



UMass Amherst




AIA Western  
Massachusetts

## 9th Edition Building Energy Code (IECC 2018) Training

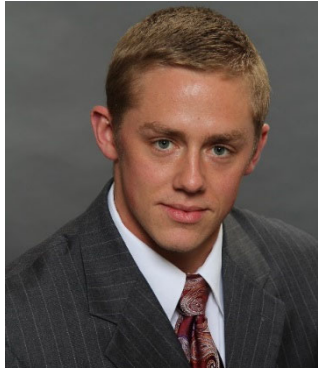
*This program is a joint program of the WMAIA COTE Committee and UMass Facilities and Campus Services presented by Jensen Hughes and GDS Associates*

April, 2020

# Program Logistics

- Everyone but the speaker will be muted.
- Questions will be submitted in writing using the chat.
- Chat is located at the bottom of our screen – look for this speech bubble symbol. 
- Type in your question. Questions will be monitored and asked by Ludmilla Pavlova-Gillham AIA at the end of each section if not more frequently.
- Here's how to set your best view for this meeting: Right now you should see the speaker's screen and video images of participants on the right of your screen. Move your cursor over the video images, at the top left of the video images, click on the second gray box (when you hover it will say: "show small active speaker video") Now you will see the PowerPoint and the video of just the person speaking.
- CEU credits will be provided to AIA members based on the information you submitted during the registration process. Non-members will receive certificates of attendance if they were requested. We will be monitoring attendance during the program.
- Questions on logistics of this program – [director@wmaia.org](mailto:director@wmaia.org)

# Arthur Gager – Jensen Hughes



**Arthur Gager**  
Sr. Fire Protection Engineer  
Jensen Hughes

Arthur Gager has been at Jensen Hughes for about 9 years. He started his career in smoke control design and has expanded. Much of his time is now working on laboratory buildings and existing buildings

- Bachelor of Science in Civil Engineering from Worcester Polytechnic Institute
- Master of Science in Fire Protection Engineering from Worcester Polytechnic Institute
- Registered Professional Engineer (CA, CT, FL, MA)



## JENSEN HUGHES

Jensen Hughes is a multi-disciplinary engineering firm. We have a wide range of ability, staff and experience. Our goal is to advance the Science of Safety

### New England Presence:

- Six Offices
- >50 Professional Staff
- Fire Protection and Code Consulting
- Accessibility Review
- Fire Alarm and Fire Sprinkler System Design
- Security Assessment & Master Planning
- Vibration Analysis
- UMA Commencement
- UMA Residential Life Study
- LGRC Tower Projects
- Physical Sciences Building
- Life Sciences Laboratory

# Session Outline

- . 1 – Opening / Background
- . 2 – International Building Code/ Adoption of the IECC
- . 3 – IBC/ IEBC/ IECC Specific Design Features
- . 4 – IECC Commercial Key Changes and Massachusetts Amendments
- . 5 – Residential Application
- . 6 – General Q and A

# Learning Objectives

- . Identify scoping language that adopts the IECC and how energy concepts are intertwined in various codes
- . Distinguish which building types are subject to which energy codes
- . Review compliance paths and the intersection of IECC, ASHRAE 90.1, 780 CMR Amendments, and the Stretch Code
- . Review and apply key changes between the 2015 and 2018 IECC, and in the new updated 780 CMR Ch. 13 Amendments
- . Extend your knowledge of information required on construction documents
- . Recap the importance of air barriers, how to comply with these provisions, and key updates in the new code
- . Understand how best to leverage Mass Save incentive programs to reach beyond code minimums

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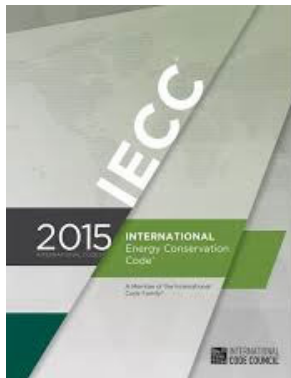
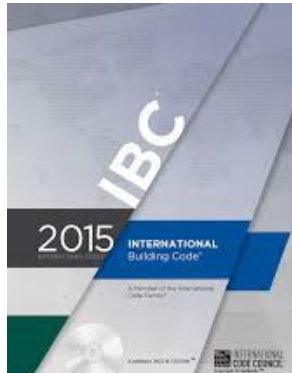
## *IBC/ IEBC and Adoption of the IECC*

- . 780 CMR – Massachusetts State Building Code  
IBC/ IEBC
- . IECC Adoption
- . Stretch Code

# Code Overview

780 CMR 9<sup>th</sup> Edition – 2015 IBC/IRC  
October 2017 – ?

780 CMR 10<sup>th</sup> Edition – 2021 IBC/IRC  
Mid 2021 – ?



2015 IECC  
January 2017 – August 7, 2020

2018 IECC  
February 2020 – ?

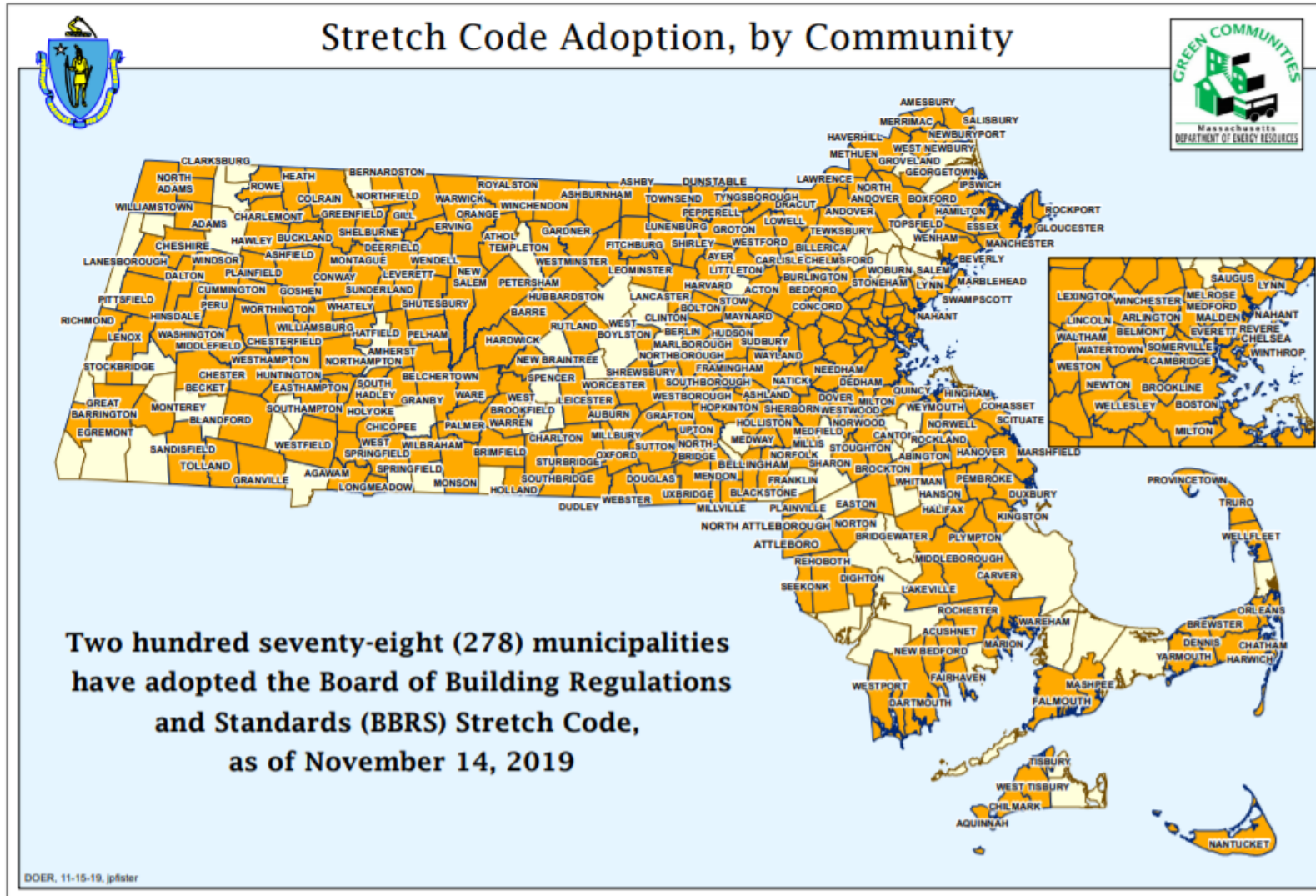
2021 IECC  
2022? - ?

# *Energy Code (IECC)*

- . Code Adoptions
  - 780 CMR Chapter 13 – Adopts and Amends the IECC
  - 780 CMR 51.00 Chapter 11 – Adopts and Amends the IECC
  - 780 CMR 115 Appendix AA – Stretch
  
- . Stretch Energy Code
  - Overall performance rating of structure
  - New residential
  - New commercial over 100,000 ft<sup>2</sup>
  - New supermarkets, labs and conditioned warehouses over 40,000 ft<sup>2</sup>
  - Not applicable to additions, renovations and repairs



# Stretch Adoption



# *International Existing Building Code*

780 CMR 34.00 Section 104.2.2.1 requires that the building is investigated and evaluated in accordance with the provisions of 780 CMR 34.00. The investigation and evaluation must include effects of the proposed work on at least the following systems: structural, means of egress, fire protection, energy conservation, lighting, hazardous materials, accessibility and ventilation.

In work area method – Alterations to existing buildings or structures are permitted without requiring the entire building or structure to comply with the energy requirements of the IECC or IRC. The alteration must conform to the requirements of the IECC or IRC as they relate to new construction only (IEBC 708.1, 811.1 and 908.1).\*

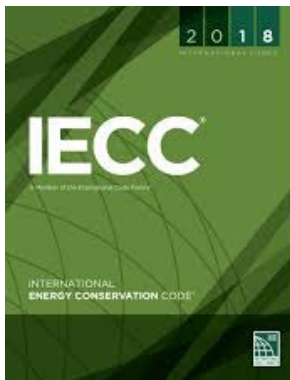
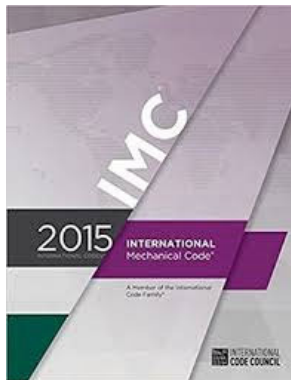
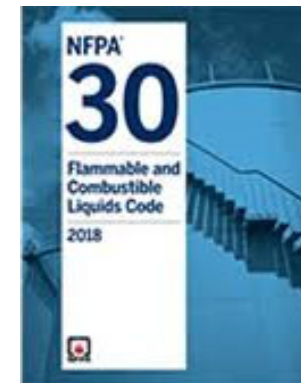
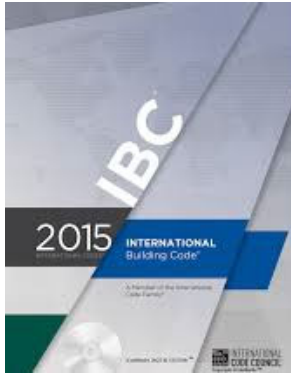
\*There are specifics in IEBC, IECC Chapter C5 and IECC Chapter R5

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## *Commercial Design Features*

- . Exterior Walls
- . Mechanical Arrangement
- . Light Replacement
- . Reroofing

# Requirements



# Exterior Walls

## *Water Resistive Barriers – NFPA 285*

- 780 CMR Section 1403.5 Vertical and lateral flame propagation of water-resistive barrier products on exterior wall of buildings of Type I, II, III, and IV construction greater than 40 feet in height is regulated and required to be NFPA 285 compliant with certain exceptions.



# Mechanical Arrangement

- Termination of Shafts
  - Penthouses
  - Mechanical stories
- Laboratory Exhaust
  - ERU's
  - Hazardous exhaust ductwork
- Location of Equipment
  - Built-up roof protection
  - Interstitial locations
- Passive Heating and Cooling
  - Air movement throughout the building height
  - Air movement in corridor space



# Reroofing

- Type of roof work
  - Roof recover versus roof replacement
  - Impacts insulation requirements and thickness
- Roof drainage
  - Primary versus secondary/ scuppers



# *Light Replacement*

- Light replacement scope
  - Deemed deficient in existing buildings per 780 CMR
  - In the work area per IEBC
  - Additional areas IEBC
- Alterations are required to comply with the IECC for new construction
  - Alterations that replace less than 50% of the luminaires in a space
  - New lighting systems that replace less than 10% of the luminaires in a space.



# Associated Requirements

- Elevator Venting
  - Changes to 524 CMR
- Low E Glass/ BDA's
  - Reduced transmission
- Solar Panels
  - Solar readiness
  - Fire Department access pathway
  - Electrical storage and compliance



# ( 4 )

## *MA Commercial Energy Code (780 CMR CH. 13)*

- . Scoping
- . Key changes 2015 to 2018 IECC
- . MA Amendments
- . New Provisions
- . Mass Save Programs



***Matthew Siska, P.E.***

Principal at  
GDS Associates

With over 18 years of experience in the commercial construction industry, Matt's career began as a building and fire code consultant. He transitioned into the energy efficiency industry, working with both new construction and existing building retrofits. Matt brings a real world, practical perspective to the discussion of energy conservation and building science practices.

- Bachelor of Science in Civil Engineering from Worcester Polytechnic Institute
- Master of Science in Fire Protection Engineering from Worcester Polytechnic Institute
- Registered Professional Engineer FPE and Architectural



GDS is a multi-service engineering and consulting firm providing services to a broad range of clients associated with, or affected by, electric, natural gas, water, and wastewater utilities.

Services Include:

- Power Supply Planning
- Wholesale & Retail Rates
- Regulatory & Financial
- Transmission Planning & NERC/CIP Compliance
- Distribution System Planning & Line Design
- DSM & Energy Efficiency
- Utility Distribution Services
- Natural Gas
- Renewable Energy
- Sustainability
- Emerging Smart Infrastructure
- Data Analytics
- Electrification
- DER Integration

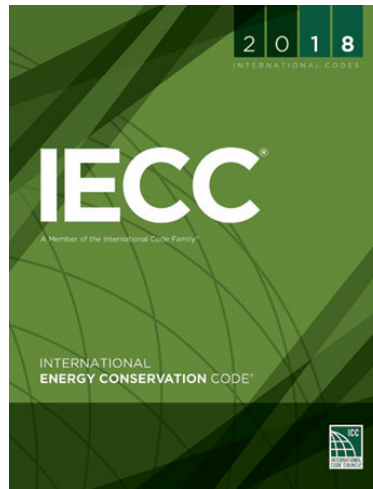
# Applicable Codes

Detached one- and two-family dwellings and townhouses ≤ 3 Stories (IRC Scoping)



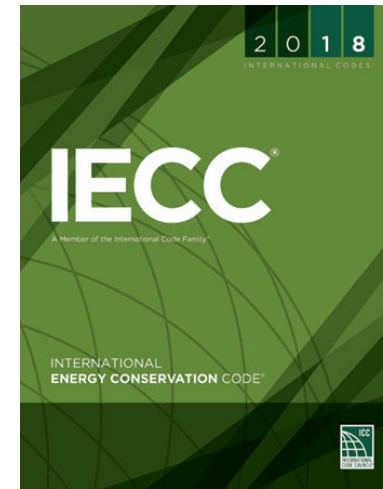
**780 CMR  
Residential Code  
w/ MA Amendments**

Group R-2, R-3, and R-4 buildings ≤ 3 Stories (IECC Definition)



**780 CMR Base Code  
w/ MA Amendments  
RESIDENTIAL  
PROVISIONS**

All Other Building Types



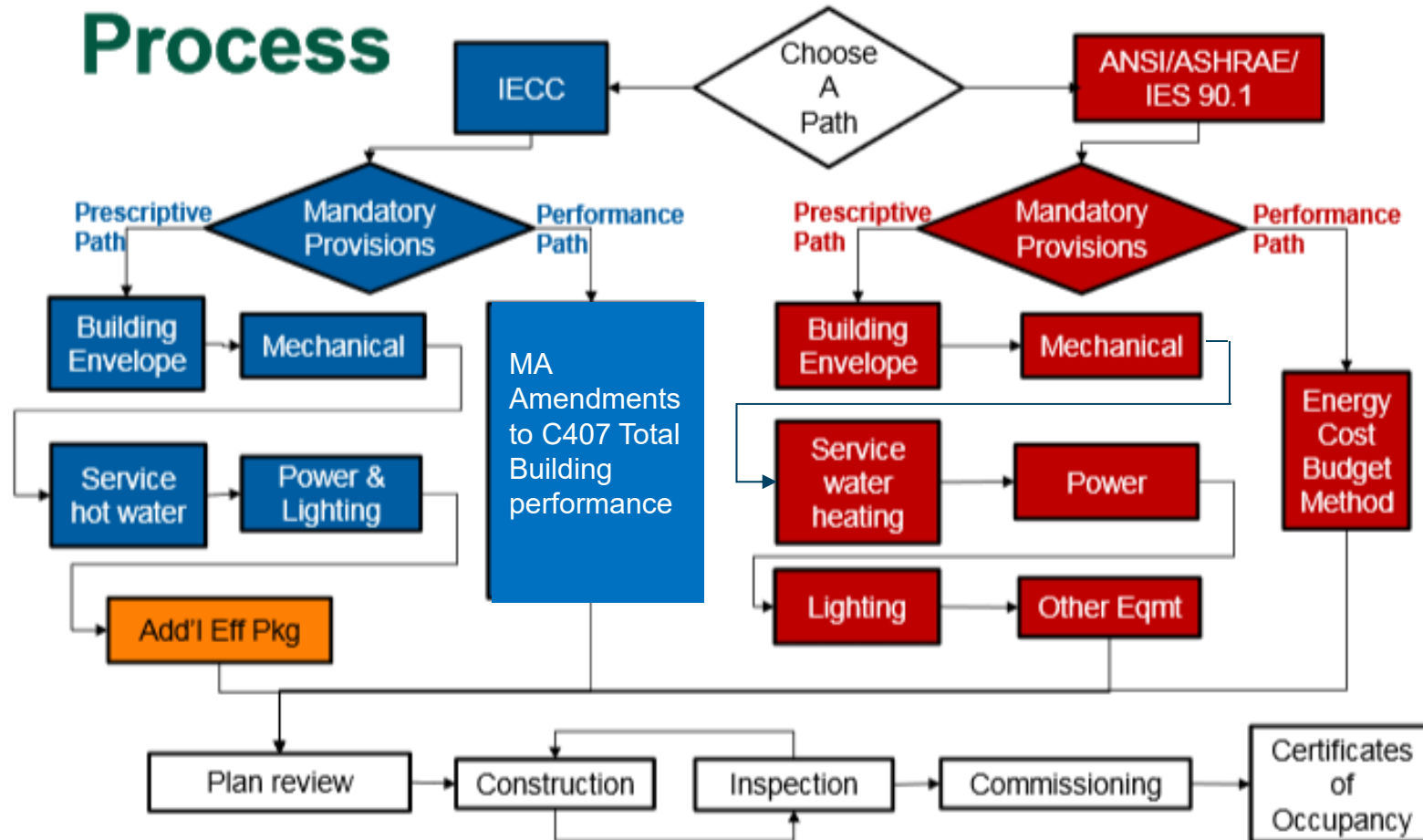
**780 CMR Base Code  
w/ MA Amendments  
COMMERCIAL  
PROVISIONS**



**\* MA Amendment: Group R Buildings up to 5 stories may follow energy provisions of R406**

# Compliance Pathways

## IECC Commercial Compliance Process



Source: iccsafe.org Annual 2015 IECC Update (Amended for MA)

# *Massachusetts Amendments to Chapter 13*

*MA Amendments are intended to expressly apply to the IECC, and are also applicable, in intent, to ASHRAE 90.1*

- . Adopt IECC Appendix CA: Solar-Ready Zone – Commercial
- . Add EV-Ready provisions
- . Amend air barrier provisions
- . Amend lighting provisions
- . Strengthen provisions for additional package options

# Key Changes 2015 to 2018 IECC

- . Overall modest changes the base IECC Version
- . Insulation and fenestration levels
  - . C402.1.3 Heated Slabs: R-5 required full slab. R-15 for 36" below in 5A. Previously R-10 for 24" below
  - . U-0.31 provision for glazing in garage doors (new)
  - . Slight reductions to SHGC requirements in CZ 5
- . Clarifications to air barrier provisions
  - . Sealing of penetrations
  - . Rooms containing fossil fuel burning equipment
  - . Loading dock seals
- . New provisions related to heated and cooled vestibules
- . Revisions to interior and exterior lighting power budgets and better clarity for lighting controls. *MA Amendments further adjust LPD allowances and control requirements*
- . New control requirements for hotels and motels with > 50 guest rooms
- . Mechanical provisions reorganized based on equipment type
- . Extension of C406 Additional Package options. *MA Amendments extend further, and require compliance with three options*

# Information Required on Construction Documents

(C103.2) Construction documents shall be of sufficient clarity to indicate the location, nature and extent of the work proposed, and show in sufficient detail pertinent data and features of the building, systems and equipment as herein governed. Details shall include, but are not limited to:

- . Insulation materials and their R-values.
- . Fenestration U-factors and solar heat gain coefficients (SHGCs).
- . Area-weighted U-factor and solar heat gain coefficient (SHGC) calculations
- . Mechanical system design criteria.
- . Mechanical and service water heating system and equipment types, sizes and efficiencies.
- . Economizer description.
- . Equipment and system controls.
- . Fan motor horsepower (hp) and controls.
- . Duct sealing, duct and pipe insulation and location.
- . Lighting fixture schedule with wattage and control narrative.
- . Location of daylight zones on floor plans.
- . Air sealing details.

## MA Amendments

- . Solar ready roof zone in accordance with Appendix CA
- . EV Ready Space Locations in accordance with C405.10

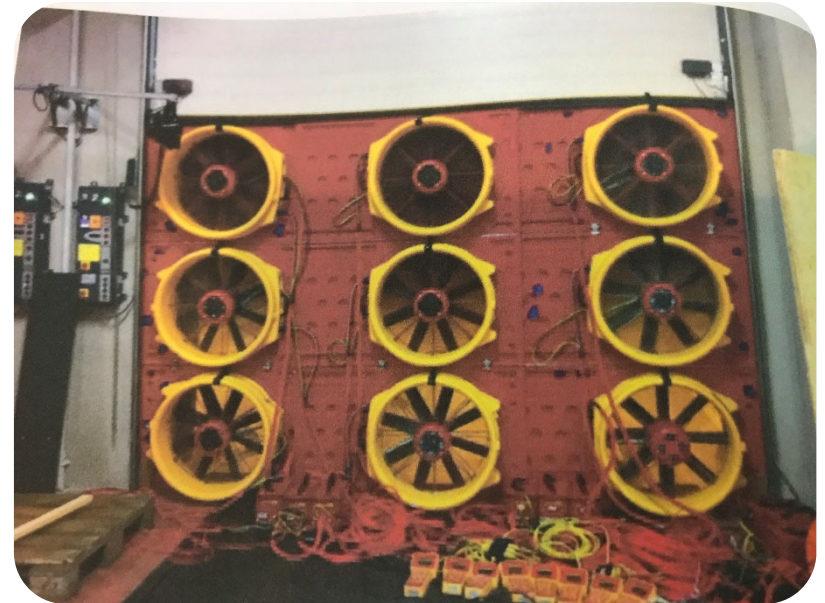
**C103.2.1: Building's thermal envelope must be depicted on CD's**



# *Air Leakage – Thermal Envelope*

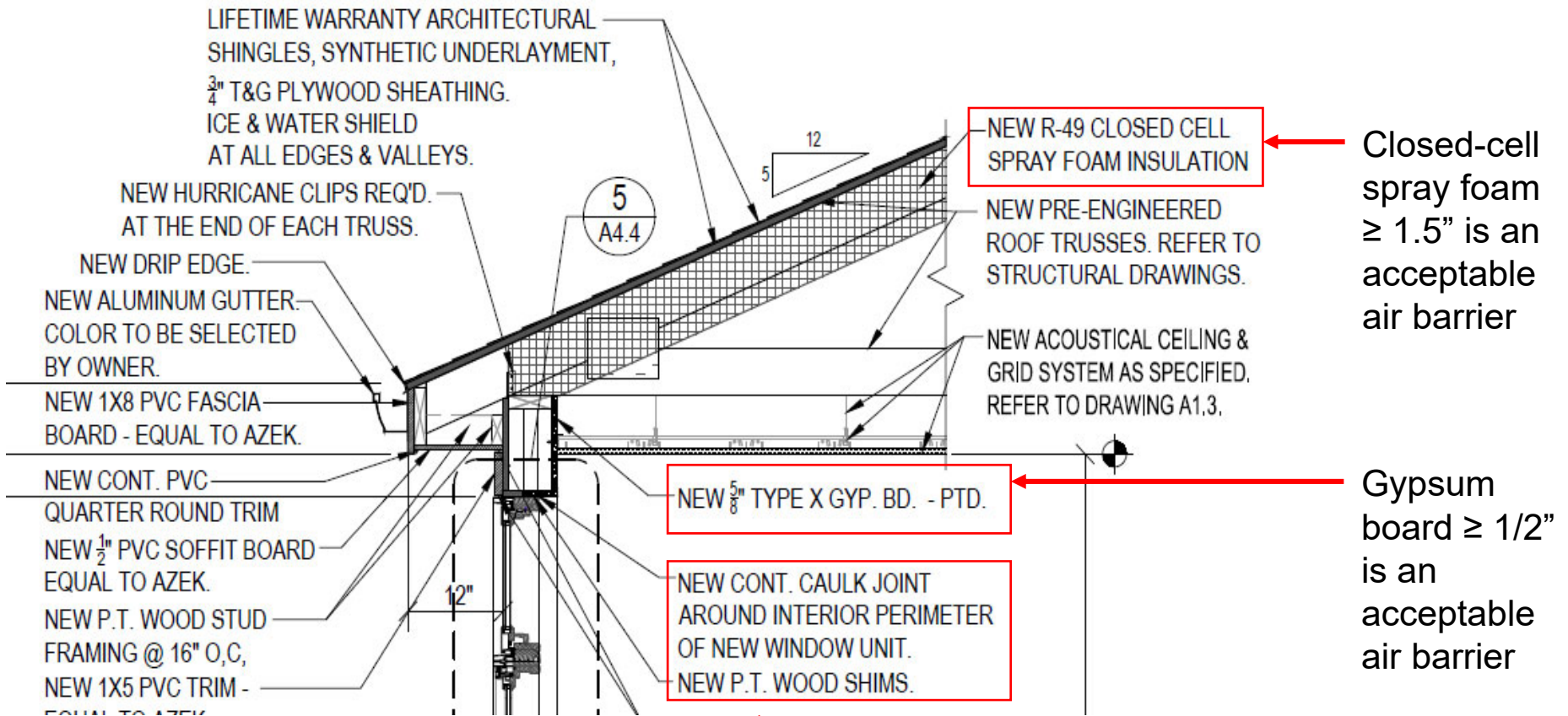
**The building thermal envelope of all buildings must comply with one of the following:**

- Continuous air barrier comprised of acceptable prescriptive materials
- Use of assemblies tested by third party to meet or exceed allowable leakage rates
- Performance testing to  $\leq 0.40$  CFM/ft<sup>2</sup> of building thermal envelop area at - 0.3 in w.c (-75 pa)



2018 Energy Code Essentials, ICC

# Air Leakage – Thermal Envelope

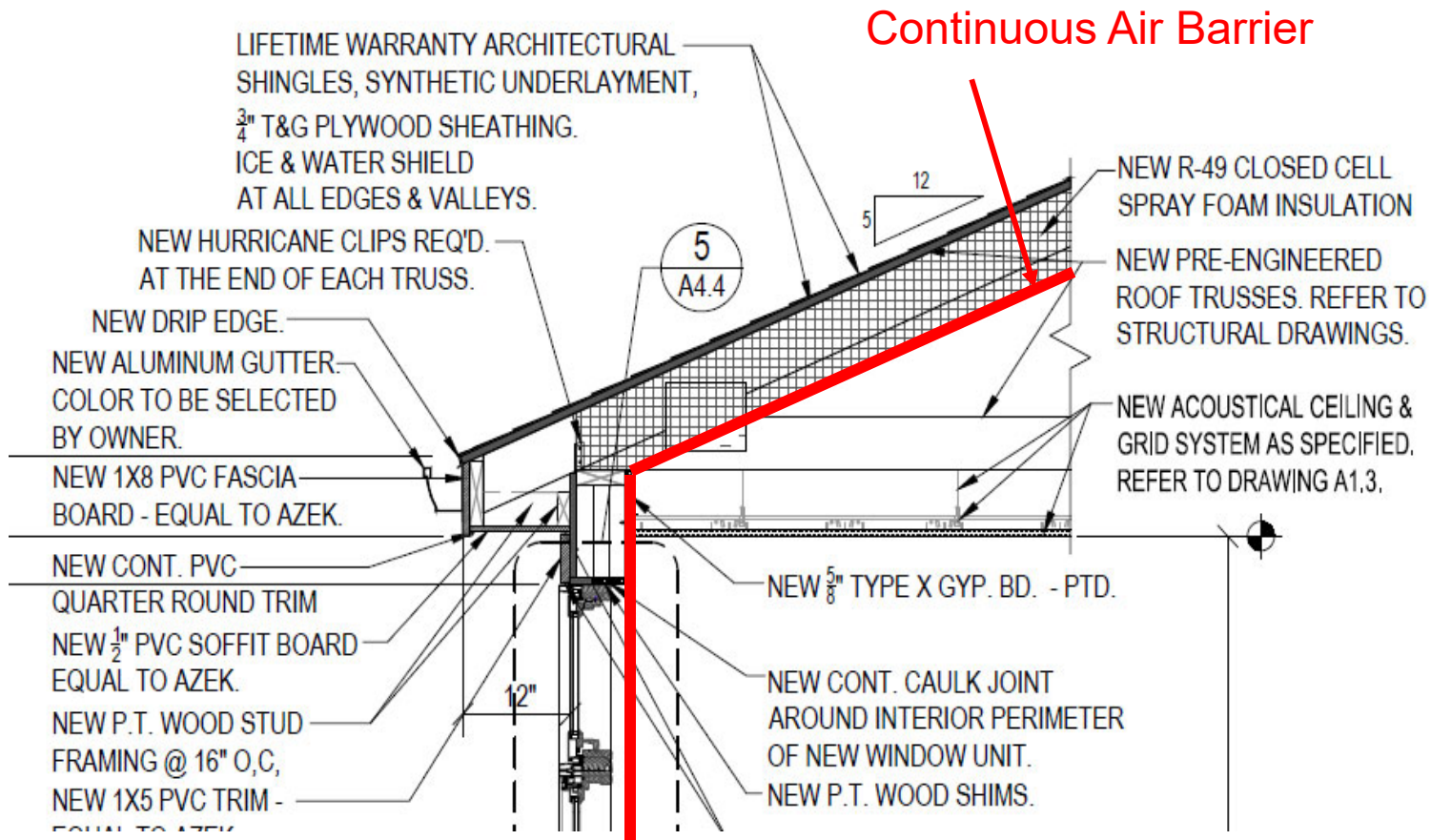


Closed-cell spray foam  $\geq 1.5$ " is an acceptable air barrier

Gypsum board  $\geq 1/2$ " is an acceptable air barrier

Air barrier joints and seams shall be sealed, including sealing transitions in places and changes in materials (C402.5.1.1)

# Air Leakage – Thermal Envelope



# Modified Air Barrier Provisions in 2018 IECC (as amended)

## C402.5.1.1 Air Barrier Construction

- . **ADD** Sealing of penetrations must allow for expansion, contraction, and mechanical vibration
- . **REMOVE** Reference to moisture vapor permeable wrapping material

## C402.5.1.2.2 [Air Barrier] Assemblies

- . **MA AMENDMENT ELIMINATES** Option 2, “Masonry walls constructed of clay or shale masonry units with a nominal width of 4” or more”, as an acceptable assembly

## C402.5.3 Rooms Containing Fuel Burning Appliances

- . **CLARIFY** Requirements for these spaces. Such rooms must be located outside the thermal envelope, or enclosed and isolated from other condition spaces
- . [Commentary] Direct vent appliances are not addressed because they are not “served” by an opening in the thermal envelope but are instead provided with direct venting to supply combustion air and to exhaust products of combustion

## C402.5.6 Loading Dock Weather seals

- . **ADD** language that weather seals at cargo door openings and loading door openings shall be designed to restrict infiltration and provide direct contact along the top and sides of vehicles

# Vestibule Provisions

**C402.5.7:** Building entrances shall be protected with an enclosed vestibule. Exceptions:

- Non-public doors
- Doors opening directly from a sleeping unit or dwelling unit
- Doors that open directly from a space < 3,000 ft<sup>2</sup>
- Entrances with a qualifying air curtain
- Revolving doors (the presence of revolving doors does not relieve the requirement for vestibules on adjacent doors)
- Doors used primarily to facilitate vehicular movement or material handling, and adjacent personnel doors



**\*New in 2018\*** **C403.4.1.4:** Heated or cooled vestibules (Mandatory)

- Heating system for heated vestibules, and air curtains with integral heating must be provided with controls to shut down heating when OAT > 45°F
- Requires thermostat located in vestibule. Establishes limits on heating setpoint to 60°F and cooling setpoint to 85°F

# Hotel Guestroom Energy Management

## **\*New in 2018\*** C403.7.6: Automatic Controls of Guestroom HVAC Systems (Mandatory)

- . Group R-1 with more than 50 guestrooms must comply.
- . Temperature Setpoint Controls:
  - Raise cooling setpoint or lower heating setpoint by 4°F within 30 minutes of guest leaving the room
  - Automatically raise cooling setpoint to 80°F or lower heating setpoint to 60°F when guestroom is unrented or has been vacant for 16 hours
- . Ventilation Controls:
  - Configured to automatically shut off ventilation and exhaust systems within 30 minutes of guest leaving room, or otherwise shutting off outside air and exhaust air
  
- . Does not require a specific controls strategy to determine when a room is occupied
- . Occupancy sensors, vacancy sensors, captive key systems or any other controls strategy that satisfy the automatic temperature and time criteria would meet the requirement
- . Code does not prescribe maximum or minimum temperatures when the room is occupied
- . Network guestroom control systems that return to default occupied setpoints before a room is rented are not precluded by this section

# Electrical Lighting Changes

## 2020 MA Amendment to C405.3.2

### *Interior Lighting Power Allowances*

- The 2018 IECC amends allowable LPD's from the 2015 version and Massachusetts further amends

	2015 IECC (W/ft <sup>2</sup> )	2018 IECC (W/ft <sup>2</sup> )	MA Amendments 2020 (W/ft <sup>2</sup> )
Hospital	1.05	1.05	<b>0.96</b>
Hotel/Motel	0.87	0.75	<b>0.56</b>
Library	1.19	0.78	<b>0.83</b>
Manufacturing Facility	1.17	0.90	<b>0.82</b>
Motion Picture Theater	0.76	0.83	<b>0.44</b>
Office	0.82	0.79	<b>0.64</b>
Parking Garage	0.21	0.15	<b>0.18</b>

Expanded or clarified requirements for lighting controls:

- Open office spaces
- Threshold for daylighting controls amended to 100 watts (MA)
- Occupancy sensor locations
- Exterior Lighting Controls

# Additional Efficiency Package Options (C406)

- . Base 2015 IECC required buildings to comply with at least one additional efficiency package option (LPD, HVAC, renewables, etc.).
  - . MA Amendments extended this provision, requiring at least two additional package options unless located in a territory not served by Mass Save
- . **2018 IECC ADDS** package options that can be used to comply with this section including enhanced envelope performance and reduced air infiltration. Base 2018 IECC only requires compliance with one additional option.
  - . **UPDATED MA AMENDMENTS** require compliance with **THREE** additional efficiency package options. Additionally, the MA Amendments:
    - ❑ Add two additional package options; Renewable Space Heating and Type IV Heavy Timber Construction
    - ❑ Define renewable space heating as “all space heating provided with a cold-climate heat pump having a rated COP of at least 1.75 @ 5°F
    - ❑ Extend LPD reduction to exterior lighting in addition to interior



# Rooftop Solar Readiness

## 2018 MA Amendment to C402.3

### ***Rooftop Solar Readiness (Mandatory)***

*Follow IECC Appendix CA: Solar-ready Zone - Commercial*

- Solar Readiness provisions were also included in prior MA amendments to 780 CMR Ch. 13
- Appendix CA is new to 2018 IECC. Not mandatory unless specifically referenced in adopting ordinance

	2015 IECC with MA Amendments	2018 IECC with MA Amendments
<b>Applicability</b>	New buildings and additions < 4 stories, with ≥ 2,400 ft <sup>2</sup> roof area Oriented between 110° and 270° of true north or have low slope roofs	New buildings and additions < 5 stories, Oriented between 110° and 270° of true north or have low slope roofs
<b>Exceptions</b>	Assembly A-2, A-3, Group H Buildings with permanently installed on-site renewable Rooftop parking Roofs shaded more than 50% of daylight hours Buildings not meeting conditions for solar zone	Building with permanently installed on-site renewables Roofs shaded more than 70% of daylight hours Certification from licensed design professional that the site is not suitable
<b>Requirements</b>	Not less than 1,600 ft <sup>2</sup> or 50% of roof area exclusive of mandatory access or setback areas Free from obstructions. Reserved electrical space Show structural design loads on documents	Not less than 40% of roof area (projected gross area less skylights, roof gardens, setbacks, etc.) Free from obstructions. Reserved electrical space. Add collateral dead load of not less than 5 psf

# Electric Vehicle Readiness

## 2018 MA Amendments ADD Section C405.10

### *Electric Vehicle Charging Spaces (“EV-READY Spaces”)*

Group A-1, B, E, I, M and R buildings with 15 or more passenger vehicle parking spaces shall provide one EV-READY Space

- “EV-READY Space” is defined as a designated parking space which is provided with one dedicated 50-amp branch circuit for EVSE serving Electric Vehicles
- The branch circuit shall be identified as “EV-READY” in the service panel or subpanel directory. Termination location shall also be marked ‘EV-READY” and terminate in NEMA receptacle or SAE J1772 connector

#### **Exceptions:**

- Parking spaces and garage spaces intended solely for retail sale or vehicle service
- If all non EV-READY spaces are separated from the meter by a public right-of way
- Any 50 amp branch circuit may be replaced by 3 or more “EV-READY” labelled 20 amp branch circuits and terminations where additional spaces are available

# Mass Save Technical Assistance and Incentive Programs

- Program Administrators are evolving the programs to adapt to increasingly stringent codes
  - Energy Use Intensity (EUI) based offerings
  - Basing savings/incentives on actual building performance versus modeled
  - Zero Net Energy (ZNE) and passive house
- Technical Assistance Services (*still in development*)
  - Sample language for OPR and BOD
  - Benchmark EUIs of similar buildings
  - Evaluate Photo-voltaic (PV) potential
  - Early modeling/feedback to help design team prioritize decisions
  - Lifecycle cost analysis/Economic analysis
  - Spot check design team energy models at end of schematic Design (SD), Design Development (DD), Construction Documents (CD)
  - As built-calibrated energy model

# Mass Save Technical Assistance and Incentive Programs

	Path 1	Path 2	Path 3	Path 4
Proposed Paths	Deep Energy Savings / Low EUI	Whole Building (modeled)	Simplified Whole Building	Systems
Current Paths	(none)	Integrated Design – Large Building	Integrated Design – Small Building	Systems

Engage before 50% SD!

Best available incentives and TA support

Engage before 100% DD!

Comprehensive incentives and TA support

Late engagement still accepted

Fewer incentives and minimal TA support

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## *MA Residential Energy Code*

- . IECC Residential / IRC
- . 780 CMR – Massachusetts State Building Code CH. 51.00
- . Stretch Code
- . Performance Path and Inputs



***Bruce Bennett***

Principal  
GDS Associates

With over 22 years of experience in the residential development industry, Bruce's career began as a Development Officer, working in multifamily housing finance, planning and development. This provided an intro to the world of energy codes and standards. Bruce started the Building Energy Services division of the Energy Efficiency Department at GDS Associates performing diagnostic testing (e.g. air infiltration testing, duct leakage) and energy rating services (HERS Ratings).

- Bachelor of Science in Environmental Design from the University of Massachusetts-Amherst
- Master of Regional Planning from University of Massachusetts-Amherst

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Services Include:

- Power Supply Planning
- Wholesale & Retail Rates
- Regulatory & Financial
- Transmission Planning & NERC/CIP Compliance
- Distribution System Planning & Line Design
- DSM & Energy Efficiency
- Utility Distribution Services
- Natural Gas
- Renewable Energy
- Sustainability
- Emerging Smart Infrastructure
- Data Analytics
- Electrification
- DER Integration

# Residential Energy Code Compliance

- **R401.2** Projects shall comply with one of the following:
  - 1. Prescriptive Path Sections R401 through R404 and R407 (including RESCheck™)
  - 2. Performance Path Simulated Energy Alternative (e.g. Energy Modeling)
  - 3. Performance Path An energy rating index (“ERI”) or approved alternative and all mandatory provisions in R401 – R404. Qualifying approaches under R406 include:
    - ✓ Certified RESNET HERS (rating with MA Amendments)
    - ✓ Certified ENERGY STAR Homes, Version 3.1
    - ✓ Certified Passive House performance method
- STRETCH Code Communities require the performance path

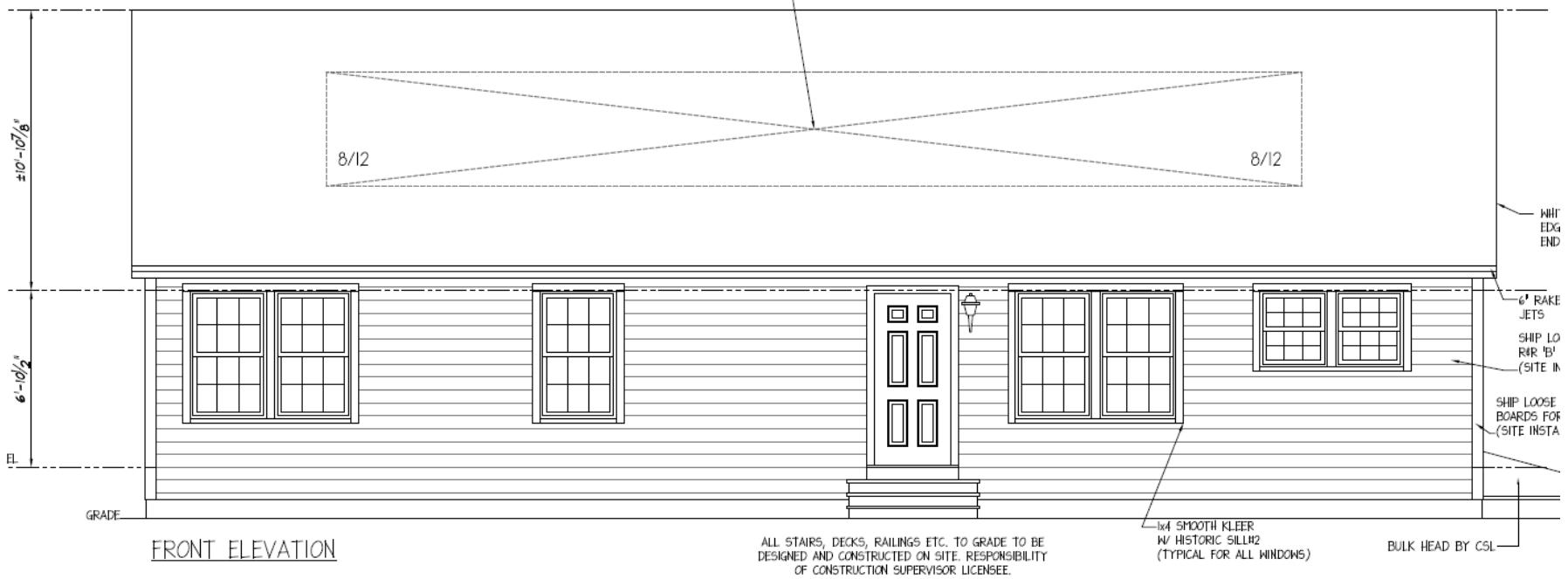
# Key Changes 2015 to 2018 IECC (w/ MA Amendments)

- . Electric Vehicle Charging Spaces (“EV Ready Spaces”) are **not** required for **detached one- and two-family dwellings and townhouses ≤ 3 stories** under this code
- . New construction residential buildings must be solar ready if they have >600ft<sup>2</sup> of roof area oriented between and 110° and 270° of true North
  - . Exceptions:
    - . Permanent, on-site renewable energy system
    - . Shaded for more than 70% of daylight hours
    - . Construction documents show the conditions do not exist for a solar-ready zone
- . “Outdoor air intakes and exhausts shall have automatic or gravity dampers that close when the ventilation system is not operating”
  - . Alternative ventilation rate:  $CFM = (0.01 \times \text{sq ft}) + (7.5 \times (1 + \text{no. of bedrooms}))$
- . The solar-ready zone needs to be identified on the plans



# Key Changes 2015 to 2018 IECC (w/ MA Amendments)

SOLAR-READY ZONE, 300 SQ. FT. MIN. PATHWAYS/PREP FOR ROUTING FUTURE COMPONENTS PROVIDED. DESIGN, SUPPLY AND INSTALLATION OF SOLAR COMPONENTS RESPONSIBILITY OF CONSTRUCTION SUPERVISOR LICENSEE.



# Key Changes 2015 to 2018 IECC (w/ MA Amendments)

- The maximum energy rating in Table R406.4 has updated slightly from 2015. If on-site renewable energy is used for compliance under the ERI analysis, mandatory requirements on envelope and SHGC must be met

Maximum HERS Index Score	2018 Energy Code (w/ MA Amendments)	
On-site Renewable Energy Application	New Construction	Whole House Renovations; Additions
None	55	65
Solar Electric Generation	60	70
Clean Space Heating	60	70
DHW	57	67
Solar Electric and Clean Space Heating	65	75
Solar Electric and DHW	62	72
Solar Electric, Clean Space Heating and DHW	67	77

# *Key Changes 2015 to 2018 IECC (w/ MA Amendments)*

## **What is Clean Space Heating?**

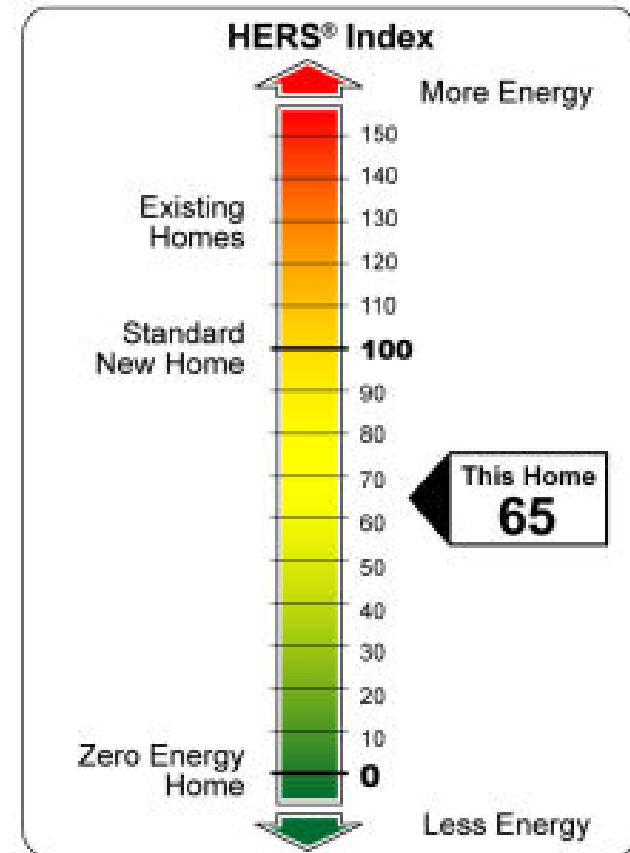
- Clean Biomass Space Heating
  - Wood Pellet Fired Furnace / Boiler w/ efficiency  $\geq 80\%$  and low particulate matter ( $\leq .15 \text{ \#/MMBtu}$ )
- Solar Thermal Array
- Air Source Heat Pumps (COP  $\geq 1.75$ )
- Geothermal Heat Pumps

## *R406: Energy Rating Index Alternative*

- . Required in STRETCH Code Communities
- . Establishes an energy rating compliance alternative
- . Voluntary Performance Compliance Path
- . Uses ERI or “Energy Rating Index”
  - Reference Home=2006 IECC
- . HERS Compatible

# Home Energy Rating (HERS)

- 100 = a home that uses the same amount of energy (100%) that a standard new home uses
- 75 = a home that uses only 75% of the energy of a standard home
- Rating performed by independent 3rd-party
  - Accredited HERS Rating Provider



Source: Residential Energy Services Network

# Home Energy Rating Example

Input	Base Case	Scenario 1	Scenario 2	Scenario 3	Scenario 4
Size (sq ft)	2,443				
Bedroom	3				
Basement	Unfinished				
Foundation	R0				
Floor	R30				
Walls	R21				
Window (U-Val)	0.29				
Window : Wall	15%			10%	
Heating	95% LP Furn			96%	94% BOILER
Hot Water	50 gal LP		Instant LP	Instant LP	INDIRECT 40 gal tank
AC (SEER)	13				
Duct Leak (% of CFA)	6% of CFA	4%	4%	4%	No ducts
Blower Door	5 ACH <sub>50</sub>	3 ACH <sub>50</sub>	3 ACH <sub>50</sub>	3 ACH <sub>50</sub>	3 ACH <sub>50</sub>
HERS Index	60	58	54	51	50
<b>w/ 4 KW PV</b>	<b>40</b>	<b>38</b>	<b>34</b>	<b>32</b>	<b>31</b>

# Home Energy Rating Example

Input	Base Case	Scenario 1	Scenario 2	Scenario 3
Size (sq ft)	2150			
Bedroom	3			
Basement	Conditioned			
Foundation	R10			
Floor	R30 (over garage)			
Walls	R30 (HDSF+6.5)	R21	R21	R21
Window (U-Val)	0.24			
Window : Wall	14.5%			
Heating	Mini-split		95% LP boiler	95% LP boiler
Hot Water	Instant LP			
Duct Leak (% of CFA)	No Ducts			
Blower Door	.84 ACH <sub>50</sub>			3 ACH <sub>50</sub>
HERS Index	47	51	48	49
w/ 7KW PV	10	12	10	11

# Home Energy Rating Example



## Residential New Home Construction Incentives

for single-family homes and multi-family homes (3 stories or less)

MassSave Incentive Structure	
	<i>SINGLE FAMILY</i>
Electric Savings	\$0.35 / kWh
Fuel Savings	\$35 / mmbtu
Total % Savings	\$3000 / %
Rating Fee Subsidy	\$350
LEDs	Free
Adder ENERGY STAR ®	\$100



**Thank You!**

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