New York State
Strategies for Increasing
Energy Code Compliance

NASEO Webinar: December 13, 2012

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NYSERDA
ARRA-FUNDS

• Training: 540 classroom sessions (18 courses); 16,800 code officials, architects, engineers, builders

• 200+ Plan Review Services

• 12 Online courses
  – REScheck, COMcheck, ECCCNYS, Building Science, Construction Practices

• Research Projects
  – Insulation of existing buildings
  – Energy Point System (alt. code path - existing buildings)

• Compliance Study #1
Welcome to the NYSERDA Energy Code Training Website

You have arrived at NYERDA's one-stop site for information on the Energy Conservation Construction Code of New York State - 2010 (ECCCNYS - 2010), effective December 29, 2010. This is your site for information on the ECCCNYS - 2010 and to register for NYERDA's free or low-cost training and support programs, including unique energy-related classes and individualized plan review consulting services. Our objective is to provide you the best tools available to support New York State's goals for higher building performance.

Technical Questions
For specific technical questions on the code, please contact NYS Department of State - Codes Division.

Account Setup
Create a free user account to have full access to this website.

Energy Code

TRAINING MATERIALS

COURSE MANUAL
ENERGY CONSERVATION
CONSTRUCTION CODE
OF NEW YORK STATE - 2010

CONDUCTIVITY OF BUILDING MATERIALS

High conductivity means high heat flow. Most building materials have very low conductivity, however, through thermal bridging, resistance to heat flow can be reduced. Conductivity is measured in units of Btu/hr/ft²/°F.:

- Concrete: 0.2
- Wood: 0.2
- Steel: 50

Conductivity of Building Materials

IMPACT OF THERMAL BRIDGING FOR STEEL STUD WALL

- Steel studs have a lower thermal resistance compared to other materials. This means that they can transfer heat more quickly. The diagram below illustrates the impact of thermal bridging.

Thermal Short-Circuits: Types

- Shear: wind, lateral forces, seismic loads, etc.
- Thermal: occurs when heat flows through connections between different materials, such as metal studs and concrete slabs.

Thermal Short-Circuiting in Buildings

- Use materials with low thermal conductivity to minimize heat flow.
- Insulate areas where heat loss is significant, such as exterior walls and roofs.
- Use weather stripping and caulking to seal gaps and cracks that allow heat to escape.

Thermal Bridging and Its Impact on Energy Efficiency

- Thermal bridges increase heat loss, which can significantly reduce the energy efficiency of a building.
- Design buildings to minimize thermal bridging by using materials with low thermal conductivity and proper insulation.
Part 1: File Video

Presenter name: Pam Cole
COMPLIANCE STUDIES

Compliance Study 1 (VEIC): 2010–2012

• $600,000
• DOE Protocol
• New Construction focus
  • Residential and Commercial

Compliance Study 2: 2012–2013

• $700,000
• < DOE Protocol
• Develop 5-year framework for all four sectors
• 1st: commercial renovation focus
Challenges in following DOE Protocol

- Confusion in use of first-generation of protocol
- Inadequate data (Dodge / McGraw Hill)
- Sampling issues
Building – Specific Data

• Municipalities
  – Lack of data; suspicious; difficult to directly access code officials

• Owners and Managers
  – Lack of data / limited awareness of energy items; suspicious; self-selection process / higher quality buildings
Building - Access

• Reluctance to permit onsite visits
  – Code officials, owners, managers

• Limited number of visits ($$$)
  – 54,556 sq miles, 660 mi. tip-tip
  – Varying stages of construction
## COMPLIANCE RATES

<table>
<thead>
<tr>
<th></th>
<th>DOE/BECP Protocol</th>
<th>REScheck/COM/check</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(% all reqmnts in compliance)</td>
<td>(% bldgs pass)</td>
</tr>
<tr>
<td>Residential</td>
<td>ECCCNYS - 2007</td>
<td>73%</td>
</tr>
<tr>
<td>Commercial</td>
<td>ASHRAE 90.1 – 2004/2007</td>
<td>85%</td>
</tr>
</tbody>
</table>

- Estimated lifetime lost energy savings (5-year bldg cycle, new construction): $1.3B minimum
FAILURES & OPPORTUNITIES

Residential
- Envelope: basement walls, slabs, floors; above grade walls
- Slab insulation
- Infiltration
- Duct leakage
- Mechanical system sizing

Commercial
- Energy recovery and cooling efficiency
- Interior lighting
- Envelope efficiency requirements
ADMINISTRATIVE FAILURES

- 55%: documentation sufficient to demonstrate compliance
- 5%: HVAC sizing calculations
- 68%: REScheck compliance report
- 51%: REScheck inspection checklist
- 69%: Certificate of Occupancy
STUDY #1: INTERNAL IMPRESSIONS

Surprised at compliance numbers

• Ongoing training and work with code officials, didn’t expect to reach 50%

Methodology expensive, indirect and incomplete means to determine compliance

Great interest in gap between compliance at permit stage and post-construction
Participating in process of considering IECC2012

- (NY) IECC/Commercial: July 2013
- (NY) IECC/Residential: May 2014

Focusing on capacity for compliance rather than stringency of provisions

- Ex., Residential: ACH 5 mandatory envelope testing vs ACH 3 based on ENERGYSTAR® research data and NYS infrastructure
MOVING FORWARD: > COMPLIANCE

Focus on Existing Buildings (+/-90% construction activity)
• Coordination with Existing Building Code

Long View on achieving Low Energy/ZNE
• Incremental Steps

Building Science
• Durability, repairability, safety
MOVING FORWARD: > COMPLIANCE

ADDRESS APATHY

(NY) Energy Code is 1 of 9 codes

- Code officials, contractors
- Architects/engineers
- Municipal officials
- Building Owners
Complexity of Code

• Six to eight Compliance Paths not understood

• Compliance reliant on weak links
  – Code official, contractors
ECCNYS-2010 COMMERCIAL COMPLIANCE OPTIONS (Applies to All Buildings Except 1, 2, and 3 Story Residential)

ADMINISTRATIVE CHAPTERS (Chapters 1, 2, 3, and 6)

MANDATORY REQUIREMENTS (Sections 502.4, 502.5, 503.2, 504, 505.2, 505.3, 505.4, 505.6 and 505.7)

PATH 1

PRESCRIPTIVE

Section 502 Building Thermal Envelope

1A R-value (Section 502.1.1)

1B U-factor Alternative (Section 502.1.2)

Section 503 Systems

Section 504 Service Water Heating

Section 506 Electrical Power and Lighting

Compliance? Yes/No

OR

PERFORMANCE (Modeling Approach)

Section 506 Total Building Performance

Annual Energy Cost of Proposed Design Less Than or Equal to Annual Energy Cost of Standard Reference Design? Yes/No

OR

PATH 3

ANSI/ASHRAE/IESNA Standard 90.1-2007

NOTE Building Designer should be familiar with the compliance options for standard 90.1 when choosing this path.

Notes:
1. The Administrative Chapters of the ECCNYS-2010 apply independent of the chosen compliance option.
2. All mandatory requirements must be met for Paths 1 and 2. Standard 90.1-2007 has its own set of mandatory requirements.
3. If chosen, Standard 90.1 must be followed in its entirety. However, the Administrative Chapters of ECCNYS-2010 still apply.
ECCCNYS-2010 RESIDENTIAL COMPLIANCE OPTIONS (Applies to All 1, 2, and 3 Story Buildings)

ADMINISTRATIVE CHAPTERS (Chapters 1, 2, 3, and 6)¹

MANDATORY REQUIREMENTS² (Sections 401, 402.2.12, 402.4, 402.5, 402.6, 403, and 404.1)

PATH 1

PRESCRIPTIVE

Section 402
Building Thermal Envelope

1A
R-value (Sections 402.1.1 and 402.1.2)

1B
U-factor Alternative (Section 402.1.3)

1C
Total UA Alternative³ (Section 402.1.4)

Section 403
Systems

Section 404
Electrical Power and Lighting

Compliance? Yes/No

PATH 2

PERFORMANCE (Modeling Approach)

Section 405
Simulated Performance Alternative

Annual Energy Cost of Proposed Design Less Than or Equal to Annual Energy Cost of Standard Reference Design? Yes/No

¹ The Administrative Chapters of the ECCCNYS-2010 apply independent of the chosen compliance option.
² All mandatory requirements must be met independent of the compliance path chosen. Exception: Section 402.6 applies only to Path 1a and Path 2.
³ REScheck software can be used to determine compliance using the Total UA Alternative.
Improved Training

• Quality instructors, focused content, responsive to code changes and needs

Direct Municipal Support

• Plan and inspection services
• Hotline
• Pilot programs (3rd party)
Website

- More dynamic, become go-to site for NY
- Training registration, Library, Online courses

Administrative and Technical Studies

- Ex., 3\textsuperscript{rd} party; research in support future code provisions
CONTINUE RESEARCH

Research and Development of the Energy Point System

Final Report

10/12/2012

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RETROFIT ENERGY POINT SUMMARY

|                      | $E_{P\text{prop},\text{tot}}$ | $E_{P\text{code},\text{tot}}$ | Points Earned 
|----------------------|-------------------------------|-------------------------------|-----------------
| Roof                 |                               |                               |                 
| Wall, Above Grade    |                               |                               |                 
| Fenestration         |                               |                               |                 
| Air Sealing          |                               |                               |                 
| Unitary Air Conditioners and Condensing Units, Packaged Terminal Air Conditioners | | | 
| Warm Air Furnaces    |                               |                               |                 
| Service Water Heaters |                              |                               |                 
| Interior Lighting    |                               |                               |                 
| Total                |                               |                               |                 

Points Earned = $E_{P\text{prop},\text{tot}} - E_{P\text{code},\text{tot}}$
GOALS

• Greater direct access to code officers and builders

• Feedback from compliance study to program
  – Where to train? What to train?

• Increase quality and relevance of materials

• Find strategic balance
  – Aspiration and reality of codes and as-builts

• Tackle Apathy
www.nyserda.ny.gov/energy-stars
THANK YOU!

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