Codes and Standards for Carbon Neutral Buildings Initiative Year 5 Market Evaluation Report:

Baseline Estimates and Progress Toward Goals

Executive Summary

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Executive Summary

Through its Codes and Standards for Carbon Neutral Buildings (CSCNB) Initiative, the New York State Energy Research and Development Authority (NYSERDA) implements approaches that accelerate the pathway to more efficient, flexible, decarbonized buildings in New York State by supporting the advancement of building codes, standards, and other building policies. This Year 5 evaluation report presents the market evaluation team's final estimates of initiative indirect energy savings, based on market research conducted over five years in accordance with a methodology developed in collaboration with NYSERDA. Research activities have included surveys of energy code training participants, interviews with code officials and building professionals from jurisdictions across New York State, and Delphi panels focused on a review of New York State energy code compliance. In Year 5, an independent panel of New York State and national experts in code development and code compliance assessed the impact of NYSERDA on increasing energy code compliance and adopting advanced statewide and stretch energy codes.

A key goal of the CSCNB Initiative is to lower the energy use intensity (EUI) of newly constructed and renovated buildings by training code officials and building professionals. By increasing understanding of code requirements, officials and professionals increase energy code compliance of buildings, thereby improving building efficiency. This evaluation found that between 2020 and 2024 compliance increased 7% to 22% against the established baseline, depending on the building sector and construction type. As of November 2024, over 88,900 persons attended NYSERDA-supported trainings (this number includes individuals who attended multiple trainings). In surveys, training participants reported high satisfaction with the trainings and a greater understanding of the statewide energy code and the stretch codes. The independent panel found that NYSERDA's large-scale and effective training program increased NYSERDA trainings increased compliance by 4.2% to 5.9%, resulting in significant building EUI improvements and energy savings, as illustrated in Table 5, below. NYSERDA also increased energy code compliance in some jurisdictions by implementing 21 pilots that advanced alternative code compliance strategies, including third party support for code enforcement and adoption of code compliance technology.

NYSERDA further reduced building EUIs by advancing statewide and stretch energy codes, which require buildings to be constructed more efficiently than older code requirements. As of November 2024, 44 jurisdictions, including New York City have adopted stretch codes with support from NYSERDA. This evaluation found that NYSERDA was highly influential in jurisdictions adopting stretch code by developing the model code and providing technical support for its adoption.

From 2020 through 2024, NYSERDA worked to significantly transform the new construction and major renovation market in New York State through providing technical assistance to jurisdictions and training to code officials and other building professionals. NYSERDA's utilized multiple levers to achieve energy savings in New York's new construction and major alterations; specifically, NYSERDA:

- Worked with state-level and local officials to develop and further adoption of more stringent energy codes. At the state level these codes set the minimum construction standard for all new construction and major alterations, and at the jurisdictional level, stretch codes set standards that supersede the statewide code. Between 2020 and 2024 NYSERDA conducted the following work to advance energy codes:
    - Worked with the New York State Department of State (DOS) and the Code Council to develop and advance the Energy Conservation Construction Code of New York State (ECCCNYS). New York adopted the latest version of the statewide code (ECCCNYS-2020) in May of 2020. From 2020 through 2024 NYSERDA continued to work with State agencies to advance an even more efficient version of ECCCNYS. Adoption of this code, ECCCNYS-2025, expected in 2025, will result in significant energy savings across the state.[1,2]
    - Provided critical direct technical assistance to the City of New York (which accounts for approximately half of the state's square footage impacted by energy codes) to adopt NYStretch-2020 as the New York City Energy Conservation Code (NYCECC).
    - Developed a model local energy stretch code (NYStretch-2020) that is approximately 11% more efficient than ECCCNYS-2020, and provided technical assistance to support adoption.
- As typically not all buildings meet all the provisions of construction codes, NYSERDA also made significant investments to increase the level to which buildings comply to the ECCCNYS-2020 and local stretch codes. Increasing the level of compliance to energy codes results in savings because buildings that are more compliant are more energy efficient. To increase code compliance, NYSERDA conducted the following activities:

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1 While methodology for this evaluation called for assessment of the impact of adoption of a new statewide energy code, the new code is anticipated to be adopted outside of this evaluation period. Estimates of indirect savings therefore reflect the analysis of the impact of trainings, stretch code support, and alternative code compliance strategies. Future evaluations will capture savings from the upcoming statewide energy code.

2 The new energy code is adopted on a schedule determined by the NYS code council and administered by the NYS Department of State as its secretariate. NYSERDA worked (per energy law section 11-103.2(b)) to develop code change proposals that exceed those in 2021 IECC/90.1-2019 and, pivoted to develop proposals that exceed 2024 IECC/90.1-22, following the March 4, 2022 code council meeting, where the determination was made to skip the 2021 I-codes. The 2024 Notice of Rule in Development includes amendments to residential and commercial code that were taken from NYStretch-2020, which, if adopted, would exceed 2024 IECC.

- Trained over 11,000 code officials and building professionals about specific provisions of the codes. These trainings reached jurisdictions in all 62 counties throughout New York State, impacting 438 million square feet of construction activity and raising code compliance.
- Developed resources, trainings, and pilot projects to modernize jurisdictions' code enforcement processes. These efforts further increased levels of code compliance for 7 million square feet of construction activity.

Together, these activities are estimated to have resulted in an energy savings impact of 1.6 million MMBTU (1.6 Tbtu[3]) over 5 years, exceeding NYSERDA's initial savings targets for this initiative.

Savings Estimates

The market evaluation team estimated the final indirect savings of the CSCNB Initiative for 2020 through 2024, when it was primarily funded by the Clean Energy Fund (CEF). This report also shows energy savings achieved through NYSERDA's building codes program in years preceding this evaluation, when funded by Technology & Market Development Program (T&MD). Table 1, Table 2, and Table 3 show the savings estimates associated with the initiative, and the savings targets provided by NYSERDA.[4] As illustrated in the tables, NYSERDA exceeded its targets in each of the years for which targets were available. Table 4 shows the estimates listed above converted to MMBtu. Table 5 provides a breakdown of savings estimates by impact area by Tbtu.[5] Table 5 shows that the majority of the initiative's savings came from NYSERDA's energy codes training program.

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3 Trillion British thermal units.

4 In other reporting years, the team had provided preliminary estimates of indirect savings at the request of NYSERDA; these preliminary estimates were developed using benchmarks and internal panels to provide an interim view of initiative progress, with the understanding that final estimates would be conducted in the final year of the evaluation. These final estimates would use the full rigor defined in the evaluation methodology, using and incorporate the assessment of an independent panel of code experts provided with information on initiative activities. The findings of the panel were in many areas very similar to preliminary estimates, with training found to improve compliance rates by an estimated average of 5.0% (5.4% in 2020, decreasing to 4.5% in 2024). The panel provided estimates of the influence of NYSERDA on stretch code adoption, which, after adjustment by the team, ranged from 50% for New York City to 68% for other jurisdictions.[4] The panel also estimated that code compliance support activities NYSERDA is supporting would increase compliance; panelists estimated third party support could increase compliance by 10% and implementation of code compliance technologies could increase compliance by 6%.

5 As estimates per impact area were first calculated in Year 2 with the establishment of the preliminary savings estimation methodology, they are available starting in 2020.

Table 1. CSCNB Initiative Savings Estimates, GWh

Incremental Annual Additions (GWh)	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	Cumul. Annual 2015-2024
NYSERDA Indirect Savings Target[a]	N/A	N/A	N/A	N/A	N/A	28.34	27.08	45.89	28.56	28.56	158.42
Estimated Savings[a]	116.88	78.88	88.35	84.19	89.00	52.85	53.92	75.77	66.25	64.52	770.61
Percentage Funded by CEF	0%	0%	0%	26%	69%	99%	100%	100%	100%	100%	
Percentage Funded by T&MD	100%	100%	100%	74%	31%	1%	0%	0%	0%	0%	
CEF Savings per budget allocation	0	0	0.34	21.59	61.79	52.32	53.92	75.77	66.25	64.52	396.51
T&MD Savings per budget allocation	116.88	78.88	88.01	62.6	27.21	0.53	0	0	0	0	374.11

[a] NYSERDA Indirect Savings Targets are available by year for CEF funding only and not T&MD; therefore, Indirect Savings Targets are not available for 2015-2019. The market evaluation team analyzed savings using T&MD Review (2015–2019) & the CSCNB evaluation methodology (2020–2024). The T&MD savings review is provided in the Appendix of this report.

Table 2. CSCNB Initiative Savings Estimates, MW

	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
NYSERDA Indirect Savings Target	-	-	-	-	-	-	-	-	-	-
Estimated Savings	33.23	22.52	25.01	23.76	25.35	14.02	14.52	20.44	17.87	17.38
Percentage Funded by CEF	0%	0%	0%	26%	69%	99%	100%	100%	100%	100%
Percentage Funded by T&MD	100%	100%	100%	74%	31%	1%	0%	0%	0%	0%
CEF Savings per budget allocation	0.00	0.00	0.10	6.09	17.60	13.88	14.52	20.44	17.87	17.38
T&MD Savings per budget allocation	33.23	22.52	24.91	17.67	7.75	0.14	0	0	0	0

Table 3. CSCNB Initiative Savings Estimates, Billion BTU

Incremental Annual Additions (Billion BTUs)	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	Cumul. Annual 2015-2024
NYSERDA Indirect Savings Target[a]	N/A	N/A	N/A	N/A	N/A	37.17	35.93	68.48	51.79	51.79	245.15
Estimated Savings[a]	135.40	106.56	103.51	100.13	100.69	101.73	101.06	130.03	113.96	111.41	1,104.48
Percentage Funded by CEF	0%	0%	0%	26%	69%	99%	100%	100%	100%	100%	
Percentage Funded by T&MD	100%	100%	100%	74%	31%	1%	0%	0%	0%	0%	
CEF Savings per budget allocation	0	0	0.40	25.68	69.90	100.71	101.06	130.03	113.96	111.41	653.16
T&MD Savings per budget allocation	135.4	106.56	103.11	74.45	30.79	1.02	0	0	0	0	451.33

[a] NYSERDA Indirect Savings Targets are available by year for CEF funding only and not T&MD; therefore, Indirect Savings Targets are not available for 2015-2019. The market evaluation team analyzed savings using T&MD Review (2015–2019) & the CSCNB evaluation methodology (2020–2024). The T&MD savings review is provided in the Appendix of this report.

Table 4. CSCNB Initiative Savings Estimates Converted to MMBtu

Incremental Annual Additions (MMBTUs)	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	Cumul. Annual 2015-2024
Total T&MD and CEF	534,211	375,710	404,973	387,398	404,371	282,071	285,053	388,553	340,017	331,573	3,733,929
T&MD Only	534,211	375,710	403,413	288,050	123,634	2,821	-	-	-	-	1,751,309
CEF Only	-	-	1,560	99,348	280,736	279,250	285,053	388,553	340,017	331,573	2,006,090

Table 5. CSCNB Initiative Savings Estimates by Initiative Activity (Tbtu), 2020–2024

	Energy Savings Tbtu				
	2020	2021	2022	2023	2024
Stretch Code Adoption	0.02	0.05	0.07	0.07	0.07
Training	0.26	0.24	0.32	0.26	0.25
Alternative Code Support	0.00	0.00	0.00	0.01	0.01
Total	**0.28**	**0.29**	**0.39**	**0.34**	**0.33**

Findings and Recommendations

The market evaluation team offers the following findings and recommendations for the CSCNB Initiative activities.

Finding 1: Estimated code compliance is increasing but at a slower rate in the last years of the current code cycle. Data show that compliance levels are cyclical. Compliance initially drops following the adoption of a new code, with the greatest increases in the years that follow the code adoption (coinciding with use of compliance resources such as training) and then plateaus in later years.

Delphi panel data and interviews point to an overall trend of energy code compliance increasing over the course of the evaluation period of 2023-2024 by 7% to 22%. These substantial increases in code compliance are a key factor in the initiative exceeding its initial savings targets for this evaluation period. This continued compliance increase is largely driven by commercial new construction; in residential projects and commercial additions and alterations, data suggest that compliance has plateaued. Expert feedback suggests the following reasons for these trends:

- Commercial new construction projects are built by teams that have more resources and higher levels of staff (on average) than in residential new construction, while the actors in the residential new construction market are more fragmented.

- Commercial builders typically have broader experience with building systems and compliance measures (e.g., weather barriers) than residential builders, and can therefore better engage with new requirements. Commercial builders already default to a higher level of review that enables compliance, while market actors in residential and smaller projects are more likely to find the additional costs and time requirements of compliance more challenging.

Recommendation 1a: With NYS at the end of the current code cycle and adoption of a new state code expected in 2025, continue plans to offer increased support to familiarize stakeholders with the upcoming code and minimize the anticipated drop in compliance, to the extent possible. Prioritize support to jurisdictions with limited bandwidth to further energy code compliance by focusing on increasing their understanding of and engagement with new requirements. Continue to provide technical support to larger jurisdictions, such as New York City, to enable collaboration and demonstration. Continue to explore opportunities for engaging building professionals and market actors who can influence the quality of projects brought to code officers.

- **NYSERDA Response to Recommendation:** Pending. NYSERDA will contract with training providers to develop and deliver training on the new state Energy Code and intersecting requirements of the state Uniform Code and do so within the context of the state's pending building electrification rule. NYSERDA will evaluate the impact and effectiveness of this training and adjust as needed. NYSERDA will continue to work with state and regional home builders associations, and regional material suppliers, to inform training and resources aimed at supporting building professionals in advance of and during the next code cycle. NYSERDA will continue to work closely with DOS to provide code compliance support and tools including online code compliance resources to NYS AHJs.

Recommendation 1b: Develop packages of resources specifically focused on residential projects and additions and alterations and explore new ways to market these resources to building professionals with limited bandwidth for compliance activities. When developing compliance resources, ensure that the resources serve market actors of all types of projects (small and large, residential and commercial, new construction and alterations).

- **NYSERDA Response to Recommendation:** Pending. Future training will address additions and alterations for residential and commercial buildings. Market research will inform what, if any, other additional resources should be developed and what their potential demand and utility would be.

Finding 2: Regional variations in resources, staffing, and priorities impact opportunities to improve compliance. Many experts stressed that jurisdictions have competing priorities, such as easing processes to streamline economic development and using limited staff bandwidth for compliance with safety elements (e.g., fire code) rather than energy consumption. Feedback suggests that compliance levels vary across the state and that rural jurisdictions facing resource and staffing limitations are key drivers of lower compliance rates. Permit application processes vary by jurisdiction, with many jurisdictions still using paper processes that require additional staff hours. These variations add to the burden of applicants who must keep track of different processes and platforms across jurisdictions. Experts estimated that targeted third-party support will have a meaningful impact on compliance in these jurisdictions (average of 10%), as will code compliance technology (average of 6%).

Recommendation 2a: While post-training surveys gather data about where trainees work, survey questions could be structured to require respondents to select one or more cities or counties in a drop-

down menu to allow for easier processing and mapping of who has been engaged in each region across the state.

- **NYSERDA Response to Recommendation:** Pending. NYSERDA will explore the feasibility of gathering a greater degree of locational granularity in training survey instruments.

Recommendation 2b: Develop a protocol for assessing community capacity for compliance, considering potential inputs such as number of code officials, number of trained building professionals, points of engagement with NYSERDA, and others. Use findings from this analysis to support the development of more opportunities to target specific communities with resources that allow them to pursue energy code compliance without sacrificing already limited bandwidth. Explore opportunities to build local resources that support compliance and limit administrative, procurement, and maintenance requirements for code officials, builders, and other permit applicants.

- **NYSERDA Response to Recommendation:** Pending. NYSERDA plans to expand the availability of pilot programs designed to make enforcement easier and more efficient at the building department level.

Finding 3: Energy code officials' perception of the energy code in some jurisdictions may affect code enforcement and by extension, compliance. Interviews revealed that some code officials are not motivated to communicate code requirements to other market actors due to the perception that the value of the energy code was tied to concern about climate change, which they consider unnecessarily political and not well received in their jurisdiction. Some code officials also noted that they believed the energy code was becoming unrealistic and infeasible, or that they would alienate developers or political leadership by pursuing compliance. Interviews suggest that the majority of these concerns would be mitigated if energy code compliance was positioned as offering financial benefits such as compelling payback periods.

Recommendation 3a: Develop materials that highlight various benefits of the energy code in state resources and training. Incorporate easily communicated bullets and sound bites into training offerings, so that trainees may communicate benefits within the communities they serve.

Recommendation 3b*:* Where feasible, leverage existing pilot activities to enhance communication of the value proposition to communities. Given the ways in which compliance and motivating policies vary across jurisdictions, it may be beneficial in some cases to explore working meetings and collaboration

with community leadership and stakeholders in select jurisdictions to assess different jurisdictions' needs and provide customized support aligned with their needs and interests.

- **NYSERDA Response to Recommendations (3a & 3b):** Pending. NYSERDA will explore the practicality and utility of incorporating additional value propositions of energy code compliance into any future training and resources developed.

Finding 4: Trainings continue to provide value to attendees and are useful in increasing compliance. The percentage of code officials and building professionals who reported an increased understanding of energy codes influencing their approach to code compliance has remained consistently high throughout the evaluation period. This evaluation found that trainings have impacted code compliance, representing 80% of the energy savings in this initiative. At least 71% of respondents in all years say that they believe trainings increased compliance. Respondents also reported increased understanding of the energy code post-training in all years at remarkably consistent rates, though data show trainings have a slightly greater impact in the years immediately following code changes. More than 40% of survey respondents reported that they either made changes or expected to make changes to their energy code-related work procedures after attending the training every year. Early data suggest NYSERDA's increased diversification in training offerings has been well received, with surveys showing high ratings for information quality and relevancy to work for the new asynchronous trainings.

Recommendation 4: As was done ahead of code adoption in 2020, increase training efforts and resources near the upcoming energy code update. Providing additional support in the ramp up and following a code change will support code officials and building professionals with the transition. Continue to explore the impact of diversifying the energy code trainings' reach by experimenting with training formats (e.g., asynchronous online training options). Interview feedback noted that complex technical slides can be overwhelming and that providing real-world examples, pictures, and case studies could help engage trainees.

- **NYSERDA Response to Recommendation:** Pending. NYSERDA will support training on the next energy code update, informed in part by this evaluation.