



**NYSERDA**

# **Evaluation Criteria for Determining the Cost-Effectiveness of an Update to the New York State Energy Code**



# INTRODUCTIONS

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Background & Context

Cost-Effectiveness

Lifecycle Cost Methodology Summary

Societal Effects Summary

Reporting Cost Effectiveness

Next Steps

Public Comments



# New York's Climate Action Plan brings us together today.

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The Energy Law tells NYSERDA to set how the cost-effectiveness of a proposed update to the Energy Code is measured.

# NEW YORK IS A GLOBAL CLIMATE LEADER

building a healthier future with thriving communities; homes and businesses powered by clean energy; and economic opportunities accessible to all New Yorkers

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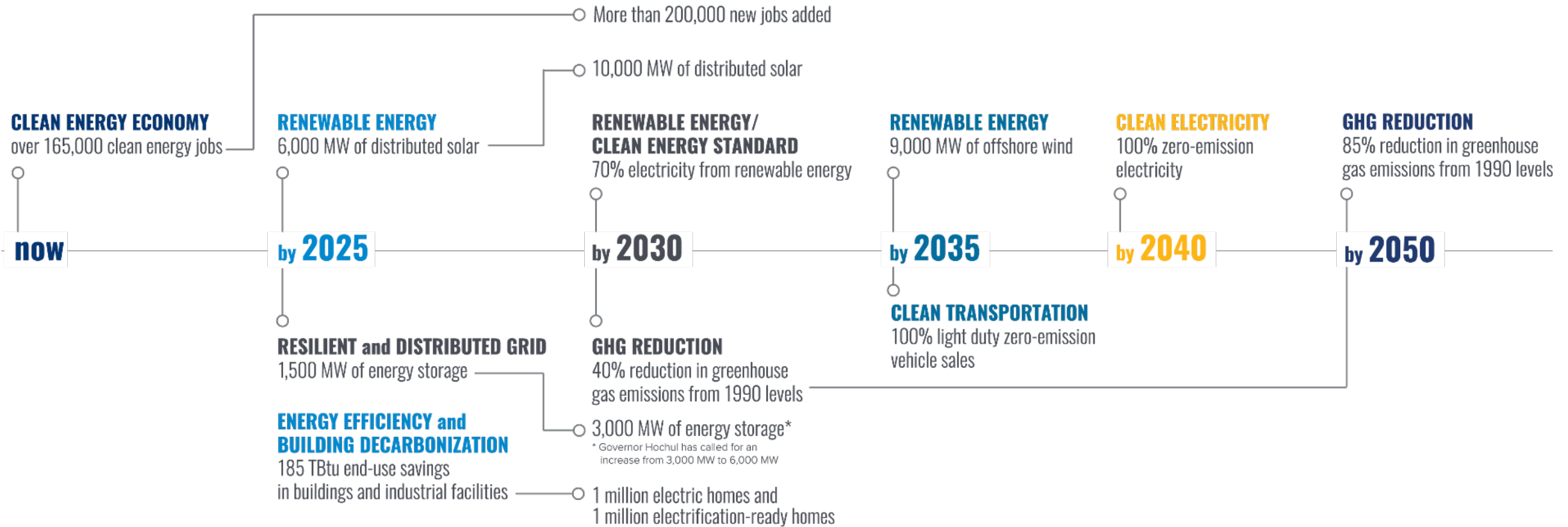
## OUR MISSION

Advance clean energy innovation and investments to combat climate change improving the health, resiliency, and prosperity of New Yorkers and delivering benefits equitably to all.

## OUR PROMISE

NYSERDA provides resources, expertise, and objective information so New Yorkers can make confident, informed energy decisions.

## 40% REDUCTION IN GREENHOUSE GAS EMISSIONS BY 2030



# Understanding the Energy Code

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The Energy Code is the construction standard for energy efficiency in new buildings, additions, and major renovations.

## ENERGY CODE IS THE STANDARD FOR ENERGY EFFICIENCY IN BUILDINGS, generally applicable to new construction, additions, and alterations of existing buildings or building systems

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- The State Energy Conservation Construction Code (Energy Code) is 19 NYCRR Part 1240, which includes the 2020 Energy Conservation Construction Code of New York State (2020 ECCCNY) and ASHRAE 90.1-2016 (as amended by 19 NYCRR section 1240.3) and various other reference standards that have been incorporated by reference.
- Energy Code defines requirements for building envelope (insulation, windows and air sealing), mechanical systems for heating, cooling, ventilation and water heating, and electrical power and lighting systems.
- Energy Code sets the floor for energy efficiency in buildings.

# CURRENT NYS UNIFORM CODE AND ENERGY CODE



2020 BUILDING CODE OF NEW YORK STATE



2020 RESIDENTIAL CODE OF NEW YORK STATE



2020 FIRE CODE OF NEW YORK STATE



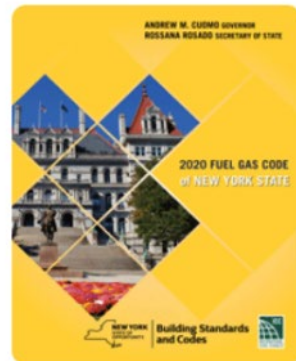
2020 MECHANICAL CODE OF NEW YORK STATE



2020 ENERGY CONSERVATION CONSTRUCTION CODE OF NEW YORK STATE



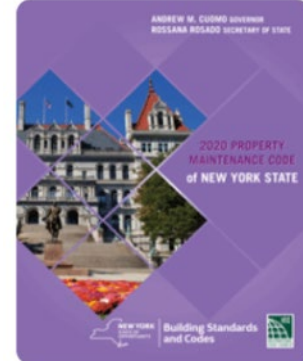
2020 PLUMBING CODE OF NEW YORK STATE



2020 FUEL GAS CODE OF NEW YORK STATE



2020 EXISTING BUILDING CODE OF NEW YORK STATE



2020 PROPERTY MAINTENANCE CODE OF NEW YORK STATE

The next NYS update will be based on the 2024 VERSION OF THE MODEL CODES



# CODE COUNCIL IS AUTHORIZED

## to update the Uniform Code and Energy Code

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- The State Fire Prevention and Building Code Council is comprised of 17 members appointed by the Governor, including some with the advice and consent of the Senate.
- The members of this group represent architects, engineers, builders, trade unions, persons with disabilities, code enforcement, fire prevention, villages, towns, cities, counties, state agencies, the State Fire Administrator and the Secretary of State.
- Updates to the NYS Uniform and Energy Code are enacted through a rulemaking process outlined in the State Administrative Procedure Act (SAPA) and usually occur every 3 years following national model code updates.
- Prior to finalizing an update, the Code Council must determine that the proposed Energy Code remains cost-effective

## ADVANCED BUILDING CODES, APPLIANCE AND EQUIPMENT EFFICIENCY STANDARDS ACT OF 2022

*Energy Law §11-103(2)(a)* The state fire prevention and building code council is authorized, from time to time as it deems appropriate and consistent with the purposes of this article, to review and amend the code, or adopt a new code, through rules and regulations provided that the code remains cost effective with respect to building construction in the state. **In determining whether the code remains cost effective, the code council shall consider (i) whether the life-cycle costs for a building will be recovered through savings in energy costs over the design life of the building under a life-cycle cost analysis performed under methodology as established by the New York state energy research and development authority in regulations which may be updated from time to time, and (ii) secondary or societal effects, such as reductions in greenhouse gas emissions, as defined in regulations.** Before publication of a notice of proposed rulemaking establishing the methodology or defining secondary or societal effects, the president of the authority shall conduct public meetings to provide meaningful opportunities for public comment from all segments of the population that would be impacted by the regulations, including persons living in disadvantaged communities as identified by the climate justice working group established under section 75-0111 of the environmental conservation law.

A cost effectiveness determination must consider energy and societal costs over the life-cycle of a building when the Energy Code is updated.

## NEW YORK STATE LAW has changed the way an Energy Code update is evaluated

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- The Advanced Building Codes, Appliance and Equipment Efficiency Standards Act of 2022 (Code and Standards Act) requires the State Fire Prevention and Building Code Council (Code Council) to evaluate the cost effectiveness of an update to the *Energy Code*.
- The Code Council must evaluate benefits over a longer time horizon and consider the value of societal effects, including reduced greenhouse gas emissions, rather than limiting consideration to a shorter time horizon of 10 years in a simple-payback analysis.
- NYSERDA to establish the methodology used to calculate the benefits and to define the societal effects through rulemaking.

# THE ENERGY LAW COST-EFFECTIVENESS DETERMINATION IS NOT REQUIRED FOR ALL CODES

## Rulemaking 1

## Rulemaking 2

### Administration & Enforcement of Uniform Code and Energy Code

#### Uniform Code

- 1. Building Code
- 2. Residential Code
- 3. Existing Building Code
- 4. Fuel Gas Code
- 5. Mechanical Code
- 6. Plumbing Code
- 7. Fire Code
- 8. Property Maintenance Code

#### Energy Code

- 1. Residential, 3 stories or less
- 2. Commercial and tall Residential

Criteria for Evaluating Cost-Effectiveness of Energy Code

Energy Code Update Subject to Cost-Effectiveness Determination Required in Energy Law

## Cost-Effectiveness Criteria Public Meetings

NYSERDA October 2023

*Comments open until November 3, 2023*

## Notice of Proposed Rulemaking & 60-Day Public Comment Period

NYSERDA January to March 2024

## Cost-Effectiveness Criteria Final Rule

NYSERDA May 2024

# ENERGY CODE UPDATE TAKES EFFECT

May 2025

2023

2024

2025

## Code Council Adopts Code Revisions

Code Council December 2024

## Energy Code Notice of Proposed Rulemaking

Code Council September 2024

## State Energy Code Notice of Rule in Development

Code Council March 2024

# Understanding Cost-Effectiveness

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The costs and savings/benefits of a proposed Energy Code are evaluated relative to current requirements

## WHAT IS A COST-EFFECTIVENESS EVALUATION?

Calculates the incremental costs and savings/benefits of a proposed Energy Code relative to existing requirements

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- The proposed evaluation criteria considers a 30-year useful life of a building and includes broader societal effects of energy use in a comprehensive view of costs, benefits, and impacts across New York State.
- This is an improvement over the old method that used a simplified 10-year payback scenario that did not account for a variety of factors, including interest rates and the true full useful life of an investment.

## ***NYSERDA PROPOSES***

### Approach to cost-effectiveness criteria pursuant to Energy Law

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#### **A. LIFE-CYCLE COST METHODOLOGY FOR CALCULATING ENERGY SAVINGS PROPOSAL**

Calculates life-cycle cost using a 30-year analysis of incremental costs and utility bill savings of a proposed Energy Code relative to current requirements using computer-simulated building models, expressed in net present value.

#### **B. SOCIETAL EFFECTS PROPOSAL**

Assigns values to the global societal benefits from greenhouse gas emission reductions that result from the energy savings in buildings under a proposed Energy Code relative to current requirements. This can be done by calculating the dollar value of greenhouse gas emission reductions on an annual basis for the 30-year study period – following the NYS Department of Environmental Conservation's *Establishing a Value of Carbon, Guidelines for use by State Agencies* – and then summing up the cumulative benefit of the emission reductions that happened each year, expressed in net present value.



# A. Proposed Life-cycle Cost Methodology

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Total energy savings (after new costs) of a proposed Energy Code compared to current requirements, estimated over 30 years of building ownership.

## ***NYSERDA PROPOSES***

### Using U.S. Department of Energy approach to evaluate proposed Energy Code updates

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- Using the US DOE approach, NYSERDA proposes to:
  - Calculate incremental energy savings (kbtu) of the proposed Energy Code compared to today's requirements over 30 years.
  - Calculate incremental benefits (energy cost savings in dollars) of the proposed Energy Code compared to today's requirements over 30 years.
  - Calculate incremental costs (first costs, mortgage and taxes, equipment replacement costs, residual value, maintenance costs in dollars) of the proposed Energy Code compared to today's requirements over 30 years.
  - Sum the net present value of these calculated costs and savings to determine energy savings.

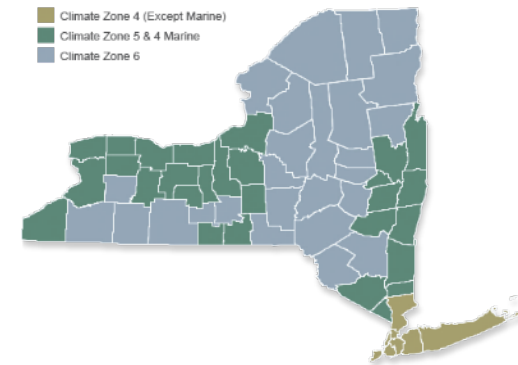
# A1. Proposed Life-cycle Cost Methodology: Calculating Energy Savings

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Computer models can be used to understand how much energy is saved in new buildings built to the proposed Energy Code, over time.

## DIGITAL MODELS can be used to simulate building energy performance to determine energy savings

- NYSERDA proposes to use digital models of baseline and proposed building models that represent a minimum of 75% of new construction in the state.
  - Simulation accounts for the total modeled energy use of each prototype designed to comply with current legal requirements and Energy Code (baseline) and is compared to each corresponding prototype designed to comply with the proposed Energy Code.
  - Residential and commercial building can be modeled based on US Dept. of Energy's new construction prototypes.
  - Simulation results can be weighted by building type for the three NYS climate zones.



WEIGHTED PROPOSED ENERGY USE RESULTS minus WEIGHTED BASELINE ENERGY USE RESULTS equals

**INCREMENTAL STATEWIDE ENERGY USE OF THE PROPOSED ENERGY CODE**

## A2. Proposed Life-cycle Cost Methodology: Calculating Incremental Savings and Costs

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Computer models can also estimate how much more or less new buildings built to the proposed Energy Code would cost, over time.

## ***NYSERDA PROPOSES***

### Calculating ENERGY COST SAVINGS annually for 30 years with energy price escalation rates

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How much more or less will it cost to power a building, built to a proposed energy code?

- Average annual energy prices can be used to avoid seasonal price fluctuation. Where the current annual prices are historically high or low, a longer-term (such as 3-year) average may be used.
- Energy prices weighted by climate zone can account for regional prices differences.
- Current energy prices and projected changes to energy prices over time (escalation rates) can be taken from public sources maintained by federal agencies, state agencies, or investor-owned utilities.
- Total, 30-year energy costs can be calculated to a present value using a discount rate to understand the long-term value of a proposed Energy Code in today's dollars.
  
- Where applicable, mortgage interest tax deduction can be applied as savings.

## ***NYSERDA PROPOSES***

### Calculating the costs of a proposed Energy Code compared to current requirements over 30 years

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- Costs that NYSERDA proposes to include the following incremental costs (how much more or less it costs to build and maintain a building using a proposed Energy Code vs current requirements):
  - Initial costs, including material costs, sales tax, down payment, labor, overhead and profit.
  - Financing and property tax payments applied annually over 30-years.
  - Equipment replacement costs, with any residual value at end of building life accounted for.
  - Maintenance and commissioning costs (commissioning is the process of ensuring a building operates as designed).
- Cost data sources will come from cost-estimating publications such as RS Means. Supplemental data may come from sources including direct distributor, manufacturer and builder quotes; cost estimating firms; industry sources; or journal articles.

## ***NYSERDA PROPOSES***

# Using net present value to reflect time-value of money with discount rates translating future cash flows to today's dollars

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NYSERDA proposes the following approach to discount rates

- Publicly owned, commercial buildings:
  - A real discount rate, as per Annual Supplement to NIST Handbook 135, that does not account for borrowing costs and taxes.
  - A minimum, real discount rate of 3.0% in accordance with Federal standard 10 CFR 436
- Privately owned commercial buildings:
  - A nominal discount rate, equivalent to the commercial loan interest rate, for costs and benefits that are not subject to inflation (loan interest, loan payments, interest tax deduction).
  - A real discount rate for costs and benefits that are subject to inflation (replacement costs/residual value, maintenance costs, energy cost savings). This real discount rate will be tied to the rate of inflation.
- Residential buildings: a nominal discount rate, equivalent to the average mortgage interest rate.
- Total incremental benefits and total incremental costs can be calculated at present value using a respective discount rate.



## ***NYSERDA PROPOSES***

# EXPRESSING LIFE-CYCLE COST USING NET PRESENT VALUE FORMULA

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- $NPV \text{ savings} = PV (\text{incremental benefits}) - PV (\text{incremental costs})$

Where:

- $PV (\text{incremental benefits}) = PV (\text{energy cost savings}) + PV (\text{tax deductions})$
- $PV (\text{incremental costs}) = \text{first costs} + PV (\text{loan \& property tax payments}) + PV (\text{replacement costs}) + PV (\text{residual value}) + PV (\text{maintenance costs})$

## B. Proposed Societal Effects

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Societal effects can be calculated by assigning a dollar value to greenhouse gas emissions from the energy used in the computer simulated buildings.

## What are emissions factors?

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- Greenhouse gas (GHG) emission factors for grid electricity measure the emissions intensity of grid power (the amount of emissions produced per unit of power generated—metric ton of GHG/MWh)
- Fossil fuel GHG emission factors measure the emissions intensity of fuel use (the amount of emissions produced per unit of energy—metric ton of GHG/MMBTU)
- Emissions factors can be used to evaluate how a change to electric load or fuel use from changes to building efficiency represented by a proposed Energy Code will affect emissions per unit of energy.
- Calculating the estimated emissions impact of a proposed Energy Code is the basis for calculating its societal costs and benefits.

## ***NYSERDA PROPOSES***

### Defining “societal effects” as greenhouse gas emissions

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- Societal effects would be quantified in dollars.
- Emissions factors would be applied to incremental energy savings to calculate the emissions output of a proposed Energy Code, determined by NYSERDA in accordance with the *Climate Act*.
- NYSERDA proposes to calculate the value of avoided greenhouse gas emissions on an annual basis for the 30-year study period following the DEC publication *Establishing a Value of Carbon, Guidelines for Use by State Agencies*. Net present value can be calculated using a discount rate pursuant to guidance from DEC or that of another NYS regulatory agency.

# Determining Cost Effectiveness

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A proposed Energy Code can be deemed cost-effective if the 30-year value of benefits exceeds the costs, across the state.

## ***NYSERDA PROPOSES***

reporting the following cost-effectiveness values:

1. Net Present Value of Energy Savings using the life-cycle cost methodology
2. Net Present Value of Societal Savings over the life-cycle
3. The sum of the Net Present Value of Energy Savings and Societal Savings.

Results will be presented, as possible, by climate zone, building type, and aggregated statewide summary.

**NYSERDA assumes that the Code Council will determine a proposed Energy Code is cost-effective when the sum of NET PRESENT VALUES IS POSITIVE**

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**NPV ENERGY SAVINGS + NPV SOCIETAL SAVINGS > 0 = COST EFFECTIVE**

**NPV ENERGY SAVINGS + NPV SOCIETAL SAVINGS < 0 = NOT COST EFFECTIVE**

The sample calculation below examines a 2020 State Energy Code Baseline and the IECC 2021 model code.

- All new buildings in all three New York Climate Zones are weighted in a statewide average.
- Comprehensive analysis would be supported in a full report, inclusive of modeling assumptions, inputs, and data sources.

		Incremental Energy Savings (kWh/ft <sup>2</sup> /Year)*	30-Year NPV for Cost-Effectiveness Criteria (\$/ft <sup>2</sup> )*		
			Life-Cycle Energy Cost Savings	Societal Savings	Combined Savings
<b>RESIDENTIAL</b>	Single Family	0.83	-\$0.13	\$1.91	\$1.79
	Low-Rise Multifamily	1.13	\$0.24	\$2.74	\$2.49
	<b>Weighted**</b>	<b>0.92</b>	<b>-\$0.02</b>	<b>\$2.15</b>	<b>\$1.99</b>
<b>COMMERCIAL &amp; LARGE MULTIFAMILY</b>	Small Office	0.38	\$6.52	\$0.11	\$6.62
	Large Office	0.59	\$7.92	\$0.18	\$8.10
	Standalone Retail	0.52	\$6.12	\$0.03	\$6.16
	Primary School	0.61	\$7.74	\$0.18	\$7.92
	Small Hotel	0.72	\$0.58	\$0.20	\$0.78
	Mid-Rise Apartment	0.06	\$1.68	-\$0.03	\$1.65
	<b>Weighted**</b>	<b>0.34</b>	<b>\$4.32</b>	<b>\$0.06</b>	<b>\$4.38</b>

\* Weighted by climate zone

\*\* Weighted by building type

## PUBLIC MEETINGS

**October 17**, 6:00 pm – 8:00 pm

Albany Capital Center  
Albany, New York

**October 19**, 6:00 pm – 8:00 pm

Buffalo Niagara Convention Center  
Buffalo, New York

**October 24**, 6:00 pm – 8:00 pm

Founders Auditorium at Medgar Evers College  
Brooklyn, New York

**October 26**, 11:00 am – 1:00pm

Virtual



SCAN THE QR CODE FOR  
VENUE AND PRE-REGISTRATION  
INFORMATION, WEBCAST FOR  
VIEWING IN-PERSON MEETINGS,  
AND LINK TO THE VIRTUAL MEETING

## WRITTEN COMMENT SUBMISSION

- Comment form at <https://nyserda.seamlessdocs.com/f/EvaluatingCostEffectiveness>
- Email to [codes@nyserda.ny.gov](mailto:codes@nyserda.ny.gov)
- Comment cards available at the registration table and written comments will be accepted this evening or through mail sent to:  
Cost-Effectiveness Criteria Comments-NYSERDA  
17 Columbia Circle  
Albany, New York 12203