What is COMNET?

• **COMNET** is a methodology to facilitate the assessment of energy efficiency of commercial and multifamily buildings
  – Modeling guidelines and procedures consistent with ASHRAE 90.1
  – Default building usage parameters
  – Open standards for modeling software

• **COMNET** is not
  – A new rating system
  – Modeling software
What problems does COMNET address?

• **Technical Challenges**
  – Too many modeling flavors
  – Results vary too much from modeler to modeler, from simulation to operation
    • Occupancy, plug loads, commercial refrigeration and vertical transportation
    • Gap between “predicted” and actual energy use of a building
  – Manual generation of reference building subject to errors

• **Market-Based Challenges**
  – Many models prepared by modelers lacking needed expertise
  – No ongoing quality assurance program; limited consequences for modeler misconduct
COMNET offers solutions

- **COMNET** standardizes process of energy simulations by:
  - Accurate specification and automatic generation of the baseline building
  - Standardized schedules and other operation assumptions
  - Providing credit for reductions in non-regulated energy use, e.g. Energy Star equipment

- **COMNET** is developing a quality assurance program:
  - To accredit software
  - For building energy modelers
  - For screening building energy models before submission to rating authorities
COMNET facilitates automatic generation of baseline building

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<table>
<thead>
<tr>
<th>System Code</th>
<th>Fans</th>
<th>Cooling</th>
<th>Heating</th>
</tr>
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<tbody>
<tr>
<td>1. PTAC</td>
<td>CV</td>
<td>DX</td>
<td>Boiler</td>
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<tr>
<td>2. PTHP</td>
<td>CV</td>
<td>DX</td>
<td>HP</td>
</tr>
<tr>
<td>3. PSZ-AC</td>
<td>CV</td>
<td>UX</td>
<td>Furnace</td>
</tr>
<tr>
<td>4. PSZ-HP</td>
<td>CV</td>
<td>DX</td>
<td>HP</td>
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<td>5. PAV RH</td>
<td>VAV</td>
<td>UX</td>
<td>Boiler</td>
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<tr>
<td>6. PAV RH</td>
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<td>DX</td>
<td>Electric</td>
</tr>
<tr>
<td>7. VAV RH</td>
<td>VAV</td>
<td>CW</td>
<td>Boiler</td>
</tr>
<tr>
<td>8. VAV RH</td>
<td>VAV</td>
<td>CW</td>
<td>Electric</td>
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</tbody>
</table>
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COMNET Technical Manual

• The COMNET Modeling Guidelines and Procedures (MGP)
  – Consistent with ASHRAE 90.1 Appendix G
  – A consensus standard (seeking ANSI status)
  – Procedures for energy modeling of commercial buildings and comparing against baseline standards
    • Federal tax deductions (ASHRAE 90.1-2001),
    • Green building ratings (ASHRAE Standard 90.1-2007), and
  – Defines default modeling assumptions
    • Plug loads, commercial refrigeration, vertical transportation, occupancy, ...

• Additional Future Baselines
  – ASHRAE 90.1-2010 under development
  – Code compliance
    • California Title 24 under development
    • IgCC under consideration
  – Building energy ratings—zero Energy Performance Index (zEPI) under consideration
COMNET MGP consensus process

- Written by COMNET technical team with participation including members of national labs, ASHRAE committees and the LEED EA TAG
- Two rounds of public comment
- Responses to each comment from the COMNET Technical Committee
- Approved by COMNET Standing Committee (CSC) and RESNET Board of Directors
Organization of COMNET

- Work performed within committees

**CSC**
- Charles Eley, Chair (AEC)
- Bill Prindle (ICF)
- Jean Lupinacci (EPA)*
- Martha Brook (CEC)
- Michael Holtz (LightLouver)
- David Goldstein (NRDC)
- Steve Taylor (Taylor/ASHRAE)
- Mike Opitz (Cadmus)
- Philip Fairey (FSEC)
- Cliff Majersik (IMT)
- Colin McCormick (DOE)*

**TECHNICAL**
- Charles Eley
- Michael Holtz
- Philip Fairey
- Steve Taylor
- Martha Brook
- David Goldstein

**QUALITY ASSURANCE**
- Cliff Majersik
- Philip Fairey
- Bill Prindle
- Chip Barnaby
- Roger Hedrick
- Ann McCormick
- Ellen Franconi
- Swami Muthusamy
- Ted Leopkey

**STRUCTURE AND FINANCE**
- David Goldstein
- Michael Holtz
- Philip Fairey
- Cliff Majersik
- Steve Baden

**PROMOTION**
- Cliff Majersik
- Jean Lupinacci
- Amir Roth
- Martha Brook
- Mike Opitz

*Advisory members
Benefits of COMNET

• **Benefits to USGBC/LEED and Other Rating Authorities**
  – Standardized method to get an accurate, reliable asset rating
  – More confidence in model results
  – Less time required to review submittals (lower cost)
  – Data flows seamlessly into rating authorities’ databases
  – Reduces errors in the model
  – Process is adaptable to new and changing baselines

• **Benefits to Building Owners and LEED Projects**
  – Reduces the time and cost of energy modeling
  – Fewer opportunities for errors or differing rules interpretations means fewer rejections of models
  – LEED points more predictable and less uncertain
  – Quicker LEED certification
  – Standardization allows for apples-to-apples comparison between buildings
Benefits of COMNET (cont)

• **Benefits to Energy Modelers**
  – Less effort, a more error free process
  – Automatic generation of baseline buildings
  – Credit for reductions in non-regulated energy use – e.g. plug loads and commercial refrigeration
  – Same COMNET-accredited software can be used for multiple purposes
    • Green building ratings
    • Energy labels
    • Tax deduction
    • Utility/DSM programs
    • Code compliance (future)

• **Benefits to Software Developers**
  – Single specification serves multiple purposes - Tax credits, Green building ratings, Energy labels and Code compliance (future)
  – Credibility from third-party
  – Reduced development costs
Typical example: Potential Savings for LEED-NC, CS, Schools, Retail

COMNET Saves $21,000 (60%) per project on modeling costs

- **Business-As-Usual Assumptions**
  - Building of typical complexity
    - 204 hours for modeler
    - 32 hours for reviewer

$21,000 savings

- GCBI savings, $2,400
- Savings to LEED applicant, $18,600
## Typical example: Potential Savings for LEED-NC, CS, Schools, Retail

<table>
<thead>
<tr>
<th>Task</th>
<th>Hours/Project</th>
<th>Cost/Project, Today</th>
<th>Cost/Project, with COMNET</th>
<th>COMNET SAVINGS</th>
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</thead>
<tbody>
<tr>
<td>Create Proposed Model</td>
<td>80</td>
<td>$12,000</td>
<td>$12,000</td>
<td>$0</td>
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<tr>
<td>Create Baseline Model</td>
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<td>External Review of Proposed</td>
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<tr>
<td>External Review of Baseline</td>
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<tr>
<td>Response to Baseline Review</td>
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<td>$6,000</td>
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<td>$6,000</td>
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<tr>
<td><strong>TOTAL Cost/Project</strong></td>
<td><strong>236</strong></td>
<td><strong>$35,400</strong></td>
<td><strong>$14,400</strong></td>
<td><strong>$21,000</strong></td>
</tr>
</tbody>
</table>

Multiplied by 1000 Projects/Year

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<table>
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<tr>
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<td>$35,400,000</td>
<td>$14,400,000</td>
<td>$21,000,000</td>
</tr>
</tbody>
</table>
Title 24 ACM – Current Status

- The ACM (Alternative Calculation Method) defines modeling rules for the baseline building – analogous to ASHRAE 90.1 BPRM (Building Performance Rating Method)
- A custom energy budget is developed based on the proposed building’s envelope, HVAC and lighting features and physical geometry
- Requirements for baseline building match prescriptive code, and must be shown to be cost effective under the Warren-Alquist Act
- Incentive programs such as Savings by Design base percent savings against minimum Title 24 compliance
- However, the performance approach under T24 has its limitations:
  - Only regulated energy use is considered
  - Compliance calculation places many restrictions on design inputs
  - The reference approach for certifying software is based on outdated software (DOE2.1e)
Title 24 – Movement to COMNET Structure

• California will be using COMNET to upgrade Title 24 ACM for 2013 Code cycle to:
  – Allow designers to take credit for innovative design measures that are currently outside the scope e.g., passive design strategies, desiccant systems, heat recovery, WSE, heat pump coil defrost
  – Adopt COMNET building descriptors as the basis for rule-set to automatically generate the baseline building
  – Update the reference method for software testing based on criteria in COMNET

• Other realignment with 90.1 PRM to:
  – Move definition of baseline HVAC system based on number of stories and floor area to be consistent with PRM
  – Use ASHRAE PRM equipment sizing procedure based on unmet load hours
Possible next steps for LEED/USGBC

• Incentivize use of the COMNET MGP in LEED projects
  – Comment submitted to LEED EA TAG for next version of LEED: Require use of MGP for building energy modeling
    • Alternatively, additional points under LEED EA Credit 1 could be offered to reward use of MGP
  – Innovation points for use of MGP
  – Fast track review of projects modeled using COMNET

• Encourage energy modeling software developers to make their software COMNET compliant

• Provide new representation on 3 COMNET committees: Promotion, Technical and Standing (CSC)
Project Team

- **Project Management**
  - New Buildings Institute

- **Institutional Lead**
  - Institute for Market Transformation
  - RESNET

- **Technical Lead**
  - Architectural Energy Corporation
  - Energy Soft
  - Florida Solar Energy Center
  - Energy and Environmental Economics
  - McHugh Energy Consultants
  - National Resource Defense Council
Conclusion

• COMNET Guidelines and Procedures are complete and ready to reference
• COMNET offers simpler, faster, cheaper building energy modeling with less variability
• COMNET can facilitate LEED submissions and reviews, increase compliance with procedures, and decrease rework, while saving money for USGBC/GBCI and registered projects