement. Two respondents discussed that as enforcement grows, there is also increasing fear of fines and other noncompliance issues such as project delays. One respondent discussed how including a virtual element during the COVID-19 pandemic has been helpful for enforcement.

When asked about the impact of alternative code compliance efforts on communities, many respondents thought it was too early to tell, though half believed that alternative code compliance support would have a positive impact on code compliance. These respondents highlighted that compliance varies widely across regions and that third-party support would likely standardize the process, thereby standardizing compliance rates. Respondents were less sure about the possible drawbacks of alternative code compliance. One respondent emphasized the importance of making a good first impression in the rollout of the alternative code compliance programs. To encourage jurisdictions to use alternative code compliance resources, respondents suggested ensuring access to qualified inspectors, financing, and an easy application process.

*“Compliance significantly varies across regions and third-party systems will probably standardize it.”*

- Longitudinal jurisdictional respondent

Respondents had several suggestions when asked what other factors should be considered when implementing alternative code compliance programs. Their main considerations were liabilities for third-party inspectors, industry acceptance, and allowing time for a learning curve. Several respondents were interested in how alternative code compliance programs would navigate the legal ramifications and protections for people doing the inspections in case something went wrong or was missed. Others were concerned about how alternative code compliance programs would be accepted by the general codes community and how these programs would account for the learning curve of builders and municipalities trying to integrate the alternative systems into the existing systems.

## 5. Energy Code Adoption Support

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Under the Initiative, NYSERDA works to develop stretch codes available to jurisdictions that go beyond state energy code and support their adoption by sharing resources with jurisdictions. As noted in the Year 3 evaluation, NYSERDA has developed and delivered NYStretch2020 for adoption by jurisdictions. NYStretch2020 is a voluntary, locally adoptable stretch energy code that is approximately 19% more energy-efficient than the residential provisions of the 2020 ECCCNY and roughly 7% more energy-efficient than the commercial provisions of the 2020 ECCCNY.

Besides developing NYStretch2020 (which NYSERDA developed in consultation with the NYS Department of State) and providing technical assistance in earlier years of the Initiative, NYSERDA is now working with the Department of State to resolve issues in NYStretch and develop NYStretch2020v1.1, and proposed amendments to the Energy Conservation Construction Code of New York State that achieves energy savings greater than the yet-published 2024 International Energy Conservation Code for residential buildings, and ASHRAE Standard 90.1-2022 for commercial buildings. This work to advance the Energy Conservation Construction Code of New York State is required by Energy Law, Section 11-103(2)(b).

### 5.1. Initiative Progress

With 42 jurisdictions having adopted stretch codes to date, NYSERDA has already surpassed the goal of having 26 jurisdictions adopt stretch codes. NYSERDA is now focusing on both increasing support for the communities with stretch codes, such as New York City, and providing additional capability support for jurisdictions through PON 4600 (discussed in Section 4).

The Stretch to Zero pilot program has evolved in Year 4, given New York State's passing of the ambitious FY 2024 State Budget in May 2023, which advanced comprehensive legislation focused on building sector decarbonization that will protect the state's families and residents. Against this backdrop, NYSERDA's Stretch to Zero pilots have transitioned into support for local communities focused on best practices and training that can help their community-driven goals.

## 6. Energy Code Training and Education

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### 6.1. Initiative Progress

As of August 2023, NYSERDA had completed a total of 70,665 trainings (seats filled) through the Codes and Standards for Carbon Neutral Buildings (CSCNB) Initiative, and 10,398 individual local code official and building professionals (such as contractors, architects, and energy professionals) had been trained. This compares to and exceeds the 2023 goal of 12,000 seats filled. From March 2020 to August 2023, four implementers taught 46 unique courses. NYSERDA has shared with the team that training will continue to be provided to all target markets, and that as part of an effort to reach more builders (typically a harder to reach market) they are contracting with an additional high-performance builder and building consultant to provide trainings targeting builders.

### 6.2. Training Surveys

The Initiative has provided training webinars to code officials and building professionals since March 2020. As part of evaluating this training, the market evaluation team conducted two rounds of online surveys with training participants, the first immediately after the training and the second six months later.

#### 6.2.1. Reactions Immediately After Training

In June 2020, the team sent the first immediate surveys to participants immediately after they participated in the training webinar; immediate surveys have continued to be sent to participants through this evaluation period. This section covers selected survey questions, and the remaining survey questions are covered in the report Appendix. The analysis includes statistical significance testing, and the results are reported as applicable.<sup>14</sup> For this analysis, the market evaluation team aggregated results from Year 4.

##### 6.2.1.1. *Understanding of Energy Codes*

To assess the impact of the training on attendees' understanding of the ECCCNY, NYCECC, and NYStretch, the team asked immediate survey respondents to estimate their level of understanding of the energy code before and immediately after training on a 7-point scale (where 1 is no understanding and 7 is expert understanding).

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<sup>14</sup> This statistical significance testing included sample t-tests for the continuous data, proportions tests for the binary data, and chi-squared tests for the categorical data.



The team asked only individuals attending ECCCNY-specific training to estimate their level of understanding of the ECCCNY before and after the training. Sixteen percent of respondents (n=419) ranked themselves as having an understanding of 6 or 7 on the 7-point scale prior to attending the training. When asked how they ranked themselves after the training, the scores improved such that 50% of respondents ranked themselves a 6 or 7. This resulted in a statistically significant increase from a mean score of 4.3 to a mean score of 5.4.

Regarding the NYCECC, the team asked individuals attending NYC-specific training to estimate their level of understanding of the code before and after the training events. Eleven percent (n=74) of the respondents ranked themselves as having an understanding of 6 or 7 on the 7-point scale prior to attending the training. When asked how they ranked themselves after the training, the scores improved such that 41% of respondents ranked themselves as having an understanding of 6 or 7. This resulted in a statistically significant increase from a mean score of 3.8 to a mean score of 4.8.

Regarding NYStretch, the team asked only individuals attending a training session covering NYStretch topics to provide their level of understanding of the stretch energy code before and after the training events. Only 10% (n=60) of respondents ranked themselves as having a level of understanding of 6 or 7 prior to attending the training. The level of understanding increased to 39% of respondents who rated themselves a 6 or 7 after the training. Mean scores increased from 3.7 prior to the training to 5.0 after attending the training, a statistically significant change.

#### *6.2.1.2. Satisfaction with Trainings*

Immediate survey respondents were asked to rate a variety of aspects of the training they had just attended on a scale of 1 to 7, where 7 was the best possible score. Respondents rated trainings highly for all elements, with “presenters’ knowledge of the subject” ranking the highest, with a score of 6.59. Respondents also ranked the location and timing of the event highly, with a score of 6.4. The lowest-ranked aspect was “relevancy to the respondents work,” with a score of 6.04. None of the aspects for any of the trainings received lower than a 6 average score.

#### *6.2.1.3. Expected Impacts on Implementation*

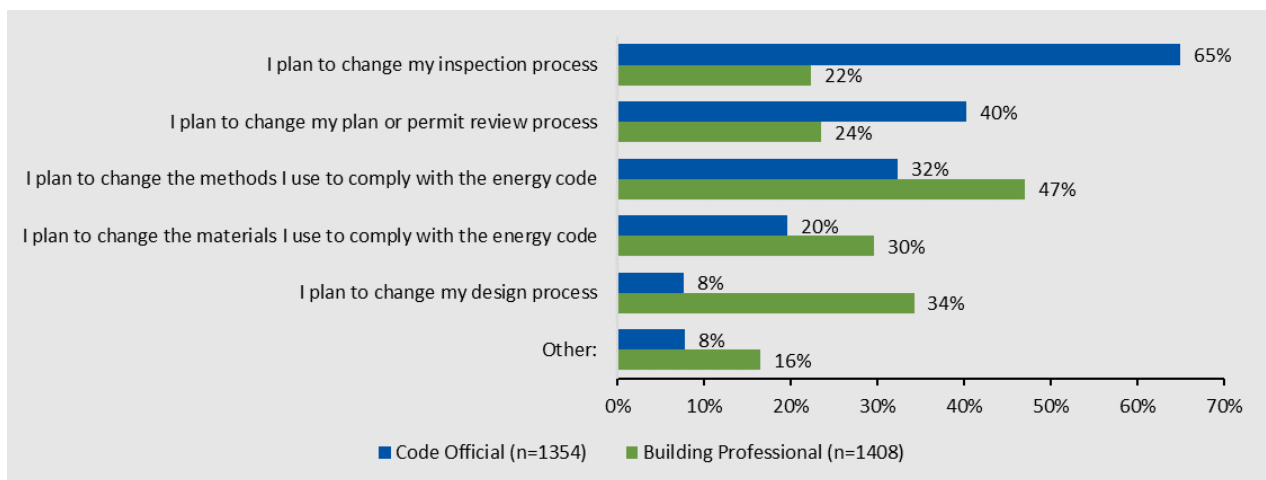
The team asked immediate survey respondents whether they planned to use what they had learned in the webinar in their work. Ninety-one percent (n=3,226) said they did plan to use what they had learned, and

only 2% said they did not. The remaining 7% said the information they learned was not relevant to their work. The findings were consistent between code officials and building professionals.

When asked how they planned to apply what they learned, code officials most commonly said they planned to change their inspection process (65%, as shown in Figure 1, compared with 22% of building professionals). Building professionals most commonly said they planned to change the methods they use to comply with energy code (47% compared with 32% of code officials). The difference between responses from code officials and building professionals was statistically significant for all response options, indicating that code officials and building professionals plan to apply new knowledge to their work in different ways.<sup>15</sup>

**Figure 1. How Respondents Plan to Apply Knowledge**

Source: Immediate Survey Question: “How will you use the training in your work?” August 2023.



In verbatim comments, respondents noted that what they learned had helped improve communication and improve the review process:

- “Very informative and useful to the work I do everyday.”
- “This is my first training with NYSERDA. I will be doing a substantial more amount of studying through this site.”
- “I learned some things I did not know before. I am looking forward to next year’s availability of new materials and applications.”

<sup>15</sup> The team uses a proportion test; all p-values were less than 0.05, indicating statistical significance at 95% confidence.

- “Although I have an extensive working knowledge of the ECCCCNYS, I picked up useful information from the presenter on items I don't use on a daily basis and through his answers to questions or comments from attendees.”
- “I always take more hours of energy code training than required even though I don't receive credit for multiples of the same courses, but I understand it and learn a little more each time I attend.”

### 6.2.2. Reactions Six Months After Training

The market evaluation team launched the follow-up survey in March 2021. These surveys are sent out to participants six months after they participate in the training webinars; no follow-up survey respondent is asked to take an additional survey, even if they participate in additional trainings. This ensures there is no double-counting of results as these findings are used to estimate overall impact of the training. The full set of survey questions are covered in the Appendix. The team analyzed results received in Year 4.

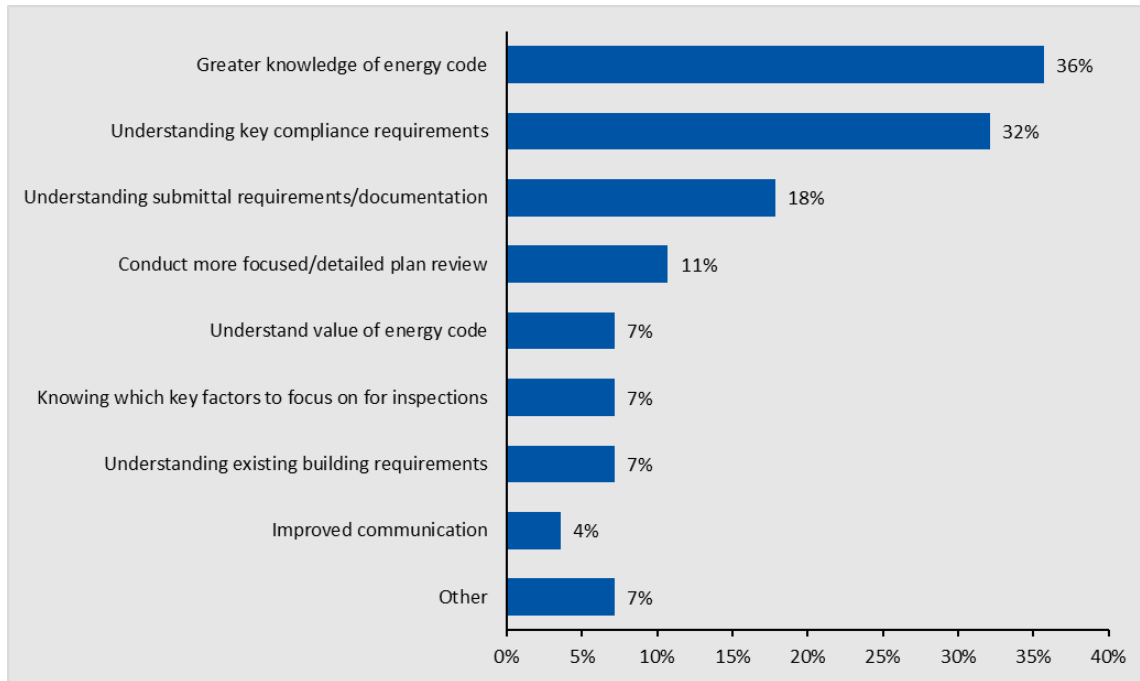
#### 6.2.2.1. *Energy Code Implementation from Follow-Up Survey Results*

The Initiative provided training webinars to code officials and building professionals, and attendees were surveyed immediately and six months after the training. The team asked follow-up survey respondents if, after six months, they had changed the way they address code compliance issues compared with their approach before they attended their first training session. Overall, 68% of participants responded affirmatively. Seventy-two percent of code officials and 73% of building professionals were either addressing compliance differently or expecting to make changes in the future. There is not a statistically significant difference between code officials and building professionals in terms of the proportion that changed the way code compliance issues are addressed.

When asked to describe how they address compliance issues differently based on information learned at NSYERDA-sponsored trainings, respondents most commonly reported a general increase in their knowledge of the energy code (36%) and understanding key compliance requirements (32%). The results are shown in Figure 2.

**Figure 2. How Respondents Address Compliance Issues Differently after Training**

Source: Follow-Up Survey Question (n=28): “Please describe how you are addressing the compliance issues differently because of the training.” August 2023. Multiple responses allowed.



#### 6.2.2.2. Information Sharing

The market evaluation team asked follow-up survey respondents to consider with whom they shared information that they learned at the webinars. As shown in Figure 3, code officials most often shared information with other code officials (77%), significantly more than building professionals shared information with code officials (15%).<sup>16</sup> Nearly half (48%) of building professionals reported sharing information with architects and with energy professionals.

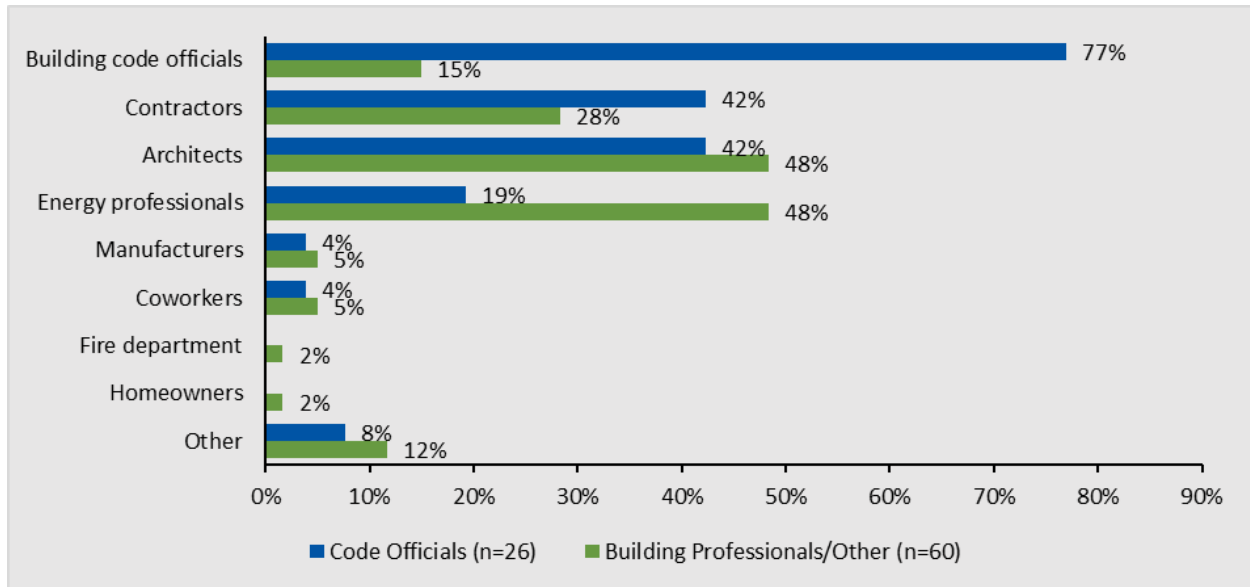
Those who shared information with code officials also estimated how much of what they learned at the webinars they passed on. Seventy percent of respondents (n=20) reported sharing 40% or less of what they had learned with other code officials. Only 20% of respondents said they shared at least 80% of what they learned. There was no statistically significant difference in the percentage of information passed on to other code officials between code officials and building professionals.

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<sup>16</sup> This difference is statistically significant at the 95% confidence level.

**Figure 3. Webinar Information Shared with Other Professionals**

Source: Follow-Up Survey Question: “With which parties listed below have you shared any information from the webinars?” Multiple responses allowed; August 2023.



### 6.2.2.3. Feedback on Future Training

When asked what sort of training they would find most useful for future webinars, 42% of respondents suggested expanding the list of topics, such as the following:

- Solar and geothermal power design and implementation
- Decarbonization strategies, planning, means, and methods
- Impacts of Local Law 97
- Energy retrofits
- ASHRAE 36 HVAC Controls
- Modeling for different types of buildings and HVAC systems.
- Commissioning and inspection

Twenty percent of respondents said they wanted the training courses to have a greater focus on new and emerging technology; 16% said they would like the existing trainings to include more real-world examples. Nine percent of respondents said they were satisfied with current options and had no suggestions.

Overall, 68% of follow-up survey respondents rated the value of the webinars they attended as a 6 or 7 on a 7-point scale (with a mean score of 6.05 for all responses), suggesting that respondents remembered the trainings and continued to find them valuable six months after attending.

## 7. Findings and Recommendations

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The market evaluation team offers the following findings and recommendations for the Codes and Standards for Carbon Neutral Buildings Initiative activities occurring between September 2022 and August 2023.

**Finding 1: Estimated code compliance continues to increase overall across the state.** According to Year 4 survey findings and jurisdictional interviews, code compliance has been increasing. Seventy-two percent of training survey respondents thought code compliance was increasing and 60% said NYSERDA has played a role in this increase. Most of the expert longitudinal panel thought compliance has been increasing; however, there have been challenges. These respondents noted that additions and alterations are more challenging to bring up to code than are newly constructed buildings and that the community still has reservations about the requirements and impacts of the stronger energy code.

***Recommendation 1 for NYSERDA program staff:*** To provide more support with the challenge of bringing additions and alterations up to code, consider expanding the NYSERDA-approved trainings to include more in-depth topics on retrofitting additions and alterations. Target improving builder understanding of additions and alterations energy code requirements.

***NYSERDA response to recommendation:*** Pending. Future solicitations for energy code training development and delivery will emphasize the need for a focus on existing buildings.

***Recommendation 2 for market evaluation team:*** To better understand how builders are impacted by the training, add questions to gather data on builder training needs and motivations, as well as a self-identifying section in the surveys for builders. Currently, the two main categories are code officials and building professionals. With further breakdown, NYSERDA can better understand builder attendance by region, builder perceptions, opportunities, and barriers, if any.

***NYSERDA response to recommendation:*** Pending. This recommendation will be explored as part of the next planned evaluation.

**Finding 2: Many jurisdictions have unmet basic needs that stymie code compliance; early responses to NYSERDA's new pilots suggest addressing these needs is improving compliance.** Alternate Code Compliance pilot participants and longitudinal jurisdictional panel respondents have shared that basic

needs such as organizational capacity and funding are challenges to code compliance. Jurisdictions reported constraints such as insufficient resources for a dedicated inspector and reliance on a part-time code official shared between jurisdictions, and the lack of resources for trainings or technological advancements. Pilot participants are enthusiastic about the additional bandwidth and expertise on complex projects brought by the third-party support offered in the pilot, and they are successfully replacing antiquated software with technology that provides transparency to permit applicants around energy code requirements, increased efficiencies in compliance and enforcement activities, and better communication for all parties involved.

***Recommendation 3 for NYSERDA program staff:*** Expand the Alternate Code Compliance pilot to engage additional jurisdictions and bring these resources to more communities across the state.

***NYSERDA response to recommendation:*** Pending. NYSERDA is working in partnership with the Department of State to expand online code compliance in Authorities that Have Jurisdiction (AHJs) across NYS with a focus on the needs of Disadvantaged Communities.

**Finding 3: Jurisdictions face a number of challenges in accessing code compliance resources, even if those resources are confirmed internally to be needed and desirable.** Interviews revealed a lack of bandwidth and access to information and resources in local governments responsible for compliance, which constrains or delays compliance activities. Even with the support of the Alternate Code Compliance pilot, some participant AHJs reported challenges in accessing the third-party support component due to questions around procurement, administration, and local access to knowledgeable third parties. Jurisdictional longitudinal interview respondents also expressed desire for more materials, such as a simple and direct manual to guide them through changes of the energy code. Even in cases in which materials are available, such as NYSERDA's List of Qualified Third-Party Support Providers, many jurisdictional interviewees and survey respondents reported being unaware of them.

***Recommendation 4 for NYSERDA program staff:*** Continue to support Alternate Code Compliance pilot participants with the application process and development of materials and assess additional resources that would be beneficial to guide jurisdictions and energy professionals. Explore new marketing techniques to effectively share the materials. Consider using case studies to give examples of utilization of third-party support.



***NYSERDA response to recommendation:*** Pending. As noted in response to recommendation #2 above, NYSERDA is working in partnership with the Department of State to expand online code compliance in Authorities that Have Jurisdiction (AHJs). Future additional resources and third-party support that can enable code compliance in AHJs is expected.

**Finding 4: Training participants are attaining meaningful information from the trainings.** In the Year 3 evaluation 44% of respondents suggested expanding the training topics. In Year 4 training implementors responded by providing more trainings in the categories respondents suggested. When rating the trainings overall in Year 4, respondents gave the highest mean score since the beginning of the Initiative (a score of 6.05 out of 7). When asked how the training has impacted their work, 68% of the respondents shared that they either strengthened their knowledge of the energy code or now better understand key compliance requirements. The training implementors listening to survey feedback, the respondents' high ratings of the trainings, and the majority of respondents saying that they have applied knowledge from the trainings into their jobs demonstrates that training participants are gaining meaningful information from the trainings.

***Recommendation 5 for NYSERDA program staff:*** Consider adjusting the trainings topics to include more of the training participants' interests and needs with compliance topics such as building decarbonization and new technologies. Continued response to respondent suggestions on topics will drive engagement and improve code compliance.

***NYSERDA response to recommendation:*** Pending. Decarbonization mandates for new construction are expected to phase-in beginning 12/31/2025. Future energy code training will address this new paradigm.

**Finding 5: Data limitations present some challenges in evaluating the Initiative's impact in disadvantaged communities (DACs) and alternate opportunities for evaluation of this impact should be explored.** The market evaluation team's preliminary review of DAC data was not able to successfully isolate the indirect energy savings anticipated as occurring in DAC census tracts because geographic data lacked granularity (census tracts not necessarily aligning with city or county boundaries, lack of census tract-based new construction rates). The team found meaningful results from the interviews, but the savings analysis could not confidently draw conclusions about the savings.

***Recommendation 6 for NYSERDA program staff:*** Explore other options and data sources that could be used to isolate the impact on indirect savings estimates of DACs and non-DACs. Consider other ways that

the impact on DACs can be assessed, such as tracking the responses and progress of jurisdictions that serve DACs under the Alternate Code Compliance pilots.

***NYSERDA response to recommendation:*** Pending. NYSERDA is developing and will execute a methodology for evaluating program impacts on DACs.