Energy Savings and Cost-Effectiveness Analysis of the 2024 New York State Energy Conservation Construction Code, Residential Provisions

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Abstract

This report summarizes the energy savings and cost-effectiveness analysis of the residential provisions of the 2024 New York State Energy Conservation Construction Code (2024 NYSECCC) compared to the residential provisions of the 2020 Energy Conservation Construction Code of New York State (2020 ECCCNYS) and the 2020 New York City Energy Conservation Code (2020 NYCECC). The report includes a qualitative comparison of measures in the proposed and baseline codes, a description of the approach used for developing energy models representing homes built to the two codes, and descriptions of how the incremental first costs and economic inputs are determined. The results section shows the energy, energy cost, life cycle cost, and greenhouse gas impacts of the 2024 NYSECCC as compared to the 2020 ECCCNYS and 2020 NYCECC across new construction in New York State.

Keywords

Energy code, cost-effectiveness, New York City, NYSERDA

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Acronyms and Abbreviations

CFIS	central fan-integrated supply system
CPI	consumer price index
CZ	climate zone
DHW	domestic hot water
DOE	US Department of Energy
DWHR	drain water heat recovery
ECCCNYS	Energy Conservation Construction Code of New York State
EF	energy factor
EIA	Energy Information Association
ERV	energy recovery ventilator
EUL	effective useful life
EV	electric vehicle
EVSE	electric vehicle supply equipment
ft	feet
HRV	heat recovery ventilator
HVAC	heating, ventilation, and air conditioning
IECC	International Energy Conservation Code
kBtu	thousand British thermal units
kWh	kilowatt hours
LCC	life cycle cost
lf	linear foot
lm	lumen
LPD	lighting power density
LRMF	low rise multifamily
MF	multifamily
MMBtu	million British thermal units
MT	metric tons
MWh	megawatt hours
NAHB	National Association of Home Builders
NBI	New Buildings Institute
NPV	net present value
NREL	National Renewable Energy Laboratory
NYC	New York City
NY	New York
NYCECC	New York City Energy Conservation Code
NYDOS	New York Department of State
NYS	New York State

NYSECCC	New York State Energy Conservation Construction Code
NYSERDA	New York State Energy Research and Development Authority
PNNL	Pacific Northwest National Laboratory
SF	single-family
SRE	sensible recovery efficiency
UEF	uniform energy factor
W	watts

Executive Summary

This analysis is conducted at the request of the New York State Energy Research and Development Authority (NYSERDA). The 2024 edition of the New York State Energy Conservation Construction Code (NYSECCC) was developed as an overlay of the 2024 International Energy Conservation Code (IECC) with additional measures from the 2021 IECC and 2020 NYStretch Energy Code. In parallel, the Zero Emissions New Construction (ZENC) requirements in Energy Law prohibit fossil fuels in new low-rise residential construction. This report evaluates the cost-effectiveness potential of the proposed 2024 code relative to New York State's current energy code, the 2020 Energy Conservation Construction Code (2020 ECCCNYS), assuming the ZENC is in place for both the energy code scenarios. In New York City, the baseline code is the 2020 New York City Energy Conservation Code (2020 NYCECC), which is incorporated into the analysis.

The following report describes the methodology, analysis, and results of the energy savings and cost-effectiveness analysis. The analysis follows the approach set forth by NYSERDA's "Evaluation Criteria for Determining the Cost Effectiveness of Proposed Changes to the Energy Conservation Construction Code of New York State codified at Part 510 of Title 21 of the Official Compilation of Codes, Rules and Regulations of the State of New York" as published in the New York State Register on June 18, 2024 (Cost Effectiveness Rule).

The analysis begins with a qualitative assessment to evaluate the anticipated energy impact of code changes proposed by the 2024 NYSECCC, including a determination of which impacts could be quantified through an energy analysis. An energy analysis is then conducted via customized energy models tailored to the code requirements for the State of New York. Cash flows for each year are used to determine the present value life cycle cost (LCC) saving. The cash flows are based on energy savings, incremental first costs incorporated into mortgage payments, and maintenance and replacement costs. The analysis also quantifies societal effects of avoided greenhouse gas (GHG) emissions. Net annual emissions are based on energy savings and emission factors published by NYSERDA. The annual value of those avoided emissions is calculated using New York State Department of Environmental Conservation's published guidance, "Establishing a Value of Carbon, Guidelines for Use by State Agencies."

The analysis uses a 30-year study period. It assumes that the 2024 NYSECCC will take effect in January 2026. The study also assumes that all residential buildings subject to the residential energy code in both the proposed and baseline scenarios will not usefossil fuels starting December 31, 2025, based on Energy

Law Section 11-104(6)(b), which prohibits installation of fossil fuel equipment in certain new construction.

Tables ES-1 & ES-2 show the results of the cost-effectiveness analysis of the proposed 2024 NYSECCC relative to the 2020 ECCCNYS and 2020 NYCECC, where negative values indicate costs and positive values indicate savings. Individual prototypes are weighted by construction floor area to develop aggregated results for all residential buildings in New York State. Overall, the proposed 2024 NYSECCC is expected to yield 17% site energy savings, 17% energy cost savings, and $4,846 lifecycle cost savings per household compared to the current 2020 ECCCNYS and 2020 NYCECC across all new residential construction in the state for this code cycle. When considering the societal impact of avoided greenhouse gas emissions (GHG) in accordance with the Cost Effectiveness Rule, the 2024 NYSECCC provides a lifecycle cost savings of $5,765 per household and a total GHG reduction of 17%.

Table ES-1. Statewide Energy Cost Savings, Incremental First Cost, and Lifecycle Cost Savings per Square Foot

Building Type	First year energy cost savings ($/ft^2)[a]	Incremental first cost ($/ft^2)	LCC savings ($/ft^2)[a]	Societal effects ($/ft^2)[b]	LCC savings with societal effects ($/ft^2)[a]
Single-family	$0.26	$2.75	$1.84	$0.47	$2.32
Multifamily	$0.35	$2.35	$3.42	$0.58	$4.02
New York Statewide Weighted Average	**$0.26**	**$2.33**	**$2.05**	**$0.45**	**$2.50**

Table ES-2. Statewide Energy Cost Savings, Incremental First Cost, and Lifecycle Cost Savings per Dwelling Unit

Building Type	First year energy cost savings ($/dwelling unit)[a]	Incremental first cost ($/dwelling unit)	LCC savings ($/dwelling unit)[a]	Societal effects ($/dwelling unit)[b]	LCC savings with societal effects ($/dwelling unit)[a]
Single-family	$710	$7,388	$4,959	$1,266	$6,225
Multifamily	$462	$3,053	$4,485	$762	$5,247
New York Statewide Weighted Average	**$594**	**$5,350**	**$4,736**	**$1,029**	**$5,765**

[a]Negative values in savings columns indicate costs, not savings.
[b]Positive societal effects are considered savings.

1 Introduction

The New York Department of State (NYDOS) developed the 2024 NYSECCC proposals based on measures from the 2024 IECC, 2021 IECC, and 2020 NYStretch Energy Code. The 2024 NYSECCC is expected to go into effect in January 2026. The residential provisions of the 2024 NYSECCC are expected to be more efficient than the residential provisions of the 2020 ECCCNYS and 2020 NYCECC.

The Zero Emissions New Construction (ZENC) requirements established in New York Energy Law Section 11-104(6)(b) prohibit installation of fossil fuel equipment in low-rise residential new construction and take effect on December 31, 2025. For this analysis, ZENC is assumed to be in effect for both the proposed 2024 NYSECCC and the baseline codes of 2020 ECCCNYS and 2020 NYCECC.

This report documents the stringency of the residential provisions of the proposed 2024 NYSECCC compared to the 2020 ECCCNYS and 2020 NYCECC and provides an analysis of the incremental first cost, energy cost savings, life cycle cost (LCC) savings, and value of societal effects of the 2024 NYSECCC. The analysis is conducted using the approach set forth by NYSERDA's "Evaluation Criteria for Determining the Cost Effectiveness of Proposed Changes to the Energy Conservation Construction Code of New York State codified at Part 510 of Title 21 of the Official Compilation of Codes, Rules and Regulations of the State of New York" as published in the New York State Register on June 18, 2024 (Cost Effectiveness Rule). The analysis is conducted using all three New York State Climate Zones (CZ), 4A, 5A, and 6A, with 4A split between NYC and the balance of homes in 4A not in NYC. Results are provided in this technical report, along with a narrative summarizing the findings and their implications for New York State's code development process.

Section 2 of this report contains a qualitative evaluation of the major differences in the provisions of the proposed 2024 NYSECCC compared to the 2020 ECCCNYS and 2020 NYCECC and presents the methodology and assumptions for calculating the estimated energy savings and cost effectiveness of the proposed 2024 NYSECCC. Section 3 presents the results of the evaluation for the entire suite of residential single-family and low-rise multifamily prototype building models. Sections 4 and 5 provide discussion and conclusions.

2 Methodology

This section summarizes the code measures and modeled systems used to evaluate the 2024 NYSECCC. Table 1 shows the comparison of the measures resulting from the 2024 NYSECCC vs. the 2020 ECCCNYS and 2020 NYCECC. The "Prescriptive/Mandatory" column shows the requirements of the 2024 NYSECCC prescriptive path. The "Prescriptive + Credits" column shows the additional credit options chosen for this analysis to comply with 2024 NYSECCC section R408 Additional Efficiency Requirements. In summary, the overall energy impact of the proposed 2024 ECCCNYS is expected to be positive (energy savings) over the baseline codes.

Table 1. A Preliminary Qualitative Comparison: 2024 NYSECCC vs. 2020 ECCCNYS and 2020 NYCECC

Code Section	Component	Climate Zone[a]	2020 ECCCNYS/ NYCECC	2024 NYSECCC Prescriptive/ Mandatory	2024 NYSECCC Prescriptive + Credits	Energy Impact Captured through Modeling
R402.1	Fenestration U-factor[a]	4A	0.32	0.27		Yes
		5A	0.30	0.27	0.25	
		6A (1 | 2)	0.30 | 0.28	0.27		
	Fenestration SHGC	4A	0.40	0.40		
		5A	NR	0.40		
		6A	NR	NR		
	Ceiling R-value[a]	4A	49	49		
		5A	49	60		
		6A (1 | 2)	49 | 60	60		
	Wood-framed R-value[a]	4A	20 or 13+5ci	30 or 20+5ci or 13+10ci or 0+20ci		
		5A	20 or 13+5ci			
		6A (1 | 2)	20+5ci or 13+10ci | 23			
	Floor R-value	4A	19	30 or 19+7.5ci or 20ci		
		5A	30			
		6A	30			
	Basement wall R-value	4A	10ci or 13	15ci or 19 or 13+5ci		
		5A	15ci or 19			
		6A	15ci or 19			
	Slab R-value and depth	4A	10, 2 ft.	10, 4 ft.		

Code Section	Component	Climate Zone[a]	2020 ECCCNYS/ NYCECC	2024 NYSECCC Prescriptive/ Mandatory	2024 NYSECCC Prescriptive + Credits	Energy Impact Captured through Modeling
		5A	10, 2 ft.			
		6A	10, 4 ft.			
	Crawlspace wall R-value			15ci or 19 or 13+5ci		
		All	15 or 19			
R402.4.1.2	Air leakage testing	4A & 5A	3.0 ACH50	3.0 ACH50		Yes
		6A		2.5 ACH50		
R403.3	Duct location	NYC	In conditioned space or buried in attic insulation	In conditioned space or buried in attic insulation		Yes
		All	In conditioned space, buried in attic insulation, or R-8 duct insulation			
R403.5.2	Hot water pipe insulation	All	R-3 pipe insulation	Table R403.5.2, mostly requiring R-4 pipe insulation		Yes
R403.6.2	Ventilation systems	NYC	HRV/ERV or balanced ventilation	None		Yes
		4A	None			
		5A		None	HRV/ERV w/ SRE 0.75	
		6A		HRV/ERV w/ SRE 0.65		
R403.7.1	Electric-resistance space heating	All	None	No electric resistance space heating >2 kW		Yes
R403.6.5	Exhaust control for bathrooms	All	None	Bathroom exhaust must have timer, sensor, or other control		No
R404.1	Interior lighting	All	90% high efficacy	100% high efficacy		Yes
R404.2	Lighting controls	All	None	Interior lighting must have dimmer or occupant sensor		No
R408	DHW layout	NYC	Compact layout or drain heat recovery	None	Compact layout	Yes

Code Section	Component	Climate Zone[a]	2020 ECCCNYS/ NYCECC	2024 NYSECCC Prescriptive/ Mandatory	2024 NYSECCC Prescriptive + Credits	Energy Impact Captured through Modeling
		All	None			
R408	DHW equipment	All	Minimum efficiency equipment	Minimum efficiency equipment	HPWH UEF 3.3	Yes
R408	HVAC equipment	All	Minimum efficiency equipment	Minimum efficiency equipment		Yes
R408	Appliances	4A	Minimum efficiency equipment	Minimum efficiency equipment	Efficient fridge, dishwasher, and laundry	Yes
		5A			Minimum efficiency equipment	
		6A				

[a] The 2020 ECCCNYS allowed for two different package options for envelope requirements in Climate Zone 6, Options 1 and 2, noted as (1 | 2) here.

2.1 Residential Prototypes and Construction Weights

Resource Refocus used Pacific Northwest National Laboratory (PNNL) draft prototype models for the 2024 IECC as a starting point for modeling the 2024 NYSECCC, 2020 ECCCNYS, and 2020 NYCECC. The residential prototypes, modified to match the code requirements and credits of the proposed and baseline codes, include all combinations of models by building type (single family and low-rise multifamily), electric heating type (electric resistance and heat pump), foundation types (crawlspaces, heated basements, unheated basements, and slab foundations) and New York State Climate Zones (4A, 5A, and 6A). The weather stations used for the modeling were JFK Airport in 4A, Albany in 5A, and Massena in 6A.

Table 2 shows the distribution of new construction in New York State by building type, foundation type, heating fuel, and Climate Zone; these weights assume the ZENC is in effect but that there is not a ban on electric resistance. Table 3 shows the distribution of new construction for the proposed results due to the combination of the 2024 NYSECCC electric resistance prohibition and the ZENC fossil fuel prohibition.

Table 2. New York State Baseline Code Construction Weights by CZ, Heating Type, and Foundation Type

Foundation	Heating System	NYC		CZ 4A		CZ 5A		CZ 6A		Total
		SF	MF	SF	MF	SF	MF	SF	MF	
Crawlspace	Electric Resistance	0.0%	0.2%	0.1%	0.4%	0.2%	0.5%	0.1%	0.1%	**1.4%**
Crawlspace	Heat Pump	0.2%	0.7%	1.3%	1.5%	2.9%	2.0%	0.8%	0.2%	**9.6%**
Heated Bsmt.	Electric Resistance	0.0%	0.4%	0.2%	0.9%	0.5%	1.2%	0.1%	0.1%	**3.4%**
Heated Bsmt.	Heat Pump	0.4%	1.7%	3.0%	3.6%	6.9%	4.9%	1.9%	0.5%	**22.9%**
Slab	Electric Resistance	0.0%	0.3%	0.2%	0.7%	0.4%	0.9%	0.1%	0.1%	**2.6%**
Slab	Heat Pump	0.3%	1.3%	2.3%	2.7%	5.3%	3.7%	1.4%	0.4%	**17.4%**
Unheated Bsmt.	Electric Resistance	0.0%	0.6%	0.3%	1.4%	0.8%	1.9%	0.2%	0.2%	**5.6%**
Unheated Bsmt.	Heat Pump	0.7%	2.7%	4.9%	5.9%	11.3%	7.9%	3.0%	0.9%	**37.1%**
Total		**1.7%**	**7.9%**	**12.2%**	**17.0%**	**28.2%**	**23.0%**	**7.5%**	**2.5%**	**100.0%**

Table 3. New York State Proposed Code Construction Weights by CZ, Heating Type, and Foundation Type

Foundation	Heating System	NYC		CZ 4A		CZ 5A		CZ 6A		Total
		SF	MF	SF	MF	SF	MF	SF	MF	
Crawlspace	Heat Pump	0.2%	0.8%	1.4%	1.7%	3.3%	2.3%	0.9%	0.3%	**11.0%**
Heated Bsmt.	Heat Pump	0.5%	1.9%	3.4%	4.1%	8.0%	5.6%	2.1%	0.6%	**26.3%**
Slab	Heat Pump	0.4%	1.5%	2.6%	3.2%	6.1%	4.3%	1.6%	0.5%	**20.0%**
Unheated Bsmt.	Heat Pump	0.8%	3.1%	5.6%	6.7%	12.9%	9.1%	3.5%	1.0%	**42.7%**
Total		**1.8%**	**7.3%**	**13.1%**	**15.8%**	**30.3%**	**21.4%**	**8.1%**	**2.3%**	**100.0%**

2.2 Economic Inputs

The incremental first costs associated with the 2024 NYSECCC compared to the 2020 ECCCNYS and 2020 NYCECC are gathered from sources such as RSMeans,[1] the National Renewable Energy Laboratory's (NREL) National Residential Efficiency Measures[2] (NREM) database, other energy code cost analyses, and equipment retailer websites. The costs are adjusted using location cost multipliers from RSMeans representative of the three NY Climate Zones (described below). Where the most recent available data for costs are from prior to 2024, the costs are adjusted to current year dollars using the

[1] RS Means. 2024. 2024 Residential Building Cost Data. RSMeans data from Gordian, Rockland, Massachusetts. Available at https://www.rsmeansonline.com/SearchData

[2] "NREL: National Residential Efficiency Measures Database Home Page." n.d. Remdb.nrel.gov. Accessed December 7, 2022. https://remdb.nrel.gov/.

consumer price index (CPI) or RSMeans Historical City Cost Index multipliers (also described below). Detailed information about first cost sources by measure will be included in a future version of the report.

Location factors: Location factors are used to adjust national average costs to account for locational diversity in material and labor costs (RSMeans 2024).[3] The 2024 RSMeans location multipliers for New York State, which are averaged across cities in each Climate Zone, are shown in Table 4.

Table 4. Location Multipliers

Climate Zone	Location Multiplier
NYC	1.264
4A	1.175
5A	1.041
6A	1.008

Historical multipliers: For measures that do not have costs available from studies or databases produced in the last year (2024), the analysis also uses the RSMeans Historical City Cost Index to estimate how much the cost has changed over time (i.e., since the last referenced cost for each measure). This is akin to using the consumer price index, except that it references RSMeans data that is specific to each year in New York State. For example, if a referenced cost is from 2018, the Historical Index is used to scale from 2018 to 2024 costs, then location multipliers would be applied to differentiate by region.

Incremental first costs: The total incremental first costs per dwelling unit for each prototype are weighted across foundation and fuel types and shown in Table 5.

Table 5. Total Incremental First Costs of the Prescriptive and Mandatory Provisions of 2024 NYSECCC Compared to the 2020 ECCCNYS and 2020 NYCECC

Building Type	Incremental first cost ($/ft^2)	Incremental first cost ($/dwelling unit)
Single-family	$2.75	$7,388
Multifamily	$2.34	$3,053
New York Statewide Weighted Average	**$2.32**	**$5,350**

To estimate electricity costs in each Climate Zone of New York State, average residential electricity prices for all utilities serving each county are pulled from Form EIA-861M's Sales and Revenue data for

[3] RS Means. 2024. 2024 Residential Building Cost Data. RSMeans data from Gordian, Rockland, Massachusetts. Available at https://www.rsmeansonline.com/SearchData

2023[4] and then averaged for each Climate Zone based on the utility territory weighted by population served in each county. Table 6 shows the electricity prices used for the analysis.

Table 6. Average New York State Electricity Prices

Climate Zone	Electricity ($/kWh)
NYC	$0.302
4A	$0.227
5A	$0.177
6A	$0.166

The additional economic parameters used in this analysis are summarized in Table 7. They follow the specifications in the Cost Effectiveness Rule.

Table 7. Summary of Economic Parameters

Parameter	2024 Value
Mortgage Interest Rate	4.27%
Loan Term	30 years
Down Payment Rate	15.0%
Points and Loan Fees	0.80%
Discount Rate	5% (equal to Mortgage Rate)
Period of Analysis	30 years
Income Tax Rate	18.3%
Home Price Escalation Rate	2.5% (equal to Inflation Rate)
Inflation Rate	2.5%
Energy Escalation Rates - Electricity	2.7%

[4] Form EIA-861M: Sales to Ultimate Customers. EIA, 2024. https://www.eia.gov/electricity/data/eia861m/. Accessed February 2024.

3 Results

This section summarizes the results of the energy and cost-effectiveness analysis of the 2024 NYSECCC compared to the 2020 ECCCNYS and 2020 NYCECC.

3.1 Site Energy Savings

The results of the energy savings analysis of the proposed 2024 NYSECCC over the baseline code have been aggregated over the set of foundation types and Climate Zones using the construction weights in the state established previously. Table 8 through Table 10 summarize weighted, statewide results for site energy savings for all end uses in kBtu per dwelling unit and per square foot. In summary, the results show 17% site energy savings for projected new dwelling units in the state. The increase in fan energy is likely due to the addition of HRV systems in the 5A and 6A prototypes, and the significant decrease in DHW energy is mostly due to the use of a heat pump water heater instead of an electric resistance water heater.

Table 8. Weighted, Statewide Site Energy Savings for the Prescriptive and Mandatory Provisions 2024 NYSECCC for Single-family Buildings

(kBtu/dwelling unit)	Heating	Cooling	Lighting	Interior Equipment	Fan	DHW	Total Energy
2020 ECCCNYS/ NYCECC	26,435	4,973	4,941	29,450	4,320	9,438	79,557
2024 NYSECCC	20,127	4,396	4,635	29,279	5,834	2,287	66,557
(kBtu/ft^2)	Heating	Cooling	Lighting	Interior Equipment	Fan	DHW	Total Energy
2020 ECCCNYS/ NYCECC	9.8	1.8	1.8	11.0	1.6	3.5	29.6
2024 NYSECCC	7.5	1.6	1.7	10.9	2.2	0.9	24.8
Savings (%)[a]	**24%**	**12%**	**6%**	**1%**	**-35%**	**76%**	**16%**

[a] Negative values indicate increased energy use, positive values indicate savings.

Table 9. Weighted, Statewide Site Energy Savings for the Prescriptive and Mandatory Provisions of 2024 NYSECCC for Multifamily Buildings

(kBtu/dwelling unit)	Heating	Cooling	Lighting	Interior Equipment	Fan	DHW	Total Energy
2020 ECCCNYS/ NYCECC	9,920	2,627	3,841	17,798	1,668	6,435	42,289
2024 NYSECCC	7,186	2,284	3,062	17,562	2,761	1,611	34,466
(kBtu/ft^2)	Heating	Cooling	Lighting	Interior Equipment	Fan	DHW	Total Energy

2020 ECCCNYS/ NYCECC	7.6	2.0	2.9	13.6	1.3	4.9	32.4
2024 NYSECCC	5.5	1.8	2.3	13.5	2.1	1.2	26.4
Savings (%)[a]	**28%**	**13%**	**20%**	**1%**	**-65%**	**75%**	**18%**

[a] Negative values indicate increased energy use, positive values indicate savings.

Table 10. Weighted, Statewide Average Site Energy Savings for the Prescriptive and Mandatory Provisions of 2024 NYSECCC

(kBtu/dwelling unit)	Heating	Cooling	Lighting	Interior Equipment	Fan	DHW	Total Energy
2020 ECCCNYS/ NYCECC	18,673	3,870	4,424	23,974	3,074	8,027	62,042
2024 NYSECCC	14,045	3,403	3,896	23,772	4,389	1,970	51,475
(kBtu/ft^2)	Heating	Cooling	Lighting	Interior Equipment	Fan	DHW	Total Energy
2020 ECCCNYS/ NYCECC	8.1	1.7	1.9	10.4	1.3	3.5	26.9
2024 NYSECCC	6.1	1.5	1.7	10.3	1.9	0.9	22.4
Savings (%)[a]	**25%**	**12%**	**12%**	**1%**	**-43%**	**75%**	**17%**

[a] Negative values indicate increased energy use, positive values indicate savings.

3.2 Energy Cost Impact

The weighted, statewide energy cost impact from the 2024 NYSECCC to the 2020 ECCCNYS have been calculated using the fuel prices in Table 6. The annual energy cost savings results are included in Table 11 through Table 13.

Table 11. Annual, Weighted, Statewide Energy Cost Savings of the Prescriptive and Mandatory Provisions of 2024 NYSECCC for Single-family Buildings

($/dwelling unit-year)	Electricity Cost
2020 ECCCNYS/ NYCECC	$4,334
2024 NYSECCC	$3,624
($/ft^2-year)	Electricity Cost
2020 ECCCNYS/ NYCECC	$1.61
2024 NYSECCC	$1.35
Savings (%)[a]	**16%**

[a]Negative values indicate costs, positive values indicate savings.

Table 12. Annual, Weighted, Statewide Energy Cost Savings of the Prescriptive and Mandatory Provisions of 2024 NYSECCC for Multifamily Buildings

($/dwelling unit-year)	Electricity Cost
2020 ECCCNYS/ NYCECC	$2,555
2024 NYSECCC	$2,093
($/ft^2-year)	Electricity Cost
2020 ECCCNYS/ NYCECC	$1.96
2024 NYSECCC	$1.60
Savings (%)[a]	**18%**

[a]Negative values indicate costs, positive values indicate savings.

Table 13. Weighted, Statewide Average Annual Energy Cost Savings of the Prescriptive and Mandatory Provisions of 2024 NYSECCC

($/dwelling unit-year)	Electricity Cost
2020 ECCCNYS/ NYCECC	$3,498
2024 NYSECCC	$2,904
($/ft^2-year)	Electricity Cost
2020 ECCCNYS/ NYCECC	$1.52
2024 NYSECCC	$1.26
Savings (%)[a]	**17%**

[a]Negative values indicate costs, positive values indicate savings.

Table 14. Weighted, Statewide Summarized Site Energy and Cost Savings of 2024 NYSECCC

Building Type	First year energy cost savings ($/ft^2)[a]	First year energy cost savings ($/dwelling unit)[a]	First year site energy savings (kBtu/ft^2)[a]	First year site energy savings (kBtu/dwelling unit)[a]	Annual site energy savings (%)[a]
Single-family	$0.26	$710	4.8	13,000	16%
Multifamily	$0.35	$462	6.0	7,824	18%
New York Statewide Weighted Average	**$0.26**	**$594**	**4.6**	**10,567**	**17%**

[a]Negative values indicate costs, positive values indicate savings.

3.3 Societal Effects: Greenhouse Gas Emissions Savings

Table 15 shows the greenhouse gas emissions savings associated with each fuel type based on projected emissions rates for the next 30 years (2026-2055) based on NYSERDA emissions factors as directed in the Cost Effectiveness Rule.

Table 15. Annual, Weighted, Statewide Average Greenhouse Gas Emissions Savings, 2026-2055

(pounds CO_2e/dwelling unit-year)[a]	GHG Savings
Single-family	570
Multifamily	343
Total (weighted)	463
(pounds CO_2e/ft^2-year)[a]	GHG Savings
Single-family	0.21
Multifamily	0.26
Total (weighted)	0.20

[a]Negative values indicate increased emissions, positive values indicate savings.

The statewide total first-year energy and GHG savings by fuel type are calculated by multiplying annual energy and GHG savings per dwelling unit by the estimated number of annual construction starts by building type and Climate Zone in New York State. The 30-year cumulative energy and GHG savings are calculated by summing the total annual energy and emissions savings over the next thirty years, given the same number of construction starts for each of the three years of the code cycle. Table **16** summarizes these total savings, where GHG savings are presented as metric tons (MT) of CO_2e. The GHG savings of the 2024 NYSECCC represent a 17% reduction from the 2020 ECCCNYS and 2020 NYCECC in new construction.

Table 16. Weighted, Statewide Total First Year and Cumulative Energy and Greenhouse Gas Savings[a]

Building Type	First year electric savings (MWh)	First year emissions savings (MT CO_2e)	Cumulative 30-year electric savings (MWh)	Cumulative 30-year emissions savings (MT CO_2e)
Single-family	27,479	9,052	2,390,704	166,684
Multifamily	9,056	3,023	787,901	55,105
New York Statewide Weighted Average	**36,536**	**12,075**	**3,178,605**	**221,790**

[a]Negative values indicate increased consumption, positive values indicate savings.

3.4 30-year Life Cycle Cost (LCC) Impact

Table 17 summarizes the 30-year LCC savings of the 2024 NYSECCC over the 2020 ECCCNYS and 2020 NYCECC. The results have been aggregated over the set of foundation types and Climate Zones using the construction weights matrix. The table includes the LCC savings with and without the societal effects of avoided GHG emissions, which are calculated in accordance with the Cost Effectiveness Rule.

The 2024 NYSECCC results in 30-year LCC savings based on the standard calculation as well as when including societal effects from avoided GHG emissions.

Table 17. Summarized Weighted, Statewide Average 30-Year Cost Effectiveness

Building Type	LCC savings ($/ft²)[a]	Societal effects ($/ft²)[b]	LCC savings with societal effects ($/ft²)[a]	LCC savings ($/dwelling unit)[a]	Societal effects ($/dwelling unit)[b]	LCC savings with societal effects ($/dwelling unit)[a]
Single-family	$1.84	$0.47	$2.32	$4,959	$1,266	$6,225
Multifamily	$3.44	$0.58	$4.02	$4,485	$762	$5,247
New York Statewide Weighted Average	**$2.06**	**$0.45**	**$2.50**	**$4,736**	**$1,029**	**$5,765**

[a]Negative values in savings columns indicate costs, not savings.
[b]Positive societal effects are considered savings.

3.5 Simple Payback and 10-Year Net Present Value

Table 17 summarizes the simple payback (which is the incremental first cost divided by the annual energy cost savings) and the 10-year net present value (NPV) (which is the comparison of the incremental first cost to the present value of the energy savings and residual value of capital) of the 2024 NYSECCC over the 2020 ECCCNYS. The results have been aggregated over the set of foundation types and Climate Zones using the construction weights matrix. The 10-year NPV is positive, as it is a combination of the energy cost impacts over ten years as well as the replacement costs and residual value of equipment that has yet to be replaced. The 10-year NPV minus the incremental cost is also positive, indicating that the present value of the savings and remaining equipment value after ten years exceed the incremental first costs.

Table 18. Weighted, Statewide Simple Payback and Net Present Value

Building Type	Total Cost Savings ($/year)[a]	Incremental Cost ($)	Simple Payback (years)	10-Year NPV ($)	10-Year NPV minus Incremental Cost ($)[a]
Single-family	$710	$7,388	10.4	$13,606	$6,218
Multifamily	$462	$3,053	6.6	$6,351	$3,299
New York Statewide Weighted Average	**$594**	**$5,350**	**9.0**	**$10,197**	**$4,846**

[a]Negative values in savings columns indicate costs, not savings.

4 Discussion

The 2024 NYSECCC contains elements that encourage more efficient building design such as increased envelope insulation requirements, duct and ventilation system improvements, and energy credits that allow for flexibility of design while still ensuring energy efficiency improvements. This analysis uses conservative estimates for construction and equipment costs as well as model inputs, which may result in an underestimation of energy savings and cost effectiveness. The 2024 NYSECCC is cost effective statewide.

5 Conclusion

The prescriptive and mandatory elements of the residential provisions of the 2024 NYSECCC are expected to yield positive energy savings over the baseline 2020 ECCCNYS and 2020 NYCECC. Statewide, the weighted average savings (based on an assumed package of credit measures) results in a 17% reduction in annual site energy, energy costs, and lifetime GHG emissions. The 2024 NYSECCC results in a statewide 30-year life cycle savings of $4,846 per dwelling unit ($5,765 per dwelling unit when including the societal benefits of avoided GHG in the analysis).

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