

PERFORMANCE SYSTEMS DEVELOPMENT


NEW YORK STATE OF OPPORTUNITY.

NYSERDA


NYStretch For Residential Buildings Part 2

NYStretch Mechanical, Plumbing, Lighting, and Electrical Power


Performance Systems Development (PSD)



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Introductions 

Presented by:
Performance Systems Development



Chris Whittet
Energy Codes Specialist
Presenter

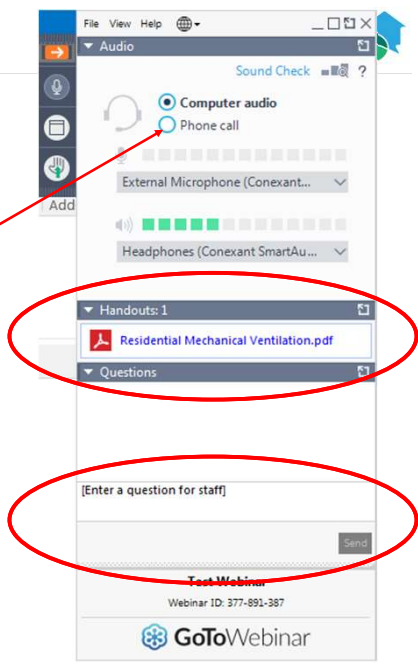
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Logistics

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- Recordings

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Continuing education

This webinar is approved for:

- 1.5 hours NYDOS In-service Training, Topic 3 – Energy Code
- 1.5 AIA LU | HSW
- 1.5 BPI CEUs

Everyone will receive a certificate of attendance

NYDOS Course Number:
T02-07-2976



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All Attendees



- **To receive credit, you must:**
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 - The scheduled end time if the webinar ends late, or
 - The actual end time if the webinar ends early.
- Code officials: Please allow at least three weeks for training to show up in your SLMS training history.

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Agenda

- Recap PART 1
- Introduction and NYStretch Overview, Benefits, Intent and Organization
- Mechanical and Plumbing
- Lighting and Electrical
- Compliance Paths Review

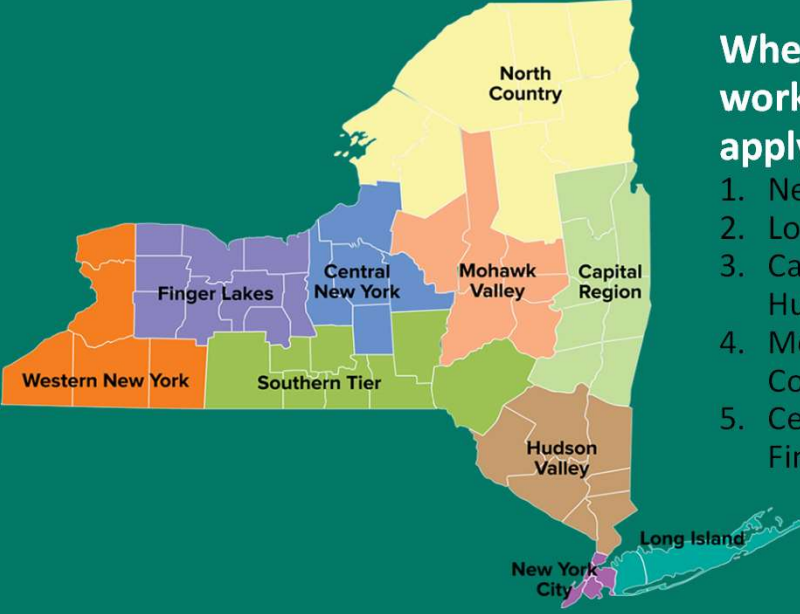
Learning Objectives

After taking this course, attendees will be able to...

1. Identify how mechanical equipment efficiencies and lighting factor into each energy code compliance option under NYStretch
2. Identify differences between NYStretch (or NYCECC) and the base code for mechanical and plumbing systems
3. Understand the Electric Power (Solar-ready and EV-ready) requirements
4. Identify and understand mandatory requirements (items that must be met regardless of compliance path)

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POLL 1



Where do you perform work? Choose all that apply.

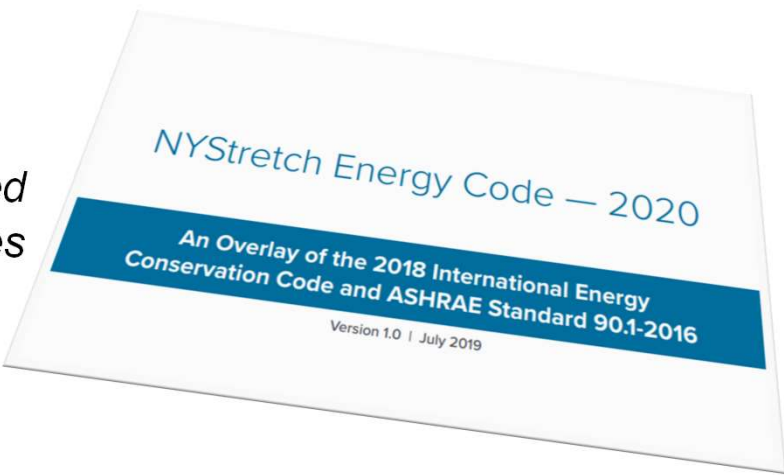
1. New York City
2. Long Island
3. Capital Region / Hudson Valley
4. Mohawk Valley / North Country
5. Central / Southern Tier / Finger Lakes / Western NY

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What is a Stretch Code?

Stretch code definition:
An energy code that can be easily adopted by local municipalities which results in a higher level of efficiency than the statewide “base energy code”



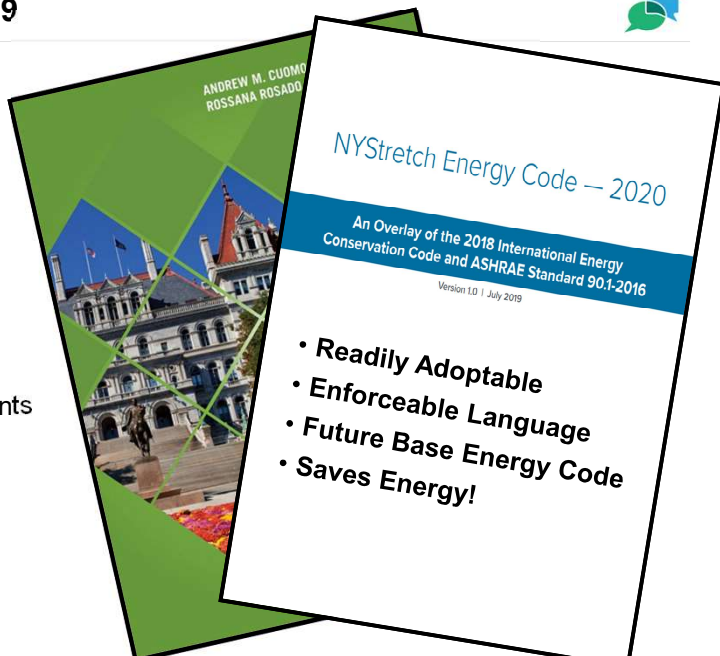
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NYSTRETCH – Published July 2019

NYStretch Commercial & Residential requirements work together with the base New York Energy Conservation Construction Code

- Chapter 1:** Scope and Administration
- Chapter 2:** Definitions
- Chapter 3:** General Requirements
- Chapter 4:** Energy Efficiency Requirements
- Chapter 5:** Existing Buildings
- Chapter 6:** Referenced Standards
- Appendix
- Index





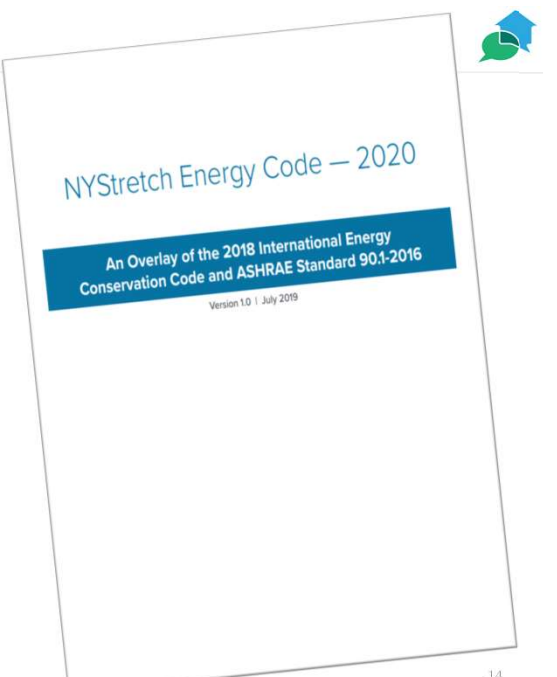
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NYStretch Code - Residential

3	Amendments to 2018 International Energy Conservation Construction Code Residential Provisions	56
3.1	Amendments to Section 401.2	56
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3.15	Amendments to Table R406.4	61
3.16	Addition of New Section R408	62
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3.20	Addition of a New Entry for "PHI" to Chapter 6	64

Includes requirements that have been amended or added to the base NYS Energy Code

Residential Section of the NYStretch Code is 8 Pages in length






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NYStretch Benefits

- ✓ NYStretch homes use less energy, have lower utility bills, increased comfort and better building envelopes
- ✓ Occupants of NYStretch homes will benefit from long-term energy and cost savings
- ✓ NYStretch gives local communities more flexibility to further their carbon reduction and sustainability goals
- ✓ NYStretch helps show what's possible for future Energy Code enhancements
- ✓ **Energy savings!!!**



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Stretch Code Local Adoptions (or Filed for Adoption)

Municipality	Region
Beacon, City of	Hudson Valley
Hastings-on-Hudson, Village of	Hudson Valley
Dobbs Ferry, Village of	Hudson Valley
Montour Falls, Village of	Southern Tier
Kingston, City of	Hudson Valley
New Rochelle, City of	Hudson Valley
Dryden, Town of	Southern Tier
Bethel, Town of	Hudson Valley
Ossining, Town of	Hudson Valley
Marbletown, Town of	Hudson Valley
Newfield, Town of	Southern Tier
Bedford, Town of	Hudson Valley
Philmont, Village of	Capital District
Athens, Village of	Capital District
Niskayuna, Town of	Capital District
Lima, Village of	Finger Lakes
Canandaigua, City of	Finger Lakes
Cortlandt, Town of	Hudson Valley
Mamaroneck, Town of	Hudson Valley

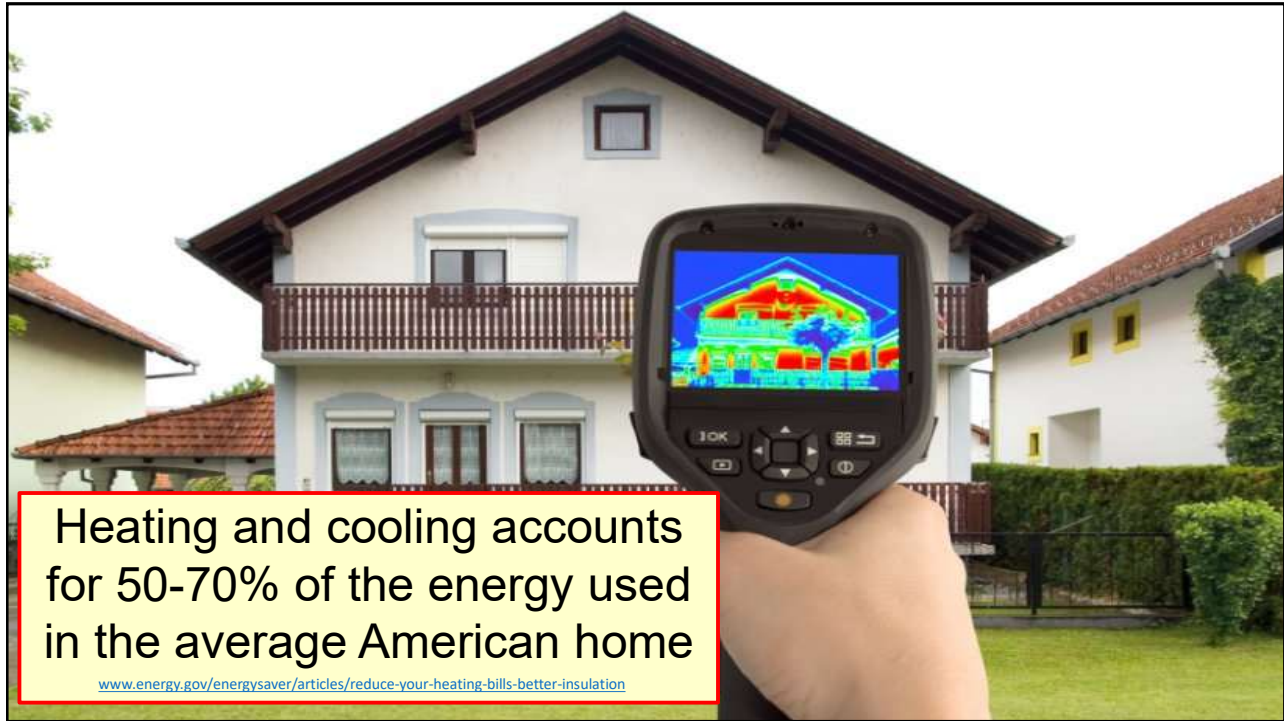
Examples of other states and territories:
CA, MA, BC

NYStretch Energy Code — 2020

An Overlay of the 2018 International Energy Conservation Code and ASHRAE Standard 90.1-2016

Version 1.0 | July 2019

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NYStretch Residential Energy and Cost Savings

NYStretch Energy Code — 2020

An Overlay of the 2018 International Energy Conservation Code and ASHRAE Standard 90.1-2016

Version 1.0 | July 2019

Residential provisions result in approximately **25% energy savings** over the 2020 ECCC NY

	Total Regulated Site Energy (kBtu/dwelling unit)	Total Regulated Source Energy (kBtu/dwelling unit)	Total Energy Costs (\$/dwelling unit)
Baseline	59,926.4	91,545.1	1,514.9
2020 NYStretch	45,161.4	71,769.2	1,216.7
Savings	24.6%	21.6%	19.7%

For more information about the 2020 New York Stretch Code, see: <https://www.nyscrda.ny.gov/All-Programs/Programs/Energy-Code-Training/NYStretch-Energy-Code-2020>

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NYStretch Intent

- ✓ NYStretch was created by NYSERDA to be “a pivotal tool for New York jurisdictions to support the State’s energy and climate goals”
- ✓ It does this by “accelerating the savings obtained through their building energy codes”
- ✓ Authorities Having Jurisdiction have the legal ability to voluntarily adopt NYStretch

REV Clean Energy Goals for 2030

40%

Reduction

in greenhouse gas emissions from 1990 levels

50%

Generation

of New York State’s electricity must come from renewable energy sources

23%

Decrease

in energy consumption of buildings from 2012 levels

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NYStretch and 2020 New York City Energy Conservation Code Highlights

Allowable Compliance Paths

Building Thermal Envelope:

- Better windows and skylights
- Higher insulation levels
- Insulation inspected by an approved agency
- Air Leakage Testing Requirements

Mechanical systems:

- All ducts in conditioned space
- Ducts sized properly
- Efficient plumbing layouts
- Drain water heat recovery
- Recirculation systems
- Balanced ventilation with HRV/ERV or HVAC-integrated with ECM
- Ventilation flow testing required

Electric Power & Lighting:

- Lighting – basically requires LEDs
- Electric power packages
 - Solar-ready zone
 - EV equipment capable

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Funded by the New York State Energy Research and Development Authority(NYSERDA)

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NYStretch - R403.3 Ducts in Conditioned Space

NYStretch requires duct systems in new buildings and additions to be located in conditioned space

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NYStretch - R403.3 Ducts in Conditioned Space

Two options:

1. Keep all ducts and air handlers inside the building's thermal & air barrier
2. Keep air handler inside the thermal & air barrier **AND** qualify the ducts as "buried ducts"

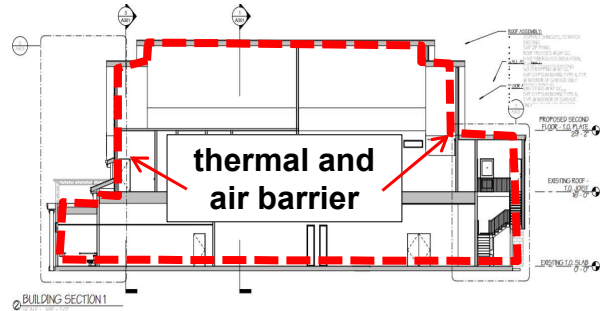
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NYStretch - R403.3 Ducts in Conditioned Space



The duct system is in conditioned space if it is located completely:

- a) Within the continuous air barrier
- and*
- b) Within the building thermal envelope



Section 105.2.1 of the NYS base Energy Code requires the *building's thermal envelope* shall be represented on the construction drawings

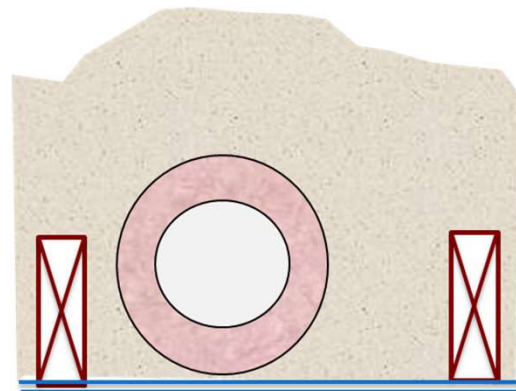
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NYStretch - R403.3 Ducts in Conditioned Space



If ducts are buried in insulation in a particular way, they qualify as “ducts within conditioned space”



Ducts buried in insulation

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NYStretch - R403.3 Ducts in Conditioned Space



To qualify Ducts Buried in Ceiling Insulation in NYStretch as "Ducts in Conditioned Space":

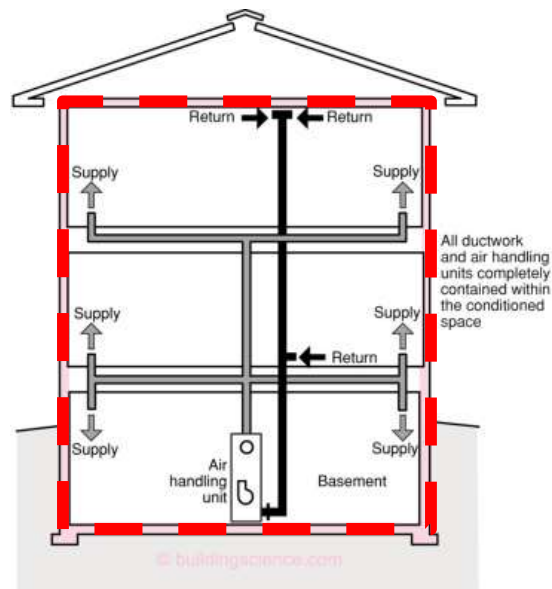
1. ALL air handlers must be inside the building thermal & air barrier
2. Supply and Return Ductwork must be insulated to R-8 Min
3. Duct leakage (as measured by a leakage test to the outside) must be less than or equal to 1.5 cubic feet per minute per 100 square feet of conditioned floor area served by the duct system
4. The ceiling insulation R-value installed above the insulated duct must be greater than or equal to the proposed ceiling insulation R-value (less the R-value of the insulation on the duct)

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NYStretch - R403.3 Ducts in Conditioned Space



- 1) Air handlers must be inside the building thermal & air barrier



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NYStretch - R403.3 Ducts in Conditioned Space



- 2) R-8 Minimum Supply & Return Duct Insulation



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NYStretch - R403.3 Ducts in Conditioned Space



- 3) Duct leakage (as measured by a leakage test to the outside) must be less than or equal to 1.5 cubic feet per minute per 100 square feet of conditioned floor area served by the duct system



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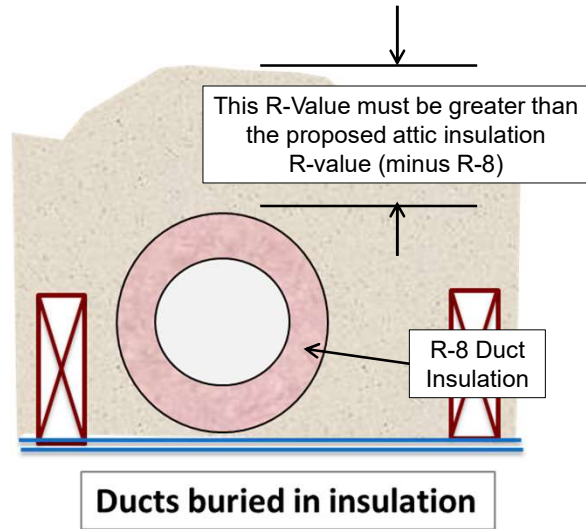
NYStretch - R403.3 Ducts in Conditioned Space



- 4) The ceiling insulation R-value installed above the insulated duct must be greater than or equal to the proposed ceiling insulation R-value (less the R-value of the insulation on the duct)

Example:

- Proposed ceiling R-value: R-49
- Duct insulation: R-8
- Insulation required above the duct:
 $R-49 - R-8 = R-41$



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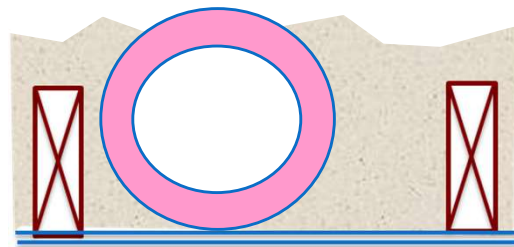
NYStretch - R403.3 Ducts in Conditioned Space



Watch out for ductwork located in:

- ✓ Vented attics
- ✓ Vented crawl spaces
- ✓ Uninsulated basements
- ✓ Garage ceilings
- ✓ Vented side-attics
- ✓ Unconditioned porches

Or, ducts that are only partially buried or not buried deep enough



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POLL #2



True or False

Ducts must be tested for leakage to meet the requirements of NYStretch.

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NYStretch - R403.3.8 Ducts System Sizing



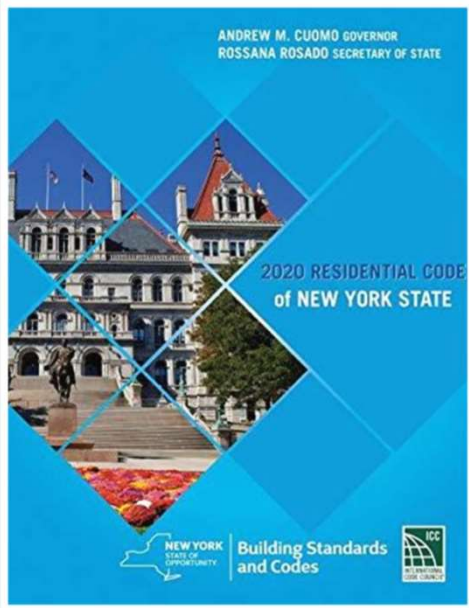
Ducts shall be sized in accordance with ACCA Manual D based on calculations made in accordance with:

- ACCA Manual S
- ACCA Manual J
- or other approved heating and cooling sizing calculation methodologies



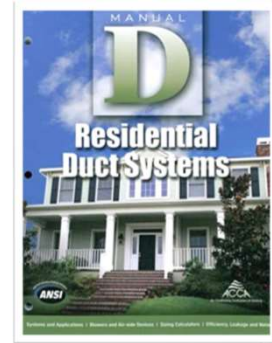
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NYS 2020 Residential Code – M1601.1 Duct Design



Duct systems serving heating, cooling and ventilation equipment **shall be installed in accordance with** the provisions of this section and one of the following:

- ACCA Manual D
- The appliance manufacturer's installation instructions
- Other approved methods



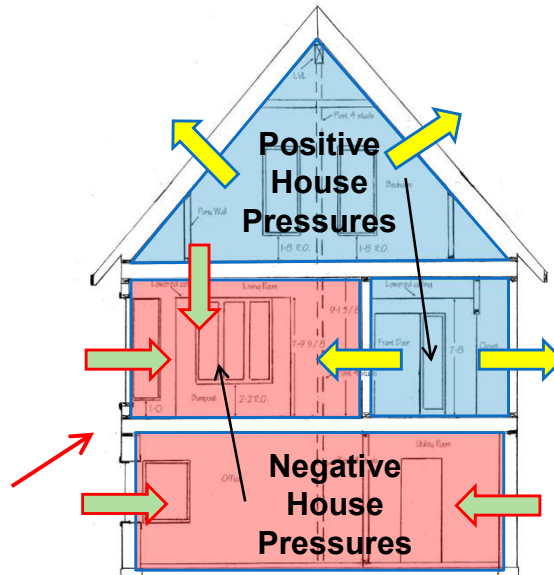
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Duct Sizing Problems



Ducts that are NOT sized properly can cause:

- ✓ Rooms to be too warm or too cool
- ✓ Ductwork to be noisy when the air handler is on
- ✓ Utility bills to be higher than they should be
- ✓ Pressure imbalances within the home



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Duct Sizing Problems

Make sure the Duct Return System is designed properly

They can be overlooked and undersized!

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NYStretch Duct Sealing (Same as the base NYS Energy Code)

[NY] R403.3.2 Duct Sealing (Mandatory)

- Ducts, air handlers and filter boxes shall be sealed.

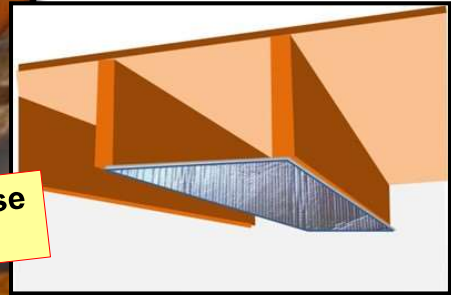
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NYStretch – No Building Cavities as Ducts (Mandatory)



NYStretch does not allow building framing cavities to be used as ducts or plenums.



Same as the base Energy Code

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Duct Design and Installation




Flex ducts:

No compression, kinks, sagging, acute angle bends



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ACCA Resources: <http://www.acca.org/standards/codes>


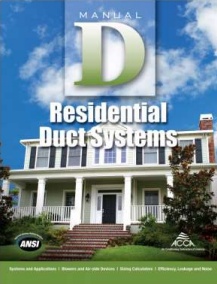


Verifying ACCA Manual D® Procedures


Why are duct design calculations important?
 Achieving occupant satisfaction is the principal goal of any HVAC design. For residential air duct designs ACCA's Manual D is the procedure recognized by the American National Standards Institute (ANSI) and specifically required by residential building codes. Air is the first word in air conditioning. If the network of ducts carrying the air is not properly designed then the health and safety of the occupant are at risk, the equipment could fail more quickly, the energy costs could rise, and occupant comfort might be sacrificed.

What problems come from wrong sized ducts?
 In order for home owners to be comfortable a duct system must be designed to carry the right amount of air, at the right speed, into the right room. If the ducts are the wrong size then the wrong amount of air will enter the room and may cause:

- The room to be too warm or too cool
- The air to be too drafty and disturb people while they sleep, eat, read, etc.
- The air to be too noisy and drown out conversations, TV or radio programs, etc.
- The air to be too slow – the conditioned air will not circulate or mix well in the room.
- The fan to work harder, possibly fail sooner, and use more energy to move air
- The furnace or air conditioner safety devices to stop equipment operation
- Pressure differentials that may increase energy costs by pushing out conditioned air or drawing in unwanted air.

Includes Duct Inspection Checklist



ACCA
 AIR CONDITIONING CONTRACTORS OF AMERICA®

2800 Shirlington Road, Suite 300
 Arlington, VA 22206
 Phone 703-824-4477
 Fax 703-575-4449

ACCA's Manual D Residential Duct Design Checklist		
Key Item	Check	Questions to Ask
Information from load calculation	CFM for each room	Does each room have a heating and cooling CFM assigned? (Proportioned air supply based on Manual J8 room-by-room load calculations) (C)
Manufacturer's Data	Manufacturer's External Static Pressure (ESP)	According to the manufacturer's data will the fan produce the specified airflow at the specified static pressure? (Manufacturers produce a graph that relates air flow and static pressure) (A) (B)
	Accessory and device pressure losses	Did the contractor submit the manufacturer's data specifying the pressure drop for any item in the air stream like a high efficiency filter or a hot water coil? (C)
Manual D Friction Worksheet	Available Static Pressure (ASP)	Are supply outlets, return grilles, and balancing dampers listed at a standard 0.03? (C) Are the pressure drops listed for other external devices: filters, coils, etc...? (C)
	Total Effective Length (TEL)	Did the contractor calculate the TEL by adding the longest Supply Total Effective Length and the longest Return Total Effective Length? (Total Effective Length = the length of the duct from outlet back to unit + the effective length for all fittings, i.e., elbows, reducers, take-offs, etc...) (D)
	Friction Rate design value	Did the contractor use the Friction Rate Chart or calculate Friction Rate [FR = ASP x 100 / TEL] (C)
Air Distribution System Design	Branch Lead Size	Did the contractor size the ducts based on the design CFM, friction rate, and the duct material used? (C)
	Trunk Size	Did the contractor select a supply trunk duct large enough to accommodate all the supply branch leads? (C)
	Return Trunk Duct Velocities	Did the contractor select the return trunk duct large enough to meet the lower return air velocity requirements? (I)
Manual T	Return air path	Verify each occupied room has an open air path (ACCA recommends a ducted return for each bedroom, den, library, etc...) (C)
	Register and Grille Face Velocities	Does the air velocity across the register or grille exceed the Recommended Velocity Chart? (Grille manufacturers list the face velocity for grilles and registers at a given CFM, e.g., 12 x 4 - Model XYZ, 500fpm at 120cfm) (I)

ACCA (Air Conditioning Contractors of America) is dedicated to providing the highest quality air conditioning and air conditioning services. Some of the services we offer, and our industry standards are: ACCA design, installation, and maintenance.

The ACCA Code of Ethics and Standards of Practice is a commitment to the highest quality of service and performance.

Sponsored by The ACCA Code of Ethics and Standards of Practice is a commitment to the highest quality of service and performance.

For a more detailed analysis on the design process visit www.acca.org for Bob's House

To order ACCA Manual D 888-290-2220

For a more detailed analysis on the design process visit www.acca.org for Bob's House


To order ACCA Manual D 888-290-2220

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POLL #3

True or False

ACCA Manual D provides industry standards for proper duct design.



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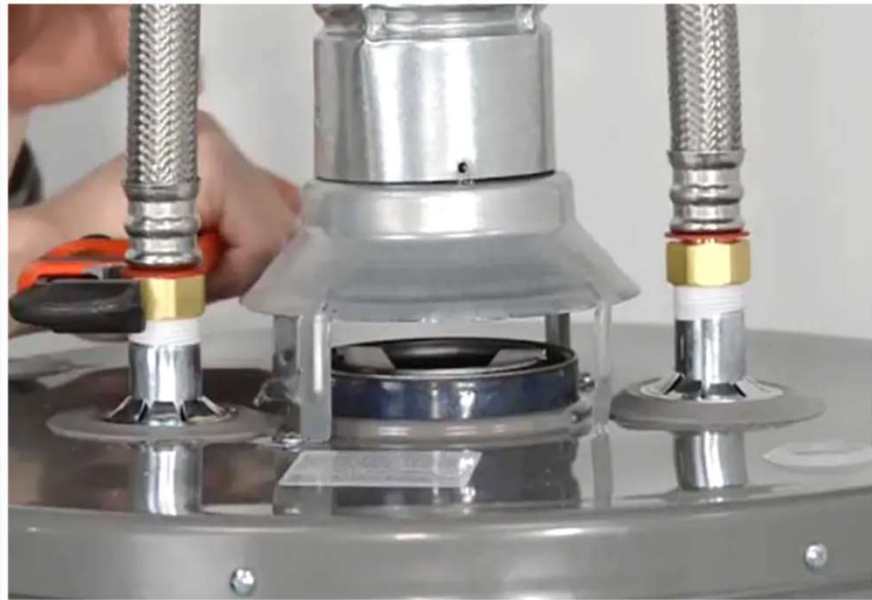
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NYStretch energy conservation measures for service hot water systems



An efficient service water system shall be based on **one** of the following:

1. Maximum allowable pipe length method
2. Maximum allowable pipe volume method
3. Drain water heat recovery
4. Recirculation systems



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NYStretch energy conservation measures for service hot water systems



Meet **one** of the following:

1. Maximum allowable pipe length method
2. Maximum allowable pipe volume method
3. Drain water heat recovery
4. Recirculation systems

In both cases, the intent is to minimize the amount of hot water in the pipe which, in turn, minimizes heat losses

The goal of drain water heat recovery is to reclaim waste heat from at least one shower in the home

The goal of recirculation system requirements in NYStretch is to operate residential service water heating recirculation systems more efficiently

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NYStretch Maximum allowable pipe length method




Table R403.5.5.1
Pipe Volume and Maximum Piping Lengths

Nominal Pipe or Tube Size (inch)	The maximum allowable pipe length is from the nearest source of heated water to the termination of the fixture supply pipe	Maximum Pipe or Tube Length		
		System without a circulation loop or heat-traced line (feet)	System with a circulation loop or heat-traced line (feet)	Lavatory faucets – public (metering and nonmetering) (feet)
1/4 ^a		50	16	6
5/16 ^a		50	16	4
3/8 ^a		50	16	3
1/2		43	16	2
5/8		32	12	1
3/4		21	8	0.5
7/8		16	6	0.5
1		13	5	0.5
1 1/4		8	3	0.5
1 1/2		6	2	0.5
2 or larger		4	1	0.5

a. The flow rate for 1/4-inch size pipe or tube is limited to 0.5 gallons per minute; for 5/16-inch size, it is limited to 1 gpm; for 3/8-inch size, it is limited to 1.5 gpm.

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NYStretch Maximum allowable pipe length method




Table R403.5.5.1
Pipe Volume and Maximum Piping Lengths

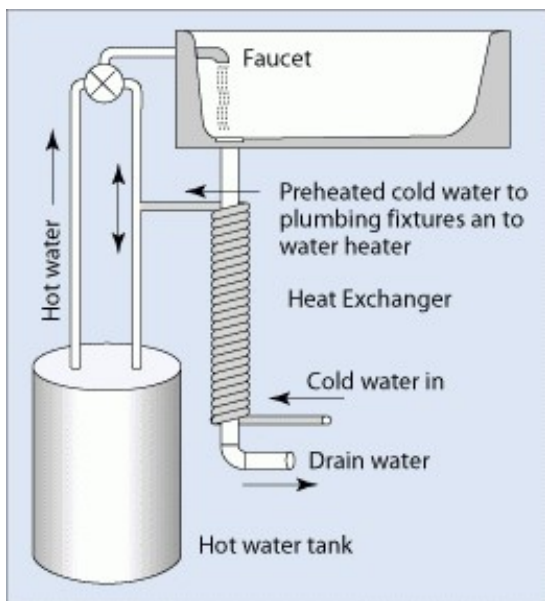
Nominal Pipe or Tube Size (inch)	VOLUME (Liquid Ounces Per Foot Length)	Maximum Pipe or Tube Length		
		System without a circulation loop or heat-traced line (feet)	System with a circulation loop or heat-traced line (feet)	Lavatory faucets – public (metering and nonmetering) (feet)
1/4 ^a	0.33	50	16	6
5/16 ^a	0.5			
3/8 ^a	0.75			
1/2	1.5			
5/8	2			
3/4	3	21	8	0.5
7/8	4	16	6	0.5
1	5	13	5	0.5
1 1/4	8	8	3	0.5
1 1/2	11	6	2	0.5
2 or larger	18	4	1	0.5

The maximum volume shall be 64 ounces for hot or tempered water from a water heater or boiler to the fixture

a. The flow rate for 1/4-inch size pipe or tube is limited to 0.5 gallons per minute; for 5/16-inch size, it is limited to 1 gpm; for 3/8-inch size, it is limited to 1.5 gpm.

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NYStretch – R403.5.4 Drain water heat recovery



Drain water heat recovery units shall have a minimum efficiency of 40 percent if installed for equal flow or a minimum efficiency of 52 percent if installed for unequal flow



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NYStretch R403.5.5.4 Recirculation Systems



- NYStretch requires that recirculation systems have no more than 1/2 gallon of storage. The storage limit shall be measured from the point where the branch feeding the fixture branches off the recirculation loop to the fixture

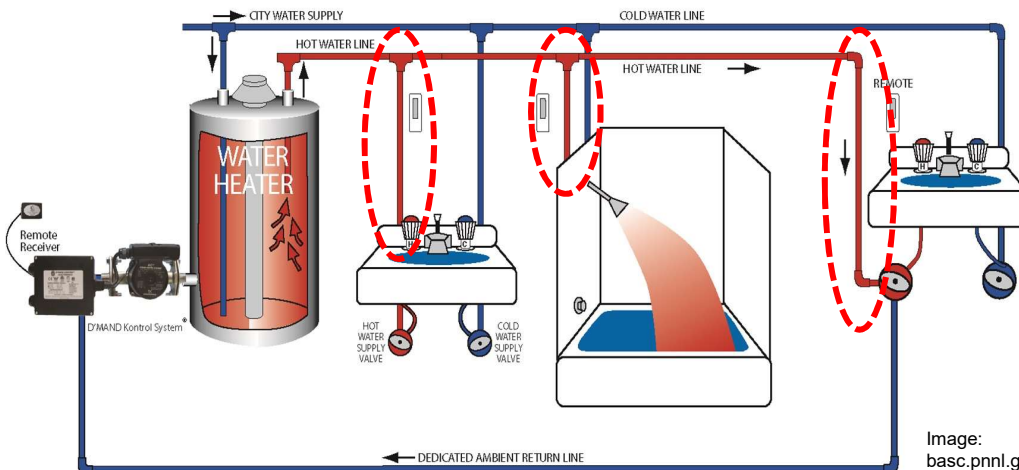


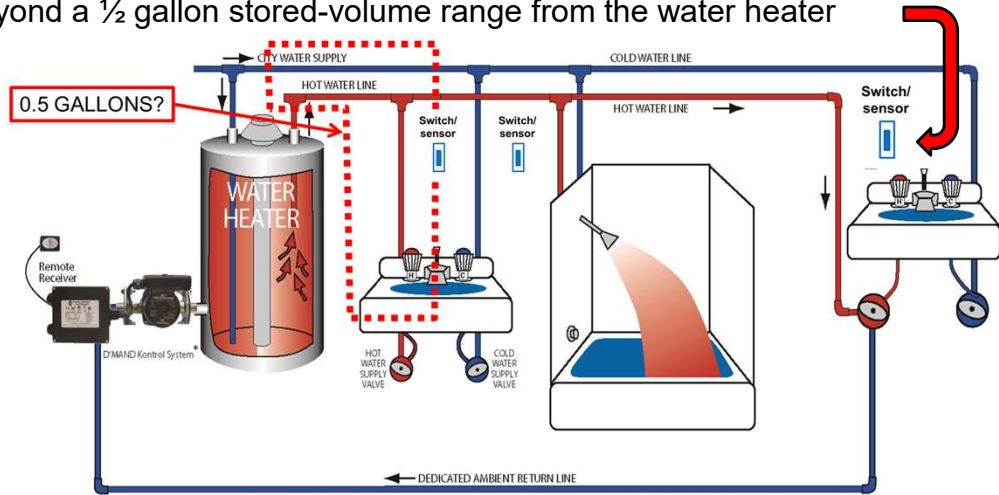
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NYStretch R403.5.5.4 Recirculation Systems



- In addition, recirculation systems must be based on an occupant-controlled switch or an occupancy sensor, installed in each bathroom, which is located beyond a ½ gallon stored-volume range from the water heater



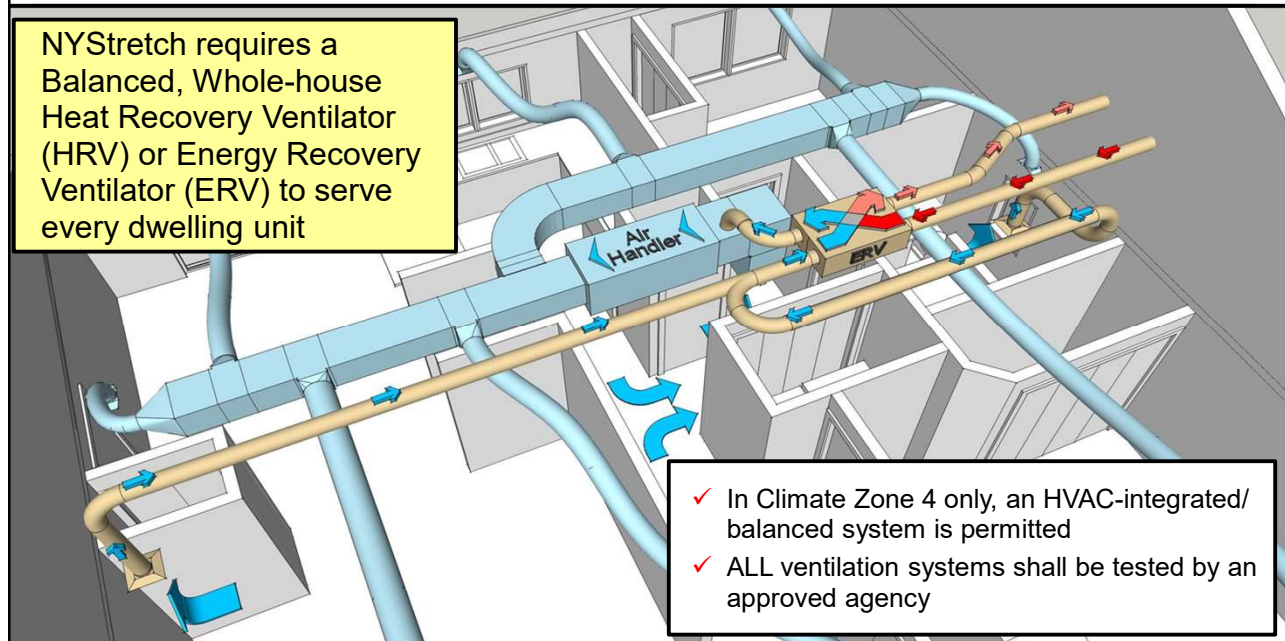
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NYStretch – R403.6.2 Mechanical Ventilation (Mandatory)



NYStretch requires a Balanced, Whole-house Heat Recovery Ventilator (HRV) or Energy Recovery Ventilator (ERV) to serve every dwelling unit



- ✓ In Climate Zone 4 only, an HVAC-integrated/balanced system is permitted
- ✓ ALL ventilation systems shall be tested by an approved agency

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Ventilation Definitions

ECCCNYS/NYCECCC Chapter 2:

WHOLE HOUSE MECHANICAL VENTILATION SYSTEM - An exhaust system, supply system, or combination thereof that is designed to mechanically exchange indoor air with outdoor air when operating continuously or through a programmed intermittent schedule to satisfy the whole house ventilation rates

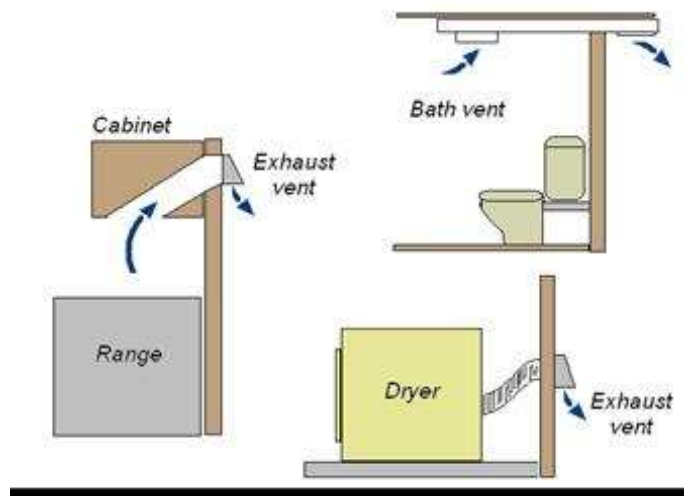


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Ventilation Definitions

Other terms:

“Local” or “spot” ventilation: Ventilation systems intended to control moisture or pollutants at their source (e.g., bath fans and range hoods), rather than the whole house. These systems are typically manually turned off and on.



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Mechanical Ventilation System Types

The diagram illustrates three types of mechanical ventilation systems in a house cross-section:

- Exhaust-Only:** Shows air being drawn from the house into a central unit and then exhausted out through the roof. Arrows indicate air leaving the house through the roof and entering from the walls.
- Supply-Only:** Shows air being drawn from the outdoors into a central unit and then distributed into the house. Arrows indicate air entering from the roof and leaving through the walls.
- Balanced:** Shows air being drawn from the outdoors into a central unit, which then distributes air into the house while also exhausting an equal amount of indoor air out through the roof. Arrows indicate air entering from the roof and leaving through the walls.

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Balanced Mechanical Ventilation Systems

Balanced Mechanical Ventilation Systems draw outdoor air into the house and expel an equal amount of indoor air to the outdoors

- ✓ Systems can be balanced with or without heat recovery

The diagram shows a house cross-section with a central mechanical ventilation unit. Arrows indicate outdoor air being drawn into the house through the roof and indoor air being exhausted out through the roof, maintaining a balanced flow.

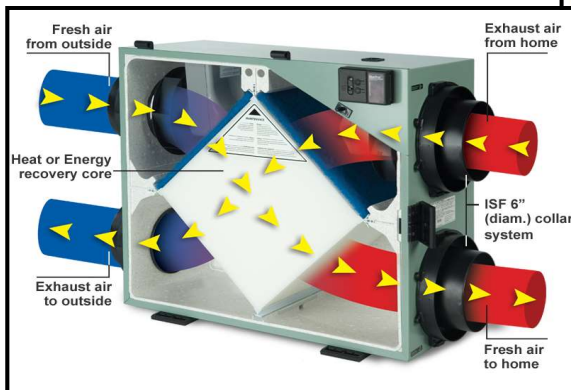
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NYStretch – R403.6.2 Mechanical Ventilation (Mandatory)



HRVs and ERVs are similar devices in that both supply air to the home and exhaust stale air while recovering energy from the exhaust air in the process.



The primary difference between the two is that an HRV transfers heat while an ERV transfers both heat and moisture.

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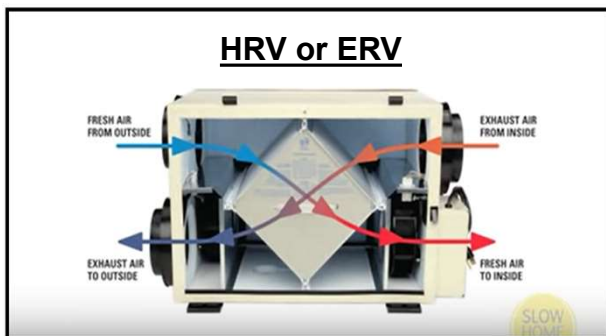
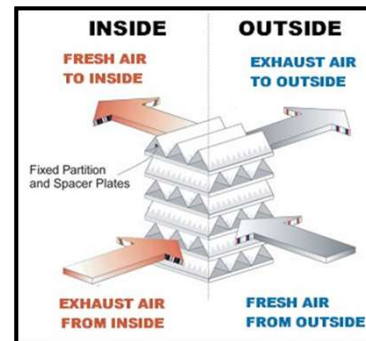
53

NYStretch – R403.6.2 Mechanical Ventilation (Mandatory)



In new buildings, every dwelling unit shall be served by a **heat recovery ventilator (HRV) or energy recovery ventilator (ERV)**

- Must be installed per manufacturer's instructions
- Equipment must be *listed*
- Properly sized for the application, including conditioned floor area and number of occupants



Exception: Systems, in climate zone 4, using the return side of the building's heating and/or cooling system air handler to supply outdoor air (meeting certain requirements)

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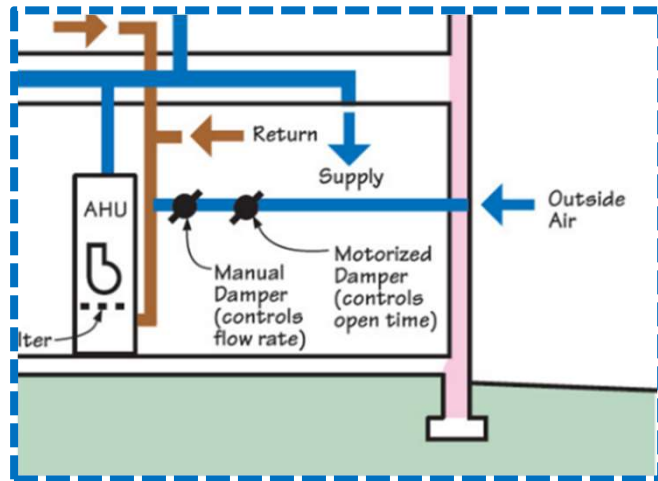
54

NYStretch R403.6.2 - HRV/ERV Exception in Climate Zone 4



There is an exception to HRV/ERV requirement in NYStretch for ventilation systems that use the return side of the building's heating and/or cooling system air handler to supply outdoor air. The exception requires:

- The mixed air temperature entering the air handler meets manufacturer's requirements
- Furnace fans *field verified* to not exceed 45 W/CFM - Other types of heating ≤ 58 W/CFM
- Equivalent exhaust air from one or more fans, located remotely from the source of supply air, must be interlocked for simultaneous operation
- Ventilation rates per Table R403.6.2(1)
- Continuous operation of the balanced ventilation system is not permitted



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RCNYS M1505.4.3 - Mechanical Ventilation Rate



Eq. 15-1: $CFM = (0.01 \times \text{total square foot area of house}) + [7.5 \times (\text{number of bedrooms} + 1)]$

or

RCNYS Table M1505.4.3(1)
CONTINUOUS WHOLE-HOUSE VENTILATION SYSTEM AIRFLOW RATE REQUIREMENTS

Dwelling Unit Floor Area (square feet)	Number of Bedrooms				
	0-1	2-3	4-5	6-7	>7
Airflow in CFM					
< 1,500	30	45	60	75	90
1,501 – 3,000	45	60	75	90	105
3,001 – 4,500	60	75	90	105	120
4,501 – 6,000	75	90	105	120	135
6,001 – 7,500	90	105	120	135	150
> 7,500	105	120	135	150	165

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RCNYS M1505.4.3 - Mechanical Ventilation Rate



For a 2,000 square foot home with 3 bedrooms, the Mechanical Ventilation Rate required is 60 CFM

RCNYS Table M1505.4.3(1)
CONTINUOUS WHOLE-HOUSE VENTILATION SYSTEM AIRFLOW RATE REQUIREMENTS

Dwelling Unit Floor Area (square feet)	Number of Bedrooms				
	0-1	2-3	4-5	6-7	>7
	Airflow in CFM				
< 1,500	30	45	60	75	90
1,501 – 3,000	45	60	75	90	105
3,001 – 4,500	60	75	90	105	120
4,501 – 6,000	75	90	105	120	135
6,001 – 7,500	90	105	120	135	150
> 7,500	105	120	135	150	165

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RCNYS M1505.4.3 - Whole-house Mechanical Ventilation



Exception: System may operate intermittently if:

- Controls enable operation on a preset schedule
- Ventilation rate is multiplied by an adjustment factor per Table M1507.3.3(2)

RCNYS Table M1505.4.3(2)
INTERMITTANT WHOLE-HOUSE VENTILATION SYSTEM AIRFLOW RATE REQUIREMENTS

Run-time % in Each 4-hour Segment	25%	33%	50%	66%	75%	100%
Factor	4.0	3.0	2.0	1.5	1.3	1.0

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ECCCNYS R403.6.1 - Whole House Mechanical Ventilation



Fans shall meet the efficacy requirements of Table R403.6.1

TABLE R403.6.1
 WHOLE-HOUSE MECHANICAL VENTILATION FAN EFFICACY

Fan Location	Air Flow Rate Minimum (CFM)	Minimum Efficacy (CFM/WATT) ^a	Air Flow Rate Maximum (CFM)
HRV or ERV	Any	1.2 cfm/watt	Any
Range hoods	Any	2.8 cfm/watt	Any
In-line fan	Any	2.8 cfm/watt	Any
Bathroom, utility room	10	1.4 cfm/watt	< 90
Bathroom, utility room	90	2.8 cfm/watt	Any

Exception: Where whole-house mechanical ventilation fans are integral to HVAC equipment they shall be powered by an electronically commutated motor (ECM)

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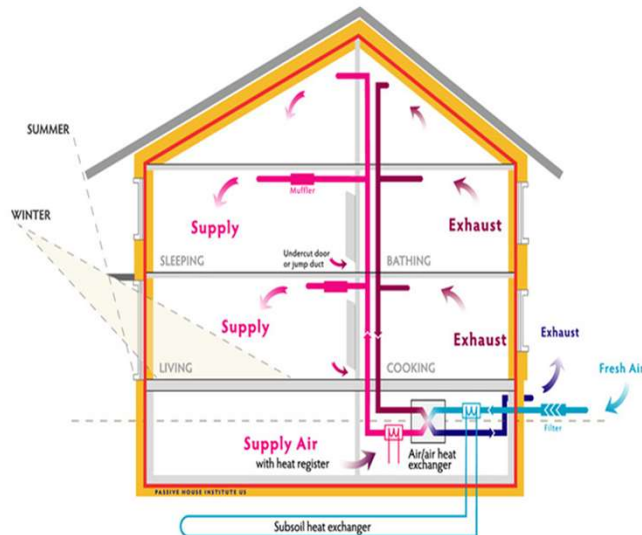
59

Ventilate Right



Whole-house mechanical ventilation is necessary to:


- Maintain good indoor air quality
- Reduce excess moisture build-up in the house
- Meet code




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Why Build Tight and Ventilate?



REM/Rate Modeling Case Study




	House 1: 2009 IECC Leakage Rate	House 2: 2018 IECC Leakage Rate
Location	Climate Zone 5	
Conditioned floor area	3,000 ft ²	
Envelope air leakage	7 ACH50	3 ACH50
Whole-house ventilation strategy	None	Exhaust-only Fan efficacy: 2.4 CFM/W (89.9 CFM, 64 W)
Annual heating energy use	108.4 MMBtu	87.7 MMBtu
Annual heating energy cost (\$)	\$1,307	\$1,028
Heating energy savings (%)	--	20%
Annual heating energy savings (\$)	--	\$279
15-yr heating energy savings (\$)	--	\$4,185

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POLL #4



Ventilation Rate is based on (*which two* of these items):

- a) CFM of the air handler
- b) Square footage of building
- c) Number of bedrooms
- d) Number of bathrooms
- e) Volume of building

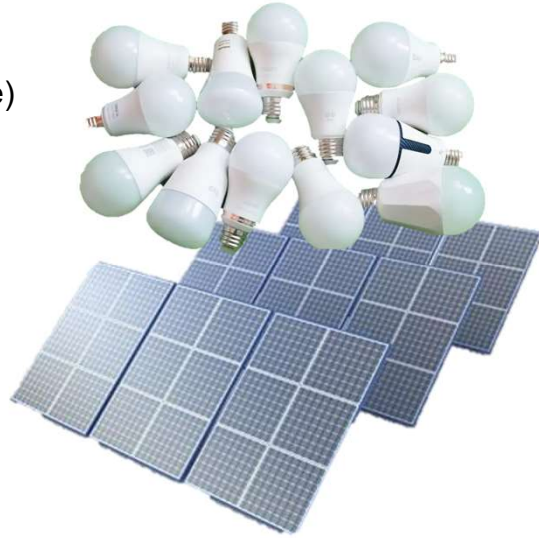
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NYStretch Lighting & Electrical Power



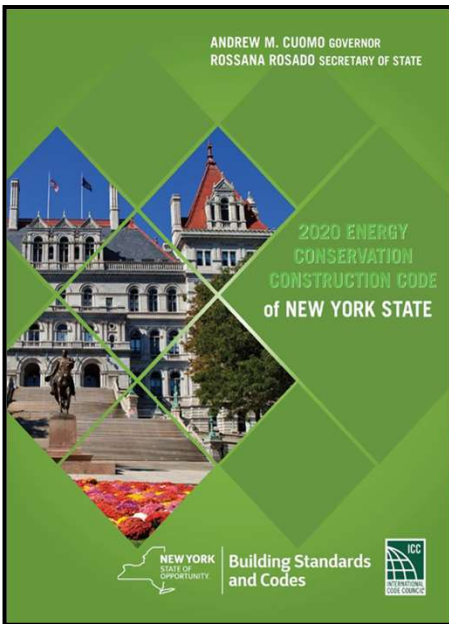
- Lighting
 - 90% high efficacy (same as base code)
 - High efficacy definition (different from base code)
- Electric power packages (both are required)
 - Solar-ready zone (Appendix RA) for homes >1,400 SF and
 - Electric vehicle service equipment capable



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NYStretch Lighting Efficacy



A minimum of 90% of the **lamps** (i.e., bulbs) in permanently installed fixtures shall be **high efficacy**

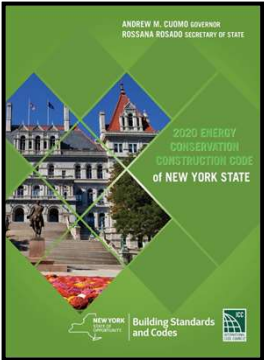
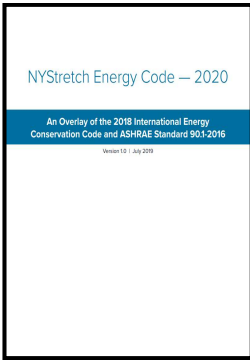
NYStretch Energy Code – 2020

An Overlay of the 2018 International Energy Conservation Code and ASHRAE Standard 90.1-2016

Version 1.0 | July 2019

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NYStretch Lighting Efficacy


For Lamps	Minimum Lamp Efficacy
Over 40 watts	60 lumens per watt
Over 15 watts to 40 watts	50 lumens per watt
15 watts or less	40 lumens per watt

Lamps with an efficacy of at least 65 lumens per watt or have a total luminaire efficacy of at least 45 lumens per watt


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NYStretch Lighting Efficacy




Incandescent Bulb
15 Lumens per watt



Halogen Bulb
18 Lumens per watt



CFL
60 Lumens per watt



LED
100 Lumens per watt

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Example Lighting Fixture Schedule

LIGHTING FIXTURE SCHEDULE									
Fixture ID	LOCATION	MANUFACTURER/ MODEL	LAMP TYPE	# OF LAMPS/ FIXTURE	FIXTURE WATTAGE (Watt)	LAMP EFFICACY (Lumens/Watt)	FIXTURE EFFICACY (Lumens/Watt)	TOTAL # OF FIXTURES	NOTES
A1	Apt Foyer	QWERT/ Model-number-LE-1234-5678	LED	1	26	98	—	82	2700K
A2	Apt Bathroom	WERTY/ Model-number-LE-2345-6789	LED	1	35	92	—	126	3000K
C1	Lobby	ERTYU/ Model-number-LE-3456-7890	LED	1	53	—	83	25	6'
C2	Corridor	RTYUI/ Model-number-LE-4567-8901	LED	1	20	—	87	56	4'
B1	Storage	TYUIO/ Model-number-CFL-5678-9012	Compact FL	2	28	91	—	18	14W T5 (2)

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Electrical Power Packages (Mandatory)

NYStretch requires new buildings to meet the requirements of:

1. *Solar-ready Zone*
2. *Electrical Vehicle Service Equipment Capable*

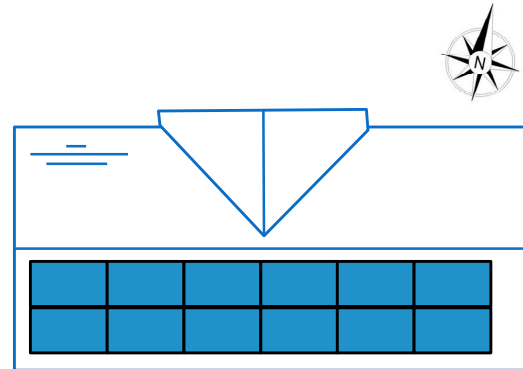
68

Electrical Power Packages (Mandatory)



Solar-ready zone (Appendix RA) for homes >1,400 SF

“A solar-ready zone is a section or sections of roof or building overhang designated and reserved for the future installation of a solar photovoltaic or solar thermal system”



Solar Ready Roof Plan

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Electrical Power Packages (Mandatory)



Solar-ready zone (Appendix RA) for homes >1,400 SF:

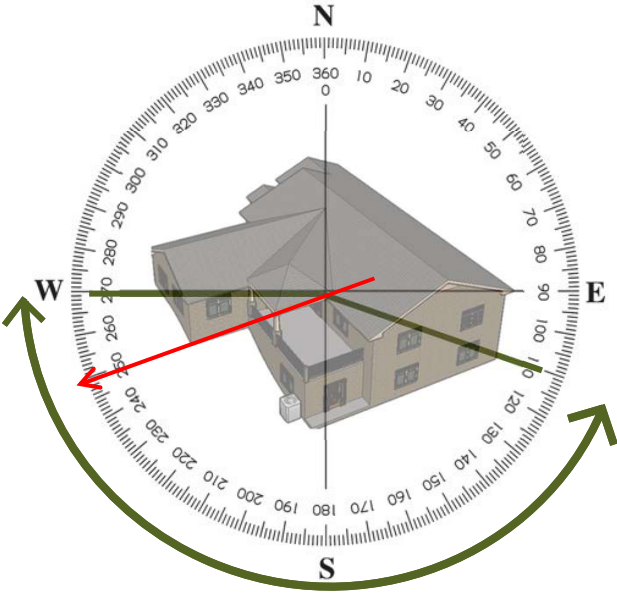
- NYStretch requires newly constructed detached 1 and 2-family homes and townhomes that have more than 1400 sf of conditioned floor area to meet the requirements of Appendix RA of the NYS Energy Code.
- The solar-ready zone applies to buildings with at least 600 sf roof area between 110 degrees and 270 degrees of true north.
- Exceptions are given for additions to buildings, buildings shaded more than 70% of daylight hours annually and for those where an on-site renewable energy system is permanently installed.
- Reserved electric panel space, roof-load calculations and an electrical pathway from roof to the electric panel box is required.

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Appendix RA: Solar-Ready Provisions

- Not less than 600 sq.ft. of roof area
- Oriented between 110 to 270 degrees of true north




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Appendix RA: Solar-Ready Provisions

Exception 1: Buildings with permanently installed on-site renewable energy systems

Exception 2: Solar-ready zone shaded for more than 70% of daylight hours annually

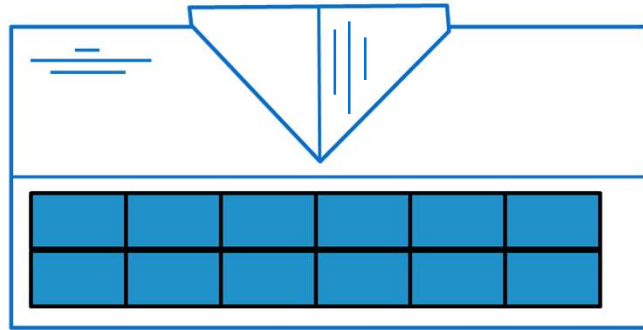


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RA103.2 Construction Documentation



Solar-ready zone shall be indicated on the construction documents



Solar Ready Roof Plan

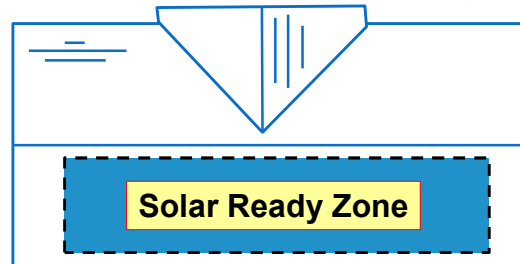
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RA103.3 Solar-Ready Zone Area



- The solar-ready zone shall not be less than **300 sqft**, or
- If the house is:
 - A **townhouse** three stories or less, **and**
 - Total floor area less than 2,000 sq.ftThe solar ready zone shall not be less than **150 sqft**.



These areas are **exclusive** of mandatory access or set-back areas as required by 527 CMR (fire safety code)

Solar Ready Roof Plan

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RA103.3 Solar-Ready Zone Area



Each solar-ready zone area shall be composed of:

- Areas not less than 80 square feet
- At least 5 ft. wide

The solar-ready zone should not be obstructed, including but not limited to:

- Vents
- Chimneys
- Roof-mounted equipment



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RA103.5 Roof Load Documentation



The **structural design loads** for live and dead loads should be clearly indicated on construction documentation

ROOF LOADS:	
GROUND SNOW LOAD, P_g	= 20 PSF
TERRAIN CATEGORY	= C
SNOW EXPOSURE FACTOR, C_e	= 1.0
THERMAL FACTOR, C_t	= 1.1
SLOPE REDUCTION FACTOR, C_s	= 1.0
IMPORTANCE FACTOR, I	= 1.1
MINIMUM FLAT ROOF SNOW LOAD, P_f	= 22 PSF
LIVE LOAD	= 20 PSF
MISCELLANEOUS MECHANICAL AND ELECTRICAL LOADS	= 5 PSF

Image Source: <http://seblog.strongtie.com/2017/01/snow-loading-trusses-specifying-roof-snow-load-isnt-enough/>

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RA103.6 Interconnection Pathway

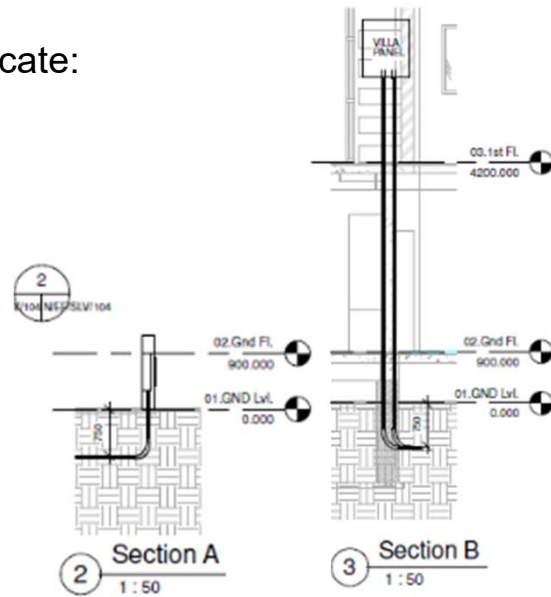


Construction drawings should indicate:

1. Electrical conduit **pathway** from the solar-ready zone to the electrical panel (PV)

Or

2. Plumbing **pathway** from the solar-ready zone to the service hot water system (solar thermal)



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Electrical Service Reserved Space



- The main electrical service panel shall have a **reserved space** to allow installation of a **dual pole circuit breaker** for future solar installation
- It shall be labeled *“For Future Solar Electric”*



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RA103.8 Construction Documentation Certificate

Solar-ready Zone Certificate

This permanent certificate, indicating the solar-ready zone and other requirements of this section, shall be posted at a conspicuous location (electrical distribution panel, water heater, etc.) by the builder/registered design professional

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NYStretch and NYCECC ELECTRIC VEHICLE CHARGING STATION CAPABLE

One- and two-family dwellings and townhouses – two choices:

- A. 208/240V 40-amp outlet for each dwelling unit
- OR
- B. panel capacity and conduit for future installation of outlet adjacent to parking area

Residential occupancies with a common parking area – two choices:

- A. 208/240V 40-amp outlet for 5% of spaces, but not less than one outlet
- OR
- B. panel capacity and conduit for future installation of 208/240V 40-amp outlets adjacent to parking area for 5% of the total parking spaces, but not less than one outlet




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Poll #5

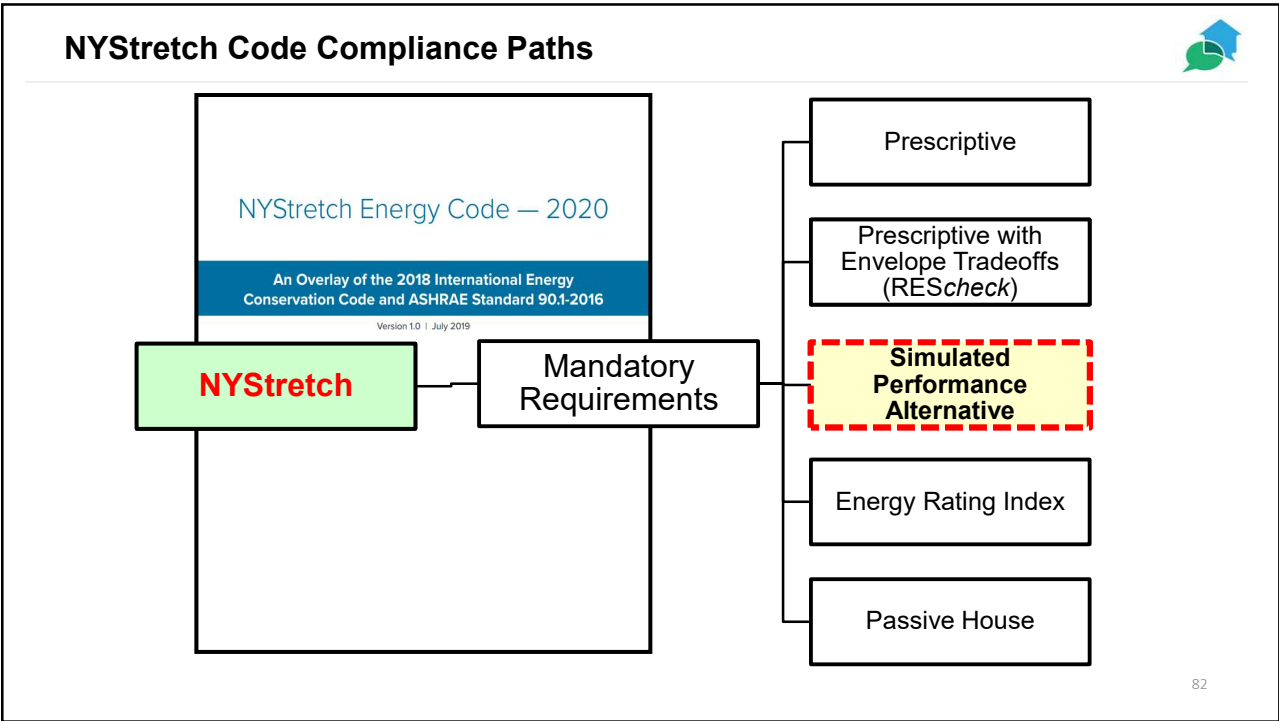
True or False

Both Solar-ready Zone requirements and Electrical Vehicle Service Equipment requirements must be met for NYStretch.



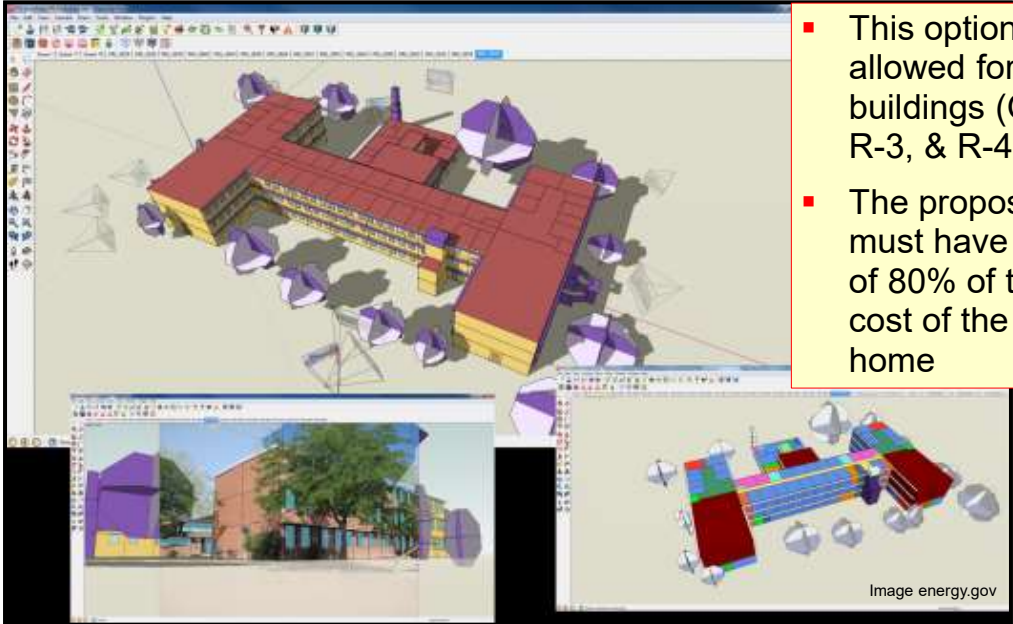
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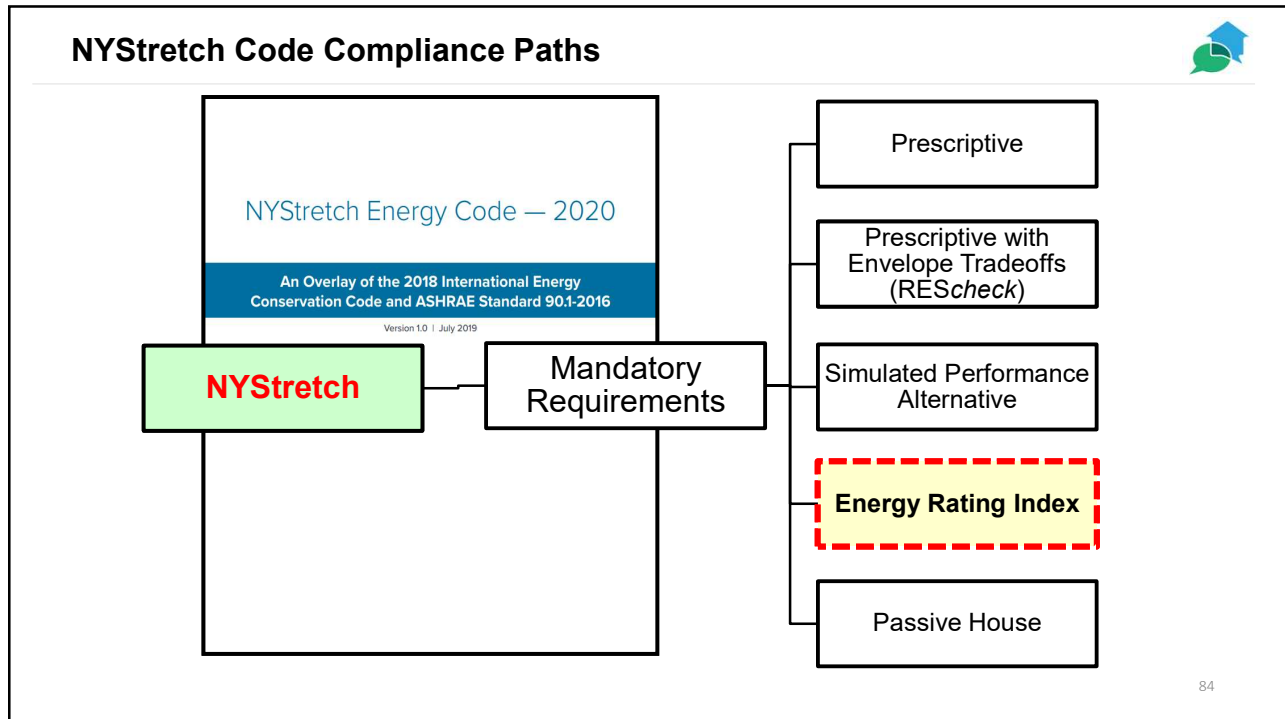
NYStretch Simulated Performance Alternative



- This option is only allowed for multifamily buildings (Groups R-2, R-3, & R-4)
- The proposed home must have a maximum of 80% of the energy cost of the reference home

Image energy.gov

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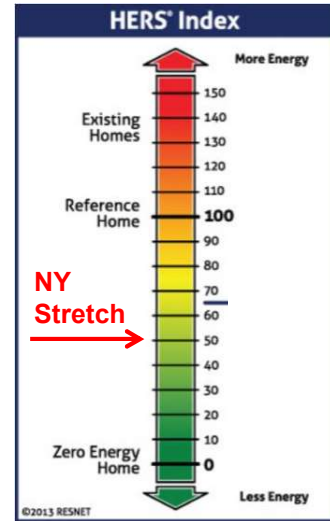
ERI-based Compliance R406

- Compliance based on an ERI analysis requires that the rated design be shown to have an ERI less than or equal to the appropriate value listed in Table R406.4
- Section R406.5 requires that verification of compliance with Section R406 be completed by an approved third party

[NY] Table R406.4
Maximum Energy Rating Index

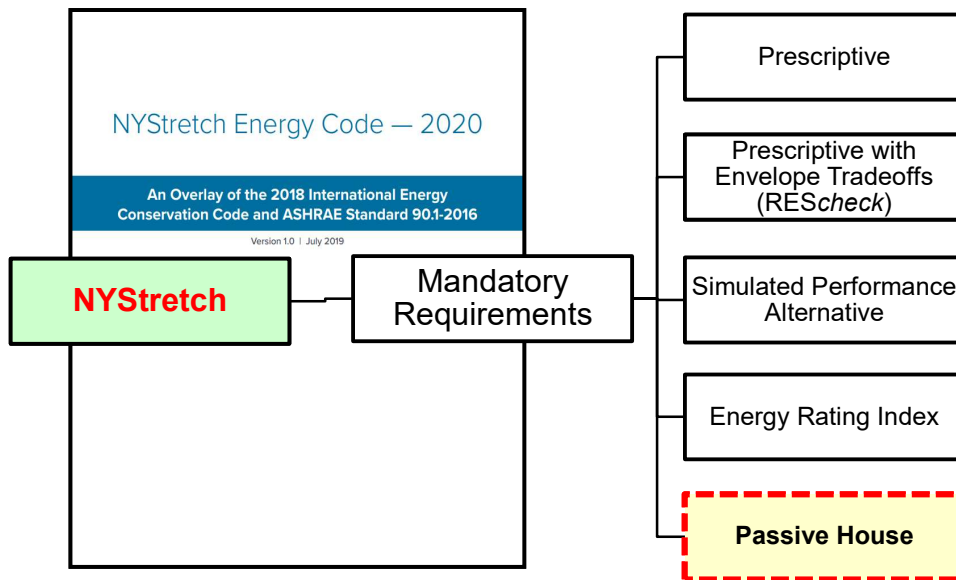
Climate Zone	ERI Base Code	ERI NYStretch /NYCECC
4	62	50
5	61	50
6	61	50

A home with a HERS Index Score of 50 is 50% more energy efficient than the Reference Home



Source: <http://www.resnet.us/energy-rating>

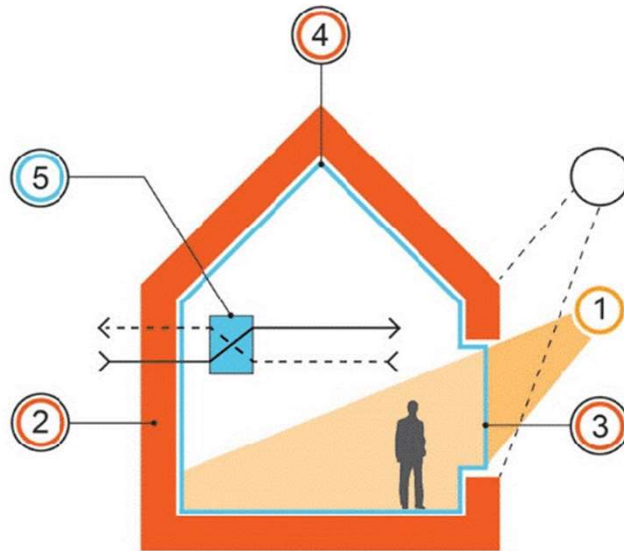
NYStretch Code Compliance Paths



R408 Passive House Based Compliance Option



- The Passive House compliance option is only offered in the NYStretch Code (it is not an eligible compliance option in the NYS base Energy Code or in NYC)
- ALL base “Prescriptive” and “Mandatory” Energy Code Requirements shall be met
- Passive House fundamental principals include:
 1. Solar Orientation
 2. High R-Value Insulation
 3. High-Performance Windows
 4. Air-Tight Building Envelope
 5. Balanced Mechanical Ventilation with Heat Recovery



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Adopting NYStretch in your Local Area



The 2020 Adoption Resources NYStretch “Toolkit” includes:

- ✓ An Adoption Guide
- ✓ A General NYStretch Fact Sheet
- ✓ A Comparison Document (compares the NYStretch-2020 to the 2020 Energy Conservation Construction Code of New York State (State Energy Code).
- ✓ A Commercial Cost Analysis Report
- ✓ A Residential Cost Analysis Report
- ✓ A Stringency Analysis Summary (suitable as an Exhibit when filing with the Department of State)
- ✓ FAQ document on NYStretch.



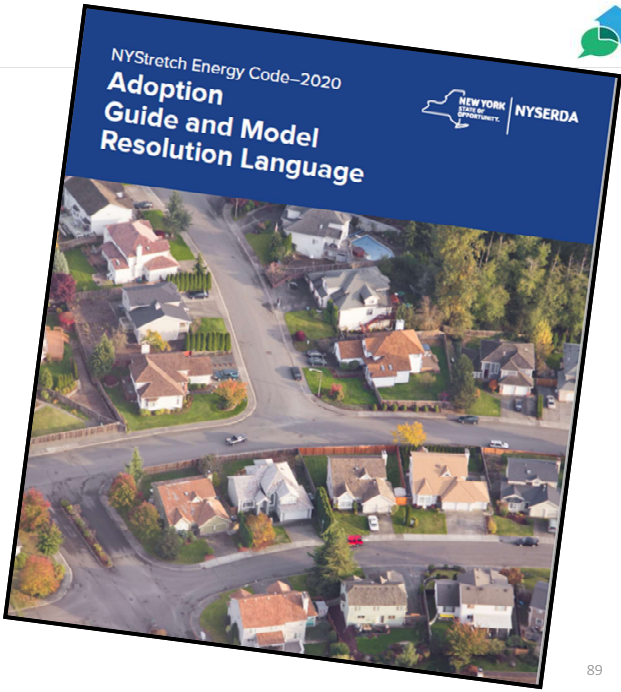
If you have further questions, contact the NYSERDA codes team - codes@nyserda.ny.gov

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NYStretch Adoption Kit

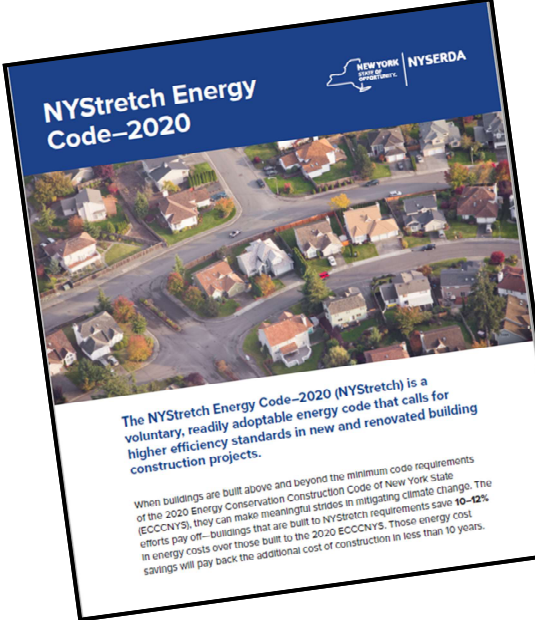
This NYStretch Adoption Guide helps you learn about the support available from NYSERDA and steps to adopt NYStretch in your community



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NYStretch General Fact Sheet



NYStretch Energy Code-2020 is a voluntary, readily adoptable energy code that calls for higher efficiency standards in new and renovated building construction projects.

When buildings are built above and beyond the minimum code requirements of the 2020 Energy Conservation Construction Code of New York State (ECCCNYS), they can make meaningful strides in mitigating climate change. The efforts pay off—buildings that are built to NYStretch requirements save **10-12%** in energy costs over those built to the 2020 ECCCNYS. Those energy cost savings will pay back the additional cost of construction in less than 10 years.

NYStretch Energy Code-2020

What are the benefits?

- **Save money and energy:** Use less energy and reduce living and operational costs for your constituents with lower utility bills and better building envelopes.
- **Help the environment:** Reduce your greenhouse gas emissions and reliance on fossil fuels.
- **Boost the local economy:** Develop your existing workforce, build expertise in newer technologies, and create more green jobs.
- **Improve community growth:** Increase community attractiveness and property values as more home and business owners are looking for green and energy-efficient buildings.
- **Increase property values:** Encourage the use of NYStretch locally so future occupants (renters, tenants, and owners) of new and renovated buildings that meet this code will benefit from the long-term energy and cost savings.

Where does NYStretch go beyond the 2020 ECCCNYS?

- **Building envelope:** Improved insulation and window performance, air barrier commissioning, air leakage testing, and mandatory mechanical ventilation
- **Lighting:** Reduced interior and exterior lighting power and lighting controls
- **Electrical:** Whole-building energy monitoring
- **Compatibility:** Renewable and electric vehicle readiness

What resources are available?

- **Code Manual:** NYSERDA provides a single-volume code manual that aids in consistent interpretation among code officials and offers reliable standards.
- **Template Legislation:** A NYStretch Adoption Guide with a resolution/legislation template is available to help facilitate local adoption of NYStretch.
- **NYStretch Training for Code Officials, Architects, and Builders**
- **Updated RESCheck™ and COMCheck™ tools**
- **FAQs Document**

For assistance with adoption, contact NYSERDA's outreach coordinators at nyserdera.ny.gov/cec-coordinators.

Learn more and access resources at nyserdera.ny.gov/stretchenergy2020.

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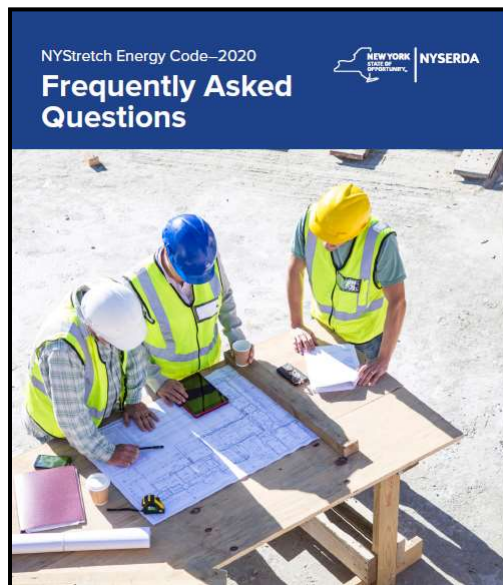
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NYStretch Adoption Resources



The NYStretch Frequently Asked Questions document includes answers to:

1. How can communities benefit from adopting and enforcing a stretch energy code like NYStretch?
2. How do communities adopt NYStretch?
3. How would NYStretch be implemented and enforced?
4. Can a jurisdiction adopt just the residential or commercial portion of the NYStretch?
5. How much energy will each new home save if built to meet NYStretch?
6. How much energy and money will each new commercial building save if built to meet NYStretch?

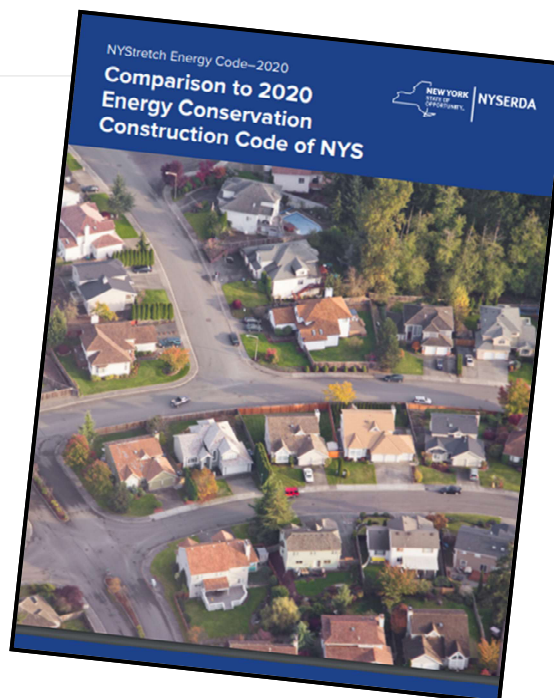


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NYStretch Comparison Document



The NYStretch Comparison document includes a summary of provisions in NYStretch that are not in 2020 NYS Energy Code



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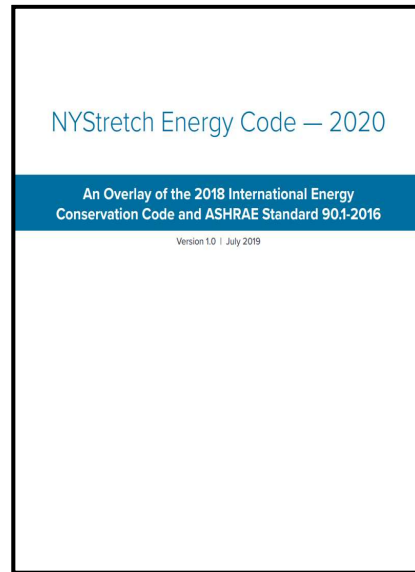
Remember...



NYStretch is:

- ❖ Readily adoptable
- ❖ Written in enforceable language, familiar to building departments
- ❖ Coordinated with the New York State Uniform and Energy Codes
- ❖ Intended to be about one cycle ahead of the current State Energy Code
- ❖ Cost-effective and regionally appropriate

Learn more and access resources at:
nyserda.ny.gov/stretchenergy2020



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THANK YOU & QUESTIONS

NYDOS Course Number:
T02-07-2976

Mike Turns

mturns@psdconsulting.com

Chris Whittet

cwhittet@psdconsulting.com

Dave Abrey

dabrey@psdconsulting.com

Register for additional training at <https://psdconsulting.com/ny-energycode/>

Please fill out the evaluation survey that will appear directly after the webinar!

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