Municipal Energy Code Support

- Initial program provided from 2010-2012
- For support of the 2010 ECCCNYNS
- (2009 IECC)
Municipal Energy Code Support

- Plan Review Service
- Energy Code Hotline
- Field Inspection Assistance
- In-Office Training & Presentation Programs
Plan Review Service Provided For

- Code Enforcement Officials
- Design Professionals
- Other Stakeholders
Municipal Energy Code Support

Initial Plan Review Breakdown

- 51% Residential Plan Reviews
- 49% Commercial Plan Reviews
Municipal Energy Code Support

Plan Review Deliverables

- Plan Review Checklist
- Inspection Checklist (Residential)
- Code Compliance Narrative Report
- On-call Consultation
Residential Plan Review Checklist

Project #: Date: Name of Evaluation(s):

Building Contact: Name: Phone: Email:

Building Name & Address: Subdivision: Lot #: Conditioned Floor Area: ft²

Climate Zone: County: Jurisdiction:

Compliance Approach: Prescriptive Trade-Off Compliance Software Other

Compliance Software Used: Green Building/Above-Code Program? Yes No

Building Type: 1- and 2-Family, Detached: Single Family Modular Townhouse

Multifamily: Apartment Condominium

Project Type: New Building Existing Building Addition Existing Building Renovation

Special Considerations: Historic Building Commercial Space

<table>
<thead>
<tr>
<th>ECCNY Section #</th>
<th>Pre-Inpection/Plan Review</th>
<th>Code Value</th>
<th>Verified Value</th>
<th>Y</th>
<th>N</th>
<th>N/A</th>
<th>Comments/Assumptions</th>
</tr>
</thead>
<tbody>
<tr>
<td>103.2</td>
<td>Construction drawings and documentation available. Documentation sufficiently demonstrates energy code compliance.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Insulation materials and their R-values</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fenestration U-factors</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Area-weighted U-factor</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mechanical system design criteria</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mechanical and service water heating system and equipment types, sizes and efficiencies</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Equipment and systems controls</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Duct sealing, duct and pipe insulation and location</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lighting fixture schedule with wattage</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HVAC loads calculations: Heating system size(s): Cooling system size(s):</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Written Statement of Compliance Item (Design Professional)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

General Permit Data Entered
Values and Compliance Entered
# Municipal Energy Code Support

## Inspection Checklist

**Residential Inspection Checklist**

<table>
<thead>
<tr>
<th>IECC Section #</th>
<th>Inspection</th>
<th>Code Value</th>
<th>Plan Value</th>
<th>Complies</th>
<th>Comments/Assumptions</th>
</tr>
</thead>
<tbody>
<tr>
<td>401.3</td>
<td>Permanent Certificate w/ Energy Code Compliance Statistics</td>
<td>On Electric Panel</td>
<td></td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td>402.1.1</td>
<td>Slab edge insulation R-value.</td>
<td>Unheated: R-10 Heated: R-15</td>
<td></td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td>302.2, 402.2.8</td>
<td>Slab edge insulation depth/length.</td>
<td>2 ft. 7-4 &amp; 5 4 ft. 2-Z-6</td>
<td></td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td>402.1.1</td>
<td>Basement wall insulation R-value.</td>
<td>Continuous: R-10 7-4 &amp; 5 R-15 2-Z-6</td>
<td></td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td>402.2.7</td>
<td>Basement wall insulation depth.</td>
<td>10 ft. or to basement floor</td>
<td></td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td>303.2</td>
<td>Basement wall insulation installed per manufacturer's instructions.</td>
<td></td>
<td></td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td>402.2.9</td>
<td>Crawl space wall insulation R-value.</td>
<td>Continuous: R-15 7-4 &amp; 5 R-15 2-Z-6 Cavity R-13 7-4 &amp; 5 R-19 2-Z-6</td>
<td></td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td>303.2</td>
<td>Crawl space wall insulation installed per manufacturer's instructions.</td>
<td></td>
<td></td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td>402.2.9</td>
<td>Crawl space continuous vapor retarder installed with joints overlapped by 6 inches and sealed, and extending at least 6” up the stem wall.</td>
<td>Required</td>
<td></td>
<td>N/A</td>
<td></td>
</tr>
</tbody>
</table>

**Values from Plan Review Checklist**
Municipal Energy Code Support

Code Compliance Narrative

• The wrong version of COMcheck was used to provide compliance with the Energy Code. The envelope compliance certificate located on Sheet A002 indicates that COMcheck Version 3.0, Release 2B was used. All Energy Code Compliance worksheets should be provided using the most current version of COMcheck, which is version 3.8.2.

• The building location provided in the envelope compliance certificate located on sheet A002 indicates that the building is located in Cookeville, Tennessee. The building location should be revised indicating the location in Batavia, New York.

• The climate zone location provided in the envelope compliance certificate on sheet A002 locates the building in climate zone 9b. The climate zone location should be revised to locate the building in climate zone 5 per the Energy Code, Table 301.1.
Municipal Energy Code Support

On-call Consultation

- Available by e-mail
- Individual Phone Conversation
- Conference Call between Design Team, T.Y. Lin and Code Official
Municipal Energy Code Support

Plan Review Report

- Detailed analysis of each project.

- Recommendations for remediation of deficient items.

- Recommendations for issuance of a Building Permit.
Municipal Energy Code Support

Turn-Around Time

- Residential – Typically 5 Business Days
- Commercial – Maximum 10 Business Days
Municipal Energy Code Support

Energy Code Hotline

- Response to questions from Code Officials and Other Stakeholders
- Telephone Line Staffed 8:30 am – 4:30 pm Monday - Friday, Year Round
- Response within 48 Hours
Municipal Energy Code Support

Program Benefits

- Consistency in answers
- Answers to all Previous Questions Readily Available to Responder for Quick Turn Around
- ICC Energy Code Commentary Utilized as Resource
Municipal Energy Code Support

Program Benefits

- Answers to Complex Questions vetted among team members and the Department of State Office of Bldg Standards & Codes
- Provide Checklist of Findings
- Response within 3 Days of Request
Municipal Energy Code Support

Field Inspection Assistance

- Provided on-site Energy Code Inspection Guidance to Code Enforcement Officials
- Provide on-site Energy Code Inspection Guidance for the Design Professional
- Provide Written Report of Findings
Municipal Energy Code Support

In-Office Presentation

- Provide Plan Review Presentation to Code Enforcement Officials at their office.

- Can include Code Officials from Adjoining Communities as well as Other Stakeholders.
Lessons Learned

- **Common Deficiencies**
  - Fenestration (no values provided, no specifications)
  - Specifications (for HVAC System equipment, Air Barrier Material and Sealing)
  - Heating/Cooling Load Calculations
Municipal Energy Code Support

Lessons Learned

- Common Deficiencies
  - R - U Values
  - Water Heating Systems and Equipment
  - Incorrect use of Computer Generated Compliance Software
# Municipal Energy Code Support

## Lessons Learned

- **Common Deficiencies**

| Date       | A | B | C | D | E | F | G | H | I | J | K | L | M | N | O | P | Q | R | S | T | U | V | W | X | Y | Z |
| June 1     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| July 1     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| Aug 1      |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| Sept 1     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| Oct 1      |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| Nov 1      |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| Dec 1      |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| Jan 2      |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| Feb 2      |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| Mar 2      |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| Apr 2      |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| May 2      |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| June 2     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| July 2     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| Aug 2      |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| Sept 2     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| Oct 2      |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| Nov 2      |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| Dec 2      |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |

**Top 5 Most Common Deficiencies**

1. Report
2. Production
3. Maintenance
4. Ventilation
5. Heating

**Legend**

- R = Residential
- C = Commercial

**Supported by**

[Newport Ventures](#)

[TY-LIN International](#)
Municipal Energy Code Support

Lessons Learned

- **Common Deficiencies**

<table>
<thead>
<tr>
<th></th>
<th>R</th>
<th>C</th>
<th>R</th>
<th>C</th>
<th>R</th>
<th>C</th>
<th>R</th>
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<tr>
<td>Description</td>
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<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>

**Legend:**
- R: Requirement
- C: Compliance
Municipal Energy Code Support

What building components does the Energy Code address?

2012: ~ 5.5 billion commercial buildings
~ 90B ft$^2$

$76B – Heating, Cooling, Lighting, Water Heating

Source: Buildings Energy Data Book, US DOE
Municipal Energy Code Support

- R-Values
- U-Factors
- HVAC Load Calcs.
- Economizers
- System Controls
- Ducts
- Service Water Heating
- Lighting Plans
- Commissioning
- Construction Documents

Submittal Package Must Contain

Supported by nyserda
Municipal Energy Code Support

Common Deficiencies

- Residential Fenestration:
  - Missing in 74% of submitted projects

![Bar Chart]

- Non-Compliant
- Compliant

Supported by:
- Newport Ventures
- TYLIN International
- NYSERDA
Common Deficiencies

- Commercial Fenestration:
  - Missing in 73% of submitted projects
Municipal Energy Code Support

Common Deficiencies

- Residential Specifications
  - Missing in 63% of submitted projects
Municipal Energy Code Support

Common Deficiencies

- Commercial Specifications:
  - Missing in 52% of submitted projects
Municipal Energy Code Support

Common Deficiencies

- Residential Heating/Cooling Calculations:
  - Missing in 62% of submitted projects
Municipal Energy Code Support

Common Deficiencies

- Commercial Heating/Cooling Calculations:
  - Missing in 60% of submitted projects
Municipal Energy Code Support

Common Deficiencies

- Residential R – U Values
  - Missing in 55% of submitted projects
Common Deficiencies

- Commercial R-Values/U-Factors:
  - Missing in 62% of submitted projects
## Municipal Energy Code Support

### TABLE C402.2 Revised Thermal Envelope requirements

<table>
<thead>
<tr>
<th>Climate Zone</th>
<th>Zone 4</th>
<th>Zone 5</th>
<th>Zone 6</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>All other</td>
<td>Group R</td>
<td>All other</td>
</tr>
<tr>
<td><strong>Roofs</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Attic and other</td>
<td>R-38</td>
<td>R-38</td>
<td>R-38</td>
</tr>
</tbody>
</table>
Municipal Energy Code Support

Common Deficiencies

- **Residential Water Heating Equipment:**
  - Missing in 47% of submitted projects
Municipal Energy Code Support

Common Deficiencies

- Commercial Water Heating Equipment:
  - Missing in 54% of submitted projects
Lessons Learned

- If the plans and specifications do not show compliance, it cannot be expected that work in the field will comply.

- A submittal may be provided with the compliance documentation (i.e. COMcheck, REScheck), but still might not comply.
Lessons Learned

- By focusing on details, compliance can be achieved.

- The Energy Code impacts the construction from the foundation to final operational testing. (Start out wrong and it’s hard to get back on track)
Lessons Learned

- Majority of projects submitted included compliance documentation that was not accurately reflected on the drawings.
Lessons Learned

- The contractors may never see the COMcheck or REScheck documents, and therefore never understand what was required.
Municipal Energy Code Support

Lessons Learned

- A building built from faulty plans will not comply with the Energy Code.
- Some errors are not possible to correct without deconstructing part of the building.
Lessons Learned

- Missing information or details will impact the building efficiency forever, costing the owner or end user money.
Municipal Energy Code Support

Enclosure Thermal Performance

Convective losses... lacking air sealing

Air Leakage along the corner joint

IR Thermogram
Municipal Energy Code Support

Program Benefits

- Plans are scrutinized down to the details
- Subject matter experts check for strict compliance with the energy code
Municipal Energy Code Support

Program Benefits

- Extensive time is dedicated to Energy Code compliance. The average Code Official may not have that time available.

- Even small projects require dedicated, uninterrupted time to focus on the Energy Code because it covers so many facets of the project.
Municipal Energy Code Support

Program Benefits

- Design professionals learn exactly what is required for submittal.
  
  (Believe it or not, it is difficult for design professionals to track and implement all of the changes to the Energy Code.)
Program Benefits

- Less operational cost for the owner.
  - Heating (over sized equipment less efficient)
  - Cooling (under sized equipment cycles too much)
  - Interior Lighting (illuminating only occupied spaces)
  - Exterior Lighting (light for security and architectural accent)
Municipal Energy Code Support

Program Benefits

- Projects are brought into compliance.
- Energy efficiency is attained
- Energy cost savings are realized
Program Benefits

- The Owner can invest in above code energy alternatives, funded by cost savings

- Greenhouse gas emissions are reduced
Municipal Energy Code Support

2014 Energy Code Update

- More stringent requirements for commercial projects
  - Allowable glazing reduced unless used for day-lighting
  - Skylights required in many single story uses, with daylight controls
  - More stringent Air Barrier requirements

Cont’d
Municipal Energy Code Support

- Building envelop requirements, more inspections necessary
- Larger HVAC systems require commissioning
- Additional areas require lighting controls
- Reduction in allowable illumination for building exteriors
# Municipal Energy Code Support

## Changes in U-Factors

<table>
<thead>
<tr>
<th>Climate Zone</th>
<th>2010</th>
<th>2014</th>
<th>2010</th>
<th>2014</th>
<th>2010</th>
<th>2014</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fixed Fenestration</td>
<td>0.40</td>
<td>0.38</td>
<td>0.35</td>
<td>0.38</td>
<td>0.35</td>
<td>0.36</td>
</tr>
<tr>
<td>Operable Fenestration</td>
<td>0.40</td>
<td>0.45</td>
<td>0.35</td>
<td>0.45</td>
<td>0.35</td>
<td>0.43</td>
</tr>
<tr>
<td>Entrance Doors</td>
<td>0.85</td>
<td>0.77</td>
<td>0.80</td>
<td>0.77</td>
<td>0.80</td>
<td>0.44</td>
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<tr>
<td>Skylights</td>
<td>0.60</td>
<td>0.50</td>
<td>0.60</td>
<td>0.50</td>
<td>0.60</td>
<td>0.50</td>
</tr>
</tbody>
</table>

1 Other than metal frame
2 Metal Framed with or without Thermal Break
Municipal Energy Code Support

Air Barrier Compliance Paths

- Tested materials
- Tested assemblies
- Whole building testing
Municipal Energy Code Support

Blower Door Testing in Commercial Buildings
Municipal Energy Code Support
Compliance Options 2012 IECC

Pick One:

- C406.2 – Eff. HVAC Performance
- C406.3 – Eff. Lighting Systems
- C406.4 – On-site Renewable Energy

Building energy cost to be \( \leq 85\% \) of standard reference design building

Prescriptive Path

Total Building Performance

“Trade Off” COMcheck

Prescriptive Chapter C4

IECC 2012

ECCC of NYS Commercial

“Trade Off”

NEWPORT VENTURES

TY-LIN INTERNATIONAL

Supported by nysерdа

Energy Innovation Solutions
Municipal Energy Code Support

Compliance Options ASHRAE 90.1

ECCC of NYS Commercial

ASHRAE 90.1-2010

Prescriptive Path

Section 11: Energy Cost Budget Method

Normative Appendix G

Prescriptive Sections 5, 6, 7, 8, 9

Building Envelope Trade Off

Supported by NYserda
Newly Funded Energy Code Support

- Provide Plan Review Services for:
  - 2010 Residential Energy Code
  - 2014 Commercial Energy Code
    - 2012 IECC w/ NYS Supplement
    - 2010 ASHREA 90.1 w/NYS Supplement
  - New Energy Code coming (estimated January 2016)
Municipal Energy Code Support

Newly Funded Energy Code Support

- Plan Review Services Provides
  - Tabular code compliance checklist
  - Energy Code inspection checklist (residential)
  - Narrative report with recommended corrective action
  - Recommendation for permit issuance
Municipal Energy Code Support

Newly Funded Energy Code Support

- In office plan review presentation
  - One-on-one or small group
  - Code Officials and other stakeholders
Municipal Energy Code Support

Newly Funded Energy Code Support

- On-site Energy Code inspection guidance.
  - Code Officials
  - Other Stakeholders
Municipal Energy Code Support

Newly Funded Additional Support Services

- Energy Code training programs
- In-office training
- Continuing educational credits
Municipal Energy Code Support

Newly Funded Additional Support Services

- Data management assistance
- Project tracking assistance
- General municipal enforcement support
Municipal Energy Code Support

Newly Funded Energy Code Support

- Energy Code Hotline
  - Code Officials
  - Design Professionals
  - Builders
  - Suppliers
  - Other Stakeholders
Municipal Energy Code Support

On-line registration of projects for Plan Review

Pre-paid shipping labels provided to applicants

NYSERDA PROJECT REGISTRATION

Please complete the following form and mail or e-mail the form to:

T.Y. Lin International,
255 East Ave.,
Rochester, NY 14604,
Attn: Scott Copp or planreview@tylin.com
(585) 512-2000 - Phone or (585) 697-3449 - Fax

Name of Municipality
Name of Municipal Contact Person

Address of Municipality
Phone Number of Municipal Contact

E-mail of Municipal Contact

Project Address
Applicant

Name of Design Professional
Design Professional Contact Person

Project Started YES NO
Phone Number of Design Professional

Upon receipt of the registration we will mail to you a pre-paid UPS label so that you can send the plans and supporting documents to our office. We will place your project into the plan review queue and send you an anticipated date for completion of our review. Our goal is to return the completed plan review and plans to you in as short a time period as possible.

Click here to submit the form
(this may not work on all servers, if not, copy and e-mail or mail completed form)
Municipal Energy Code Support

Program Contact Information:

• James Burton, T.Y. Lin, Associate Vice President
  (585) 512-2000, james.burton@tylin.com

• Scott Copp, T.Y. Lin, Sr. Project Manager
  (585) 512-2000, scott.copp@tylin.com

• Steven Rocklin, RA, T.Y. Lin, Technical Director
  (518) 641-6884, steven.rocklin@tylin.com

planreview@tylin.com    inspection@tylin.com    energyhotline@tylin.com
Municipal Energy Code Support
On Behalf of T.Y. Lin International, NYSERDA and Climate Smart Communities

Thank You for Participating

KWH