

# UPDATING VERMONT'S COMMERCIAL ENERGY CODE

## Informational Webinar for Stakeholders

FEBRUARY 19, 2014

[http://publicservice.vermont.gov/topics/  
energy\\_efficiency/code\\_update](http://publicservice.vermont.gov/topics/energy_efficiency/code_update)

# Welcome and Agenda

- ▶ Introductions
- ▶ Background and schedule
- ▶ How to provide input
- ▶ Approach: guiding principles
- ▶ Compliance update
- ▶ 2015 IECC – foundational document
- ▶ Technical requirements
- ▶ Q & A

# Introductions–Update Team

- ▶ Kelly Launder and Barry Murphy, *Vermont Public Service Department*
- ▶ Stu Slote and Tim Guiterman, *Navigant*
- ▶ Richard Faesy and Jim Grevatt, *Energy Futures Group*
- ▶ Jim Edelson, *New Buildings Institute*
- ▶ Eric Makela, *Britt/Makela Group*
- ▶ Mike DeWein, *Consultant*

# Background

- ▶ Energy code update required by Vermont Law
- ▶ Residential Building Energy Standards (RBES)
- ▶ Commercial Building Energy Standards (CBES)
- ▶ Every 3 years
- ▶ Process managed by Public Service Department

# Background

- ▶ Act 89
  - Town administrator requirements
    - Provide information
    - Certificate of Occupancy tied to code certificate

# Schedule for Update Process

- ▶ Effective early 2015
- ▶ Stakeholder meetings Spring 2014
- ▶ Legislative Committee on Rulemaking (LCAR) early fall, 2014 in order to meet January 1 target

# Stakeholder Input

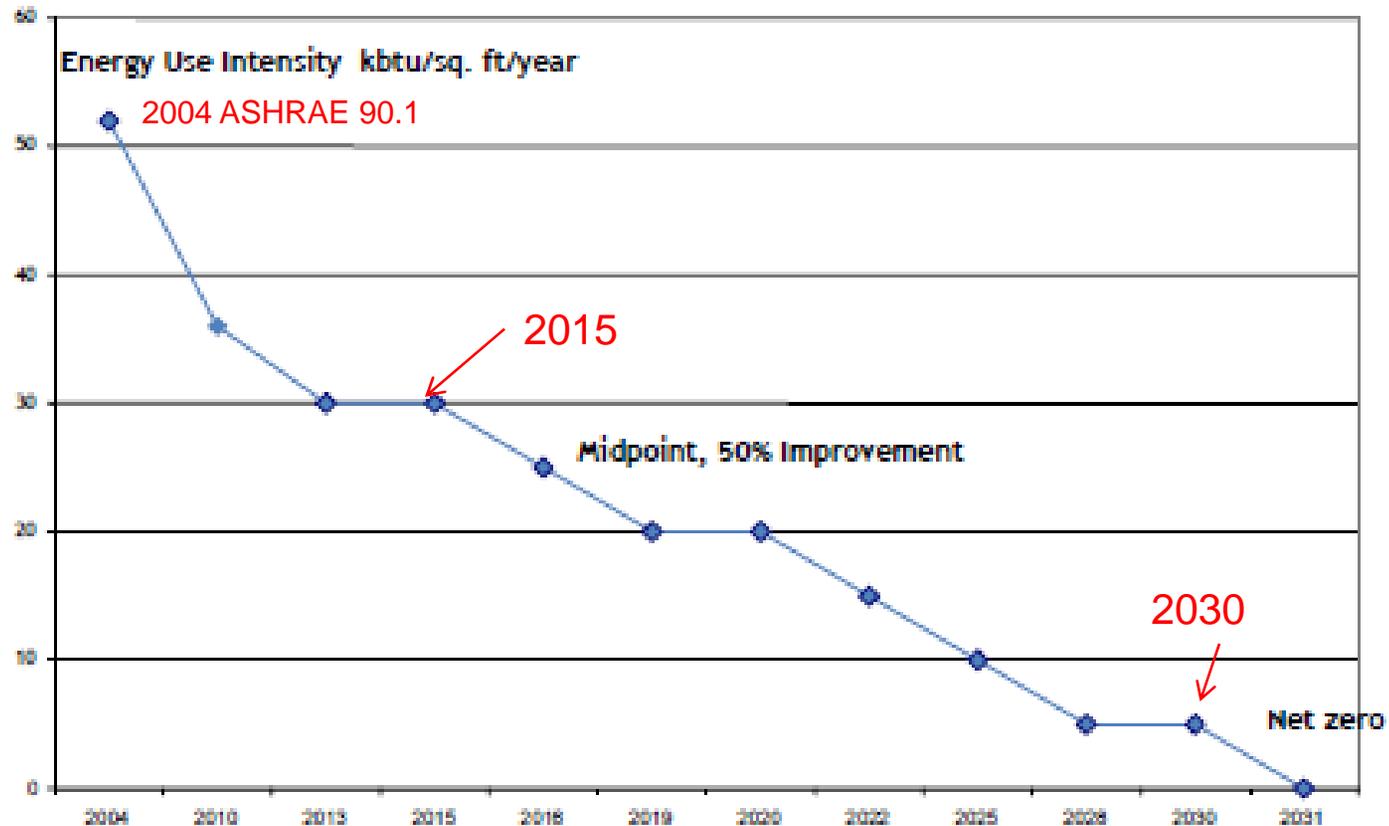
- ▶ Four public stakeholder meetings
  - 1:00pm–4:00pm for Commercial
  - March 12 – Vermont College, Montpelier
  - March 14 – Vermont Fire Academy, Pittsford
  - May 7 – Burlington Electric Department
  - May 9 – Windsor Welcome Center
- ▶ Questions and comments to:
  - Barry Murphy, Public Service Department  
802–828–3183  
barry.murphy@state.vt.us

# Objectives and Approach

- ▶ Comprehensive Energy Plan says VT should establish a “...clear path to achieve a goal of having all new buildings built to net zero design by 2030.”
- ▶ “Path” means it’s not one step to net zero—rather incremental improvements to achieve net-zero goal (up to 5 more code updates before 2030)
- ▶ Balance any construction cost increases and construction/technology changes with reducing energy use

# Vermont Energy Codes Over Time

## Building Energy Performance Goals For ASHRAE 90.1 Standard



Source: NEEP Building Energy Codes Policy 3/1/2009

# Code Compliance

- ▶ Scarcity of enforcement funding/resources, BUT
- ▶ Several initiatives to increase compliance
  - Energy Efficiency Utility (EEU) programs: Efficiency Vermont, Vermont Gas and Burlington Electric Department
  - Act 89 – new requirements
  - Energy Code Assistance Center through Efficiency Vermont
  - Outreach to municipalities by Public Service Department and Efficiency Vermont
  - Exploring creation of an “Building Energy Code Collaborative”

# Compliance Options for 2014 CBES

- ▶ Technical Approaches
  - Prescriptive 2014 CBES
    - *COMcheck* software approach
  - ASHRAE 90.1–2013
  - Performance Approach
    - Energy modeling to 90.1–2013 Appendix G
      - Stretch code could include a % improvement
- ▶ Mandatory Requirements
- ▶ Administrative Requirements
  - Affidavit/Certificate signed and posted in building
  - Copy filed with the Town Clerk
  - Copy to the PSD

# 2011 CBES – Recap

- ▶ 2011 CBES is a mix of 2012 and 2009 IECC (and ASHRAE 90.1–2010 and 2007)
- ▶ Introduced new continuous air barrier requirements
- ▶ New metal building R-values; new vestibule requirements
- ▶ Functional performance testing for buildings >50K SF (Economizers, VAV fan control, Hydronic Controls)
- ▶ Expanded economizer requirements
- ▶ And more...

# 2015 IECC as the Foundational Document for 2014 CBES

- ▶ Desire to be consistent between C&I and Res
- ▶ Lighting is significantly reorganized and measurably more efficient
- ▶ SHW is significantly revised and more efficient
- ▶ Modest changes/updates to HVAC
- ▶ Little change to envelope
- ▶ Introduces efficiency and renewable energy “packages”

# 2015 IECC as the Foundational Document for 2014 CBES (continued)

- ▶ Definitions and language throughout thoroughly clarified
- ▶ 2015 has a chapter on renovation/remodel
- ▶ 2015 brings us in step with national update cycle
- ▶ Whether 2012 or 2015, Vermont can increase OR decrease stringency

# Proposed Base & Stretch Levels

## ► Envelope

Item	2011 CBES	Base	Stretch
Continuous air barrier	3 options (materials, assemblies or testing)	No change, but reorganized text for clarity	2 options  Materials list plus leakage testing (i.e., blower door) <i>or</i> Materials list plus air barrier commissioning
Insulation values	2009 and some 2012 IECC values	No change <i>or</i> 2012 IECC values (where better)	2015 IECC, ASHRAE 90.1-2013 or NBI Core Performance Tier 2 values as stretch

# Proposed Base & Stretch Levels

## ► Envelope (*continued*)

Item	2011 CBES	Base	Stretch
Window Solar Heat Gain Coefficient (SHGC)	SHGC only considers projection factor	SHGC to consider projection factor <i>and</i> orientation	More stringent (lower) SHGC values than base
Skylights in High Bay Areas	None	All high bay areas over 2500 sq. ft. must be 75% daylit	

# Proposed Base & Stretch Levels

## ▶ Mechanical

Item	2011 CBES	Base	Stretch
HVAC Energy Recovery	Mandatory for systems with airflow >5000 cfm	Expand range of exhaust energy recovery down to 10% of outdoor air rate	Required for ventilation systems with high airflow rates (>1000 CFM)
HVAC System Controls	Thermostatic controls with setback capability in each zone	<ul style="list-style-type: none"> <li>- Part load requirements for water-cooled centrifugal chillers</li> <li>- Deadband of at least 5 F for thermostatic controls</li> <li>- Isolate zone control requirements for large zones</li> <li>- Snow and ice melt system controls</li> </ul>	

# Proposed Base & Stretch Levels

## ▶ Mechanical (*continued*)

Item	2011 CBES	Base	Stretch
Economizer Functional Testing	None	<ul style="list-style-type: none"> <li>- Fault detection and diagnostics requirements</li> <li>- Low-leakage damper rating and labeling required</li> <li>- Water-side economizer requirements for non-fan cooling systems</li> </ul>	
Duct Leakage	Duct sealing for low, medium and high pressure systems and pressure classification on construction documents		<ul style="list-style-type: none"> <li>- Maximum leakage lowered from 6 to 4 for high pressure systems</li> <li>- No more than 5% of ductwork can be located outside of thermal envelope</li> </ul>

# Proposed Base & Stretch Levels

## ▶ Mechanical (*continued*)

Item	2011 CBES	Base	Stretch
Duct Insulation	Min R-8 insulation in unconditioned spaces and R-10 when outside of building		R-8 insulation in unconditioned spaces  R-12 when located outside the building

# Proposed Base & Stretch Levels

## ▶ Service Water Heating

Item	2011 CBES	Base	Stretch
SHW Piping Insulation		Minimum pipe insulation table tied to fluid temps and insulation	Includes a pipe length limit option or a water volume option
Demand Recirculation Pumps		Requirement to shut off automatically or manually when not in operation	<ul style="list-style-type: none"><li>– Recirculation system design requirements</li><li>– Recirculation system controls requirements</li></ul>

# Proposed Base & Stretch Levels

## ▶ Service Water Heating (*continued*)

Item	2011 CBES	Base	Stretch
Waste Water Energy Recovery and Commissioning	None	Building with high hot water loads to meet 40% of peak hot water demand with either partial solar thermal or heat recovery	Service water heating systems commissioning and completion requirements

# Proposed Base & Stretch Levels

## ▶ Lighting and Controls

Item	2011 CBES	Base	Stretch
Lighting Power Density (LPD)	Based on 2012 IECC	2015 IECC (90.1–2013) as both base and stretch values	One of the efficiency packages is improved LPDs (90% of LPD in table)
Occupancy Sensors	For buildings >5000 sq. ft.  Controlled either by time schedule, occupant sensor or signal from BAS system	– Occupancy sensors in classrooms, conference rooms, lunch and break rooms, private offices, restrooms, warehouse spaces, storage rooms and janitorial closets – Important reorganization of controls language – Sensors control 50% of load in stairways, parking garages (per ASHRAE)	

# Proposed Base & Stretch Levels

## ▶ Lighting and Controls (*continued*)

Item	2011 CBES	Base	Stretch
Daylight Controls	Lighting within daylight zones shall be individually controlled from general area lighting	Spaces with a total of more than 150 watts of general lighting within sidelight and toplight daylight zones shall include daylight responsive controls	

# Proposed Base & Stretch Levels

## ▶ Electrical Power/Energy Consumption

Item	2011 CBES	Base	Stretch
Vertical & Horizontal Transport	None	Elevator cabs: Luminaires to exceed 35 lumens per watt. Ventilation fans less than 0.33 watts/cfm. Escalators and moving walks: Automatic controls to reduce speed to minimum permitted when not in use	
Controlled Receptacles	None	- Automatic controls in at least 50 percent of the 125 volt 15- and 20-Ampere receptacles in private offices, computer classrooms and individual workstations and labeled "Automatic Control Receptacle" - Considering "load segregation" requirement (dedicated panels for end-uses)	

# Proposed Base & Stretch Levels

## ▶ Electrical Power/Energy Consumption (*continued*)

Item	2011 CBES	Base	Stretch
Computer/ Server Rooms	None	2015 IECC ventilation requirements	NBI Core Performance Tier 2: Separate economizer, HVAC controls, humidification and fan power limitation and controls for computer rooms over 5 tons
Refrigerated Display Case Lighting	None	2015 IECC: Either automatic time switch or motion sensor controls required	

# Proposed Base & Stretch Levels

## ▶ Commissioning and Verification

Item	2011 CBES	Base	Stretch
Functional Testing and Commissioning	For buildings >50K SF  Economizers, VAV fan control, and hydronic controls	Required for lighting controls, mechanical systems over 480 kBtu cooling and 600 kBtu heating  Add specificity for testing of lighting controls and defines role of registered design professional	

# Proposed Base & Stretch Levels

## ▶ Efficiency Packages

- Base code – require minimum of one package
- Stretch code – require minimum of two packages
  
- Six packages to choose from
  - Efficient lighting (90% of stated LPD values)
  - Efficient HVAC (e.g., 10% improvement)
  - Enhanced digital lighting controls
  - On-site renewables
  - Dedicated outdoor air system
  - Reduced energy use in service water heating

# Questions?

- Tim Guiterman, Navigant
- Stu Slote, Navigant
- Jim Edelson, New Buildings Institute
  
- Follow up  
Barry Murphy, Public Service Department  
802-828-3183  
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