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NYStretch – Energy Overview

Development of Model Provisions for Voluntary Local Adoption in New York

February 8, 2017

Agenda

I. Project overview
II. NYStretch-Energy project development summary
III. Draft proposed NYStretch-Energy results
IV. Draft proposed Commercial NYStretch-Energy results
V. Draft proposed Residential NYStretch-Energy results
VI. List of Initialisms and Acronyms

What is NYStretch-Energy?

"Overlay" code, or alternative compliance path, for local adoption (as MRLS)

+ More rigorous than base energy code

+ Results in buildings that achieve greater energy savings and reduced GHG emissions

+ Anticipates successor code advancements, culminating in a statewide Net Zero Energy code by 2028/30

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NY Stretch-Energy in Context

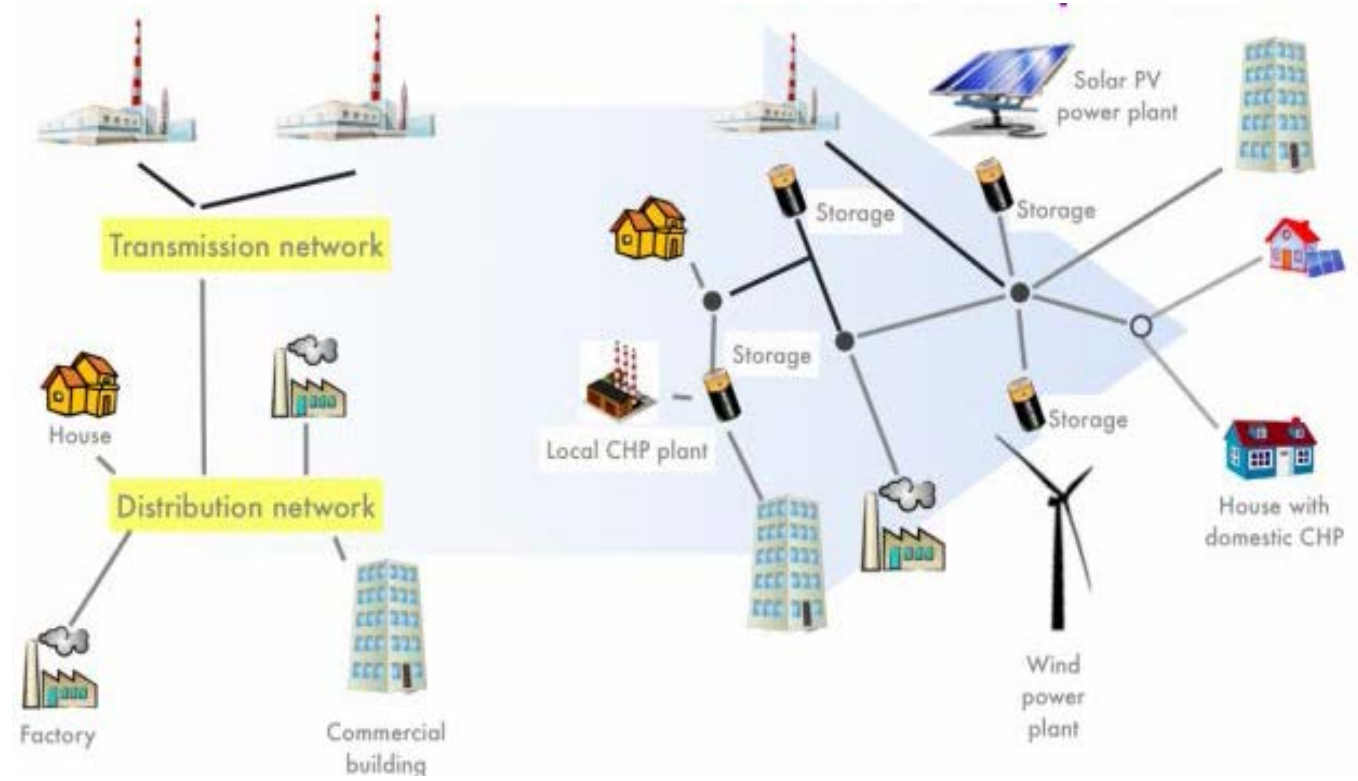
Part of NYSERDA's suite of code-related activities:

- ✓Online and classroom trainings
- ✓Municipal support/plan review
- ✓Code Commentaries
- ✓Codes conference (Spring 2017)

http://www.nyserdacodetraining.com/

Reforming the Energy Vision (REV)

Governor Cuomo's strategy to build a clean, resilient and affordable energy system for all New Yorkers



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Clean Energy Fund (CEF)

- 10-year, $5 billion funding commitment
- Reshapes New York's energy efficiency, renewable energy and energy innovation programs
- Reduces cost of clean energy
- Accelerates adoption of energy efficiency to reduce load
- Increases renewable energy to meet demand
- Mobilizes private investment in clean energy

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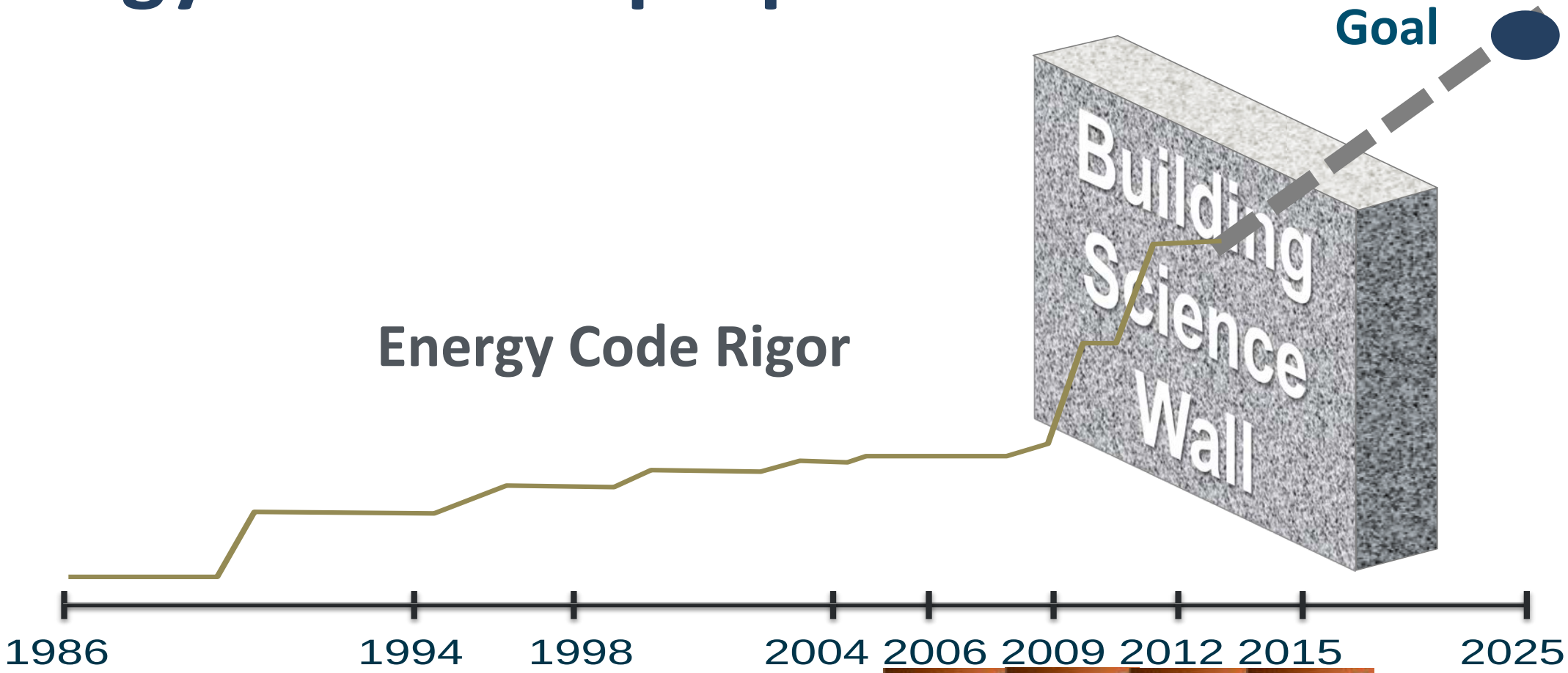
Benefits of a Stretch Code

- Lower building operating costs/increased energy savings
- Increased occupant comfort
- Improved resiliency (with respect to power disruptions)
- Signal transition to performance-based codes
- Allows design flexibility
- Stimulates R&D and commercialization of products/systems to improve energy efficiency performance
- Provides consistency while leveraging developed above-code infrastructure
- Alignment with utility programs

Development challenges

- Finding balance point between meaningful savings and cost/achievability
- Maintenance and updates (prescriptive vs. performance)
- Potential for the “patchwork quilt” across jurisdictions
- Local governments have many other pressing issues to address
- 2015 IECC effective in New York State (Oct. 3, 2016) leaping a code cycle (on Residential side)
- For broader NYStretch Framework - How far to push into non-energy (green code) governed (site and land development, transit connectivity, stormwater, indoor environmental quality, materials,etc.)

Energy Code Ramp Up



Slide courtesy of U.S. DOE and Newport Partners

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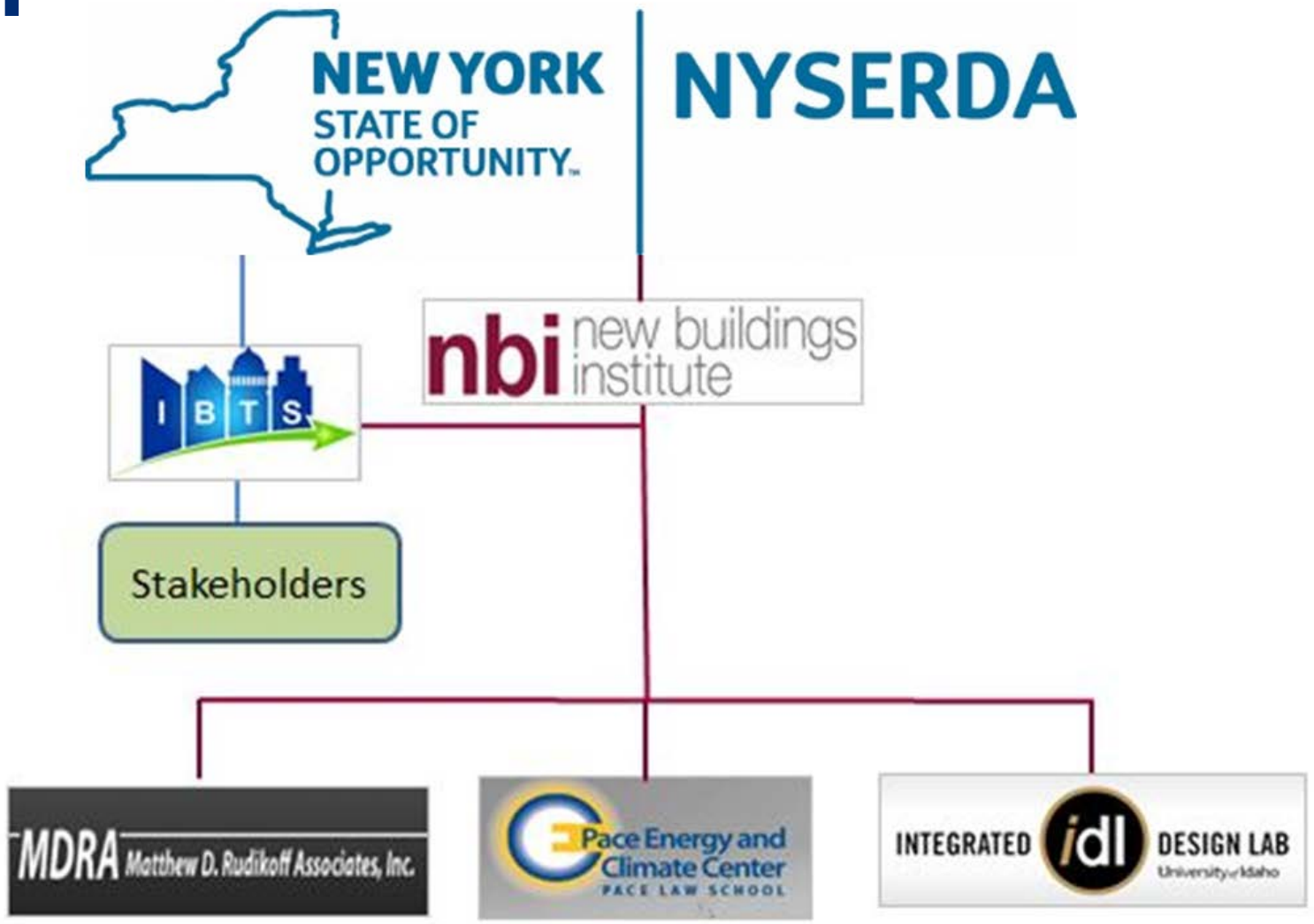
The Team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nbi new buildings institute
IBTS
Stakeholders
MDRA Matthew D. Rudikoff Associates, Inc.
Pace Energy and Climate Center
PACE LAW SCHOOL
INTEGRATED idl DESIGN LAB
University of Idaho

NYStretch – Mission and Team Members

- *NYStretch-Energy Objective* – Provide readily-adoptable code language for local governments in New York that will deliver energy efficiency performance significantly above current code
- *Project Consultant Team*: New Buildings Institute (Jim Edelson, Mark Lyles); IBTS (Jeff Domanski, Art Pakatar, Debbie Russell, Mark Eggers); PNNL (Bing Liu, Jian Zhang); Pace University Climate and Energy Center (Karl Rabago); Bruce Harley Energy Consulting (Bruce Harley)

Stakeholder input

- 25-member Advisory Group (3 in-person meetings and webinar) –
- Commercial/MF and Residential Working Groups (3 calls/review sessions)
- Reviewed existing stretch codes, PV- and EV-ready language and ordinances
- Multiple calls/discussions with stakeholders (NYSDOS, NYC Mayor's Office and DOB, MA DOER, Efficiency VT)

Development Process

- Looking to what other states have done (MA, CA, VT)
- Advisory Group guidance - Make it rigorous but straightforward and achievable; backstop for best practices in building design/engineering
- Residential and Commercial/Multi-family Working Groups reviewed “topics documents” generated by project team w/ Advisory Group guidance
- Iterative energy modeling to predict savings and fine-tune

Important Notes

- We are presenting proposed (not final) provisions
- NYStretch has undergone internal legal review by NYSERDA counsel
- Language will be available for public comment (not a formal SAPA process)
- Final language to be issued in Spring 2017.

Renewables and Electric Vehicle provisions

PV-ready

- Residential (1 and 2 family homes >1400 ft.)
  - (In accordance with 2015 IECC Appendix RB) Solar-zone on roof, free of obstructions
  - Dedicated (labeled) space on electric service panel

EV-ready

  - 1-2 family homes – Provide outlet (240V/40amp) or capability
  - MF (with common parking area) – Provide outlets (or infrastructure) for 5 % of parking spaces

Renewable Energy Options

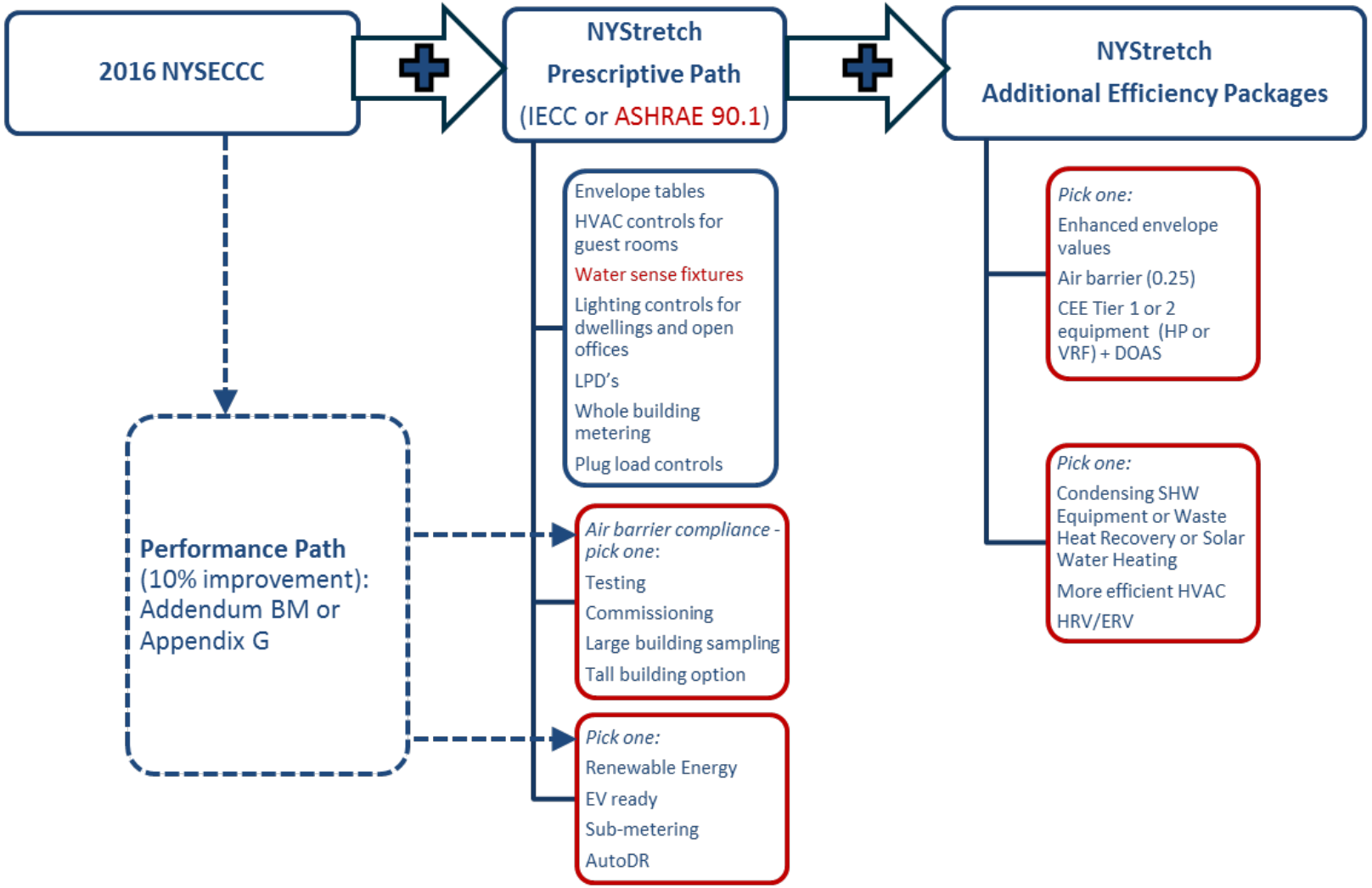
Residential (option packages)

- Solar thermal hot water system
- More efficient HVAC, including GSHP

Commercial (options packages)

- Meet 3% of load w/ onsite renewables
- Solar thermal hot water system

NYStretch: Commercial Buildings



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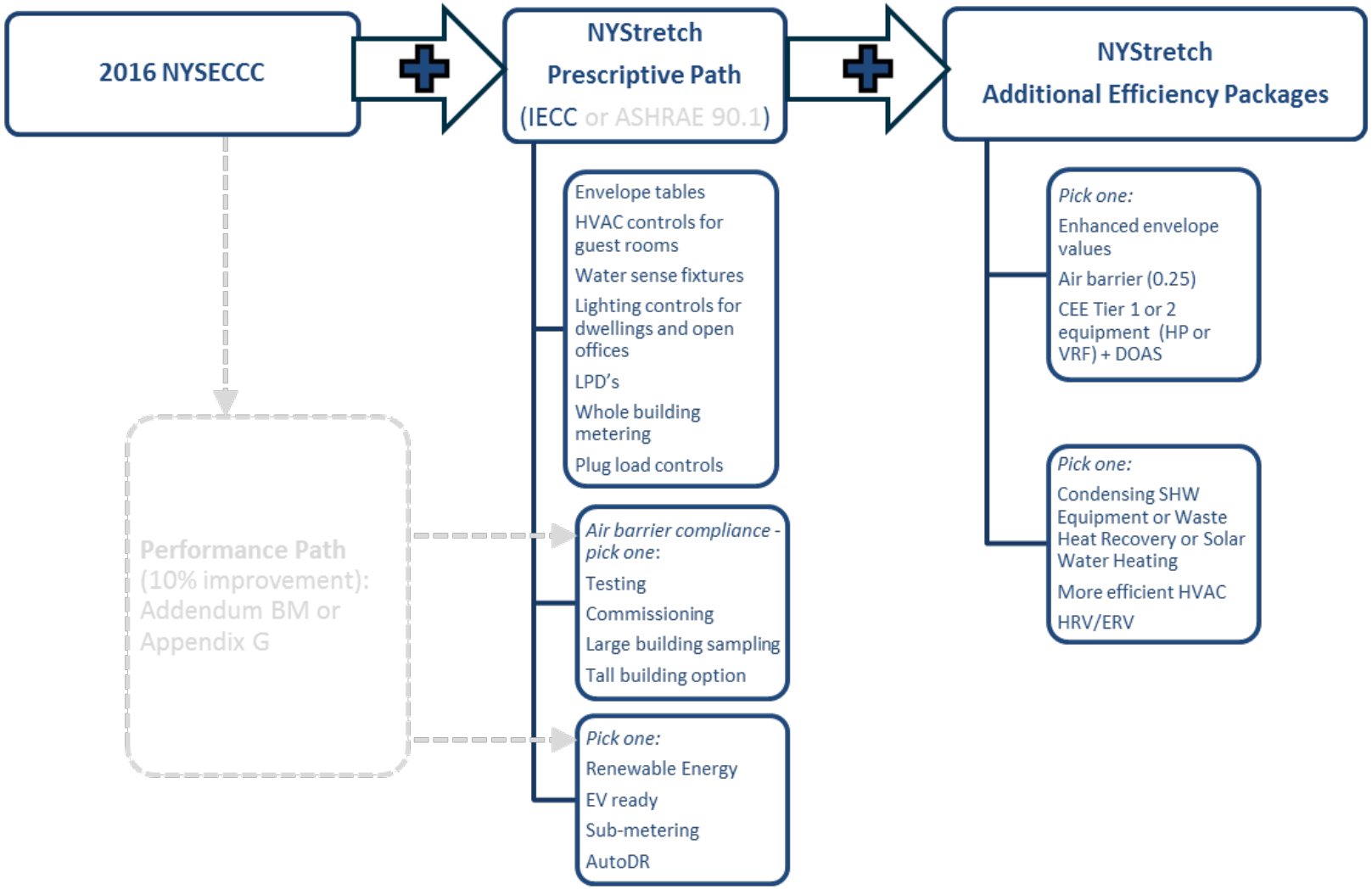
NYStretch: IECC Prescriptive Path



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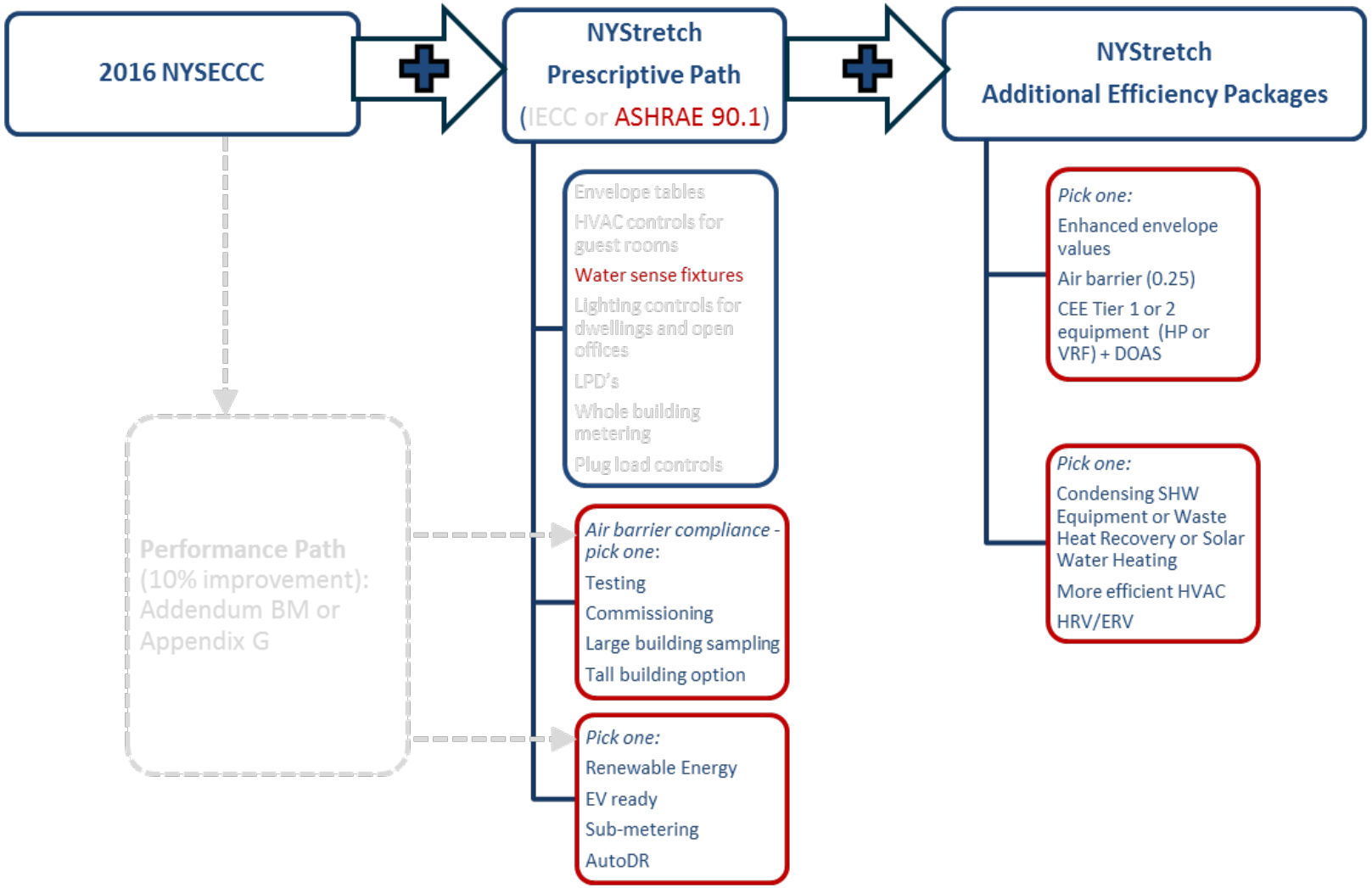
NYStretch: 90.1 Prescriptive Path



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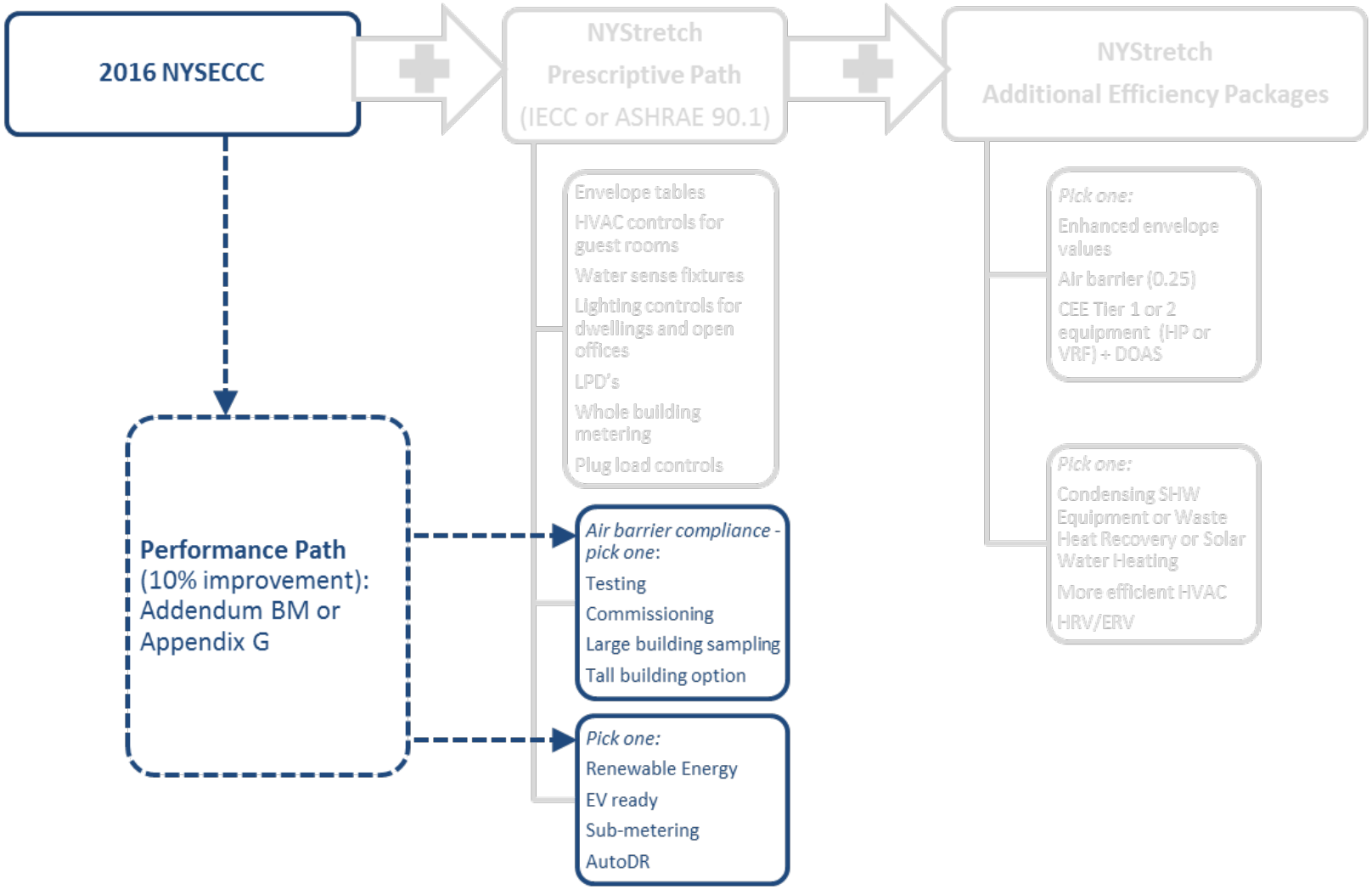
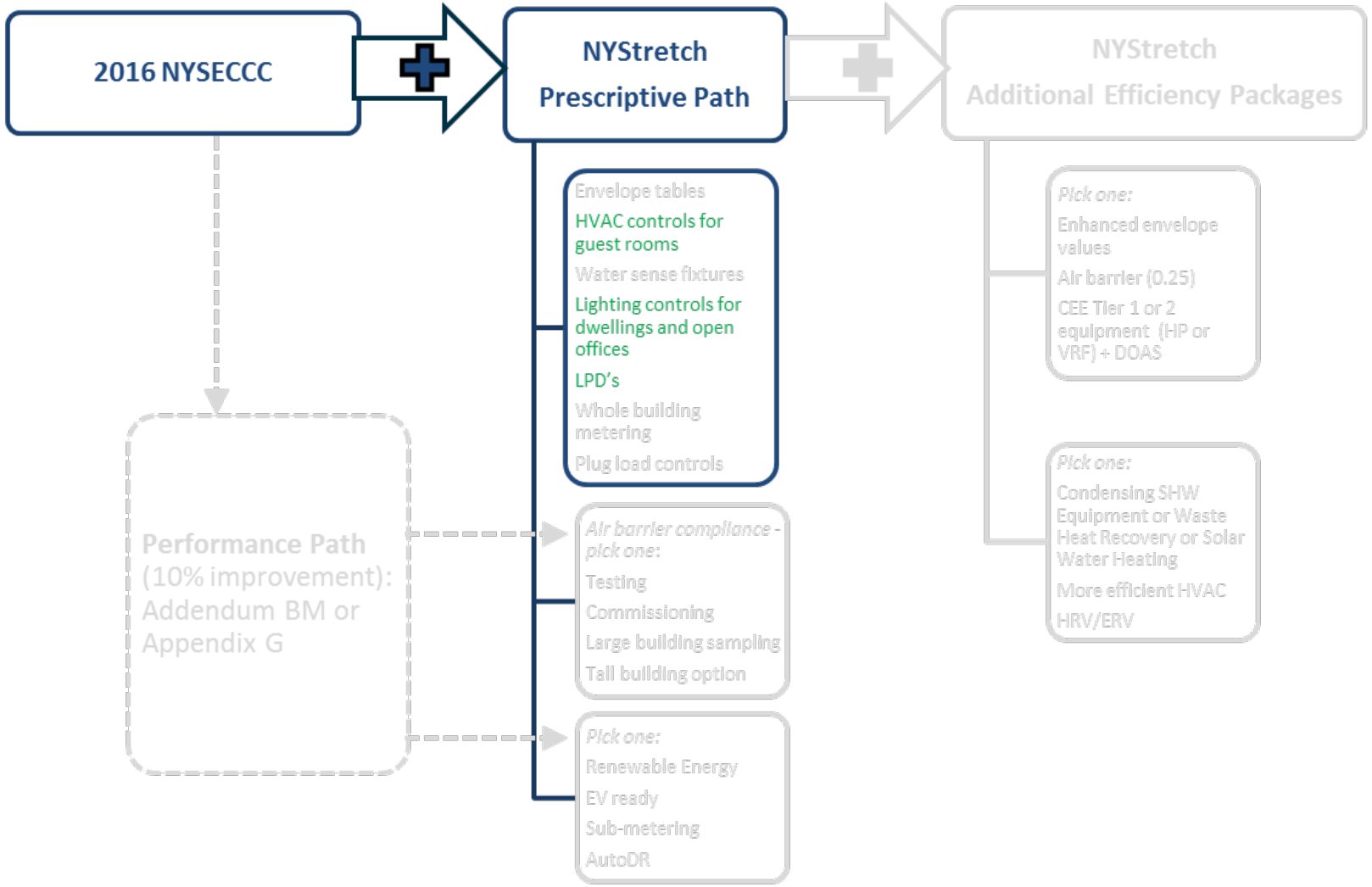
NYStretch: Performance Path



NYStretch: Existing Buildings Path



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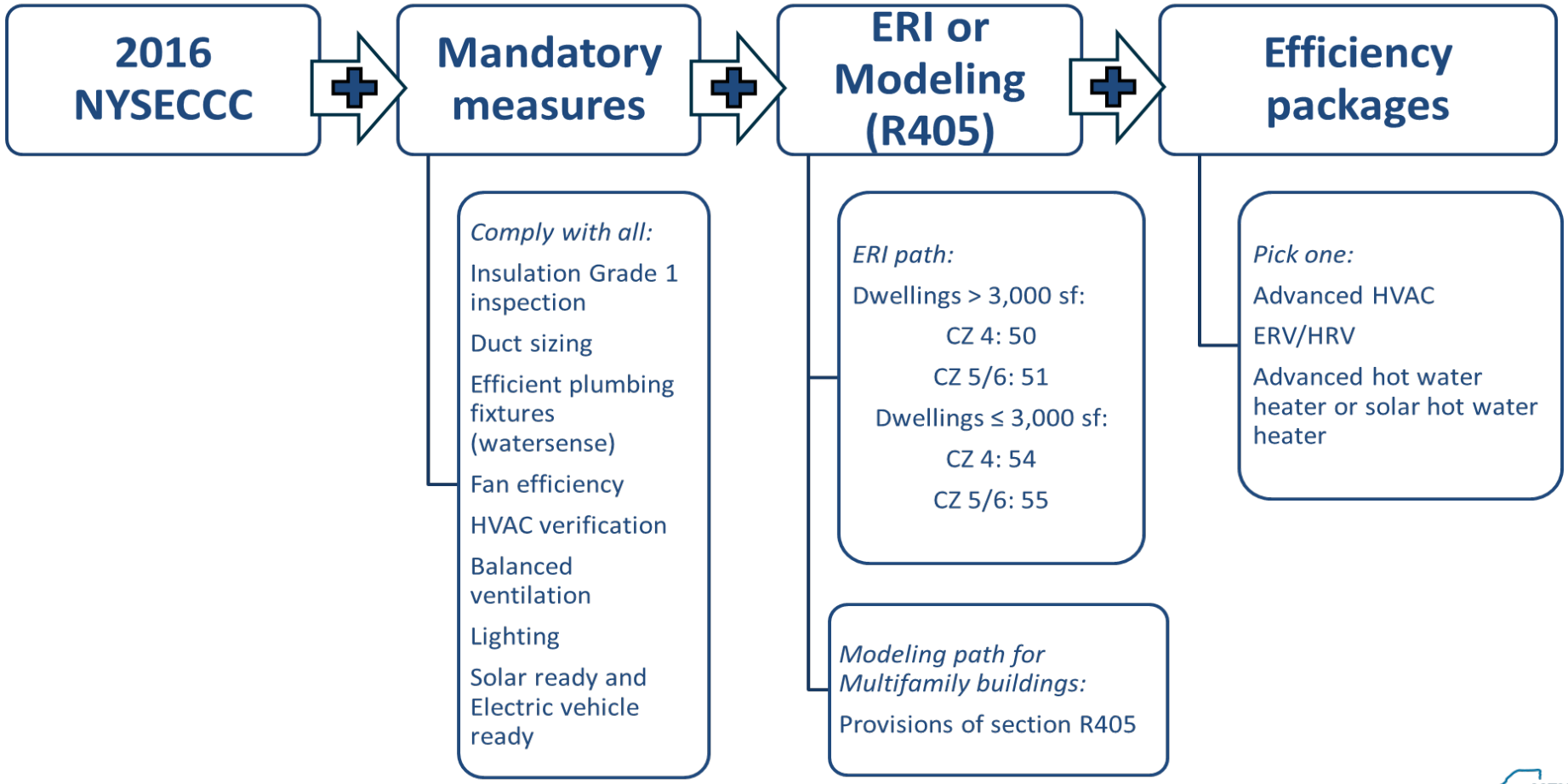
Weighted Results

Measures	Weighted Average Savings
Base Stretch plus C406.2 More efficient HVAC Equipment*	9.1%
Base Stretch plus C406.3 Reduced air infiltration	8.4 %
Base Stretch plus C406.4 Enhanced envelope performance	12.8 %
*this measure also requires a DOAS system which we were unable to model due to the varying baselines and possible configurations. Analysis conducted by PNNL indicates that efficient equipment plus DOAS can provide 6% - 8% total savings beyond a building with a code level VAV system.	

NYStretch – Residential Buildings

- Performance based, with mandatory ERI requirements
- Size adjustment (lower ERI/HERS Index required for larger homes)
- Open-wall inspection (RESNET Grade I insulation install)
- Balanced ventilation
- 90% of lamps in hard-wired fixtures high-efficacy (above 75% required by 2015 IECC)

NYStretch: Residential Dwellings



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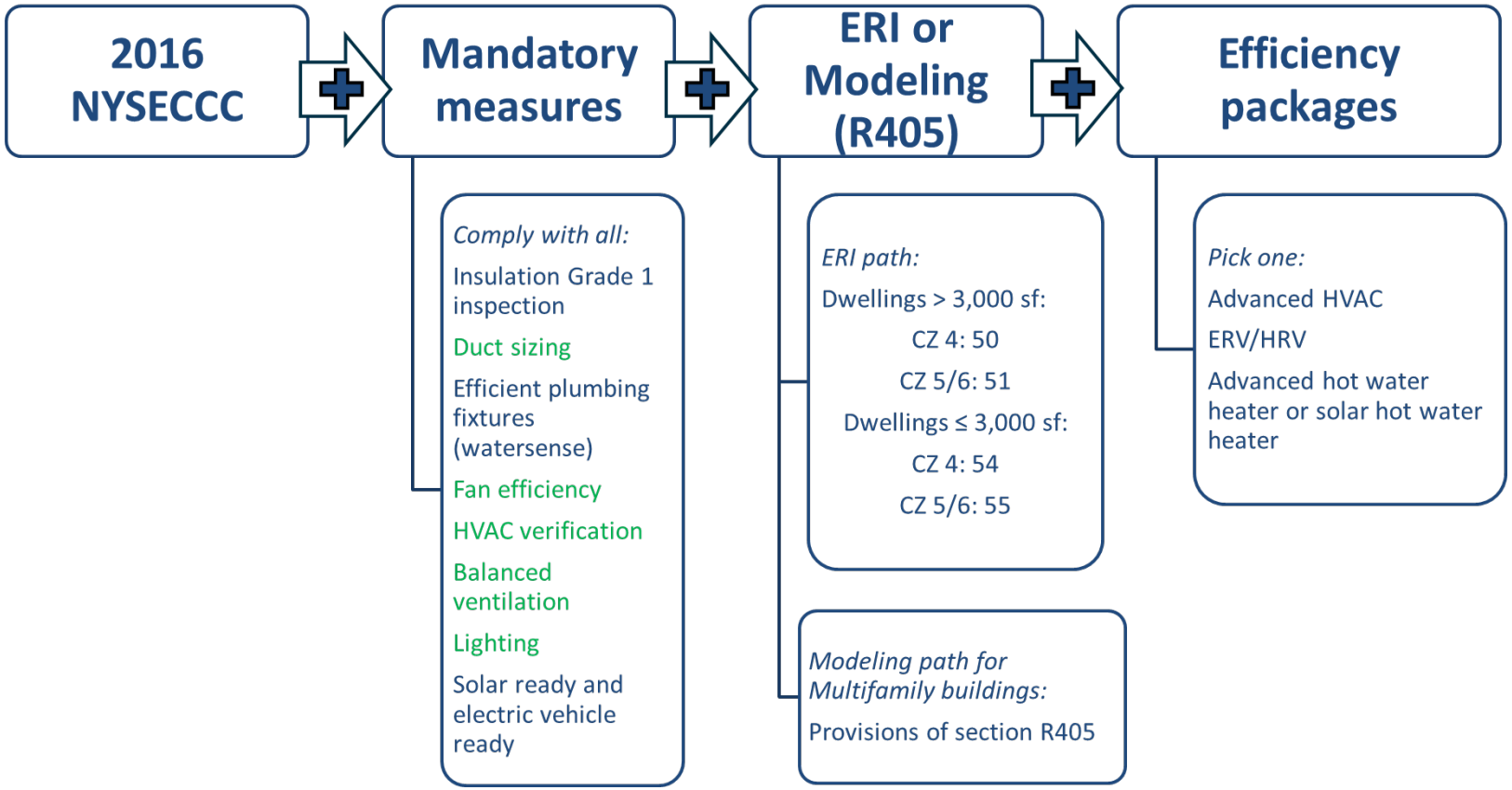
NYStretch: Existing Residential Dwellings



Residential energy modeling

- Purpose: determine approximate ERI (HERS index) for stretch code targets
- Estimate associated stretch code savings relative to baseline
- Prototype house 2,376 SF, 3 bedroom
  - 4 basement types (slab, crawl, heated/unheated basement)
  - 3 heating types (gas furnace, heat pump, gas boiler)
  - 3 code-defined climate zones represented in NYS (4,5 & 6)
  - 36 total, weighted by 2015 baseline survey data from new homes

Baseline Home *(2015 IECC prescriptive path)*

Shell	HVAC	Lighting and Appliances
Leakage – 3ACH$_{50}$ (per code testing req.)	Efficiencies higher than federal minimums	Lamps – 75% high-efficacy (per code)
Insulation R-values (prescriptive per code)	Good heating and cooling equipment (92% AFUE furnace/13 SEER AC)	Appliances –defaults
Insulation install quality – Good (RESNET Grade 2)	Ducts in conditioned envelope	
Windows and Doors – good quality (per code)	Exhaust-only ventilation	

NYStretch Home *(proposed provisions modeled)*

Shell	HVAC	Lighting and Appliances
Leakage – 2.5 ACH_{50}	Modest, low-cost upgrades	90% meeting lighting power density requirements
Insulation R-values – Slightly higher than min. prescriptive	Furnace – 94% AFUE	Appliances – RESNET defaults
Insulation install quality – Better (RESNET Grade I)	A/C – 14 SEER	
Fenestration – Slightly better U-factors	Ventilation - Balanced	

Results

- 14% savings (weighted average) both electric and gas
- HERS index (weighted average) dropped from 63 to 56 from baseline to NYStretch home

Climate Zone	Baseline ERI (for 2015 prescriptive approach home)	NYStretch ERI (modeled; includes most NYStretch provisions)	Proposed NYStretch ERI for homes <3000SF	Proposed NYStretch ERI for 3000 SF+ home
4	63	55	54	50
5	64	56	54	50
6	62	55	54	50

Conservative savings estimates

- 2015 IECC prescriptive path home house with high efficiency (higher than federal minimum) HVAC equipment
- No duct sealing savings
- Savings from mechanical was upgrade from 13 to14 SEER A/C and 92.5 AFUE to 94 AFUE furnaces
- Upgrade does not account for every requirement in proposed NYStretch Energy (e.g. WaterSense fixtures not modeled for SF prototypes)

VI. List of Initialisms and Acronyms

Term	Explanation
AC or A/C	Air Conditioning
ACH_{50}	Air changes per hour at a pressure difference of 50 pascals
Addendum BM	Refers to Addendum BM to ASHRAE Standard 90.1- 2013, Energy Standard for Buildings Except Low-Rise Residential Buildings, which establishes the Performance Rating Method found in Appendix G of Standard 90.1 as a new method of compliance while maintaining its traditional use in gauging the efficiency of "beyond code" buildings.
Appendix G	Refers to ASHRAE Standard 90.1-2013 Appendix G: Performance Rating Method
AFUE	Annual fuel utilization efficiency
ASHRAE	A global society, founded in 1894, to advance human well-being through sustainable technology for the built environment
AutoDR	Automated demand response
CEE	Consortium for Energy Efficiency
CEF	Clean Energy Fund
DOAS	Dedicated outdoor air system
ERI	Energy rating index
ERV	Energy recovery ventilator
EV	Electric vehicle
GHG	Greenhouse gas
GSHP	Ground source heat pump
HERS	Home energy rating system
HP	Heat pump
HRV	Heat recovery ventilator

Term	Explanation
HVAC	Heating, ventilating and air conditioning
IBTS	Institute for Building Technology and Safety
IECC	International Energy Conservation Code
LPDs	Lighting power densities
MA DOER	Massachusetts Division of Energy Resources
MF	Multifamily
MRLS	More restrictive local standard
NYC	New York City
NYC DOB	New York City Department of Buildings
NYSDOS	New York State Department of State
NYSECCC	New York State Energy Conservation and Construction Code
NYSERDA	New York State Energy Research and Development Authority
PNNL	Pacific Northwest National Laboratory
PV	Photovoltaics
R&D	Research and development
RESNET	Residential Energy Services Network
REV	Reforming the Energy Vision
SAPA	State Administrative Procedures Act
SEER	Seasonal energy efficiency ratio
SF	Square foot
SHW	Service water heating
VAV	Variable air volume
VRF	Variable refrigerant flow