Codes and Standards for Carbon Neutral Buildings Initiative Year 4 Market Evaluation Report:

Baseline Estimates and Progress Toward Goals

Appendices

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NYSERDA Contract # 104542 March 2024

NYSERDA Record of Revision

Document Title
Codes and Standards for Carbon Neutral Buildings Initiative Year 4 Market Evaluation Report: Baseline Estimates and Progress Toward Goals March 2024

Revision Date	Description of Changes	Revision on Page(s)
March 2024	Original Issue	

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Appendix A. Preliminary CEF Savings Estimates

In Year 4, the market evaluation team calculated preliminary Clean Energy Fund (CEF) savings estimates of the Codes and Standards for Carbon Neutral Buildings (CSCNB) Initiative associated with stretch code adoption and increased code compliance resulting from training.

The methodology for calculating these preliminary savings aligned with the methodology of Year 3, in which the team had made the following updates:

- Leveraged Pacific Northwest National energy use intensities for building codes at the end-use level, rather than the whole-building level
- Used an adjusted method for estimating energy consumption assuming that elements of a building project that are not in compliance with current code are 100% compliant with the previous code version
- Updated code compliance estimates with results from the Year 3 Delphi Panel

In Year 4, the savings estimates were refreshed with Dodge data provided by NYSERDA.

Table 1 shows the estimated savings for 2020, 2021 and 2022, for electric, electric demand, and fossil fuel savings. For 2022 training impacts, the market evaluation team used the 2021 impacts because total building square footage for 2022, an important component of the savings calculation, was not yet available. The team will update the 2023 estimates in Year 5, when complete 2023 data will be available. Similarly, the team trued up 2021 and 2022 estimates based on updated 2021 and 2022 square footage data that became available in Year 3.

Table 1. Preliminary Savings Estimates

	Electric Savings (GWh)			Demand Savings (MW)			Fossil Fuel Savings (Billion BTU)		
	2020	**2021**	**2022**	**2020**	**2021**	**2022**	**2020**	**2021**	**2022**
Stretch Code Adoption	4.1	14.28	15.12	1.1	4.0	4.2	6.76	18.17	20.01
Training	49.01	42.00	42.00	13.8	11.2	11.2	71.45	83.56	83.56
Total	53.11	56.28	57.11	14.9	15.2	15.4	78.22	101.73	103.57

Because two sources provided funding for the Initiative in 2020, the CEF and Technology and Market Development (T&MD), the team estimated 2020 CEF savings based on the percentage of funding coming from the CEF. The revised 2020 estimate is shown in Table 2.

Table 2. Preliminary Savings Estimate – CEF Only

	Electric Savings (GWh)			Demand Savings (MW)			Fossil Fuel Savings (Billion BTU)		
	2020	2021	2022	2020	2021	2022	2020	2021	2022
Stretch Code Adoption	4.05	14.28	15.12	1.1	4.0	4.2	6.68	18.17	20.01
Training	48.39	42.00	42.00	13.6	11.2	11.2	70.55	83.56	83.56
Total	52.44	56.28	57.11	14.7	15.2	15.4	77.24	101.73	103.57

Stretch Code Adoption

To calculate the impacts of stretch code adoption, the market evaluation team used the following variables: jurisdictions that have adopted NYStretch, the building square footage affected by NYStretch adoption, and the per-square-footage change in energy use intensity per square foot affected. The team also applied an attribution factor to estimate the percentage of energy savings from jurisdictions' stretch code adoption that should be attributed to the Codes and Standards for Carbon Neutral Buildings Initiative. Table 3 provides the data inputs and sources for the stretch codes savings calculation.

Table 3. Data Inputs for Stretch Code Savings Calculation

Variable	Source/Notes
Affected Square Footage	• Dodge data provided by NYSERDA: Assumed square footage is evenly distributed throughout the year and assumed compliance with the code was achieved upon adoption of the code • Assumed 2023 construction is the same as the 2022 pace • Adjusted county-level Dodge data to jurisdictions based on census information
Attribution Factor	• Market evaluation team panel–based review of Year 3 Stretch Code jurisdiction interviews (for NYS and NYC separately)
Energy Use Intensity Change Per Square Footage	• Pacific Northwest National Laboratory: Residential and Commercial Prototype Building Models: www.energycodes.gov/prototype-building-models • NYSERDA 2020 NYStretch Energy Code Commercial Cost Effectiveness Analysis: July 2019 • NYSERDA Energy Savings and Cost-Effectiveness Analysis of the 2020 NYStretch Energy Code Residential Provisions: July 2019

The market evaluation team convened an internal panel of experts in Year 3 to estimate the attribution that the Initiative should receive based on its work to develop and promote NYStretch. The internal panel made the following determinations following interviews with jurisdictions that had adopted stretch codes.

For New York City (NYC), the internal panel estimated that 75% of the savings realized from adopting the stretch code can be attributed to the Initiative because NYC has climate priorities and a history of

adopting stretch codes. NYSERDA provided critical assistance and support for NYC's adoption of its current stretch code.

For other jurisdictions, the internal panel estimated that 92% of stretch code savings are attributable to the initiative. Only one of the five jurisdictions outside NYC had adopted a stretch code prior to NYStretch-2020. This jurisdiction found NYSERDA's assistance important to its latest iteration of code important. The internal panel concluded that it would be unlikely for jurisdictions to develop and adopt stretch codes without NYSERDA's intervention.

Table 4 details the total impacts of the adoption of NYStretch. The market evaluation team identified 42 jurisdictions that have adopted NYStretch across all three climate zones. Most significantly, NYC, which accounts for more than 92% of the affected square footage and energy savings of code adoption, adopted NYStretch in May of 2020.

Table 4. Local Impacts of New York Stretch Code Adoption

Jurisdiction or Climate Zone	Stretch Code Enhanced (1,000 sq ft)	Adoption Date	Attribution Factor	Electric Energy Savings (MWh)	Electric Demand Savings (MW)	Fossil Fuel Savings (Million BTU)
Statewide Total	**30,219.7**	**N/A**	**76%**	**15,357**	**4.300**	**20,203**
NYC - Total	27,648.8	N/A	75%	13,646	3.808	16,501
New York City	27,648.8	5/12/2020	75%	13,646	3.808	16,501
Climate Zone 4 - Total	1,808.0	N/A	92%	1066	0.308	1819
Hastings-on-Hudson, Village of	47.3	6/16/2020	92%	27	0.008	42
Dobbs Ferry, Village of	66.1	11/10/2020	92%	37	0.011	58
Bedford, Town of	103.5	2/2/2021	92%	58	0.017	91
New Rochelle, City of	472.2	4/20/2021	92%	265	0.076	416
Ossining, Town of	149.8	5/11/2021	92%	84	0.024	132
Mamaroneck, Town of	176.6	6/16/2021	92%	99	0.028	155
Cortlandt, Town of	253.1	7/20/2021	92%	142	0.041	223
North Salem, Town of	30.7	9/14/2021	92%	17	0.005	27
Irvington, Village of	39.0	9/20/2021	92%	22	0.006	34
East Hampton, Town of	97.6	11/18/2021	92%	69	0.021	147

Jurisdiction or Climate Zone	Stretch Code Enhanced (1,000 sq ft)	Adoption Date	Attribution Factor	Electric Energy Savings (MWh)	Electric Demand Savings (MW)	Fossil Fuel Savings (Million BTU)
New Castle, Town of	106.7	12/7/2021	92%	60	0.017	94
Southampton, Town of	265.4	12/14/2021	92%	188	0.056	400
Climate Zone 5 - Total	407.0	N/A	92%	353	0.099	985
Beacon, City of	81.6	4/20/2020	92%	70	0.020	194
Niskayuna, Town of	94.2	4/27/2021	92%	85	0.024	243
Lima, Village of	2.1	4/27/2021	92%	2	0.001	5
Athens, Village of	3.9	7/28/2021	92%	4	0.001	10
Philmont, Village of	5.2	8/9/2021	92%	5	0.001	13
Canandaigua, City of	75.7	9/2/2021	92%	68	0.019	195
Geneva, Town of	23.6	9/21/2021	92%	21	0.006	61
Tully, Village of	1.9	11/3/2021	92%	2	0.000	5
Orangetown, Town of	111.5	11/30/2021	92%	90	0.025	241
Pittsford, Village of	7.3	1/30/2022	92%	6	0.002	17
Climate Zone 6 - Total	355.9	N/A	92%	292	0.084	898
Montour Falls, Village of	16.1	2/18/2021	92%	15	0.005	52
Kingston, City of	93.5	4/6/2021	92%	89	0.026	299
Bethel, Town of	48.5	5/12/2021	92%	40	0.012	124
Dryden, Town of	103.1	5/20/2021	92%	68	0.019	175
Marbletown, Town of	21.8	6/1/2021	92%	21	0.006	70
Newfield, Town of	36.9	8/12/2021	92%	24	0.007	63
Humphrey, Town of	1.0	11/8/2021	92%	1	0.000	3
Esopus, Town of	35.1	12/16/2021	92%	33	0.010	112

Training Impacts

To calculate the impacts of trainings, the market evaluation team used the following variables: the building square footage affected by trained code officials and building professionals, the percentage of increased compliance resulting from training activities, and the per-square-footage change in energy use intensity per square foot affected. Table 5 identifies the source for each of these variables.

Table 5. Data Sources for Training Impacts Validation

Variable	Source/Notes
Affected Square Footage	Market square footage according to Dodge data provided by NYSERDA: Square footage estimates reduced to account for above code new construction based on initial NYSERDA estimates of 15% for residential new construction and 30% for commercial new construction
Change in Compliance Due to Initiative	Massachusetts TXC47 Non-Residential Code Compliance Support Initiative Attribution and Net Savings Assessment, July 26, 2018, NMR Group and Cadmus
Energy Use Intensity Change Per Square Footage for Percentage of Change in Code Compliance	Pacific Northwest National Laboratory: Residential and Commercial Prototype Building Models: www.energycodes.gov/prototype-building-models

As described in Year 3, the market evaluation team intended to base affected square footage on follow-up survey responses with training participants and then calculate an average impact to the population of trainees. However, the average square footage estimates applied to training participants would have yielded an impacted area that was greater than the total market. This high square footage estimate from training surveys was probably because code officials and building professionals worked on the same projects.

Table 6 shows the preliminary energy savings impacts from trainings for 2022 (complete square footage estimates for 2023 were not yet available when the analysis was conducted). The table shows the various building segments, market square footages, and final electric and fossil fuel savings. The final estimated 2022 energy savings is 55,022 MWh, the demand savings estimate is 14.7 MW, and the fossil fuel savings estimate is 99,770 MMBTU.

Table 6. Preliminary Energy Savings Impacts: Training

Segment	Market Square Footage (thousand sq-ft) [a]	Energy Savings (MWh/year)	Energy Savings (MW)	Energy Savings (MMBTU/Year)
Statewide Total	**97,819**	**55,022**	**14.7**	**99,770**
Commercial New Construction	65,959	43,444	11.3	65,068
Commercial Major Alteration and Additions	6,578	5,111	1.2	8,869
Residential New Construction	25,207	6,441	2.1	25,774
Residential Major Alteration and Additions	75	25	0.0	60

[a] Dodge data provided by NYSERDA: Square footage estimates reduced to account for above code new construction based on initial NYSERDA estimates of 15% for residential new construction and 30% for commercial new construction

Appendix B. Code Compliance Additional Details

1. In early 2022, the market evaluation team convened a Delphi Panel of 10 building energy codes and code compliance experts (panelists) working across New York State (NYS). The Delphi Panel process used the judgment of this group of experts to develop estimates and compile informed opinions on energy code compliance across the state. The team used these Year 3 Delphi Panel findings, supported by longitudinal panel results, to help calculate the savings estimates. In Year 5, the market evaluation team will convene another Delphi Panel that will further inform code compliance conclusions. The *Evaluation Methodologies* section provides details on the Delphi Panel methodology.

As shown in Table 7, seven of the 10 Delphi panelists had expertise in both residential and commercial energy codes, two had only residential expertise, and one had only commercial expertise.

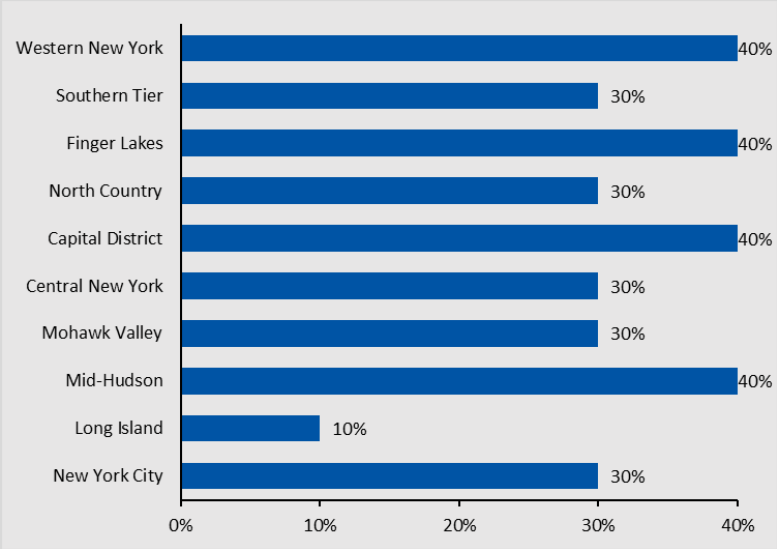
Table 7. Energy Code Expertise of Delphi Panel Participants

Category	Count
Commercial energy code expertise only	1
Residential energy code expertise only	2
Both commercial and residential energy code expertise	7

As shown in Figure 1, the team worked to ensure that the Delphi Panel respondents represented a wide range of geographic regions of work experience, with three respondents reporting having significant work experience in multiple regions.

Figure 1. Delphi Panel Study Participants' Geographic Experience (n=10)

Source: Delphi Panel Question: Multiple responses allowed. "With which geographic region(s) do you have the most expertise?" June 2022.



The team also interviewed seven individuals from three representative jurisdictions (urban [NYC], suburban, and rural). Throughout the interviews, the team presented findings from the Delphi Panel and asked the individuals if the estimates were aligned with their experience.

The following sections detail the results of the Delphi Panel process and the in-depth interviews with representative jurisdictions.

Energy Code Compliance

The market evaluation team asked Delphi Panel participants to estimate statewide compliance with the 2020 ECCCNYS, the energy code in effect during this evaluation year. The Delphi Panel provided estimates of the overall compliance rate, compliance rate by building system, and compliance rate by component for both new construction and for additions and alterations in the commercial and residential sectors. For this study, the *overall compliance rate* is the average percentage of requirements that are in compliance for the entire building. The *compliance rate* for building systems is the average percentage of requirements for a specific system that are in compliance.

Commercial Energy Code Compliance

The overall weighted panelist estimate of energy code compliance for commercial new construction in New York was 85%, and the overall estimate of compliance for alterations and additions was 84%. When asked if they agreed with the Delphi Panel's estimate of overall new construction compliance, the five

jurisdiction representatives with experience in the commercial sector agreed with the Delphi Panel's assessment, and one representative from NYC disagreed (estimating 80% compliance).

As with the overall compliance estimates for commercial alterations and additions, five of the jurisdiction representatives agreed with the Delphi Panel's assessment, while one representative from NYC disagreed (estimating 80% compliance).

Table 8 shows that new construction commercial compliance estimates have increased by 11% from the baseline estimates established through the 2015 ERS Delphi Panel, and 2% over the Year 1 Delphi Panel study findings. The change was more notable in additions and alterations, where Year 3 Delphi Panel respondents estimated compliance to have increased by 14% over the Year 1 study.

Table 8. Commercial Compliance Rates by Code and Study Year

Building Type	New Construction			Additions and Alterations		
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 Adopted	December 2010	October 2016	May 2020	December 2010	October 2016	May 2020
Estimated Compliance	74%	83%	85%	59% to 68%[a]	70%	84%

[a] 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% between the 2015 and 2020 studies.

When asked about the main challenges to achieving 100% commercial new construction compliance, respondents from representative jurisdictions commonly identified a lack of education, the complexity of the code, material costs, and a general resistance to change. One suburban architect also noted that for all project types, a key factor in achieving code compliance is the strictness of the building inspectors. They went on to say that particularly in smaller, rural communities, building firms may not have the same knowledge and experience as firms in urban communities and often are more reliant on code officials at the local level.

> *"They don't understand why they need to make changes, or pay the costs associated with those changes."*
>
> - Longitudinal jurisdictional respondent

> *"It's always going to be challenging, working with an existing envelope – how do you bring a 100-year-old building up to code without destroying the character."*
>
> - Longitudinal jurisdictional respondent

When asked about the main challenges to commercial additions and alterations compliance, respondents said they were the same challenges as for new construction. One respondent noted that those doing retrofits are often not the larger firms, exacerbating challenges around lack of education and pressure to comply. Three respondents noted that older buildings presented particular challenges, particularly around building envelope and finding ways to meet new standards with existing systems. They noted that customers were resistant to any change that affected the buildings "character" and didn't want to disturb the enclosure both because of cost as well as a resistance to insulating from the outside.

The market evaluation team also asked the Delphi Panel to consider the effect of moving to a new version of the energy code on overall compliance with commercial new construction. Panelists estimated that compliance would decrease by 7% at the beginning of a new code cycle (estimates ranged from a 5% decrease to a 10% decrease).

Four of the seven jurisdiction experts with commercial code experience disagreed with this assessment, suggesting code compliance was more likely to drop 10% to 15%. Three respondents said that it was always very challenging for code officials and builders to become familiar with new code versions, and a code official said there was not a good way for builders and code officials to become familiar with a new code before it was adopted, resulting in initial unfamiliarity with new code provisions and a reliance on building code officials catching issues as they arose, and educating builders over time.

Panelists also estimated the compliance rate for each major building system (the building envelope, mechanical systems, and electrical power and lighting systems). For both new construction and alterations and additions, panelists identified lighting and electrical systems as having the highest compliance (86% for both). Table 9 shows that the compliance estimates varied very little across the systems for both new construction and additions and alterations.

Table 9. Commercial Compliance Rate by System

System	New Construction	Additions and Alterations
Building Envelope	83%	82%
Mechanical Systems	84%	83%
Electrical Power and Lighting Systems	86%	86%

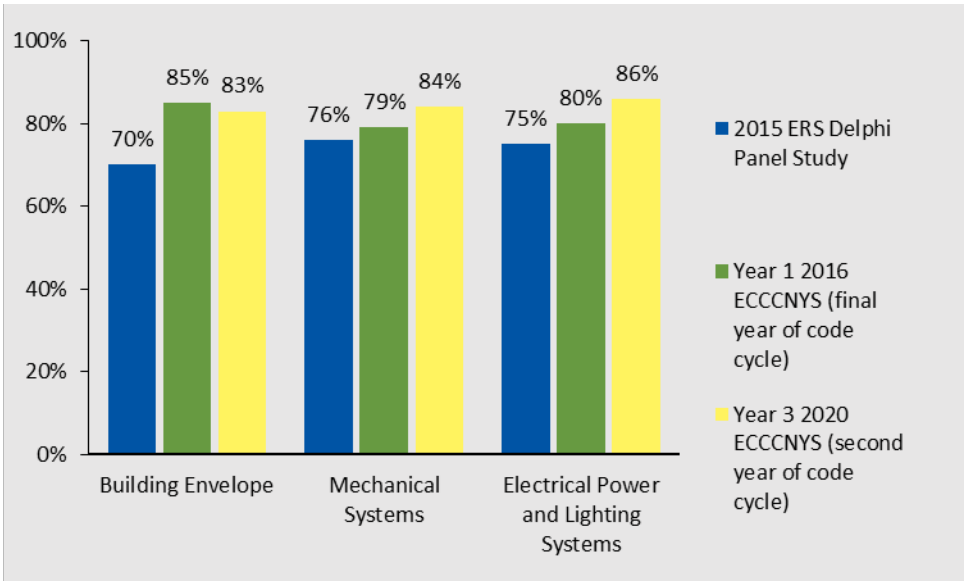
Overall, the six jurisdiction respondents with commercial experience agreed with the new construction building system compliance estimates, and which building systems saw the highest and lowest

compliance, with only two respondents disagreeing on at least one system estimate. One respondent (who owns a construction firm) said that he felt building envelope and electrical power and lighting systems should both be closer to 80%; the other respondent, an urban architect, also felt that the power and lighting systems estimate was too high, but otherwise agreed with the panel compliance estimates.

For commercial additions and alterations, more respondents disagreed with compliance estimates for systems, with three respondents agreeing with the Delphi Panel estimates, and three disagreeing. All three who disagreed felt that the envelope compliance estimate was too high (with jurisdiction respondent estimates ranging from 70% to 80%), with the suburban construction firm owner disagreeing with all three systems, thinking all should range between 70% and 75%. Respondents stated that for additions and alterations projects there was less scrutiny, and some confusion about when and where existing buildings needed to be upgraded. One respondent said code compliance for building envelopes was lower than study findings for additions and alterations, because "making the transition between old and new components is a challenge," "there is so much confusion about when and where you have to install upgrades," and "everything is a little harder, although not unachievable."

Figure 2 provides a comparison of panel estimates of commercial new construction compliance rates by system for the current study, the Year 1 study, and the 2015 ERS Delphi Panel study. The current Delphi Panel study found an increase in new construction compliance in both mechanical systems and electrical power and lighting systems over the previous Delphi Panel studies, with a small decline in building envelope compliance over the Year 1 Delphi Panel findings.

Figure 2. Comparison of New Construction Commercial System Compliance Rates by Study Year



Commercial New Construction Component-Level Compliance

The Delphi panelists estimated the compliance rate for key building components affecting energy use, which the market evaluation team identified in Year 1. Table 10 shows the average of the panelists' compliance rate estimates for each building component in new construction. Individual component compliance rate estimates may help NYSERDA and training implementers decide which topics to focus on with energy code training and other technical assistance.

Table 10. 2020 ECCCNYS Commercial New Construction Compliance Rate by Component

Component	Code Requirement	Compliance Estimate	
		Year 1	Year 3
Thermal bridging	Continuous insulation is in use for commercial projects to mitigate thermal bridging	66%	74%
Continuous air barrier installation	The air barrier is installed well with no gaps and all openings sealed continuously	70%	76%
Envelope insulation installation	Envelope insulation is installed per manufacturer requirements	67%	78%
Continuous air barrier	The air barrier meets the code requirements for materials, assembly, or testing	70%	78%
Demand controlled ventilation	Demand controlled ventilation is provided in all spaces greater than 500 square feet with an average load of 25 occupants per 1,000 square feet	69%	81%
Energy recovery ventilation	The energy recovery ventilation provided for fan systems exceeds values specified in the code; the exhaust air recovery efficiency is ≥50%	58%	84%
Mechanical commissioning	HVAC system is completed, including air and hydronic system balancing and functional performance testing; documentation and reporting requirements have been met	66%	84%
Daylighting controls	Daylit spaces have separate controls from general lighting controls or are automatically controlled with daylight sensors	80%	84%
Additional efficiency package options	Projects meet the additional efficiency requirements of Section C406	62%	84%
Envelope insulation	The building meets envelope insulation requirements	67%	85%
Vertical fenestration (windows and doors)	The vertical fenestration area is less than 30% of the gross above-grade wall area or up to 40% with automatic daylighting controls	71%	85%
Economizers	Economizers are provided where required, meet the design requirements for capacity, and have appropriate controls	85%	86%
Multiple HVAC systems	Multiple zone HVAC systems have supply air temperature reset controls and limit simultaneous heating and cooling to each zone	90%	87%

Component	Code Requirement	Compliance Estimate	
		Year 1	Year 3
Equipment sizing	Equipment meets sizing requirements	80%	87%
Interior lighting controls	Manual and automatic lighting controls are installed and functioning properly	86%	88%
Lighting power density	Lighting power meets space-specific density requirements	91%	89%
Mechanical controls	Mechanical controls include a programmable thermostat that provides heating and cooling to each zone, with capability for automatic setback and shutdown	92%	89%
Exterior building lighting power	Exterior lighting does not exceed the exterior lighting power allowance	89%	89%
Distribution systems	Ductwork and piping meet the required insulation levels	85%	89%
Exterior lighting controls	Exterior lighting is controlled by either motion sensor or time clock	91%	89%
Fenestration (windows, skylights, and doors)	Windows and doors meet U-factor and solar heat gain coefficient requirements	88%	90%
Variable air volume systems	Variable air volume fan motors are ≥10 horsepower, are driven by variable speed drive, have a vane-axial fan with variable pitch blades, or have controls or devices to limit fan motor demand	88%	90%
Equipment efficiency	Installed equipment meets efficiency requirements	95%	93%

There were several notable changes between the two studies where Delphi panelists identified changes around code requirements compliance. The Year 1 Delphi Panel gave the lowest commercial new construction compliance scores to energy recovery ventilation (ERV) and additional efficiency package options; however, the Year 3 study saw a notable increase in reported compliance for both (from 58% and 62% respectively, to 84%). Two of the jurisdictional respondents specifically noted agreement with the panel results showing improved compliance with ERV requirements. However, they were not as sure if they had seen the same improvement with additional efficiency package options compliance as estimated by the Delphi Panel. Equipment efficiency remained at the highest level of compliance, likely because items in the state are already manufactured to required standards.

Specific code requirements with compliance rates below 80% include the thermal bridging, continuous air barrier installation quality, envelope insulation installation quality, and continuous air barrier—all building envelope requirements. Many panelists and interviewees noted that compliance is lowest for provisions that require expert installation or other expert knowledge and highest for products that can be purchased with code-required specifications.

Commercial Additions and Alterations Component-Level Compliance

The panelists also estimated the compliance rate for select building components for additions and alterations. Table 11 shows the average of the panelists' compliance rate estimates for each select building component.

Table 11. 2020 ECCCNYS Commercial Additions/Alterations Compliance Rate by Component

Component	Code Requirement	Compliance Estimate	
		Year 1	Year 3
Thermal bridging	Continuous insulation is in use for commercial projects to mitigate thermal bridging	49%	71%
Continuous air barrier installation	The air barrier is installed well with no gaps and all openings sealed continuously	57%	72%
Demand controlled ventilation	Demand controlled ventilation is provided in all spaces greater than 500 square feet with an average load of 25 occupants per 1,000 square feet	58%	73%
Energy recovery ventilation	The energy recovery ventilation provided for fan systems exceeds values specified in the code; the exhaust air recovery efficiency is ≥50%	62%	73%
Continuous air barrier	The air barrier meets the code requirements for materials, assembly, or testing	62%	74%
Envelope insulation installation quality	Envelope insulation is installed per manufacturer requirements	65%	74%
Additional efficiency package options	Projects meet the additional efficiency requirements of Section C406	33%	75%
Mechanical commissioning	HVAC system is completed, including air and hydronic system balancing and functional performance testing; documentation and reporting requirements have been met	53%	78%
Vertical fenestration (windows and doors)	The vertical fenestration area is less than 30% of the gross above-grade wall area or up to 40% with automatic daylighting controls	75%	79%
Daylighting controls	Daylit spaces have separate controls from general lighting controls or are automatically controlled with daylight sensors	63%	79%
Interior lighting controls	Manual and automatic lighting controls are installed and functioning properly	80%	80%
Economizers	Economizers are provided where required, meet the design requirements for capacity, and have appropriate controls	72%	81%
Multiple HVAC systems	Multiple zone HVAC systems have supply air temperature reset controls and limit simultaneous heating and cooling to each zone	78%	81%
Exterior building lighting power	Exterior lighting does not exceed the exterior lighting power allowance	77%	81%

Component	Code Requirement	Compliance Estimate	
		Year 1	Year 3
Variable air volume systems	Variable air volume fan motors are ≥10 horsepower, are driven by variable speed drive, have a vane-axial fan with variable pitch blades, or have controls or devices to limit fan motor demand	80%	81%
Exterior lighting controls	Exterior lighting is controlled by either motion sensor or time clock	84%	82%
Lighting power density	Lighting power meets space-specific density requirements	80%	82%
Envelope insulation	The building meets envelope insulation requirements	78%	83%
Equipment sizing	Equipment meets sizing requirements	64%	83%
Distribution systems	Ductwork and piping meet the required insulation levels	83%	84%
Mechanical controls	Mechanical controls include a programmable thermostat that provides heating and cooling to each zone, with capability for automatic setback and shutdown	79%	85%
Equipment efficiency	Installed equipment meets efficiency requirements	94%	86%
Fenestration (windows, skylights, and doors)	Windows and doors meet U-factor and solar heat gain coefficient requirements	79%	86%

There were several notable changes between the two studies where Delphi panelists identified changes around code requirements compliance for additions and alterations as well. The most significant change was the 42% compliance increase estimated for additional efficiency package options. Additionally, the other two lowest compliance requirements in Year 1, thermal bridging and mechanical commissioning, increased from 49% to 71% and 53% to 78% respectively in Year 3. One longitudinal jurisdictional respondent said thermal bridging compliance was still low, but agreed that commissioning compliance had improved notably. Another longitudinal jurisdictional respondent said he agreed with the panel results, seeing improvement for both these requirements over the past few years. Like new construction findings, this suggests that several key low-compliance components that were identified as particularly challenging in Year 1 saw improved compliance over time, bringing up overall compliance estimates.

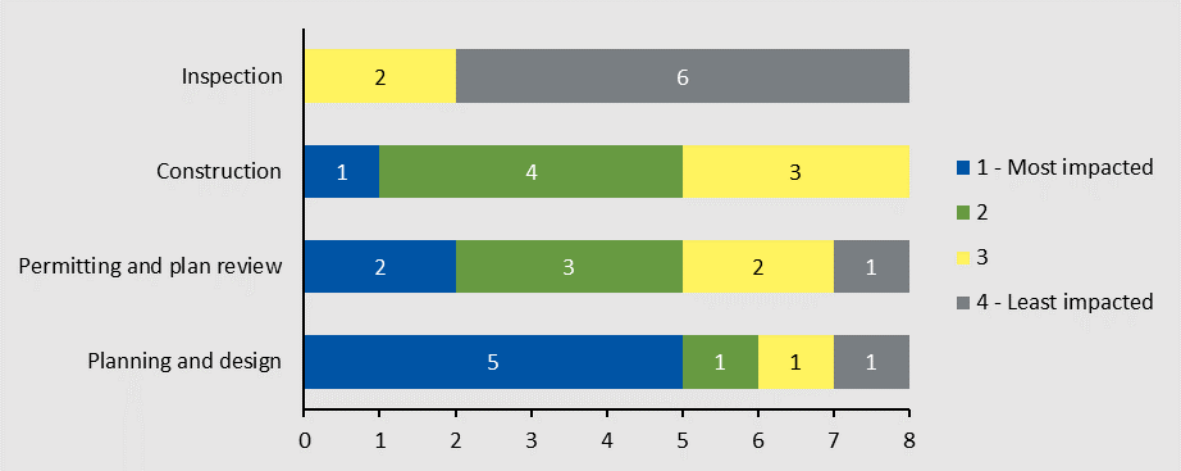
New focus areas with compliance rates below 74% include thermal bridging and continuous air barrier installation quality (which also scored the lowest for new construction), as well as demand controlled and energy recovery ventilation. Many panelists and interviewees noted that compliance is lowest for provisions that require significant changes to existing building structures, such as adding insulation to existing buildings.

Impact of Commercial Code Compliance Activities

In addition to estimating compliance with certain commercial energy code provisions, the Delphi panelists were also asked to rank the phase of a commercial new construction project at which energy compliance is most impacted. As shown in Figure 3, respondents were not in complete agreement, but most commonly cited the planning and design phase as having the greatest impact on compliance. One respondent noted that "you need to have it designed into the project first to even know what is needed to be done, and [account for] the added costs to the project." All eight Panelists with commercial experience ranked the inspection phase as having lower impact on compliance (a 3 or 4 on the 4-point scale).

Figure 3. Project Phase for Commercial New Construction Most Impacting Code Compliance (n=8)

Source: Delphi Panel Question: "At which phase of a commercial new construction project is energy code compliance most significantly impacted?" June 2022.



Overarching Commercial Findings

Panelists identified three key challenges the commercial building market must overcome when complying with the energy code:

- The complexity of the energy code
- The cost of implementing energy code requirements
- Lack of education for designers and installers

Panelists and jurisdiction interviewees identified which activities, practices or support would help increase compliance. Panelists said that more training, increased licensing requirements, and expanding the use of third parties for plan review and inspection oversight would help increase commercial compliance. One panelist also noted that standardizing envelope details for all exterior wall assembly

types would help address confusion around how to work with different manufactured materials and create more consistent compliance with requirements.

Residential Energy Code Compliance

The panelists' overall weighted estimate of energy code compliance for single-family residential new construction in NYS was 85%, and their overall estimate of compliance for single-family alterations and additions was 81%. While two jurisdiction interviewees (of six with residential experience) agreed with these estimates, the remaining four disagreed about if the estimate was too high or too low. Two interview respondents again generally agreed with the compliance estimates for residential alterations and additions while the others all found it too high, all providing a compliance estimate of 75%.

As shown in Table 12, compliance estimates for the residential sector remained fairly consistent between the 2015 ERS study and the Year 1 study; however, both estimates for new construction compliance and additions and alterations compliance improved between the Year 1 and Year 3 Delphi Panel studies.

Table 12. Residential Compliance Rates by Code and Study Year

Building Type	New Construction			Additions and Alterations		
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 Compliance	77%	77%	85%	62% to 71%[a]	71%	81%

[a] 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 0%–9% between the 2015 and 2020 studies.

Year 3 panelists estimated the current overall compliance rate for low-rise residential (low-rise multifamily) new construction as 82%, up from 73% in the Year 1 study, a 9% increase in compliance, which is similar to the compliance rate increase for the residential single-family new construction market (8%).

"If you've designed the building and if something is wrong, you may not be able to change it to get the correct thing because it takes so long to get materials."

- Longitudinal jurisdictional respondent

When asked to consider the main challenges to achieving 100% residential new construction compliance, respondents identified education and training (particularly of contractors), and the cost and availability of materials and new technologies. One respondent noted that the increasing stringency of the energy code requires new, more technical building techniques, such as whole house air systems, that can be challenging to install. This tied in with other feedback on the challenges of getting builders up to speed, particularly small contractors who have fewer resources. Respondents also noted that the cost of many common building materials, like insulation, caulking, and sealants, had increased substantially over the past few years, increasing the cost of complying with energy code requirements. A respondent who owns a construction firm noted that material costs issues were also sometimes exacerbated by lack of availability.

The respondents identified the same challenges facing residential additions and alterations as those affecting new construction and noted that, like new construction, these projects often involve smaller contracting firms that often are not as aware as larger firms of energy code requirements and the techniques needed to properly comply with them.

"The biggest one is communicating what code changes are and getting builders up to speed (they are not getting the education)."

- Longitudinal jurisdictional respondent

The market evaluation team asked the Delphi Panel to consider the effect of moving to a new version of the energy code on overall residential new construction code compliance. Panelists estimated that compliance would decrease by 7% at the beginning of a new code cycle (estimates ranged from a 5% decrease to a 10% decrease), but jurisdiction interviewees found this estimate to be too low, with several respondents suggesting that code compliance would more likely drop between 10% and 15%.

Panelists also estimated the compliance rate for each major building system (building envelope, mechanical systems, electrical power and lighting systems, and documentation). As shown in Table 13, panelists identified the electrical power and lighting system components as having the highest compliance for residential new construction and additions (92% for each) and documentation as having the lowest compliance (69% and 64% respectively).

Table 13. Residential Compliance Rate by System or Category

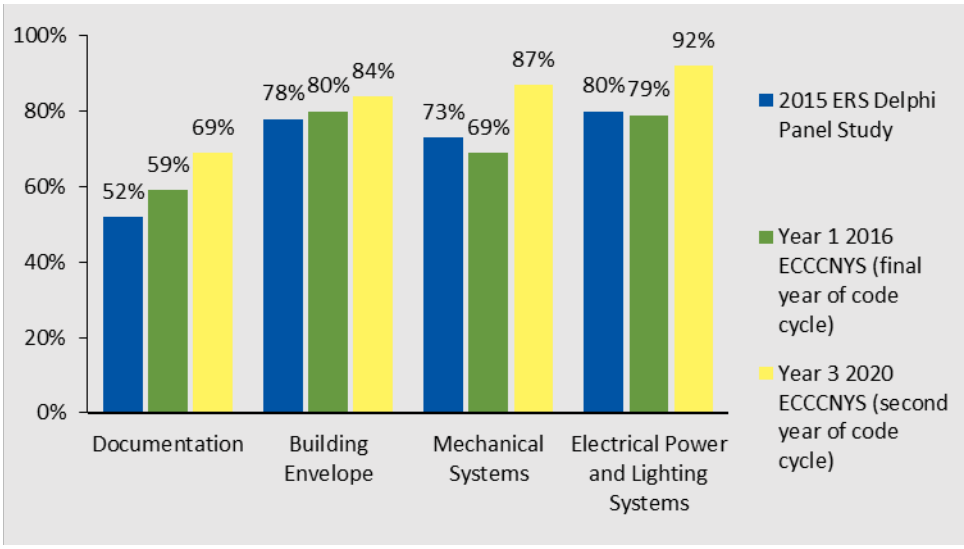
System or Category	New Construction	Additions and Alterations
Documentation	69%	64%
Building Envelope	84%	80%
Mechanical Systems	87%	84%
Electrical Power and Lighting Systems	92%	92%

Longitudinal jurisdictional respondents also considered the building system compliance estimates from the 2022 study for residential construction. Overall, the respondents agreed that lighting and power systems saw the highest compliance, noting that the bulbs and fixtures on the market tended to be very efficient and that those requirements tended to be easier to comply with than other building system requirements. However, several respondents disagreed with compliance estimates on documentation (three of six), providing much lower numbers (40% to 50%); an additional respondent generally agreed with the panel's documentation estimate but acknowledged that compliance varied widely.

For residential additions and alterations, some respondent did not agree with compliance estimates. Two respondents felt that the mechanical systems estimate was high, saying that there just wasn't enough oversight on additions and alterations projects and that some mechanical systems projects in existing building could face technical issues. Two other respondents (both architects) said the envelope compliance estimate was too high, (also pointing to insufficient oversight), and the documentation estimate was also too high and should be closer to 50%.

Figure 4 provides a comparison of estimated residential new construction compliance rates by system over time. Compliance estimates increased for all four components between the Year 1 and Year 3 study but increased for mechanical and lighting systems only after having dropped in the Year 1 study. Overall, the Year 3 Delphi Panel estimated improved compliance levels compared with levels in both the 2015 and Year 1 study.

Figure 4. Comparison of Residential System Compliance Rates by Study Year



Residential New Construction Component-Level Compliance

As with commercial construction, the panelists estimated the compliance rate for key residential building components. Table 14 shows the average of the panelists' compliance rate estimates for each select building component in residential new construction.

Table 14. Residential Compliance Rate by Component – New Construction

Component	Code Requirement	Compliance Estimate	
		Year 1	Year 3
Documentation	Construction documents supply enough detail for code officials to assess compliance, including information about air sealing and duct sealing and mechanical system design	58%	72%
Recessed lighting	Recessed fixtures in the building envelope are IC-rated and sealed with a gasket or caulk to limit air leakage	64%	76%
Duct testing	Ducts located in unconditioned spaces are tested for air leakage; total duct leakage does not exceed 4 cfm per 100 square feet of conditioned floor area	62%	78%
Insulation installation	Envelope insulation is installed per manufacturer requirements and Table R402.4.1.1 of the ECCCNYS	69%	81%
Certificates in panel	Permanent certificates are posted on or in the electrical panel to document code compliance	63%	81%
Air barrier and insulation installation	Components of the thermal envelope are installed and inspected per Table R402.4.1.1 of the ECCCNYS and verified with a blower door test	67%	81%
Air sealing	Building thermal envelope is sealed to limit infiltration; all joints and penetrations are sealed, as well as windows, doors, and attic access	61%	81%
Air leakage	Air leakage rate does not exceed 3 ACH50	79%	82%

Component	Code Requirement	Compliance Estimate	
		Year 1	Year 3
Distribution systems	Ductwork and piping are insulated and sealed	74%	85%
Tenant separation walls	The fire separations between dwelling units in two-family dwellings and townhouses are insulated to R-10 or greater and walls are air sealed	70%	85%
Equipment sizing	Heating and cooling equipment is sized per Manual J or similar requirements	65%	86%
Rooms containing fuel burning appliances	Appliance and combustion air opening is located outside the building thermal envelope or is enclosed in a room; combustion closets are insulated to levels not less than the basement wall R-value requirements in Table R402.1.2 of the ECCCNYS; closet is air sealed and door is fully gasketed	60%	86%
Inspection stickers	Builders leave window and door certification National Fenestration Rating Council stickers for inspection	78%	88%
Hot water pipe insulation	R-3 insulation on the hot water pipe is over 3/4-inch when applicable	80%	88%
Envelope insulation, general	The building meets or exceeds required envelope insulation levels (including for roof, above-grade wall, slab, foundation, and floor)	86%	90%
Duct insulation	Supply and return ducts in the attic are insulated a minimum of R-8 (where ≥3-inch diameter) and R-6 (where <3-inch diameter)	90%	91%
Vapor retarders	Vapor retarders are provided on interior side of frame walls (applicable to climate zones 5 and 6 only)	94%	91%
Individual unit lighting metering	Individual dwelling units are separately metered	94%	92%
Programmable thermostats	Programmable thermostats are installed in each dwelling unit with capabilities for daily schedule control and automatic adjustment based on largest heating/cooling zone, and have a temperature range from 55°F to 85°F	96%	94%
Interior light fixtures	At least 75% of permanent fixtures have high-efficacy lamps	79%	95%
Windows and doors	Windows and doors meet U-factor requirements	94%	95%

There were several notable changes between the two most recent Delphi Panel studies for residential new construction. Most code requirements saw an increase in estimated compliance, with the largest increases reported for rooms containing fuel burning appliances (from 60% to 86%), equipment sizing (65% to 86%), and air sealing requirements (61% to 81%). One longitudinal jurisdictional respondent agreed with the panel study, saying rooms with fuel burning appliances were seeing improvements in compliance, but did not think equipment sizing had improved so substantially. However, another jurisdictional respondent said that he believed equipment-sizing compliance was not overly

"Complete Energy Code documentation is rare."

- Delphi Panel Respondent

challenging and likely was high. The Year 1 Delphi Panel gave the lowest residential new construction compliance score to documentation; while the Year 3 estimate for documentation increased by 14%, it continued to achieve the lowest compliance rating. Windows and doors remained at the high end for compliance, likely because this equipment is manufactured to required standards, making code requirements easy to comply with.

Areas that need focused attention to improve compliance rates (compliance below 80%) include documentation, recessed lighting, and duct testing.

Residential Additions and Alterations Component-Level Compliance

The panelists also estimated the compliance rate for select building components in residential additions and alterations. Table 15 shows the average of the panelists' compliance rate estimates for each select building component.

Table 15. Residential Compliance Rate by Component – Additions and Alterations

Component	Code Requirement	Compliance Estimate	
		Year 1	Year 3
Documentation	Projects supply enough detail on the construction documents for code officials to assess compliance, including details for air and duct sealing and mechanical system design	41%	65%
Recessed lighting	Recessed fixtures in the building envelope are IC-rated and sealed with a gasket or caulk to limit air leakage	58%	66%
Duct testing	Ducts located in unconditioned spaces are tested for air leakage; total duct leakage does not exceed 4 cfm per 100 square feet of conditioned floor area	61%	68%
Certificates in panel	Permanent certificates are posted on or in the electrical panel to document code compliance	25%	73%
Air sealing	Building thermal envelope is sealed to limit infiltration; all joints and penetrations are sealed, as well as windows, doors, and attic access	44%	74%
Air barrier and insulation installation	Components of the thermal envelope are installed and inspected per Table R402.4.1.1 of the ECCCNYS and verified with a blower door test	49%	74%
Equipment sizing	Heating and cooling equipment is sized per Manual J or similar requirements	58%	76%
Insulation installation	Envelope insulation is installed per manufacturer requirements and Table R402.4.1.1 of the ECCCNYS	66%	78%
Tenant separation walls	The fire separations between dwelling units in two-family dwellings and townhouses are insulated to R-10 or greater and walls are air sealed	55%	81%

Component	Code Requirement	Compliance Estimate	
		Year 1	Year 3
Distribution systems	Ductwork and piping are insulated and sealed	71%	81%
Inspection stickers	Builders leave window and door certification National Fenestration Rating Council stickers for inspection	74%	81%
Air leakage rate	Air leakage rate does not exceed 3 ACH(50)	44%	81%
Envelope insulation, general	The building meets or exceeds required envelope insulation levels (including for roof, above-grade wall, slab, foundation, and floor)	79%	84%
Rooms containing fuel burning appliances	Appliance and combustion air opening is located outside the building thermal envelope or is enclosed in a room; combustion closets are insulated to levels not less than the basement wall R-value requirements in Table R402.1.2 of the ECCCNYS; closet is air sealed and door is fully gasketed	44%	85%
Programmable thermostats	Programmable thermostats are installed in each dwelling unit with capabilities for daily schedule control and automatic adjustment based on largest heating/cooling zone, and have a temperature range from 55°F to 85°F	96%	85%
Hot water pipe insulation	R-3 insulation on the hot water pipe is over 3/4-inch when applicable	79%	86%
Duct insulation	Supply and return ducts in the attic are insulated a minimum of R-8 (where ≥3-inch diameter) and R-6 (where <3-inch diameter)	88%	87%
Vapor retarders	Vapor retarders are provided on interior side of frame walls (applicable to climate zones 5 and 6 only)	94%	88%
Windows and doors	Windows and doors meet U-factor requirements	93%	91%
Interior light fixtures	At least 75% of permanent fixtures have high-efficacy lamps	82%	92%
Individual unit lighting metering	Individual dwelling units are separately metered	91%	92%

There were several notable changes between the two most recent Delphi Panel studies for residential additions and alterations. Several code requirements saw a notable increase in estimated compliance, including certificates in panel (from 25% to 73%), rooms containing fuel burning appliances (44% to 85%), and air leakage rate (44% to 81%). The Year 1 Delphi Panel gave the lowest residential new construction compliance score to certificates being properly displayed to document compliance in electrical panels; while the Year 3 compliance estimate increased by 48%, it continues to show room for improvement. One longitudinal jurisdictional respondent agreed about increased compliance with displaying certificates in panels, saying he knows they ask for the certificates, but he wasn't sure that they were consistently displayed in practice. Another said that he still did not consistently see certificates being

properly displayed. Requirements around light fixtures and metering received high compliance estimates, likely because of the increasing prevalence of these efficient technologies.

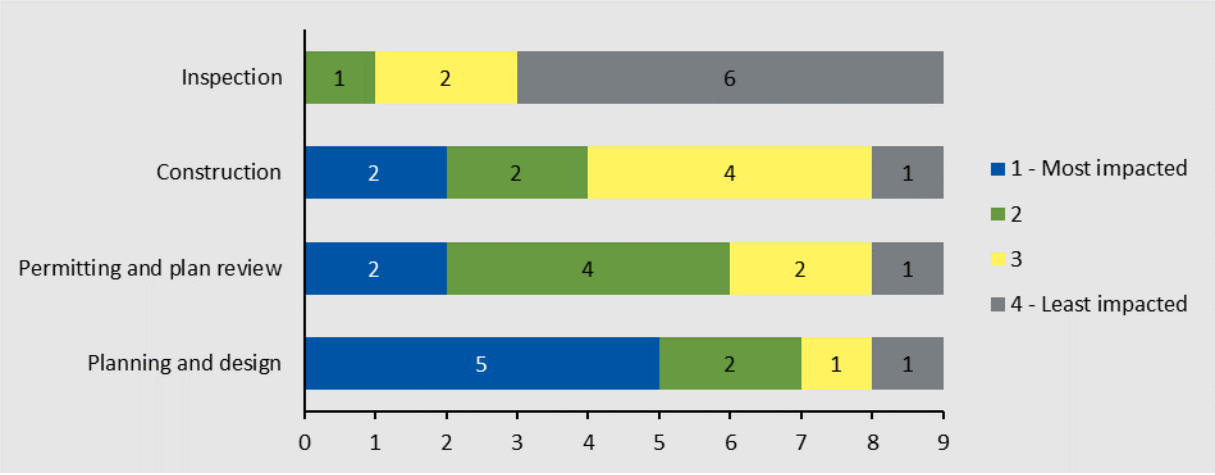
Areas that need focused attention to improve compliance rates (compliance below 70%) include documentation, recessed lighting, and duct testing – the same three lowest-rated components as residential new construction, suggesting that NYSERDA might consider focusing outreach and educational resources in these areas.

Impact of Residential Code Compliance Activities

The Delphi panelists were also asked to rank at which phase of a residential new construction project that energy compliance is most impacted. The nine respondents with residential code experience again most commonly found the planning and design phase to most impact overall project compliance, and for the inspection phase to have the least impact (see Figure 5). One respondent noted that "if it is not on the plans chances are it won't get done", and another noting "if/when the design is right, this [permitting and plan review] should be less significant." Many respondents noted they felt the same about residential new construction as they did for commercial projects in terms of what project phases ultimately most impacted code compliance.

Figure 5. Project Phase for Residential New Construction Most Impacting Code Compliance (n=9)

Source: Delphi Panel Question: "At which phase of a residential new construction project is energy code compliance most significantly impacted?" June 2022.



Overarching Residential Findings

Panelists with residential expertise identified several common challenges the residential building market must overcome when complying with energy codes.

- Costs of implementing energy code requirements
- Differing energy code interpretations by different jurisdictions/uneven enforcement across municipalities
- Difficulty sourcing materials
- The challenge of finding a qualified labor force (because of lack of education or resistance to change)
- The complexity of the energy code (also cited as a barrier in the commercial sector).

Panelists and jurisdiction interviewees identified which activities, practices, or support would help increase compliance. Panelists and members of representative jurisdictions said that, like with improving commercial compliance, more training was key to increasing compliance. Interviewees also suggested providing more rebates and tax incentives and implementing third-party enforcement more widely.

Initiative Progress

A key goal of the Codes and Standards for Carbon Neutral Buildings initiative is for energy code compliance to increase by five percent in NYS 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 to the 2015 compliance estimate of 74%. The estimate for residential single-family new construction also significantly increased from 77% in 2015 to 85%, showing much improvement over the 2015 estimate. 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.[1] Despite those fluctuations, estimated overall code compliance is improving over time.

[1] The Year 1 panel study was in the fourth year of the code cycle; the Year 3 panel study was in the second year of the code cycle.

Appendix C. Longitudinal Jurisdictional and Alternative Code Enforcement Pilot Interviews

Longitudinal Jurisdictional Interview Assessment

The market evaluation team interviewed 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 disadvantaged communities (DACs). Perspectives provided in these interviews may differ by jurisdiction, depending on the unique perspective and role of the experts interviewed. Opinions expressed by interview respondents about their experience with the energy code may differ from other actors involved in code compliance, enforcement, and impacts on DACs.

To ensure geographical, socioeconomic, and building density diversity, the team interviewed six professionals who work with the energy code in urban (NYC), suburban, and rural jurisdictions. Two focused on residential buildings, one specialized in commercial buildings, and three had experience with both. Four people focused on new buildings, two in the residential sector and two in the commercial sector. Two people had experience with multifamily and two specialized in low-income housing. To better understand how market trends and opinions change over time, the team created a pool of possible respondents and has interviewed these individuals over the life of the Codes and Standards for Carbon Neutral Buildings (CSCNB) Initiative.

Code Compliance

The team asked the energy code experts if energy code compliance has increased, decreased, or stayed the same in the residential and commercial sectors for new builds and additions and alterations. Respondents said that compliance has varied widely between new builds and additions and alterations. Five said that compliance in additions and alterations has increased while compliance in new buildings has largely stayed the same. This was because complying with the energy code was more difficult for additions and alterations; however, because of that difficulty there was more room for increased compliance. Many respondents said that new buildings were more likely to be built already in compliance, but additions and alterations have to be brought up to code using the existing building. One respondent commented that while new builds have begun accounting for energy code compliance at the start of the planning process, existing buildings only need to create a 20% energy savings, which does not guarantee full compliance. Many respondents said the complexity of enforcing the energy code with

> *"Additions and alterations do not get as much attention as they should."*
>
> - Longitudinal jurisdictional respondent

additions and alterations has resulted in new construction projects receiving more attention with code compliance.

Challenges to Code Compliance

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 operating needs. Three respondents discussed how much of the focus on compliance is on codes more directly related to safety for occupants, such as fire codes. One respondent noted that, with the recent changes in the energy code, sometimes people will think that they are compliant with the current code but will be thinking of the previous iteration. Some respondents said that any change in the energy code can be perceived by the general contracting community as a challenge to compliance and project management. Another raised the issue that enforcement through the judicial branch tends to be challenging because judges prioritize enforcement of dangerous situations first. 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, have constraints providing trainings, and are limited in updating their often outdated code compliance systems.

> *"Even as an energy consultant, you have to constantly review codes. It is a lot and complexity is a barrier."*
>
> - Longitudinal jurisdictional respondent

Ideas for Increasing Compliance

The energy code experts provided ideas to increase compliance, including increased communication with contractors about code changes and their added value, standardized education materials, and a streamlined application process. To increase knowledge of the code and combat the challenges of its complexity, four suggested outreach to contractors about the code changes and explaining the value add of those changes. Two suggested preparing a standardized guide for the different building types that includes examples for easier understanding. One suggested reframing the connections between the energy and fire codes. Sealing a building better will help lower the risk of fire moving through a building; therefore, energy codes are directly connected to greater occupant safety. The respondent suggested that fire code trainings could include some information about how energy code compliance helps fire code safety. One respondent noted that creating a more streamlined application process, such as using a client relationship management system, would increase understanding and compliance on applications.

Alternative Code Enforcement

Current Enforcement Strategy

The market evaluation team asked respondents about their current system of energy code enforcement. Four respondents stated that building inspectors and code officials were the main enforcement strategy. One said that code officials used a process that included reviewing the energy plan prior to permitting, a tabular analysis, using REScheck and COMcheck, and an on-site inspection during various stages of the construction. Any corrections or violations would then need to be corrected, and possibly audited. REScheck and COMcheck were noted twice in the interviews as part of the protocol, although one respondent stated that code enforcement through REScheck and COMcheck is not as useful "for those already focused on sustainability because it's just a compliance tool, not a design tool."

For existing buildings, one respondent noted that compliance for additions and alterations often falls on architects. Two mentioned that enforcement currently varies widely based on code official availability, funding, and if the project is a new build or an addition or alteration. Larger municipalities tend to have bigger offices, more funding, and offer training, and they are more likely to have a dedicated code official. 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.

Recent Changes to Code Enforcement

> *"Rural communities do not have the capacity to hire an inspector, but more counties would benefit from it."*
>
> - Longitudinal jurisdictional respondent

When asked about what changes energy code jurisdiction respondents have seen recently, most interviewees said that code enforcement has become more robust, but one said that there has been no change. Respondents attributed the increase in enforcement to the growing familiarity of the codes, more staffing, and penalties for noncompliance. Several discussed that, as compliance grows, there is also a growing fear of the fines and other non-compliance issues such as project delays. They agreed that compliance varies widely between projects and enforcement systems. One respondent discussed how their jurisdiction had included a virtual element during the COVID-19 pandemic that has been helpful for enforcement.

Types of Alternative Enforcement Strategies

The market evaluation team asked the energy code experts what types of alternative code enforcement strategies they had heard of previously. Most were not fully familiar with alternative systems, but one noted using third-party construction inspectors to certify that the building matches the construction documents. This respondent also said there had been movement toward more virtual processes.

For these interviews, the team also was interested in learning how familiar respondents were with NYSERDA's list of qualified third-party support providers.[2] This list is a voluntary resource created by NYSERDA to help authorities having jurisdiction (AHJs) find capable third-party support providers for projects as needed. None of the respondents were very knowledgeable of the list. One respondent had heard of the qualified third-party support providers list but did not know details, such as if it was specific to New York City or more broadly to New York State.

Impact of Alternative Enforcement

When asked about the impact of alternative code enforcement on communities, many respondents thought it was too early to tell; however, half of the respondents believed that alternative code enforcement would have a positive impact on code compliance. These respondents highlighted that compliance varies widely across regions and third-party support would likely standardize the process, thereby standardizing compliance rates. A few respondents emphasized that building code officials are already stretched thin from their daily duties, and it would be helpful to have a third-party support provider whose sole purpose is to ensure code compliance.

> *"Compliance significantly varies across regions and third-party systems will probably standardize it."*
>
> - Longitudinal jurisdictional respondent

Ideas to Encourage the Use of Alternative Enforcement

Respondents were also asked about how jurisdictions could be encouraged to use alternative code enforcement. Respondents suggested ensuring access to qualified inspectors, financing, and an easy application process. Several respondents emphasized that having easy access to people who are trustworthy and qualified to inspect and review projects would be helpful in encouraging jurisdictions to adopt alternative enforcement systems. Respondents also noted that financing is critical to supporting

[2] NYSERDA. 2023. *Find a NYSERDA Qualified Third-Party Support Provider*. https://www.nyserda.ny.gov/All-Programs/Clean-Resilient-Building-Codes/State-Energy-Code-Training-and-Resources/Third-Party-Support-Resources/Third-Party-Support-Resources-List.

jurisdictions in adding more alternative code enforcement strategies. One respondent said that when considering policy measures such as incentivizing "carrots" or deterrent "sticks" that carrots would be a good place to start. The respondent suggested that the program could look like a subsidized program, with free code reviewers that municipalities could sign up for, again emphasizing the importance of financing. Another respondent recommended streamlining the application process so that the municipalities do not become overburdened while trying to qualify for the alternative enforcement programs.

Drawbacks

The market evaluation team asked respondents what drawbacks could occur from the alternative code enforcement. Respondents were not as sure about the negative impacts, but many thought that money was an obstacle to implementing more alternative code enforcement strategies and achieving more compliance generally. One respondent also emphasized the importance of making a good first impression in the rollout of the alternative code enforcement programs and added that, if people have a negative experience with the initial programs, it will be harder to encourage scaling up.

Other Considerations

Respondents were then asked what other factors should be considered when implementing alternative code enforcement programs. They had many suggestions. The 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 enforcement 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 these alternative code enforcement programs would be accepted by the general codes community and how these programs would account for the learning curve of builders and municipalities as they integrate the alternative systems into the existing systems.

> *"We have to think about the liability of the people doing those third-party inspections."*
>
> - Longitudinal jurisdictional respondent

One respondent also suggested integrating energy code training into fire code trainings to demonstrate how energy codes are directly interconnected to occupant safety. For example, sealing a building better will directly lower the risk of a fire moving quickly through a building. If building code officials must pay or apply for an additional energy-related step, it will rarely be taken. Instead, demonstrating these code linkages during trainings will be more effective in promoting general energy code enforcement.

DAC Considerations

The market evaluation team was also interested in how the energy code experts viewed the effects of energy codes on disadvantaged communities (DACs). The team used the DAC definition in accordance with the New York State Climate Act. Respondents largely agreed that stronger energy codes could result in better quality housing stock, less affordability in the short term but money savings in the long term, and that shifting to modular homes might be helpful. Respondents also noted a substantial difference in the impacts for DACs in regulated affordable housing compared to nonregulated affordable housing.

Impacts on Housing in DACs

Five respondents said that stronger energy codes would result in better quality housing stock for DACs and a better quality of life for inhabitants. One respondent connected the stronger codes to better health for residents since "there are high asthma rates in certain city locations that correspond to low-income areas. Hopefully reducing fossil fuel emissions will remediate the situation."

> *"Every time the State asks for stringent codes, more low-income communities are unable to buy a home."*
>
> - Longitudinal jurisdictional respondent

However, three respondents also were concerned about the affordability of homes with stronger energy codes, especially in areas that are typically underfunded. One respondent emphasized that while there are benefits to energy efficiency, there have been many changes to the energy code in the last five years and complying with these changes can add thousands of dollars upfront for residents. This is compounded by the already increasing prices of materials, such as lumber. One respondent said that "the cost of building a house has gone up about 50% in the last few years" and that "affordability is a critical conversation." Two respondents mentioned how modular homes can be a more affordable option. One respondent noted that many companies have turned to modular home construction practices due to the increasing price of building homes.

When asked about the reason for the impacts, two respondents said that the complexity of building codes meant that any changes are generally perceived as a challenge by the contracting community. One respondent said that "new things usually require more education, cost, coordination, and time—even when the changes are minor." The respondent added that planners have to plan for uncertainty because the process relies on people who are paid $15 per hour to correctly install items, but it can be challenging for people who have been doing the same task for many years to change their practices.

Regulated and Non-Regulated Affordable Housing

> *"Lack of affordability widens the gap between those who own their own home and those that do not."*
>
> - Longitudinal jurisdictional respondent

When asked about how stronger energy codes would impact housing in DACs, two respondents noted that the impacts would vary widely between regulated and nonregulated affordable housing. For regulated affordable housing owned by the Housing Authority, they said that inhabitants tend to benefit greatly from the positive impacts of stronger energy codes, such as better quality housing, bill savings, and health benefits. One said that "tenants in regulated affordable housing benefit a lot because those owners are required to remain compliant." This respondent also noted that the regulated affordable housing is often new construction anyway and therefore easier to regulate from the project's beginning.

The two respondents said that low-income populations living in nonregulated affordable housing are hit hard by the negative financial impacts of the stronger energy codes compared to their counterparts living in regulated affordable housing. One respondent said that these negative impacts are because the financial burden falls squarely on the owners, who typically are already financially burdened. One respondent said that the "lack of affordability widens the gap between those who own their own home and those that do not." Additionally, these types of building are usually existing buildings that are complicated to update, further burdening the owners. Though stronger energy codes can positively impact regulated affordable housing, nonregulated affordable housing can be much more negatively impacted. It can be difficult to craft helpful legislation since additions and alterations tend to be complex to navigate and owners are already financially struggling, so even with incentives code compliance may not be the owner's main priority.

Key Takeaways

Overall, compliance has increased, but there are still ongoing challenges. Although familiarity with the energy code is increasing, people are still working on how to implement it because of it is complex, and respondents cited a lack of simple, informational materials. Ideas for increasing compliance include creating a system for communicating with contractors about code changes and developing standardized education materials.

Compliance varies widely but would improve with more financing. Whether jurisdictions would use the financing for a third-party inspection or for a devoted code official for their municipality, more funding was cited often to increase compliance and enforcement because there would be an increase in

inspections. The variability of energy code enforcement is partially due to differences in individual inspectors' availability of time and education, varied enforcement of new builds versus existing additions and alterations, and unequitable resources across small rural and larger municipalities. Additions and alterations are more challenging to bring up to compliance because the baseline is the existing building, whereas new construction must comply directly with the new code.

People are still somewhat reserved about accepting the more robust energy codes. Respondents cited some fear around penalties such as fines and projects becoming behind schedule because of the time needed to comply with the new changes of the energy code. If inspections find that the project is not compliant, builders must fix the issues and then the project is at risk of falling behind schedule, which can have an effect on project management generally. Overall, respondents agreed that more robust energy codes would result in better quality buildings and provide long-term benefits to inhabitants, but people are still adapting to the stronger enforcement. There is also a lack of understanding about the value proposition, and building officials tend to prioritize other codes that more directly impact occupant safety rather than the energy code.

> *"More 'meat' to the argument would help sell the stricter codes, rather than just saying it is for energy conservation."*
>
> - Longitudinal jurisdictional respondent

Alternative Code Enforcement Pilot Interviews

PON 4600 Release and Goals

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 authorities having jurisdiction (AHJs) in relation to residential and commercial buildings plan reviews and inspections as well as energy code compliance. Applications were selected through October 2022. At the time of the evaluation, the market evaluation team were made aware of a total of six AHJs participating in PON 4600's Third Party Support component and six AHJs participating in its Advancing Code Compliance Technology component. At the time of this report, NYSERDA said 10 AHJS are now participating in the Third-Party Support component and 11 are participating in the Advancing Code Compliance Technology component.

As part of a broader effort to support AHJs, NYSERDA issued a Request for Qualifications (RFQL 4698) –Third Party Support Providers (link) prior to the issuance of PON 4600. RFQL 4698 seeks to create a

pool of technically qualified "Third-Party Support Providers" with expertise in energy code plan review and inspection for commercial and residential buildings.

NYSERDA is also working with the NYS Department of State (DOS) to develop third-party resources and has developed and continues to improve a comprehensive website of third-party resources for voluntary use and access by all AHJs and interested stakeholders.[3]

Jurisdictions Interviewed

The market evaluation team reached out to six AHJs participating in each of the two components of PON 4600, which represented seven discrete AHJs. Six AHJs made themselves available for interviews. Of these, three represent jurisdictions serving DAC-designated census tracts and three did not.

Interview Methodology and Overview

Interviews were conducted following an interview guide, which was designed to determine what influenced the decision of the AHJs to participate, including the role of NYSERDA support. The interview first asked how far along the AHJs were in engaging with the pilot program, how they first engaged with the opportunity, key players in the engagement, and why they were motivated. AHJs were then asked questions specific to the two components of the PON, Third Party Support and Advancing Code Compliance Technology.

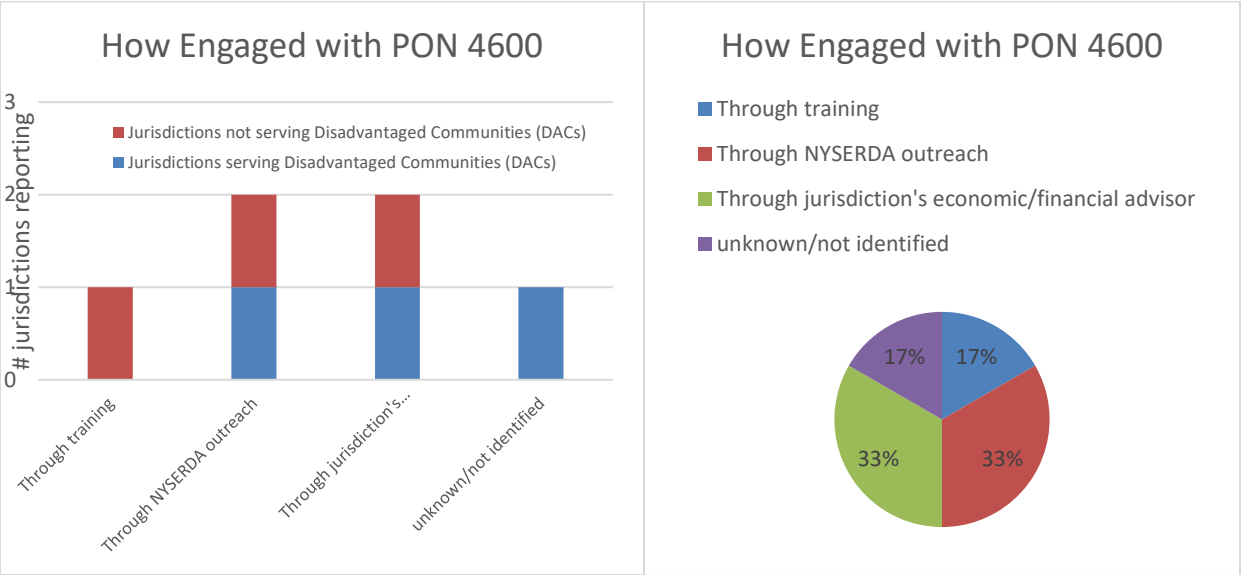
Interview Responses

Initial Engagement and Awareness

Of six jurisdictions interviewed, five were participating in both components of PON 4600 and one was participating only in the Code Compliance Technology component. One respondent learned about the PON at a training, two through NYSERDA outreach, two through an economic or financial advisor, and one was unsure how the opportunity was identified (Figure 6). Of the two AHJs that learned of the PON through NYSERDA outreach, one learned of it through an email alert and the other through active engagement with NYSERDA program leads for other programs.

[3] NYSERDA. "Third Party Support Resources." Accessed October 2023. https://www.nyserda.ny.gov/All-Programs/Clean-Resilient-Building-Codes/State-Energy-Code-Training-and-Resources/Third-Party-Support-Resources

Figure 6. How Engaged with PON 4600

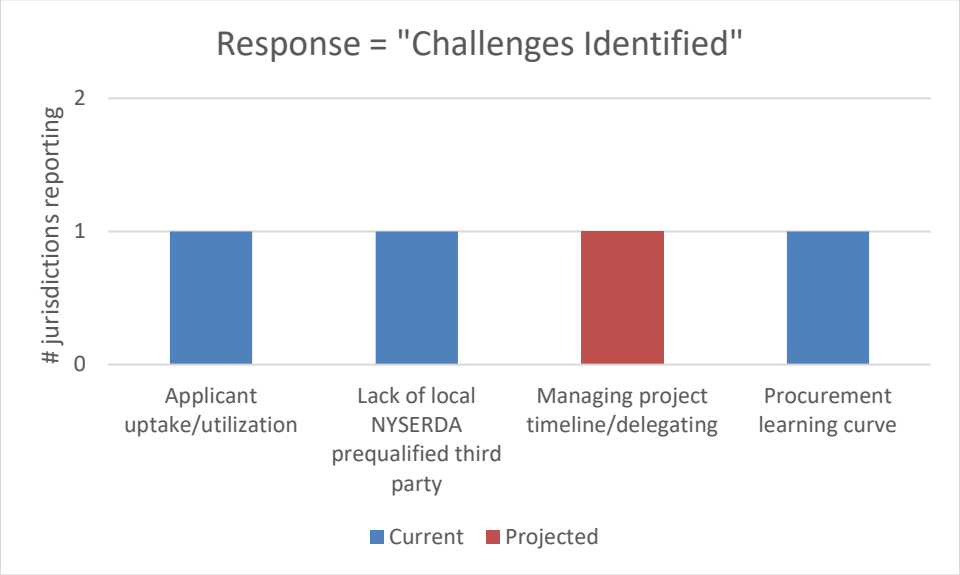


Motivation for Participation in the PON

Of six distinct jurisdictions interviewed (reporting on participation in 11 components of PON 4600), five were motivated to participate by the access to funding (three that served DACs and two that did not). Five AHJs identified a specific governmental need that motivated participation (three that served DACs reported and two that did not). Two were motivated to participate based on a desire to participate in programming offered by the state and/or NYSERDA (these AHJs did not serve DACs). Specific to the PON's two components, two AHJs reported interest from hearing positive experiences about implementation of new compliance technology in peer jurisdictions, and one had previous positive experience using third-party review. One jurisdiction was motivated by improving (operational) efficiency. Another wanted to simplify the engagement process for the jurisdiction and for applicants but found that there were no locally available third parties on NYSERDA's prequalified list (a resource they sought to use to simplify the engagement process for themselves and for applicants).[4] Another jurisdiction said the main challenge to implementation was identification of a procurement path that would work for their government, noting that this would be the first time the jurisdiction sought to procure third-party support. A jurisdiction that had not yet engaged a third party on a project said it would be challenging to delegate review to a party outside the government and still manage the review process timeline.

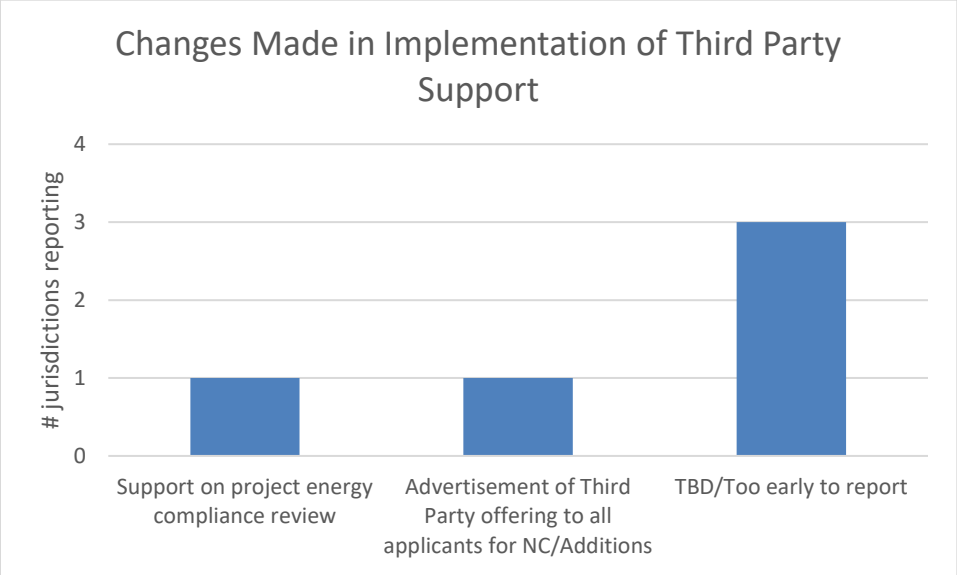
[4] Access to local third-party support appeared to be resolved for this jurisdiction at the time of the interview.

Figure 7. Response = "Challenges Identified" (Current and/or Projected)



Of the four AHJs reporting on changes made to date for implementation of third-party support (Figure 8), three said it was too early in their implementation timeline to report. One reported on completion of its first third-party project review and that it had finalized a document to advertise the use of third-party review to all applicants of new construction and additions or alterations.

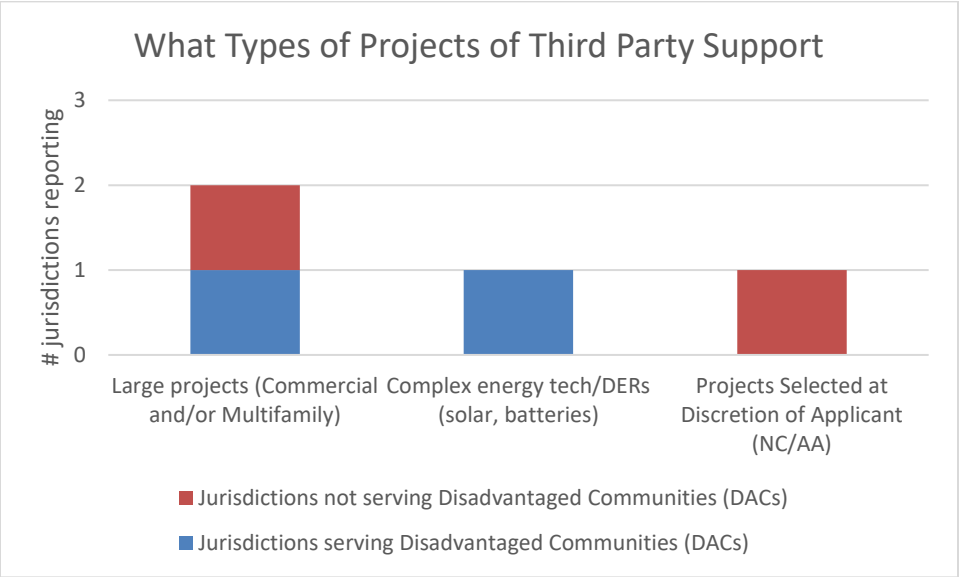
Figure 8. Changes Made for Implementation (Third-Party Support)



Jurisdictions were asked what types of projects that third-party support would be used for. As shown in Figure 9, two stressed the need for support on projects in more complex, larger buildings (commercial and

multifamily) and one cited a mixed-use project in the downtown area. One AHJ spoke primarily about the need for support on projects that had newer "green tech" technologies such as solar, battery energy storage systems (BESS), and other distributed energy resources (DERs). One AHJ did not speak to the need for support on complex projects and instead described a system in which applicants could access third-party support at their discretion for any new construction project or addition or qualifying alteration.

Figure 9. Types of Projects, Third-Party Support



Internal and External Reactions

Jurisdictions were asked about the reactions to implementation of third-party support within their government (Figure 10 and Figure 11). Four jurisdictions reported on positive internal reactions from experiences with the third-party support component of the pilot to date or projected. No jurisdictions reported neutral or negative internal reactions. When asked why internal reactions were shown or projected to be positive, they said implementation of third-party support was improving cross-departmental efficiencies, general function, and bandwidth (through efficiency); addressing the need for support on complex projects; and helping the jurisdiction with sustainability.

Figure 10. Reactions to Third-Party Support: Internal

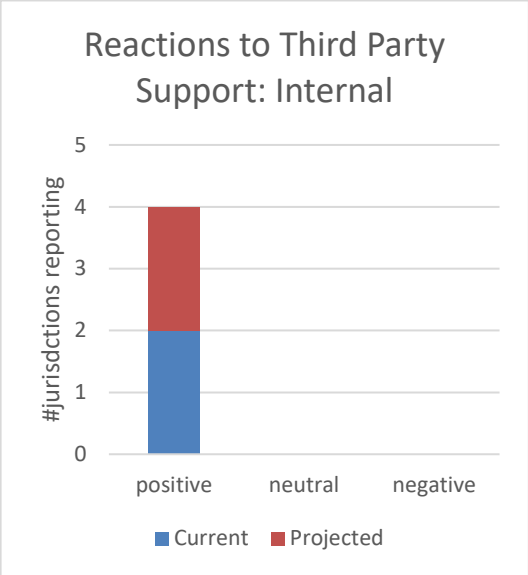


Figure 11. Internal Reactions = Positive (Third-Party Support)

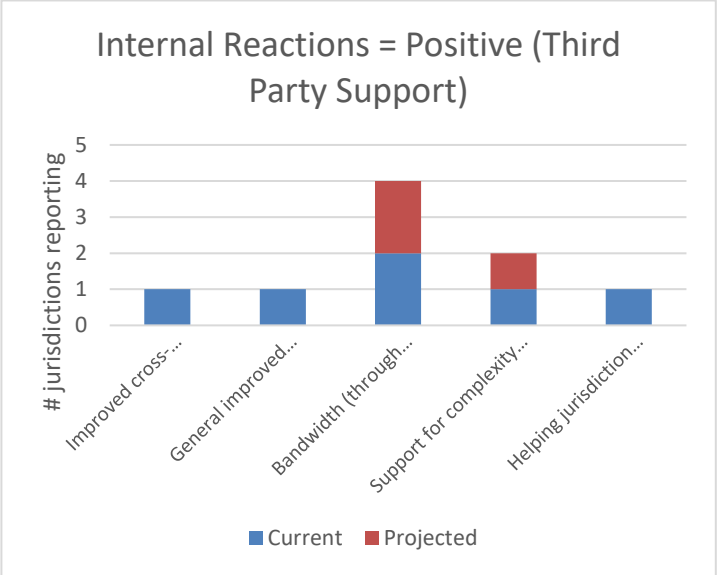
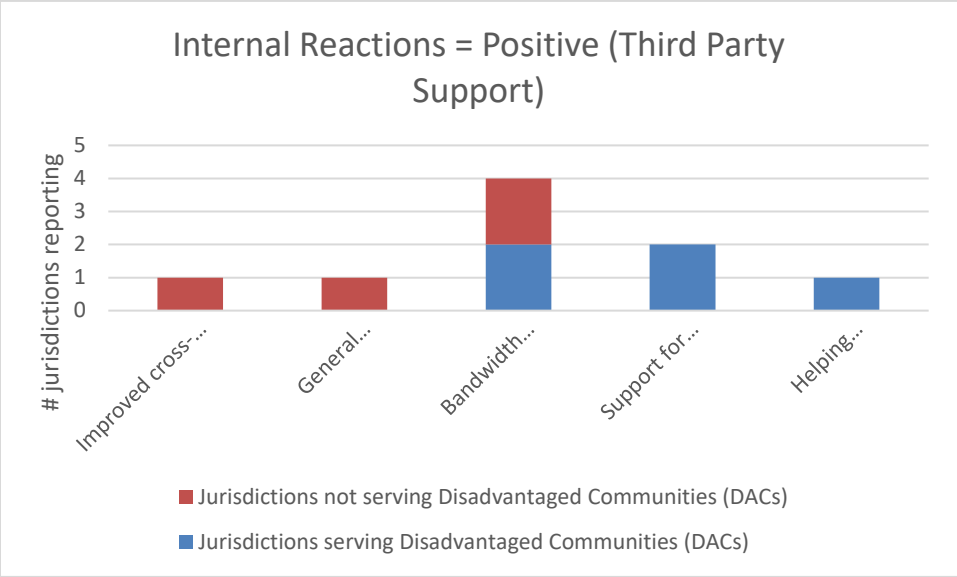


Figure 12 shows the same data broken down between jurisdictions serving DACs and those that did not.

Figure 12. Internal Reactions = Positive (Third-Party Support), DAC vs non-DAC



Jurisdictions were asked about the reactions to implementation of third-party support externally, including from builders and other building professionals, permit applicants, and community members (Figure 13 through Figure 17). Two jurisdictions reported positive reactions received from external parties, one reported neutral/no reaction, and two reported negative reactions (one described reactions to date and one projected negative reactions).

Figure 13. Reactions to Third-Party Support: External

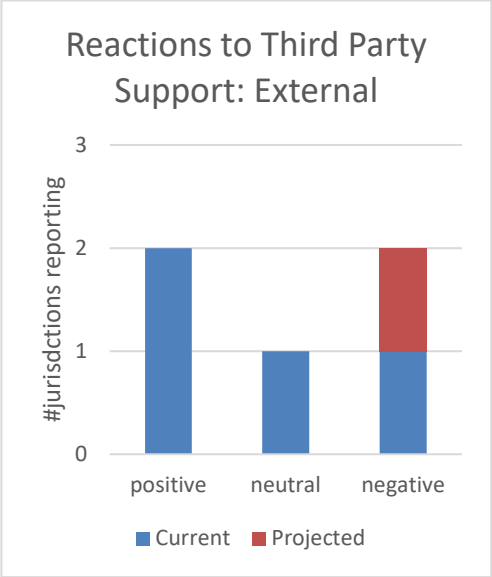


Figure 14. External Reactions = Positive (Third-Party Support)

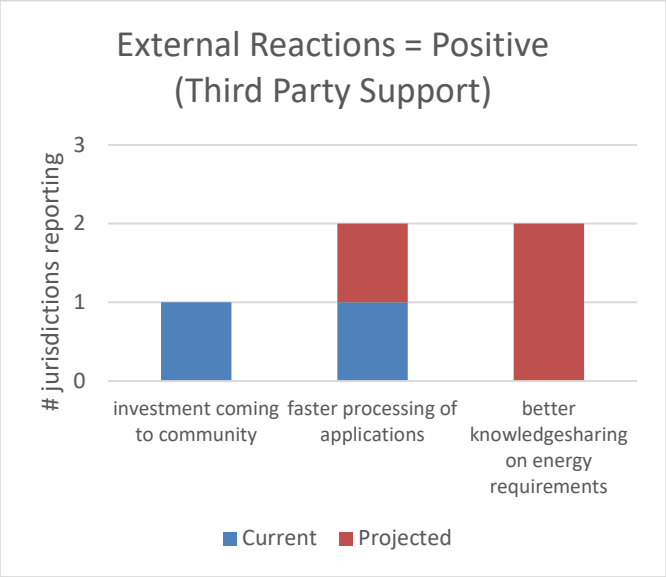


Figure 15. External Reactions = Positive (Third-Party Support, DAC vs non-DAC)

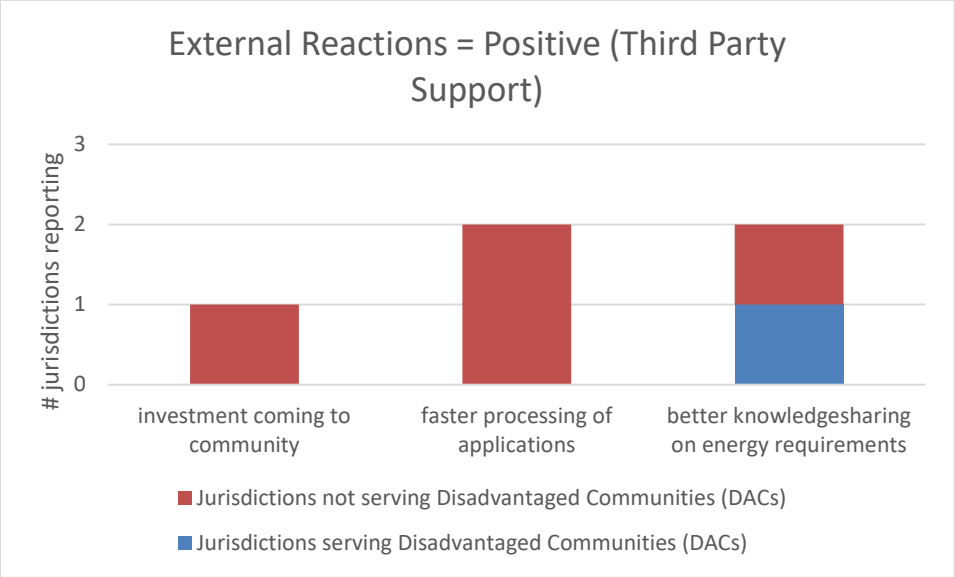


Figure 16. External Reactions = Negative (Third-Party Support)

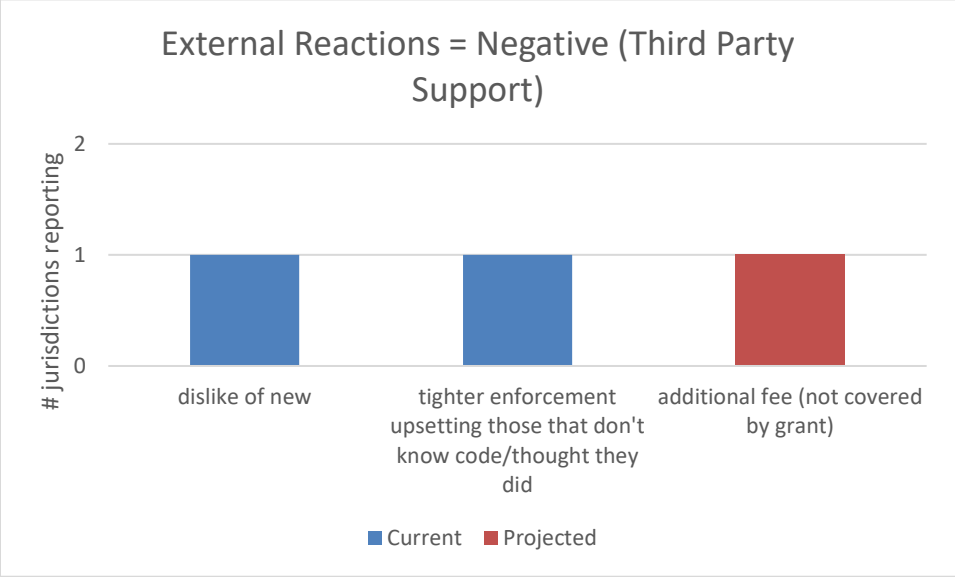
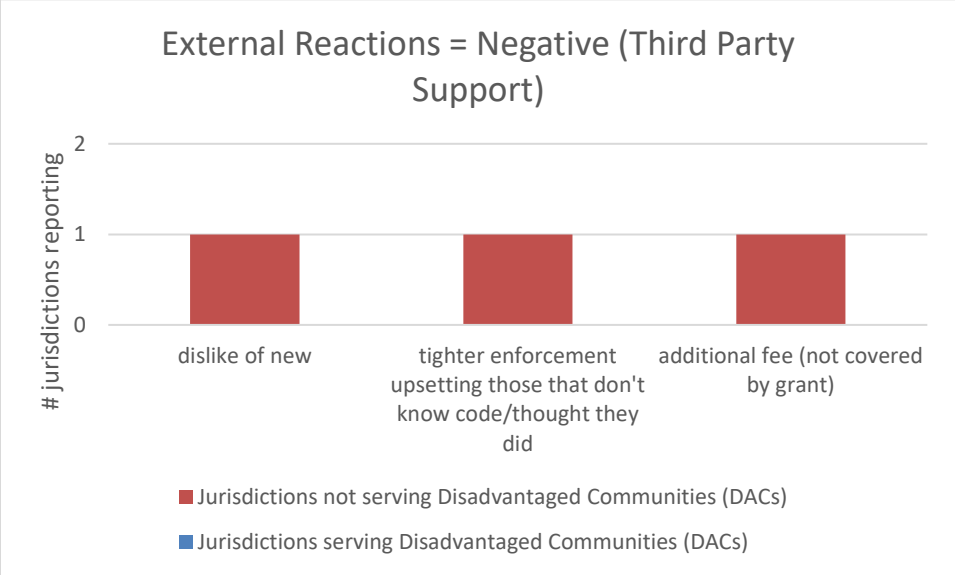


Figure 17. External Reactions = Negative (Third-Party Support, DAC vs non-DAC)



Effects on Code Compliance and Building Practices

Jurisdictions were asked about the effect of third-party support on both code compliance and building practices in their jurisdiction. All reported having either experienced or projecting to experience an improvement in compliance due to third-party support (Figure 18 and Figure 19). When asked for reasons, they said third-party support granted internal staff more time for compliance activities (one had experienced this, two projected this experience), faster processing of applications (one currently

experiencing and one projecting), expertise ensuring that larger projects comply (one projecting), and expertise in green and renewable technologies enabling more installations (one projecting). In comparing responses across jurisdictions serving DACs with those that do not (Figure 20), jurisdictions serving DACs were more likely to report realized or projected improvement in compliance due to improved access to expertise.

Figure 18. Effect on Compliance: Third Party Support

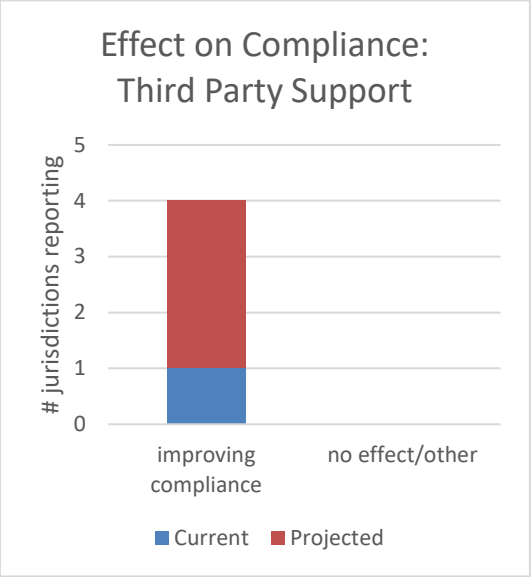


Figure 19. Reasons for Improved Compliance (Third Party Support)

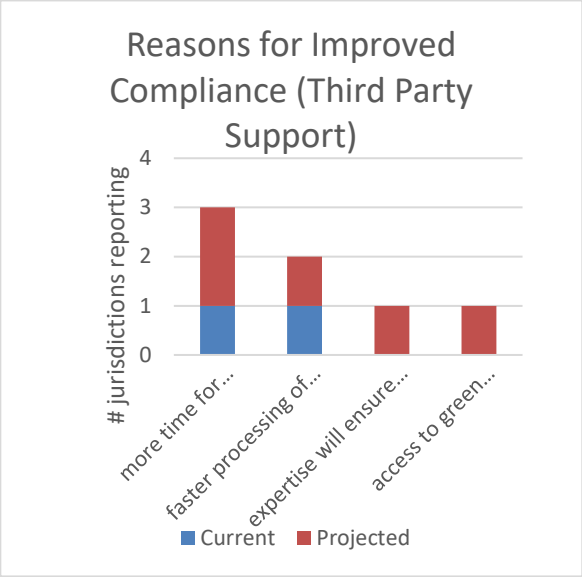
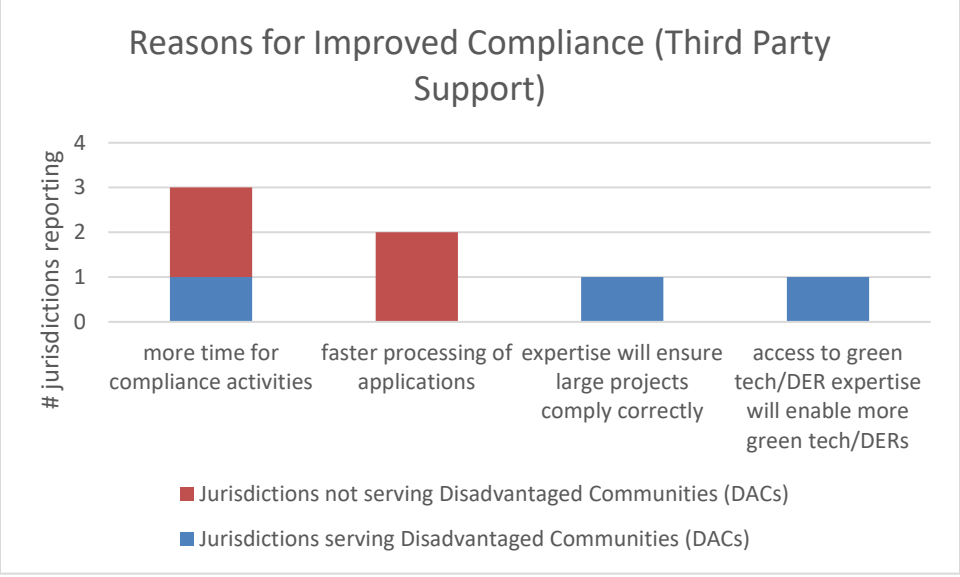


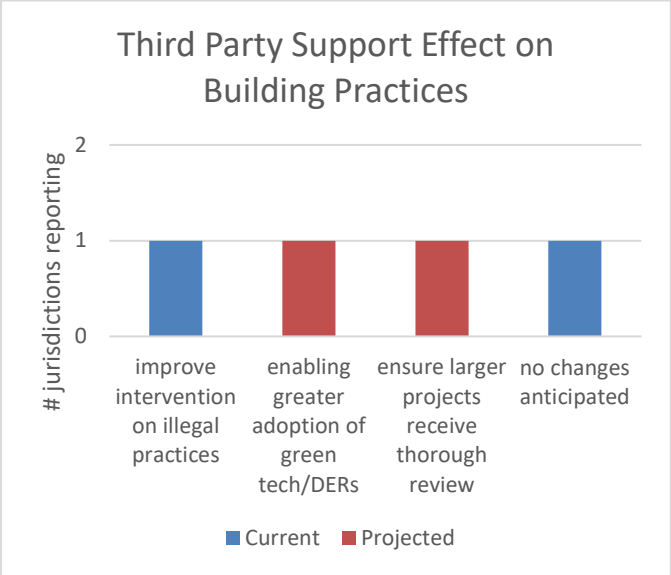
Figure 20. Reasons for Improved Compliance (Third Party Support, DAC v non-DAC)



Jurisdictions were asked to share the realized and/or projected effects of implementation of third-party support on building practices in their territory (Figure 21 and Figure 22).

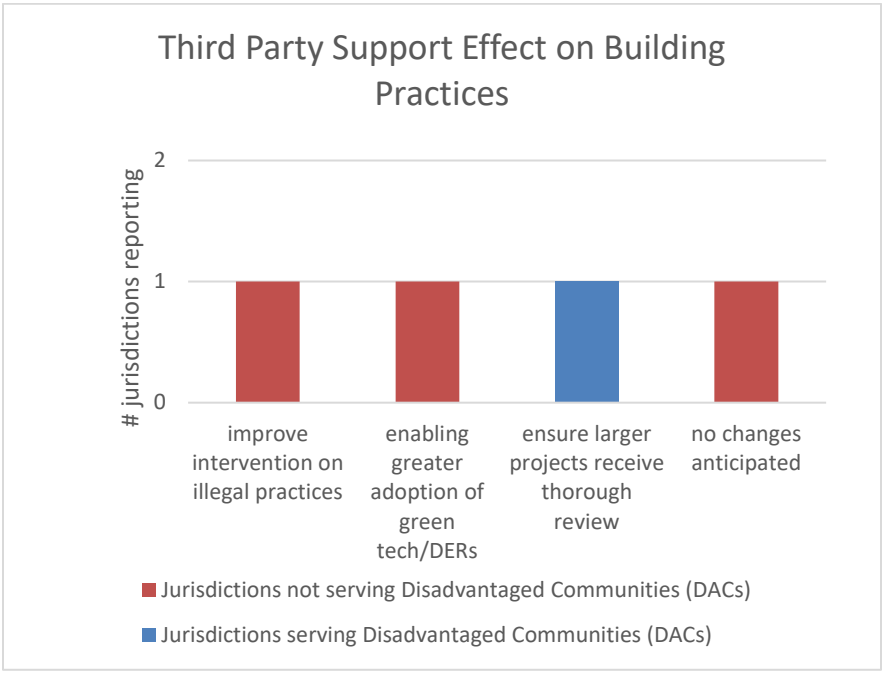
Answers varied and were difficult to aggregate. One jurisdiction said that implementation of third-party support had improved intervention on illegal practices by granting code enforcement more bandwidth to intervene in purposefully noncompliant activities.

Figure 21. Third Party Support Effect on Buildings Practices (Current and Projected)



Another projected that third-party support would provide for greater adoption of "green tech" and mentioned the benefit of having access to expertise for review of renewable energy projects and DERs. One jurisdiction did not project any changes to building practices based on third-party support availability and implementation.

Figure 22. Third Party Support Effect on Buildings Practices (DAC and non-DAC)



Jurisdictions were also asked to report on building practices or technologies that may have become more prevalent since implementing the third-party support component of the pilot. Given the early stage of implementation of all participating jurisdictions, all respondents said this was yet to be determined.

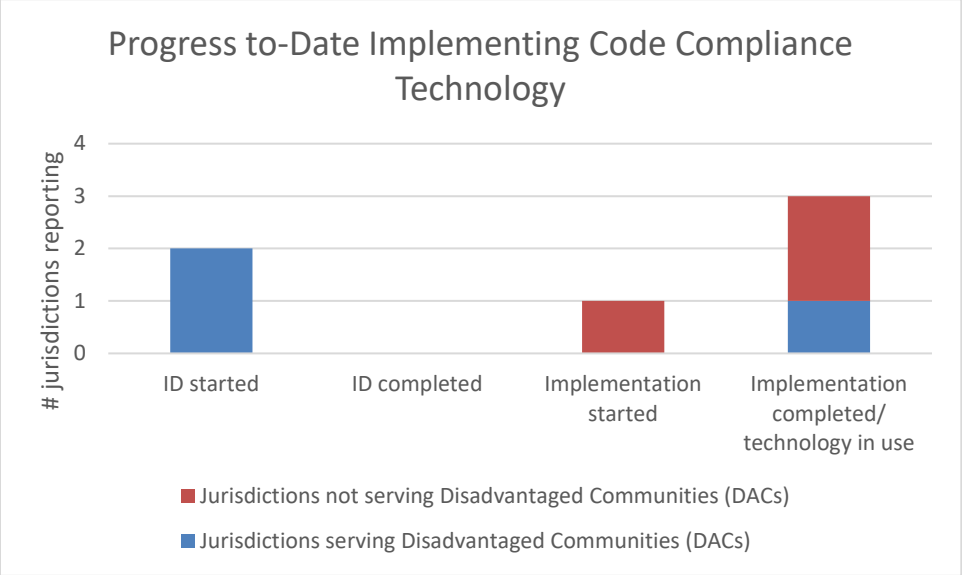
Advancing Compliance Technology Component

This section reflects interviews with six jurisdictions on their implementation of a new code compliance technology through PON 4600.

Progress Made/Timeline

As shown in Figure 23, three of the six jurisdictions said that the technology had been identified, selected, procured, and implemented and was in early stages of use (one jurisdiction served DACs and two did not). Another (that did not serve DACs) said that the jurisdiction had begun implementation but the technology was not yet in use. Two jurisdictions (both serving DACs) were still identifying the appropriate technology and determining the best path for procurement.

Figure 23. Progress to-Date Implementing Code Compliance Technology



Impressions to Date

Jurisdictions were asked to provide their general impressions of the implementation of the Advancing Code Compliance Technology component of the PON to date (Figure 24 and Figure 25). Three said implementation was going well, and a fourth projected that it would. One jurisdiction said it was too soon to be determined. Two shared challenges they were experiencing in implementation.

Figure 24. Impressions of Technology Implementation Progress to-Date

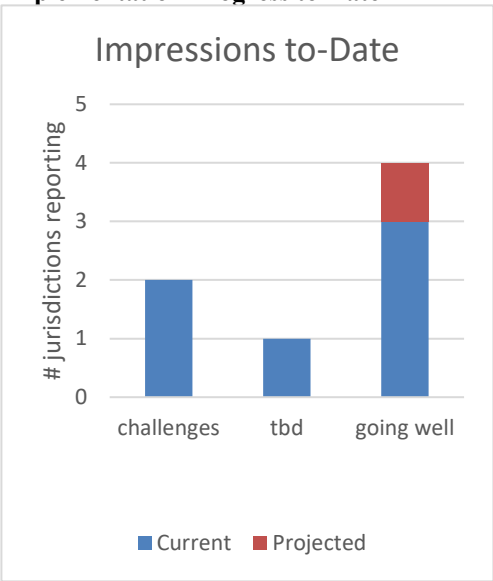
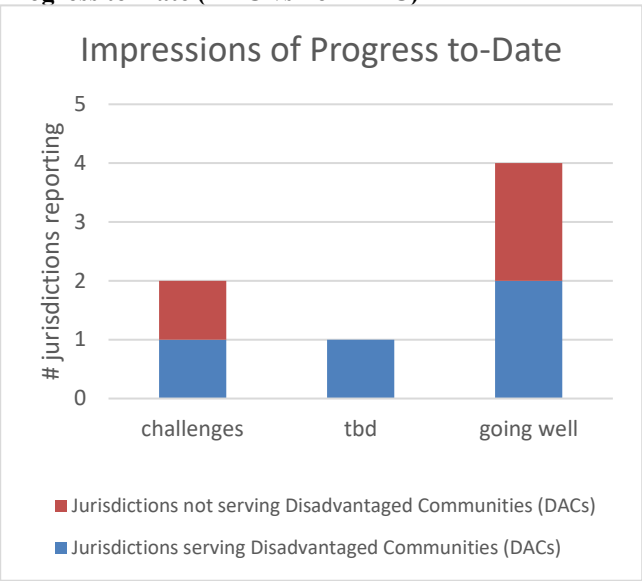
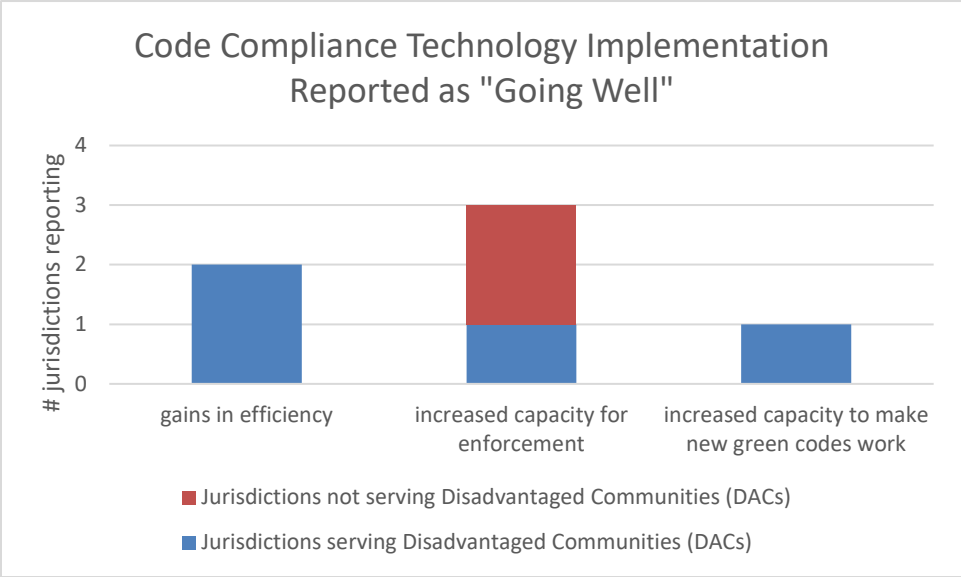


Figure 25. Impressions of Technology Implementation Progress to-Date (DAC vs non-DAC)



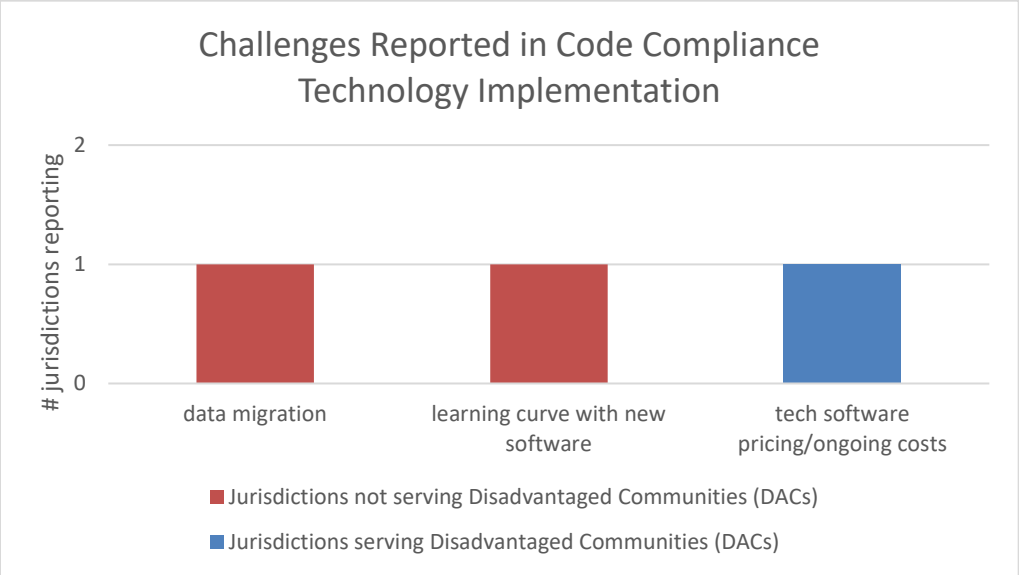
All four jurisdictions that reported implementation going well or projecting that it would to go well spoke of operational efficiency gains and increased capacity (Figure 26). Three jurisdictions (one serving DACs) specified that they were experiencing or were projecting to experience increased capacity for enforcement by implementing the code compliance technology. One jurisdiction (serving DACs) reported that implementation was going well due to the increased capacity to make new green codes work.

Figure 26. Code Compliance Technology Implementation Reported as "Going Well"



Jurisdictions that expressed challenges in implementing code compliance technology reported the difficulty of data migration (in particular, lack of support from the existing software) and staff learning curves in adapting to the new software (Figure 27). A third jurisdiction (serving DACs) reported concerns over the pricing of the software, particularly the impact of the ongoing service costs on the municipality's budget. Data migration and staff learning curves appeared to be short-term challenges, but the timeline for resolution of the ongoing costs of the compliance software package was unclear.

Figure 27. Challenges Reported in Code Compliance Technology Implementation



Capabilities of New Technology

Jurisdictions reported implementing, or were in the process of or projecting to implement, a number of features of the new code compliance technologies. They discussed capabilities such as to assist in both plan review and managing compliance violations. Four jurisdictions (one serving DACs) reported how the implementation allowed them to move away from a paper-based plan review system. Three said the new technology would allow them to present a new online application option to the public. Two said that the technology allowed them to generate multiple permits from a single entry.

Three jurisdictions (two serving DACs) said that implementation of the new technology allowed them to conduct cloud-based compliance, mitigating the inability to conduct compliance in the field if the server was inaccessible. Three (one serving DACs) reported that the new technology would allow for the automation of violation listing on properties. Two (one serving DACs) specified the ability to issue tickets in the field. Three said access to energy codes. Two (one serving DACs) reported the new ability

of the software to reference state and local codes, including energy, and one (serving DACs) said applicants could quickly reference the energy code.

One jurisdiction planned to implement technology software that allowed completion of an application in the language of the applicant, easing applicant submission. Another said that integration of demographic data would allow their office to better understand which communities are "getting help" more than others. These new features are listed in Figure 28 and by DACs or non-DACs in Figure 29.

Figure 28. New Offerings of Code Compliance Technology

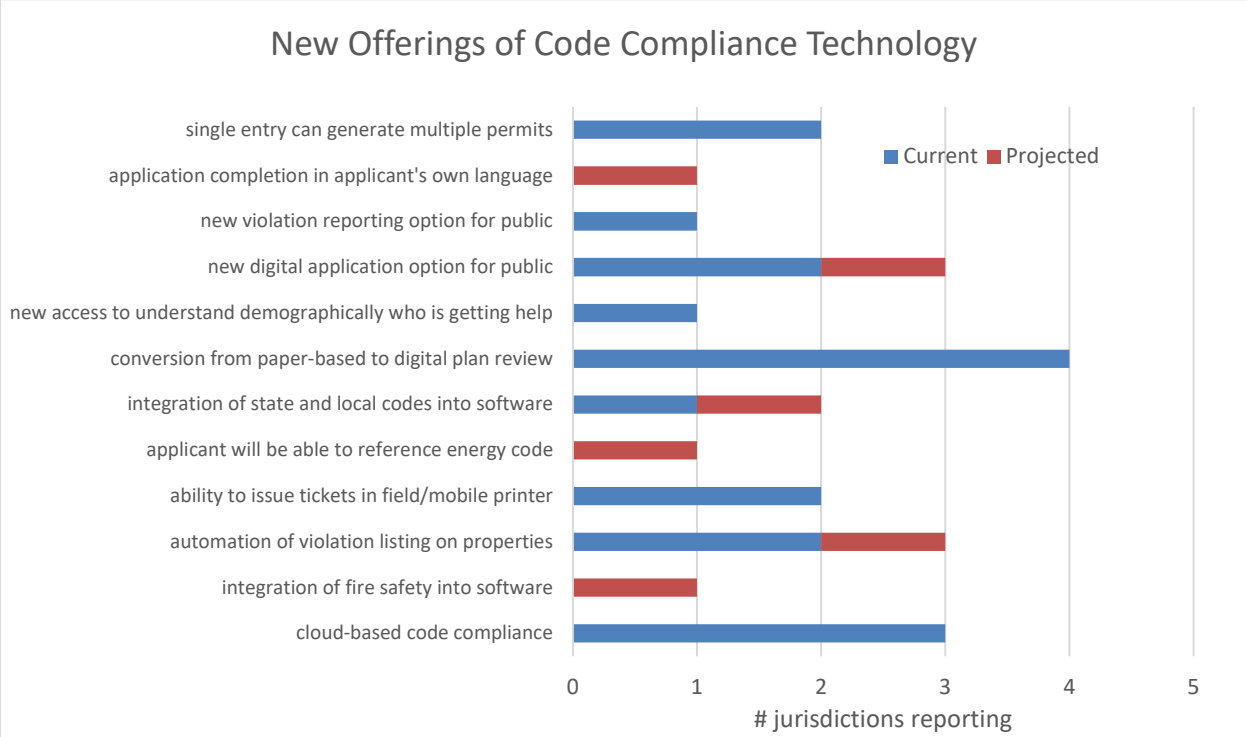
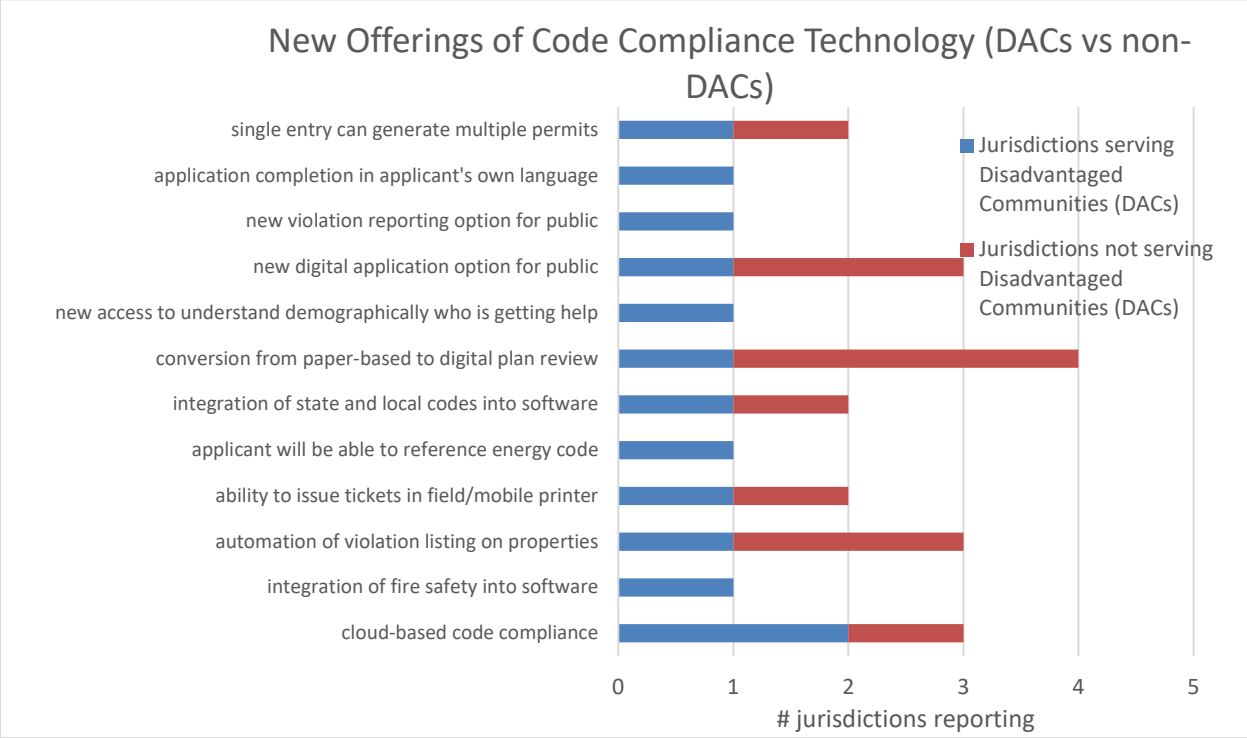


Figure 29. New Offerings of Code Compliance Technology (DACs vs non-DACs)



Internal and External Reactions

Jurisdictions were asked about reactions within their government on participation in the technical component of the PON. As shown in Figure 32, all six respondents expressed positive internal reactions (five had realized implementation, one projected). Two (neither serving disadvantaged communities, as shown in Figure 33) also shared negative reactions.

Figure 32. Internal Reactions to Code Compliance Technology

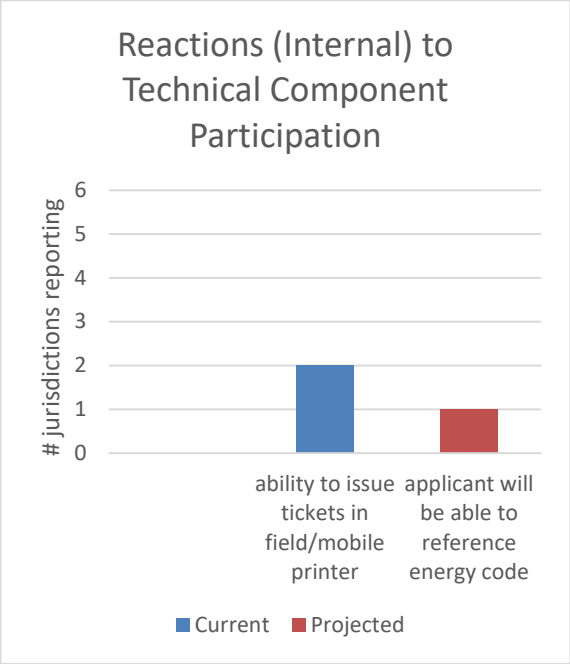


Figure 33. Internal Reactions to Code Compliance Technology, DAC vs non-DAC

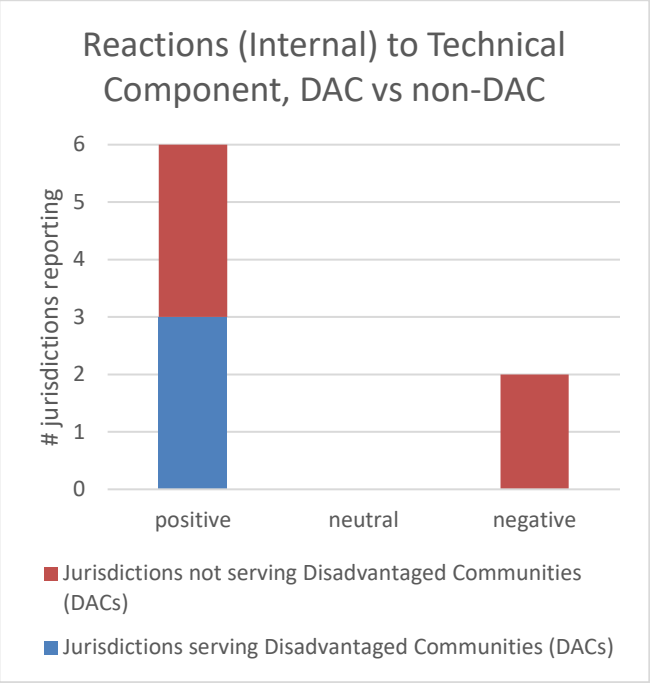


Figure 30. Internal Reactions to Code Compliance Technology

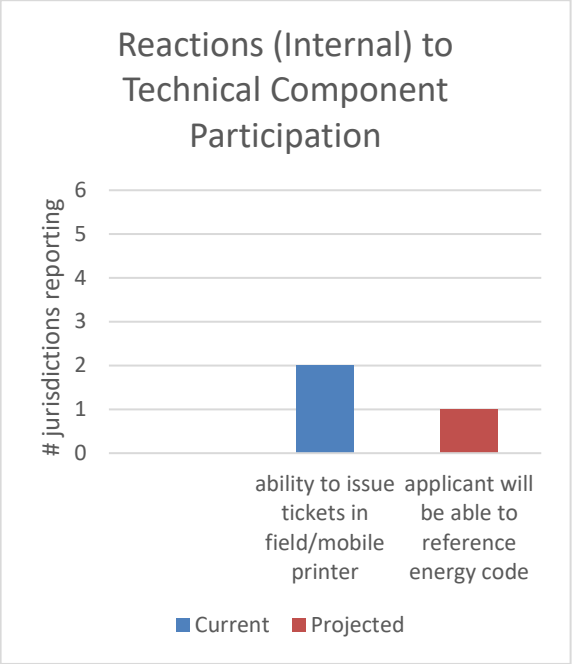
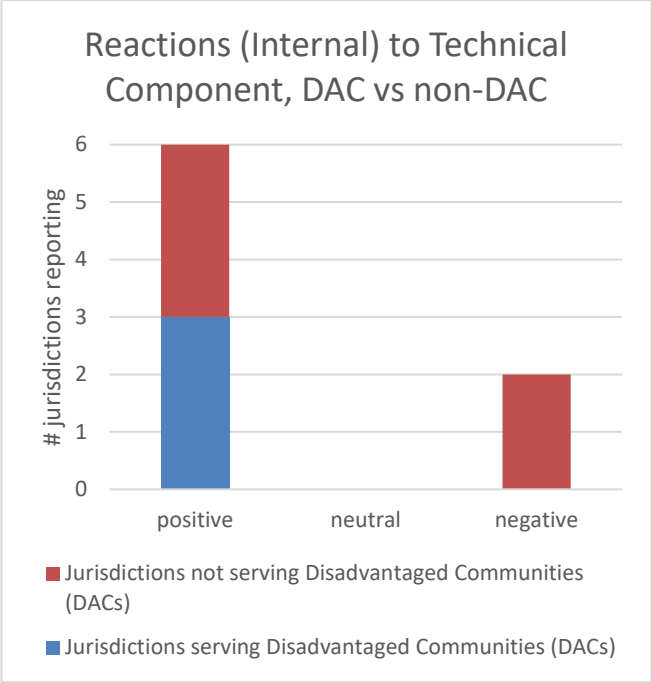


Figure 31. Internal Reactions to Code Compliance Technology, DAC vs non-DAC



Jurisdictions reporting positive reactions said that implementation of the technology both significantly relieved staff with internal operations and improved communication with external parties; these reactions were split relatively evenly between jurisdictions serving DACs and those that did not. Several jurisdictions described their existing systems as "antiquated" and difficult to use at all, much less to do so efficiently. Three jurisdictions reported on relief of administrative workloads, and one reported on relieving the workload of IT staff. Two said that implementation of the technology was seen positively internally for creating better communication with the public in both applications and violations, and another said that implementation helped to ease the flow (and mitigate the need for) applicant questions. These responses are shown in Figure 34 through Figure 39.

> *"This grant helped us get something that hopefully we'll have beyond when I'm here."*
>
> - PON 4600 respondent

Figure 32. Why Negative Reaction (External) to Technology Component

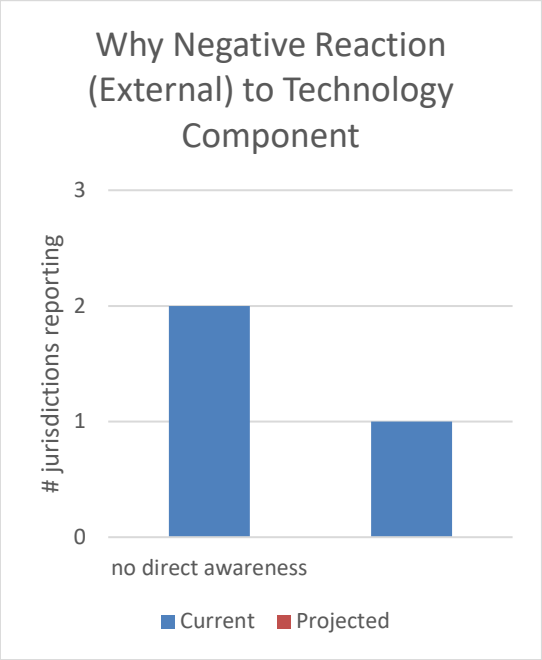


Figure 33. Why Negative Reaction (External) to Technology Component, DAC vs non-DAC

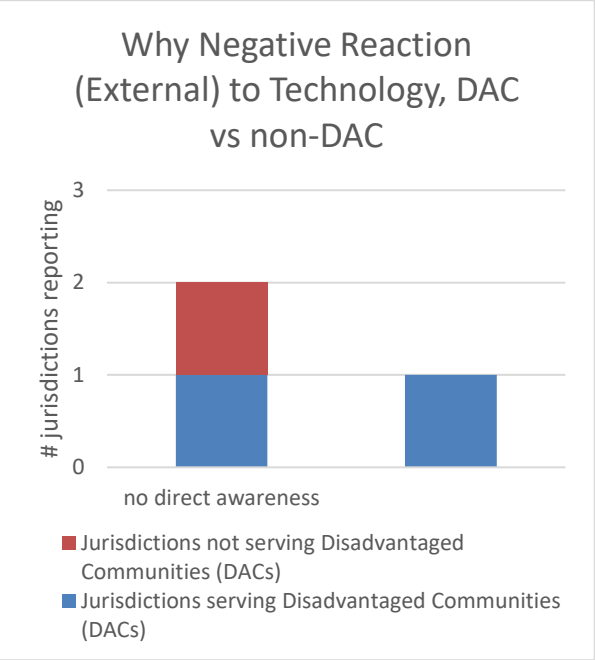


Figure 34. Reasons for Internal Positive Reactions (Compliance Technology, Current and Projected)

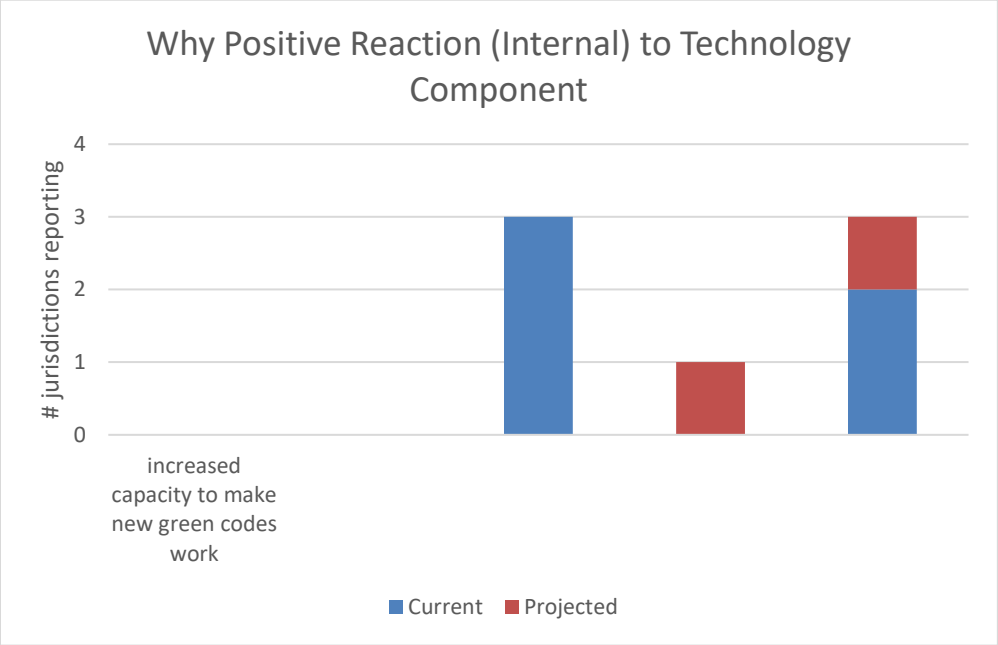
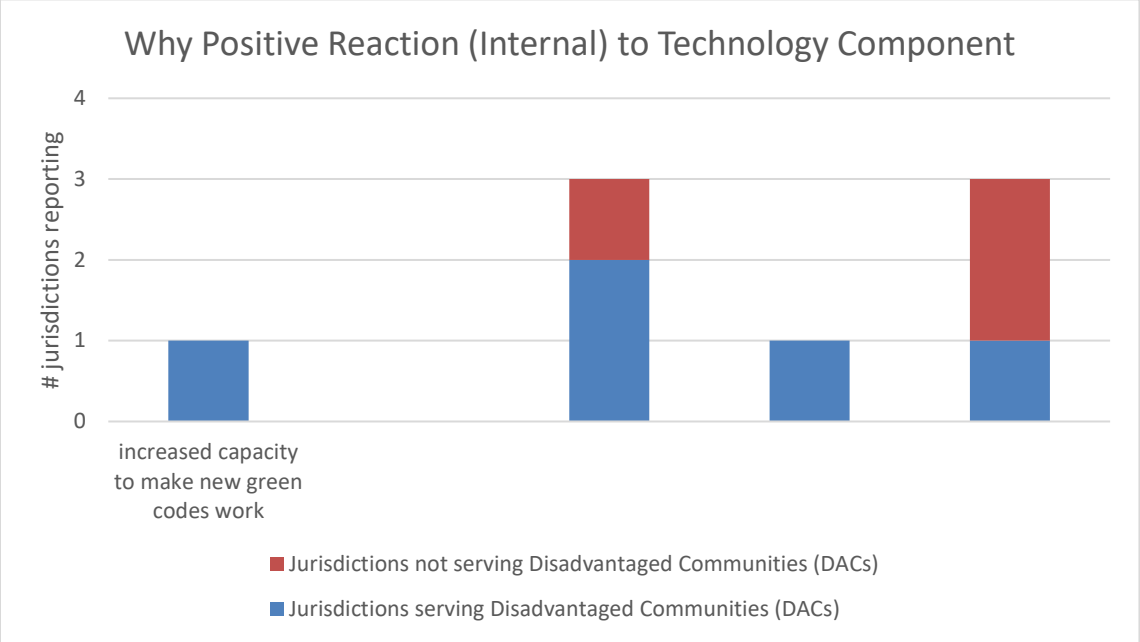


Figure 35. Reasons for Internal Positive Reactions (Compliance Technology, DAC vs non-DAC)



Jurisdictions that reported negative reactions (two, neither serving DACs) reported on learning curves in technology adoption and a lack of or insufficient technology "help desk" (Figure 36 And Figure 37).

Figure 36. Why Negative Reaction (Internal) to Technology Component

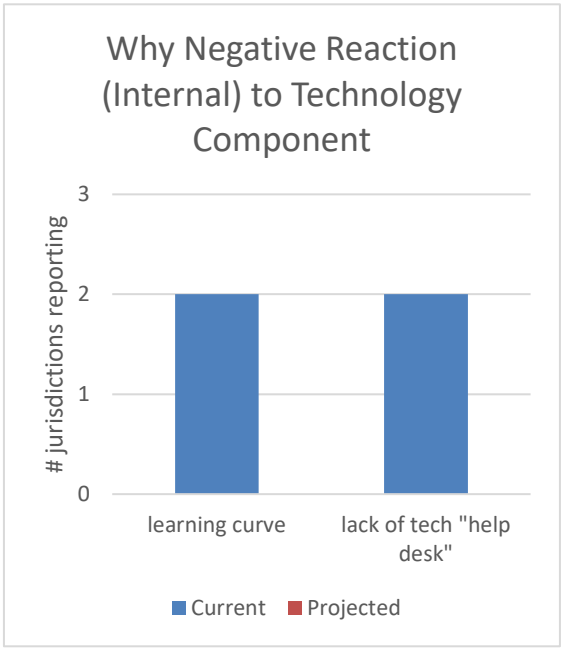
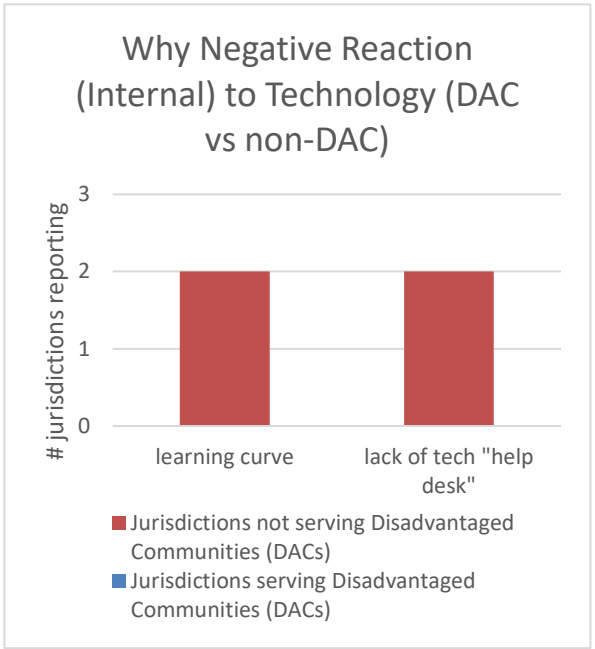


Figure 37. Why Negative Reaction (Internal) to Technology Component (DAC vs non-DAC)



Jurisdictions were asked about their experience (to date and/or projected) with external reactions to their implementation of the code compliance technology. As shown in Figure 38, all reported either having experienced (three jurisdictions) or were projecting to experience (three jurisdictions) positive external reactions. Two jurisdictions reported negative external reactions, and two reported neutral or no external reaction. As shown in Figure 39, positive and neutral reactions were split between jurisdictions serving and not serving DACs. Negative reactions were reported only by jurisdictions not serving DACs.

Figure 38. External Reactions to Technology Component Implementation

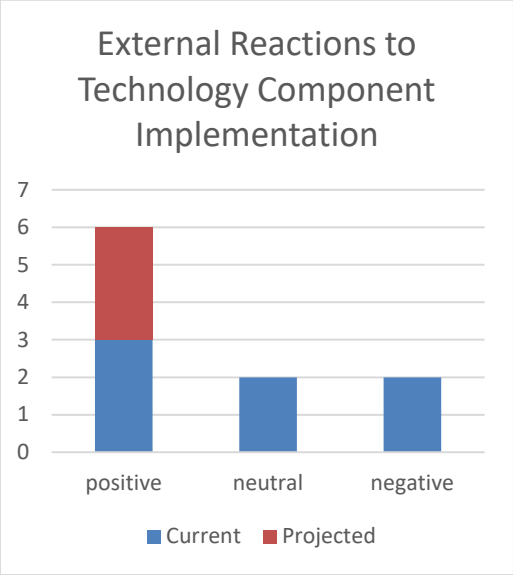
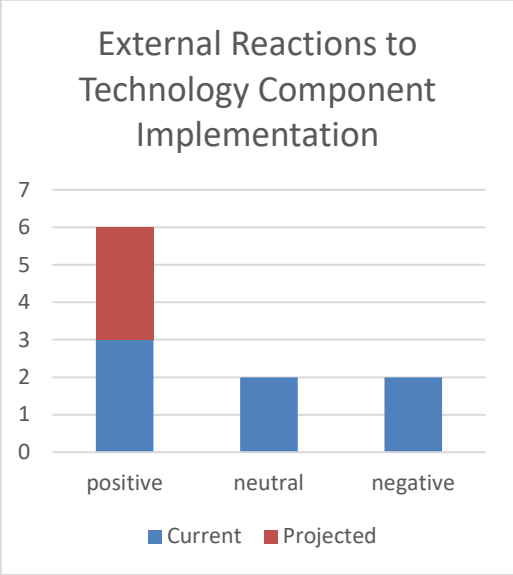


Figure 39. External Reactions to Technology Component Implementation, DAC vs non-DAC



Positive external reactions primarily related to improvements in the application process. Three jurisdictions had seen or expected to see greater functionality for applicants, two had seen or expected to see a reduction of applicant questions, and one reported on positive responses due to greater transparency for applicants. Another jurisdiction projected positive reactions for a streamlined application process. One jurisdiction (not serving DACs) said the public had reacted positively to better code enforcement. These results are shown in Figure 40 and Figure 41.

Figure 40. Why Positive Reaction (External) to Technology Component Implementation

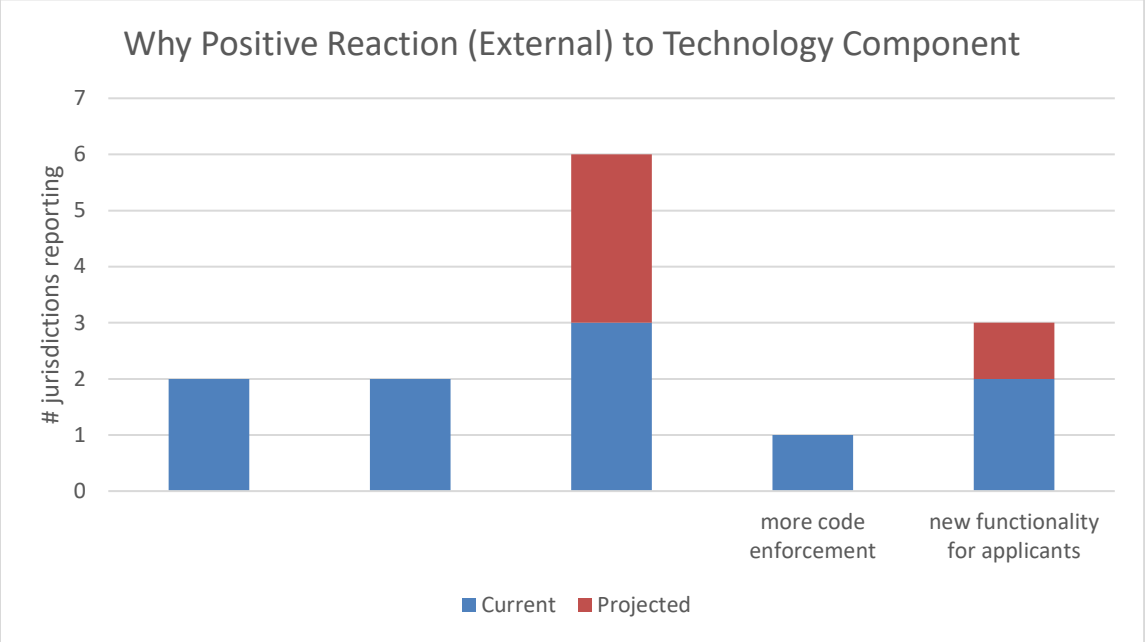
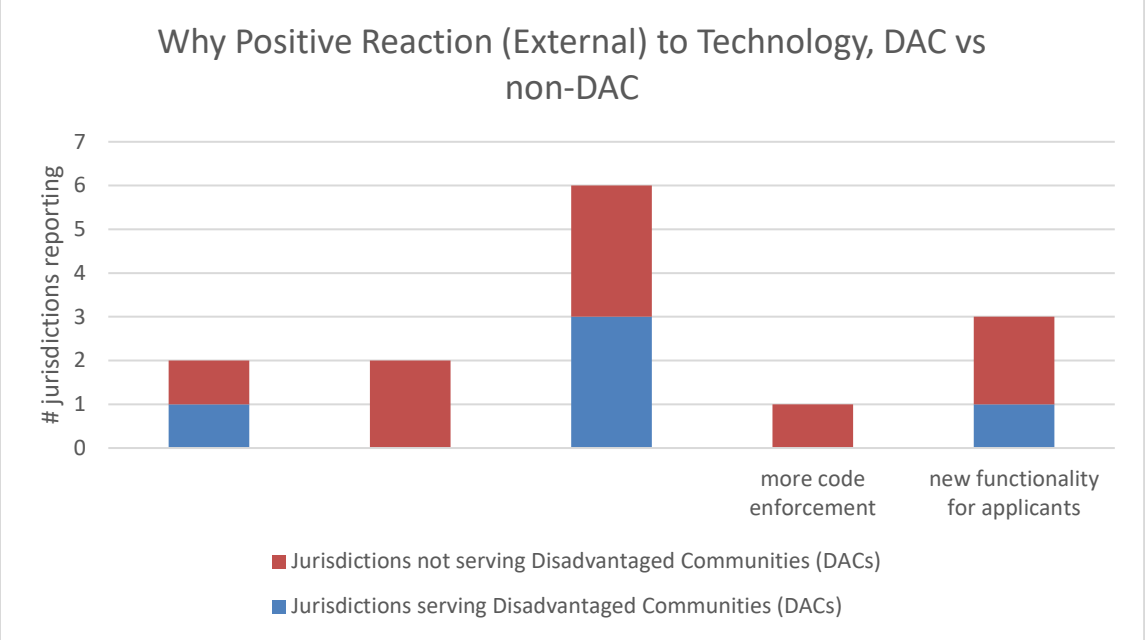


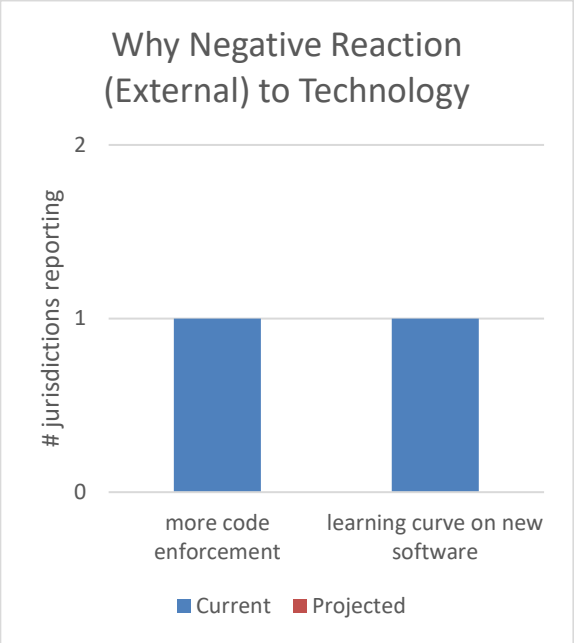
Figure 41. Why Positive Reaction (External) to Technology Component (DAC vs non-DAC)



The two jurisdictions reporting negative external reactions (neither serving DACs) said they were based on a negative public perception of additional code enforcement as well as a learning curve to using a new software for applications. Negative reactions are shown in Figure 42.

The two jurisdictions reporting no or neutral reaction said this because there was not yet significant external awareness of the new code compliance technology.

Figure 42. Why Negative Reaction (External) to Technology Component Implementation



Effects on Code Compliance and Building Practices

Jurisdictions were asked to report on how implementation of the code compliance technology was affecting and/or would affect compliance. As shown in Figure 43, all said that implementation was increasing compliance and/or was projected to increase compliance. One jurisdiction (serving DACs) reported that the technology was also giving applicants and building professionals a way to check their project against new, innovative "green tech" options, making building professionals more aware of efficient and clean energy options for current and future projects (Figure 44).

Figure 43. How Technology Component Implementation is Affecting Compliance

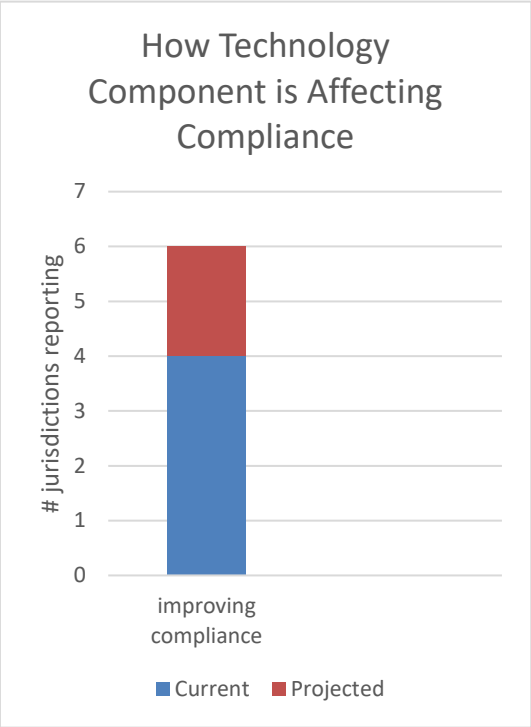
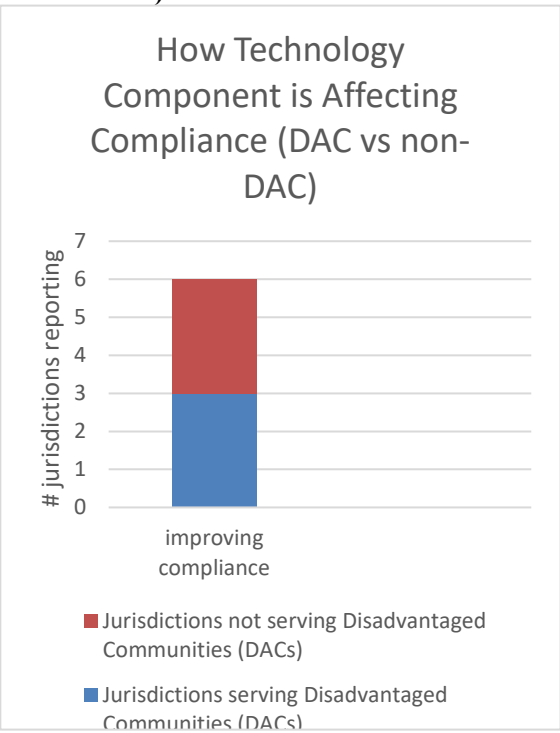


Figure 44. How Technology Component Implementation is Affecting Compliance (DAC vs non-DAC)



When asked how the implementation of the technology component was improving compliance, five jurisdictions said their ability to improve operational efficiency (three reported on current operations and two jurisdictions projected this ability following implementation). Two jurisdictions (both serving DACs) said that the technology allowed for better coverage of violations. One said that the increased transparency on requirements would improve compliance. Similarly, another jurisdiction stressed that better communication during plan review improved compliance. Another (serving DACs) projected that the new technology's ability to allow for public reporting of violations would improve compliance. These results are shown in Figure 45 and Figure 46.

Figure 45. How Technology Implementation is Improving Compliance

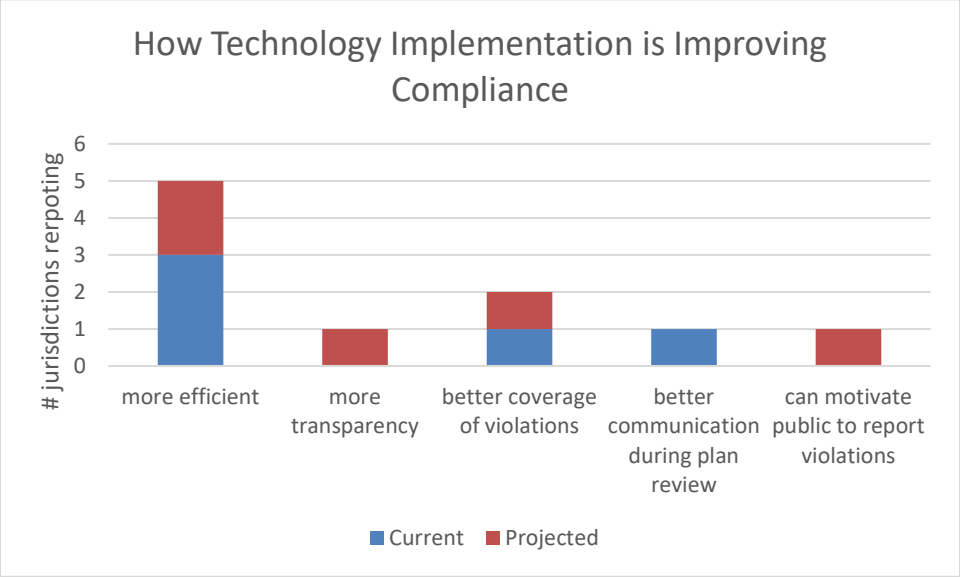
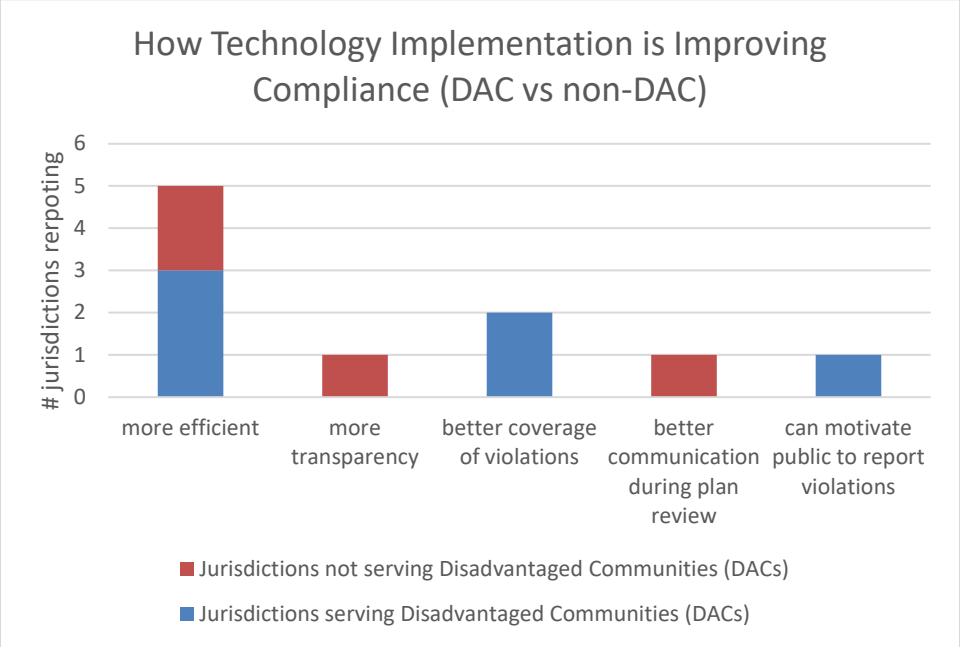


Figure 46. How Technology Implementation is Improving Compliance (DAC vs non-DAC)



Jurisdictions were asked to report the effects that implementation of the technology component had had on building practices (Figure 47 and Figure 48). Two reported improved applications due to better communication between the jurisdiction's review team and applicants and also to better access to energy codes by all parties (applicants and reviewers). One jurisdiction reported general increased awareness that codes would be enforced, and another reported further online automation options. One projected seeing faster review processes and another projected creating more opportunities to educate builders on green

technology opportunities. Only one jurisdiction did not see or project any changes in building practices due to the implementation of the technology.

Figure 47. Technology Component Effects on Building Practices

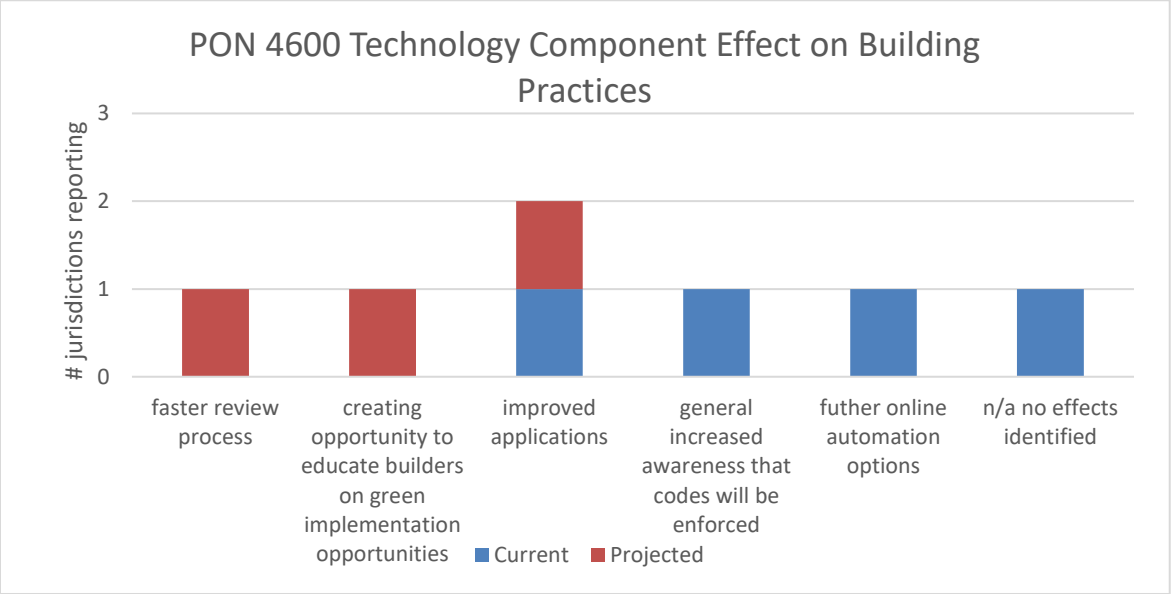
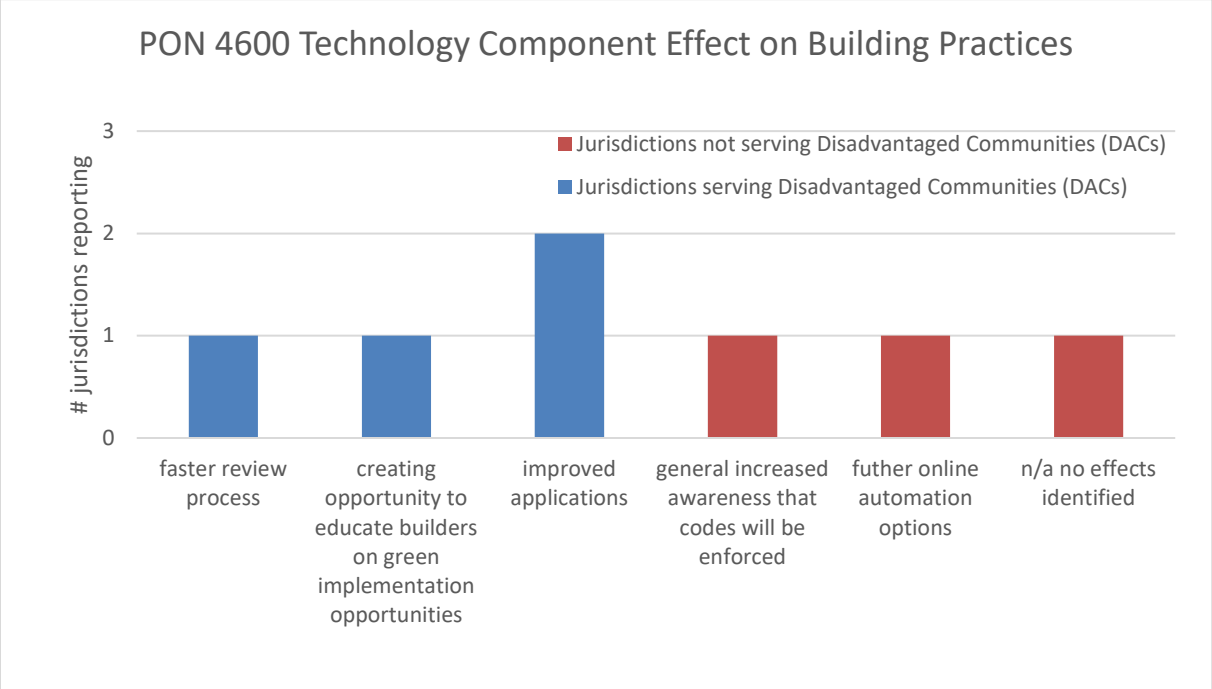


Figure 48. Technology Component Effect on Building Practices (DAC vs non-DAC)



When asked what building practices or technologies had become more prevalent, all six jurisdictions said that it was too early to determine this given the early stage in deployment. One projected no changes. Another projected more engagement with green tech and distributed energy resources (DERs).

Conclusions and Next Steps

Pilot resources are not yet fully disseminated but are already making a difference.

- Third-party resources are providing needed expertise on larger complex projects, needed expertise on innovative energy projects, or at the very least bandwidth.
- Technology is allowing jurisdictions to interact with their applicants and provide them with critical (and regularly evolving) information on energy code, helping them to more efficiently bring better projects to review.
- Pilot resources are serving needs identified by jurisdictions: operational efficiency, alleviating confusion of applicants, helping applicants connect directly with the energy code to mitigate compliance issues, and allowing enforcement officers to efficiently operate in the field.
- Some jurisdictions are using resources differently, for example, third-party support offered for applicants to use rather than being contracted and/or assigned by the jurisdiction. Flexibility from NYSERDA appears to be appreciated as municipalities consider what works best for them based on the reasons they were motivated to participate.
- NYSERDA's multi-stage application support matters by allowing more jurisdictions to access resources. Bandwidth in local government is thin and several jurisdictions referred to NYSERDA's regular follow-up and identification of all necessary application steps, including support in implementation, as part of what allows for successful participation.

Results from the interviews will be summarized for the Program-Induced Effects Expert Panel, which will be convened in Year 5 of the evaluation.

Appendix D. DAC and Energy Code Research Findings and Expert Interview Assessment

DAC and Energy Code Research Findings

The Market and Evaluation Team conducted research to seek to develop an unbiased, foundational understanding informed by the latest discussions of how energy codes impact low income and/or disadvantaged communities, to inform the development of the interview process and interview targets for this Task. The Team has summarized the findings from this research into the below. Research references are provided at the end of this Appendix subsection.

Energy codes are a way to reach low-income households with EE and relieve the energy burden. Energy codes provide a way to ensure new construction and building alterations result in more energy efficient buildings, which in turn lowers the amount a household must spend on energy bills. Low- and moderate-income households carry a disproportionate energy burden, the percentage of gross household income spent on energy cost.[1] A 2019 presentation by NYSERDA cites an average energy burden of 9.4% in low-income NYS households and 19.4% in very low-income households. Because of challenges in reaching low-income households with incentive dollars and other types of energy efficiency resources, energy codes can be a powerful way to provide energy burden relief to these households. This is particularly valuable in the case of multi-family rentals, where split incentives can decrease the effectiveness of energy efficiency incentives, and which are disproportionately low-income. As described by the U.S. Department of Housing and Urban Development, energy codes are needed to correct market externalities where reducing carbon is undervalued – carbon-based fuels are disproportionately hurting low-income/disadvantaged communities so carbon reductions will disproportionately help them.[2]

Energy codes can increase the value of a home and therefore also increase its (upfront) cost. Even as they reduce the operating costs of a home through lower utility bills, energy codes can in some cases increase the cost to build a home by creating a higher-quality product. The way this affects low-income and/or disadvantaged communities of New Yorkers will vary depending on a household's housing situation and different stakeholders involved in paying for up-front and ongoing housing and utility costs.

Low-income households may or may not be burdened by this. According to the Institute for Market Transformation (IMT) 87% of homebuyers finance their purchase, in which case the potential combination of higher upfront costs and decreased ongoing (utility costs) creating an acceptable payback period should not present a challenge[3]; but those that do not finance may feel the upfront financial strain.

A low-income family building their own home over time and without financing (for example, in a recent interview a code officer described that in their community many projects were cases of builders who were "accountants by day and carpenters by night") may be affected by energy code requirements, costs, and benefits differently than a low-income family seeking to rent a home recently built to code, or a low-income family applying for subsidized public housing.

These costs matter: low-income New Yorkers are particularly burdened by housing and housing-associated costs. New York has among the highest percentages of homeowners and renters above the affordability and severe housing cost burden thresholds.[4] In New York City, 54% of renters and 33% of homeowners are considered cost-burdened by housing costs.

Potential impacts of increased upfront costs from advanced energy codes can be offset by energy efficiency incentives. Specialized incentives exist for low-income/affordable housing whole building energy efficiency. Federal energy efficiency programs include DOE's Low Income Weatherization Assistance Program; HHS's Low Income Home Energy Assistance Program; energy-efficient mortgages under Fannie Mae, Freddie Mac, and the FHA and EPA's ENERGY STAR Certified Homes. NYS programming targeting low-income energy efficiency exists through partnerships between NYSERDA and HCR (NYS) and NYSERDA and NYC's Housing and Preservation Department (HPD).

As discussed above, who bears the burden of increased upfront cost can vary. The party benefiting from energy bill reduction may also vary. The utility bill savings that come from having an energy-efficient home are a clear benefit to low-income households, if those households directly pay their utility bills and can capture the savings – but low-income households, more likely to be renters, may have utility costs budgeted within their rental rate, and it is unclear whether these savings would be transferred to them in all scenarios.

Since the determination of an energy code's financial value to a population is assessed via a cost-effectiveness test, it may be valuable to use an LMI lens within this cost effectiveness testing to better assess the impact on low-income households Cost effectiveness tests rely on a number of parameters to assess the costs and benefits of an energy code to a given area, including household financial assumptions such as mortgage rates, down payments for homeowners, inflation rates. A summary of cost-effectiveness of the 2021 IECC shows an average simple payback period across all climate zones of 10.5 years, with payback periods ranging from 4.8 in the coldest climate, 7.3 in the warmest climate, and peaking at 12.4 years, 16.7 years, and 11.2 years in the most temperate Climate Zones 4, 5, and 6, respectively, which are the climate zones present in New York state.[5] A presentation

from the Pacific Northwest National Lab (PNNL) discusses updating financial assumptions to ensure cost burdens reflect low and moderate income (LMI) experiences.[6]

Aside from the direct financial impacts of upfront housing cost/value changes and energy bill reductions, energy codes can have other effects on DAC and low-income communities. There are well-documented positive externalities of improved energy efficiency for lower income communities and DACs, including decreased pollutant burdens and improved energy security. There may be other impacts of energy codes affecting low-income and DAC households distinctly, such as impacts of code compliance enforcement. One paper correlates stricter energy codes with a decreased square footage of housing available to low-income communities. Another suggests a history of penalizing DAC and LI communities disproportionately in code enforcement.

Compliance with energy code may be lower in low-income communities and DACs, leading to decreased overall impact. A review of compliant vs non-compliant energy efficiency measures in compliance site visits to LMI (80% AMI) and non-LMI single family households found statistically significant lower levels of compliance in lower-income homes than higher-income homes. While direct extrapolation from this study is not recommended[7] it suggests that compliance rates for low-income households should be specifically examined in assessments of code compliance and overall energy code community impacts.

Additional considerations for disadvantaged communities could warrant further research. Further research could be done to more comprehensively summarize the many variables that contribute to the definition of a disadvantaged community. The impact on household finances and health are the most established impacts on low-income and DACs that have come up in the research, but other indirect impacts may be found. Providing resources toward code compliance may support households with disabilities; and may be both a challenge and an opportunity in bringing benefits to DACs with high percentages of non white households that have faced racial discrimination by authorities. DACs are more likely to be urban (71% DAC vs 49% DAC and non-DAC, by population[8]) and renters (71% of DAC housing units vs 50% DAC and non-DAC housing units[9]) and may be less affected by the challenge of the upfront cost, as well as in some cases not directly benefitting from utility bill savings.

The market evaluation team conducted seven interviews with ten experts and community-based organization leaders with specialties in energy, racial equity, and affordable housing. These interviews were designed to better understand how Disadvantaged Communities (DACs) and lower-income (LI)

populations are impacted by energy code adoption, implementation and enforcement, as well as how NYSERDA and other entities might most effectively provide support.

DAC and Energy Code Expert Interview Assessment

Interview Panel Selection

The market evaluation team conducted research and consulted with NYSERDA to inform the development of a target interview list to ask about the effect of the energy code in disadvantaged and low-income (DAC-LI) communities. The interview list included experts from equity and energy efficiency-focused non-profits and think tanks, affordable housing developers, and community organizations, with experts having experience in the public, private and nonprofit sectors. Interviews were conducted in September, October and November 2023.

Definition of DAC

For this research, the market evaluation team and interview participants used the definition of DACs from New York State's Climate Act. This Act required the development of criteria to identify DACs to ensure that frontline and otherwise underserved communities benefit from the state's transition to cleaner, greener sources of energy, reduced pollution and cleaner air, and economic opportunities. Criteria were finalized in 2023 and the state established a database of census tracts that qualify as DACs based on their scores on a number of identified criteria.

The Climate Act states that DACs will be identified as "...based on geographic, public health, environmental hazard, and socioeconomic criteria, which shall include but are not limited to:

1. Areas burdened by cumulative environmental pollution and other hazards that can lead to negative public health effects;
2. Areas with concentrations of people that are of low income, high unemployment, high rent burden, low levels of home ownership, low levels of educational attainment, or members of groups that have historically experienced discrimination on the basis of race or ethnicity; and
3. Areas vulnerable to the impacts of climate change such as flooding, storm surges, and urban heat island effects."

Impact of the Energy Code: Themes Discussed

The team asked the DACs and energy code experts how changes in the energy code impact housing in DACs and LI areas. Respondents discussed a variety of impacts, with many of the impacts intersecting. While some participants only saw positive impacts from code changes, most experts talked about both the

positive and negative impacts. The most common themes discussed included improving existing infrastructure, health benefits, tenant and landlord cooperation, people displacement, and differing perceptions of cost burdens. Below is a summary of each of the main themes of the discussion of the impact of energy code changes, as described by the respondents.

Improving Existing Infrastructure as a Challenge to Energy Code Compliance

Six respondents discussed the need for greatly improving the current DAC housing stock before considering more advanced energy efficiency measures for energy code changes. There is currently a large gap in housing quality between DACs and non-DACs. One participant stated that DACs have some of the "highest and most serious housing code violations that provide immediate hazards to inhabitants." Another responded that the housing market in DACs are often broken and that DACs "can't even meet the existing code." Improving the existing housing quality in DACs would minimize the gap between DACs and non-DACs and reduce the impacts of redlining, historic disinvestment, and discrimination. Three participants discussed how issues are typically within existing buildings in DACs, as opposed to new construction. Multifamily housing stock in New York tends to be older and in need of retrofitting, but there is a cost barrier for replacing appliances and upgrading the building envelope. One respondent said that in New York City there are two realities in DACs, one more expected story of inhabitants struggling with housing stability and access, but that there is also a surprising rate of investment in new construction and housing appreciation. The respondent further shared that the Energy Code plays into this dual reality because there has historically been a bigger emphasis on the new construction energy codes, instead of existing buildings. While it is reasonable to have two sets of codes for the different construction vintages, the respondent said that the divide between new construction and existing building energy codes can contribute to the divide in the community dealing with an already stark contrast of housing quality within DACs. One participant said that while the high goals of the Energy Code are admirable, they do not always account for the historic disinvestment. Financial support will be needed to combat the historic legacy of DACs, and since loans often contain qualification barriers, financial support through grants will be useful in reaching compliance. As the energy code changes, supporting DACs in updating the older, existing infrastructure will be a critical step in improving compliance and overall quality of life for inhabitants who have experienced historic disinvestment.

> *"That's the biggest challenge we have… the housing markets are broken. We can't even meet the existing code."*
>
> - DAC respondent

> *"At the intersection of housing and energy there is lack of knowledge for historical disinvestment and historical racism."*
>
> - DAC respondent

Improvements in Energy Code Represent Health Benefits

Five respondents discussed how the changing energy codes would positively impact the health of DACs. Better insulation would improve indoor air quality and more electrification would improve outdoor air pollution. Air pollution contributes to respiratory illnesses, such as asthma, which can be prevalent in DACs due to the historically less access to clean air. Increasing the energy codes would decrease the rates of asthma. One participant also connected the heath impacts to financial impacts, saying that by decreasing asthma in DACs, community members would have to visit the doctor less and miss less work. The participant emphasized the financial connection to health since some DAC and LI members do not have paid sick leave. Of the experts that spoke on this topic, there was consensus that increasing energy codes would have a positive health impact on DACs.

> *"You can tie the health to financial because it means less trips to the doctor and less missed work. A lot of LI people do not have sick leave, so health has a direct health link."*
>
> - DAC respondent

Landlord-Tenant Split Incentives and Cost Transference

Four participants talked about how changes in the energy code could increase the problem of split incentives, with landlords underinvesting in energy efficiency measures since their tenants pay the energy bills. Seeking additional energy efficiency through changes to the Energy Code raises concerns that if landlords do invest in energy efficiency measure, the costs could be transferred to tenants who, especially in DACs, are often already energy burdened and the most vulnerable to cost increases. This increased cost is compounded by an already extremely high cost of living, especially in New York City. Two respondents mentioned that while some landlords are simply not incentivized to invest in energy efficiency measures, other landlords actively look for ways to increase costs for tenants and may take advantage of the changing energy code for profit. As one expert emphasized, many DAC members are renters and have some of the highest eviction rates, making the issues of split incentives and transferring costs especially concerning.

Need for Mitigation of Displacement

> *"One concern to avoid is green gentrification, where people get pushed out of new construction as the building codes become greener. We must make sure there is not a displacement of people and an increase in costs."*
>
> - DAC respondent

Three respondents discussed how changes in the energy code could heighten the displacement of people due to housing cost increases and green gentrification. One participant was concerned about DAC residents being displaced and another discussed the displacement of people into DACs that would contribute to affordable housing competition. One respondent said that "one concern to avoid is green gentrification, where people get pushed out of new construction as the building codes become greener. We must make sure there is not a displacement of people and an increase in costs." The concern for displacement comes from a historic precedent of lower income people being pushed out of neighborhoods as new green amenities, such as parks, draw higher paying tenants. Another expert discussed how green gentrification may be a factor, but that the main drivers of potential displacement from increased energy codes are increased housing costs and lack of housing supply.

Perceptions of Cost Burdens in Energy Code Enactment

Financial impacts of the energy code were a common theme raised throughout these conversations about how the Energy Code would impact DACs, and often determined whether the code was considered positive or negative. One participant also described how an impact can be viewed as positive or negative based on that person's role. The participant further shared that they saw a tension between builders, who are responsible for learning, implementing, and documenting the energy code updates, and community members, who would benefit from better quality housing stock and improved health. Although builders would have the advantage of living in communities with increased energy codes, builders are concerned with the additional work costs anticipated from increased codes. DACs would be particularly at risk for increased construction and retrofitting costs because many of the buildings are not compliant with the current code. One respondent said that operating with a larger compliance deficit and less financial resources than non-DAC areas could be a challenge for DACs in achieving compliance with the new code. The increased costs to builders could be passed along to people looking for housing. However, two other participants were hesitant to agree that builders would face an increase in costs and transfer them to the community. One expert said that the

> *"There is that tension between people saying [energy code changes] will help individuals and communities, but builders saying it would hurt because compliance is more expensive."*
>
> - DAC respondent

perceived higher prices from energy code changes are often misconstrued and unclear. Whether or not prices would increase with the energy code change, perceptions of cost impacts appear to be critical for the building community.

Supporting Programs

For participants that talked about the increase of costs with energy code changes, the market evaluation team asked which programs participants had heard of to mitigate those increased costs. The programs could be federal, state, or any other type. Participants all discussed different programs, without any overlap.

- ***Clean Energy Initiative (CEI).*** One expert discussed how CEI was initially very successful because it coordinated well with other programs. However, although CEI started well, the participant said, "now they have lowered the amounts… the amounts they are providing now aren't adequate to the incremental costs created." This respondent said they now must rely on multiple other programs to support their projects.
- ***Building Energy Codes Program***. Another participant said they had heard of the Building Energy Codes program, which operates at the federal level to collaborate with several entities on building code cost effectiveness, energy code adoption, training, and technical assistance. According to the respondent, it is too soon to tell if this program has been successful.
- ***Low Income Home Energy Assistance Program (LIHEAP)***. The federally funded LIHEAP program was recommended to assist with energy bills and weatherization. The respondent said that this program has been successful so far.

Financial Benefits

The market evaluation team asked participants if they agreed with sources that suggest that any increased costs to low-income communities not offset by increased home value and ongoing bill savings can be offset by energy efficiency incentives. One expert agreed that increased home value and bill savings could offset costs, citing home energy analysis studies that found energy efficiency measures to create direct energy savings. Another expert adamantly disagreed due to New York's increasing energy bills, especially for DAC members that are already energy burdened. Another respondent said the level of offset depended too heavily on the situation to take a firm stance. Three experts observed that the concept of offsetting energy efficiency costs with an increased home value is less applicable to DACs, which contain many renters. There could be other benefits to the tenants though, such as reducing the costs of housing quality-based services, such as flood insurance.

Additional Actions to Provide Support

When the market evaluation team asked the experts what additional actions could be taken to mitigate undesirable financial impacts, the main suggestions included providing DACs financial grants and improving the building envelope. The suggestions included:

- ***Coordinating with other programs on the federal, state, and local levels to use other funding sources before putting the cost on rate payers***. The expert recommended exploring a partnership with the New York Green Bank or the federal Greenhouse Reduction Fund with Environmental Protection Agency (EPA).
- ***Improving the building envelope***. The participants recommended this focus because making a home as airtight as possible would help the home retain heating and cooling, requiring less energy from the temperature regulation systems and increasing occupancy comfort.
- ***Supporting DACs with on-site solar generation, where feasible***. The additional power generation would decrease the amount of electricity needed from the grid. However, this would require financial support, preferably in the form of a grant, instead of a loan.
- ***Updating the electric grid to prepare for electrification***. This will take a great deal of investment, but the expert recommended it to make the anticipated fuel switching from gas to electricity more affordable in the long term.
- ***Providing trainings on DAC specific energy code concerns***. The expert recommended targeted trainings because "when people are well trained then the perceived costs go away."
- ***Coordinating with utilities on implementing programs or subsidies for DACs and LI areas***. The respondent discussed how although utilities are often regulated, they should play a critical role in mitigating DAC financial impacts.

Realization of Financial and Other Benefits in DACs

Participants were asked by the market team how DAC households could benefit, financially or otherwise, from stricter energy codes. Besides the health benefits and decreased energy bills, discussed in previous section, experts discussed increased labor opportunities, better overall maintenance, and increased thermal comfort. Three of the participants said that the exact level of benefits would depend upon the type of household. Another of the respondents emphasized the importance of defining a "benefit" through the people who are actually receiving it.

> "The definition of a 'benefit' has to start with the people who will receive the benefit."
>
> - DAC respondent

Better Overall Maintenance

Five of the experts said that people throughout the community would benefit from a reduced energy burden due to more consistent housing quality and reliable systems. More modern energy codes have tighter envelopes, better HVAC systems, and tighter windows. These increased systems contribute to more fire safety and the newer systems are more reliable and less likely to break.

Increased Labor Opportunities

Two respondents said that the new energy code systems and electrification updates will require a massive undertaking, creating well-paying and reliable jobs. If DAC residents looking for jobs could connect with employment opportunities, the new systems would lead to labor increases. One expert said that NYSERDA is already working with women going into green careers, and that these programs should be scaled up to better prepare for the transition and provide good jobs to DAC members.

Increased Thermal Comfort

With the new systems, there would be more control over thermal comfort. One respondent discussed how in addition to updating the residence to be less drafty, the newer systems also often have remote controls residents could use for direct control over their thermal comfort. Another of the experts emphasized how important the energy code is in making a home "comfortable and desirable" for the residents. One of the participants said that centering housing quality around the inhabitants' quality of life is an important step in creating a more holistic conversation about improving DAC living areas.

> *"We all want to live in a comfortable home that we can afford, is nice, bright, has access to services... The energy code is part of making the home comfortable and desirable."*
>
> - DAC respondent

The market evaluation team asked respondents if the benefits from living in energy code compliant homes were compelling to DAC communities. Five of the respondents said that the benefits from increased code compliance were compelling, although improving communication is essential.

Improving Communication

Communication around the benefits of energy efficiency could be improved by recruiting trusted community ambassadors, removing complicated terminology, and discussing the energy code in more holistic terms. Trusted sources within the community have an easier time connecting with residents. One respondent recommended partnering with local community groups to have ambassadors that can spread the word more effectively. The participant recommended providing funding to community-led organizations to "help build the capacity to engage with more community members. This would tackle the power imbalance and allow people think of possible solutions." Another of the experts said that technical terminology is a barrier for community members to engage effectively in conversations about the changing energy codes and housing quality improvements. When discussing the reasoning behind the housing improvements, it is better to break it down using more relatable language. One respondent said that the is sometimes a misconception that DAC members are so "stressed by the daily realities" of working to make rent and put food on the table, that the community members are too busy to think about energy efficiency. This is a well-meaning framework, but as the expert emphasized, it does not do "justice to the complexities of people's lives." The issue is not that people do not have time to think about energy efficiency, instead whether or not people have been "engaged with people that they trust to make it clear how energy efficiency and green standards play into their lived realities." Instead of approaching people about energy efficiency as a solitary concern, it can be more effective to discuss in a way that connects better health, increased comfort, better insulation, and more reliable appliances and systems to energy efficiency. As on the respondents put it, "everyone wants clean air and rats out of the apartment." Conveying energy efficiency as a critical piece of improving everyday life is a more compelling communication strategy.

> *"I would love to see funding to grassroots organizations to help build the capacity to engage with more community members. This would tackle the power imbalance and allow people think of possible solutions"*
>
> - DAC respondent

Additional Resources for DACs

The market evaluation team asked the respondents if they had other ideas for bringing value of energy codes to DACs. One respondent suggested providing architecture trainings to minority associations, to ensure there is open access to the information.

Key Takeaways

Overall, DACs have specific conditions that require additional attention when changing the energy code. DACs are mostly comprised of older, existing buildings that are often not in compliance with the current energy code. When there is an energy code update, DACs are impacted because the communities typically contain a higher percentage of non-compliant buildings, deal with tenant and landlord split incentives and cost transferring, and experience people displacement. One of the main improvements could be made by bringing the existing housing stock up to code with improved insulation, and retrofitting HVAC systems and appliances. There are financial barriers for upgrading and retrofitting, so helping DACs with access to grants would be helpful to increase energy compliance and combat historic disinvestment. Interviews revealed disagreement about whether costs can be effectively mitigated by decreased energy bills. Providing access to funding is essential in tackling the tension between builders who are nervous about financing the implementation of energy efficiency measures and community members who would benefit from the code compliance. DACs are interested in the benefits of energy efficiency, such as improved health and increased thermal comfort. However, communication to DAC members can be improved by partnering with community organizations, speaking without technical terminology, and connecting the daily lived experience with energy code compliance benefits.

Research References

"Beneficial Electrification for Low Income Communities." Rocky Mountain Institute, 2023. https://rmi.org/wp-content/uploads/2023/03/beneficial_electrification_low_income_communities.pdf.

Bruegge, Christopher D., Tatyana Deryugina, and Erica Myers. "The Distributional Effects of Building Energy Codes." National Bureau of Economic Research (NBER) Working Paper No. 24211, January 2018. https://www.nber.org/system/files/working_papers/w24211/w24211.pdf.

Cejudo, Carmen. Diversity, Equity and Inclusion. Pacific Northwest National Laboratory (PNNL), June 22, 2021. https://www.energycodes.gov/sites/default/files/2021-07/PNNL_DEI.pdf.

Davis, Lucas. "Can Americans Afford to Fully Electrify Their Homes?" Kleinman Center for Energy Policy, September 2021. https://kleinmanenergy.upenn.edu/podcast/can-americans-afford-to-fully-electrify-their-homes/.

Electric and Gas Bill Relief Program. NYS Department of Public Service. https://dps.ny.gov/electric-and-gas-bill-relief-program.

Final Disadvantaged Communities (DAC) 2023, accessed June 2023. https://data.ny.gov/Energy-Environment/Final-Disadvantaged-Communities-DAC-2023/2e6c-s6fp/about_data.

"Five Things Cities and CDCs Don't Get About Code Enforcement." Shelterforce: Essential Reporting on Affordable Housing. 2013. https://shelterforce.org/2013/03/26/5_things_cities_and_cdcs_dont_get_about_code_enforcement/.

"HCR Clean Energy Initiatives CEI Program Questions and Answers." NYS Homes and Community Renewal, December 2022. https://hcr.ny.gov/system/files/documents/2022/12/cei-qa-2022_12_13-1.pdf

"Housing Affordability in New York State." Office of the New York State Comptroller, June 2019. https://www.osc.ny.gov/files/reports/special-topics/pdf/housing-affordability-2019.pdf.

Kelly, Cherylyn. "Are Energy Codes Exacerbating the Housing Affordability Crisis?" Institute for Market Transformation (IMT), May 10, 2022. https://imt.org/news/are-energy-codes-exacerbating-the-housing-affordability-crisis/.

"Manufactured Housing and Standards - Frequently Asked Questions." U.S. Department of Housing and Urban Development. https://www.hud.gov/program_offices/housing/rmra/mhs/faqs.

McFarlane, Alastair; Janet Li; Michael Hollar. "Building Codes: What Are They Good For?" U.S. Department of Housing and Urban Development. Cityscape: A Journal of Policy Development and Research. Volume 23, Number 1.
2021. https://www.huduser.gov/portal/periodicals/cityscpe/vol23num1/ch4.pdf.

Nambiar, Chitra. "Falling Short: Does Energy Code Compliance and Enforcement Vary by Income?" ACEEE Summer Study 2022 (Asilomar Conference), August 2022. https://www.researchgate.net/publication/368416915_Falling_Short_Does_Energy_Code_Compliance_and_Enforcement_Vary_by_Income.

"New York State Rent Relief Funding: Spotlight on New York City." Office of the New York State Comptroller, Report 7-2022, August 2021. https://www.osc.ny.gov/files/reports/osdc/pdf/report-7-2022.pdf.

Reina, Vincent. "Utility Costs & Federally Subsidized Housing." NYU Furman Center. June 17, 2015. https://furmancenter.org/files/publications/NYUFurmanCenter_UtilityCosts_Webinar_17JUN15.pdf.

Rohrbacher, Christina. "The Rural Energy Cost Burden: Designing Code Compliance and Energy Efficiency Programs for Underserved Populations." Northeast Energy Efficiency Partnerships (NEEP). https://neep.org/blog/rural-energy-cost-burden-designing-code-compliance-and-energy-efficiency-programs-underserved.

Salcido, V. Robert; Yan Chen; YuLong Xie; Z. Todd Taylor. "National Cost Effectiveness of the Residential Provisions of the 2021 IECC." Pacific Northwest National Laboratory, PNNL-31019. June 2021. https://www.energycodes.gov/sites/default/files/2021-07/2021IECC_CostEffectiveness_Final_Residential.pdf.

Schuetz, Jenny. “Who’s to blame for high housing costs? It’s more complicated than you think.” Brookings Institute, January 17, 2020. https://www.brookings.edu/articles/whos-to-blame-for-high-housing-costs-its-more-complicated-than-you-think/.

“State of Homeowners and Their Homes.” State of the City 2022, Furman Center. https://furmancenter.org/stateofthecity/view/state-of-homeowners-and-their-homes.

“State of Renters and Their Homes.” State of the City 2022, Furman Center. https://furmancenter.org/stateofthecity/view/state-of-renters-and-their-homes.

The Power & Proximity of Code Enforcement: a Tool for Equitable Neighborhoods.” Cities for Responsible Investment and Strategic Enforcement (RISE), Hester Street. June 2019. https://hesterstreet.wpenginepowered.com/wp-content/uploads/2019/07/CR_-Phase-I-_Equitable-Code-Enforcement-report_FINAL-JUNE-2019.pdf.

“Tools and Tactics for Engaging Communities around Code Enforcement.” Cities for Responsible Investment and Strategic Enforcement (RISE), Hester Street. April 2019. https://hesterstreet.wpenginepowered.com/wp-content/uploads/2019/07/Cities-RISE_CE-101_v10_-FOR-PRINT.pdf.

U.S. Department of Energy Uses ACS Data to Power the Low-income Energy Affordability Data (LEAD) Tool. https://www.census.gov/programs-surveys/acs/about/acs-data-stories/lead-tool.html.

Appendix E. Evaluation Methodologies

To assess the effects of the Program Opportunity Notice (PON) 4600: Third-Party Support and Advancing Code Compliance Technology Pilot program, the market evaluation team conducted interviews with authorities having jurisdiction (AHJs) that were participating in PON 4600; energy code experts in representative jurisdictions; and energy, housing, environmental, and social justice professionals with expertise on energy code impacts in disadvantaged communities (DACs); surveys with training participants; and a preliminary savings analysis. This appendix provides methodologies for these research activities.

Alternative Code Enforcement Interviews for PON 4600

The market evaluation team conducted interactive, one-on-one phone interviews with jurisdictions that had adopted one or both components of the Third-Party Support and Advancing Code Compliance Technology pilot. The respondents were contacted using information provided by NYSERDA. Interviews were with various municipality employees, such as planners, commissioners, and mayors. Table 16 shows the distribution of respondents by municipal occupation.

Table 16. Alternative Code Enforcement Respondents by Occupation

Respondents Occupation	Number of Respondents
Commissioner	1
Planner	1
Code official	1
Mayor	2
Supervisor	1
Manager	1
Director	1

The market evaluation team asked the respondents to provide information based on their own experiences with the New York State (NYS) energy code market and their motivation of applying for the pilot program, NYSERDA's role in the implementation decision, and what changes have been observed since the pilot program's start. The team then compiled and analyzed the interview results.

Longitudinal Jurisdictional Expert Interviews

The market evaluation team combined the opinions from a group of experts engaged in building and code compliance and enforcement-related activities in jurisdictions across New York State, obtained through interactive, one-on-one, in-depth phone interviews. The team asked respondents to provide information based on their own experiences with the NYS energy code market and as experts in their respective fields.

To ensure geographical, socioeconomic, and building density diversity, the team interviewed professionals who work with the energy code in an urban jurisdiction (NYC), a suburban jurisdiction, and a rural jurisdiction.

The market evaluation team selected jurisdictions in Year 1 by conducting an analysis of new square footage in New York's urban, suburban, and rural counties since 2006. First, the team mapped counties to a census-defined, core-based statistical area (CBSA) by urban, suburban, and rural categories. Then the team assessed the new square footage over time for each CBSA. As expected, the CBSA that included New York City (NYC) consistently had the highest new construction rates for the commercial and residential sectors. The team filtered out the NYC CBSA to determine which suburban and rural counties consistently experienced the most new construction between 2006 and 2017 and used this list to select jurisdictions for participation.

The market evaluation team created a potential sample list of experts for each of the three types of jurisdictions and set a target to interview three individuals in each jurisdiction. The team developed the sample by researching local energy code experts and building professionals with experience in each jurisdiction, contacting building departments and design professional firms, and speaking with code officials and other experts for recommendations. To reduce self-selection bias in these interviews, the team recruited respondents who represented a variety of occupations and regional expertise. The interviewees' occupations complemented the panelists' occupations well by providing greater representation of the construction industry. Table 17 shows respondent types from each region.

Table 17. Longitudinal Jurisdictional Interview Respondent Types

Municipality Type	Code Officials	Construction Firms	Architecture Firms
Urban	1	0	1
Suburban	0	1	2
Rural	1	0	0

DAC and Energy Code Expert Interviews

During September of 2023, the market evaluation team interviewed nine experts with a background in DACs and energy code impacts. These interviewees were recruited through collaboration with research from the team and feedback from NYSERDA. The team focused its outreach on organizations and staff with backgrounds in supporting DACs, low-income housing issues, and energy code impacts. The team targeted these interviews to organizations with influence ranging from the national, state, and local level and interviewed staff who could speak to how DACs are impacted by energy code changes,

implementation, and enforcement, as well as about the best practices for supporting DACs. Staff roles included chief executive officer (CEO), architect, program manager, and program director. Respondents provided information based on their own experiences with low-income housing and DACs, and data from their expertise in the field.

Training Participant Surveys

Starting in June 2020, the market evaluation team sent surveys to webinar participants immediately after training sessions. Participants received a survey invitation for every training session they attended, which allowed the team to gather feedback on multiple training topics for each attendee. Approximately six months after attending trainings, the team sent a follow-up survey to attendees.

The first round of surveys sent immediately after participation were primarily intended to gather feedback about the classes, such as the relevance of topics and overall satisfaction with the training.

The follow-up survey was designed to provide insight about how participants applied the information from the trainings in their work and what changes they made after participating. Training survey results are key inputs into the final indirect savings evaluation, as these inputs are used to estimate the degree to which the Codes and Standards for Carbon Neutral Buildings (CSCNB) Initiative training activities have impacted overall code compliance in New York.

Survey Research Objectives

The immediate survey results address three topics:

- Review of courses offered, number of respondents, and mean training score
- Geographic representation of jurisdictions of respondents
- Impacts of training on respondents' work in energy code implementation

The follow-up survey results provided information about these topics:

- Geographic representation of respondent jurisdictions
- Square footage of respondents' work since participating in trainings
- Impact of education on respondents' work in energy code implementation
- Dissemination of educational content beyond NYSERDA-sponsored events

Preliminary Savings Analysis

In Year 2, the market evaluation team began conducting a preliminary calculation of the energy savings from the CSCNB Initiative under the Clean Energy Fund (CEF) budget. The full preliminary savings calculation methodology aligns with the methods for the multiyear indirect impacts methodology.

Stretch Code Adoption

The market evaluation team first determined the building areas enhanced by a jurisdiction's adoption of NYStretch through Dodge data by the year of the permit. To calculate the areas affected by a jurisdiction's midyear adoption of NYStretch, the team assumed construction was evenly distributed throughout the year. For example, if the code was adopted on June 30, the permitted areas were assumed to include half of the year's permitted construction.

To estimate the energy impacts of NYStretch, the team used the energy-use intensities from the cost-effectiveness analysis of the commercial[5] and residential[6] codes. The team analyzed the energy use intensities for residential and commercial buildings by climate zone (and for NYC due to a separate baseline code) for electricity and fossil fuels.

The team estimated the energy savings for NYStretch to exclude energy savings from expected participation in other above-code programs, including ENERGY STAR and utility-sponsored programs. The team also assumed that compliance with NYStretch was comparable to the 2020 statewide and NYC energy codes.

Increased Code Compliance Due to Training

To estimate the impacts of training, the team first analyzed survey data to determine the average square footage affected by code officials and building professionals following training attendance. The team then applied these per-trainee effects to the number of overall training participants and found that the total building square footage affected would have exceeded the total market square footage, as shown in the 2021, 2022, and 2023 Dodge data. The likely reason for this discrepancy is double counting when multiple training participants, such as code officials, are working in the same building department. Therefore, based on the significant number of trainees, the team assumed that the Initiative training touched the entire New York market and applied training effects to the entire market as determined by

5 NYSERDA 2020 NYStretch Energy Code Commercial Cost Effectiveness Analysis (July 2019).

6 NYSERDA Energy Savings and Cost-Effectiveness Analysis of the 2020 NYStretch Energy Code Residential Provisions (July 2019).

Dodge data. The team adjusted the Dodge data to account for homes that are built to higher standards than specified by the code.

The final evaluation will determine the percentage of compliance change that should be attributed to the CSCNB Initiative through an independent expert panel. This preliminary savings estimation relied on a benchmarked value from a code compliance study conducted in Massachusetts, [7] which estimated that a similar program effected a 5% compliance increase in that state. The team applied this percentage to preliminary savings for this report. This percentage increase is a primary driver of the preliminary savings estimate. The independent expert panel, when presented with findings from the evaluation, may determine a different impact from CSCNB Initiative training on code compliance, and as such, the preliminary savings estimates are highly sensitive to the determination of the independent panel.

The 5% benchmarked value presents a preliminary estimate. Findings from the market evaluation survey research (which will be reviewed by the independent panel) indicate that the Initiative is likely to increase code compliance across the state. The following findings from the Year 3 research indicate this directional trend:

- Trainings touch a significant number of code officials and building professionals from across the state
- Training participants indicate high satisfaction with training courses and relevance of training courses
- More than half of the training participants said they have either already adjusted their work or plan to adjust their work following the trainings
- Code officials and building professionals said they believe code compliance has increased over the last year and that NYSERDA has played a role in this trend

To calculate the change in energy-use intensities for each percentage of change in code compliance, the team gathered the code energy-use intensities from ASHRAE 90.1-2016 and ASHRAE 90.1-2013 for commercial building and the IECC 2015 and IECC 2018 for residential buildings in each of the three climate zones. The team then calculated baseline energy-use intensities (EUI) for each zone using the following equation:

[7] Massachusetts TXC47 Non-Residential Code Compliance Support Initiative Attribution and Net Savings Assessment: July 26, 2018: NMR and Cadmus

$$Baseline\ EUI = (ASHRAE\ 90.1 - 2016\ or\ IECC\ 2018\ EUI * Compliance\ Rate) + (ASHRAE\ 90.1 - 2013\ or\ IECC\ EUI * (1 - Compliance\ Rate))/Compliance\ Rate$$

To determine the EUI from one percentage increase of code compliance the team used the following equation:

$$Increased\ Compliance\ EUI = (ASHRAE\ 90.1 - 2016\ or\ IECC\ 2018\ EUI * Compliance\ Rate) + (ASHRAE\ 90.1 - 2013\ or\ IECC\ EUI * (1 - Compliance\ Rate))/(Compliance\ Rate + 1\%)$$

The energy savings for one percentage point increase in compliance was calculated as the difference between the Baseline EUI and the Increased Compliance EUI. This formula is slightly adjusted from the Year 2 evaluation. The Year 3 method assumes that building elements that are not fully compliant with current code are fully compliant with the preceding code. In Year 3 the team also adjusted the code compliance estimates based on Year 3 Delphi Panel results.

Table 18 shows the changes in EUI that each percentage change in code compliance achieves for each building sector and climate zone. To calculate the preliminary savings estimates, the market evaluation team multiplied these EUI by five percent points by the statewide building square footage from Dodge.

Table 18. Change in Energy Use Intensity per Percentage Change in Code Compliance

Building Type	Building Type	Code Compliance	Climate Zone	Change in Energy Use Intensity per % Change in Compliance		
				kWh/sq ft	kW/sq ft	Million BTU/ sq ft
Single Family	Addition and Alteration	81%	4A	0.04965	0.00002	0.00020
Single Family		81%	5A	0.05358	0.00002	0.00026
Single Family		81%	6A	0.05943	0.00002	0.00031
Multifamily Low Rise		81%	4A	0.06519	0.00002	0.00014
Multifamily Low Rise		81%	5A	0.06846	0.00002	0.00016
Multifamily Low Rise		81%	6A	0.07395	0.00002	0.00019
Multifamily Mid/High Rise		84%	4A	0.11962	0.00003	0.00015
Multifamily Mid/High Rise		84%	5A	0.11785	0.00003	0.00020
Multifamily Mid/High Rise		84%	6A	0.12355	0.00003	0.00026
Commercial		84%	4A	0.16369	0.00004	0.00024
Commercial		84%	5A	0.15493	0.00004	0.00031
Commercial		84%	6A	0.15966	0.00004	0.00041

Building Type	Building Type	Code Compliance	Climate Zone	Change in Energy Use Intensity per % Change in Compliance		
				kWh/sq ft	kW/sq ft	Million BTU/ sq ft
Single Family	New Construction	85%	4A	0.04509	0.00002	0.00018
Single Family		85%	5A	0.04866	0.00002	0.00023
Single Family		85%	6A	0.05398	0.00002	0.00028
Multifamily Low Rise		85%	4A	0.05922	0.00002	0.00013
Multifamily Low Rise		85%	5A	0.06218	0.00002	0.00015
Multifamily Low Rise		85%	6A	0.06717	0.00002	0.00018
Multifamily Mid/High Rise		85%	4A	0.11677	0.00003	0.00014
Multifamily Mid/High Rise		85%	5A	0.11505	0.00003	0.00019
Multifamily Mid/High Rise		85%	6A	0.12061	0.00003	0.00025
Commercial		85%	4A	0.15974	0.00004	0.00023
Commercial		85%	5A	0.15118	0.00004	0.00030
Commercial		85%	6A	0.15580	0.00004	0.00040

Exploration of Capacity to Identify Indirect Savings in Disadvantaged Communities

Evaluation of the Initiative in Year 4 has explored the ability to identify savings in 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, and a database identifying areas throughout the state that meet the final DAC definition was released, supporting analysis to understand impacts on DACs. The dataset also includes the 45 indicators, expressed as a percentile ranking, used to determine environmental burden and climate change risks and population characteristics and health vulnerabilities on each census tract.[8]

Using data on total population and number of households in DAC-identified vs non-DAC-identified census tracts by county and climate zone, a method has been explored to estimate the portion of long-term indirect savings that are occurring in DACs, as described in Table 19.

[8] 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.

Table 19. Summary of Draft Methodology for Estimating Long-Term Indirect Savings in Disadvantaged Communities

Indirect Savings Calculation	Source Data	Method for Savings Estimate
Calculation of Indirect Savings Attributed to Training	DAC Database (Columns = County, Population_Count, DAC_Designation)	Pro rata % of indirect savings of each building sector and building type affected by training based on a percent DAC vs non-DAC makeup by population per each Climate Zone (identified by mapping each County's Climate Zone)
Calculation of Indirect Savings Attributed to Stretch Code Adoption	DAC Database (Columns = City_Town, Population_Count, DAC_Designation)	Pro rata % of indirect savings of jurisdictions having adopted stretch codes based on jurisdiction's percent DAC vs non-DAC makeup by population

Review of Data to Support Identification of DAC vs non-DAC Construction Rates

DACs are identified by census tracts, which can cross jurisdictional lines and other boundaries used for modeling these savings; therefore, the segmentation process isolated counties with DACs but did not successfully identify savings attributable to DAC or non-DAC areas of a given county. Further, in creating such a segmentation certain assumptions are made, including the assumption that new construction rates (an input to the savings modeling) would be similar in DACs as opposed to non-DACs. The market evaluation team geocoded 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 DAC census tracts or non-DACs.

The analysis relied on the ACS indicators that identified buildings by the range of years in which they were built and by whether they are owner-occupied or rented. The market evaluation team then summarized the data by DAC or non-DAC census tract by building age bin, rented or owner-occupied status, and county. The results suggested that buildings in DAC census tracts across New York State are *on average* approximately six years older than those in non-DAC census tracts. The team explored the possibility of extrapolating a percentage to show by how much more non-DAC census tracts contained new construction compared to DAC census tracts. However, results on building age were not consistent across counties and were in fact the reverse in some (e.g., Franklin County, Kings County). Therefore, the team was hesitant to draw conclusions due to the wide range of building age results across the ACS five-year dataset.

Given the data limitations and challenges of this analysis, it is recommended that the relationship between rate of construction and DAC census tract be flagged for further exploration against other datasets.

Appendix F. Detailed Survey Results of Energy Code Training

Introduction

This section provides detailed results from the market evaluation team's ongoing evaluation of the energy code training provided in a series of instructional sessions through NYSERDA's Code and Standards for Carbon Neutral Buildings (CSCNB) Initiative. This appendix presents analysis of data collected from the immediate and follow-up surveys (conducted approximately six months after trainees attended a session) and expands on the summarized results of immediate surveys that were provided to NYSERDA in the quarterly summary memo.

The energy code training sessions are delivered to participants by the Urban Green Council (UGC), Newport Ventures, Performance Systems Development (PSD), and a fourth implementer, Karpman Consulting. Feedback on the training sessions is primarily captured through an immediate survey administered via email after each course. The immediate survey collects key information about training attendees and their experience with the training sessions. A quarterly memo submitted to NYSERDA summarizes results from the following immediate survey topics:

- Participant demographics and regions in which they work
- Participant knowledge of the Energy Conservation Construction Code of New York State (ECCCNYS) before and after attending the training
- Participant knowledge of the New York City Energy Conservation Code (NYCECC) before and after attending the training
- Participant knowledge of NYStretch before and after attending the training
- Participant satisfaction with key training aspects
- Participant perception of the usefulness of training topics and suggestions on areas of improvement

Follow-up surveys are more focused on actions taken by training attendees after the sessions as well as on general activities and knowledge of code compliance and code adoption. The memo summarizes results from the following follow-up survey topics:

- Work procedures that have changed due to participation in NYSERDA trainings
- Participant and jurisdiction energy code characteristics
- Information filled with code officials for different project types

- Perceived changes in code compliance over time, and the potential impact of NYSERDA webinars on that change
- Participants' perception of the value of webinars after six months

Table 20 provides the current immediate and overall survey response rates for each implementer. A list of specific courses for which surveys were distributed is included at the end of this appendix. The data provided in this memo reflect the cumulative responses received from training participants across the project year (training sessions that were delivered between September 2022 to August 2023).

Table 20. Immediate Survey Response Rate

Implementer	Surveys Sent	Responses Received	Response Rate
UGC	1,563	336	21%
Newport Ventures	464	68	15%
PSD	10,709	905	8%
Karpman Consulting	969	152	16%
Total	**13,705**	**1,461**	**11%**

The first round of follow-up surveys was distributed in March 2021 to those who participated in webinars in September 2020. Those who completed a follow-up survey in one month will not receive another invitation in a later month to ensure no double-counting of experience and feedback. Responses shown in Table 21 are from participants who attended a webinar between September 2020 and February 2023.

Table 21. Follow-Up Survey Respondents through August 2023

Month Attended	Year Attended	Invites Sent	Responses [a]	Response Rate
September	2020	1,011	74	7%
October	2020	1,239	80	6%
November	2020	241	12	5%
December	2020	678	35	5%
January	2021	408	44	11%
February	2021	385	26	7%
March	2021	498	45	9%
April	2021	393	22	6%
May	2021	353	19	5%
June	2021	297	30	10%
July	2021	239	14	6%
August	2021	256	14	5%
September	2021	1,187	77	6%
October	2021	296	12	4%
November	2021	498	19	4%

Month Attended	Year Attended	Invites Sent	Responses [a]	Response Rate
December	2021	470	16	3%
January	2022	530	30	6%
February	2022	488	24	5%
March	2022	1,017	190	19%
April	2022	382	59	15%
May	2022	321	53	17%
June	2022	349	37	11%
July	2022	225	26	12%
August	2022	335	52	16%
September	2022	225	18	8%
October	2022	509	42	8%
November	2022	303	21	7%
December	2022	283	14	5%
January	2023	429	61	14%
February	2023	234	43	18%
Total		**14,079**	**1,209**	**9%**

[a] Responses include both partial and fully completed responses.

Of those who received a survey invite, 706 respondents completed the survey, with an additional 503 recorded as partial respondents (answered at least one question but did not complete the survey) (Table 22).

Table 22. Follow-Up Survey Response Rate

Attendance Month	Surveys Sent	Completed Surveys	Partially Completed Surveys	Response Rate
September 2020	1,011	31	43	7%
October 2020	1,239	40	40	6%
November 2020	241	7	5	5%
December 2020	678	24	11	5%
January 2021	408	21	23	11%
February 2021	385	12	14	7%
March 2021	498	23	22	9%
April 2021	393	11	11	6%
May 2021	353	10	9	5%
June 2021	297	26	4	10%
July 2021	239	9	5	6%
August 2021	256	11	3	5%
September 2021	1,187	34	43	6%
October 2021	296	7	5	4%
November 2021	498	14	5	4%
December 2021	470	8	8	3%
January 2022	530	22	8	6%

Attendance Month	Surveys Sent	Completed Surveys	Partially Completed Surveys	Response Rate
February 2022	488	19	5	5%
March 2022	1,017	101	89	19%
April 2022	382	29	30	15%
May 2022	321	26	27	17%
June 2022	349	18	19	11%
July 2022	225	23	3	12%
August 2022	335	48	4	16%
September 2022	225	16	2	8%
October 2022	509	35	7	8%
November 2022	303	19	2	7%
December 2022	283	13	1	5%
January 2023	429	29	32	14%
February 2023	234	20	23	18%
Total	**14,079**	**706**	**503**	**9%**

Courses Provided in 2023

Between September 2022 and August 2023, four implementers (PSD Consulting, Urban Green Council, Karpman Consulting, and Newport Ventures) worked with NYSERDA to deliver energy code training webinars to code officials, builders, contractors, and others in the field. The implementers offered courses for the updated ECCCNYS, the NYCECC, and NYStretch-2020. Overall, 3,771 unique participants attended at least one webinar.[9]

Table 23 shows the training topics offered by each implementer and the number of survey invites sent and received. For the immediate survey, participants could receive multiple invites and provide feedback for multiple webinars, as each participant received a survey link for each webinar they attended. The market evaluation team sent invites out promptly after the webinar was conducted to obtain feedback as close as possible to the day of training attendance.

[9] This was determined using unique email addresses the implementers provided to the market evaluation team from training attendee reports.

Table 23. Webinar Participants and Immediate Survey Respondents from September 2022 through August 2023

Implementer	Course Title	Invitations Sent	Survey Responses Received [a]	Response Rate
Karpman Consulting	110: Performance-Based Compliance with ASHRAE Standard 90.1 2016	231	34	15%
	210: Compliance Documentation for ASHRAE 90.1 Section 11 and Appendix G	92	27	29%
	213: Integrating Performance-Based Compliance into the Design Process	132	34	26%
	212: Review of the Modeling-based Submittals for ASHRAE 90.1 Section 11 and Appendix G	514	57	11%
	2020 ECCCNYS for Residential Buildings: Overview	208	26	13%
	2020 ECCCNYS for Commercial Buildings: Overview	59	6	10%
	Clean Energy Communities Energy Code Enforcement	180	36	20%
PSD Consulting	A Process for Residential Energy Code Compliance and Enforcement / Part 2 Energy Code Inspections in 15 Minutes or Less	375	33	9%
	A Process for Energy Code Compliance and Enforcement / Energy Code Plan Reviews in 15 Minutes or Less	393	41	10%
	Air Sealing to 3 ACH50	339	39	12%
	Other IECC Envelope Requirements	324	32	10%
	Efficient Forced Air Distribution	362	28	8%
	Whole-house Mechanical Ventilation	395	34	9%
	Lighting Systems for Large Commercial Buildings	317	23	7%
	Mechanical Systems for Large Commercial Buildings	338	23	7%
	Prioritizing ECCCNYS Enforcement for Commercial Buildings (Pt 2)	225	11	5%
	Prioritizing ECCCNYS Enforcement for Commercial Buildings (Pt 1)	248	21	8%
	NYStretch Overview and Thermal Envelope Requirements Part 1	472	34	7%
	NYStretch Mechanical, Plumbing, Lighting, and Electric Power Part 2	464	37	8%
	NYStretch Energy Code for Commercial Buildings Part 1: Building Thermal Envelope, Mechanical Systems, Commissioning, and Additions and Alterations	455	35	8%

Implementer	Course Title	Invitations Sent	Survey Responses Received [a]	Response Rate
	NYStretch Energy Code for Commercial Buildings Part 2: Electric Power and Lighting, Total Building Performance, Additional Efficiency Package Options, and Appendices	404	26	6%
	NY Energy Codes for Simple Buildings- Part 1: Retail Building	518	44	8%
	NY Energy Code for Simple Commercial Buildings- Part 2: Mixed-Use Apartment, Grocery, and Office Building	499	40	8%
	Multifamily Air Sealing	355	28	8%
	Multifamily Thermal Bridging	353	32	9%
	The Energy Code and Existing Buildings- Residential Part 1 Additions	451	47	10%
	The Energy Code and Existing Buildings- Residential Part 2 Alterations, repairs and changes of occupancy or use	397	40	10%
	Electrifying the Energy Code - Residential	658	68	10%
	Electrifying the Energy Code - Commercial Part 1	554	51	9%
	Electrifying the Energy Code - Commercial Part 2	285	27	9%
	The Energy Code and Existing Buildings (Commercial) - Part 1	197	14	7%
	The Energy Code and Existing Buildings (Commercial) - Part 2	179	12	7%
	Don't Be Left Exposed - Part 1: Meeting the Energy Code with the Safe Use of Foam Insulation	538	43	8%
	Don't Be Left Exposed - Part 2: Meeting the Energy Code with the Safe Use of Foam Insulation	509	32	6%
	Put a Lid On It Part 1: Unvented Attics	105	10	10%
Urban Green Council	Crushing the Code New York State: Residential	216	51	24%
	Crushing the NYS Energy Code: Commercial	145	40	28%
	Crushing the Code New York City: Residential	212	48	23%
	What's New in the 2020 NYC Energy Code	304	86	28%
	Crushing the Code New York City: Commercial	234	43	18%
	Crushing the Code NYS: Energy Code 101	65	18	28%
	Crushing the Code NYS: Residential Envelope	61	10	16%
	Crushing the Code NYS: Commercial Envelope	63	8	13%
	Crushing the Code NYS: Demonstrate Compliance	61	10	16%

Implementer	Course Title	Invitations Sent	Survey Responses Received [a]	Response Rate
	Crushing the Code NYS: Commercial Building Systems	54	8	15%
	Crushing the Code NYS: Residential Building Systems	71	14	20%

[a] These responses include both fully and partially completed online surveys.

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. As shown in Table 24, most trainings were rated highly by respondents for all elements, with "relevancy to work" generally rated slightly lower than "quality of information" from the webinar or "likelihood to recommend" the trainings to others. None of the elements for any of the trainings got lower than a 5 average rating.

Table 24. Webinar Scores by Training Topic: September 2022 – August 2023

Implementer	Course Title	Quality of Information	Relevancy to Work	Likelihood to Recommend
Karpman Consulting	110: Performance-Based Compliance with ASHRAE Standard 90.1 2016	6.62	6.48	6.21
	210: Compliance Documentation for ASHRAE 90.1 Section 11 and Appendix G	6.44	5.5	6.29
	213: Integrating Performance-based Compliance into the Design Process	6.4	6.24	6.54
	212: Review of the Modeling-based Submittals for ASHRAE 90.1 Section 11 and Appendix G	6.32	5.81	5.93
Newport Ventures	2020 ECCCNYS for Residential Buildings: Overview	6.33	5.8	6
	2020 ECCCNYS for Commercial Buildings: Overview	6.75	6.75	5.75
	Clean Energy Communities Energy Code Enforcement	6.45	6.17	6.54
PSD Consulting	A Process for Residential Energy Code Compliance and Enforcement / Part 2 Energy Code Inspections in 15 Minutes or Less	6.64	6.29	6.41
	A Process for Energy Code Compliance and Enforcement / Energy Code Plan Reviews in 15 Minutes or Less	6.36	6.12	6.19
	Air Sealing to 3 ACH50	6.57	6.52	6.48
	Other IECC Envelope Requirements	6.26	6.11	6.24
	Efficient Forced Air Distribution	6.68	6.23	6.14
	Whole-house Mechanical Ventilation	6.33	5.71	6.04
	Lighting Systems for Large Commercial Buildings	6.36	5.93	6.55
	Mechanical Systems for Large Commercial Buildings	6.39	6	6.47

Implementer	Course Title	Quality of Information	Relevancy to Work	Likelihood to Recommend
	Prioritizing ECCCNYS Enforcement for Commercial Buildings (Pt 2)	5.62	5.5	5.89
	Prioritizing ECCCNYS Enforcement for Commercial Buildings (Pt 1)	6.36	6.14	6
	NYStretch Overview and Thermal Envelope Requirements Part 1	6.35	6.09	6.5
	NYStretch Mechanical, Plumbing, Lighting, and Electric Power Part 2	6.26	6.22	6.04
	NYStretch Energy Code for Commercial Buildings Part 1: Building Thermal Envelope, Mechanical Systems, Commissioning, and Additions and Alterations	6.57	6.26	6.41
	NYStretch Energy Code for Commercial Buildings Part 2: Electric Power and Lighting, Total Building Performance, Additional Efficiency Package Options, and Appendices	6.59	6.09	6.1
	NY Energy Codes for Simple Buildings- Part 1: Retail Building	6.39	5.74	6.16
	NY Energy Code for Simple Commercial Buildings- Part 2: Mixed-Use Apartment, Grocery, and Office Building	6.1	5.64	5.82
	Multifamily Air Sealing	6.25	5.85	6.29
	Multifamily Thermal Bridging	6.32	6	6.12
	Electrifying the Energy Code - Residential	6.34	5.82	6.24
	The Energy Code and Existing Buildings- Residential Part 1 Additions	6.29	6.14	6.25
	The Energy Code and Existing Buildings- Residential Part 2 Alterations, repairs and changes of occupancy or use	6.42	6.13	6.26
	Electrifying the Energy Code - Commercial Part 1	6.44	6.08	6.4
	Electrifying the Energy Code - Commercial Part 2	6.36	5.82	6.2
	The Energy Code and Existing Buildings (Commercial) - Part 1	6.23	5.85	6.23
	The Energy Code and Existing Buildings (Commercial) - Part 2	6.78	5.89	6.78
	Don't Be Left Exposed - Part 1: Meeting the Energy Code with the Safe Use of Foam Insulation	6.25	5.81	6.3
	Don't Be Left Exposed - Part 2: Meeting the Energy Code with the Safe Use of Foam Insulation	6.05	5.85	6.23
	Put a Lid On It Part 1: Unvented Attics	6.5	6.3	6.7
Urban Green Council	What's New in the 2020 NYC Energy Code	6.28	5.77	6.36
	Crushing the Code New York City: Commercial	6.36	6.64	6.39
	Crushing the NYS Energy Code: Commercial	6.58	6.29	6.43

Implementer	Course Title	Quality of Information	Relevancy to Work	Likelihood to Recommend
	Crushing the Code NYS: Energy Code 101	5.86	6	6.36
	Crushing the Code New York City: Residential	6.32	6	6.6
	Crushing the Code New York State: Residential	6.45	6.02	6.22
	Crushing the Code NYS: Residential Envelope	6.6	6.44	6.6
	Crushing the Code NYS: Commercial Envelope	6.43	5.86	6.33
	Crushing the Code NYS: Demonstrate Compliance	6.4	5.5	6.4
	Crushing the Code NYS: Commercial Building Systems	6.43	6.5	6.71
	Crushing the Code NYS: Residential Building Systems	6.67	6.58	6.5

Immediate Survey Participant Characteristics

To understand who is participating in the sessions, the market evaluation team asked respondents to identify if they were code officials or building professionals (which includes architects, engineers, contractors, etc.). As shown in Table 25, code officials represented a lower proportion of participants (45%).

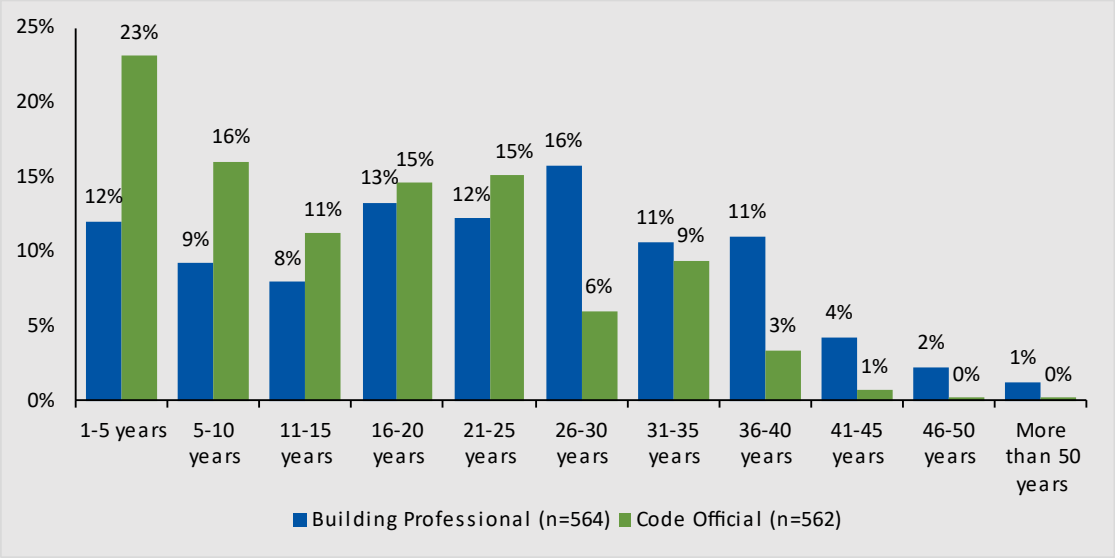
Table 25. Immediate Survey Occupation Type

Participant Type	Number of Participants	Percentage of Participants
Code Officials	664	45%
Building Professionals	797	55%
No Response Provided	0	0%
Total	**1,461**	**100%**

Participants' years of experience working in their position (or a similar position) ranged widely for both code officials and building professionals. As shown in Figure 49 code officials were more likely to have less than 21 years of experience in their job (65%) compared with building professionals (43%).

Figure 49. Years of Experience for Code Officials and Building Professionals

Source: Immediate Survey Question: "Years of experience in this (or similar) position."

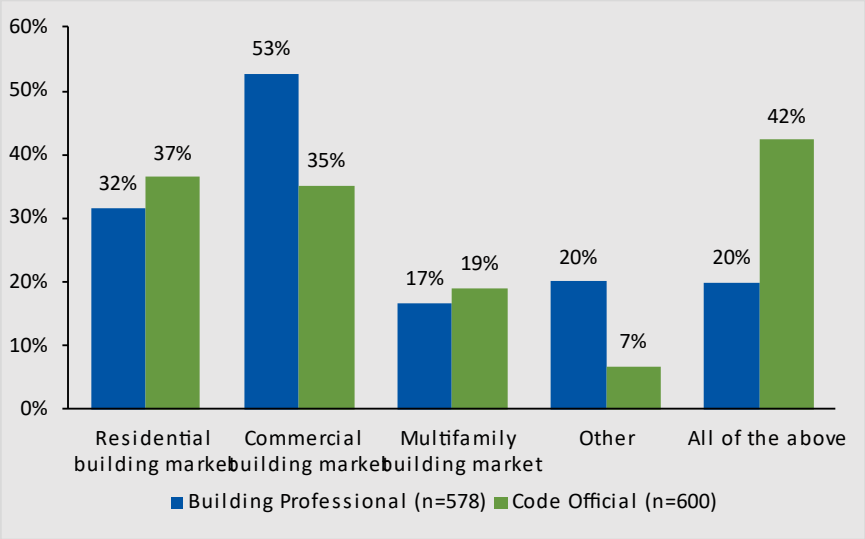


Overall, 40% of building professional respondents and 25% of code officials said they worked in a jurisdiction that has adopted NYStretch-2020. An additional 32% and 48%, respectively, said they do not work in a stretch code jurisdiction. The remaining respondents were not sure.

To get more insight into who is participating in the energy code training sessions, the market evaluation team also collected information on the markets and types of work participants do professionally. As shown in Figure 50, training is reaching participants in both residential and commercial markets, with 42% of code officials saying they work in all construction markets.

Figure 50. Market to Which Participants' Work Applies

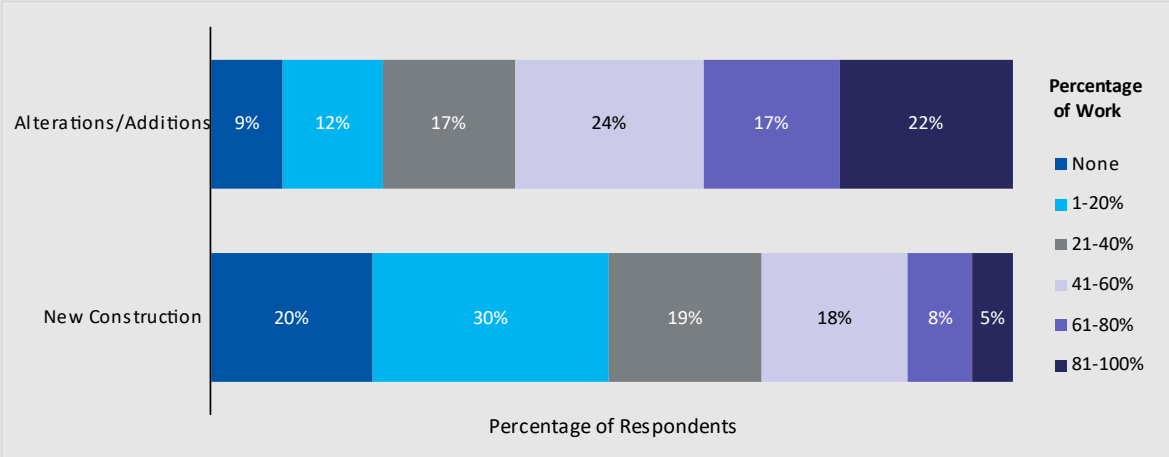
Source: Immediate Survey Question: "Please select the market to which your work applies."



Participants also reported on what percentage of their work was new construction versus additions and alterations. As shown in Figure 51, 39% of respondents said that more than 60% of their work is in alterations and additions. Only 13% said that more than 60% of their work is new construction.

Figure 51. Breakdown of Participants' Time by Work Type (n=1,200)

Source: Immediate Survey Question: "About what percentage of your work is …?"



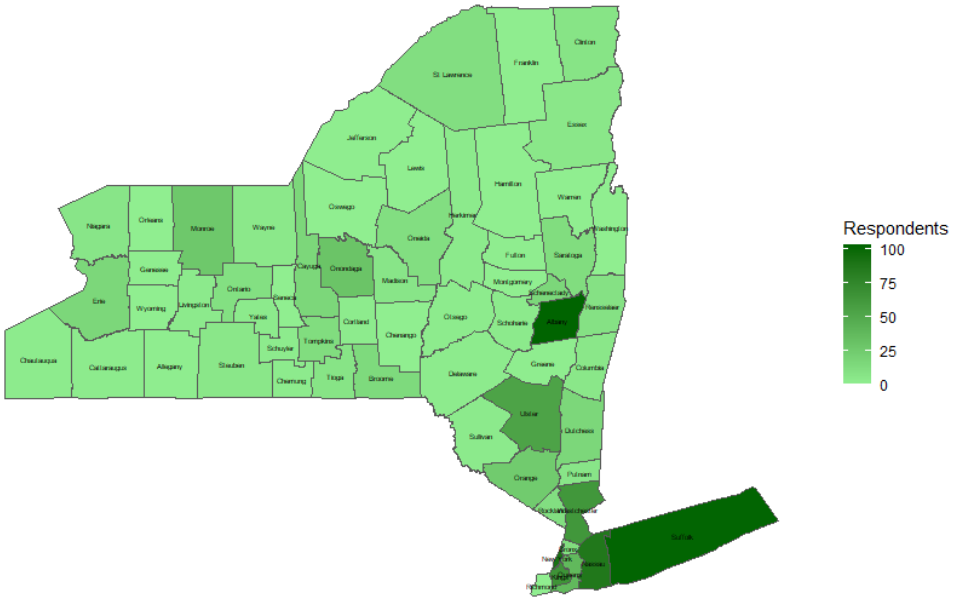
Geographical Representation

Immediate survey respondents were asked to list up to three jurisdictions in which they work, so the market evaluation team could ensure that the webinars were reaching attendees across New York State (NYS). While the original intent was to collect the names of towns, a notable number of respondents

specified counties or regions instead; because of this, the team converted all responses to county-based entries and applied these to a state map.

As shown in Figure 52, 51 of 62 counties had at least one immediate survey respondent (82% of all state counties). The counties with the highest representation were the five boroughs of New York (22% of respondents), Albany County (11%), and Suffolk County (11%). The average number of immediate survey respondents per county was 18.

Figure 52. Immediate Survey Representation by County (n=939)

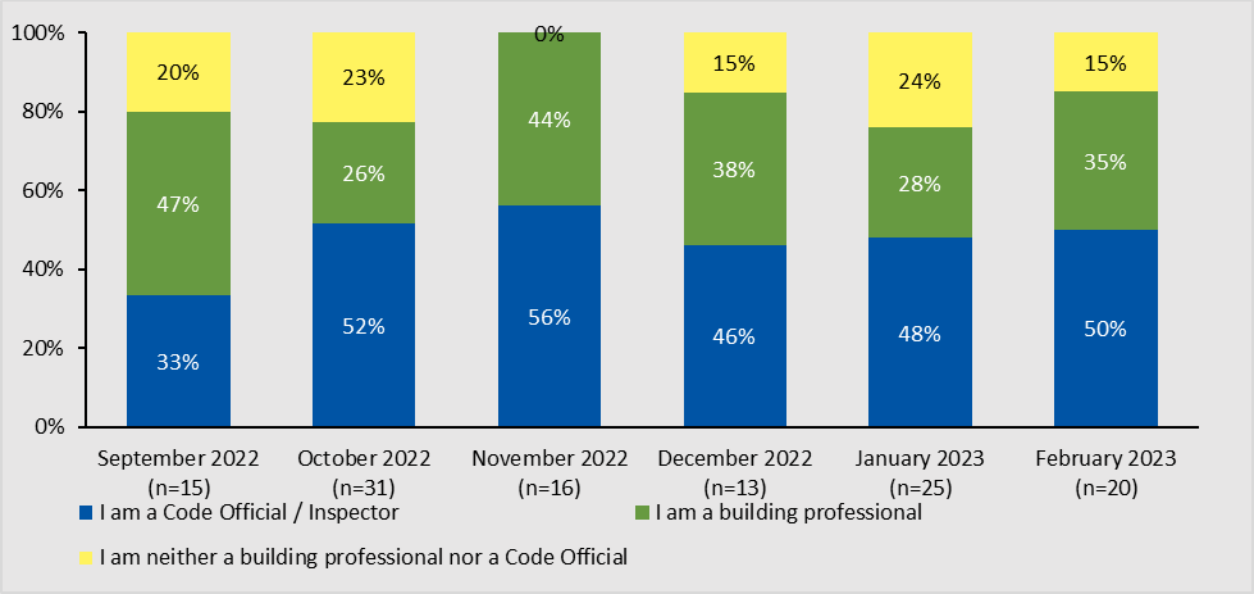


Follow-Up Survey Participant and Jurisdiction Characteristics

For the follow-up survey data collection from September 2022 to February 2023, 44% of respondents were code officials, with 40% building professionals (contractors, architects, etc.). This represents slightly different proportions of respondents by occupation type as from the immediate survey respondents, where building professionals represented 55% of respondents. As shown in Figure 53, this is somewhat consistent between months. Those who said they did not fall into the two main categories (code officials and building professionals) self-reported a variety of positions including firefighters, planning board members, building maintenance staff, and health and safety professionals.

Figure 53. Survey Respondent Work Category (n=554)

Source: Follow-Up Survey Question: "Please select your area of work from the categories below."

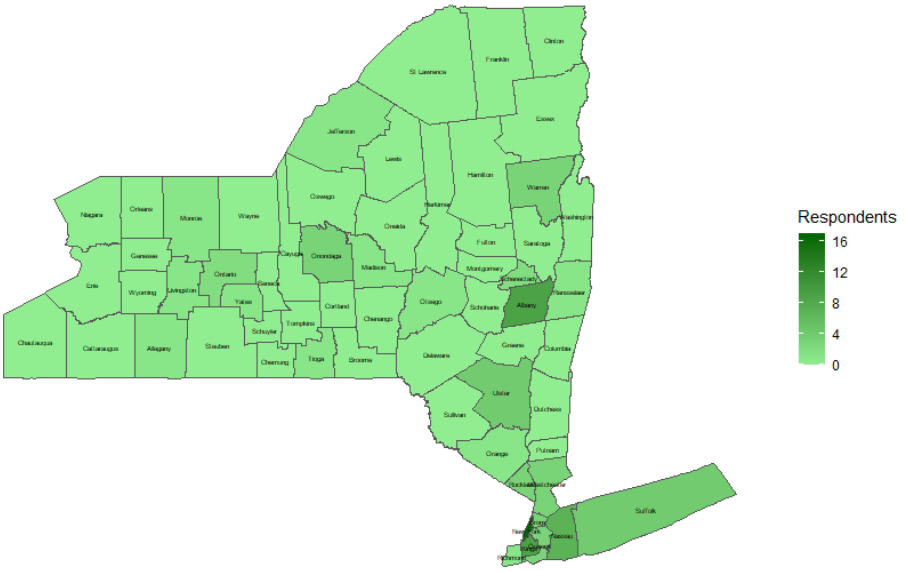


Geographical Representation

Follow-up survey respondents were asked to list up to three jurisdictions in which they work, so the market evaluation team could ensure that the webinars are reaching attendees across NYS. While the original intent was to collect the names of towns, a notable number of respondents specified counties; because of this, the team converted all responses to county-based entries and applied these to a state map.

As shown in Figure 54, 47 of 62 counties were represented (76% of all state counties) by follow-up survey respondents, with the lowest number of counties represented in the northwest portion of the state (which has a more rural population than that in the southeast, which had the most representation). The counties with the highest representation were the five boroughs of NYC (18% of respondents), Albany County (15%), and Nassau County (7%). The NYC counties and Albany County were also highly represented in the immediate surveys. Most counties were represented by only a few respondents (generally between one and four).

Figure 54. Follow-Up Survey Representation by County (n=207)

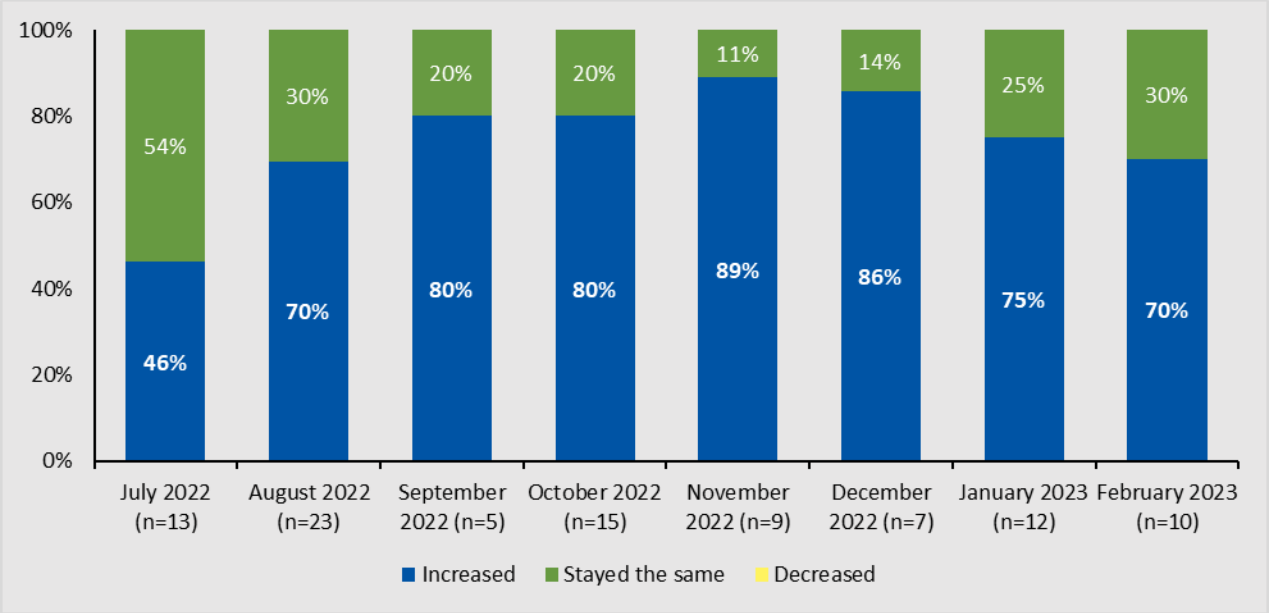


Trends (Follow-Up Survey)

Survey respondents were asked to consider the past 12 months and indicate if they felt that during that time compliance with the energy code in NYS had increased, decreased or stayed the same. Overall, 72% of all respondents said they felt that energy code compliance had increased over the past 12 months. As shown in Figure 55, the majority of respondents for each training month felt that energy code compliance had increased over the past 12 months, no respondents in this program year said compliance had decreased.

Figure 55. Change in Energy Code Compliance

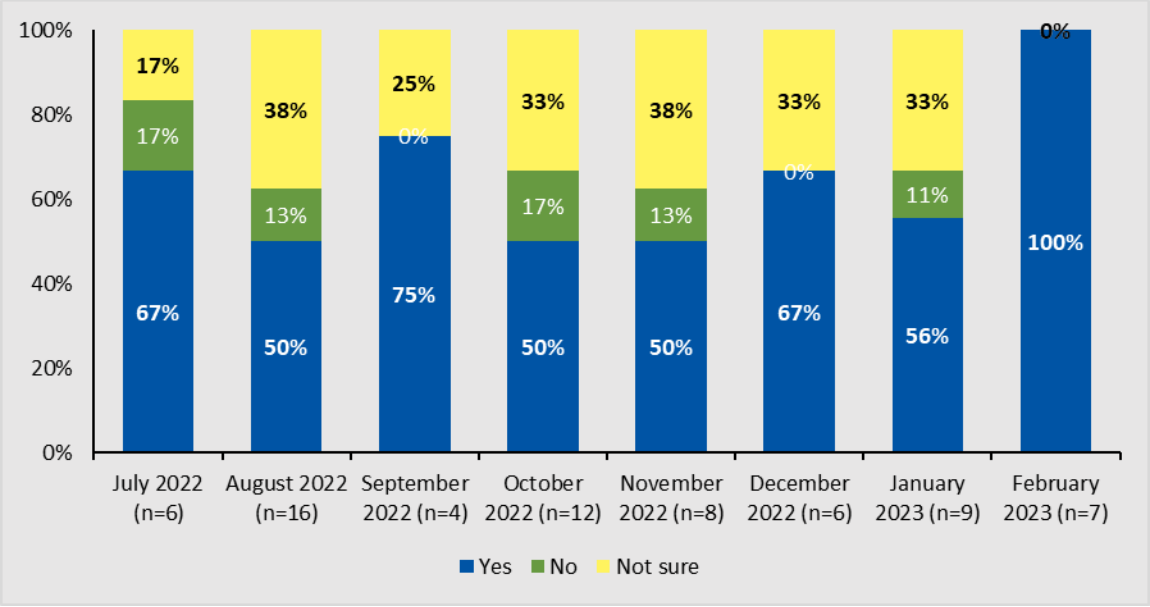
Source: Follow-Up Survey Question: "In the last year or so, do you think compliance with the energy code in New York State has increased, stayed the same, or decreased?"



Of those respondents who said that they had observed an increase in code compliance, 60% said that they thought the services provided by the NYSERDA technical support and training initiatives had played a role in this increase in compliance, with an additional 29% saying they were not sure. Figure 56 shows the breakdown by training month.

Figure 56. Whether NYSERDA-Sponsored Events Impact Compliance Improvements

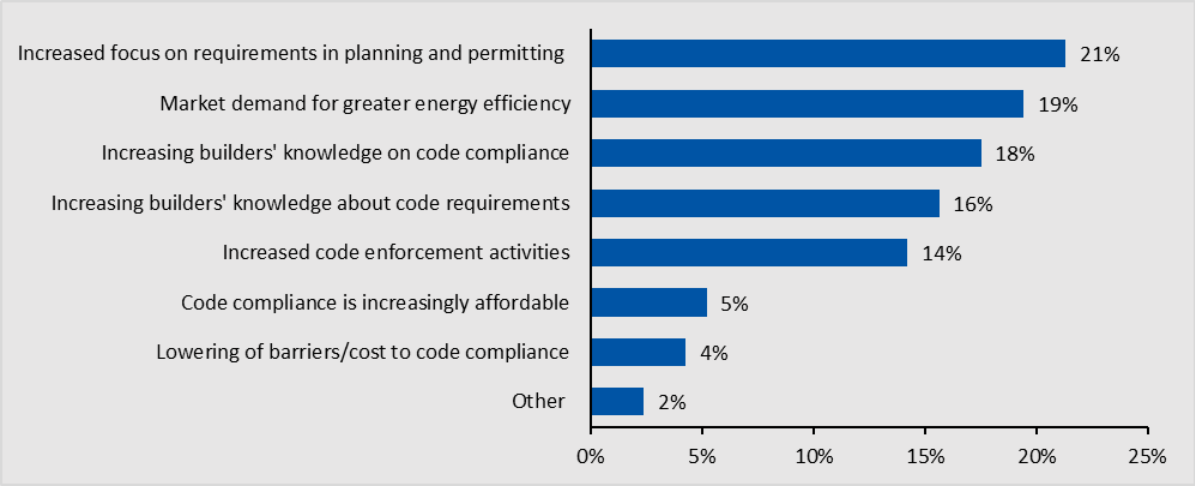
Source: Follow-Up Survey Question: "Do you think the services provided by the NYSERDA Initiative, including training and technical assistance, have played a role in this?"



Respondents who had reported an increase in energy code compliance were also asked to identify other factors that they thought contributed to the increased code compliance in NYS. As shown in Figure 57, respondents identified several factors, including increased focus on energy code in planning and permitting (21%), market demand for greater energy efficiency (19%), and increased builders' knowledge about code requirements (18%).

Figure 57. Other Factors Contributing to Increased Compliance (n=211)

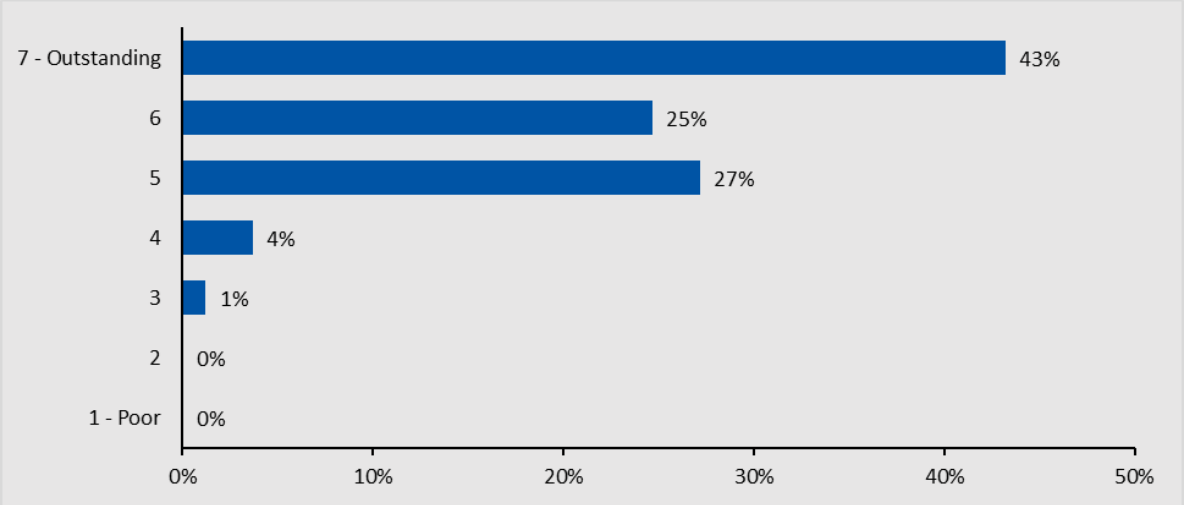
Source: Follow-Up Survey Question: "What factors do you think have contributed to the increase in code compliance other than the NYSERDA initiatives?"



Overall, taking everything into consideration, survey respondents rated the value of the webinars they attended as a 6.05 on a scale of 1 to 7 (with 1 being poor and 7 being outstanding) in helping attendees better understand and implement NYS energy code. As shown in Figure 58, the most common rating was a seven, with 43% of respondents giving that score.

Figure 58. Overall Value of NYSERDA Training Initiative (n=81)

Source: Follow-Up Survey Question: "Taking everything into consideration, how would you rate the overall value of the webinar you attended?"



Square Footage Calculation

The team asked follow-up survey respondents to estimate the number of projects and the square footage of projects completed since participating in the webinars. Although most respondents work only in certain sectors (such as residential construction and alterations), overall, 82 respondents provided usable information. The number of respondents for each project and respondent types are included in the tables below.

Overall, 31 of the 664 code officials who completed the survey provided a response for at least one building category. As shown in Table 26, most code officials reported working on residential alternations and additions following the trainings. This category includes multifamily buildings with five or fewer dwelling units that were on average the smallest in terms of square footage. The largest projects code officials reported working on were multifamily new construction projects.

The market evaluation team calculated the total square footage that code officials worked on after the trainings as the product of the percentage of code officials who worked on a building category, the median of projects on which each building professional worked, the average square footage per project

(based on the median of average project square footage reported by code officials), and the number of code officials trained in 2022[10]. The total square footage affected by code officials based on this calculation is greater than the 2023 new construction and additions and alterations data reported by Dodge Data and Analytics (Dodge), which NYSERDA provided to the market evaluation team. The difference is especially significant for additions and alterations.

Table 26. Projects in the Six Months After Attending Training (Code Officials)

Category	n	% Code Providing a Response	Median Number of Projects	Average Square Footage per Project	Code Officials Trained in 2022	Square footage Affected by Training Participants
Commercial New Construction	9	35%	2	50,000	664	22,984,615
Commercial Additions and Alterations	15	58%	4	20,000		30,646,154
Residential New Construction	15	58%	10	3,000		11,492,308
Residential Alterations and Additions	17	65%	8	2,050		7,120,123
Multifamily New Construction	5	19%	2	52,000		13,280,000
Multifamily Alterations and Additions	7	27%	3	28,000		15,016,615

Overall, 51 of the 664 building professionals who completed the survey provided a response for at least one building category. As shown in Table 27, building professionals worked mostly on commercial additions and alteration projects. As with code officials, total square footage reported by building officials exceeds the building square footage reported by Dodge, particularly for alterations and additions.

[10] 3,963 unique persons attended trainings in 2021. According to the immediate surveys, 47% of those training attendees were code officials.

Table 27. Projects in the Six Months since Attending Training (Building Professionals)

Category	n	% Code Providing a Response	Median Number of Projects	Average Square Footage per Project	Building Professionals Trained in 2022	Square footage Affected by Training Participants
Commercial New Construction	25	53%	2	50,000	797	42,393,617
Commercial Additions and Alterations	33	70%	5	20,000		55,959,574
Residential New Construction	8	17%	5	11,000		6,715,149
Residential Alterations and Additions	10	21%	3	4,500		2,289,255
Multifamily New Construction	9	19%	2	210,000		64,099,149
Multifamily Alterations and Additions	6	13%	2	53,000		10,784,936

The total square footage reportedly affected by the follow-up survey respondents exceeds the 2023 square footage reported by Dodge. This difference may result from multiple respondents in the same building department or firm working on the same building or from inaccurate data from Dodge.

Understanding of the ECCCNYS, NYCECC, and NYStretch (Immediate Survey)

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

Figure 59 illustrates the change in attendees' level of understanding of the ECCCNYS. The team asked only individuals attending ECCCNYS-specific training to estimate their level of understanding of the ECCCNYS before and after the training. Overall, 16% of 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 51% of respondents ranked themselves a 6 or 7. This resulted in an increase from a mean score of 4.3 to a mean score of 5.4.

Figure 59. Understanding of the ECCCNYS (n=598)

Source: Immediate Survey Questions: "Prior to attending the training on [Course Title], what was your level of understanding of the Energy Conservation Code of New York State?" and "After attending the training on [Course Title], what is your level of understanding of the Energy Conservation Code of New York State?"

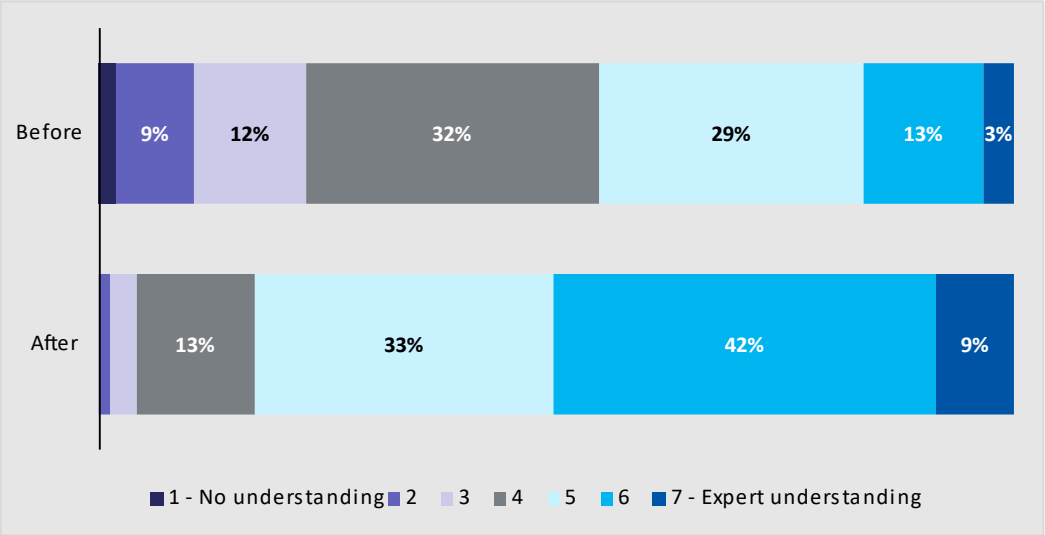


Figure 60 shows the change in attendees' level of understanding of the NYCECC. The team asked individuals attending New York City (NYC)-specific training to estimate their level of understanding of the NYCECC before and after the training events. Fifteen percent of the respondents ranked themselves as 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 an increase from a mean score of 3.8 to a mean score of 4.8.

Figure 60. Understanding of the NYCECC (n=478)

Source: Immediate Survey Questions: "Prior to attending the training on [Course Title], what was your level of understanding of the New York City Energy Conservation Code?" and "After attending the training on [Course Title], what is your level of understanding of the New York City Energy Conservation Code?"

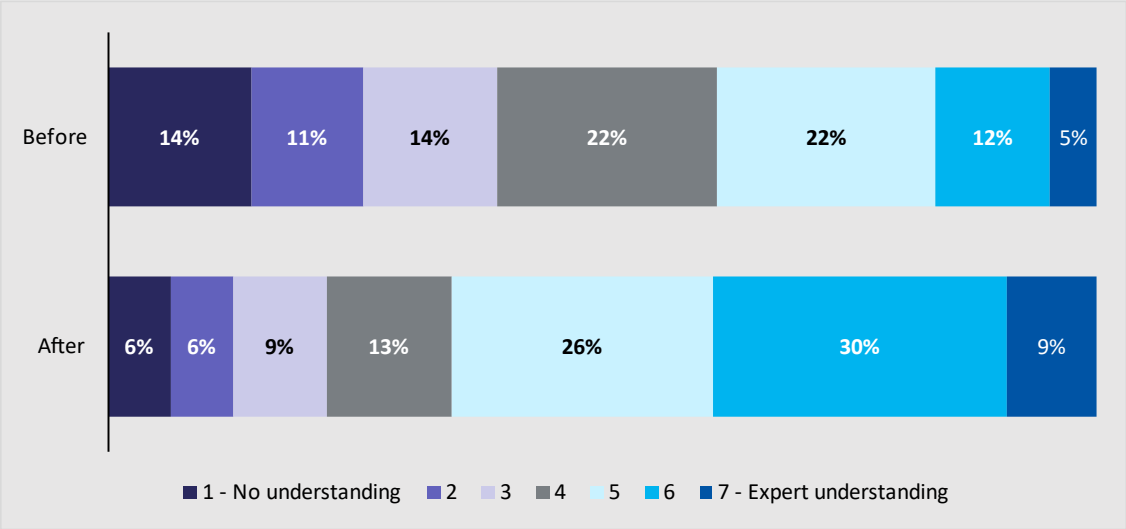
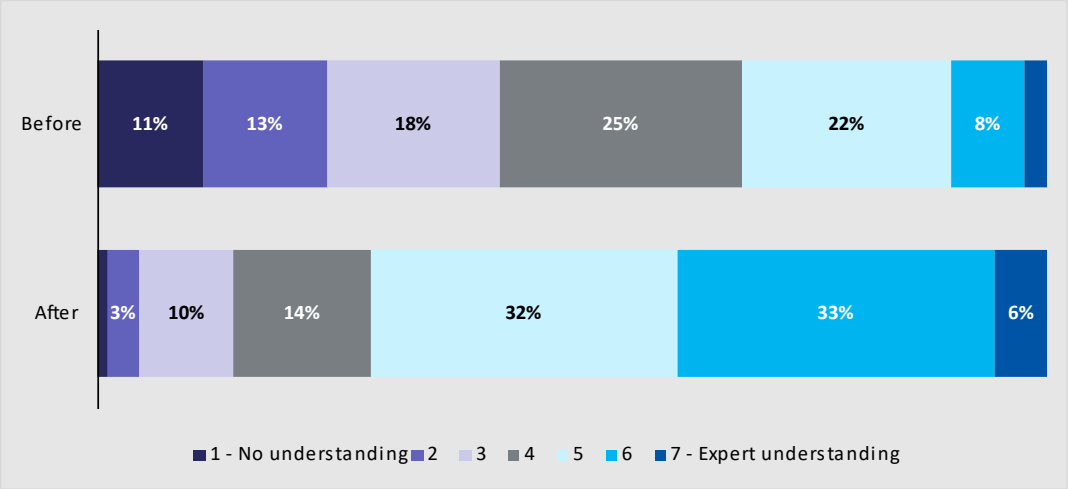


Figure 61 shows the change in attendees' level of understanding of NYStretch. The team asked only individuals attending a training session covering NYStretch topics to provide their level of understanding of the stretch energy code before and after the training events. Only 11% of respondents ranked themselves as having a level of understanding of 6 or 7 prior to attending the training. The level of understanding increased to 39% rating themselves a 6 or 7 after the training. Overall, mean scores increased from 3.7 prior to the training to 5.0 after attending the training.

Figure 61. Understanding of NYStretch (n=592)

Source: Immediate Survey Questions: "Prior to attending the training on [Course Title], what was your level of understanding of the NYStretch Energy Code - 2020 on a scale from 1 to 7" and "After attending the training on [Course Title], what is your level of understanding of the NYStretch Energy Code - 2020 on a scale from 1 to 7"

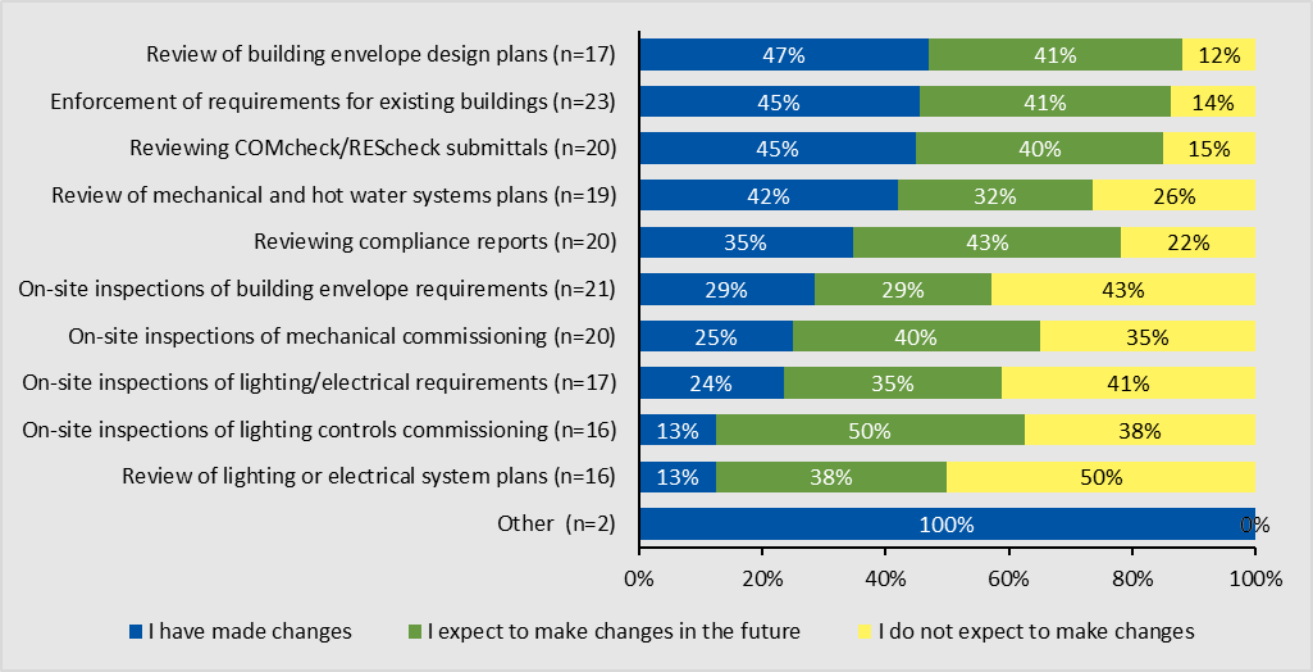


Participant Changes to Work Procedures (Follow-Up Survey)

Code officials were asked to identify what (if any) procedures of their work had changed as a result of attending the training webinars. As shown in Figure 62, code officials said that they had made changes to the way they review building envelope design plans (47%) and to their enforcement of requirements of existing buildings and review of COMcheck/REScheck submittals (both 45%). However, a similar percentage of code officials also said they were unlikely to make changes when reviewing lighting or electrical system plans (50%). Additionally, code officials said that they were unlikely to make changes when conducting on-site inspections of building envelope requirements (43%) or on-site inspections of lighting/electrical requirements (41%).

Figure 62. Work Procedures Changed from Lessons Learned at NYSERDA Webinars (Code Officials)

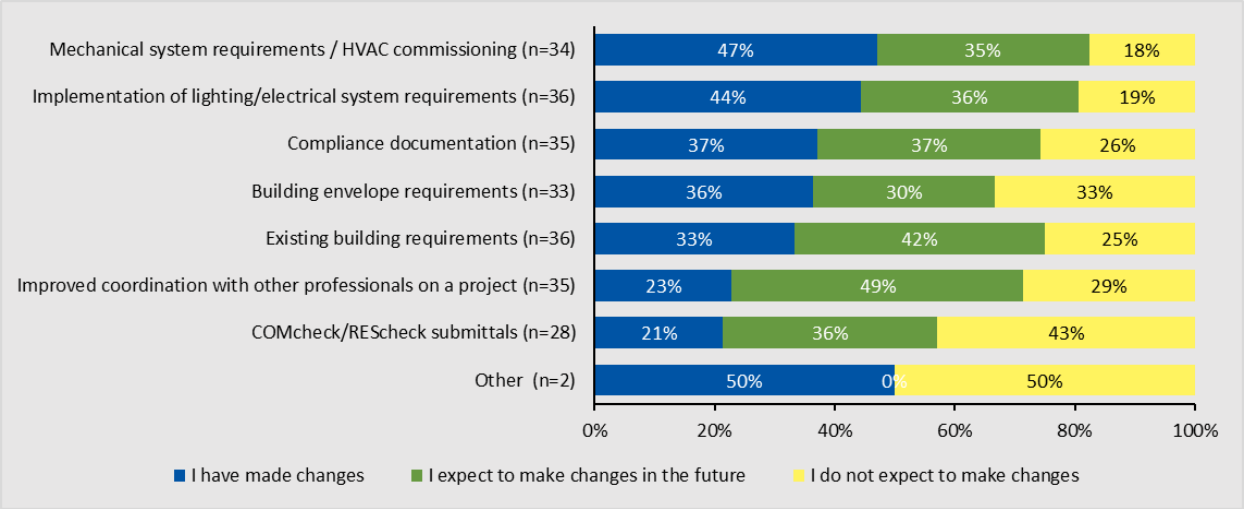
Source: Follow-Up Survey Question: "For each topic listed below, please identify if the procedures of your work have changed or will change as a result of what you learned at the webinars you attended."



Building professionals were also asked to consider if their work procedures had changed as a result of what they learned at NYSERDA-sponsored webinars. As shown in Figure 63, building professionals most often reported that they had made changes to their work around meeting mechanical system requirements or HVAC commissioning (47%), implementation of lighting or electrical system requirements (44%), and compliance documentation (37%). However, an additional 43% of building professionals indicted they were unlikely to make change to their work around COMcheck or REScheck submittals.

Figure 63. Work Procedures Changed from Lessons Learned at NYSERDA Webinars (Building Professionals)

Source: Follow-Up Survey Question: "For each topic listed below, please identify if the procedures of your work have changed or will change as a result of what you learned at the webinars you attended."

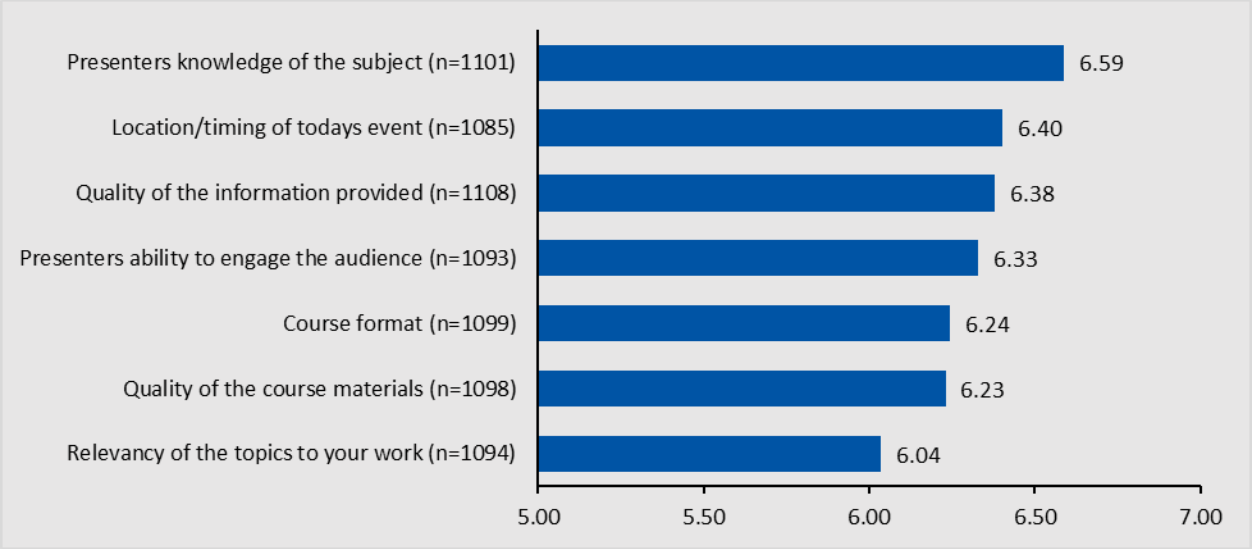


Satisfaction with Training Elements (Immediate Survey)

The market evaluation team asked respondents to rate their satisfaction with key aspects of the training on a 7-point scale, where 1 is not at all satisfied and 7 is very satisfied. Figure 64 shows that attendees are generally satisfied with all aspects of the training. The mean rating for all elements is higher than 6 on the 7-point scale. The figure also shows that respondents were most satisfied with how knowledgeable the presenters were on the subject matter, followed by the convenient timing of the webinars and satisfaction with the quality of the information provided and the.

Figure 64. Respondent Mean Satisfaction Rating for Key Training Elements

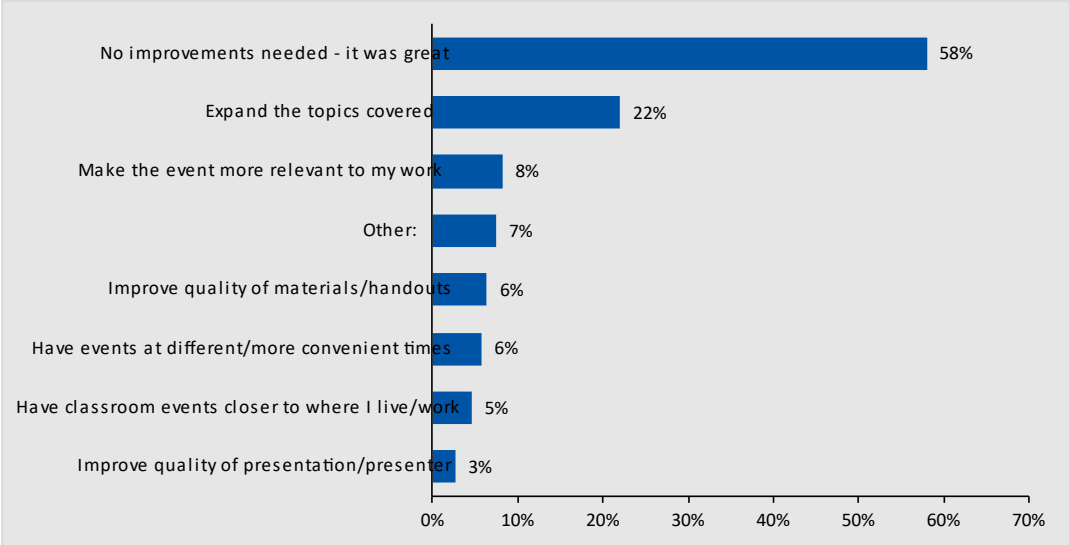
Source: Immediate Survey Question: "Please rate your satisfaction with: … on a scale of 1 – Not satisfied at all, to 7 – Very satisfied."



When asked what could improve the training events, 59% of respondents said the training was great and no improvements were needed. Figure 65 shows the most common suggestions for improvements.

Figure 65. Respondent Suggests for Course Improvement (n=940)

Source: Immediate Survey Question: "How can we improve the [Course Title] training or similar events in the future?"



Recent verbatim responses provided by respondents included the following:

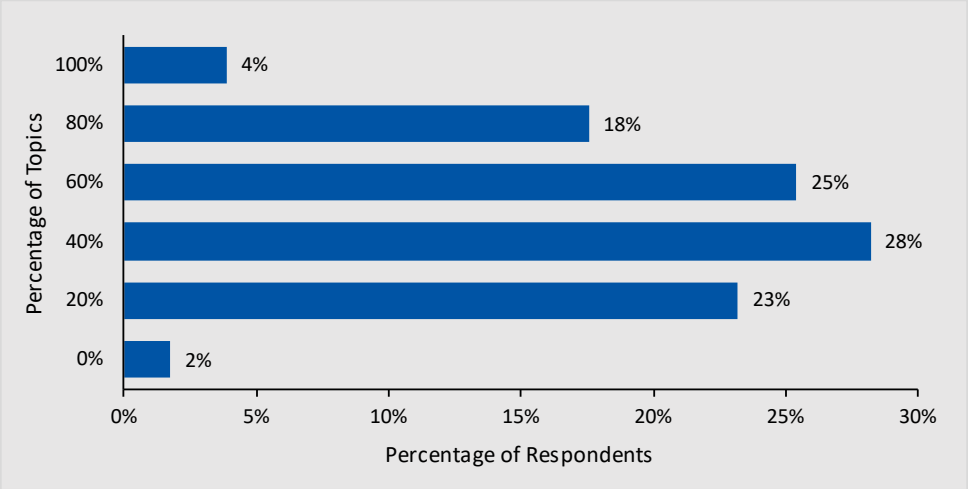
- "Although presenter was clearly qualified and informative he spoke so quickly there were sections that were difficult to follow (no matter, I will continue to use consultants for code conformance) and I did appreciate the emphasis on proper & healthy ventilation & how to pass awareness of this on to clients"
- "Good to have the excerpts from the code but would be more helpful to incorporate more insight and interpretations instead of reading the word for word code."
- "I think the information covered was great, but the training wasn't very engaging besides the periodic quizzes. Would have preferred a non-recorded presentation, but I do think it was still helpful."

Relevance and Usefulness of Training Topics (Immediate Survey)

The market evaluation team asked respondents to identify the percentage of topics covered in the training sessions that covered new information. As shown in Figure 66, few respondents said that either all or none of the topics covered were new information. Nearly a third of respondents (28%) said that approximately 40% of the topics covered was new information.

Figure 66. New Information as a Percentage of Topics Covered (n=1,082)

Source: Immediate Survey Question: "What percent of the topics covered in the training session today was new information for you?"



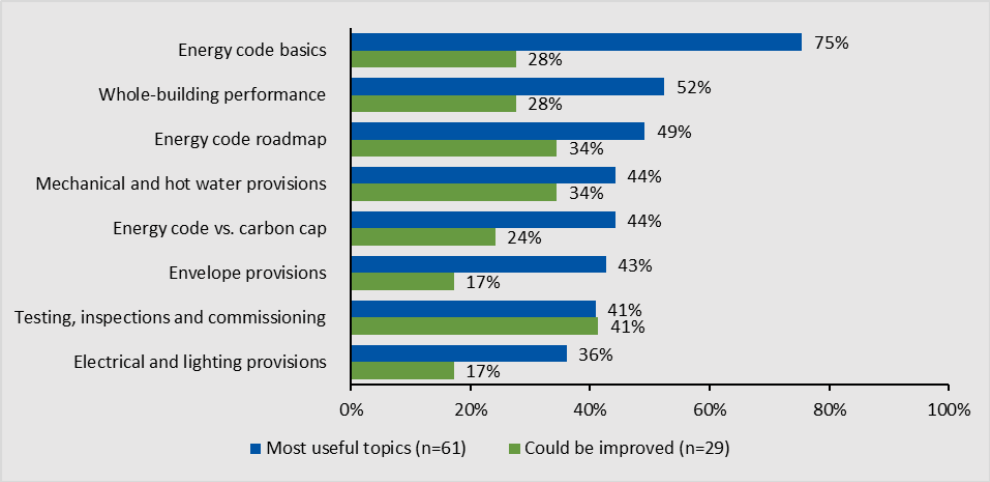
The most useful topics and the topics identified as needing improved content for each course are presented in the following sections.

What's New in the 2020 NYC Energy Code: Commercial (UGC)

Figure 67 shows the topics respondents who took the "What's New in the 2020 NYC Energy Code" training found most useful and those they suggested could be improved. The topic respondents found most useful was energy code basics (75%). When asked which topic could be improved, 41% said testing, inspections, and commissioning.

Figure 67. Feedback on Topics Covered (What's New in the 2020 NYC Energy Code: Commercial)

Source: Immediate Survey Questions: "What were the most useful topics of the training for you?" and "Are there any topics from today's training that could be improved?" Multiple responses allowed.

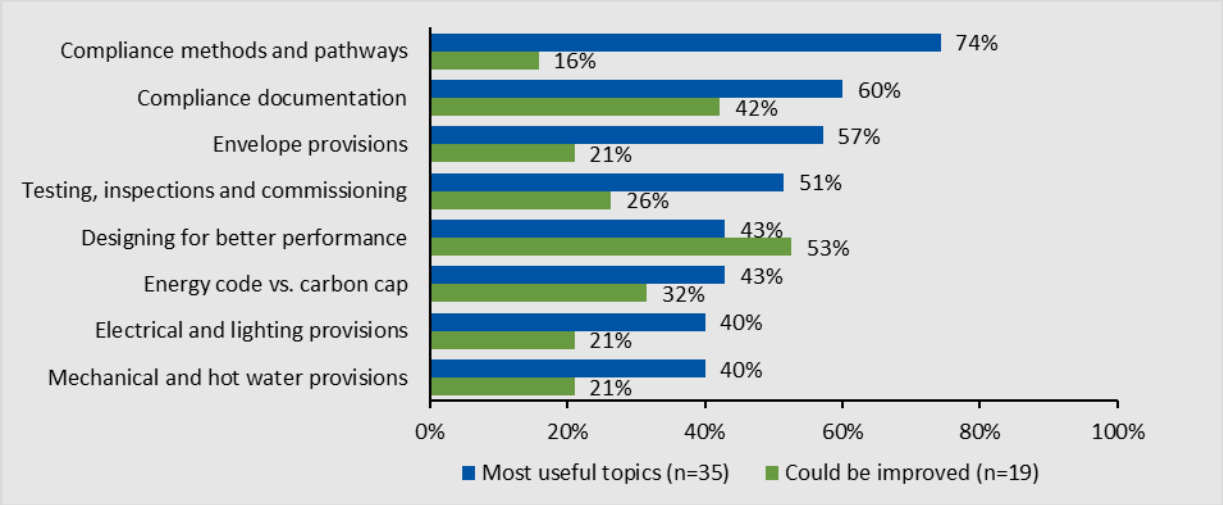


Crushing the NYC Energy Code: Commercial (UGC)

Figure 68 shows the topics respondents who took the "Crushing the NYC Energy Code: Commercial" training found most useful and those they suggested could be improved. The topic respondents found most useful was compliance methods and pathways (74%). When asked which topic could be improved, 53% of respondents said designing for better performance.

Figure 68. Feedback on Topics Covered (Crushing the NYC Energy Code: Commercial)

Source: Immediate Survey Questions: "What were the most useful topics of the training for you?" and "Are there any topics from today's training that could be improved?" Multiple responses allowed.

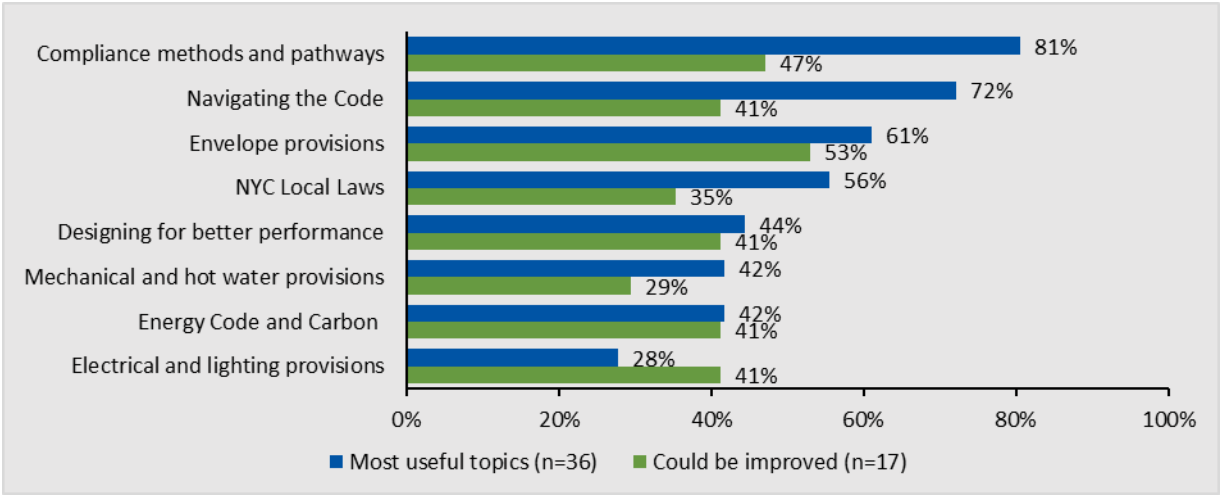


Crushing the NYC Energy Code: Residential (UGC)

Figure 69 shows the topics respondents who took the "Crushing the NYC Energy Code: Residential" training found most useful and those they suggested could be improved. The topics respondents found most useful was compliance methods and pathways (81%). The topic that respondents most commonly said could be improved was envelope provisions (53%).

Figure 69. Feedback on Topics Covered (Crushing the NYC Energy Code: Residential)

Source: Immediate Survey Questions: "What were the most useful topics of the training for you?" and "Are there any topics from today's training that could be improved?" Multiple responses allowed.

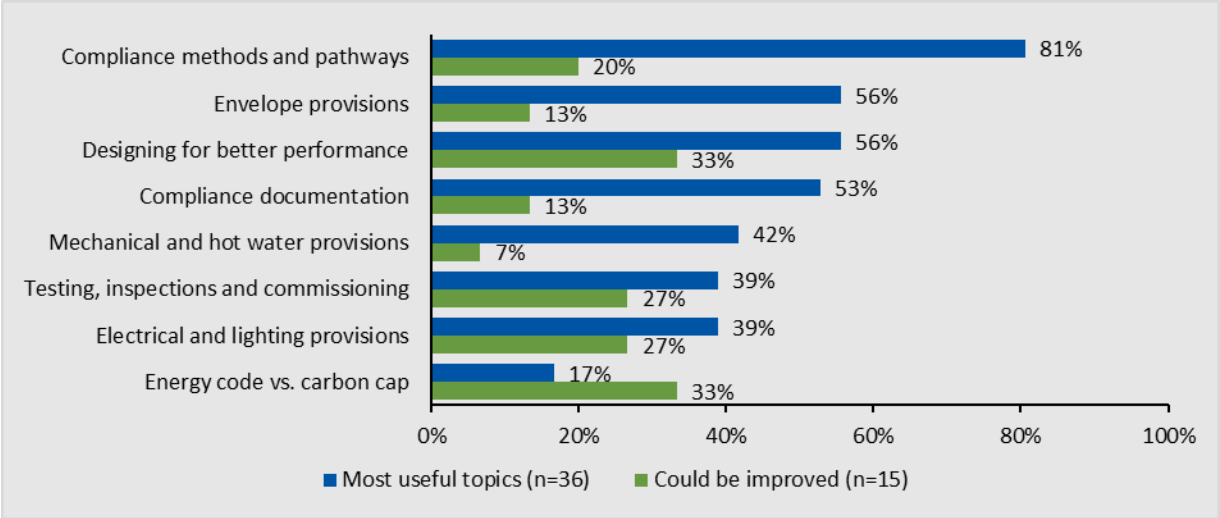


Crushing the NYS Energy Code: Commercial (UGC)

Figure 70 shows the topics respondents who took the "Crushing the NYS Energy Code: Commercial" training found most useful and those they suggested could be improved. Respondents said the most useful topic was compliance methods and pathways (81%). When asked which topics could be improved, respondents listed two topics: designing for better performance, and envelope provisions (56%).

Figure 70. Feedback on Topics Covered (Crushing the NYS Energy Code: Commercial)

Source: Immediate Survey Questions: "What were the most useful topics of the training for you?" and "Are there any topics from today's training that could be improved?" Multiple responses allowed.

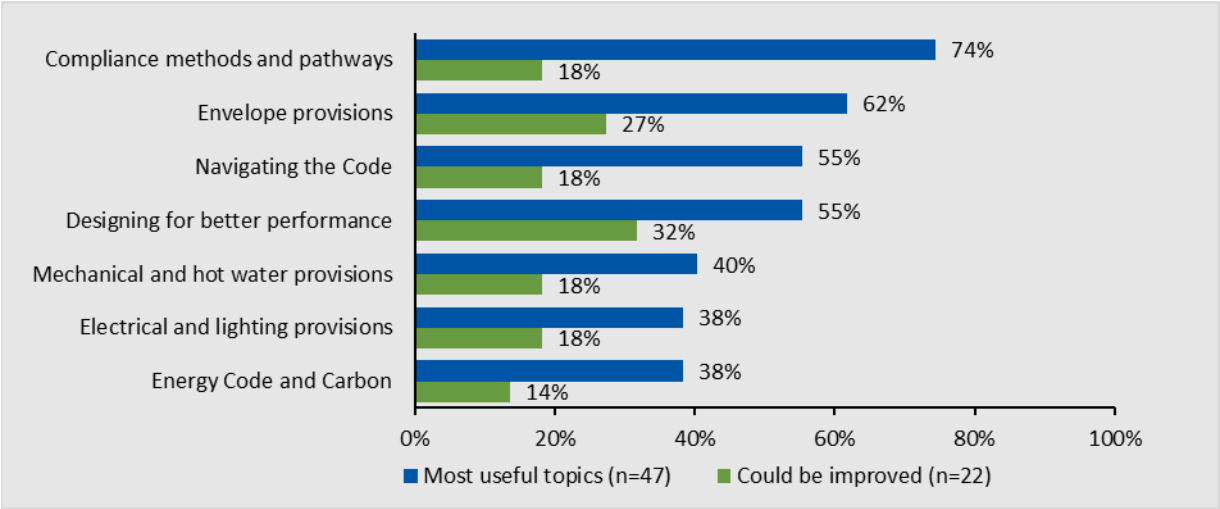


Crushing the NYS Energy Code: Residential (UGC)

Figure 71 shows the topics respondents who took the "Crushing the NYS Energy Code: Residential" training found most useful and those they suggested could be improved. Respondents said the most useful topic is compliance methods and pathways (74%). When asked which topics could be improved, respondents said designing for better performance (32%).

Figure 71. Feedback on Topics Covered (Crushing the NYS Energy Code: Residential)

Source: Immediate Survey Questions: "What were the most useful topics of the training for you?" and "Are there any topics from today's training that could be improved?" Multiple responses allowed.

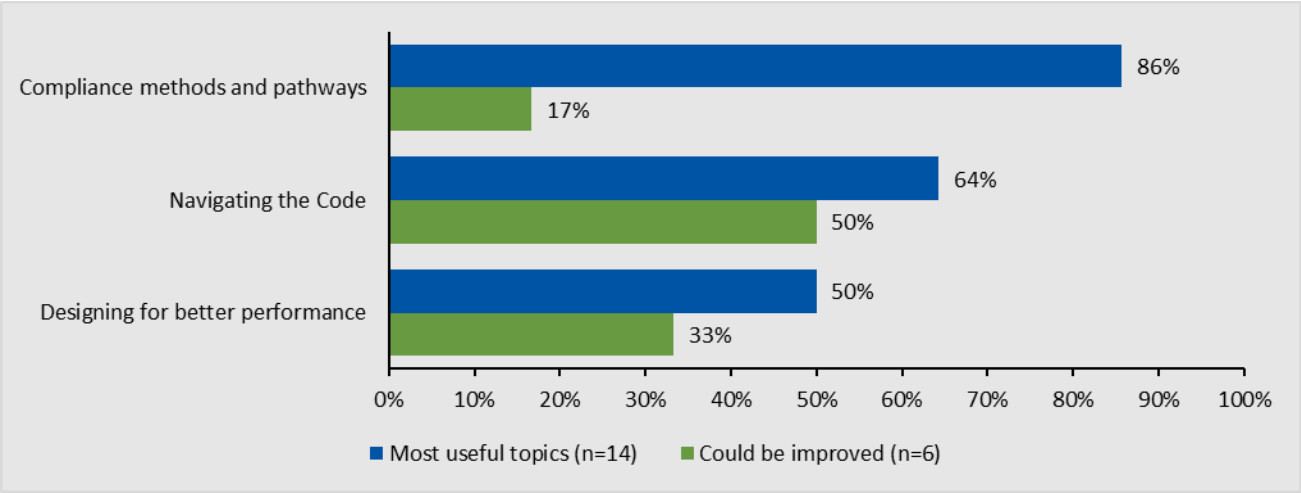


Crushing the Code NYS: Energy Code 101 (UGC)

Figure 72 shows the topics respondents who took the "Crushing the Code NYS: Energy Code 101" training found most useful and those they suggested could be improved. Respondents said the most useful topic is compliance methods and pathways (86%). When asked which topics could be improved, respondents said the navigating the code topic (50%).

Figure 72. Feedback on Topics Covered (Crushing the Code NYS: Energy Code 101)

Source: Immediate Survey Questions: "What were the most useful topics of the training for you?" and "Are there any topics from today's training that could be improved?" Multiple responses allowed.

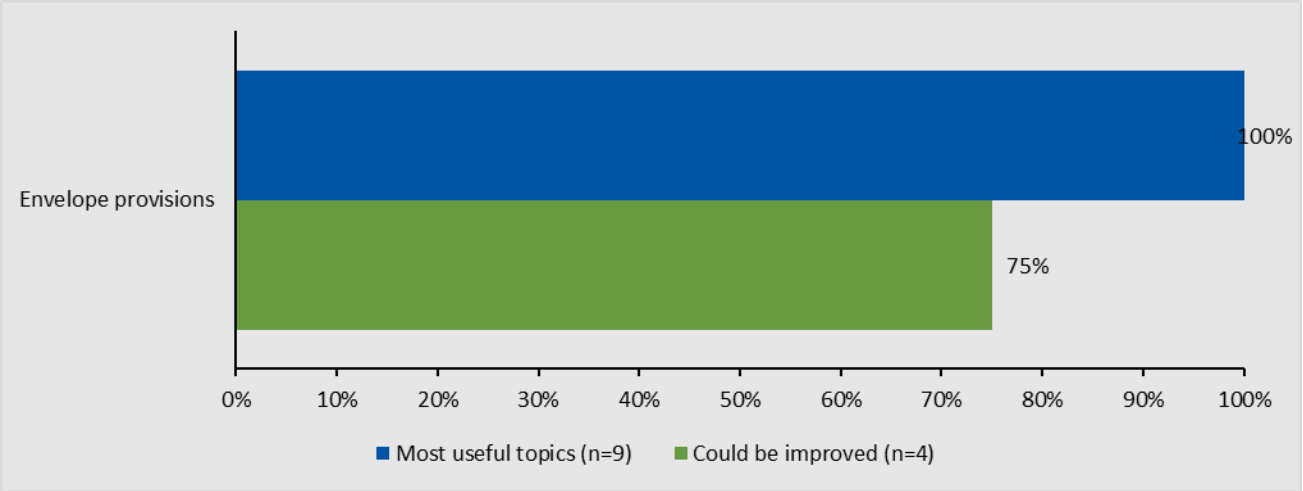


Crushing the Code NYS: Residential Envelope (UGC)

Figure 73 shows the topics respondents who took the "Crushing the Code NYS: Residential Envelope" training found most useful and those they suggested could be improved. As there is only one topic, 100% of respondents said that it was useful while 75% mentioned that it could use improvement.

Figure 73. Feedback on Topics Covered (Crushing the Code NYS: Residential Envelope)

Source: Immediate Survey Questions: "What were the most useful topics of the training for you?" and "Are there any topics from today's training that could be improved?" Multiple responses allowed.

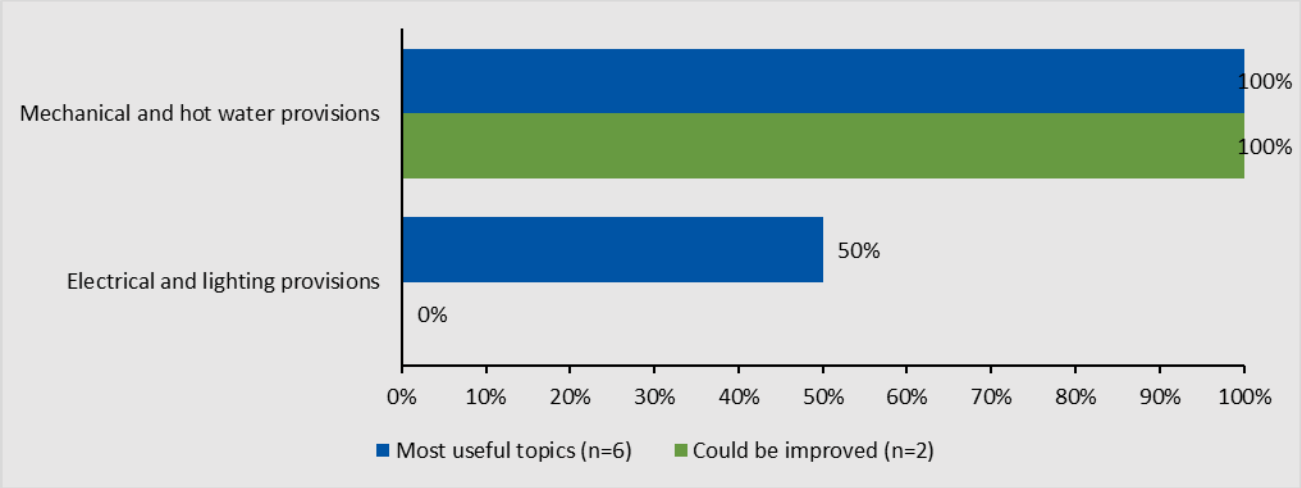


Crushing the Code NYS: Commercial Building Systems (UGC)

Figure 74 shows the topics respondents who took the "Crushing the Code NYS: Commercial Building Systems" training found most useful and those they suggested could be improved. All respondents said the most useful topic is mechanical and hot water provisions (100%). When asked which topics could be improved, respondents said the same topic (100%). Only 2 respondents provided feedback on topic improvement.

Figure 74. Feedback on Topics Covered (Crushing the Code NYS: Commercial Building Systems)

Source: Immediate Survey Questions: "What were the most useful topics of the training for you?" and "Are there any topics from today's training that could be improved?" Multiple responses allowed.

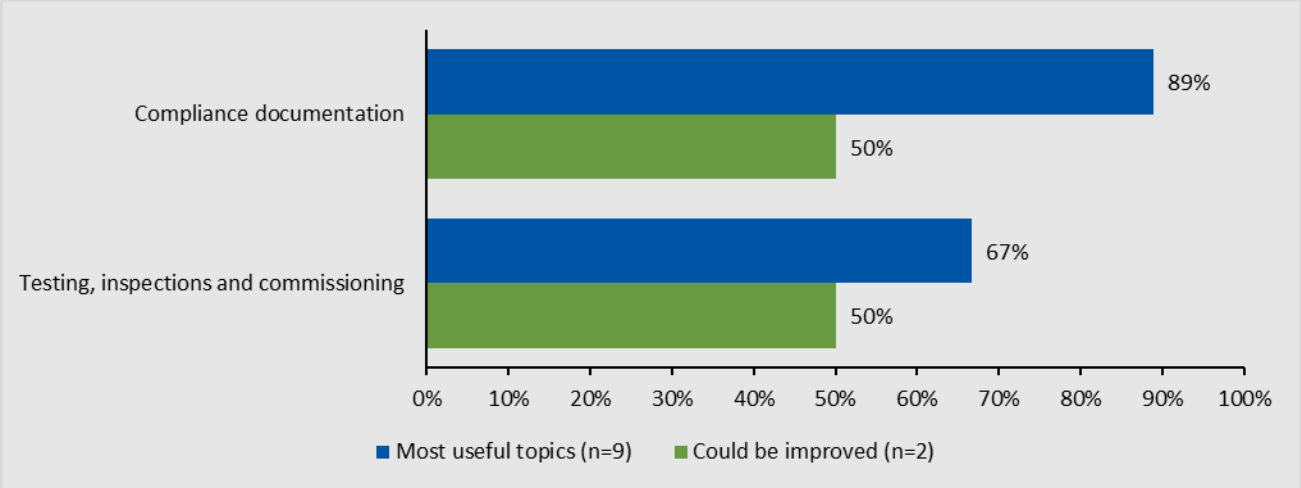


Crushing the Code NYS: Demonstrate Compliance (UGC)

Figure 75 shows the topics respondents who took the "Crushing the NYS Energy Code: Residential" training found most useful and those they suggested could be improved. Respondents said the most useful topic is compliance documentation (89%). When asked which topics could be improved, respondents listed both topics in equal proportion (50% each).

Figure 75. Feedback on Topics Covered (Crushing the Code NYS: Demonstrate Compliance)

Source: Immediate Survey Questions: "What were the most useful topics of the training for you?" and "Are there any topics from today's training that could be improved?" Multiple responses allowed.

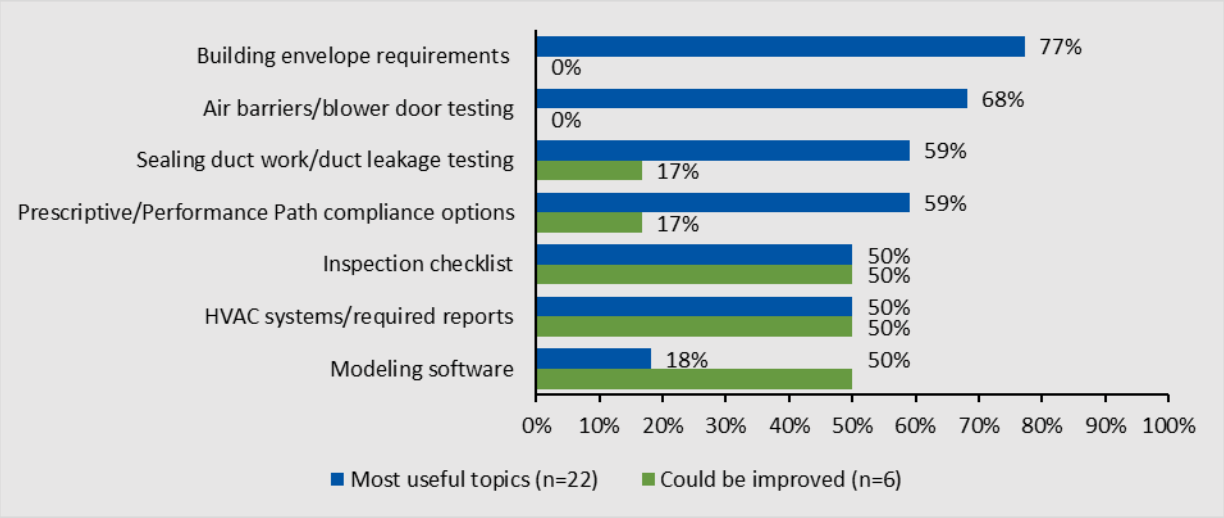


2020 ECCCNYS for Residential Buildings: Overview (Newport Ventures)

Figure 76 shows the topics respondents who took the "2020 ECCCNYS for Residential Buildings: Overview" training found most useful and those they suggested could be improved. Respondents said the most useful topics was building envelope requirements (77%). When asked which topics could be improved, respondents identified modeling software, inspection checklist, and HVAC systems/required reports (50%).

Figure 76. Feedback on Topics Covered (2020 ECCCNYS for Residential Buildings: Overview)

Source: Immediate Survey Questions: "What were the most useful topics of the training for you?" and "Are there any topics from today's training that could be improved?" Multiple responses allowed.

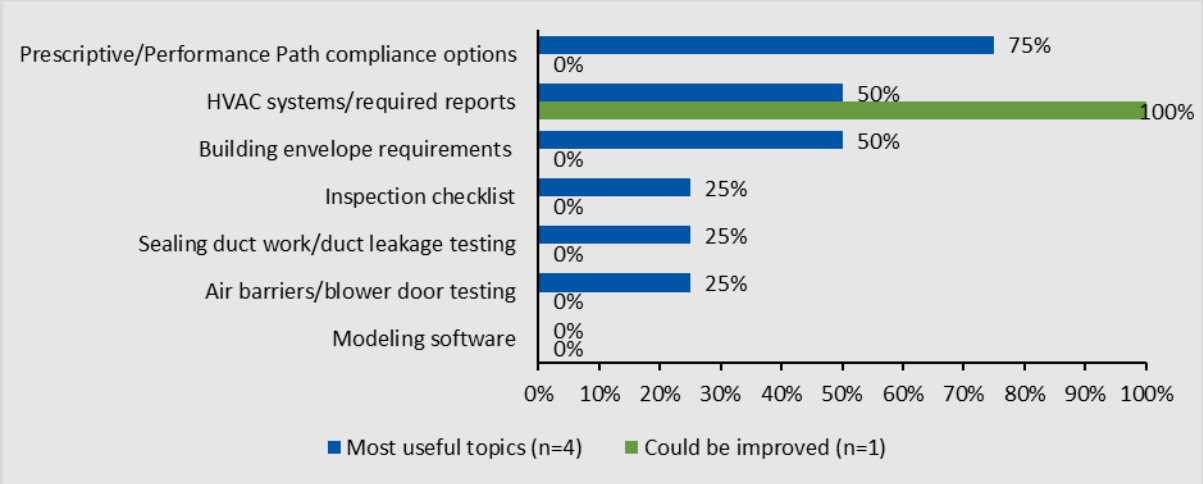


2020 ECCCNYS for Commercial Buildings: Overview (Newport Ventures)

Figure 77 shows the topics respondents who took the "2020 ECCCNYS for Commercial Buildings: Overview" training found most useful and those they suggested could be improved. Respondents said the most useful topic was prescriptive/performance path compliance options (75%). Only one respondent provided improvement feedback, and specified that the HVAC systems/required reports topic could be improved.

Figure 77. Feedback on Topics Covered (2020 ECCCNYS for Commercial Buildings: Overview)

Source: Immediate Survey Questions: "What were the most useful topics of the training for you?" and "Are there any topics from today's training that could be improved?" Multiple responses allowed.

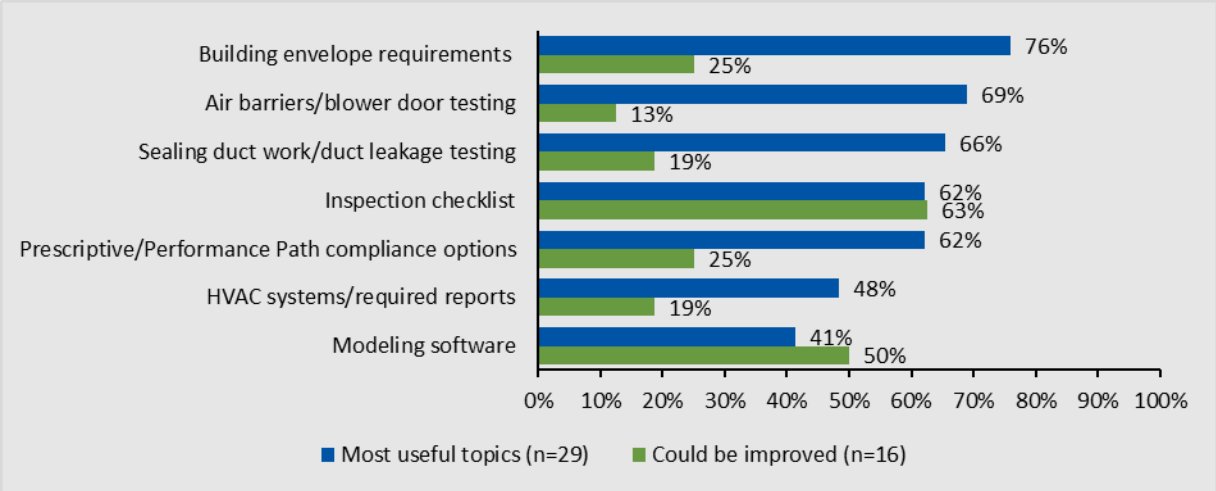


Clean Energy Communities Energy Code Enforcement (Newport Ventures)

Figure 78 shows the topics respondents who took the "Clean Energy Communities Energy Code Enforcement" training found most useful and those they suggested could be improved. Respondents said the most useful topic was building envelope requirements (76%). Respondents mentioned that the topic that could use the most improvement was the inspection checklist (63%).

Figure 78. Feedback on Topics Covered (Clean Energy Communities Energy Code Enforcement)

Source: Immediate Survey Questions: "What were the most useful topics of the training for you?" and "Are there any topics from today's training that could be improved?" Multiple responses allowed.

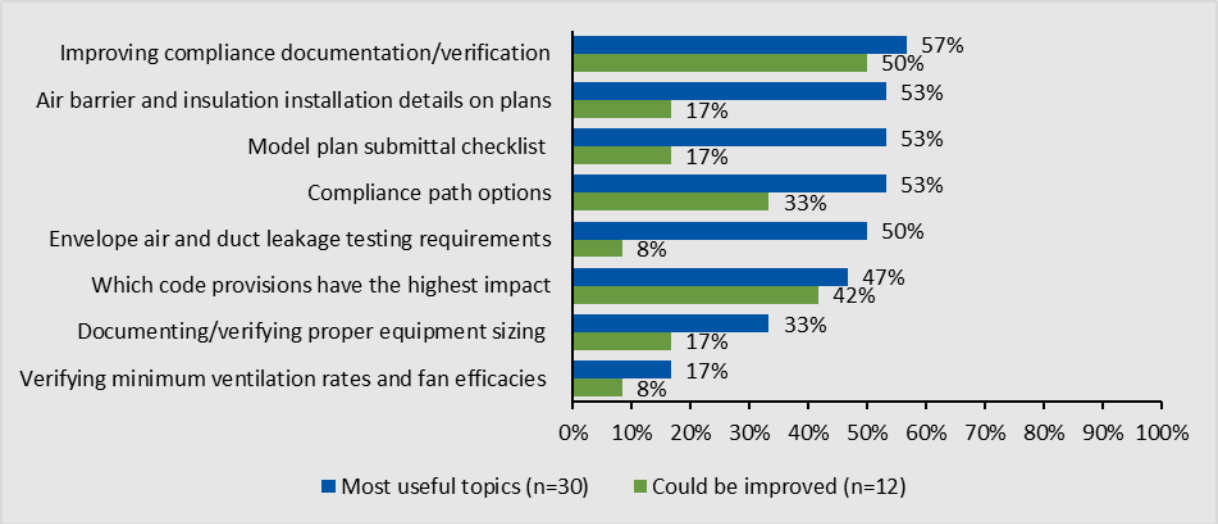


R1.1 Energy Code Plan Reviews (PSD)

Figure 79 shows the topics respondents who took the "Energy Code Plan Reviews" training found most useful and those they suggested could be improved. Respondents said the most useful topic was both improving compliance documentation/verification (57%). Half (50%) of respondents suggested the improving compliance documentation/verification topic could use the most improvement.

Figure 79. Feedback on Topics Covered (R1.1 Energy Code Plan Reviews)

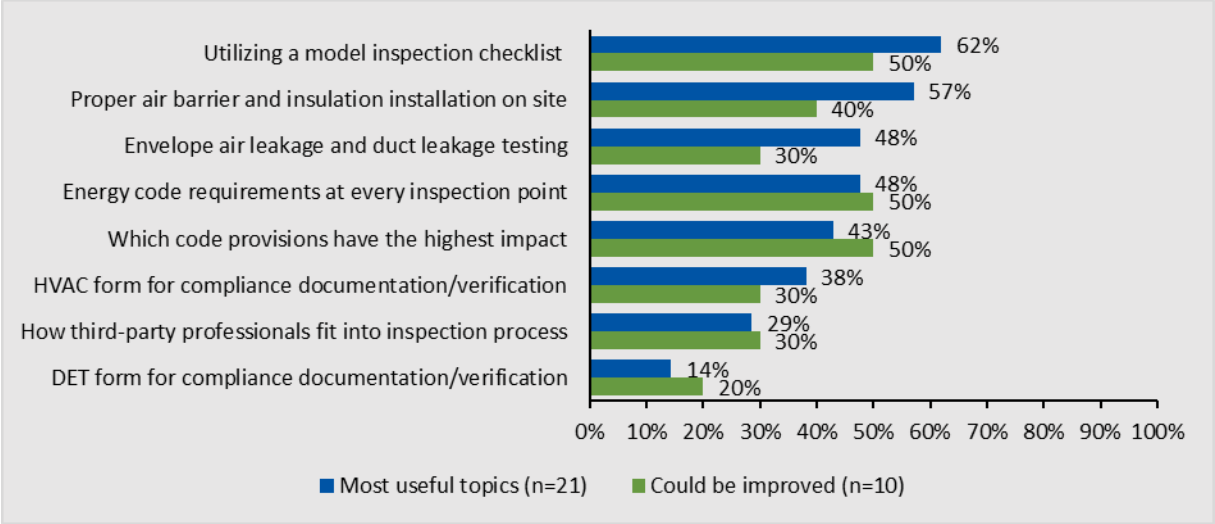
Source: Immediate Survey Questions: "What were the most useful topics of the training for you?" and "Are there any topics from today's training that could be improved?" Multiple responses allowed.



R1.2 Energy Code Inspections in 15 Minutes or Less (PSD)

Figure 80 shows the topics respondents who took the "Energy Code Inspections in 15 Minutes or Less" training found most useful and those they suggested could be improved. The most useful topics were utilizing a model inspection checklist (62%) and proper air barrier and insulation installation on site (57%). When asked which topics could be improved, 50% of respondents identified the energy code requirements at every inspection point, which code provisions have the highest impact, and utilizing a model inspection checklist.

Figure 80. Feedback on Topics Covered (R1.2 Energy Code Inspections in 15 Minutes or Less)

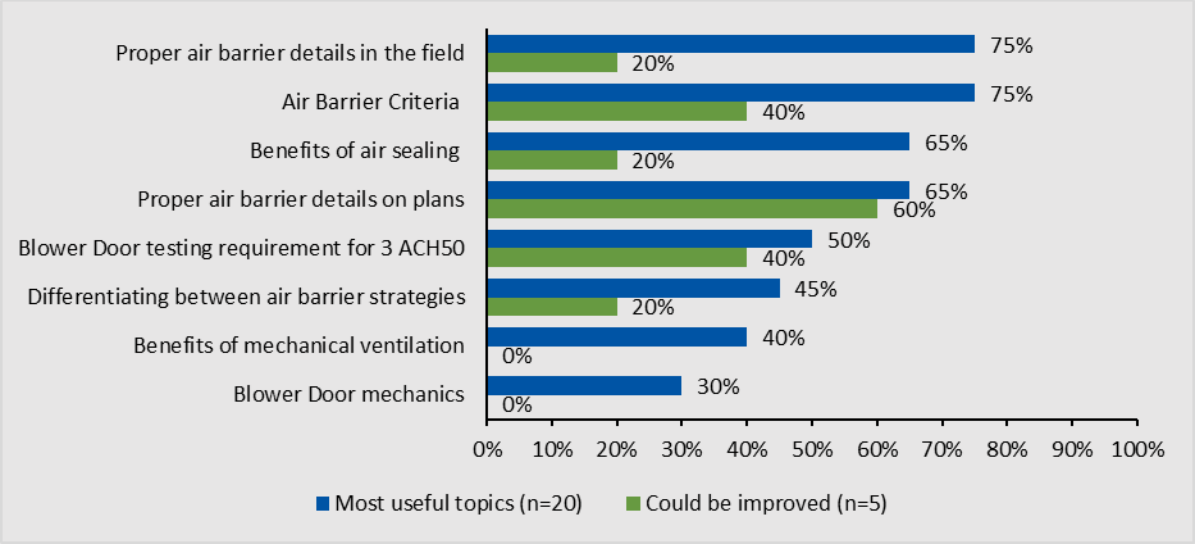


R2.1 Air Sealing to 3 ACH50 (PSD)

Figure 81 shows the topics respondents who took the "Air Sealing to 3 ACH50" training found most useful and those they suggested could be improved. The most useful topics were air barrier criteria and proper air barrier details in the field (75%). The topic that could be improved most was proper air barrier details on plans (60%).

Figure 81. Feedback on Topics Covered (R2.1 Air Sealing to 3 ACH50)

Source: Immediate Survey Questions: "What were the most useful topics of the training for you?" and "Are there any topics from today's training that could be improved?" Multiple responses allowed.

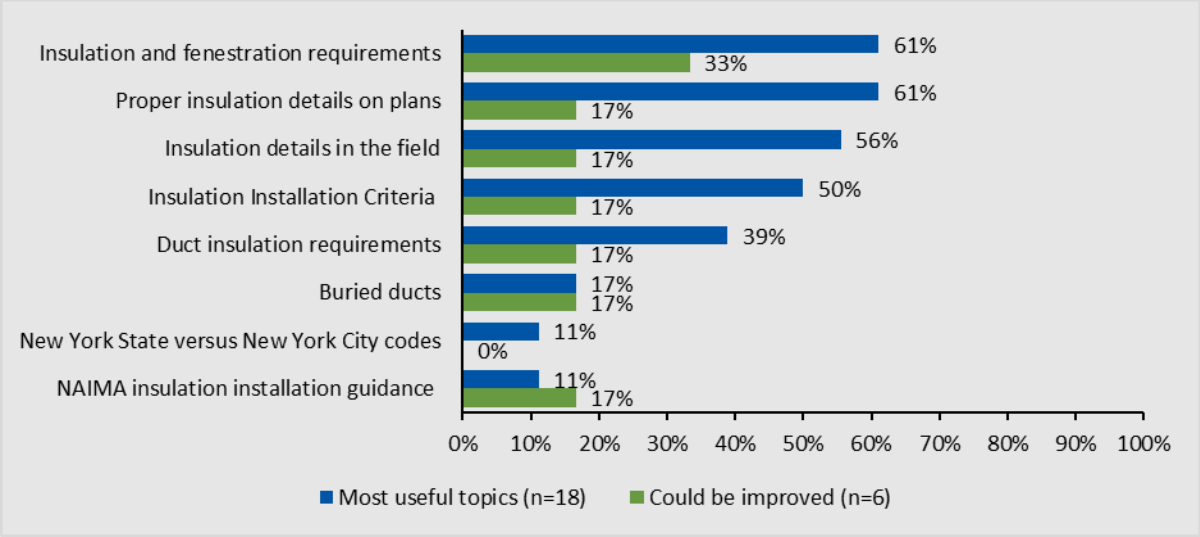


R2.2 Other IECC Envelope Requirements (PSD)

Figure 82 shows the topics respondents who took the "Other IECC Envelope Requirements" training found most useful and those they suggested could be improved. The most useful topics were insulation and fenestration requirements, and proper insulation details on plans (61%). When considering what could be improved, respondents said the insulation and fenestration requirements topic could use improvement (33%).

Figure 82. Feedback on Topics Covered (R2.2 Other IECC Envelope Requirements)

Source: Immediate Survey Questions: "What were the most useful topics of the training for you?" and "Are there any topics from today's training that could be improved?" Multiple responses allowed.

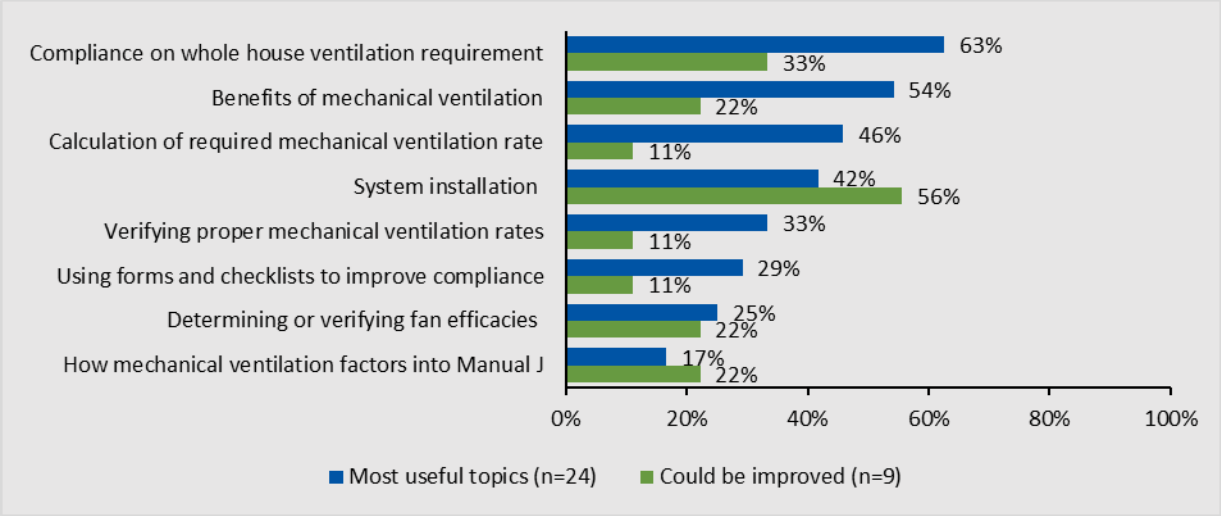


R3.1 Whole-house Mechanical Ventilation (PSD)

Figure 83 shows the topics respondents who took the "Whole-house Mechanical Ventilation" training found most useful and those they suggested could be improved. The most useful topic was compliance on whole-house ventilation requirements (63%). When asked what topics could be improved, 56% of respondents identified system installation.

Figure 83. Feedback on Topics Covered (R3.1 Whole-house Mechanical Ventilation)

Source: Immediate Survey Questions: "What were the most useful topics of the training for you?" and "Are there any topics from today's training that could be improved?" Multiple responses allowed.

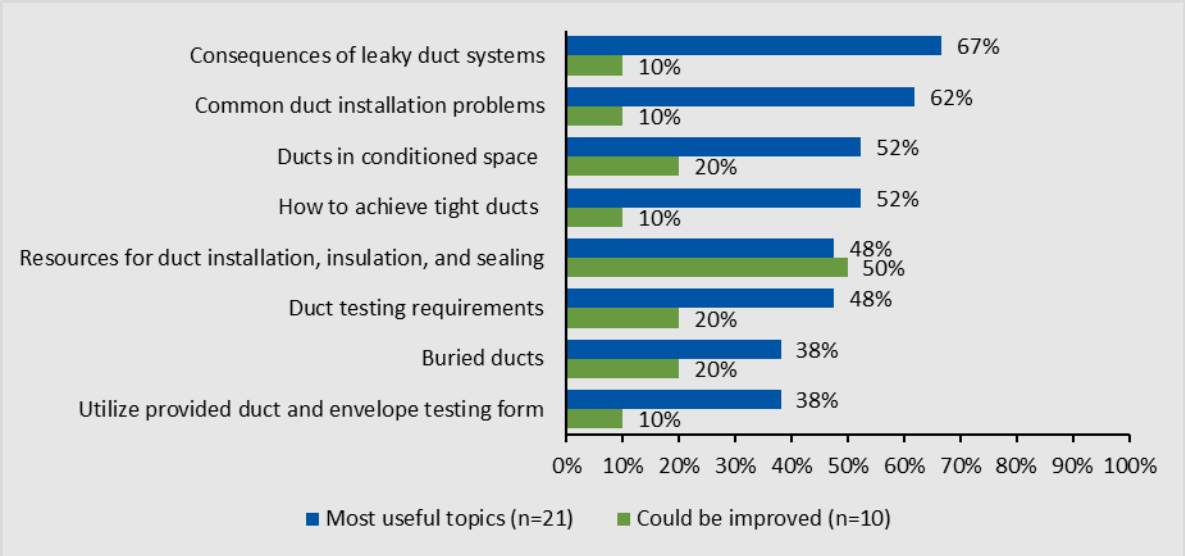


R3.2 Efficient Forced Air Distribution (PSD)

Figure 84 shows the topics respondents who took the "Efficient Forced Air Distribution" training found most useful and those they suggested could be improved. The most useful topic was consequences of leaky duct systems (67%). When asked which topic could be improved, respondents most commonly identified resources for duct installation, insulation, and sealing (50%).

Figure 84. Feedback on Topics Covered (R3.2 Efficient Forced Air Distribution)

Source: Immediate Survey Questions: "What were the most useful topics of the training for you?" and "Are there any topics from today's training that could be improved?" Multiple responses allowed.

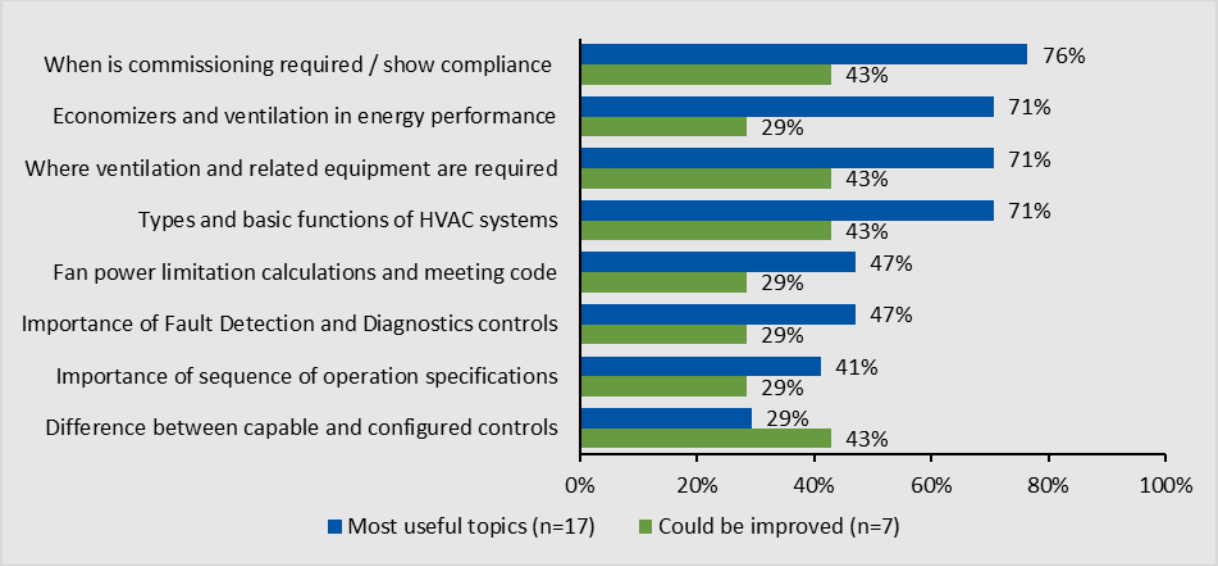


C1.1 Mechanical Systems for Large Commercial Buildings (PSD)

Figure 85 shows the topics respondents who took the "Mechanical Systems for Large Commercial Buildings" training found most useful and those they suggested could be improved. The most useful topic was when is commissioning required/show compliance (76%). Respondents found the same topic, along with difference between capable and configured controls, types and basic functions of HVAC systems, and where ventilation and related equipment are required (43%) to need the most improvement.

Figure 85. Feedback on Topics Covered (C1.1 Mechanical Systems for Large Commercial Buildings)

Source: Immediate Survey Questions: "What were the most useful topics of the training for you?" and "Are there any topics from today's training that could be improved?" Multiple responses allowed.

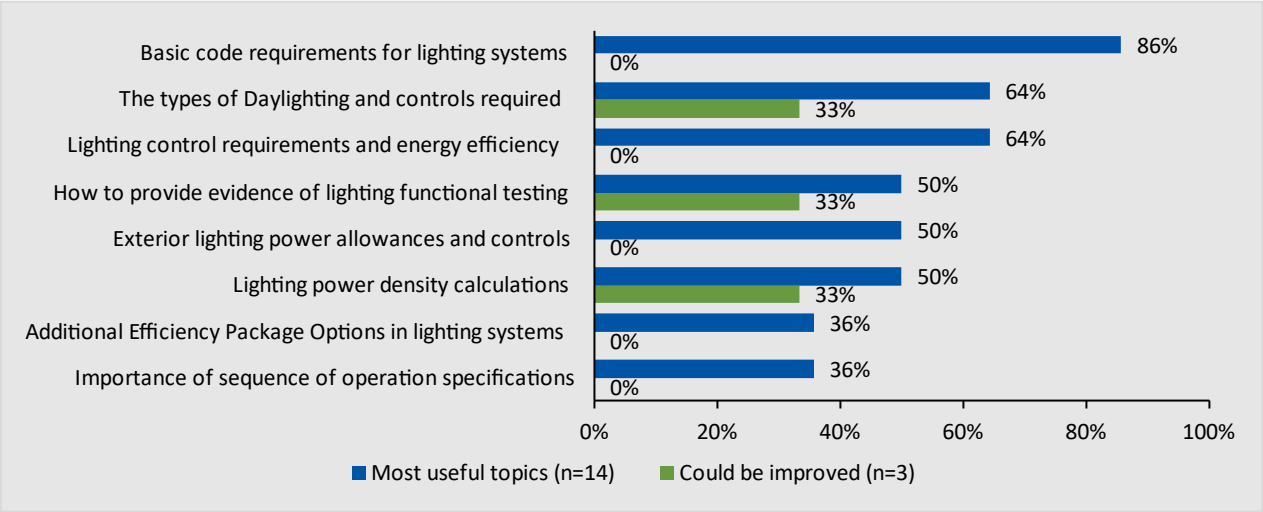


C1.2 Lighting Systems for Large Commercial Buildings (PSD)

Figure 86 shows the topics respondents who took the "Lighting Systems for Large Commercial Buildings" training found most useful and those they suggested could be improved. The most useful topic was information on basic code requirements for lighting systems (86%). Respondents suggested that the lighting power density calculations, how to provide evidence of lighting functional testing, and types of daylighting and controls required (33%).

Figure 86. Feedback on Topics Covered (C1.2 Lighting Systems for Large Commercial Buildings)

Source: Immediate Survey Questions: "What were the most useful topics of the training for you?" and "Are there any topics from today's training that could be improved?" Multiple responses allowed.

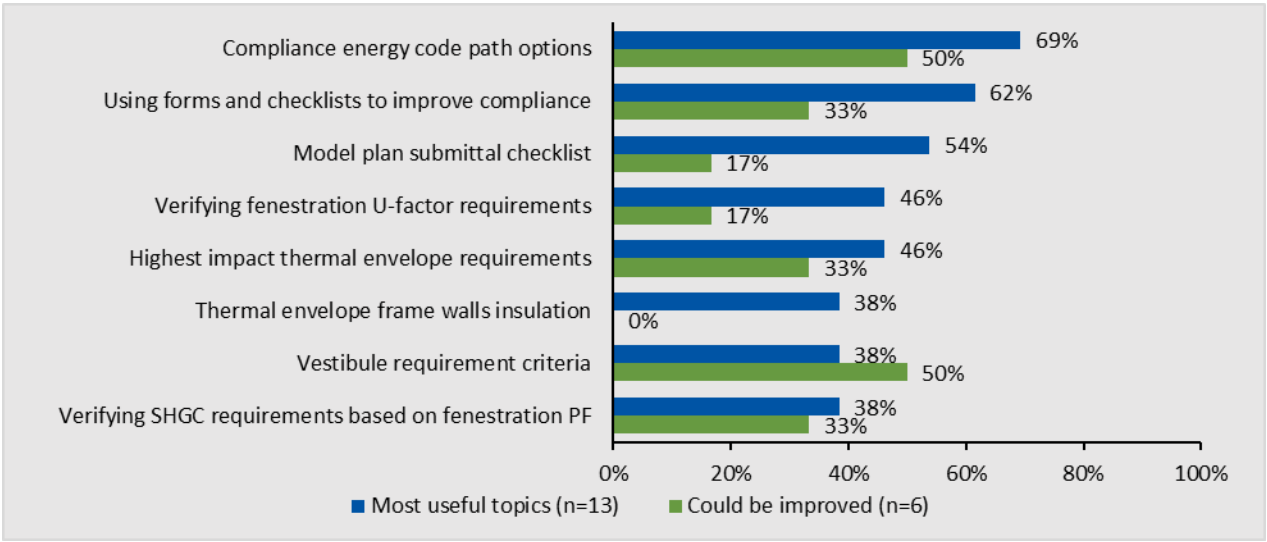


C2.1 Prioritizing ECCCNYS Enforcement for Commercial Buildings (Pt 1) (PSD)

Figure 87 shows the topics respondents who took the "Prioritizing ECCCNYS Enforcement for Commercial Buildings (Pt 1)" training found most useful and those they suggested could be improved. The most useful topic was compliance energy code path options (69%). Respondents also suggested that the same topic, along with vestibule requirement criteria, could use the most improvement (50%).

Figure 87. Feedback on Topics Covered (C2.1 Prioritizing ECCCNYS Enforcement for Commercial Buildings)

Source: Immediate Survey Questions: "What were the most useful topics of the training for you?" and "Are there any topics from today's training that could be improved?" Multiple responses allowed.

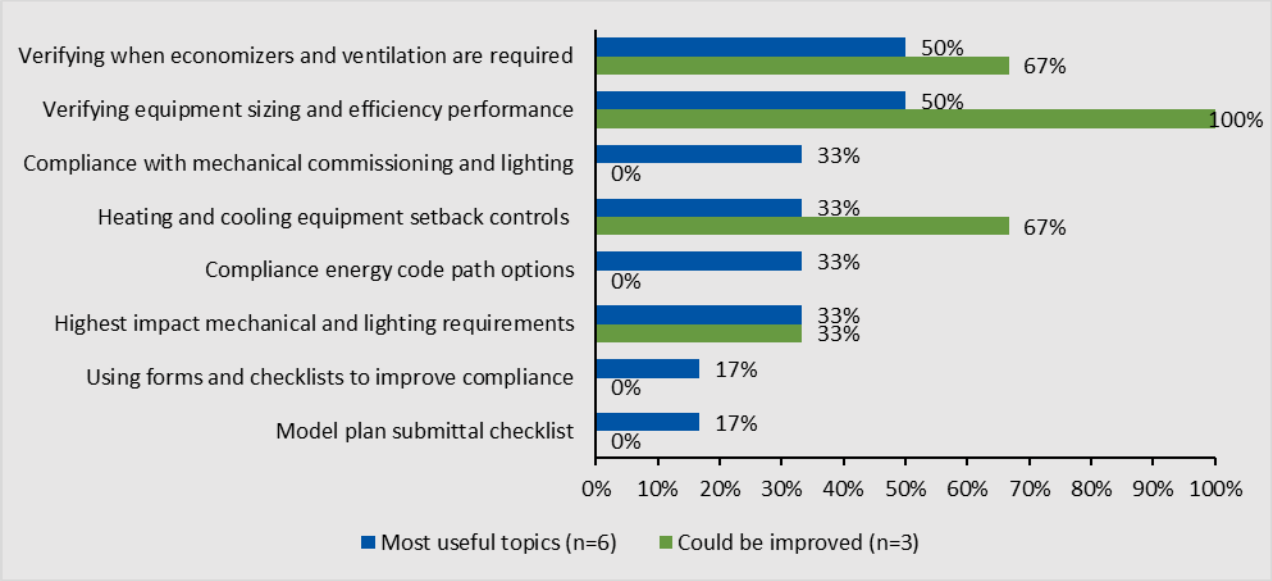


C2.2 Prioritizing ECCCNYS Enforcement for Commercial Buildings (Pt 2) (PSD)

Figure 88 shows the topics respondents who took the "Prioritizing ECCCNYS Enforcement for Commercial Buildings (Pt 2)" training found most useful and those they suggested could be improved. The most useful topics were verifying when economizers and ventilation are required, along with verifying equipment sizing and efficiency performance (50%). Respondents suggested the latter could use the most improvement (100%).

Figure 88. Feedback on Topics Covered (C2.2 Prioritizing ECCCNYS Enforcement for Commercial Buildings)

Source: Immediate Survey Questions: "What were the most useful topics of the training for you?" and "Are there any topics from today's training that could be improved?" Multiple responses allowed.

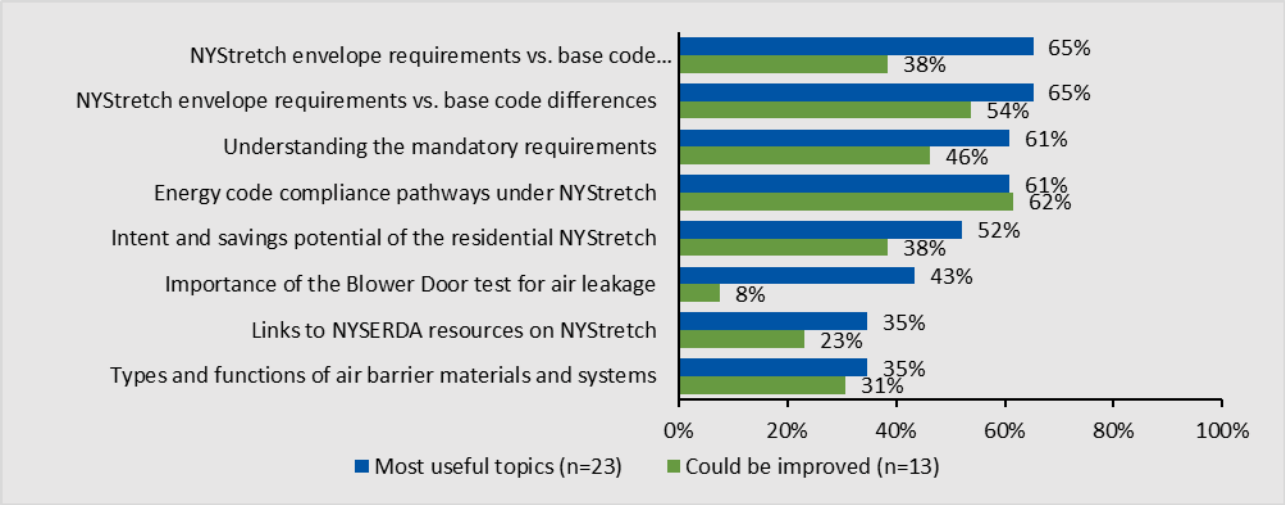


S2.1 NYStretch Overview and Thermal Envelope Requirements Part 1 (PSD)

Figure 89 shows the topics respondents who took the "NYStretch Overview and Thermal Envelope Requirements Part 1" training found most useful and those they suggested could be improved. The most useful topics were understanding the differences between NYStretch envelope requirements vs. the base code, along with commonalities between envelope requirements and the base code (65%). Respondents suggested energy code compliance pathways under NYStretch topic could use improvement (62%).

Figure 89. Feedback on Topics Covered (S2.1 NYStretch Overview and Thermal Envelope Requirements)

Source: Immediate Survey Questions: "What were the most useful topics of the training for you?" and "Are there any topics from today's training that could be improved?" Multiple responses allowed.

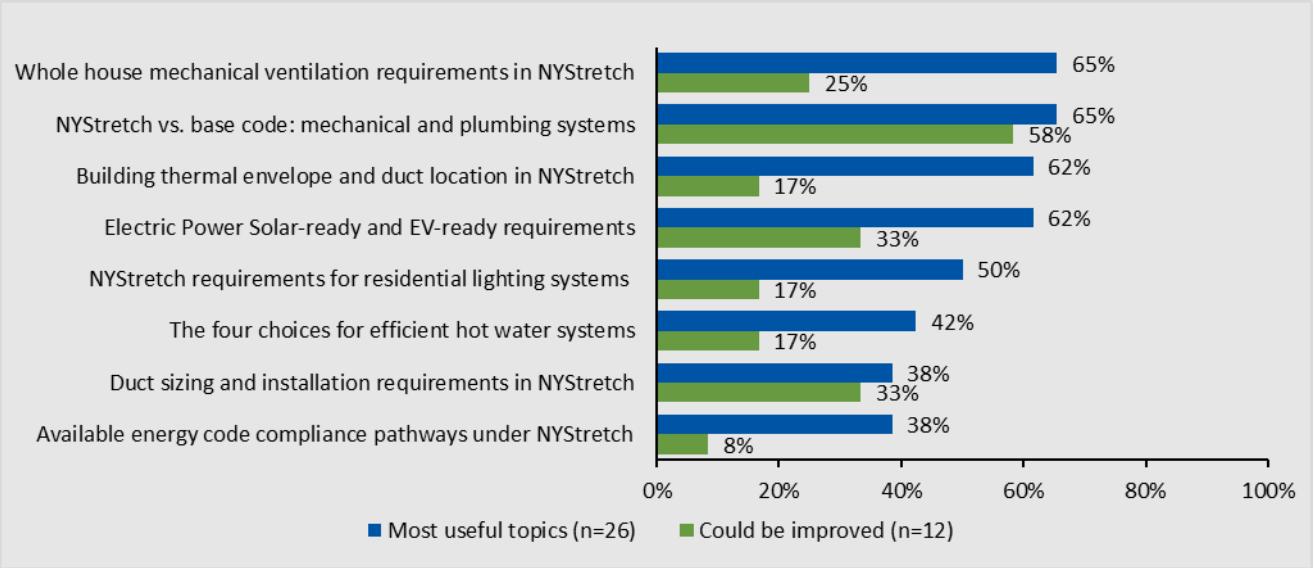


S2.2 NYStretch Mechanical, Plumbing, Lighting, and Electric Power Part 2 (PSD)

Figure 90 shows the topics respondents who took the "NYStretch Mechanical, Plumbing, Lighting, and Electric Power Part 2" training found most useful and those they suggested could be improved. The most useful topics were whole house mechanical ventilation requirements in NYStretch, and NYStretch vs. base code: mechanical and plumbing systems (65%). Respondents also suggested that the latter topic could use the most improvements (58%).

Figure 90. Feedback on Topics Covered (S2.2 NYStretch Mechanical, Plumbing, Lighting, and Electric Power)

Source: Immediate Survey Questions: "What were the most useful topics of the training for you?" and "Are there any topics from today's training that could be improved?" Multiple responses allowed.

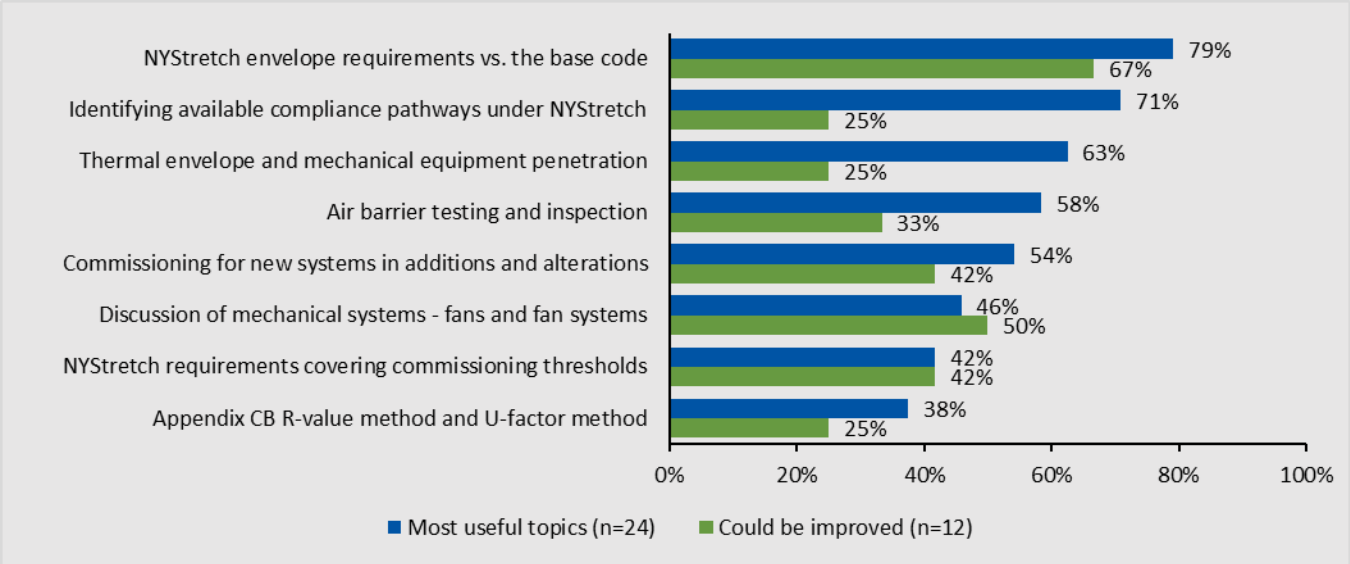


S3.1 NYStretch Energy Code for Commercial Buildings Part 1: Building Thermal Envelope, Mechanical Systems, Commissioning, and Additions and Alterations (PSD)

Figure 91 shows the topics respondents who took the "NYStretch Energy Code for Commercial Buildings Part 1: Building Thermal Envelope, Mechanical Systems, Commissioning, and Additions and Alterations" training found most useful and those they suggested could be improved. The most useful topic was comparing NYStretch envelopment requirements to the base code (79%). Respondents suggested that the same topic could use the most improvement (67%).

Figure 91. Feedback on Topics Covered (S3.1 NYStretch Energy Code for Commercial Buildings Part 1)

Source: Immediate Survey Questions: "What were the most useful topics of the training for you?" and "Are there any topics from today's training that could be improved?" Multiple responses allowed.

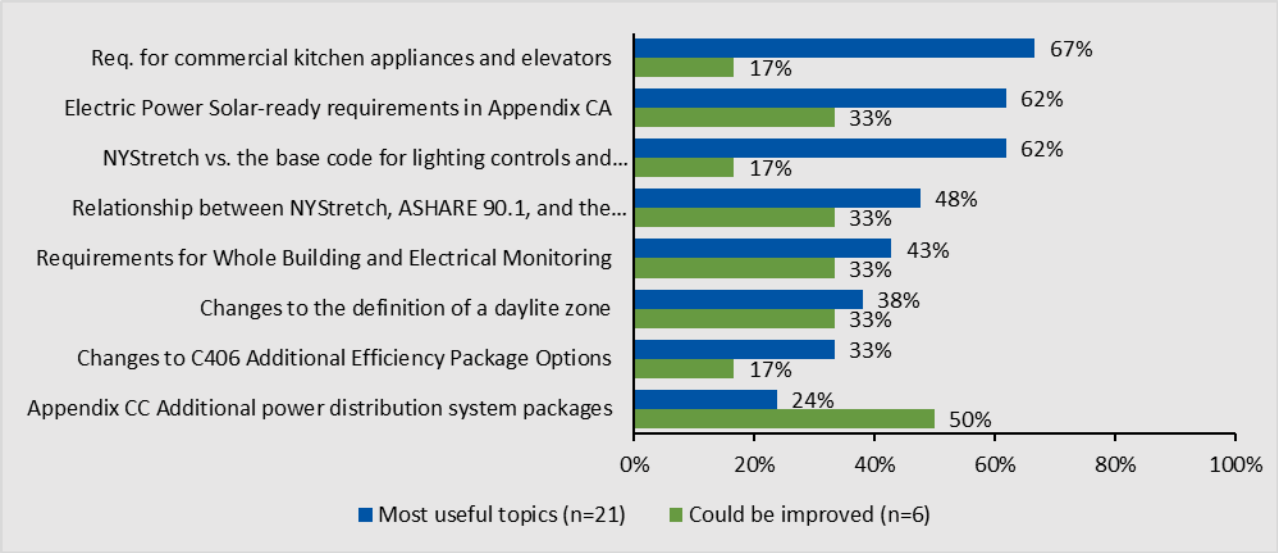


S3.2 NYStretch Energy Code for Commercial Buildings Part 2: Electric Power and Lighting, Total Building Performance, Additional Efficiency Package Options, and Appendices (PSD)

Figure 92 shows the topics respondents who took the "NYStretch Energy Code for Commercial Buildings Part 2: Electric Power and Lighting, Total Building Performance, Additional Efficiency Package Options, and Appendices" training found most useful and those they suggested could be improved. The most useful topic was requirements for commercial kitchen appliances and elevators (67%). Respondents suggested that the Appendix C Additional power distribution system packages topic could use the most improvements (50%).

Figure 92. Feedback on Topics Covered (S3.2 NYStretch Energy Code for Commercial Buildings Part 2)

Source: Immediate Survey Questions: "What were the most useful topics of the training for you?" and "Are there any topics from today's training that could be improved?" Multiple responses allowed.

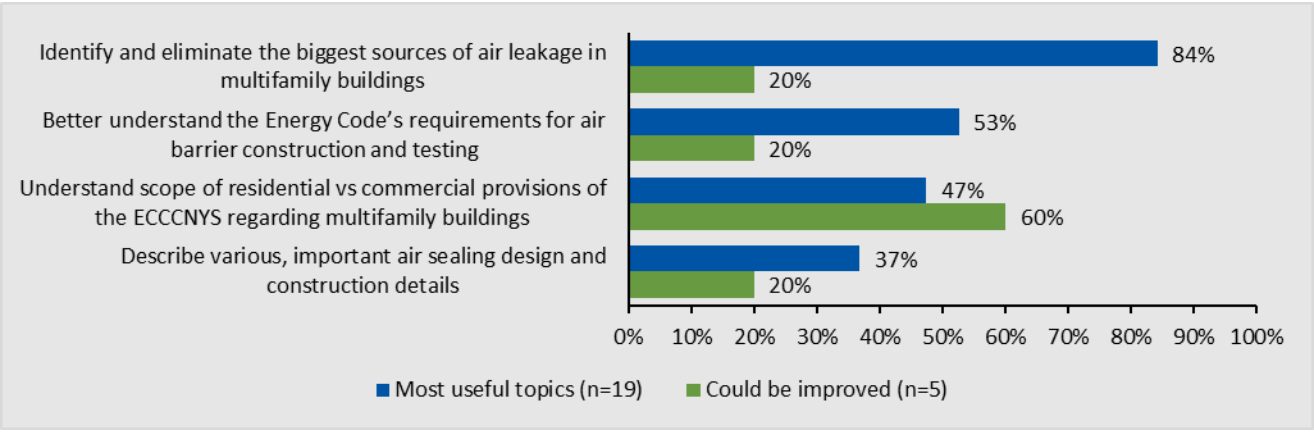


M1.1 Multifamily Air Sealing (PSD)

Figure 93 shows the topics respondents who took the "Multifamily Air Sealing" training found most useful and those they suggested could be improved. The most useful topic was identifying and eliminating the biggest sources of air leakage in multifamily buildings (84%). Respondents suggested that understanding the scope of residential vs commercial provisions of the ECCCNYS regarding multifamily buildings could use the most improvements (60%).

Figure 93. Feedback on Topics Covered (M1.1 Multifamily Air Sealing)

Source: Immediate Survey Questions: "What were the most useful topics of the training for you?" and "Are there any topics from today's training that could be improved?" Multiple responses allowed.

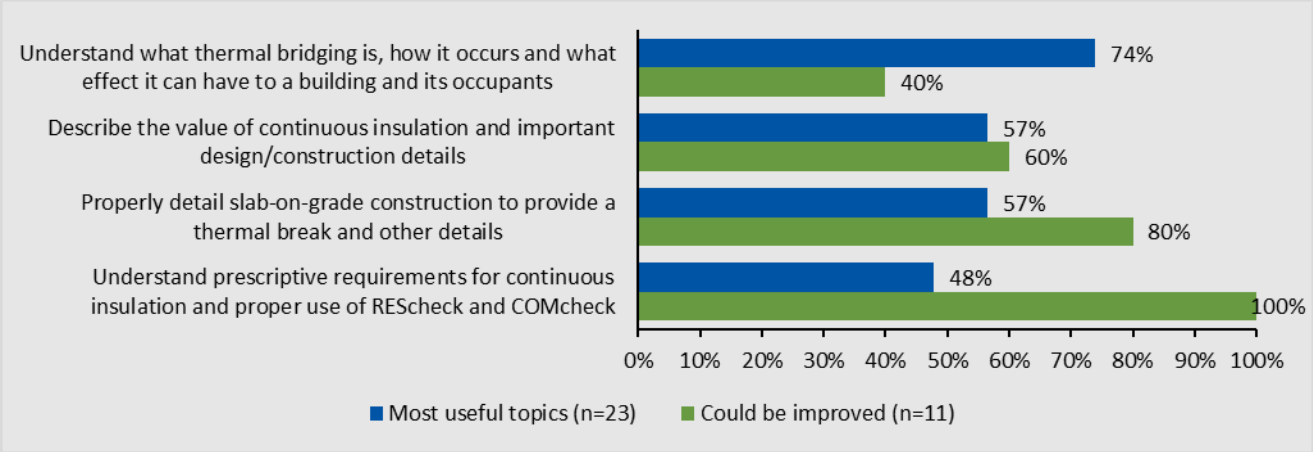


M1.2 Multifamily Thermal Bridging (PSD)

Figure 94 shows the topics respondents who took the "Multifamily Thermal Bridging" training found most useful and those they suggested could be improved. The most useful topic was understanding thermal bridging, how it occurs, and what effect it can have (74%). Respondents suggested that understanding prescriptive requirements for continuous insulation and proper use of REScheck and COMcheck could use the most improvements (100%).

Figure 94. Feedback on Topics Covered (M1.2 Multifamily Thermal Bridging)

Source: Immediate Survey Questions: "What were the most useful topics of the training for you?" and "Are there any topics from today's training that could be improved?" Multiple responses allowed.

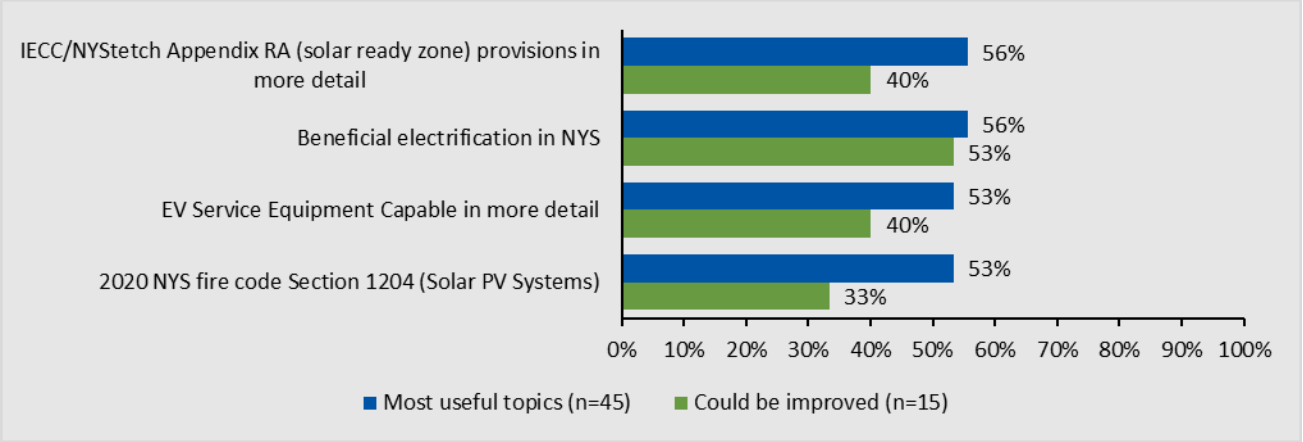


R4.0 Electrifying the Energy Code - Residential (PSD)

Figure 95 shows the topics respondents who took the "Multifamily Thermal Bridging" training found most useful and those they suggested could be improved. The most useful topics were beneficial electrification in NYS, and IECC/NYStretch Appendix RA provisions in more detail (56%). Respondents suggested that the former topic could use the most improvements (53%).

Figure 95. Feedback on Topics Covered (R4.0 Electrifying the Energy Code - Residential)

Source: Immediate Survey Questions: "What were the most useful topics of the training for you?" and "Are there any topics from today's training that could be improved?" Multiple responses allowed.

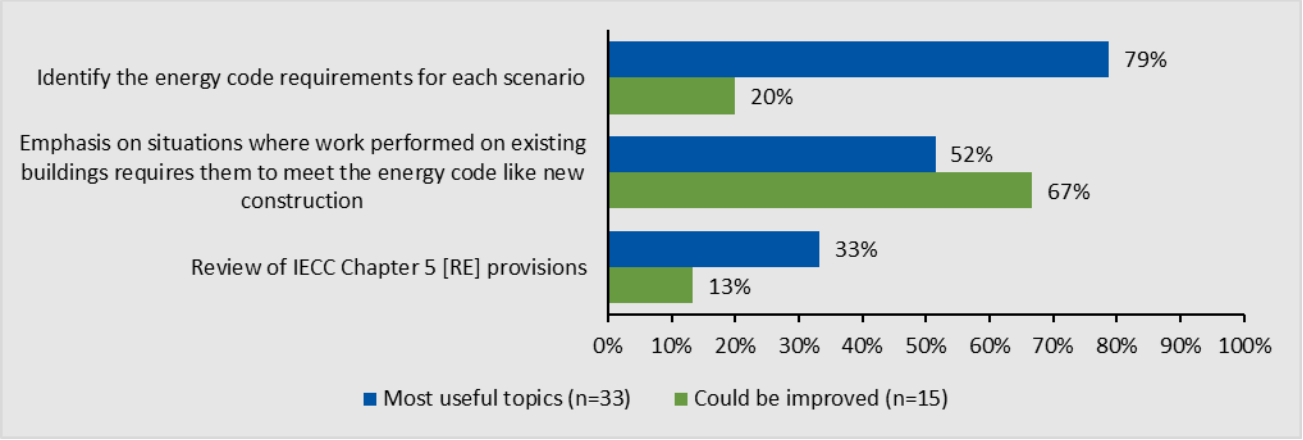


R5.1 The Energy Code and Existing Buildings – Residential Part 1 Additions (PSD)

Figure 96 shows the topics respondents who took the "The Energy Code and Existing Buildings – Residential Part 1 Additions" training found most useful and those they suggested could be improved. The most useful topic was identifying the energy code requirements for each scenario (79%). Respondents suggested the emphasis on situations where work performed on existing buildings requires officials to meet the energy code could use the most improvements (67%).

Figure 96. Feedback on Topics Covered (R5.1 The Energy Code and Existing Buildings – Residential Part 1 Additions)

Source: Immediate Survey Questions: "What were the most useful topics of the training for you?" and "Are there any topics from today's training that could be improved?" Multiple responses allowed.

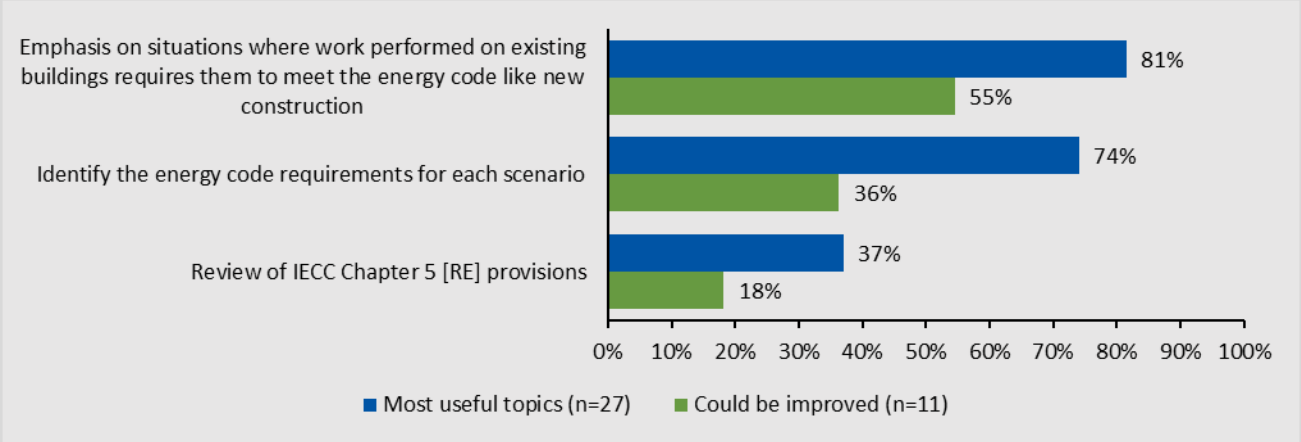


R5.2 – The Energy Code and Existing Buildings – Residential Part 2 Alterations, Repairs, and Changes of Occupancy or Use (PSD)

Figure 97 shows the topics respondents who took the "The Energy Code and Existing Buildings – Residential Part 2 Alterations, Repairs, and Changes of Occupancy or Use" training found most useful and those they suggested could be improved. The most useful topic was emphasis on situations where work performed on existing buildings requires officials to meet the energy code (81%). Respondents suggested that the same topic could use the most improvement (55%).

Figure 97. Feedback on Topics Covered (R5.2 - The Energy Code and Existing Buildings – Residential Part 2 Alterations, Repairs, and Changes of Occupancy or Use)

Source: Immediate Survey Questions: "What were the most useful topics of the training for you?" and "Are there any topics from today's training that could be improved?" Multiple responses allowed.

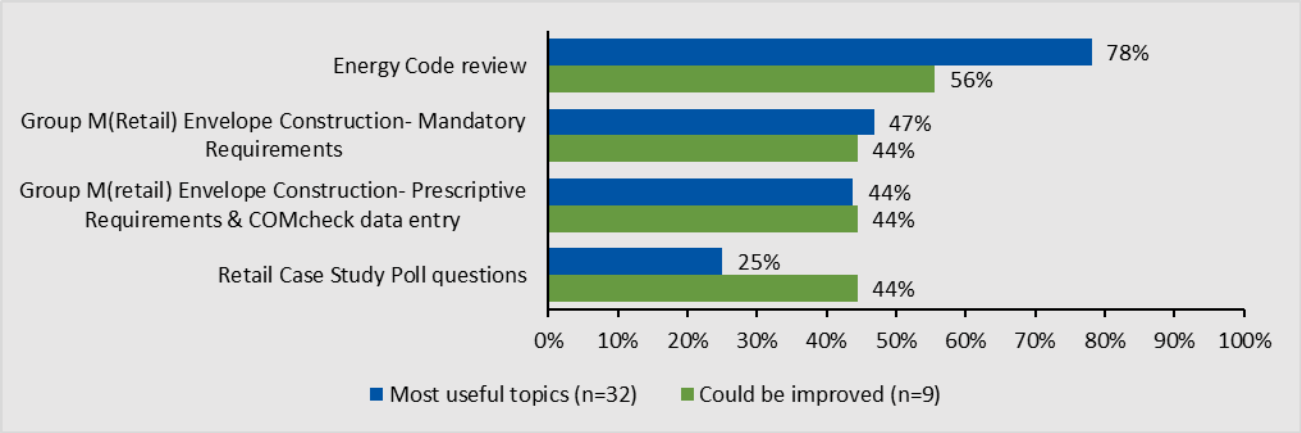


C3.1 – NY Energy Codes for Simple Buildings – Part 1: Retail Building (PSD)

Figure 98 shows the topics respondents who took the "NY Energy Codes for Simple Buildings – Part 1: Retail Building" training found most useful and those they suggested could be improved. The most useful topic was energy code review (78%). Respondents suggested that the same topic could use the most improvements (56%).

Figure 98. Feedback on Topics Covered (C3.1 – NY Energy Codes for Simple Buildings – Part 1: Retail Building)

Source: Immediate Survey Questions: "What were the most useful topics of the training for you?" and "Are there any topics from today's training that could be improved?" Multiple responses allowed.

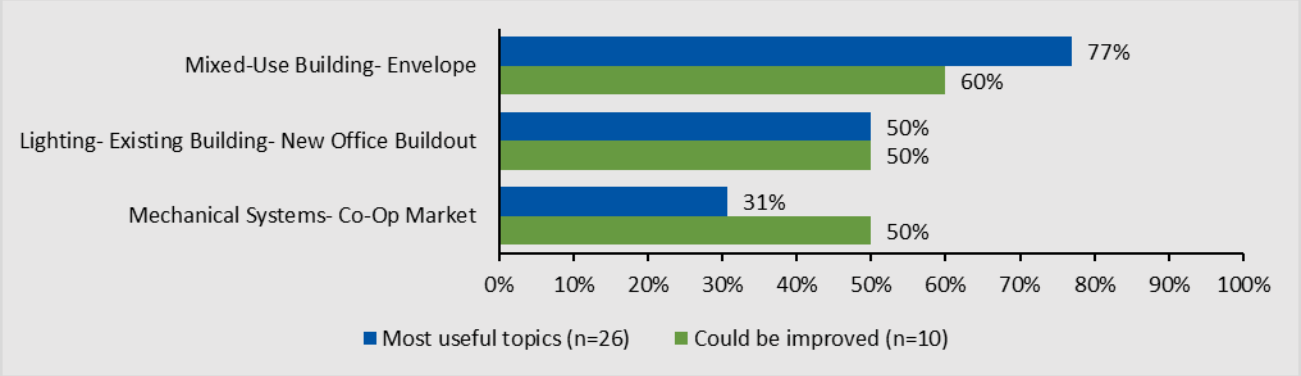


C3.2 – NY Energy Code for Simple Commercial Buildings – Part 2: Mixed-Use Apartment, Grocery, and Office Building (PSD)

Figure 99 shows the topics respondents who took the "NY Energy Code for Simple Commercial Buildings – Part 2: Mixed-Use Apartment, Grocery, and Office Building" training found most useful and those they suggested could be improved. The most useful topic was mixed-use building envelope (77%). Respondents suggested that the same topic could use the most improvements (60%).

Figure 99. Feedback on Topics Covered (C3.2 – NY Energy Code for Simple Commercial Buildings – Part 2: Mixed-Use Apartment, Grocery, and Office Building)

Source: Immediate Survey Questions: "What were the most useful topics of the training for you?" and "Are there any topics from today's training that could be improved?" Multiple responses allowed.

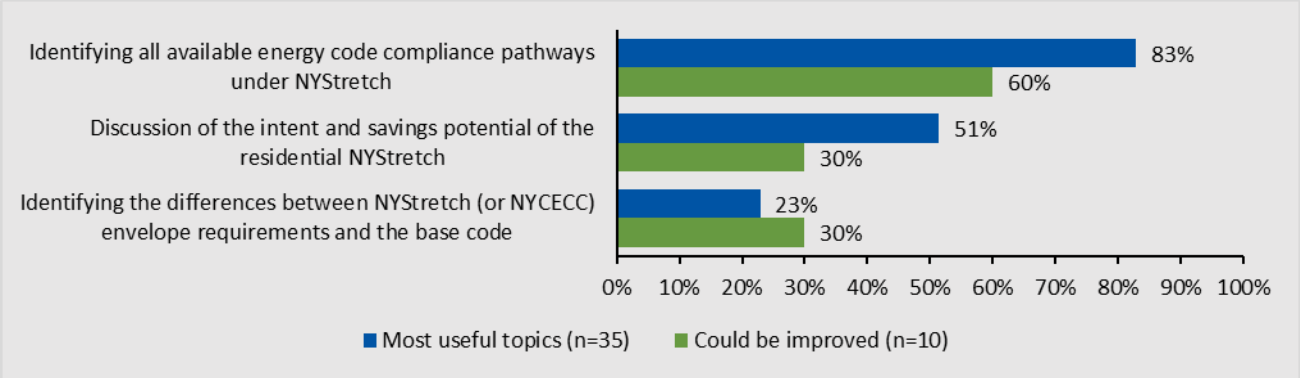


C4.1 – Electrifying the Energy Code – Commercial Part 1 (PSD)

Figure 100 shows the topics respondents who took the "Electrifying the Energy Code – Commercial Part 1" training found most useful and those they suggested could be improved. The most useful topic was identifying all available energy code compliance pathways under NYStretch (83%). Respondents suggested that the same topic could use the most improvements (60%).

Figure 100. Feedback on Topics Covered (C4.1 – Electrifying the Energy Code – Commercial Part 1)

Source: Immediate Survey Questions: "What were the most useful topics of the training for you?" and "Are there any topics from today's training that could be improved?" Multiple responses allowed.

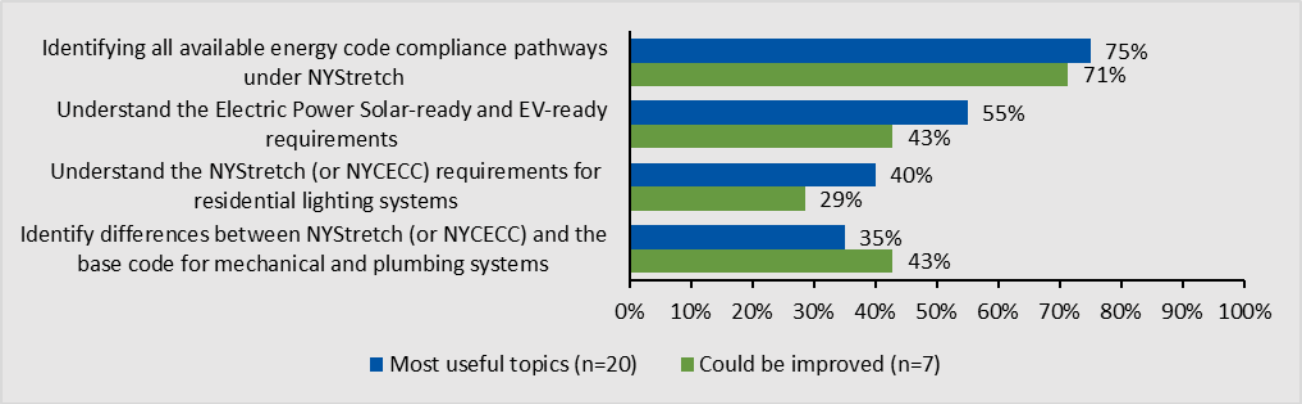


C4.2 – Electrifying the Energy Code – Commercial Part 2 (PSD)

Figure 101 shows the topics respondents who took the "Electrifying the Energy Code – Commercial Part 2" training found most useful and those they suggested could be improved. The most useful topic was identifying all available energy code compliance pathways under NYStretch (75%). Respondents suggested that the same topic could use the most improvements (100%).

Figure 101. Feedback on Topics Covered (C4.2 - Electrifying the Energy Code – Commercial Part 2)

Source: Immediate Survey Questions: "What were the most useful topics of the training for you?" and "Are there any topics from today's training that could be improved?" Multiple responses allowed.

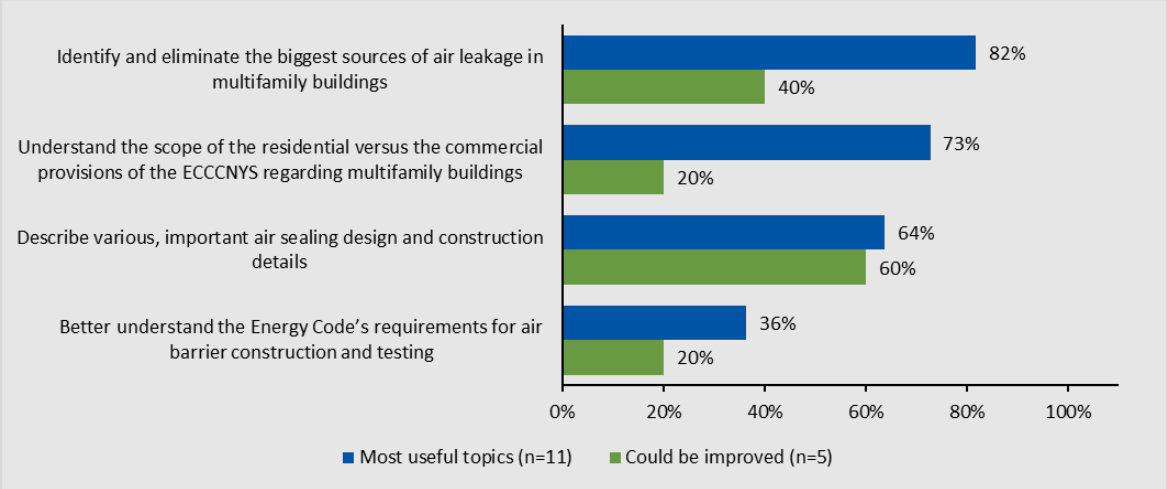


C5.1 – The Energy Code and Existing Buildings (Commercial) – Part 1 (PSD)

Figure 102 shows the topics respondents who took the "The Energy Code and Existing Buildings (Commercial) – Part 1" training found most useful and those they suggested could be improved. The most useful topic was identifying and eliminating the biggest sources of air leakage in multifamily buildings (82%). Respondents suggested that describing various, important air sealing design and construction details could use the most improvements (60%).

Figure 102. Feedback on Topics Covered (C5.1 - The Energy Code and Existing Buildings (Commercial) – Part 1)

Source: Immediate Survey Questions: "What were the most useful topics of the training for you?" and "Are there any topics from today's training that could be improved?" Multiple responses allowed.

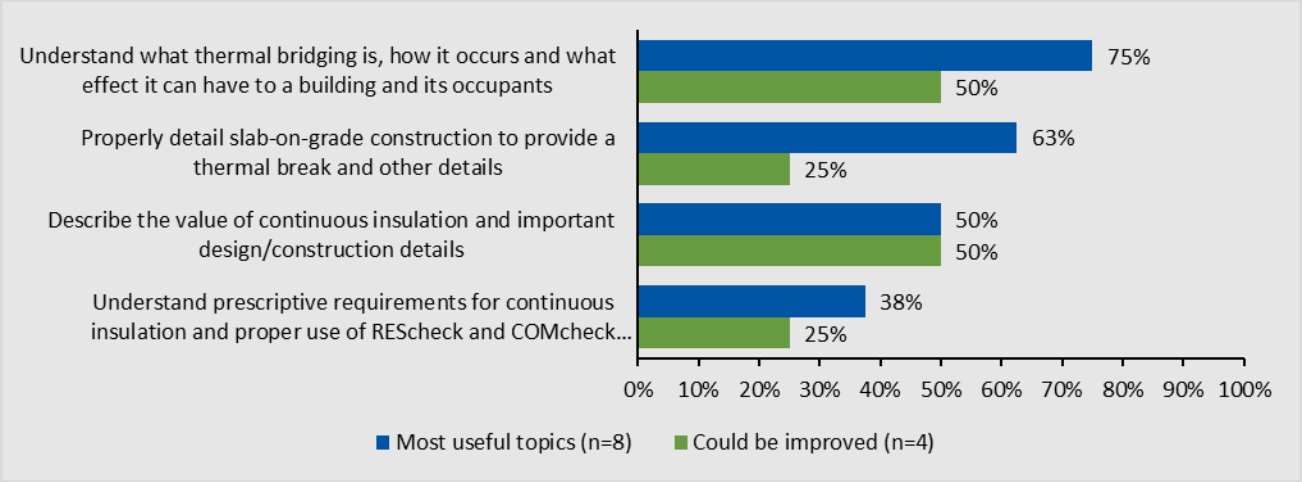


C5.2 – The Energy Code and Existing Buildings (Commercial) – Part 2 (PSD)

Figure 103 shows the topics respondents who took the "The Energy Code and Existing Buildings (Commercial) – Part 2" training found most useful and those they suggested could be improved. The most useful topic was understanding thermal bridging, how it occurs, and what effect it can have (75%). Respondents suggested that the same topic, along with describing the value of continuous insulation and important design/construction details topic could use the most improvements (50%).

Figure 103. Feedback on Topics Covered (C5.2 – The Energy Code and Existing Buildings (Commercial) – Part 2)

Source: Immediate Survey Questions: "What were the most useful topics of the training for you?" and "Are there any topics from today's training that could be improved?" Multiple responses allowed.

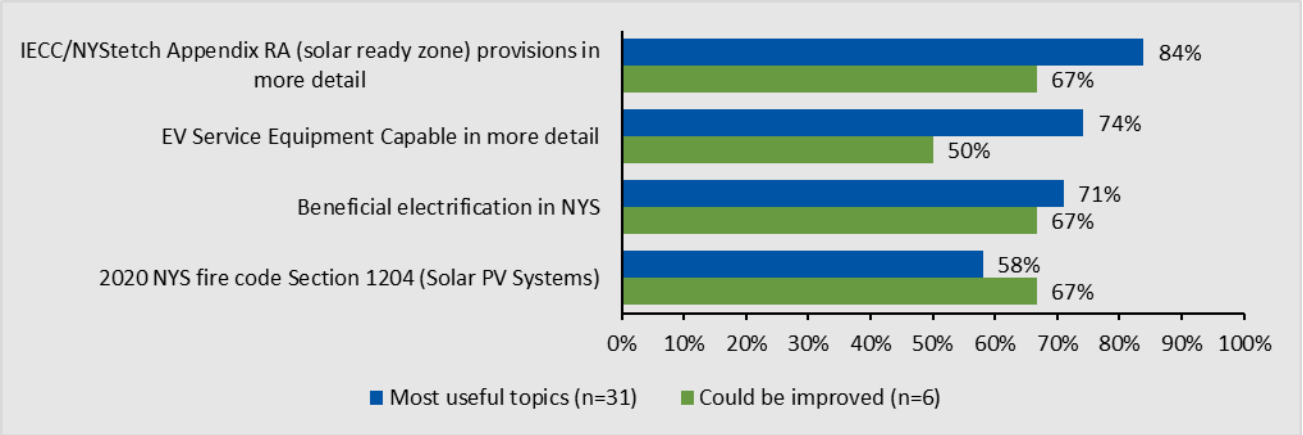


R6.1 – Don't Be Left Exposed – Part 1: Meeting the Energy Code with the Safe Use of Foam Insulation (PSD)

Figure 104 shows the topics respondents who took the "Don't Be Left Exposed – Part 1: Meeting the Energy Code with the Safe Use of Foam Insulation" training found most useful and those they suggested could be improved. The most useful topic was IECC/NYStretch Appendix RA provisions (84%). Respondents suggested that the same topic, along with 2020 NYS fire code Section 1204 topic could use the most improvements (67%).

Figure 104. Feedback on Topics Covered (R6.1 – Don't Be Left Exposed – Part 1: Meeting the Energy Code with the Safe Use of Foam Insulation)

Source: Immediate Survey Questions: "What were the most useful topics of the training for you?" and "Are there any topics from today's training that could be improved?" Multiple responses allowed.

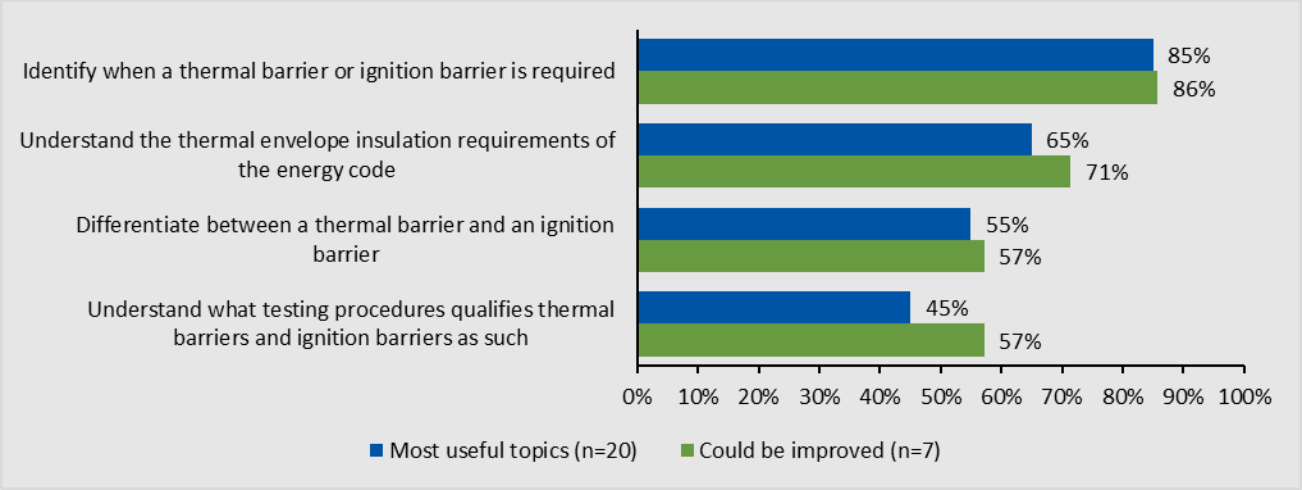


R6.2 – Don't Be Left Exposed – Part 2: Meeting the Energy Code with the Safe Use of Foam Insulation (PSD)

Figure 105 shows the topics respondents who took the "Don't Be Left Exposed – Part 2: Meeting the Energy Code with the Safe Use of Foam Insulation" training found most useful and those they suggested could be improved. The most useful topic was identifying when a thermal barrier or ignition barrier is required (85%). Respondents suggested that the same topic could use the most improvements (86%).

Figure 105. Feedback on Topics Covered (R6.2 – Don't Be Left Exposed – Part 2: Meeting the Energy Code with the Safe Use of Foam Insulation)

Source: Immediate Survey Questions: "What were the most useful topics of the training for you?" and "Are there any topics from today's training that could be improved?" Multiple responses allowed.

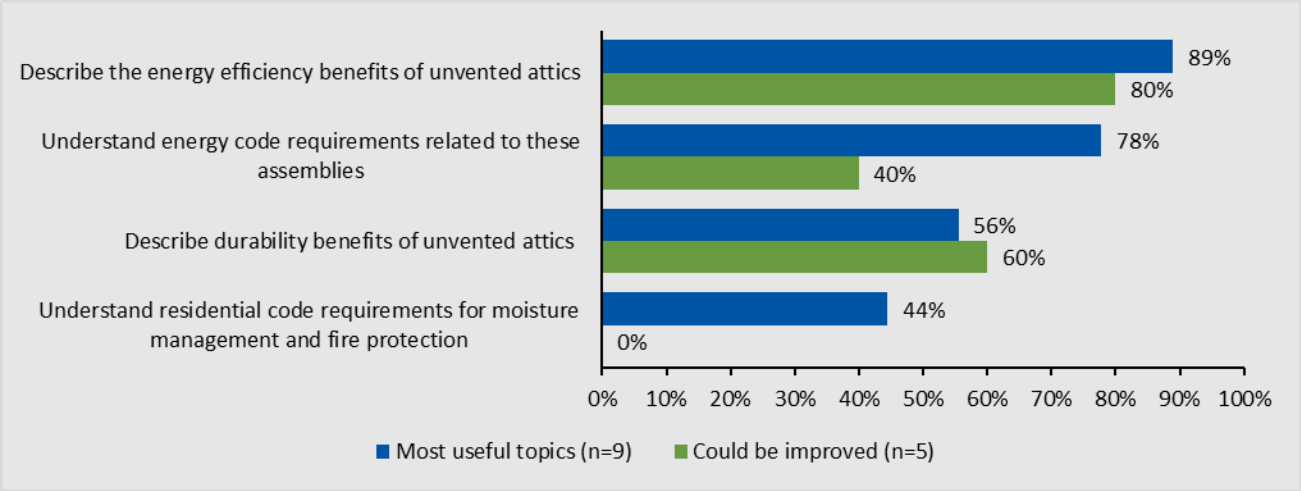


R7.1 – Put a Lid On It Part 1: Unvented Attics (PSD)

Figure 106 shows the topics respondents who took the "Put a Lid On It Part 1: Unvented Attics" training found most useful and those they suggested could be improved. The most useful topic describing the energy efficiency benefits of unvented attics (89%). Respondents suggested that the same topic could use the most improvements (80%).

Figure 106. Feedback on Topics Covered (R7.1 – Put a Lid On It Part 1: Unvented Attics)

Source: Immediate Survey Questions: "What were the most useful topics of the training for you?" and "Are there any topics from today's training that could be improved?" Multiple responses allowed.

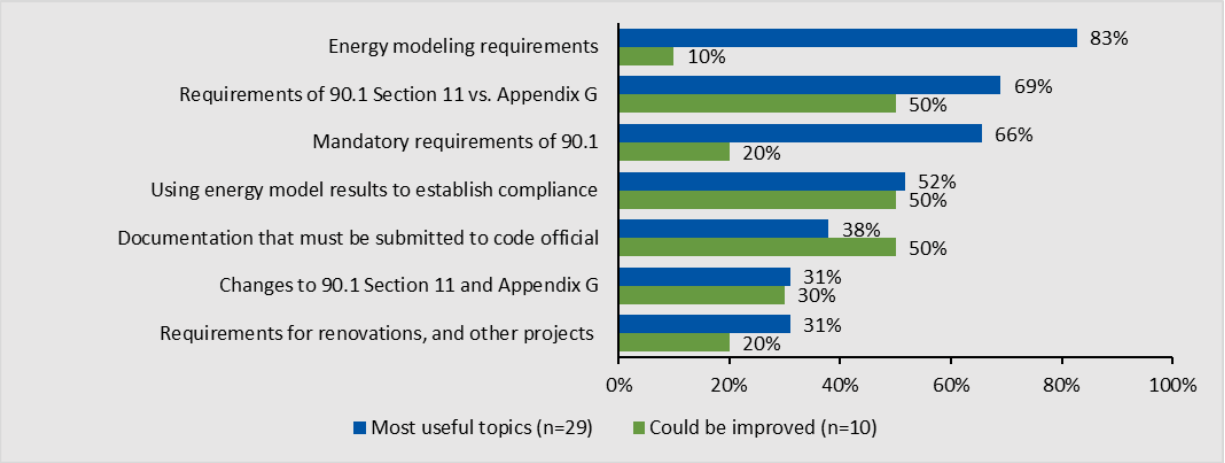


110: Performance-Based Compliance with ASHRAE Standard 90.1 2016 (Karpman)

Figure 107 shows the topics respondents who took the "110: Performance-Based Compliance with ASHRAE Standard 90.1 2016" training found most useful and those they suggested could be improved. The most useful topic was Energy modeling requirements - ASHRAE 90.1 Energy Cost Budget Method (Section 11) and Performance Rating Method (Appendix G) (83%). Respondents suggested that the requirements of 90.1 section 11 vs. Appendix G, using energy model results to establish compliance, and documentation that must be submitted to the code officials could use the most improvements (50%).

Figure 107. Feedback on Topics Covered (110: Performance-Based Compliance with ASHRAE Standard 90.1 2016)

Source: Immediate Survey Questions: "What were the most useful topics of the training for you?" and "Are there any topics from today's training that could be improved?" Multiple responses allowed.

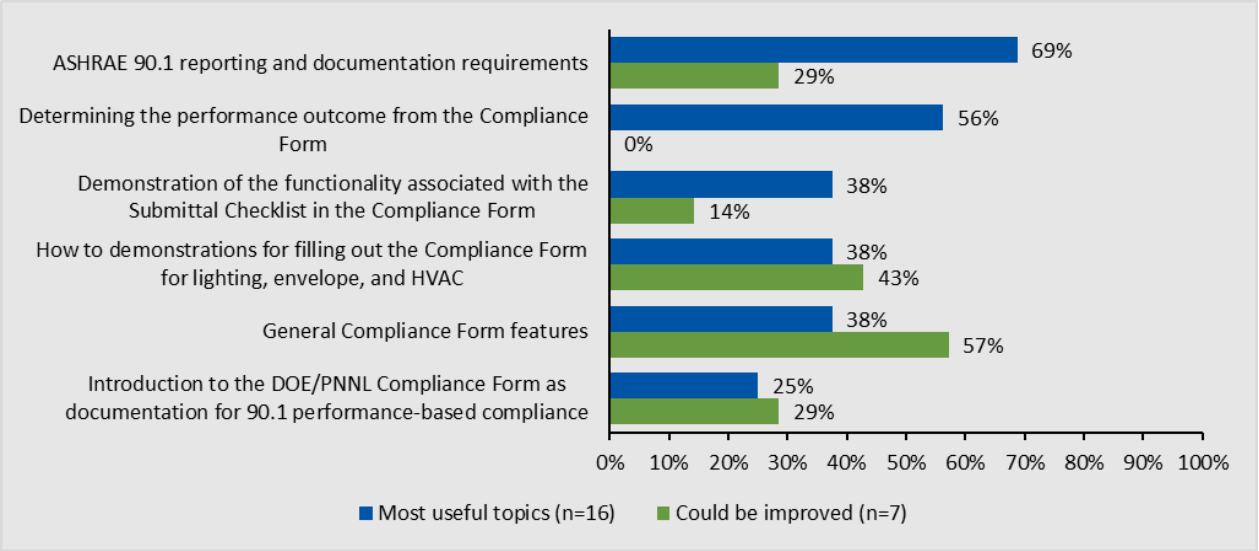


210: Compliance Documentation for ASHRAE 90.1 Section 11 and Appendix G (Karpman)

Figure 108 shows the topics respondents who took the "210: Compliance Documentation for ASHRAE 90.1 Section 11 and Appendix G" training found most useful and those they suggested could be improved. The most useful topic was ASHRAE 90.1 reporting and documentation requirements (69%). Respondents suggested that the general compliance form features (57%).

Figure 108. Feedback on Topics Covered (210: Compliance Documentation for ASHRAE 90.1 Section 11 and Appendix G)

Source: Immediate Survey Questions: "What were the most useful topics of the training for you?" and "Are there any topics from today's training that could be improved?" Multiple responses allowed.

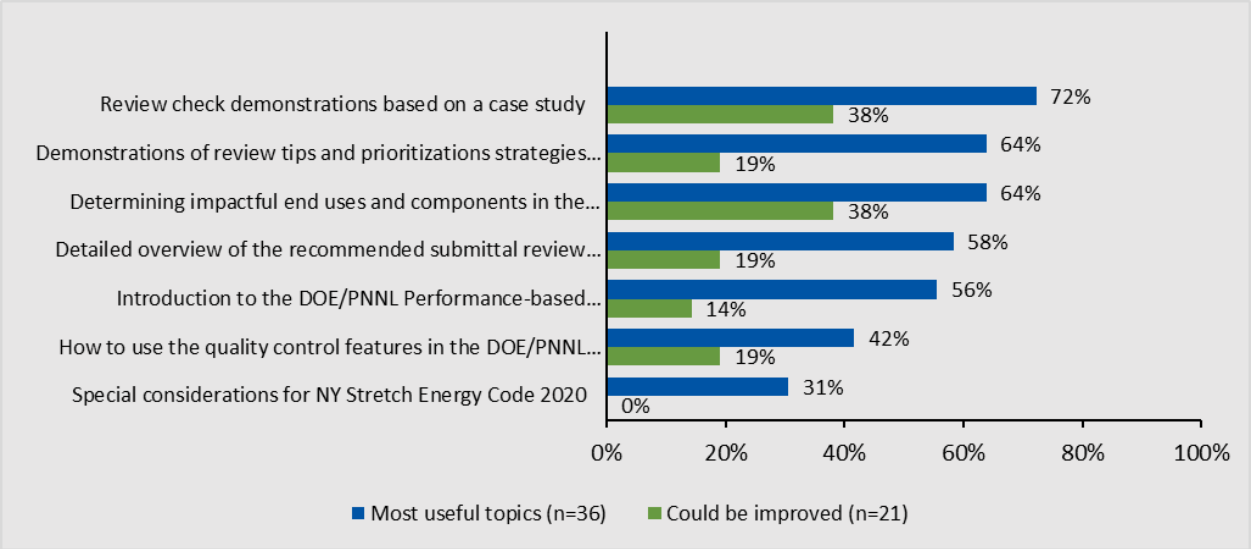


212: Review of the Modeling-based Submittals for ASHRAE 90.1 Section 11 and Appendix G (Karpman)

Figure 109 shows the topics respondents who took the "212: Review of the Modeling-based Submittals for ASHRAE 90.1 Section 11 and Appendix G" training found most useful and those they suggested could be improved. The most useful topic was reviewing check demonstrations based on a case study (72%). Respondents suggested that the same topic could use the most improvements (38%).

Figure 109. Feedback on Topics Covered (212: Review of the Modeling-based Submittals for ASHRAE 90.1 Section 11 and Appendix G)

Source: Immediate Survey Questions: "What were the most useful topics of the training for you?" and "Are there any topics from today's training that could be improved?" Multiple responses allowed.

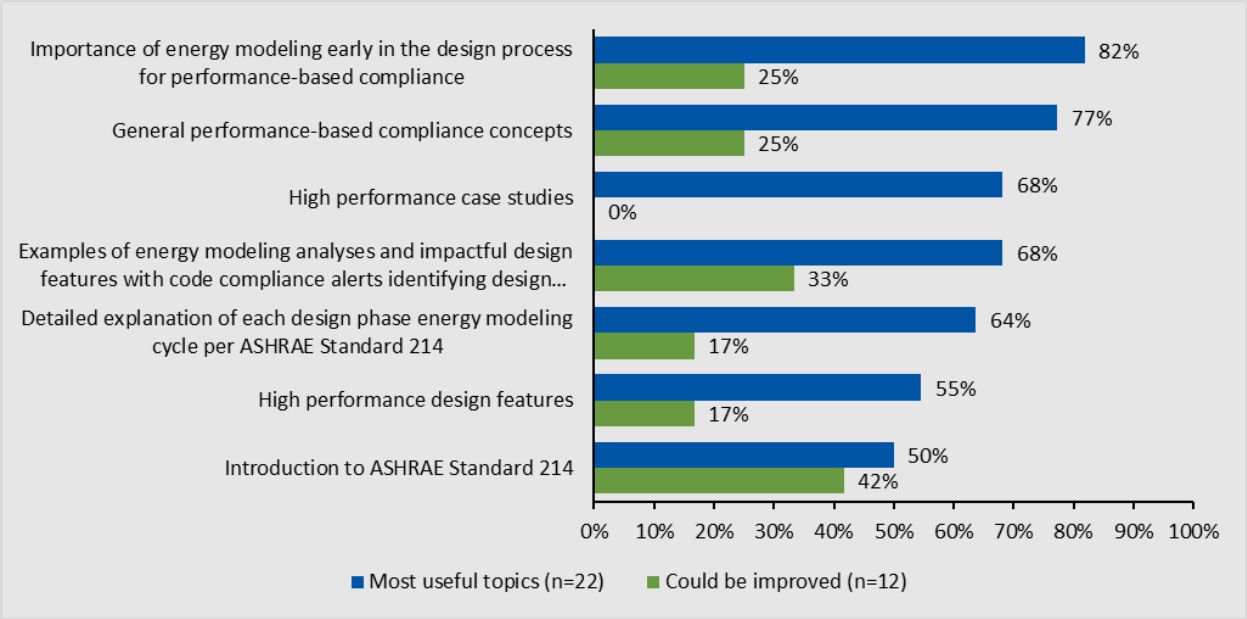


213: Integrating Performance-based Compliance into the Design Process (Karpman)

Figure 110 shows the topics respondents who took the "213: Integrating Performance-based Compliance into the Design Process" training found most useful and those they suggested could be improved. The most useful topic was the importance of energy modeling early in the design process for performance-based compliance (82%). Respondents suggested that the topic which could use the most improvement was the introduction to ASHRAE standard 214 (42%).

Figure 110. Feedback on Topics Covered (213: Integrating Performance-based Compliance into the Design Process)

Source: Immediate Survey Questions: "What were the most useful topics of the training for you?" and "Are there any topics from today's training that could be improved?" Multiple responses allowed.



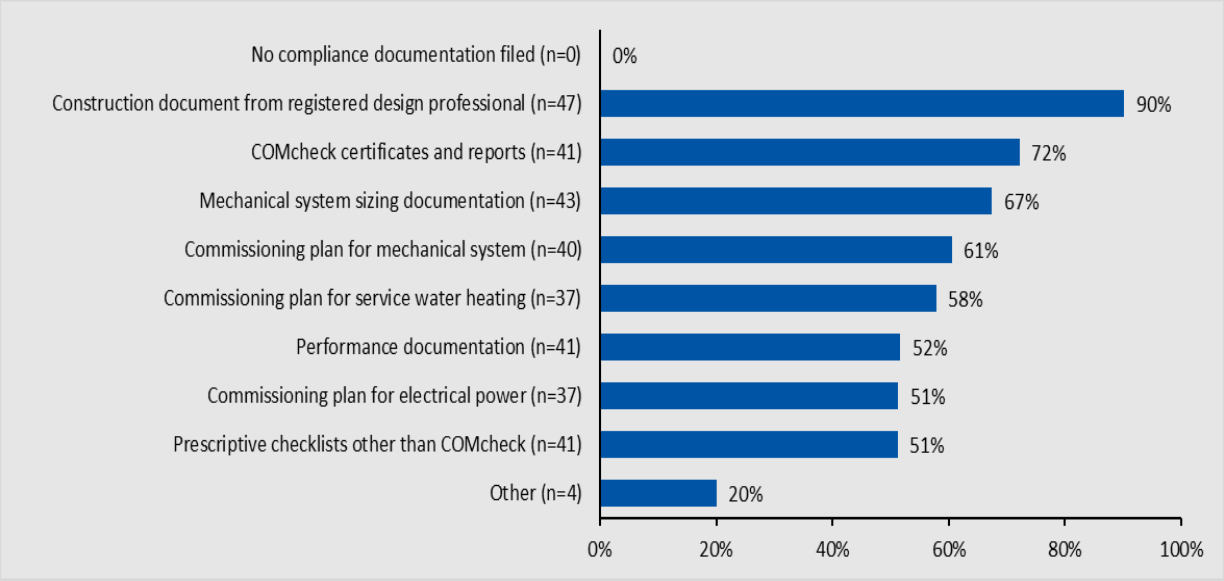
Documentation Filed with Building Departments (Follow-Up Survey)

In order to investigate the types of information filed at building departments, code officials were asked about a range of documents associated with commercial and residential new construction and renovation work. For each project type, code officials were asked about a series of document types that might be included for a project and asked to estimate the percentage of projects that included that type of compliance documentation.

As shown in Figure 111, for commercial new construction projects, no code official reported projects for which no compliance documents were filed. The documents respondents indicated were most consistently filed included construction documents prepared by a registered design professional (90% of projects) and COMcheck documents (72% of projects).

Figure 111. Documents Filed for Commercial New Construction Projects

Source: Follow-Up Survey Question: "Approximately what percentage of new construction projects submit the following:"

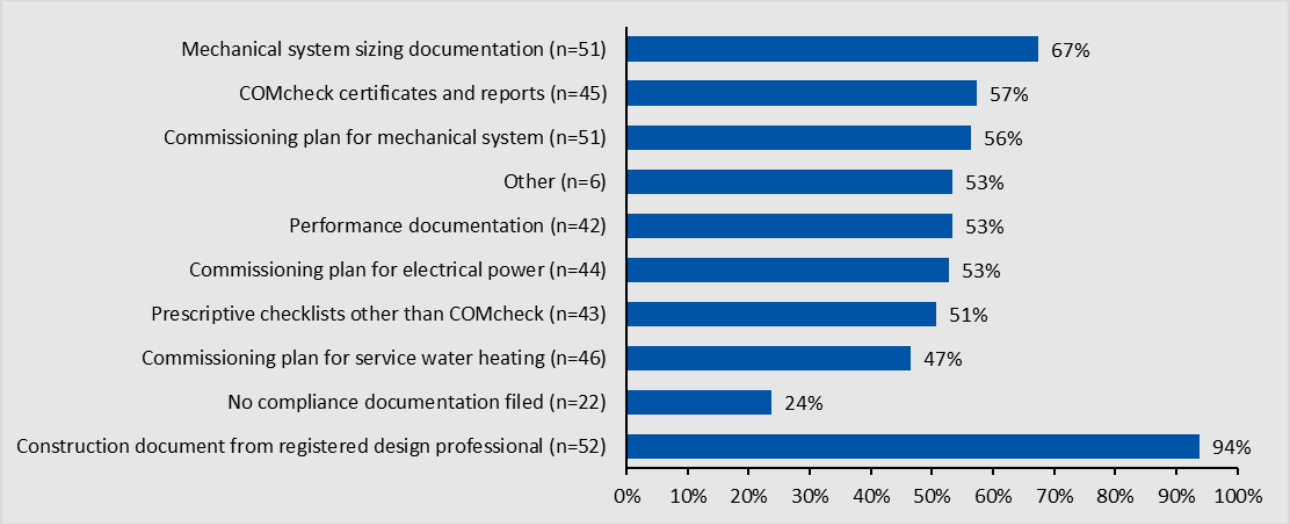


For commercial addition and alteration projects, code officials also reported that they consistently saw construction documents prepared by a registered design professional; however, 22 code officials noted that they on a few occasions they did not see any compliance documents filed.[11]

[11] This discrepancy between 94% seeing construction documents and 24% seeing no documentation is likely due to respondents not filling out percentages for all document types (the response "n" is provided for each document type for which code officials provided a response).

Figure 112. Documentation Filed for Commercial Addition or Alteration Projects

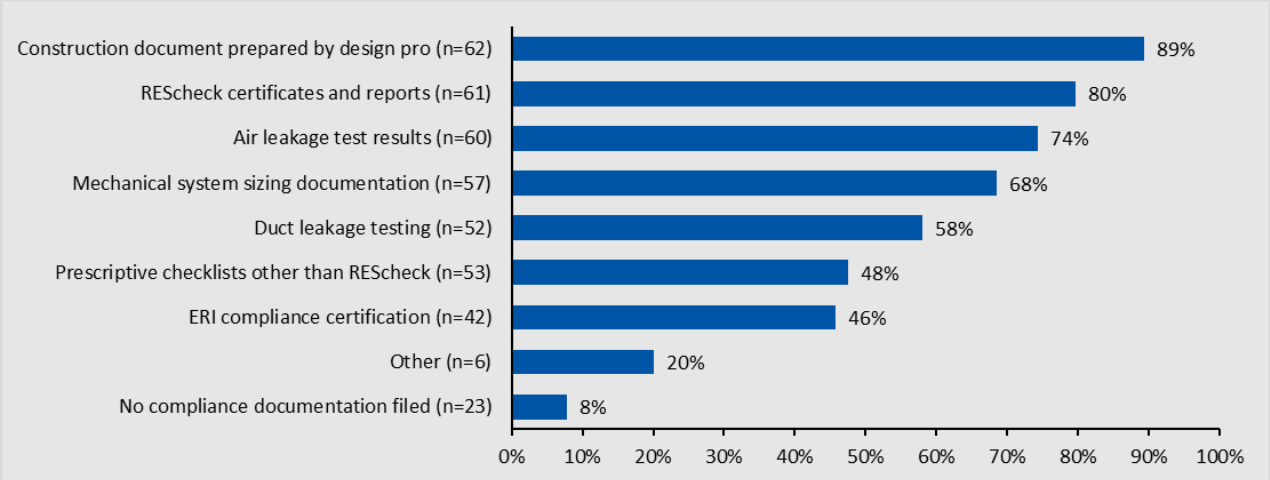
Source: Follow-Up Survey Question: "Thinking of documents relevant to the projects you have reviewed, approximately what percentage of projects submit the following:"



As with commercial new construction, code officials stated that the most commonly filed document for residential new construction projects were construction documents prepared by a registered design professional, with an average of 89% of projects providing this documentation. Overall, 23 respondents said that projects received, "No compliance documentation."

Figure 113. Documents Filed for Residential New Construction Projects

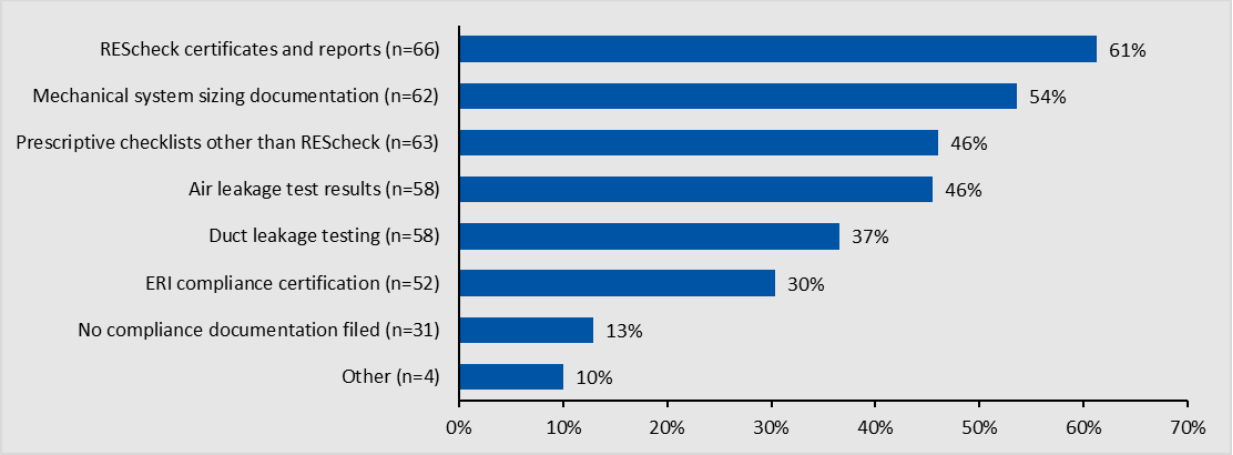
Source: Follow-Up Survey Question: "Approximately what percentage of new construction projects submit the following:"



As shown in Figure 114, REScheck certificates and reports are the most commonly filed document for residential alteration and addition projects (at 61% of projects). For these projects, code officials estimated that 13% of projects filed no compliance documentation at all.

Figure 114. Documentation Filed for Residential Addition or Alteration Projects

Source: Follow-Up Survey Question: "Thinking of documents relevant to the projects you have reviewed, approximately what percentage of projects submit the following:"



Courses

Table 28 lists the courses offered to date.

Table 28. Training Courses

Course Title	Implementer	Training Type	Date
Crushing the NYC Energy Code (Residential)	Urban Green Council	Webinar	9/1/2022
ECCCNYS for Large Commercial Buildings (Pt 1): Mechanical Systems	PSD Consulting	Webinar	9/1/2022
ECCCNYS for Large Commercial Buildings (Pt 2): Lighting Systems	PSD Consulting	Webinar	9/1/2022
Multifamily Air Sealing	PSD Consulting	Webinar	9/6/2022
Multifamily Thermal Bridging	PSD Consulting	Webinar	9/6/2022
NY Energy Codes for Simple Buildings- Part 1: Retail Building	PSD Consulting	Webinar	9/7/2022
NY Energy Code for Simple Commercial Buildings- Part 2:Mixed-Use Apartment, Grocery, and Office Building	PSD Consulting	Webinar	9/7/2022
NYStretch Overview and Thermal Envelope Requirements Part 1	PSD Consulting	Webinar	9/8/2022
NYStretch Mechanical, Plumbing, Lighting, and Electric Power Part 2	PSD Consulting	Webinar	9/8/2022
Crushing the NYS Energy Code (Residential)	Urban Green Council	Webinar	9/8/2022
Crushing the NYC Energy Code (Commercial)	Urban Green Council	In-Person	9/13/2022
A Process for Energy Code Compliance and Enforcement / Energy Code Plan Reviews in 15 Minutes or Less	PSD Consulting	Webinar	9/13/2022
A Process for Energy Code Compliance and Enforcement / Energy Code Inspections in 15 Minutes or Less	PSD Consulting	Webinar	9/13/2022
212: Review of the Modeling-based Submittals for ASHRAE 90.1 Section 11 and Appendix G	Karpman Consulting	Webinar	9/13/2022
Air Sealing to 3 ACH50	PSD Consulting	Webinar	9/14/2022
Other IECC Envelope Requirements	PSD Consulting	Webinar	9/14/2022
Electrifying the Energy Code - Residential	PSD Consulting	Webinar	9/14/2022
Electrifying the Energy Code - Commercial Part 1	PSD Consulting	Webinar	9/14/2022
NYStretch Energy Code for Commercial Buildings Part 1: Building Thermal Envelope, Mechanical Systems, Commissioning, and Additions and Alterations	PSD Consulting	Webinar	9/15/2022
NYStretch Energy Code for Commercial Buildings Part 2: Electric Power and Lighting, Total Building Performance, Additional Efficiency Package Options, and Appendices	PSD Consulting	Webinar	9/15/2022
213: Integrating Performance-based Compliance into the Design Process	Karpman Consulting	Webinar	9/20/2022
Multifamily Air Sealing	PSD Consulting	Webinar	9/21/2022

Course Title	Implementer	Training Type	Date
Multifamily Thermal Bridging	PSD Consulting	Webinar	9/21/2022
NY Energy Codes for Simple Buildings- Part 1: Retail Building	PSD Consulting	Webinar	9/22/2022
NY Energy Code for Simple Commercial Buildings- Part 2:Mixed-Use Apartment, Grocery, and Office Building	PSD Consulting	Webinar	9/22/2022
What's New in the 2020 NYC Energy Code	Urban Green Council	In-Person	9/23/2022
Air Sealing to 3 ACH50	PSD Consulting	Webinar	9/27/2022
Other IECC Envelope Requirements	PSD Consulting	Webinar	9/27/2022
Whole-house Mechanical Ventilation	PSD Consulting	Webinar	9/28/2022
Efficient Forced Air Distribution	PSD Consulting	Webinar	9/28/2022
Electrifying the Energy Code - Residential	PSD Consulting	Webinar	9/28/2022
Electrifying the Energy Code - Commercial Part 1	PSD Consulting	Webinar	9/28/2022
Prioritizing ECCCNYS Enforcement for Commercial Buildings (Pt 1)	PSD Consulting	Webinar	9/29/2022
Prioritizing ECCCNYS Enforcement for Commercial Buildings (Pt 2)	PSD Consulting	Webinar	9/29/2022
What's New in the 2020 NYC Energy Code	Urban Green Council	In-Person	9/29/2022
Crushing the NYC Energy Code (Residential)	Urban Green Council	Webinar	10/4/2022
ECCCNYS for Large Commercial Buildings (Pt 1): Mechanical Systems	PSD Consulting	Webinar	10/4/2022
ECCCNYS for Large Commercial Buildings (Pt 2): Lighting Systems	PSD Consulting	Webinar	10/4/2022
Electrifying the Energy Code - Residential	PSD Consulting	Webinar	10/5/2022
Electrifying the Energy Code - Commercial Part 1	PSD Consulting	Webinar	10/5/2022
NY Energy Codes for Simple Buildings- Part 1: Retail Building	PSD Consulting	Webinar	10/6/2022
NY Energy Code for Simple Commercial Buildings- Part 2:Mixed-Use Apartment, Grocery, and Office Building	PSD Consulting	Webinar	10/6/2022
NYStretch Overview and Thermal Envelope Requirements Part 1	PSD Consulting	Webinar	10/11/2022
NYStretch Mechanical, Plumbing, Lighting, and Electric Power Part 2	PSD Consulting	Webinar	10/11/2022
Crushing the NYC Energy Code (Commercial)	Urban Green Council	Webinar	10/12/2022
A Process for Energy Code Compliance and Enforcement / Energy Code Plan Reviews in 15 Minutes or Less	PSD Consulting	Webinar	10/12/2022
A Process for Energy Code Compliance and Enforcement / Energy Code Inspections in 15 Minutes or Less	PSD Consulting	Webinar	10/12/2022
Air Sealing to 3 ACH50	PSD Consulting	Webinar	10/13/2022
Other IECC Envelope Requirements	PSD Consulting	Webinar	10/13/2022
Crushing the NYS Energy Code (Residential)	Urban Green Council	Webinar	10/13/2022

Course Title	Implementer	Training Type	Date
212: Review of the Modeling-based Submittals for ASHRAE 90.1 Section 11 and Appendix G	Karpman Consulting	Webinar	10/17/2022
NYStretch Energy Code for Commercial Buildings Part 1: Building Thermal Envelope, Mechanical Systems, Commissioning, and Additions and Alterations	PSD Consulting	Webinar	10/18/2022
NYStretch Energy Code for Commercial Buildings Part 2: Electric Power and Lighting, Total Building Performance, Additional Efficiency Package Options, and Appendices	PSD Consulting	Webinar	10/18/2022
Prioritizing ECCCNYS Enforcement for Commercial Buildings (Pt 1)	PSD Consulting	Webinar	10/19/2022
Prioritizing ECCCNYS Enforcement for Commercial Buildings (Pt 2)	PSD Consulting	Webinar	10/19/2022
Crushing the NYS Energy Code: Commercial	Urban Green Council	Webinar	10/19/2022
Whole-house Mechanical Ventilation	PSD Consulting	Webinar	10/20/2022
Efficient Forced Air Distribution	PSD Consulting	Webinar	10/20/2022
Multifamily Air Sealing	PSD Consulting	Webinar	10/25/2022
Multifamily Thermal Bridging	PSD Consulting	Webinar	10/25/2022
210: Compliance Documentation for ASHRAE 90.1 Section 11 and Appendix G	Karpman Consulting	Webinar	10/25/2022
Electrifying the Energy Code - Residential	PSD Consulting	Webinar	10/26/2022
Electrifying the Energy Code - Commercial Part 1	PSD Consulting	Webinar	10/26/2022
NYStretch Overview and Thermal Envelope Requirements Part 1	PSD Consulting	Webinar	10/27/2022
NYStretch Mechanical, Plumbing, Lighting, and Electric Power Part 2	PSD Consulting	Webinar	10/27/2022
What's New in the 2020 NYC Energy Code	Urban Green Council	Webinar	10/27/2022
ECCCNYS for Large Commercial Buildings (Pt 1): Mechanical Systems	PSD Consulting	Webinar	11/1/2022
ECCCNYS for Large Commercial Buildings (Pt 2): Lighting Systems	PSD Consulting	Webinar	11/1/2022
A Process for Energy Code Compliance and Enforcement / Energy Code Plan Reviews in 15 Minutes or Less	PSD Consulting	Webinar	11/2/2022
A Process for Energy Code Compliance and Enforcement / Energy Code Inspections in 15 Minutes or Less	PSD Consulting	Webinar	11/2/2022
NYStretch Energy Code for Commercial Buildings Part 1: Building Thermal Envelope, Mechanical Systems, Commissioning, and Additions and Alterations	PSD Consulting	Webinar	11/3/2022
NYStretch Energy Code for Commercial Buildings Part 2: Electric Power and Lighting, Total Building Performance, Additional Efficiency Package Options, and Appendices	PSD Consulting	Webinar	11/3/2022
Crushing the NYC Energy Code (Commercial)	Urban Green Council	Webinar	11/3/2022
Prioritizing ECCCNYS Enforcement for Commercial Buildings (Pt 1)	PSD Consulting	Webinar	11/8/2022
Prioritizing ECCCNYS Enforcement for Commercial Buildings (Pt 2)	PSD Consulting	Webinar	11/8/2022
Crushing the NYS Energy Code (Residential)	Urban Green Council	Webinar	11/9/2022

Course Title	Implementer	Training Type	Date
Air Sealing to 3 ACH50	PSD Consulting	Webinar	11/9/2022
Other IECC Envelope Requirements	PSD Consulting	Webinar	11/9/2022
Electrifying the Energy Code - Residential	PSD Consulting	Webinar	11/10/2022
Electrifying the Energy Code - Commercial Part 1	PSD Consulting	Webinar	11/10/2022
Crushing the NYC Energy Code (Residential)	Urban Green Council	Webinar	11/10/2022
Crushing the NYC Energy Code (Commercial)	Urban Green Council	In-Person	11/15/2022
213: Integrating Performance-based Compliance into the Design Process	Karpman Consulting	Webinar	11/15/2022
Whole-house Mechanical Ventilation	PSD Consulting	Webinar	11/16/2022
Efficient Forced Air Distribution	PSD Consulting	Webinar	11/16/2022
NYStretch Overview and Thermal Envelope Requirements Part 1	PSD Consulting	Webinar	11/17/2022
NYStretch Mechanical, Plumbing, Lighting, and Electric Power Part 2	PSD Consulting	Webinar	11/17/2022
Multifamily Air Sealing	PSD Consulting	Webinar	11/22/2022
Multifamily Thermal Bridging	PSD Consulting	Webinar	11/22/2022
Electrifying the Energy Code - Residential	PSD Consulting	Webinar	11/23/2022
Electrifying the Energy Code - Commercial Part 1	PSD Consulting	Webinar	11/23/2022
Crushing the NYS Energy Code: Commercial	Urban Green Council	Webinar	11/29/2022
ECCCNYS for Large Commercial Buildings (Pt 1): Mechanical Systems	PSD Consulting	Webinar	11/29/2022
ECCCNYS for Large Commercial Buildings (Pt 2): Lighting Systems	PSD Consulting	Webinar	11/29/2022
What's New in the 2020 NYC Energy Code	Urban Green Council	Webinar	11/30/2022
A Process for Energy Code Compliance and Enforcement / Energy Code Plan Reviews in 15 Minutes or Less	PSD Consulting	Webinar	11/30/2022
A Process for Energy Code Compliance and Enforcement / Energy Code Inspections in 15 Minutes or Less	PSD Consulting	Webinar	11/30/2022
Crushing the NYS Energy Code (Residential)	Urban Green Council	Webinar	12/1/2022
A Process for Energy Code Compliance and Enforcement / Energy Code Plan Reviews in 15 Minutes or Less	PSD Consulting	Webinar	12/6/2022
A Process for Energy Code Compliance and Enforcement / Energy Code Inspections in 15 Minutes or Less	PSD Consulting	Webinar	12/6/2022
The Energy Code and Existing Buildings- Residential Part 1 Additions	PSD Consulting	Webinar	12/7/2022
The Energy Code and Existing Buildings- Residential Part 2 Alterations, repairs and changes of occupancy or use	PSD Consulting	Webinar	12/7/2022
NYStretch Energy Code for Commercial Buildings Part 1: Building Thermal Envelope, Mechanical Systems, Commissioning, and Additions and Alterations	PSD Consulting	Webinar	12/7/2022

Course Title	Implementer	Training Type	Date
NYStretch Energy Code for Commercial Buildings Part 2: Electric Power and Lighting, Total Building Performance, Additional Efficiency Package Options, and Appendices	PSD Consulting	Webinar	12/7/2022
Multifamily Air Sealing	PSD Consulting	Webinar	12/8/2022
Multifamily Thermal Bridging	PSD Consulting	Webinar	12/8/2022
210: Compliance Documentation for ASHRAE 90.1 Section 11 and Appendix G	Karpman Consulting	Webinar	12/13/2022
Crushing the NYS Energy Code: Commercial	Urban Green Council	Webinar	12/13/2022
Crushing the NYC Energy Code (Residential)	Urban Green Council	Webinar	12/14/2022
NYStretch Overview and Thermal Envelope Requirements Part 1	PSD Consulting	Webinar	12/14/2022
NYStretch Mechanical, Plumbing, Lighting, and Electric Power Part 2	PSD Consulting	Webinar	12/14/2022
Prioritizing ECCCNYS Enforcement for Commercial Buildings (Pt 1)	PSD Consulting	Webinar	12/15/2022
Prioritizing ECCCNYS Enforcement for Commercial Buildings (Pt 2)	PSD Consulting	Webinar	12/15/2022
Air Sealing to 3 ACH50	PSD Consulting	Webinar	12/16/2022
Other IECC Envelope Requirements	PSD Consulting	Webinar	12/16/2022
Electrifying the Energy Code - Residential	PSD Consulting	Webinar	12/20/2022
Electrifying the Energy Code - Commercial Part 1	PSD Consulting	Webinar	12/20/2022
What's New in the 2020 NYC Energy Code	Urban Green Council	Webinar	12/21/2022
The Energy Code and Existing Buildings- Residential Part 1 Additions	PSD Consulting	Webinar	12/21/2022
The Energy Code and Existing Buildings- Residential Part 2 Alterations, repairs and changes of occupancy or use	PSD Consulting	Webinar	12/21/2022
NY Energy Codes for Simple Buildings- Part 1: Retail Building	PSD Consulting	Webinar	12/21/2022
NY Energy Code for Simple Commercial Buildings- Part 2:Mixed-Use Apartment, Grocery, and Office Building	PSD Consulting	Webinar	12/21/2022
Whole-house Mechanical Ventilation	PSD Consulting	Webinar	12/22/2022
Efficient Forced Air Distribution	PSD Consulting	Webinar	12/22/2022
110: Performance-Based Compliance with ASHRAE Standard 90.1 2016	Karpman Consulting	Webinar	10/11-10/14/2022
110: Performance-Based Compliance with ASHRAE Standard 90.1 2016	Karpman Consulting	Webinar	12/6-12/9/2022
NYStretch Overview and Thermal Envelope Requirements Part 1	PSD Consulting	Webinar	12/27/2022
NYStretch Mechanical, Plumbing, Lighting, and Electric Power Part 2	PSD Consulting	Webinar	12/27/2022
Multifamily Air Sealing	PSD Consulting	Webinar	12/28/2022
Multifamily Thermal Bridging	PSD Consulting	Webinar	12/28/2022

Course Title	Implementer	Training Type	Date
Electrifying the Energy Code - Residential	PSD Consulting	Webinar	12/29/2022
Electrifying the Energy Code - Commercial Part 1	PSD Consulting	Webinar	12/29/2022
Energy Code Enforcement Training	Newport Ventures	Webinar, in-person	
2020 ECCCNYS for Residential Buildings: Overview	Newport Ventures	Webinar, in-person	
Energy Code Enforcement Training	Newport	Webinar	12/7/2022
2020 ECCCNYS for Residential Buildings	Newport	Webinar	12/14/2022
NYStretch Overview and Thermal Envelope Requirements Part 1	PSD Consulting	Webinar	1/3/2023
NYStretch Mechanical, Plumbing, Lighting, and Electric Power Part 2	PSD Consulting	Webinar	1/3/2023
Electrifying the Energy Code - Residential	PSD Consulting	Webinar	1/4/2023
Air Sealing to 3 ACH50	PSD Consulting	Webinar	1/5/2023
Other IECC Envelope Requirements	PSD Consulting	Webinar	1/5/2023
Crushing the NYS Energy Code (Residential)	Urban Green Council	Webinar	1/11/2023
NYStretch Energy Code for Commercial Buildings Part 1: Building Thermal Envelope, Mechanical Systems, Commissioning, and Additions and Alterations	PSD Consulting	Webinar	1/10/2023
NYStretch Energy Code for Commercial Buildings Part 2: Electric Power and Lighting, Total Building Performance, Additional Efficiency Package Options, and Appendices	PSD Consulting	Webinar	1/10/2023
Electrifying the Energy Code - Commercial Part 1	PSD Consulting	Webinar	1/11/2023
Electrifying the Energy Code - Commercial Part 2	PSD Consulting	Webinar	1/11/2023
Multifamily Air Sealing	PSD Consulting	Webinar	1/12/2023
Multifamily Thermal Bridging	PSD Consulting	Webinar	1/12/2023
212: Review of the Modeling-based Submittals for ASHRAE 90.1 Section 11 and Appendix G	Karpman Consulting	Webinar	1/10/2023-1/13/2023
Crushing the NYS Energy Code: Commercial	Urban Green Council	Webinar	1/19/2023
The Energy Code and Existing Buildings- Residential Part 1 Additions	PSD Consulting	Webinar	1/17/2023
The Energy Code and Existing Buildings- Residential Part 2 Alterations, repairs and changes of occupancy or use	PSD Consulting	Webinar	1/17/2023
Whole-house Mechanical Ventilation	PSD Consulting	Webinar	1/18/2023
Efficient Forced Air Distribution	PSD Consulting	Webinar	1/18/2023
NY Energy Codes for Simple Buildings- Part 1: Retail Building	PSD Consulting	Webinar	1/19/2023
NY Energy Code for Simple Commercial Buildings- Part 2:Mixed-Use Apartment, Grocery, and Office Building	PSD Consulting	Webinar	1/19/2023

Course Title	Implementer	Training Type	Date
213: Integrating Performance-based Compliance into the Design Process	Karpman Consulting	Webinar	1/24/2023
Crushing the NYC Energy Code (Residential)	Urban Green Council	Webinar	1/24/2023
A Process for Energy Code Compliance and Enforcement / Energy Code Plan Reviews in 15 Minutes or Less	PSD Consulting	Webinar	1/24/2023
A Process for Energy Code Compliance and Enforcement / Energy Code Inspections in 15 Minutes or Less	PSD Consulting	Webinar	1/24/2023
ECCCNYS for Large Commercial Buildings (Pt 1): Mechanical Systems	PSD Consulting	Webinar	1/25/2023
ECCCNYS for Large Commercial Buildings (Pt 2): Lighting Systems	PSD Consulting	Webinar	1/25/2023
Prioritizing ECCCNYS Enforcement for Commercial Buildings (Pt 1)	PSD Consulting	Webinar	1/26/2023
Prioritizing ECCCNYS Enforcement for Commercial Buildings (Pt 2)	PSD Consulting	Webinar	1/26/2023
Crushing the NYC Energy Code (Commercial)	Urban Green Council	Webinar	1/26-1/27/2023
Crushing the NYC Energy Code (Commercial)	Urban Green Council	Webinar	1/31/2023
What's New in the 2020 NYC Energy Code	Urban Green Council	Webinar	2/1/2023
NYStretch Overview and Thermal Envelope Requirements Part 1	PSD Consulting	Webinar	1/31/2023
NYStretch Mechanical, Plumbing, Lighting, and Electric Power Part 2	PSD Consulting	Webinar	1/31/2023
Electrifying the Energy Code - Residential	PSD Consulting	Webinar	2/1/2023
Air Sealing to 3 ACH50	PSD Consulting	Webinar	2/2/2023
Other IECC Envelope Requirements	PSD Consulting	Webinar	2/2/2023
NYStretch Energy Code for Commercial Buildings Part 1: Building Thermal Envelope, Mechanical Systems, Commissioning, and Additions and Alterations	PSD Consulting	Webinar	2/7/2023
NYStretch Energy Code for Commercial Buildings Part 2: Electric Power and Lighting, Total Building Performance, Additional Efficiency Package Options, and Appendices	PSD Consulting	Webinar	2/7/2023
Multifamily Air Sealing	PSD Consulting	Webinar	2/8/2023
Multifamily Thermal Bridging	PSD Consulting	Webinar	2/8/2023
Crushing the NYS Energy Code: Commercial	Urban Green Council	Webinar	2/16/2023
The Energy Code and Existing Buildings- Residential Part 1 Additions	PSD Consulting	Webinar	2/14/2023
The Energy Code and Existing Buildings- Residential Part 2 Alterations, repairs and changes of occupancy or use	PSD Consulting	Webinar	2/14/2023
Whole-house Mechanical Ventilation	PSD Consulting	Webinar	2/15/2023
Efficient Forced Air Distribution	PSD Consulting	Webinar	2/15/2023
NY Energy Codes for Simple Buildings- Part 1: Retail Building	PSD Consulting	Webinar	2/16/2023

Course Title	Implementer	Training Type	Date
NY Energy Code for Simple Commercial Buildings- Part 2:Mixed-Use Apartment, Grocery, and Office Building	PSD Consulting	Webinar	2/16/2023
110: Performance-Based Compliance with ASHRAE Standard 90.1 2016	Karpman Consulting	Webinar	2/14/2023 - 2/17/2023
Crushing the NYC Energy Code: Residential	Urban Green Council	Webinar	2/22/2023
Crushing the NYC Energy Code (Commercial)	Urban Green Council	Webinar	2/23/2023
A Process for Energy Code Compliance and Enforcement / Energy Code Plan Reviews in 15 Minutes or Less	PSD Consulting	Webinar	2/22/2023
A Process for Energy Code Compliance and Enforcement / Energy Code Inspections in 15 Minutes or Less	PSD Consulting	Webinar	2/22/2023
ECCCNYS for Large Commercial Buildings (Pt 1): Mechanical Systems	PSD Consulting	Webinar	2/23/2023
ECCCNYS for Large Commercial Buildings (Pt 2): Lighting Systems	PSD Consulting	Webinar	2/23/2023
Crushing the NYS Energy Code (Residential)	Urban Green Council	Webinar	3/8/2023
2020 ECCCNYS for Residential Buildings: Overview	Newport Ventures	Webinar	2/3/2023
Energy Code Enforcement Training	Newport Ventures	In-Person	2/23/2023
2020 ECCCNYS for Residential Buildings: Overview	Newport Ventures	In-Person	2/15/2023
110: Performance-Based Compliance with ASHRAE Standard 90.1 2016	Karpman Consulting	Webinar	3/7 - 3/10/2023
212: Review of the Modeling-based Submittals for ASHRAE 90.1 Section 11 and Appendix G	Karpman Consulting	Webinar	3/14 - 3/17/2023
Electrifying the Energy Code - Residential	PSD Consulting	Webinar	3/14/2023
Electrifying the Energy Code - Commercial Part 1	PSD Consulting	Webinar	3/15/2023
Electrifying the Energy Code - Commercial Part 2	PSD Consulting	Webinar	3/15/2023
The Energy Code and Existing Buildings (Commercial) - Part 1	PSD Consulting	Webinar	3/16/2023
The Energy Code and Existing Buildings (Commercial) - Part 2	PSD Consulting	Webinar	3/16/2023
213: Integrating Performance-based Compliance into the Design Process	Karpman Consulting	Webinar	3/21/2023
Electrifying the Energy Code - Residential	PSD Consulting	Webinar	3/21/2023
Don't Be Left Exposed - Part 1: Meeting the Energy Code with the Safe Use of Foam Insulation	PSD Consulting	Webinar	3/22/2023
Don't Be Left Exposed - Part 2: Meeting the Energy Code with the Safe Use of Foam Insulation	PSD Consulting	Webinar	3/22/2023
Electrifying the Energy Code - Commercial Part 1	PSD Consulting	Webinar	3/23/2023
Electrifying the Energy Code - Commercial Part 2	PSD Consulting	Webinar	3/23/2023
Crushing the NYS Energy Code: Commercial	Urban Green Council	Webinar	3/14/2023

Course Title	Implementer	Training Type	Date
Crushing the NYC Energy Code (Residential)	Urban Green Council	Webinar	3/23/2023
Crushing the NYC Energy Code (Commercial)	Urban Green Council	Webinar	3/28/2023
What's New in the 2020 NYC Energy Code	Urban Green Council	Webinar	3/29/2023
2020 ECCCNYS for Commercial Buildings: Overview	Newport Ventures	Webinar	2/3/2023
The Energy Code and Existing Buildings- Residential Part 1 Additions	PSD Consulting	Webinar	3/28/2023
The Energy Code and Existing Buildings- Residential Part 2 Alterations, repairs and changes of occupancy or use	PSD Consulting	Webinar	3/28/2023
Electrifying the Energy Code - Residential	PSD Consulting	Webinar	3/29/2023
Don't Be Left Exposed - Part 1: Meeting the Energy Code with the Safe Use of Foam Insulation	PSD Consulting	Webinar	3/30/2023
Don't Be Left Exposed - Part 2: Meeting the Energy Code with the Safe Use of Foam Insulation	PSD Consulting	Webinar	3/30/2023
NYStretch Overview and Thermal Envelope Requirements Part 1	PSD Consulting	Webinar	4/4/2023
NYStretch Mechanical, Plumbing, Lighting, and Electric Power Part 2	PSD Consulting	Webinar	4/4/2023
Multifamily Air Sealing	PSD Consulting	Webinar	4/5/2023
Multifamily Thermal Bridging	PSD Consulting	Webinar	4/5/2023
NY Energy Codes for Simple Buildings- Part 1: Retail Building	PSD Consulting	Webinar	4/6/2023
NY Energy Code for Simple Commercial Buildings- Part 2:Mixed-Use Apartment, Grocery, and Office Building	PSD Consulting	Webinar	4/6/2023
212: Review of the Modeling-based Submittals for ASHRAE 90.1 Section 11 and Appendix G	Karpman Consulting	Webinar	4/4 - 4/7/2023
Crushing the NYS Energy Code: Commercial	Urban Green Council	Webinar	4/13/2023
Whole-house Mechanical Ventilation	PSD Consulting	Webinar	4/11/2023
Efficient Forced Air Distribution	PSD Consulting	Webinar	4/11/2023
Air Sealing to 3 ACH50	PSD Consulting	Webinar	4/12/2023
Other IECC Envelope Requirements	PSD Consulting	Webinar	4/12/2023
NYStretch Energy Code for Commercial Buildings Part 1: Building Thermal Envelope, Mechanical Systems, Commissioning, and Additions and Alterations	PSD Consulting	Webinar	4/13/2023
NYStretch Energy Code for Commercial Buildings Part 2: Electric Power and Lighting, Total Building Performance, Additional Efficiency Package Options, and Appendices	PSD Consulting	Webinar	4/13/2023
110: Performance-Based Compliance with ASHRAE Standard 90.1 2016	Karpman Consulting	Webinar	4/11 - 4/13/2023
210: Compliance Documentation for ASHRAE 90.1 Section 11 and Appendix G	Karpman Consulting	Webinar	4/18/2023

Course Title	Implementer	Training Type	Date
Don't Be Left Exposed - Part 1: Meeting the Energy Code with the Safe Use of Foam Insulation	PSD Consulting	Webinar	4/12/2023
Don't Be Left Exposed - Part 2: Meeting the Energy Code with the Safe Use of Foam Insulation	PSD Consulting	Webinar	4/12/2023
Crushing the NYS Energy Code (Residential)	Urban Green Council	Webinar	4/20/2023
A Process for Energy Code Compliance and Enforcement / Energy Code Plan Reviews in 15 Minutes or Less	PSD Consulting	Webinar	4/18/2023
A Process for Energy Code Compliance and Enforcement / Energy Code Inspections in 15 Minutes or Less	PSD Consulting	Webinar	4/18/2023
Electrifying the Energy Code - Commercial Part 1	PSD Consulting	Webinar	4/19/2023
Electrifying the Energy Code - Commercial Part 2	PSD Consulting	Webinar	4/19/2023
Don't Be Left Exposed - Part 1: Meeting the Energy Code with the Safe Use of Foam Insulation	PSD Consulting	Webinar	4/20/2023
Don't Be Left Exposed - Part 2: Meeting the Energy Code with the Safe Use of Foam Insulation	PSD Consulting	Webinar	4/20/2023
Crushing the NYC Energy Code (Commercial)	Urban Green Council	Webinar	4/25/2023
NY Energy Codes for Simple Buildings- Part 1: Retail Building	PSD Consulting	In-Person	4/13/2023
NY Energy Code for Simple Commercial Buildings- Part 2:Mixed-Use Apartment, Grocery, and Office Building	PSD Consulting	In-Person	4/13/2023
NYStretch Energy Code for Commercial Buildings Part 1: Building Thermal Envelope, Mechanical Systems, Commissioning, and Additions and Alterations	PSD Consulting	In-Person	4/18/2023
The Energy Code and Existing Buildings- Residential Part 1 Additions	PSD Consulting	Webinar	4/25/2023
The Energy Code and Existing Buildings- Residential Part 2 Alterations, repairs and changes of occupancy or use	PSD Consulting	Webinar	4/25/2023
The Energy Code and Existing Buildings (Commercial) - Part 1	PSD Consulting	Webinar	4/26/2023
The Energy Code and Existing Buildings (Commercial) - Part 2	PSD Consulting	Webinar	4/26/2023
Electrifying the Energy Code - Residential	PSD Consulting	Webinar	4/27/2023
What's New in the 2020 NYC Energy Code	Urban Green Council	Webinar	4/27/2023
Crushing the NYS Energy Code (Residential)	Urban Green Council	Webinar	5/2/2023
Multifamily Air Sealing	PSD Consulting	In-Person	5/2/2023
Multifamily Thermal Bridging	PSD Consulting	In-Person	5/2/2023
NY Energy Codes for Simple Buildings- Part 1: Retail Building	PSD Consulting	In-Person	5/2/2023
NY Energy Code for Simple Commercial Buildings- Part 2:Mixed-Use Apartment, Grocery, and Office Building	PSD Consulting	In-Person	5/2/2023
Whole-house Mechanical Ventilation	PSD Consulting	Webinar	5/3/2023

Course Title	Implementer	Training Type	Date
Efficient Forced Air Distribution	PSD Consulting	Webinar	5/3/2023
A Process for Energy Code Compliance and Enforcement / Energy Code Plan Reviews in 15 Minutes or Less	PSD Consulting	Webinar	5/4/2023
A Process for Energy Code Compliance and Enforcement / Energy Code Inspections in 15 Minutes or Less	PSD Consulting	Webinar	5/4/2023
Crushing the NYS Energy Code: Commercial	Urban Green Council	Webinar	5/11/2023
ECCCNYS for Large Commercial Buildings (Pt 1): Mechanical Systems	PSD Consulting	Webinar	5/9/2023
ECCCNYS for Large Commercial Buildings (Pt 2): Lighting Systems	PSD Consulting	Webinar	5/9/2023
Prioritizing ECCCNYS Enforcement for Commercial Buildings (Pt 1)	PSD Consulting	Webinar	5/10/2023
Prioritizing ECCCNYS Enforcement for Commercial Buildings (Pt 2)	PSD Consulting	Webinar	5/10/2023
NYStretch Overview and Thermal Envelope Requirements Part 1	PSD Consulting	In-Person	5/9/2023
NYStretch Mechanical, Plumbing, Lighting, and Electric Power Part 2	PSD Consulting	In-Person	5/9/2023
Don't Be Left Exposed - Part 1: Meeting the Energy Code with the Safe Use of Foam Insulation	PSD Consulting	In-Person	5/11/2023
Don't Be Left Exposed - Part 2: Meeting the Energy Code with the Safe Use of Foam Insulation	PSD Consulting	In-Person	5/11/2023
NYStretch Energy Code for Commercial Buildings Part 1: Building Thermal Envelope, Mechanical Systems, Commissioning, and Additions and Alterations	PSD Consulting	In-Person	5/11/2023
NYStretch Energy Code for Commercial Buildings Part 2: Electric Power and Lighting, Total Building Performance, Additional Efficiency Package Options, and Appendices	PSD Consulting	In-Person	5/11/2023
Crushing the NYC Energy Code (Commercial)	Urban Green Council	Webinar	5/16/2023
Don't Be Left Exposed - Part 1: Meeting the Energy Code with the Safe Use of Foam Insulation	PSD Consulting	Webinar	5/16/2023
Don't Be Left Exposed - Part 2: Meeting the Energy Code with the Safe Use of Foam Insulation	PSD Consulting	Webinar	5/16/2023
Air Sealing to 3 ACH50	PSD Consulting	Webinar	5/17/2023
Other IECC Envelope Requirements	PSD Consulting	Webinar	5/17/2023
The Energy Code and Existing Buildings- Residential Part 1 Additions	PSD Consulting	Webinar	5/18/2023
The Energy Code and Existing Buildings- Residential Part 2 Alterations, repairs and changes of occupancy or use	PSD Consulting	Webinar	5/18/2023
Crushing the NYC Energy Code (Residential)	Urban Green Council	Webinar	5/23/2023
Electrifying the Energy Code - Commercial Part 1	PSD Consulting	Webinar	5/23/2023
Electrifying the Energy Code - Commercial Part 2	PSD Consulting	Webinar	5/23/2023
The Energy Code and Existing Buildings (Commercial) - Part 1	PSD Consulting	Webinar	5/24/2023

Course Title	Implementer	Training Type	Date
The Energy Code and Existing Buildings (Commercial) - Part 2	PSD Consulting	Webinar	5/24/2023
NYStretch Overview and Thermal Envelope Requirements Part 1	PSD Consulting	Webinar	5/25/2023
NYStretch Mechanical, Plumbing, Lighting, and Electric Power Part 2	PSD Consulting	Webinar	5/25/2023
Electrifying the Energy Code - Residential	PSD Consulting	Webinar	5/30/2023
NYStretch Energy Code for Commercial Buildings Part 1: Building Thermal Envelope, Mechanical Systems, Commissioning, and Additions and Alterations	PSD Consulting	Webinar	5/31/2023
NYStretch Energy Code for Commercial Buildings Part 2: Electric Power and Lighting, Total Building Performance, Additional Efficiency Package Options, and Appendices	PSD Consulting	Webinar	5/31/2023
Don't Be Left Exposed - Part 1: Meeting the Energy Code with the Safe Use of Foam Insulation	PSD Consulting	Webinar	6/1/2023
Don't Be Left Exposed - Part 2: Meeting the Energy Code with the Safe Use of Foam Insulation	PSD Consulting	Webinar	6/1/2023
2020 ECCCNYS for Residential Buildings: Overview	Newport Ventures	Webinar	5/22/2023
2020 ECCCNYS for Residential Buildings: Overview	Newport Ventures	Webinar	5/25/2023
2020 ECCCNYS for Commercial Buildings: Overview	Newport Ventures	Webinar	5/23/2023
2020 ECCCNYS for Commercial Buildings: Overview	Newport Ventures	Webinar	5/26/2023
Transitioning from Code Compliant to High-Performance: Strategies for Residential Buildings	Newport Ventures	Webinar	5/24/2023
Energy Code Enforcement Training	Newport Ventures	Webinar	5/3/2023
A Process for Energy Code Compliance and Enforcement / Energy Code Plan Reviews in 15 Minutes or Less	PSD Consulting	Webinar	6/6/2023
A Process for Energy Code Compliance and Enforcement / Energy Code Inspections in 15 Minutes or Less	PSD Consulting	Webinar	6/6/2023
ECCCNYS for Large Commercial Buildings (Pt 1): Mechanical Systems	PSD Consulting	Webinar	6/7/2023
ECCCNYS for Large Commercial Buildings (Pt 2): Lighting Systems	PSD Consulting	Webinar	6/7/2023
Air Sealing to 3 ACH50	PSD Consulting	Webinar	6/8/2023
Other IECC Envelope Requirements	PSD Consulting	Webinar	6/8/2023
Crushing the NYS Energy Code: Commercial	Urban Green Council	Webinar	6/13/2023
Crushing the NYS Energy Code (Residential)	Urban Green Council	Webinar	6/15/2023
NYStretch Energy Code for Commercial Buildings Part 1: Building Thermal Envelope, Mechanical Systems, Commissioning, and Additions and Alterations	PSD Consulting	Webinar	6/13/2023
NYStretch Energy Code for Commercial Buildings Part 2: Electric Power and Lighting, Total Building Performance, Additional Efficiency Package Options, and Appendices	PSD Consulting	Webinar	6/13/2023
Don't Be Left Exposed - Part 1: Meeting the Energy Code with the Safe Use of Foam Insulation	PSD Consulting	Webinar	6/14/2023

Course Title	Implementer	Training Type	Date
Don't Be Left Exposed - Part 2: Meeting the Energy Code with the Safe Use of Foam Insulation	PSD Consulting	Webinar	6/14/2023
NY Energy Codes for Simple Buildings- Part 1: Retail Building	PSD Consulting	Webinar	6/15/2023
NY Energy Code for Simple Commercial Buildings- Part 2:Mixed-Use Apartment, Grocery, and Office Building	PSD Consulting	Webinar	6/15/2023
Crushing the NYC Energy Code (Commercial)	Urban Green Council	Webinar	6/20/2023
NYStretch Overview and Thermal Envelope Requirements Part 1	PSD Consulting	In-Person	6/9/2023
NYStretch Mechanical, Plumbing, Lighting, and Electric Power Part 2	PSD Consulting	In-Person	6/9/2023
Don't Be Left Exposed - Part 1: Meeting the Energy Code with the Safe Use of Foam Insulation	PSD Consulting	In-Person	6/14/2023
Don't Be Left Exposed - Part 2: Meeting the Energy Code with the Safe Use of Foam Insulation	PSD Consulting	In-Person	6/14/2023
The Energy Code and Existing Buildings- Residential Part 1 Additions	PSD Consulting	Webinar	6/20/2023
The Energy Code and Existing Buildings- Residential Part 2 Alterations, repairs and changes of occupancy or use	PSD Consulting	Webinar	6/20/2023
Electrifying the Energy Code - Commercial Part 1	PSD Consulting	Webinar	6/21/2023
Electrifying the Energy Code - Commercial Part 2	PSD Consulting	Webinar	6/21/2023
NYStretch Overview and Thermal Envelope Requirements Part 1	PSD Consulting	Webinar	6/22/2023
NYStretch Mechanical, Plumbing, Lighting, and Electric Power Part 2	PSD Consulting	Webinar	6/22/2023
Crushing the NYC Energy Code (Residential)	Urban Green Council	Webinar	6/27/2023
What's New in the 2020 NYC Energy Code	Urban Green Council	Webinar	6/28/2023
Prioritizing ECCCNYS Enforcement for Commercial Buildings (Pt 1)	PSD Consulting	Webinar	6/27/2023
Prioritizing ECCCNYS Enforcement for Commercial Buildings (Pt 2)	PSD Consulting	Webinar	6/27/2023
Electrifying the Energy Code - Residential	PSD Consulting	Webinar	6/28/2023
The Energy Code and Existing Buildings (Commercial) - Part 1	PSD Consulting	Webinar	6/29/2023
The Energy Code and Existing Buildings (Commercial) - Part 2	PSD Consulting	Webinar	6/29/2023
Don't Be Left Exposed - Part 1: Meeting the Energy Code with the Safe Use of Foam Insulation	PSD Consulting	Webinar	7/5/2023
Don't Be Left Exposed - Part 2: Meeting the Energy Code with the Safe Use of Foam Insulation	PSD Consulting	Webinar	7/5/2023
NYStretch Overview and Thermal Envelope Requirements Part 1	PSD Consulting	Webinar	7/6/2023
NYStretch Mechanical, Plumbing, Lighting, and Electric Power Part 2	PSD Consulting	Webinar	7/6/2023
Crushing the NYS Energy Code (Residential)	Urban Green Council	Webinar	7/12/2023

Course Title	Implementer	Training Type	Date
Electrifying the Energy Code - Commercial Part 1	PSD Consulting	Webinar	7/11/2023
Electrifying the Energy Code - Commercial Part 2	PSD Consulting	Webinar	7/11/2023
Air Sealing to 3 ACH50	PSD Consulting	Webinar	7/13/2023
Other IECC Envelope Requirements	PSD Consulting	Webinar	7/13/2023
ECCCNYS for Large Commercial Buildings (Pt 1): Mechanical Systems	PSD Consulting	In-Person	7/11/2023
ECCCNYS for Large Commercial Buildings (Pt 2): Lighting Systems	PSD Consulting	In-Person	7/11/2023
Don't Be Left Exposed - Part 1: Meeting the Energy Code with the Safe Use of Foam Insulation	PSD Consulting	In-Person	7/12/2023
Don't Be Left Exposed - Part 2: Meeting the Energy Code with the Safe Use of Foam Insulation	PSD Consulting	In-Person	7/12/2023
NYStretch Energy Code for Commercial Buildings Part 1: Building Thermal Envelope, Mechanical Systems, Commissioning, and Additions and Alterations	PSD Consulting	Webinar	7/18/2023
NYStretch Energy Code for Commercial Buildings Part 2: Electric Power and Lighting, Total Building Performance, Additional Efficiency Package Options, and Appendices	PSD Consulting	Webinar	7/18/2023
Don't Be Left Exposed - Part 1: Meeting the Energy Code with the Safe Use of Foam Insulation	PSD Consulting	In-Person	7/13/2023
Don't Be Left Exposed - Part 2: Meeting the Energy Code with the Safe Use of Foam Insulation	PSD Consulting	In-Person	7/13/2023
The Energy Code and Existing Buildings- Residential Part 1 Additions	PSD Consulting	Webinar	7/25/2023
The Energy Code and Existing Buildings- Residential Part 2 Alterations, repairs and changes of occupancy or use	PSD Consulting	Webinar	7/25/2023
Whole-house Mechanical Ventilation	PSD Consulting	Webinar	7/27/2023
Efficient Forced Air Distribution	PSD Consulting	Webinar	7/27/2023
Crushing the Code NYS: Energy Code 101	Urban Green Council	Webinar	7/11/2023
Crushing the Code NYS: Residential Envelope	Urban Green Council	Webinar	7/12/2023
Crushing the Code NYS: Commercial Envelope	Urban Green Council	Webinar	7/13/2023
Crushing the NYC Energy Code (Residential)	Urban Green Council	Webinar	7/18/2023
Crushing the Code NYS: Residential Building Systems	Urban Green Council	Webinar	7/19/2023
Crushing the Code NYS: Commercial Building Systems	Urban Green Council	Webinar	7/20/2023
Crushing the Code NYS: Demonstrate Compliance	Urban Green Council	Webinar	7/25/2023
Crushing the NYC Energy Code: Commercial	Urban Green Council	Webinar	7/26/2023
What's New in the 2020 New York Energy Code	Urban Green Council	Webinar	7/27/2023
Crushing the Code NYS: Energy Code 101	Urban Green Council	Webinar	8/3/2023

Course Title	Implementer	Training Type	Date
A Process for Energy Code Compliance and Enforcement / Energy Code Plan Reviews in 15 Minutes or Less	PSD Consulting	Webinar	8/1/2023
A Process for Energy Code Compliance and Enforcement / Energy Code Inspections in 15 Minutes or Less	PSD Consulting	Webinar	8/1/2023
ECCCNYS for Large Commercial Buildings (Pt 1): Mechanical Systems	PSD Consulting	Webinar	8/2/2023
ECCCNYS for Large Commercial Buildings (Pt 2): Lighting Systems	PSD Consulting	Webinar	8/2/2023
The Energy Code and Existing Buildings- Residential Part 1 Additions	PSD Consulting	Webinar	8/3/2023
The Energy Code and Existing Buildings- Residential Part 2 Alterations, repairs and changes of occupancy or use	PSD Consulting	Webinar	8/3/2023
NYStretch Overview and Thermal Envelope Requirements Part 1	PSD Consulting	Webinar	8/8/2023
NYStretch Mechanical, Plumbing, Lighting, and Electric Power Part 2	PSD Consulting	Webinar	8/8/2023
Prioritizing ECCCNYS Enforcement for Commercial Buildings (Pt 1)	PSD Consulting	Webinar	8/9/2023
Prioritizing ECCCNYS Enforcement for Commercial Buildings (Pt 2)	PSD Consulting	Webinar	8/9/2023
Electrifying the Energy Code - Residential	PSD Consulting	Webinar	8/10/2023
Put a Lid On It Part 1: Unvented Attics	PSD Consulting	Webinar	8/10/2023
Crushing the Code NYS: Residential Envelope	Urban Green Council	Webinar	8/9/2023
Crushing the Code NYS: Commercial Envelope	Urban Green Council	Webinar	8/10/2023
Crushing the Code NYS: Residential Building Systems	Urban Green Council	Webinar	8/16/2023
Crushing the Code NYS: Commercial Building Systems	Urban Green Council	Webinar	8/17/2023
NY Energy Codes for Simple Buildings- Part 1: Retail Building	PSD Consulting	Webinar	8/15/2023
NY Energy Code for Simple Commercial Buildings- Part 2:Mixed-Use Apartment, Grocery, and Office Building	PSD Consulting	Webinar	8/15/2023
Air Sealing to 3 ACH50	PSD Consulting	Webinar	8/16/2023
Other IECC Envelope Requirements	PSD Consulting	Webinar	8/16/2023
The Energy Code and Existing Buildings (Commercial) - Part 1	PSD Consulting	Webinar	8/17/2023
The Energy Code and Existing Buildings (Commercial) - Part 2	PSD Consulting	Webinar	8/17/2023
Crushing the NYC Energy Code: Commercial	Urban Green Council	Webinar	8/22/2023
Crushing the Code NYS: Demonstrate Compliance	Urban Green Council	Webinar	8/23/2023
Don't Be Left Exposed - Part 1: Meeting the Energy Code with the Safe Use of Foam Insulation	PSD Consulting	Webinar	8/22/2023
Don't Be Left Exposed - Part 2: Meeting the Energy Code with the Safe Use of Foam Insulation	PSD Consulting	Webinar	8/22/2023
Multifamily Air Sealing	PSD Consulting	Webinar	8/23/2023

Course Title	Implementer	Training Type	Date
Multifamily Thermal Bridging	PSD Consulting	Webinar	8/23/2023
Put a Lid On It Part 1: Unvented Attics	PSD Consulting	Webinar	8/24/2023
Electrifying the Energy Code - Residential	PSD Consulting	Webinar	8/24/2023
NYStretch Energy Code for Commercial Buildings Part 1: Building Thermal Envelope, Mechanical Systems, Commissioning, and Additions and Alterations	PSD Consulting	Webinar	8/29/2023
NYStretch Energy Code for Commercial Buildings Part 2: Electric Power and Lighting, Total Building Performance, Additional Efficiency Package Options, and Appendices	PSD Consulting	Webinar	8/29/2023
Whole-house Mechanical Ventilation	PSD Consulting	Webinar	8/30/2023
Efficient Forced Air Distribution	PSD Consulting	Webinar	8/30/2023
Electrifying the Energy Code - Commercial Part 1	PSD Consulting	Webinar	8/31/2023
Electrifying the Energy Code - Commercial Part 2	PSD Consulting	Webinar	8/31/2023
Crushing the NYC Energy Code (Residential)	Urban Green Council	Webinar	8/30/2023
What's New in the 2020 NYC Energy Code	Urban Green Council	Webinar	8/31/2023

Appendix G. NYSERDA TMD Savings Memo

Memorandum

To:	Patricia Gonzales, PhD; NYSERDA
From:	Amalia Hicks, Hope Lobkowicz and Jeremy Eckstein; Cadmus
Subject:	Methodology for Analyzing Indirect Energy Impacts of the Codes and Standards for Carbon Neutral Buildings Initiative
Date:	May 31, 2023

Introduction

This memo outlines methodology for analyzing the indirect energy impacts of the Codes and Standards for Carbon Neutral Buildings Initiative (CSCNB) (previously named the Code to Zero Initiative).

As noted in NYSERDA's *Code-to-Zero Evaluation Plan*, assessing the indirect impacts of the Initiative is linked to hypotheses testing. NYSERDA developed a set of testable hypotheses in the *Theory of Change for the Initiative* and Cadmus continues to work with NYSERDA to ensure that indicators and data collection processes are aligned to support the analysis. Although the actual analysis of indirect impacts will not occur until the final year of the five-year evaluation plan, it is important to design a methodology at the onset of evaluation activities to ensure that appropriate data are collected during the years prior to the analysis. Cadmus, henceforth referred to as the "Market Evaluation Team," first developed the indirect savings methodology in year one and two of the evaluation period, revising it in year four to reflect changes to program design and updates to the initiative logic model.

Indirect impacts are market effects that are expected to accrue over the longer term from follow-on market activity that results from the activities NYSERDA undertakes in this Initiative. The Initiative activities are intended to influence the behavior of various stakeholder groups through ongoing training, demonstrations, and technical support. NYSERDA designed this Initiative to produce indirect impacts, as most of the energy impacts will result from market activities and changes that occur in the market over time in response to NYSERDA's market interventions.

Indirect Impacts Framework

This section discusses the basic framework required to estimate indirect savings from the Initiative.

Logic Model

NYSERDA developed a logic model to characterize the structure of the CSCNB Initiative and to provide the basis for evaluating its impacts. This logic model presents market barriers, target audiences, Initiative activities (and resources), outputs, near-term outcomes, and mid- and long-term outcomes. The Market Evaluation Team extracted key portions of the logic model to guide the development and explanation of its proposed analysis methodology. Figure 115 provides the most recent version of the logic model.

Figure 115. Codes and Standards for Carbon Neutral Buildings Logic Model

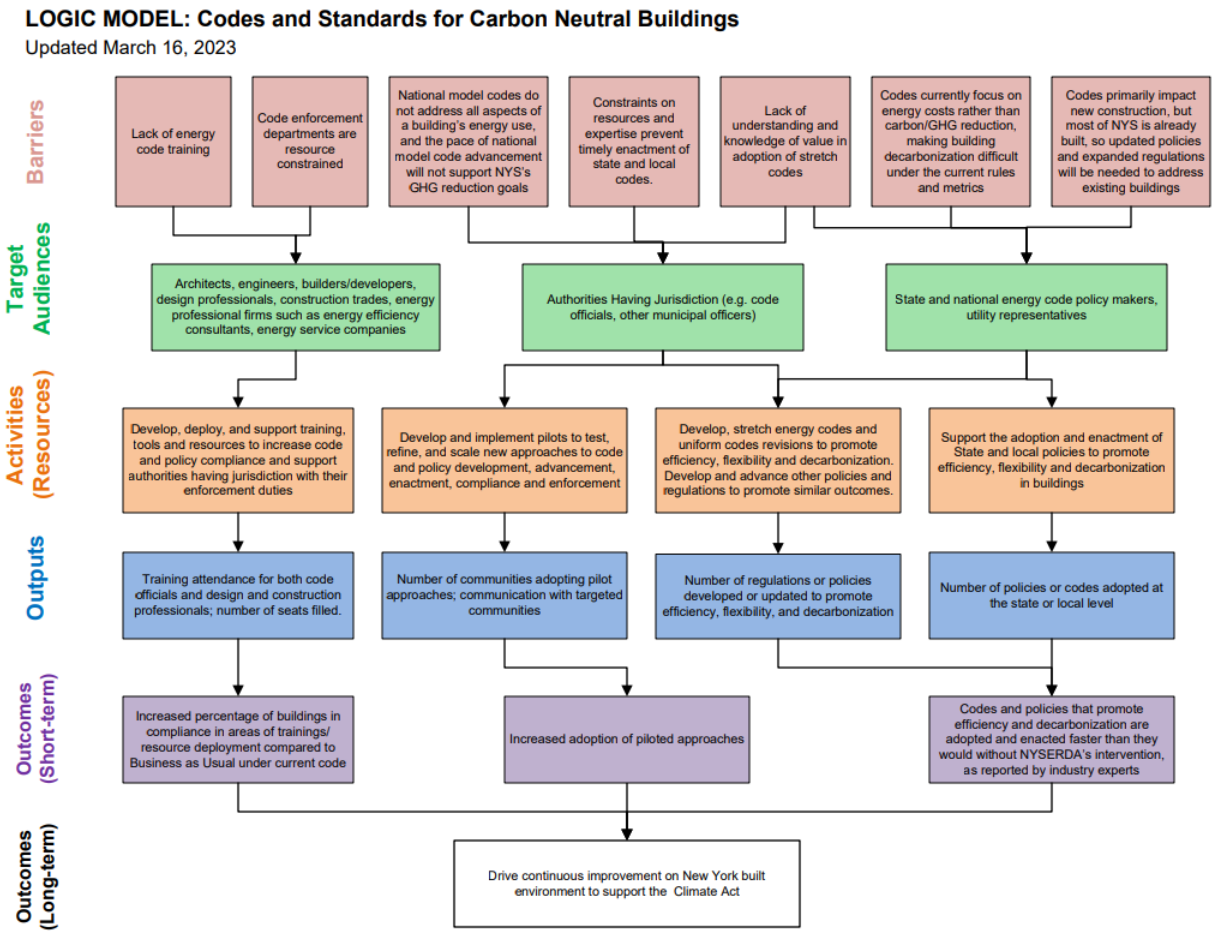


Table 29 lists the five major activities in the Initiative, along with their outputs and anticipated outcomes. The table also presents indicators that can be used to monitor the performance and progress of the Initiative. As described in the *Code-to-Zero Evaluation Plan*:

> "[P]rogram activity/output indicators represent measurable, quantifiable direct results of activities undertaken in the Initiative. Outputs are a key way of regularly tracking progress, especially in the early stages of an Initiative, before broader market changes are measurable. Outcome

indicators can encompass near-term through longer-term changes in market conditions expected to result from the activities/outputs of an intervention."

Indicators are clear, verifiable metrics of how well the Initiative is achieving its goals, with outcomes ranging from accomplishing planned activities to driving fundamental market changes. For each activity, the table presents multiple indicators that can be used to track the progress of various components of the logic model. The outcome indicators will be assessed relative to a baseline value, which will be established through the initial steps of the evaluation, with progress measured periodically throughout the evaluation.

Table 29. Key Elements of CSCNB Initiative Logic Model

Initiative Activity	Outputs	Short-Term Outcomes	Longer-Term Outcomes	Indicators[1]
Develop, deploy, and support training, tools and resources to increase code and policy compliance and support authorities having jurisdiction with their enforcement duties	Training attendance for both code officials and design and construction professionals; number of seats filled.	Increased percentage of buildings in compliance in areas of trainings/resource deployment compared to Business as Usual under current code	Drive continuous improvement on New York built environment to support the Climate Act	Output: Training attendance, number of seats filled (baseline 0). 2021: 4,000, 2022: 8,000, 2023: 12,000, 2024: 16,000, 2025: 20,000 Outcome: Increased percentage of buildings in compliance in areas of trainings/resource deployment compared to Business as Usual under current code (baseline = 0). 2021-2025: 5%
Develop and implement pilots to test, refine, and scale new approaches to code and policy development, advancement, enactment, compliance and enforcement	Number of communities adopting pilot approaches; communication with targeted communities	Increased adoption of piloted approaches Increased percentage of buildings in compliance in areas of trainings/resource deployment compared to Business as Usual under current code 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		Output: Number of communities adopting pilot approaches (baseline = TBD). 2022:5, 2023: 15, 2024: 25, 2025: 35 Outcome: Increased percentage of buildings in compliance in areas of trainings/resource deployment compared to Business as Usual under current code (baseline = 0). 2021-2025: 5%
Develop, stretch energy codes and uniform codes revisions to promote efficiency, flexibility and decarbonization. Develop and advance other policies and regulations to promote similar outcomes.	Number of regulations or policies developed or updated to promote efficiency, flexibility, and decarbonization	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		Output: Number of regulations or policies developed or updated to promote efficiency, flexibility, and decarbonization (baseline = 0). 2022: 2, 2023: 2, 2024: 2, 2025: 4 Outcome: There are currently no outcome indicators associated with the activity described here. The baseline value for the output presented in this table is not derived from evaluation studies.
Support the adoption and enactment of State and local policies to promote efficiency, flexibility and decarbonization in buildings	Number of policies or codes adopted at the state or local level			Output: Number of policies or codes adopted at the state or local level (baseline = 0). 2021: 20, 2022:25, 2023: 26, 2024: 27, 2025: 28 Outcome: Codes and policies are adopted and enacted faster than they would without NYSERDA's intervention, as reported by industry experts (baseline =qualitative)

[1] From the NYSERDA Compiled Investment Plan (revised 2/1/2023) See: https://www.nyserda.ny.gov//media/Project/Nyserda/Files/About/Clean-Energy-Fund/Matter-1600681NYSERDA-CEF-CIP-Revised-1-February-2023.pdf

Overview of Savings Potential

Each Initiative activity could produce indirect energy savings, but the timing and mechanisms will vary. It is important to understand the outputs and outcomes from each activity and how they could produce energy savings.

The codes compliance and enforcement training activity is likely to produce the largest energy savings in the near term. This is because the training can be started and can reach large numbers of code officials and building professionals relatively quickly. Prior studies have demonstrated that immediately after such training, participants say that they plan to make changes in their code enforcement and compliance, and follow-up surveys have confirmed that the training led to behavior changes that improved enforcement and compliance.[12]

However, any energy savings resulting from greater compliance will be constrained by the current rate of noncompliance and the amount that compliance can be improved. To illustrate, if the latest energy code is intended to reduce the amount of building energy consumption by 10% compared to the prior code and compliance is at a level where buildings are achieving 90% of the expected savings, the maximum increase in savings from training would be 1% (10% of 10%) of the consumption under the prior code. This increase in savings would apply to the buildings associated with training attendees who were influenced by the training and possibly to buildings associated with other code officials or building professionals who were influenced by the trainees.

Although Initiative activities other than training will likely take longer to produce energy savings, some have the potential to generate larger savings. For example, the stretch code pilots are intended to encourage nonparticipant jurisdictions to adopt stretch codes, and ultimately to lead to the adoption of some of the stretch code components into the state energy code. If the stretch code produced 10% savings relative to the base code, then all buildings in jurisdictions that adopt the stretch code would generate savings a full 10% above the base code (if they fully comply). Any stretch code components adopted in the next base state code will generate savings in all new buildings across the state. The combined savings from these effects could be much larger than the savings from increasing the compliance rate alone, but the magnitude of savings will depend on how many and which jurisdictions adopt the stretch code and which of those components are adopted in the base code.

[12] NMR Group and Cadmus. March 10, 2020. *Massachusetts Codes and Standards Compliance and Support Initiative Residential and Commercial Immediate and Follow-up Surveys – All 2019 Reports.* MA19X04-B-CCSISVY.

Steps in Determining Program-Induced Indirect Savings

The overall process of determining program-induced indirect savings for each Initiative activity entails several steps:

1. The evaluator refines and explains the logic model for how each activity leads to indirect impacts and savings and identifies the key parameters that will be used to estimate the impact of each Initiative activity.
2. The evaluator uses the logic model to identify the outputs, outcomes, and indicators associated with each activity.
3. The evaluator works with the Initiative team to identify sources of information for each indicator that will be tracked during the course of the Initiative. Likely sources include Initiative data, results from pilot projects, Delphi panel results, representative jurisdiction interviews, training participant surveys, and secondary sources.
4. The evaluator compiles the information from all relevant sources and the annual indicator data.
5. The evaluator creates a panel of independent code experts to assess the market impacts of specific Initiative activities, based on a careful and systematic review of the evidence, and to determine the program-induced effects. The independent panel will include a mix of experts, not just from New York State but also from other parts of the country, who understand relationships between program activities and influence on compliance.
6. For Initiative activities they assess, the independent panel members review the compiled information and estimate the parameters required to calculate the indirect energy impacts of the Initiative for each activity (as specified in the component-specific sections of this document).
7. For all Initiative components, the evaluator estimates values for all parameters required to calculate the indirect energy impacts that are not estimated by the independent panel (as described in the component-specific sections of this document).
8. The evaluator uses the estimated parameter values for specific activities to calculate the estimated indirect energy impacts.
9. The evaluator makes any adjustments required to avoid double-counting impacts.

NYSERDA provided the following guidance for developing a savings estimation methodology:

> "The program staff would like to explore adopting a savings methodology approach that may already be out in the field in use, but if there is not one that fits the NYSERDA program, then modifications to the current approach may be advisable. The current approach is a very detailed

bottom-up approach with a lot of inputs and uncertainty. The staff would like to limit their inputs, have greater certainty in the selected inputs, and would prefer a more top-down methodology."

The Market Evaluation Team took this guidance into account when developing these proposed methodologies and has relied on approaches already used to the extent possible. The different activities in the Initiative, however, are very diverse, as are their mechanisms for affecting outcomes in the market. Therefore, the Team has tailored the methodology to fit the nature of each activity.

Training Impacts

This section presents the Market Evaluation Team's proposed approach to evaluate indirect savings resulting from the Initiative's code compliance and enforcement training activities.

The basic algorithm for calculating indirect savings due to training is shown in Equation 1, where each variable in the equation is specific to buildings that are affected directly and indirectly by the training.

Equation 1. Training Indirect Savings Calculation

$$Indirect\ Savings_{Training} = Compliance\ Rate\ Increase_{Training} \times Energy\ Savings\ Per\ Unit\ Compliance\ Rate\ Increase_{Training} \times New\ Buildings/SQFT\ Affected_{Training}$$

While this algorithm looks relatively straightforward, there are complexities. For example, the compliance rate must be expressed and measured in a way that reflects the effect of code compliance on energy savings. To produce reasonably accurate estimates of energy impacts, it may be necessary to disaggregate compliance by building components or by systems to account for building type and size. The affected buildings include those that trained code officials inspect for compliance and those that trained building professionals design or build. Table 30 summarizes the input variables used in Equation 1, their data sources, and the timing of when the Team will compile those inputs. Each variable is discussed in further detail below the table.

Table 30. Training Effects Input Variable Sources and Timing

Outcome Variable	Input Variables	Sources	Details	Timing
Compliance rate increase from training	Training effects on compliance rates	Independent panel estimate based on expertise and multiple sources; prior study	Independent panel reviews inputs from all sources; use experience and professional judgment to develop consensus	2024 (collecting sources to inform panel

Outcome Variable	Input Variables	Sources	Details	Timing
		findings; program tracking data; training surveys; jurisdiction in-depth interviews (IDIs); code compliance (as estimated by Delphi panel)	estimates for change in compliance rate for residential and commercial buildings, new construction, and alterations resulting from training	estimate over multiple years)
Energy savings per unit change in compliance rate	Energy use compared to compliance rate	Market Evaluation Team review of prior studies; building simulations (note that these results will also apply to the savings analysis of alternative enforcement effects)	Literature review of compliance rate versus energy use; building simulations (if needed); level of disaggregation determined and normalized by floor area	2024
Buildings affected by training	Building market characteristics	Dodge data; Construction Monitor data; construction market data; U.S. Census Bureau details	Census residential permits; other sources combined to cover commercial building market; building type and floor area compiled; profile of new construction and alterations developed	2024 (analysis for all years)
	Buildings/SQFT directly affected by trainees	Follow-up surveys	Number of buildings and floor area quantified by building type inspected or designed by trainees (accounting for possible overlap of code official and building professional counts)	Annual

Logic Model Components

The training targets code officials who are engaged in enforcing the code and building professionals who follow the code requirements by designing and constructing buildings. These trained participants are the output of the training activity, and the training output metric is the number of persons trained, possibly by profession.

The anticipated outcome is an increased level of compliance with the code. In the near term, the outcome is improved code process effectiveness, which captures both changes in the perceptions that building

professionals have about the importance of the code (and their efforts to comply with the code) and in the effectiveness of the enforcement process to ensure compliance. In the longer term, specific compliance level targets can be established. For this Initiative, NYSERDA set a statewide target of 5% compliance rate increase.

The indicators for the training activity include the number of people who take the training (an output) and the compliance level percentage (an outcome). As stated above, the compliance level must be measured in a way that can be used to estimate the effects of code compliance on energy consumption.

Estimate of Compliance Rate Increase

The Market Evaluation Team will convene an independent panel of national code experts to estimate the average change in compliance in buildings associated with training participants. The independent panel will base their estimates on experience and professional judgment, combined with data compiled by the Team.

The Team will ask the independent panel to estimate the change in compliance in buildings affected by training participants in terms of specific code requirements, system-level compliance, and whole-building compliance—the same categories that were estimated by the Delphi panel. For commercial buildings, the panel will indicate whether the estimated change in compliance rates varies by building type and, for both commercial and residential buildings, whether the change in compliance rates varies by jurisdiction type. The panel will provide separate estimates for new construction and for additions and alterations.

The Team will collect and compile data from the sources listed in Table 31 to inform the independent code expert panel that assesses the increase in code compliance resulting from the training. The Team will present this information to panel members in a well-organized, clearly written document.

Table 31. Compliance Rate Increase Estimate Inputs, Sources, and Timing

Input	Source	Details	Timing
Other program findings	Literature review by Market Eval. Team	Review prior studies for training effects	2021
Number of trainees	Program tracking data	Obtain all information on training attendees	Annual
Training effects on intentions	Immediate surveys	Surveys document what trainees learned and how they plan to use the information	Ongoing
Training effects on actions	Follow-up surveys	Surveys document specifics about what and how trainees have changed code compliance behavior based on training	Ongoing

Input	Source	Details	Timing
		and with whom and what they have shared from training	
Jurisdiction perceptions	Jurisdiction IDIs	Assess compliance rate by building type and system, the role of training and other activities in enhancing compliance, and areas for training to target	Annual
Compliance rate estimates and influences	Delphi panel	Current code compliance levels by building type, system, and key requirement (including with code change in May 2020)	2020, 2022, 2024

Literature Review and Initiative Data

The Market Evaluation Team will research and document the study findings of how training programs have affected code compliance. The Team will also obtain training attendance data from NYSERDA and will organize these data by date, region, profession, and subject matter in a transparent and easy-to-process format.

Delphi Panel Information

The primary source of information for the independent code expert panel will be findings that the Team compiles from the Delphi expert panel. The Delphi panel's estimates of compliance rates are key inputs. The compliance rate is the percentage of code requirements that are complied with. The Delphi panel estimated compliance for individual code requirements (such as lighting power density), for major systems (such as mechanical systems), and for whole buildings for both new construction and alterations and additions.

The first Delphi panel process occurred from late 2019 to early 2020 and provided baseline compliance estimates for the 2016 ECCCNYS, which became effective in October 2016. The evaluation plan will require updating those Delphi panel estimates in 2022 and 2024. Given the code change in 2020, it will be important to use the 2020 Delphi panel estimates to establish baseline compliance rates for the new code. Furthermore, the subsequent Delphi panel estimates will be important evidence to establish estimates of the effect of training on compliance.

In addition to quantitative compliance estimates, the Delphi panel provides qualitative information that will support the independent code expert panel's estimates and provide added context. For example, the

Delphi panel provides insights on challenges the market faces in complying with the energy code then describes how compliance challenges vary by building type and location. This descriptive information will be useful to the independent panel in judging the effect of the training on compliance.

Training Participant Information

The Market Evaluation Team will extract and summarize information from the immediate surveys and follow-up surveys of training participants. The immediate survey will be administered during each training class and the follow-up surveys will be administered about six months after the training. The Team will design the surveys to gather details about what the participants learned and how they might use this information in their work as code official or building professional.

The data from these surveys will inform the independent panel about the influence of the training on participant behavior and will help panelists understand how the training affected enforcement of and compliance with the code. The immediate survey data will provide information about participants' intentions. The follow-up survey data will provide information about actions taken by the participants, how the training affected their behavior, and how they shared information and influenced the behavior of other professionals who might also affect code compliance.

Jurisdictional In-Depth Interview Data

The Market Evaluation Team has interviewed representatives from three jurisdictions across NYS and documented the views and experiences of code officials and building professionals from diverse jurisdictions. The evaluation plan includes interviewing staff from these same jurisdictions year over year. These interviews provide information that can be compared to findings by the Delphi panel and may highlight unique perspectives or conditions that reflect jurisdictional differences, which are important to capture.

To assess the effects of training, the most useful information from the interviews is about challenges to code compliance, ways to enhance enforcement, the role of training, and any support other than training that would increase code compliance. The Team will summarize and share the relevant interview findings with the independent panel for their consideration.

Estimate of Buildings Affected and Unit Energy Savings

Indirect savings are an estimate of the savings resulting from changes in the compliance rate multiplied by an appropriate measure of the buildings/SQFT affected. Table 31 above identified the data sources required to estimate these values.

Building/SQFT Affected by Training

The Market Evaluation Team will compile estimates of the building floor area or number of units constructed and the amount of alterations and additions that occur each year. The Team will use the training participant follow-up surveys to estimate the quantity of buildings affected by the training. The Team will design an appropriate method to accurately allocate the buildings/SQFT affected to building type, given the available data.

Unit Energy Savings

The Team will use existing information on the effect of different compliance rates on energy consumption, starting with prior studies for NYS..

Indirect Savings Calculation

The Team will calculate the indirect energy savings from the training activities using Equation 1 (above) by multiplying the estimated compliance rate increase by the energy savings and buildings/SQFT affected. The Team will perform these calculations at the most disaggregated level possible as well as at an aggregated level.

Jurisdiction Code Enactment Support Impacts

NYSERDA's CSCNB Initiative includes two activities that will indirectly influence jurisdictions to adopt stretch codes and other advanced codes:

1. General code enactment support. NYSERDA provides services (such as technical support and modeling) to jurisdictions with constrained resources and expertise. This activity can generate two types of indirect impacts: the first results when those jurisdictions receiving support go on to adopt a stretch code and the second results when those jurisdictions influence other jurisdictions to also adopt a stretch code. Additionally, NYSERDA provides support to the New York Department of State to enact the ECCCNYS.
2. Stretch to Zero pilots. Through its code pilots, NYSERDA supports a limited number of jurisdictions to adopt a carbon-free or all electric codes. This activity can generate indirect benefits if those pilots also influence other jurisdictions (that NYSERDA did not directly assist) to adopt a stretch code.

Although these two Initiative activities are distinct, supporting the enactment of NYStrech (general code enactment) and Stretch to Zero (pilots), the Team recommends assessing their indirect benefits using the

same basic methodology. To accomplish this, the Team will analyze the indirect savings from codes adopted by jurisdictions in NYS, including those that adopted NYStretch and those adopting carbon-free or all electric codes.

This section presents the proposed steps to analyze indirect savings from code enactment support.

The basic method for assessing indirect energy savings is presented in Equation 2.

Equation 2. Code Enactment Support and Stretch Code Pilots Indirect Savings Calculation

$$Indirect\ Savings_{Stretch\ Code\ Adoption} = \sum(Potential\ Energy\ Savings\ Per\ Building\ /\ SQFT_{\ Jurisdiction\ code,i} \times Compliance\ Rate_{Jurisdiction\ code,i} \times New\ Building\ /\ SQFT\ Affected_{Jurisdiction\ code,i} \times Attribution_i)$$

This equation assumes that the indirect result of the Initiative to provide code enactment support and implementing pilots is that some jurisdictions are indirectly influenced to adopt a stretch, carbon-free, or all-electric code. These jurisdictions could have been supported by the Initiative or could have been indirectly influenced by other jurisdictions or by NYSERDA's support. The equation sums the savings across all jurisdictions that were influenced to adopt a new code because of support provided by NYSERDA and adjusts these savings by compliance rate and by an attribution factor that captures how much influence the Initiative had on the jurisdiction's ability to adopt the code. Table 32 summarizes the inputs and sources required to calculate savings in Equation 2.

Table 32. Code Enactment Support Input Variable Sources and Timing

Outcome Variable	Input Variables	Source	Details	Timing
Potential jurisdiction code savings per building	Savings from code compared to base code	Energy modeling analysis by NYSERDA	Savings per residential building and per square foot for different commercial building types	2024
Jurisdiction code compliance rate	Code compliance rate relative to base code compliance rate	Delphi panel informed by prior studies and Market Eval. Team inputs	Compile information from other studies, Market Eval. Team experience, and Delphi panel	2024
New buildings affected	Quantities of residential and commercial buildings in affected jurisdictions	Jurisdiction building permit data, Dodge data, Construction Monitor data, construction market data, and U.S. Census Bureau data	Request building construction data from affected jurisdictions (and supplement as needed with other sources)	2024

Outcome Variable	Input Variables	Source	Details	Timing
Attribution (jurisdiction codes adopted as a result of NYSERDA activities)	Percentage of code savings attributable to NYSERDA code enactment support and pilots	Independent panel estimate based on expertise and multiple sources: literature review. Delphi panel results, stretch code expert IDIs, adopting jurisdiction IDIs, and pilot participant interviews	Independent panel review inputs from all sources based on experience and professional judgment (with consensus estimates for percentage of stretch code savings attributable to NYSERDA code enactment support and pilots by adopting jurisdiction)	2024 (sources informing panel estimate collected over multiple years)

Logic Model Components

Key logic model components for NYSERDA's code enactment support and stretch code pilot activities are described below.

Code Enactment Support

The logic underlying code enactment support (such as with technical details and modeling services) is that providing this support to resource- or expertise-constrained jurisdictions will indirectly enable those jurisdictions to adopt a stretch code or to encourage other jurisdictions to adopt a stretch code.

The output of this code enactment support activity is that jurisdictions enact NYStretch codes that NYSERDA developed.

The core indicators for this program activity is the number of jurisdiction that adopted stretch or other energy codes (such as the ones piloted by NYSERDA).

Stretch to Zero Code Pilots

The logic underlying the Initiative activity of having Stretch to Zero pilots is that the jurisdictions that offer and adopt such carbon-free or all electric codes would influence other jurisdictions to adopt similar codes, particularly if the pilots demonstrate energy and environmental benefits and the code is cost-effective and easy to implement.

The output delivered by the Stretch to Zero pilot activity is that pilot jurisdictions adopt carbon-free or all electric codes.

The anticipated outcome is that the Initiative's pilots will influence non-pilot jurisdictions to adopt the same stretch code.

The core indicators for this program activity are the number of pilot jurisdictions recruited to adopt a carbon-free or all electric code and the number of non-pilot jurisdictions that adopt a carbon-free or all electric code.

Estimating Program-Induced Effects

The Market Evaluation Team will convene an independent panel of national code experts to estimate how much the support provided by NYSERDA impacted jurisdictions' ability to adopt a carbon-free or all electric codes and how much the pilots and information provided by NYSERDA influenced jurisdictions in their decision to adopt a carbon-free or all electric codes. The estimates from these experts will provide the attribution factor in Equation 2, and will be based on experience and professional judgment, combined with data compiled by the Team.

The Market Evaluation Team proposes to estimate program-induced effects and indirect savings for each adopting jurisdiction (unless a very large number of those jurisdictions are supported by the Initiative and ultimately adopt a stretch code, in which case the Team will categorize jurisdictions (by size, urban versus rural, and other categories) and will develop estimates for each category.

The Team will collect and compile data from the sources listed in Table 33 to inform the independent panel. The Team will summarize this information in a structured format and present it to the independent panel so they can estimate the attribution of stretch code adoption to the pilots.

Table 33. Code Enactment Support and Stretch Code Pilots Attribution

Input Variables	Source	Details	Timing
Influence of Initiative on stretch code adoption	Literature review; Delphi panel results; interviews of stretch code experts	Provide findings about influences on stretch code adoption	2025
Perceptions about stretch codes in NYS	Jurisdictions IDIs	Compile information for input to independent panel attribution assessment	Annual
Influence of NYSERDA jurisdiction support on stretch code adoption	IDIs with jurisdictions supported by NYSERDA	Identify and interview jurisdictions; independent panel estimates attribution based on interview data	Annual

Literature Review and Initiative Data

The literature review of secondary sources will include case studies of advanced technologies that were incorporated in national model energy codes and stretch codes. The Team also will review NYStretch Energy Code–2020 and future iterations of NYStretch. The Team will supplement and combine details from the literature review with responses from targeted interviews of four experts who are knowledgeable about stretch codes.

Jurisdictional In-Depth Interview Data

In the in-depth interviews, the Team will ask respondents about the status of and projections for stretch code adoption, and about the adoption rates projected by the Delphi panel, to gather any insights based on their experience.

The Team will compile and summarize the data collected from the interviews each year to identify any trends and effects of the Initiative and will organize this information for a presentation to the independent panel.

Adopting Jurisdiction Interviews

The Market Evaluation Team will design an interview instrument and will interview a sample of jurisdictions (or a census if the number of adopting jurisdictions is small) that adopt a stretch code. The Team will obtain information on what influenced them to adopt.

The Team also will interview representatives from non-pilot/ non-supported jurisdictions that adopted stretch codes during or after the pilot to determine code characteristics, awareness of the NYSERDA activities, and influence of NYSERDA activities on the design and adoption of the codes. These non-supported jurisdiction interviews will provide data needed to differentiate between the effect of the two Initiative activities (code enactment support and stretch code pilots).

The Team will summarize the findings from these interviews and from any other data provided by the jurisdictions in a format to present to the independent panel.

Estimate of Buildings/SQFT Affected, Unit Energy Savings, and Compliance Rate

Estimating the indirect savings from adopting a stretch code requires estimating the compliance rate for the stretch code, savings from the stretch code, and an appropriate measure of the buildings/ SQFT affected. The Team will estimate compliance with the stretch code based on estimates from the Delphi

panel, prior studies, and the Team's experience and will estimate savings and the number of affected buildings using jurisdiction building construction data.

Indirect Savings Calculation

The Market Evaluation Team will calculate the indirect energy savings from the adoption of stretch codes using Equation 2. The Team will conduct this analysis either by individual jurisdiction or by jurisdiction category and will sum the results.

State Code Development Impacts

This section presents the proposed steps to analyze savings resulting from indirect influences of the Initiative on NYS energy code development and adoption. The basic algorithm for calculating indirect savings from the influence of the Initiative on code development and adoption is shown in Equation 3. It is likely that the NYS state code will not be adopted in time to fit within this evaluation timeline.

Equation 3. Code Development and Adoption Indirect Savings Calculation

$$Indirect\ Savings_{Code\ D\ and\ A} = Savings_{Adoption,NYS} + Savings_{Development,NYS}$$

Where:

$Indirect\ Savings_{Code\ D\ and\ A}$ = Indirect savings from influence on code development (D) and adoption (A)

$Savings_{Adoption,NYS}$ = Indirect savings from influence on the timing of adoption of the ECCCNYS

$Savings_{Development,NYS}$ = Indirect savings from influence on the stringency of the ECCCNYS

This equation breaks the indirect savings into those from effects on the ECCCNYS. For the NYS code, the equation accounts for the time that the Initiative advances code adoption as well as the added stringency of the code Table 34 summarizes the inputs required to estimate the indirect energy savings from the Initiative's influence on code adoption timing and stringency.

Table 34. Code Development Impact Input Variable Sources and Timing

Outcome Variable	Input Variables	Source	Details	Timing
Savings from accelerating	Months ECCCNYS adoption accelerated as result of NYSERDA CSCNB Initiative activities	Independent panel, based on expertise and information from literature review, Delphi panel,	Independent panel will provide consensus estimate of influence of code adoption acceleration	2024-2025

Outcome Variable	Input Variables	Source	Details	Timing
NYS code adoption		interviews with code adoption professionals		
	Quantities of residential and commercial buildings constructed during time adoption was accelerated	Jurisdiction building permit data, Dodge data, Construction Monitor, Construction Market Data, US census	Request statewide building construction data; supplement as needed with other sources	2024-2025
	Savings from NYS code	Analyses conducted to support adoption	Compile ECCCNYS savings estimates	2024-2025
Savings from increased NYS code stringency	Code requirements resulting from the influence of the Initiative	Independent panel, based on expertise and information from literature review, Delphi panel, interviews with code adoption professionals	Independent panel will provide consensus estimate of requirements influenced and extent of influence	2024-2025
	Energy savings from increased ECCCNYS stringency	Analyses conducted to support adoption; building energy simulations as needed	Compile ECCCNYS savings estimates	2024-2025
	Quantities of residential and commercial buildings constructed during time adoption was accelerated	Jurisdiction building permit data, Dodge data, Construction Monitor, Construction Market Data, US census	Request statewide building construction data; supplement as needed with other sources	2024-2025

Logic Model Components

The program theory underlying this Initiative component is that Initiative impacts, such as the influence on stretch code adoption, could have a second order effect on when codes are adopted in NYS, on their stringency.

In NYS, adoption of stretch codes could make it more likely that some of the required measures could be incorporated in the next state code. The Initiative might also help accelerate when NYS adopts its next code.

The anticipated outcomes are the changes to the state and model codes described above. The core indicators include the requirements adopted in new state and model codes and the timing of NYS code updates.

Estimate of NYSERDA Influence: Acceleration and Stringency

The independent panel will be asked to identify how the Initiative affected state development, including what requirements resulted from the influence of the Initiative and how the timing of state adoption was affected.

The Market Evaluation Team will rely on information from the sources used to assess the other indirect savings. To credibly assess how the Initiative influenced code development and timing, the Team also recommends conducting interviews with NYS and code developers. If available, the Team will review and summarize NYSERDA's own tracking of code advocacy efforts for the panel.

Estimate of Savings from ECCCNYS Acceleration and Increased Stringency and from National Model Code Stringency

To estimate code energy savings, the Team will compile data from other sources, such as studies conducted to support adoption of the ECCCNYS.

The Team will use the information provided by the independent panel to estimate the additional energy savings resulting from the Initiative's influence. This will require using the estimates of the number of new buildings constructed to calculate savings from the other effects as well as the energy impacts of the specific code requirements.

Indirect Savings Calculation

The Team will combine all data and calculate additional indirect savings that could be attributed to the state and model code requirements and timing effects of the Initiative. Given that these effects are secondary, the Team anticipates this analysis to be more of a qualitative assessment than a detailed quantitative analysis.

Eliminate Double-Counted Savings

There is the possibility that some Initiative activities will contribute to the same outcomes and impacts as other activities. The Team will start with the existing Initiative logic model and refine it as needed to identify paths through which different activities could produce similar outcomes. As described earlier, the Team anticipates overlap in the effects of the support provided to resource-constrained jurisdictions and the stretch code pilots, so the review of potential double-counting will include an assessment of the interactions and potential overlap of these Initiative activities.

The Market Evaluation Team will use the revised logic model to guide development of the interview instruments and focus the data collection to distinguish among the effects of different Initiative activities.

The Market Evaluation Team will carry this process into the independent panel assessments by stressing that the panel should consider indirect impacts that are linked primarily to a single Initiative activity. The Team will also ask the panel to identify any impacts that could be attributable to multiple Initiative activities and provide estimates of the extent of any overlapping influences.

The Team will be responsible for using this information to make any necessary adjustments to the impact assessments to minimize double counting.

Appendix H. CEF Methodology

Memorandum

To:	Patricia Gonzales, PhD; NYSERDA
From:	Allen Lee, PhD, Karen Horkitz, and Jeremy Eckstein; Cadmus
Subject:	Proposed Methodology for Analyzing Indirect Energy Impacts of the Code to Zero Initiative
Date:	June 19, 2020 (Revised April 6, 2021)

Introduction

This memo proposes a methodology for analyzing the indirect energy impacts of the Code to Zero Initiative. The objective of this memo is to solicit feedback from NYSERDA and provide the basis for finalizing the methodology.

As noted in NYSERDA's *Code-to-Zero Evaluation Plan*, assessing the indirect impacts of the Initiative is linked to hypotheses testing. NYSERDA developed a set of testable hypotheses in the *Theory of Change for the Initiative* and Cadmus will work with NYSERDA to ensure that indicators and data collection processes are aligned to support the analysis. Although the actual analysis of indirect impacts will not occur for several years, it is important to design the methodology now to ensure that appropriate data are collected during the years prior to the analysis. Some of the activities included in this proposed plan are not reflected in the current evaluation plan: such activities are identified in the sections below. Cadmus, henceforth referred to as the "Market Evaluation Team," will make adjustments to the evaluation plan where necessary, based on the final methodology agreed upon.

Indirect impacts are market effects that are expected to accrue over the longer term from follow-on market activity that results from the activities NYSERDA undertakes in this Initiative. The Initiative activities are intended to influence the behavior of various stakeholder groups through ongoing training, demonstrations, and technical support. NYSERDA designed this Initiative to produce indirect impacts, as most of the energy impacts will result from market activities and changes that occur in the market over time in response to NYSERDA's market interventions.

Indirect Impacts Framework

This section discusses the basic framework required to estimate indirect savings from the Initiative.

Logic Model

NYSERDA developed a logic model to characterize the structure of the Code to Zero Initiative and to provide the basis for evaluating its impacts.[13] This logic model presents market barriers, Initiative activities (and resources), target audiences, outputs, near-term outcomes, and mid- and long-term outcomes. The Market Evaluation Team extracted key portions of the logic model to guide the development and explanation of its proposed analysis methodology.

Table 35 lists the five major activities in the Initiative, along with their outputs and anticipated outcomes. The table also presents indicators that can be used to monitor the performance and progress of the Initiative. As described in the *Code-to-Zero Evaluation Plan*:

> "[P]rogram activity/output indicators represent measurable, quantifiable direct results of activities undertaken in the Initiative. Outputs are a key way of regularly tracking progress, especially in the early stages of an Initiative, before broader market changes are measurable. Outcome indicators can encompass near-term through longer-term changes in market conditions expected to result from the activities/outputs of an intervention."

Indicators are clear, verifiable metrics of how well the Initiative is achieving its goals, with outcomes ranging from accomplishing planned activities to driving fundamental market changes. For each activity, the table presents multiple indicators that can be used to track the progress of various components of the logic model. The outcome indicators will be assessed relative to a baseline value, which will be established through the initial steps of the evaluation, with progress measured periodically throughout the evaluation.

[13] The logic model appears in Appendix A of the *Clean Energy Fund Investment Plan: Codes Chapter,* dated April 19, 2019. https://www.nyserda.ny.gov/-/media/Files/About/Clean-Energy-Fund/CEF-Codes-Chapter.pdf

Table 35. Key Elements of Code to Zero Initiative Logic Model

Initiative Activity	Outputs	Near-Term Outcomes (1-3 Years)	Longer-Term Outcomes (More than 3 Years)	Indicators
Support for code compliance and enforcement	Audience-specific training delivered (13,250 trained in total); general support services to jurisdictions that pay into the System Benefits Charge	Improved code process effectiveness	Code compliance increases throughout New York State (NYS)	Number trained; compliance increases by 10%
Code enactment support of ECCCNYS and stretch code (NY Stretch 2020)	Five entities receive support services from NYSERDA • New York Department of State receives support to enact ECCCNYS • Jurisdictions receive technical support to enact stretch codes	Supported entities implement the Energy Conservation Construction Code of New York State (ECCCNYS) or enact stretch codes	Jurisdictions enact the stretch code and enact ECCNYS	Number of supported entities enacting ECCCNYS; number of jurisdictions enacting the stretch code
Pilots: Stretch to Zero	Three pilots with positive findings; findings disseminated	Pilots are scaled to additional communities, further demonstrating positive findings	Jurisdictions adopt the stretch code; stretch code concept is integrated into ECCCNYS by NYS Department of State	Number of pilots supported (3); 10 non-pilot jurisdictions adopt stretch code
Pilots: alternative code enforcement structure	Three pilots with positive findings; findings disseminated	Pilots are scaled to additional communities, further demonstrating positive findings	Jurisdictions with alternative enforcement structures demonstrate improved enforcement of the energy code	Number of pilots supported (3); 8 non-pilot jurisdictions adopt alternative enforcement structures

Initiative Activity	Outputs	Near-Term Outcomes (1-3 Years)	Longer-Term Outcomes (More than 3 Years)	Indicators
Code development and advancement	Integration of stretch code concepts into ECCCNYS and national model code	Technologies and strategies considered in ECCCNYS and model code	Concepts integrated into ECCCNYS; model code adopted that addresses all aspects of a building's energy use and energy production	Number of supported code changes adopted including stretch code requirements

Overview of Savings Potential

Each Initiative activity could produce indirect energy savings, but the timing and mechanisms will vary. It is important to understand the outputs and outcomes from each activity and how they could produce energy savings.

The codes compliance and enforcement training activity is likely to produce the largest energy savings in the near term. This is because the training can be started and can reach large numbers of code officials and building professionals relatively quickly. Prior studies have demonstrated that immediately after such training, participants say that they plan to make changes in their code enforcement and compliance, and follow-up surveys have confirmed that the training led to behavior changes that improved enforcement and compliance.[14]

However, any energy savings resulting from greater compliance will be constrained by the current rate of noncompliance and the amount that compliance can be improved. To illustrate, if the latest energy code is intended to reduce the amount of building energy consumption by 10% compared to the prior code and compliance is at a level where buildings are achieving 90% of the expected savings, the maximum increase in savings from training would be 1% (10% of 10%) of the consumption under the prior code. This increase in savings would apply to the buildings associated with training attendees who were influenced by the training and possibly to buildings associated with other code officials or building professionals who were influenced by the trainees.

Although Initiative activities other than training will likely take longer to produce energy savings, some have the potential to generate larger savings. For example, the stretch code pilots are intended to encourage nonparticipant jurisdictions to adopt stretch codes, and ultimately to lead to the adoption of some of the stretch code components into the state energy code. If the stretch code produced 10% savings relative to the base code, then all buildings in jurisdictions that adopt the stretch code would generate savings a full 10% above the base code (if they fully comply). Any stretch code components adopted in the next base state code will generate savings in all new buildings across the state. The combined savings from these effects could be much larger than the savings from increasing the compliance rate alone, but the magnitude of savings will depend on how many and which jurisdictions adopt the stretch code and which of those components are adopted in the base code.

[14] NMR Group and Cadmus. March 10, 2020. *Massachusetts Codes and Standards Compliance and Support Initiative Residential and Commercial Immediate and Follow-up Surveys – All 2019 Reports.* MA19X04-B-CCSISVY.

Steps in Determining Program-Induced Indirect Savings

The overall process of determining program-induced indirect savings for each Initiative activity entails several steps:

10. The evaluator refines and explains the logic model for how each activity leads to indirect impacts and savings and identifies the key parameters that will be used to estimate the impact of each Initiative activity.
11. The evaluator uses the logic model to identify the outputs, outcomes, and indicators associated with each activity.
12. The evaluator works with the Initiative team to identify sources of information for each indicator that will be tracked during the course of the Initiative. Likely sources include Initiative data, results from pilot projects, Delphi panel results, representative jurisdiction interviews, training participant surveys, and secondary sources.
13. The evaluator compiles the information from all relevant sources and the annual indicator data.
14. The evaluator creates a panel of independent code experts to assess the market impacts of specific Initiative activities, based on a careful and systematic review of the evidence, and to determine the program-induced effects. The independent panel will include a mix of experts, not just from New York State but also from other parts of the country, who understand relationships between program activities and influence on compliance.
15. For Initiative activities they assess, the independent panel members review the compiled information and estimate the parameters required to calculate the indirect energy impacts of the Initiative for each activity (as specified in the component-specific sections of this document).
16. For all Initiative components, the evaluator estimates values for all parameters required to calculate the indirect energy impacts that are not estimated by the independent panel (as described in the component-specific sections of this document).
17. The evaluator uses the estimated parameter values for specific activities to calculate the estimated indirect energy impacts.
18. The evaluator makes any adjustments required to avoid double-counting impacts.

NYSERDA provided the following guidance for developing a savings estimation methodology:

> "The program staff would like to explore adopting a savings methodology approach that may already be out in the field in use, but if there is not one that fits the NYSERDA program, then modifications to the current approach may be advisable. The current approach is a very detailed

bottom-up approach with a lot of inputs and uncertainty. The staff would like to limit their inputs, have greater certainty in the selected inputs, and would prefer a more top-down methodology."

The Market Evaluation Team took this guidance into account when developing these proposed methodologies and has relied on approaches already used to the extent possible. The different activities in the Initiative, however, are very diverse, as are their mechanisms for affecting outcomes in the market. Therefore, the Team has tailored the methodology to fit the nature of each activity.

Training Impacts

This section presents the Team's proposed approach to evaluate indirect savings resulting from the Initiative's code compliance and enforcement training activities.

The basic algorithm for calculating indirect savings due to training is shown in Equation 1, where each variable in the equation is specific to buildings that are affected directly and indirectly by the training.

Equation 4. Training Indirect Savings Calculation

$$Indirect\ Savings_{Training} = Compliance\ Rate\ Increase_{Training} \times Energy\ Savings\ Per\ Unit\ Compliance\ Rate\ Increase_{Training} \times New\ Buildings/SQFT\ Affected_{Training}$$

While this algorithm looks relatively straightforward, there are complexities. For example, the compliance rate must be expressed and measured in a way that reflects the effect of code compliance on energy savings. To produce reasonably accurate estimates of energy impacts, it may be necessary to disaggregate compliance by building components or by systems to account for building type and size. The affected buildings include those that trained code officials inspect for compliance and those that trained building professionals design or build. Table 36 summarizes the input variables used in Equation 1, their data sources, and the timing of when the Team will compile those inputs. Each variable is discussed in further detail below the table.

Table 36. Training Effects Input Variable Sources and Timing

Outcome Variable	Input Variables	Sources	Details	Timing
Compliance rate increase from training	Training effects on compliance rates	Independent panel estimate based on expertise and multiple sources; prior study	Independent panel reviews inputs from all sources; use experience and professional judgment to develop consensus estimates for change in	2024 (collecting sources to inform panel

Outcome Variable	Input Variables	Sources	Details	Timing
		findings; program tracking data; training surveys; jurisdiction in-depth interviews (IDIs); code compliance (as estimated by Delphi panel)	compliance rate for residential and commercial buildings, new construction, and alterations resulting from training	estimate over multiple years)
Energy savings per unit change in compliance rate	Energy use compared to compliance rate	Market Eval. Team review of prior studies; building simulations (note that these results will also apply to the savings analysis of alternative enforcement effects)	Literature review of compliance rate versus energy use; building simulations (if needed); level of disaggregation determined and normalized by floor area	2024
Buildings affected by training	Building market characteristics	Dodge data; Construction Monitor data; construction market data; U.S. Census Bureau details	Census residential permits; other sources combined to cover commercial building market; building type and floor area compiled; profile of new construction and alterations developed	2024 (analysis for all years)
	Buildings/SQFT directly affected by trainees	Follow-up surveys	Number of buildings and floor area quantified by building type inspected or designed by trainees (accounting for possible overlap of code official and building professional counts)	Annual

Logic Model Components

The training targets code officials who are engaged in enforcing the code and building professionals who follow the code requirements by designing and constructing buildings. These trained participants are the output of the training activity, and the training output metric is the number of persons trained, possibly by profession.

The anticipated outcome is an increased level of compliance with the code. In the near term, the outcome is improved code process effectiveness, which captures both changes in the perceptions that building professionals have about the importance of the code (and their efforts to comply with the code) and in the

effectiveness of the enforcement process to ensure compliance. In the longer term, specific compliance level targets can be established. For this Initiative, NYSERDA set a statewide target of 10% compliance rate increase.

The indicators for the training activity include the number of people who take the training (an output) and the compliance level percentage (an outcome). As stated above, the compliance level must be measured in a way that can be used to estimate the effects of code compliance on energy consumption.

Estimate of Compliance Rate Increase

The Market Evaluation Team will convene an independent panel of national code experts to estimate the average change in compliance in buildings associated with training participants. The independent panel will base their estimates on experience and professional judgment, combined with data compiled by the Team.

The Team will ask the independent panel to estimate the change in compliance in buildings affected by training participants in terms of specific code requirements, system-level compliance, and whole-building compliance—the same categories that were estimated by the Delphi panel. For commercial buildings, the panel will indicate whether the estimated change in compliance rates varies by building type and, for both commercial and residential buildings, whether the change in compliance rates varies by jurisdiction type. The panel will provide separate estimates for new construction and for additions and alterations.

The Team will collect and compile data from the sources listed in Table 37 to inform the independent code expert panel that assesses the increase in code compliance resulting from the training. The Team will present this information to panel members in a well-organized, clearly written document.

Table 37. Compliance Rate Increase Estimate Inputs, Sources, and Timing

Input	Source	Details	Timing
Other program findings	Literature review by Market Eval. Team	Review prior studies for training effects	2021
Number of trainees	Program tracking data	Obtain all information on training attendees	Annual
Training effects on intentions	Immediate surveys	Surveys document what trainees learned and how they plan to use the information	Ongoing
Training effects on actions	Follow-up surveys	Surveys document specifics about what and how trainees have changed code compliance behavior based on training	Ongoing

Input	Source	Details	Timing
		and with whom and what they have shared from training	
Jurisdiction perceptions	Jurisdiction IDIs	Assess compliance rate by building type and system, the role of training and other activities in enhancing compliance, and areas for training to target	Annual
Compliance rate estimates and influences	Delphi panel	Current code compliance levels by building type, system, and key requirement (including with code change in May 2020)	2021, 2023

Literature Review and Initiative Data

The Market Evaluation Team will research and document the study findings of how training programs have affected code compliance. The Team will also obtain training attendance data from NYSERDA and will organize these data by date, region, profession, and subject matter in a transparent and easy-to-process format.

Delphi Panel Information

The primary source of information for the independent code expert panel will be findings that the Team compiles from the Delphi expert panel. The Delphi panel's estimates of compliance rates are key inputs. The compliance rate is the percentage of code requirements that are complied with. The Delphi panel estimated compliance for individual code requirements (such as lighting power density), for major systems (such as mechanical systems), and for whole buildings for both new construction and alterations and additions.

The first Delphi panel process occurred from late 2019 to early 2020 and provided baseline compliance estimates for the 2016 ECCCNYS, which became effective in October 2016. The evaluation plan will require updating those Delphi panel estimates in 2021 and 2023. Given the code change in 2020, it will be important to use the 2021 Delphi panel estimates to establish baseline compliance rates for the new code. Furthermore, the subsequent Delphi panel estimates will be important evidence to establish estimates of the effect of training on compliance.

In addition to quantitative compliance estimates, the Delphi panel provides qualitative information that will support the independent code expert panel's estimates and provide added context. For example, the

Delphi panel provides insights on challenges the market faces in complying with the energy code then describes how compliance challenges vary by building type and location. This descriptive information will be useful to the independent panel in judging the effect of the training on compliance.

Training Participant Information

The Team will extract and summarize information from the immediate surveys and follow-up surveys of training participants. The immediate survey will be administered during each training class and the follow-up surveys will be administered about six months after the training. The Team will design the surveys to gather details about what the participants learned and how they might use this information in their work as code official or building professional.

The data from these surveys will inform the independent panel about the influence of the training on participant behavior and will help panelists understand how the training affected enforcement of and compliance with the code. The immediate survey data will provide information about participants' intentions. The follow-up survey data will provide information about actions taken by the participants, how the training affected their behavior, and how they shared information and influenced the behavior of other professionals who might also affect code compliance.

Jurisdictional In-Depth Interview Data

The Market Evaluation Team has interviewed representatives from three jurisdictions across NYS and documented the views and experiences of code officials and building professionals from diverse jurisdictions. The evaluation plan includes interviewing staff from these same jurisdictions year over year. These interviews provide information that can be compared to findings by the Delphi panel and may highlight unique perspectives or conditions that reflect jurisdictional differences, which are important to capture.

To assess the effects of training, the most useful information from the interviews is about challenges to code compliance, ways to enhance enforcement, the role of training, and any support other than training that would increase code compliance. The Team will summarize and share the relevant interview findings with the independent panel for their consideration.

Estimate of Buildings Affected and Unit Energy Savings

Indirect savings are an estimate of the savings resulting from changes in the compliance rate multiplied by an appropriate measure of the buildings/SQFT affected. Table 37 above identified the data sources required to estimate these values.

Building/SQFT Affected by Training

The Team will compile estimates of the building floor area or number of units constructed and the amount of alterations and additions that occur each year. The Team will use the training participant follow-up surveys to estimate the quantity of buildings affected by the training. The Team will design an appropriate method to accurately allocate the buildings/SQFT affected to building type, given the available data.

Unit Energy Savings

The Team will use existing information on the effect of different compliance rates on energy consumption, starting with prior studies for NYS. If necessary, the Team will supplement the available information by modeling building energy consumption with various assumptions about code compliance.

Indirect Savings Calculation

The Team will calculate the indirect energy savings from the training activities using Equation 1 (above) by multiplying the estimated compliance rate increase by the energy savings and buildings/SQFT affected. The Team will perform these calculations at the most disaggregated level possible as well as at an aggregated level.

Code Enactment Support Impacts

NYSERDA's Code to Zero Initiative includes two activities that will indirectly influence jurisdictions to adopt stretch codes:

3. General code enactment support. NYSERDA provides services (such as technical support and modeling) to jurisdictions with constrained resources and expertise. This activity can generate two type of indirect impacts: the first results when those jurisdictions receiving support go on to adopt a stretch code and the second results when those jurisdictions influence other jurisdictions to also adopt a stretch code. Additionally, NYSERDA provides support to the New York Department of State to enact the ECCCNYS.
4. Stretch code pilots. Through its stretch code pilots, NYSERDA supports a limited number of jurisdictions to adopt a stretch code. This activity can generate indirect benefits if those pilots also influence other jurisdictions (that NYSERDA did not directly assist) to adopt a stretch code.

Although these two initiative activities are distinct, supporting the enactment of NYStrech-2020 (general code enactment) and Stretch to Zero (pilots), the Team recommends assessing their indirect benefits using the same basic methodology. To accomplish this, the Team will analyze the indirect savings from stretch

codes adopted outside the code enactment support and pilots and will assess how much influence the code support had on adoption and the influence of the stretch code pilots.

This section presents the proposed steps to analyze indirect savings from code enactment support, including stretch code pilots.

The basic method for assessing indirect energy savings is presented in Equation 2.

Equation 5. Code Enactment Support and Stretch Code Pilots Indirect Savings Calculation

$$Indirect\ Savings_{Stretch\ Code\ Adoption} = \sum(Potential\ Energy\ Savings\ Per\ Building\ / SQFT_{Stretch\ code,i} \times Compliance\ Rate_{Stretch\ code,i} \times New\ Building\ /SQFT\ Affected_{Stretch\ code,i} \times Attribution_i)$$

This equation assumes that the indirect result of the Initiative to provide code enactment support and implementing stretch code pilots is that some jurisdictions are indirectly influenced to adopt a stretch code. These jurisdictions could have been supported by the Initiative or could have been indirectly influenced by other jurisdictions or by NYSERDA's support. The equation sums the savings across all jurisdictions that were indirectly influenced to adopt a stretch code because of support provided by NYSERDA and adjusts these savings by compliance rate and by an attribution factor that captures how much influence the Initiative had on the jurisdiction's ability to adopt the code. Table 38 summarizes the inputs and sources required to calculate savings in Equation 2.

Table 38. Code Enactment Support Input Variable Sources and Timing

Outcome Variable	Input Variables	Source	Details	Timing
Potential stretch code savings per building	Savings from stretch code compared to base code	Energy modeling analysis by NYSERDA	Savings per residential building and per square foot for different commercial building types	2024
Stretch code compliance rate	Code compliance rate relative to base code compliance rate	Delphi panel informed by prior studies and Market Eval. Team inputs	Compile information from other studies, Market Eval. Team experience, and Delphi panel	2024
New buildings affected	Quantities of residential and commercial buildings in affected jurisdictions	Jurisdiction building permit data, Dodge data, Construction Monitor data, construction market data, and U.S. Census Bureau data	Request building construction data from affected jurisdictions (and supplement as needed with other sources)	2024

Outcome Variable	Input Variables	Source	Details	Timing
Attribution (stretch codes adopted as a result of NYSERDA activities)	Percentage of stretch code savings attributable to NYSERDA code enactment support and pilots	Independent panel estimate based on expertise and multiple sources: literature review. Delphi panel results, stretch code expert IDIs, adopting jurisdiction IDIs, and pilot participant interviews	Independent panel review inputs from all sources based on experience and professional judgment (with consensus estimates for percentage of stretch code savings attributable to NYSERDA code enactment support and pilots by adopting jurisdiction)	2024 (sources informing panel estimate collected over multiple years)

Logic Model Components

Key logic model components for NYSERDA's code enactment support and stretch code pilot activities are described below.

Code Enactment Support

The logic underlying code enactment support (such as with technical details and modeling services) is that providing this support to resource- or expertise-constrained jurisdictions will indirectly enable those jurisdictions to adopt a stretch code or to encourage other jurisdictions to adopt a stretch code.

The output of this code enactment support activity is jurisdictions that enact the NYStretch-2020 stretch code.

The anticipated outcome is that the Initiative's support services will enable jurisdictions, including those that did receive and those that did not receive NYSERDA support, to enact the same stretch code.

The core indicators for this program activity include the number of jurisdictions supported by the Initiative, the number of these jurisdictions that later adopt a stretch code, and the number of other jurisdictions that enact a stretch code and were influenced by this activity.

Stretch Code Pilots

The logic underlying the Initiative activity of having stretch code pilots is that the jurisdictions that offer and adopt such stretch code pilots would influence other jurisdictions to adopt similar codes, particularly if the pilots demonstrate energy and environmental benefits and the code is cost-effective and easy to implement.

The output delivered by the stretch code pilots activity is pilot jurisdictions that adopt the Stretch to Zero stretch code. The Initiative targets the recruitment of three pilot jurisdictions to adopt a stretch code and produce positive results that are broadly disseminated to other jurisdictions.

The anticipated outcome is that the Initiative's pilots will influence about 10 non-pilot jurisdictions to adopt the same stretch code.

The core indicators for this program activity are the number of pilot jurisdictions recruited to adopt a stretch code and the number of non-pilot jurisdictions that adopt a stretch code. Another indicator is the number of jurisdictions aware of the findings from the pilots and the degree to which the pilot results influenced each jurisdiction to adopt a stretch code.

Estimating Program-Induced Effects

The Market Evaluation Team will convene an independent panel of national code experts to estimate how much the support provided by NYSERDA impacted jurisdictions' ability to adopt a stretch code and how much the pilots and information provided by NYSERDA influenced jurisdictions in their decision to adopt a stretch code. The estimates from these experts will provide the attribution factor in Equation 2, and will be based on experience and professional judgment, combined with data compiled by the Team.

The Team proposes to estimate program-induced effects and indirect savings for each adopting jurisdiction (unless a very large number of those jurisdictions are supported by the Initiative and ultimately adopt a stretch code, in which case the Team will categorize jurisdictions (by size, urban versus rural, and other categories) and will develop estimates for each category.

The Team will collect and compile data from the sources listed in Table 39 to inform the independent panel. The Team will summarize this information in a structured format and present it to the independent panel so they can estimate the attribution of stretch code adoption to the pilots.

Table 39. Code Enactment Support and Stretch Code Pilots Attribution

Input Variables	Source	Details	Timing
Influence of Initiative on stretch code adoption	Literature review; Delphi panel results; interviews of stretch code experts	Provide findings about influences on stretch code adoption	2021, 2023
Perceptions about stretch codes in NYS	Jurisdictions IDIs	Compile information for input to independent panel attribution assessment	Annual

Input Variables	Source	Details	Timing
Influence of NYSERDA jurisdiction support on stretch code adoption	IDIs with jurisdictions supported by NYSERDA	Identify and interview jurisdictions; independent panel estimates attribution based on interview data	2022, 2024
Influence of jurisdictions that adopt stretch code on other jurisdictions	IDIs with jurisdictions adopting stretch code influenced by other stretch code jurisdictions	Identify and interview jurisdictions; independent panel estimates attribution based on interview data	2022, 2024

Literature Review and Initiative Data

The literature review of secondary sources will include case studies of advanced technologies that were incorporated in national model energy codes and stretch codes. The Team also will review NYStretch Energy Code–2020 and future iterations of NYStretch. The Team will supplement and combine details from the literature review with responses from targeted interviews of four experts who are knowledgeable about stretch codes.

Delphi Panel Information

One task performed by the first Delphi panel was developing a forecast of the percentage of jurisdictions that will adopt a stretch code each year through 2030 absent any involvement by NYSERDA to encourage adoption. The Delphi panel also provided observations about factors affecting stretch code adoption and barriers to adoption and presented their comparison of adopting the One-Cycle stretch code versus the Stretch to Zero code.

The Team will update the first Delphi panel findings with those from subsequent cycles, then the Team will combine and summarize this information for a presentation to the independent panel.

Jurisdictional In-Depth Interview Data

In the in-depth interviews, the Team will ask respondents about the status of and projections for stretch code adoption, and about the adoption rates projected by the Delphi panel, to gather any insights based on their experience.

The Team will compile and summarize the data collected from the interviews each year to identify any trends and effects of the Initiative and will organize this information for a presentation to the independent panel.

Adopting Jurisdiction Interviews

The Team will design an interview instrument and will interview a sample of jurisdictions (or a census if the number of adopting jurisdictions is small) that adopt a stretch code. The Team will obtain information on what influenced them to adopt.

The Team also will interview representatives from non-pilot/ non-supported jurisdictions that adopted stretch codes during or after the pilot to determine code characteristics, awareness of the NYSERDA activities, and influence of NYSERDA activities on the design and adoption of the codes. These non-supported jurisdiction interviews will provide data needed to differentiate between the effect of the two Initiative activities (code enactment support and stretch code pilots).

The Team will summarize the findings from these interviews and from any other data provided by the jurisdictions in a format to present to the independent panel.

Estimate of Buildings/SQFT Affected, Unit Energy Savings, and Compliance Rate

Estimating the indirect savings from adopting a stretch code requires estimating the compliance rate for the stretch code, savings from the stretch code, and an appropriate measure of the buildings/ SQFT affected. The Team will estimate compliance with the stretch code based on estimates from the Delphi panel, prior studies, and the Team's experience and will estimate savings and the number of affected buildings using jurisdiction building construction data.

Indirect Savings Calculation

The Market Evaluation Team will calculate the indirect energy savings from the adoption of stretch codes using Equation 2. The Team will conduct this analysis either by individual jurisdiction or by jurisdiction category and will sum the results.

Alternative Code Enforcement Structure Impacts

This section presents the proposed steps to analyze indirect savings resulting from adoption of alternative code enforcement structures by non-pilot jurisdictions. The basic algorithm for calculating indirect savings resulting from non-pilot adoption of alternative code enforcement approaches is presented in Equation 6.

Equation 6. Alternative Enforcement Structure Indirect Savings Calculation

$$Indirect\ Savings_{Alt\ enforcement} = \sum (Attribution_i \times Compliance\ Rate\ Increase_{Alt\ enforcement,i} \times Energy\ Savings\ Per\ Unit\ Compliance\ Rate\ Increase_{Alt\ enforcement,i} \times New\ Buildings\ Affected_{Alt\ enforcement,i})$$

This equation assumes that adoption of an alternative enforcement structure can increase code compliance above what it would have been under the standard enforcement process. Greater compliance in turn leads to energy savings. The equation sums the energy savings across all jurisdictions that adopt an alternative structure in response to the findings from the three pilot jurisdictions. The savings are adjusted by an attribution factor to capture how much influence the pilots had on each jurisdiction's decision to adopt an alternative structure. Table 40 summarizes the inputs needed to estimate the indirect energy savings due to non-pilot jurisdictions adopting alternative code enforcement structures.

Table 40. Alternative Code Enforcement Input Variable Sources and Timing

Outcome Variable	Input Variables	Source	Details	Timing
Alternative enforcement structure adopted as a result of NYSERDA activities	Percent of alternative enforcement structure adoption attributable to NYSERDA pilots	Independent panel estimate, based on expertise and multiple sources: literature review, Delphi panel, pilot jurisdiction IDIs, IDIs with other jurisdictions adopting alternative enforcement structures	Independent panel reviews inputs from all sources; based on experience and professional judgment develop consensus estimate of influence of pilots on other jurisdictions adopting alternative enforcement structures	2024; Delphi panel 2021 and 2023
Compliance rate increase	Compliance rate increase	same as above	same as above	2024; Delphi panel 2021 and 2023
Energy savings per unit change in compliance rate	Energy use compared to compliance rate	Market Eval. Team review of prior studies; building simulations. Results will apply to training effects savings analysis too.	Review literature for compliance rate vs. energy use; perform building simulations if needed; determine level of disaggregation; normalize by floor area	2024
Buildings affected	Quantities of residential and commercial	Jurisdiction building permit data, Dodge data, Construction Monitor,	Request building construction data from affected jurisdictions;	2024

Outcome Variable	Input Variables	Source	Details	Timing
	buildings in affected jurisdictions	Construction Market Data, US census	supplement as needed with other sources	

Logic Model Components

The logic underlying this Initiative component is that pilots adopting alternative enforcement structures would influence some other jurisdictions to adopt similar structures. If the pilots demonstrate benefits (such as greater compliance), the benefits outweigh any added costs or burdens, and if NYSERDA promulgates the findings effectively, the expectation is that other jurisdictions would want to take advantage of alternative enforcement structures and would adopt them.

The outputs delivered by the alternative code enforcement activity are pilot jurisdictions that adopt an alternative code enforcement approach. The initiative aims to conduct pilots with three jurisdictions, producing positive results that are disseminated broadly to other jurisdictions.

The anticipated outcome is that several non-pilot jurisdictions adopt alternative enforcement structures. The Initiative projects that eight jurisdictions will be influenced to adopt alternative structures and will produce positive results that include improved code compliance.

The core indicators for this Initiative component include the number of pilot jurisdictions recruited and the number of non-pilot jurisdictions that adopt an alternative enforcement structure. Another indicator is the number of jurisdictions aware of the findings from the pilot and the degree to which the results of the pilot influenced each jurisdiction to adopt an alternative structure.

Estimation of Attribution and Compliance Rate Increase

The independent panel will provide two types of information to inform Team assessment of the indirect savings from adoption of alternative enforcement structures. First, the Team will ask the panel to estimate how much the pilots and information provided by NYSERDA influenced jurisdictions' decision to adopt an alternative structure. This will provide the attribution factor in Equation 6, above.

Second, the panel will estimate the average change in compliance in buildings because of the change in enforcement structure. This is the second term in Equation 6. This process will follow a procedure similar to that described earlier for effects of training on code compliance.

The Team proposes to analyze each adopting jurisdiction unless a very large number adopt an alternative structure. If the latter, the Team will categorize jurisdictions and develop estimates for each category.

The Team will compile and summarize data from multiple sources about the alternative compliance structures implemented through the Initiative in a structured format for presentation to the independent panel to provide the basis for the panel to estimate attribution and increases in code compliance rates.

Literature Review and Initiative Data

The Team will review and summarize findings from prior studies of alternative enforcement structures, including the structure design, components, advantages, and disadvantages, if available.

Delphi Panel Information

The Team will summarize information from the Delphi panel about alternative code enforcement structures. The first Delphi panel survey (late 2019 to early 2020) obtained estimates of the share of jurisdictions that currently implement alternative enforcement structures and observations about the potential benefits of such structures and likely jurisdiction concerns.

The Team will request similar information from subsequent Delphi panels every other year. The Team will expand the survey to solicit feedback on how the structures being adopted affect code compliance. The Team will compile and summarize the Delphi panel findings for presentation to the independent code expert panel.

Jurisdictional In-Depth Interview Data

The Team will review information from the interviews conducted with professionals in the three jurisdictions selected for in-depth interviews and document perceptions about alternative enforcement structures, awareness of jurisdictions that have adopted them, and experience with alternative structures.

The Team will compile and summarize data collected from the interviews each year, identify any trends and effects of the Initiative, and organize the information for presentation to the independent panel.

Adopting Jurisdiction Interviews

The Team will interview participants in the jurisdictions that adopted alternative enforcement structures during the pilot. The Team also will interview representatives from non-pilot jurisdictions that adopted such structures during or after the pilot to determine characteristics of the enforcement structures,

awareness of the pilots, and influence of the pilots on the design and adoption of the enforcement structures. Interviews will be conducted with up to 10 jurisdictions.

The Team will summarize the findings from these interviews and any other data provided by the jurisdictions in a format for presentation to the independent panel. Data compiled by NYSERDA related to alternative enforcement structures may also be shared with the independent panel in addition to or in lieu of jurisdiction interviews.

Estimation of Other Equation Parameters

As in estimating training impacts, estimating the indirect savings from alternative enforcement structures requires multiplying the changes in compliance rate by an appropriate measure of the quantity of buildings affected and an estimate of the savings resulting from the change in compliance rate. The Team will follow a similar procedure to the one described above for the indirect savings from training.

This analysis for the enforcement structure changes will be simpler than for the training impacts. The Team will assume that all buildings in the jurisdictions are affected and that the effects are not dependent on specific code officials.

Indirect Savings Calculation

The Team will calculate the indirect energy savings from the adoption of alternative enforcement structures using Equation 6. The Team will conduct the analysis at either the individual jurisdiction level or by jurisdiction category and sum the results. The Team will multiply the attribution factor times the estimated compliance rate increase times the energy savings and the number of buildings affected.

State and National Code Development Impacts

This section presents the proposed steps to analyze savings resulting from indirect influences of the Initiative on national model code and on NYS energy code development and adoption. The basic algorithm for calculating indirect savings from the influence of the Initiative on code development and adoption is shown in Equation 3.

Equation 7. Code Development and Adoption Indirect Savings Calculation

$$Indirect\ Savings_{Code\ D\ and\ A} = Savings_{Adoption,NYS} + Savings_{Development,NYS} + Savings_{Development,Model\ codes}$$

Where:

$Indirect\ Savings_{Code\ D\ and\ A}$ = Indirect savings from influence on code development (D) and adoption (A)

$Savings_{Adoption,NYS}$ = Indirect savings from influence on the timing of adoption of the ECCCNYS

$Savings_{Development,NYS}$ = Indirect savings from influence on the stringency of the ECCCNYS

$Savings_{Development,Model\ codes}$ = Indirect savings from influence on the stringency of residential and commercial model codes

This equation breaks the indirect savings into those from effects on the ECCCNYS and on the national model codes. For the NYS code, the equation accounts for the time that the Initiative advances code adoption as well as the added stringency of the code. For the national model codes, the Team assumes they continue to follow their normal cycle, but the Initiative could have an effect on the final stringency. The stringency of the model codes affects savings in NYS by setting the threshold for stringency that the state might increase through amendments. Table 41 summarizes the inputs required to estimate the indirect energy savings from the Initiative's influence on code adoption timing and stringency.

Table 41. Code Development Impact Input Variable Sources and Timing

Outcome Variable	Input Variables	Source	Details	Timing
Savings from accelerating NYS code adoption	Months ECCCNYS adoption accelerated as result of NYSERDA Code-to-Zero Initiative activities	Independent panel, based on expertise and information from literature review, Delphi panel, interviews with code adoption professionals	Independent panel will provide consensus estimate of influence of code adoption acceleration	2024; Delphi panel 2021 and 2023
	Quantities of residential and commercial buildings constructed during time adoption was accelerated	Jurisdiction building permit data, Dodge data, Construction Monitor, Construction Market Data, US census	Request statewide building construction data; supplement as needed with other sources	2024
	Savings from NYS code	Analyses conducted to support adoption; building energy simulations as needed	Compile ECCCNYS savings estimates; perform building energy simulations to fill gaps as needed	2024
Savings from increased	Code requirements resulting from the influence of the Initiative	Independent panel, based on expertise and information from literature review, Delphi panel,	Independent panel will provide consensus estimate of requirements influenced and extent of influence	2024

Outcome Variable	Input Variables	Source	Details	Timing
NYS code stringency		interviews with code adoption professionals		
	Energy savings from increased ECCCNYS stringency	Analyses conducted to support adoption; building energy simulations as needed	Compile ECCCNYS savings estimates; perform building energy simulations to fill gaps as needed	2024
	Quantities of residential and commercial buildings constructed during time adoption was accelerated	Jurisdiction building permit data, Dodge data, Construction Monitor, Construction Market Data, US census	Request statewide building construction data; supplement as needed with other sources	2024
Savings from increased model code stringency	Code requirements resulting from the influence of the Initiative	Independent panel, based on expertise and information from literature review, interviews with code adoption professionals	Independent panel will provide consensus estimate of requirements influenced and extent of influence	2024
	Energy savings from increased model code stringency	Analyses conducted to support adoption; building energy simulations as needed; ICC and ASHRAE documentation	Compile model code savings estimates (ICC and ASHRAE); perform building energy simulations to fill gaps as needed	2024

Logic Model Components

The program theory underlying this Initiative component is that Initiative impacts, such as the influence on stretch code adoption, could have a second order effect on when codes are adopted in NYS, on their stringency, and on the stringency of national model codes. These impacts differ from the other impacts discussed here because there is no Initiative activity that directly targets state or national code adoption. That is, these impacts would be anticipated to result from other outputs or outcomes associated with the Initiative. The logic model for the Code to Zero Initiative highlights this by showing these impacts as mid- to long-term outcomes.

In NYS, adoption of stretch codes could make it more likely that some of the required measures could be incorporated in the next state code. The Initiative might also help accelerate when NYS adopts its next code. At the national level, Initiative outcomes, such as stretch code adoption, could influence what measures are included in the next model codes by demonstrating their feasibility and cost-effectiveness.

Because there are no Initiative activities directed at the state code or national model codes, these impacts do not follow the logic model structure that presents activities and outputs. All activities and outputs that influence the state and national model codes are embedded in the other Initiative activities discussed previously.

The anticipated outcomes are the changes to the state and model codes described above. The core indicators include the requirements adopted in new state and model codes and the timing of NYS code updates.

Estimate of NYSERDA Influence: Acceleration and Stringency

The independent panel will be asked to identify how the Initiative affected state and model code development, including what requirements resulted from the influence of the Initiative and how the timing of state adoption was affected.

The Team will rely on information from the sources used to assess the other indirect savings. To credibly assess how the Initiative influenced code development and timing, the Team also recommends conducting interviews with NYS and model code developers. If available, the Team will review and summarize NYSERDA's own tracking of code advocacy efforts for the panel.

Estimate of Savings from ECCCNYS Acceleration and Increased Stringency and from National Model Code Stringency

To estimate code energy savings, the Team will compile data from other sources, such as studies conducted to support adoption of the ECCCNYS and development of the model codes. As necessary, the Team will perform building energy simulations to provide energy savings estimates for code requirements if information from other sources is inadequate.

The Team will use the information provided by the independent panel to estimate the additional energy savings resulting from the Initiative's influence. This will require using the estimates of the number of new buildings constructed to calculate savings from the other effects as well as the energy impacts of the specific code requirements.

Indirect Savings Calculation

The Team will combine all data and calculate additional indirect savings that could be attributed to the state and model code requirements and timing effects of the Initiative. Given that these effects are secondary, the Team anticipates this analysis to be more of a qualitative assessment than a detailed quantitative analysis.

Eliminate Double-Counted Savings

There is the possibility that some Initiative activities will contribute to the same outcomes and impacts as other activities. The Team will start with the existing Initiative logic model and refine it as needed to identify paths through which different activities could produce similar outcomes. As described earlier, the Team anticipates overlap in the effects of the support provided to resource-constrained jurisdictions and the stretch code pilots, so the review of potential double-counting will include an assessment of the interactions and potential overlap of these Initiative activities.

The Team will use the revised logic model to guide development of the interview instruments and focus the data collection to distinguish among the effects of different Initiative activities.

The Team will carry this process into the independent panel assessments by stressing that the panel should consider indirect impacts that are linked primarily to a single Initiative activity. The Team will also ask the panel to identify any impacts that could be attributable to multiple Initiative activities and provide estimates of the extent of any overlapping influences.

The Team will be responsible for using this information to make any necessary adjustments to the impact assessments to minimize double counting.