NORTHEAST ENERGY EFFICIENCY PARTNERSHIPS

COMMERCIAL ENERGY CODES UPDATE AND COMPARISON

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to

PUBLIC SAFETY / CAPITAL ASSET MANAGEMENT

November 17, 2011

NORTHEAST ENERGY EFFICIENCY PARTNERSHIPS

"Accelerating Energy Efficiency"

MISSION

Accelerate the efficient use of energy in the Northeast and Mid-Atlantic Regions

APPROACH

Overcome barriers to efficiency through

Collaboration, Education & Advocacy

VISION

Transform the way we think about and use energy in the world around us.

WHAT DOES NEEP DO?

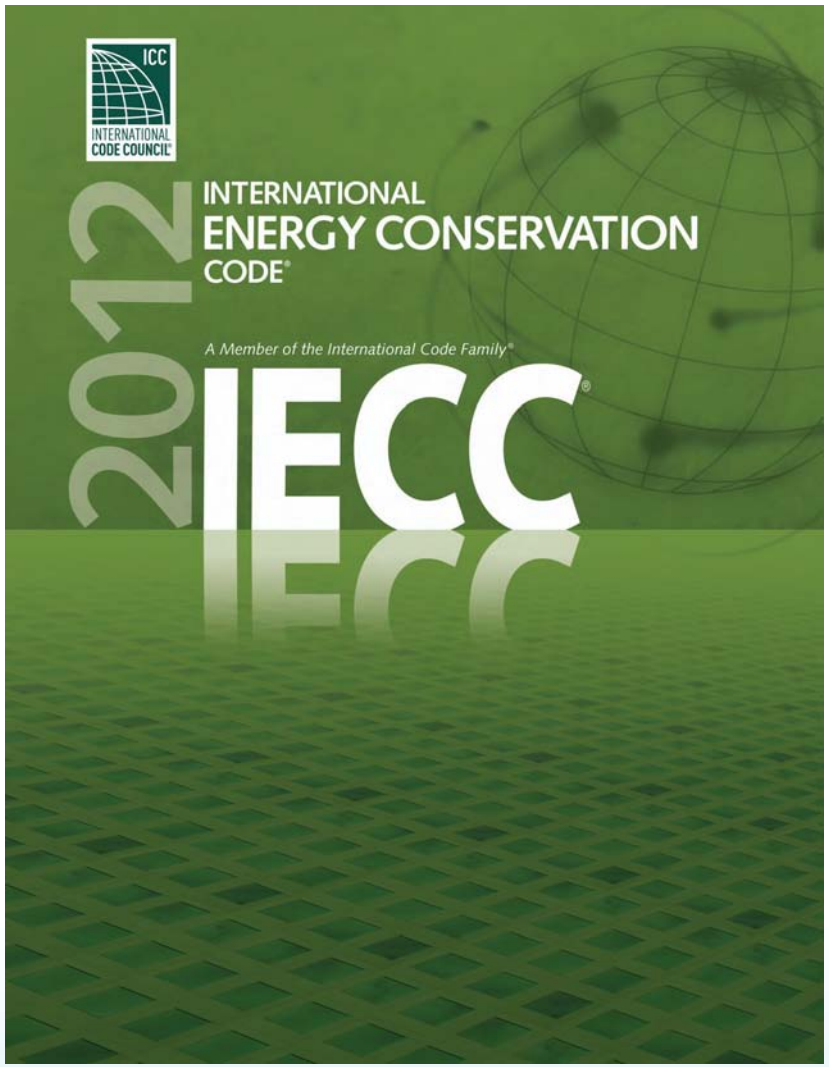
FACILITATE PARTNERSHIPS...

TO ADVANCE ENERGY EFFICIENCY

IECC 2012 ENERGY CODE COMMERCIAL CHANGES

Four Principal Areas

- ENVELOPE
- MECHANICAL / HOT WATER
- LIGHTING
- MANDATORY OPTIONS (new)



http://www.energycodes.gov/events/energycodes/documents/ecodes11/EC2011_2012iecc_commercial_update.pdf

SUMMARY OF SIGNIFICANT CHANGES

- **Increases performance** : envelope, windows, skylights
- **Reduces allowable air leakage:** envelope, duct systems
- **Reduces allowable glazing** (except for daylighting)
- **Requires daylighting** for certain types of uses > 10,000 sf
- **Adds automatic lighting controls** for daylighting strategies
- **Greater HVAC efficiencies** for certain equipment
- **Commissioning:** all HVAC systems > 400kBtu (A/C) 600k (heat)
- **Improvement Option** Choices: HVAC / Lighting / Renewables

WHY THIS IS IMPORTANT FOR DCAM

- Project Budgeting
- Re-Commissioning
- Annual Budgets
- Staff Training

PROJECT BUDGETING

Equipment & Systems Choices

- Lifetime costs – acquisition, O&M,
- Rehab / re-use (UTC)
- Adaptation to known future needs
- Anticipation of new technologies (lighting)
- Favoring integrated performance (design)

Prioritizing Expenditures

- Using less
- Using more efficiently
- Reclaim, re-use

RE-COMMISSIONING

Commissioning is a continuing process

- Scheduling with semi-annual changeovers
- Re-checking at regular maintenance interval
- Follow-up with warrantee coverages
- Service & maintenance bulletins

OPERATIONS & MAINTENANCE BUDGETS

- Maintain peak operational efficiencies
- Extend useful life of equipment
- Preserve warrantee coverages

- Plan for scheduled replacement programs
  - Monitor utilities DSM programs
- Lighting / controls updates
- HVAC / Service HW controls updates

BUDGET FOR STAFF TRAINING

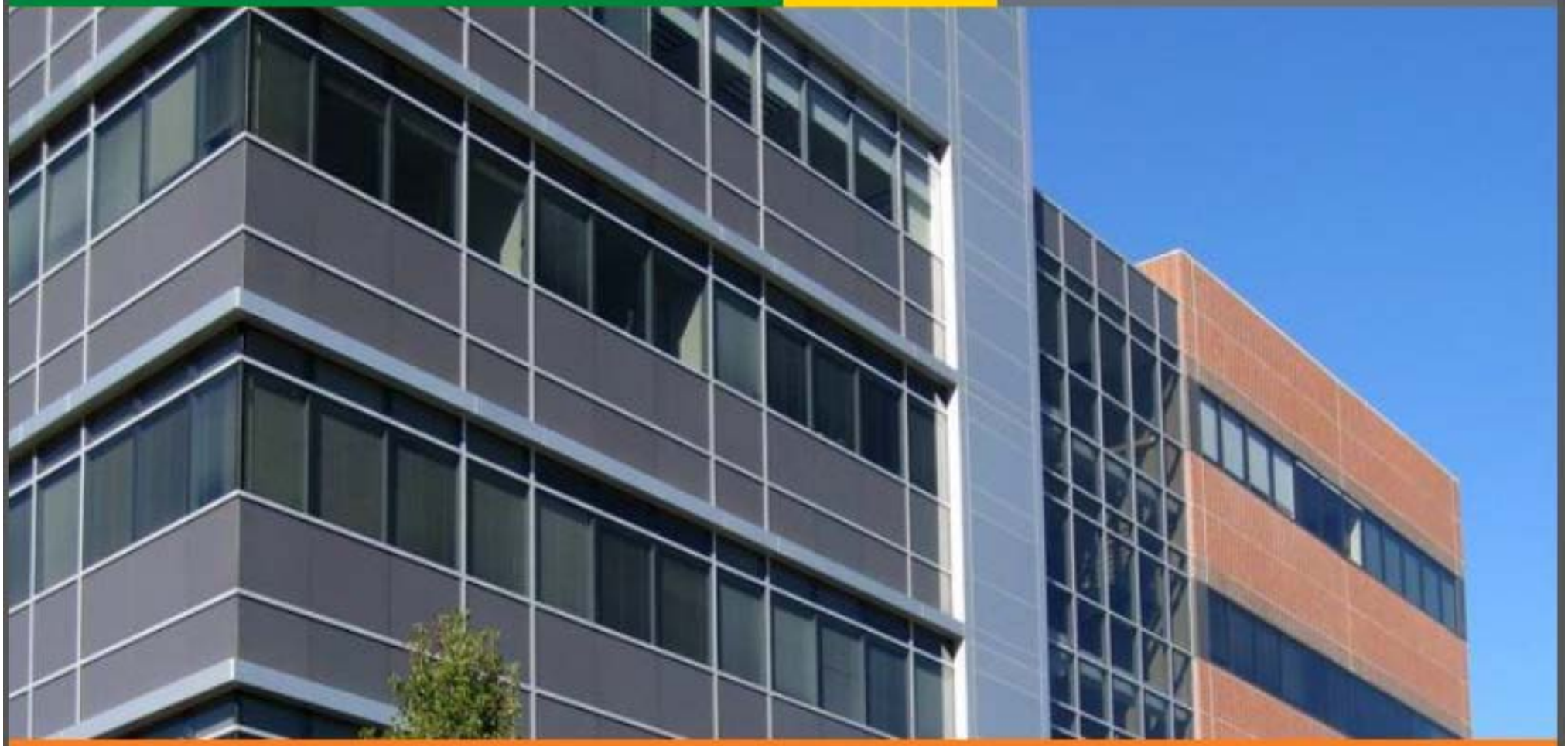
- O&M MANUALS
  - HVAC / Service Hot Water / Lighting
- Learning, understanding systems & controls
- Maintaining setpoints & limit controls; automatic shutoffs
- Monitoring / re-setting equipment; understanding warnings
- Using integrated building monitoring systems
- Monitoring utility usage – power & demand

- RE-TRAINING & PEER KNOWLEDGE TRANSFER
  - Establish and maintain a library

- CERTIFICATION TRAINING FOR NEW HIRES

BUILDING ENERGY CODES UNIVERSITY

U.S. DEPARTMENT OF ENERGY | Energy Efficiency & Renewable Energy



Major Changes to the 2012 IECC Commercial Requirements

July 2011

Eric Makela, PNNL

Commercial Compliance Options

U.S. DEPARTMENT OF ENERGY | Energy Efficiency & Renewable Energy

1

- 90.1-2010

OR

2

2012 IECC

- C402 - Envelope
- C403 - Mechanical
- C404 - SWH
- C405 - Lighting

AND

- Pick One:
  - C406.2 – Eff. HVAC Performance

  or
  - C406.3 – Eff. Lighting Systems

  or
  - C406.4 – On-site Renewable Energy

OR

3

2012 IECC

- C407 – Total Building Performance
- C402.4 – Air Leakage
- C403.2 – Provisions applicable to all mechanical systems
- C404 - SWH
- Lighting Mandatory Sections
  - C405.2
  - C405.3
  - C405.4
  - C405.6
  - C405.7
- Building energy cost to be ≤ 85% of standard reference design building

THERMAL ENVELOPE IMPROVEMENTS

- Increased efficiency of the opaque thermal envelope provisions
- Increased fenestration efficiency

- **Reduces Percentage of Vertical Fenestration Area**
  - Allowed up to 30% maximum of above grade wall area
  - In Climate Zone 5 (MA), up to 40% maximum of above grade wall with daylighting controls

NEW AIR LEAKAGE REQUIREMENTS

- More efficient air leakage requirements by requiring continuous air barriers for the building envelope

Air Barrier Materials (Compliance)
C402.4.1.2.1

U.S. DEPARTMENT OF ENERGY | Energy Efficiency & Renewable Energy

Materials with air permeance ≤ 0.004 cfm/ft^2 under pressure differential of 0.3 in. w.g. tested in accordance with ASTM E 2178

These materials meet this requirement:

Material	Thickness (minimum)
Plywood	3/8 in.
Oriented strand board	3/8 in.
Extruded polystyrene insulation board	½ in.
Foil-faced urethane insulation board	½ in.
Closed cell spray foam minimum density of 1.5 pcf	1-1/2 in.
Open cell spray foam density between 0.4 and 1.5 pcf	4.5 in.
Exterior gypsum sheathing or interior gypsum board	½ in.
Cement board	½ in.
Built up roofing membrane	
Modified bituminous roof membrane	
Fully adhered single-ply roof membrane	
A Portland cement/sand parge, stucco, or gypsum plaster	5/8 in.
Cast-in-place and precast concrete	
Sheet metal or aluminum	

MECHANICAL EQUIPMENT IMPROVEMENT

- Increased minimum efficiency requirements for certain HVAC equipment
- Increased HVAC piping insulation provisions
- Added efficiency requirements for cooling towers

AUTOMATIC DAYLIGHTING CONTROLS

- **Mandated** automatic daylighting controls for buildings with a window-to-wall ratio over 30%
- A requirement for skylights and daylighting controls for spaces over 10,000 ft^2 in certain building types

- Skylights limited to ≤ 3% of Roof Area
- Up to 5% allowed if automatic daylighting controls installed in daylight zones under skylights

ADD-OPTION MANDATE

- Comprehensive revisions to IECC 2009, Chapter 5, including a compliance option to choose between:

- High performance lighting

OR

- Onsite renewable power generation

OR

- High performance HVAC equipment
  - National Appliance Energy Conservation Act (1975 as amended)

http://www.energycodes.gov/publications/research/documents/codes/2012IECC_ASHRAE%2090%201-10ComparisonTable.pdf

ASHRAE 90.1-2010 Standard Compared with the 2012 International Energy Conservation Code

PNNL-SA-65859

KEY DIFFERENCES – IECC v. 90.1

SCOPE:	IECC 2012	ASHRAE 90.1-2010	Notes
Semi-heated		✓	No category in IECC
Mixed Occupancy	✓		
Changed Occupancy	✓		
Historic Buildings	✓	✓	
Alterations	✓	✓+	+More detailed

KEY ENVELOPE DIFFERENCES

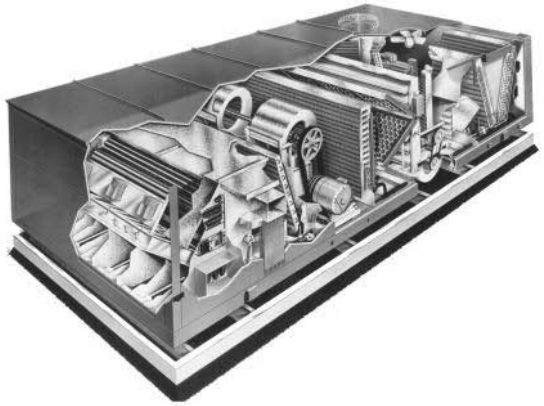
BUILDING ENVELOPE:	IECC 2012	ASHRAE 90.1-2010	Notes
Opaque Elements	✓	✓	Values vary but equivalent
Fenestration	*30 or 40%	40%	*IECC uses Daylighting
- Orientation		✓	90.1 applies limits
- Dynamic Glazing			
- Windows	✓	✓	Both now 15^0 from vertical
- Skylights		✓	
Basements	15%	Any%	Above Grade

KEY MECHANICAL DIFFERENCES

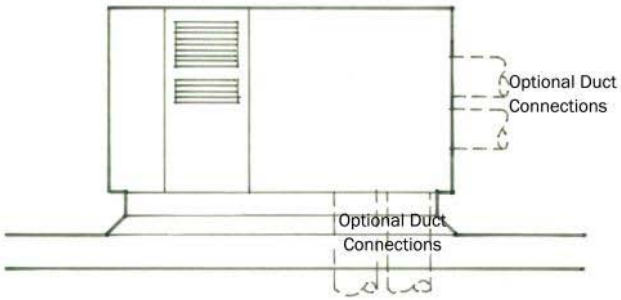
MECHANICAL:	IECC 2012	ASHRAE 90.1-2010	Notes
Duct Testing	6cfm	4cfm	90.1 better
Economizer requirements	33k	65k	(Btuh) IECC better
IPLV / ICOP / IEER	✓	✓+	Integrated equipment performance values
Fan motor requirements	7.5hp	10hp	IECC better

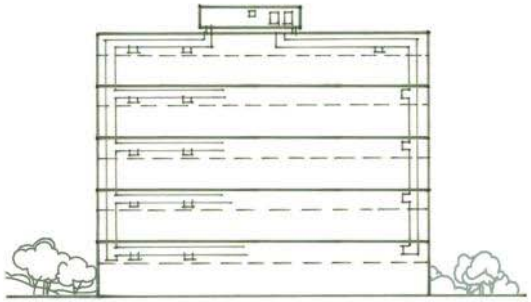
KEY ELECTRICAL DIFFERENCES

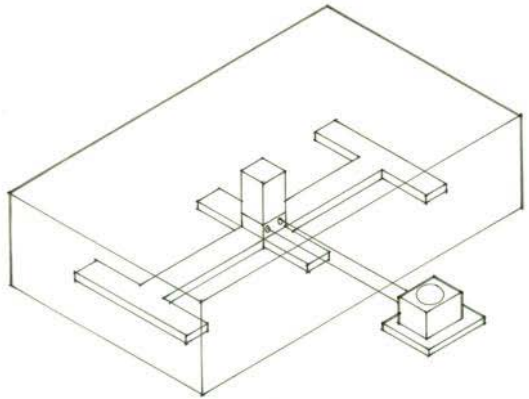
ELECTRICAL:	IECC 2012	ASHRAE 90.1-2010	Notes
Interior Lighting Power	✓	✓++	90.1 most categories; also has Room Cavity Ratio
Transformers		✓	Not in IECC
Lighting Alterations	50%	10%	90.1 more restrictive



OTHER KEY DIFFERENCES







SUPPLEMENTAL:	IECC 2012	ASHRAE 90.1-2010	Notes
Commissioning	~16K	50K	90.1 more detailed
Transformers		✓	Not in IECC
Lighting Alteration	50%	10%	90.1 more restrictive

THANK YOU

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