



COMNET

Commercial Energy
Services Network

Charles Eley, FAIA, PE
Chair of COMNET Standing Committee

February 28, 2011



What is COMNET?

- **COM**mmercial Energy Services **NET**work is a new system assessing and rating the energy efficiency of commercial and multifamily buildings
- The commercial building sister to RESNET
- Standardizes the process of performing energy calculations by:
 - Accurately specifying the baseline building
 - Restricting schedules and other building descriptors
 - Providing credit for reductions in some non-regulated energy use
 - More . . .
- Is developing a quality assurance program to:
 - Accredited software
 - Provide a portal between energy modelers and rating authorities



COMNET Team/Organization

▪ COMNET Standing Committee

- Charles Eley, Chair
- David Goldstein, NRDC
- Mike Opitz, USGBC
- Jean Lupinacci, EPA (advisor)
- Colin McCormick, DOE (advisor)
- Martha Brook, California Energy Commission
- Philip Fairey, FSEC
- Michael Holtz, Lightlouver
- William Prindle, ICF
- Steve Taylor, Taylor Engineering
- Cliff Majersik, IMT

▪ Startup Management Team/Staff

- New Buildings Institute
(Overall Management)
 - Architectural Energy Corporation
(Technical)
 - Institute for Market Transformation
(Promotion)
- ### ▪ Startup Funding
- Energy Foundation
 - Others



Commercial Building Energy Modeling Guidelines and Procedures

- The Commercial Building Energy Modeling Guidelines and Procedures have detailed procedures for energy modeling of commercial buildings and comparing against multiple baseline standards.
- The current procedures three calculation purposes:
 - federal tax deductions (ASHRAE 90.1-2001),
 - green building ratings (ASHRAE Standard 90.1-2007), and
 - energy labels
- Future purposes will include:
 - ASHRAE Building EQ
 - California code compliance and “reach”
 - ASHRAE 90.1-2010 (proposed baseline for new LEED)



Status of the Modeling Guidelines and Procedures

- Developed in 2009
- First public review in first quarter of 2010
- Second public review in July 2010
- Published August 2010
- Download from www.COMNET.org



The Maturity of Energy Models

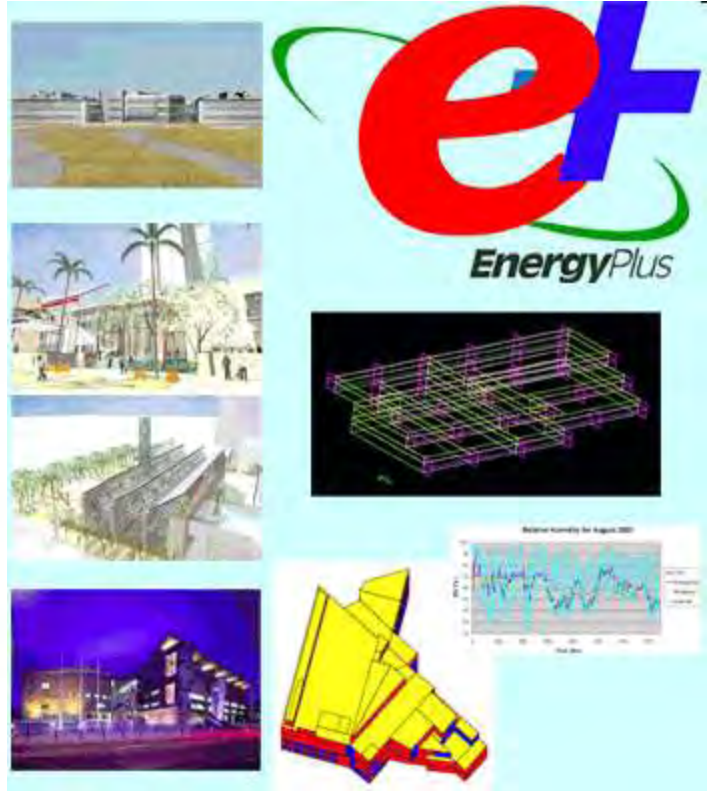


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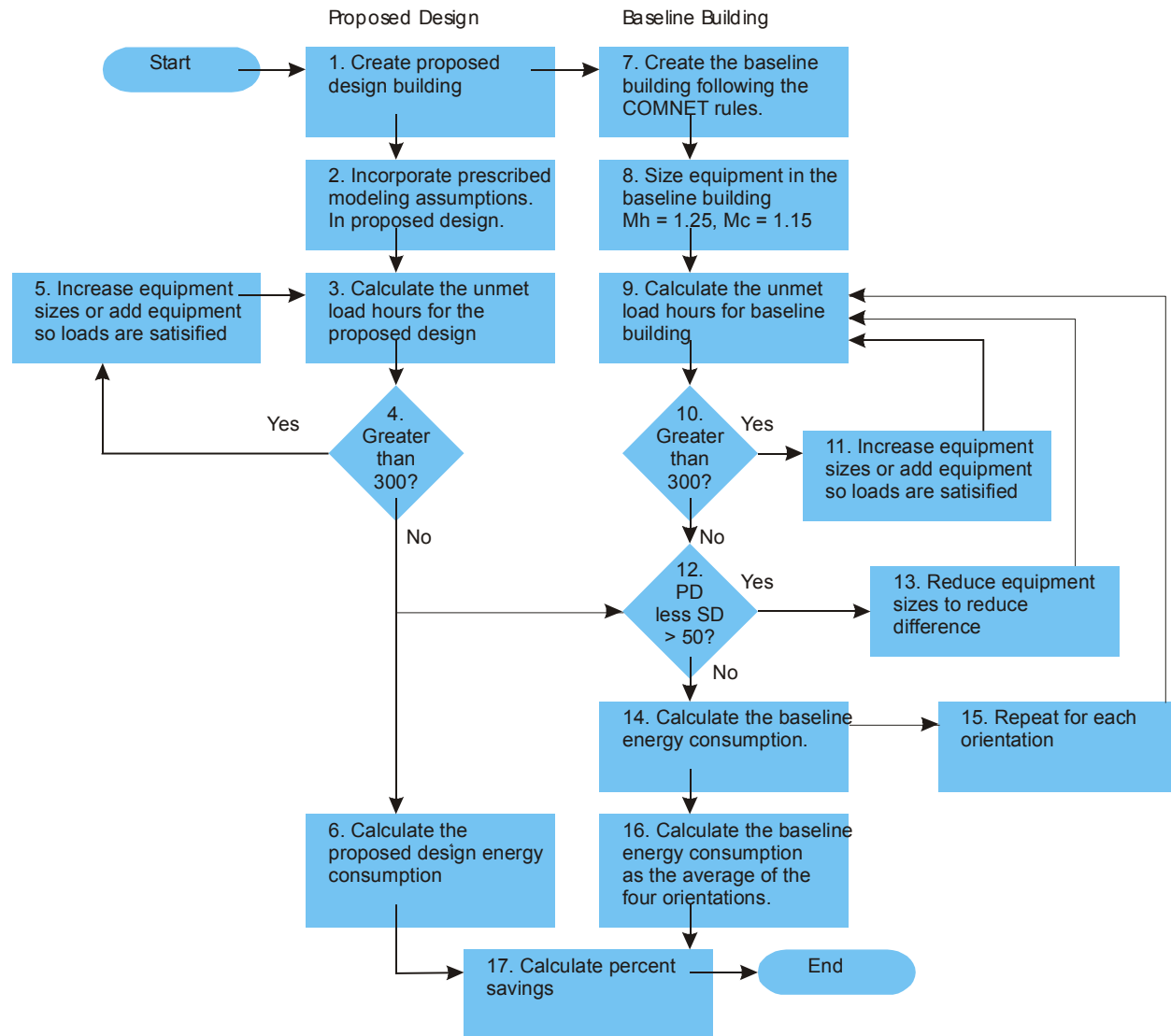
1. Overview
2. General Modeling Procedures
3. Software Requirements
4. Content and Format of Standard Reports
5. Energy Costs and Currency
6. Building Descriptors Reference
7. Modeling Tips for Advanced Design Features

Appendices

- A – Building Descriptors
- B – Modeling Assumptions and Defaults
- C – Schedules
- D – Construction Materials
- E – Software Tests
- F – TOU Costs Methodology

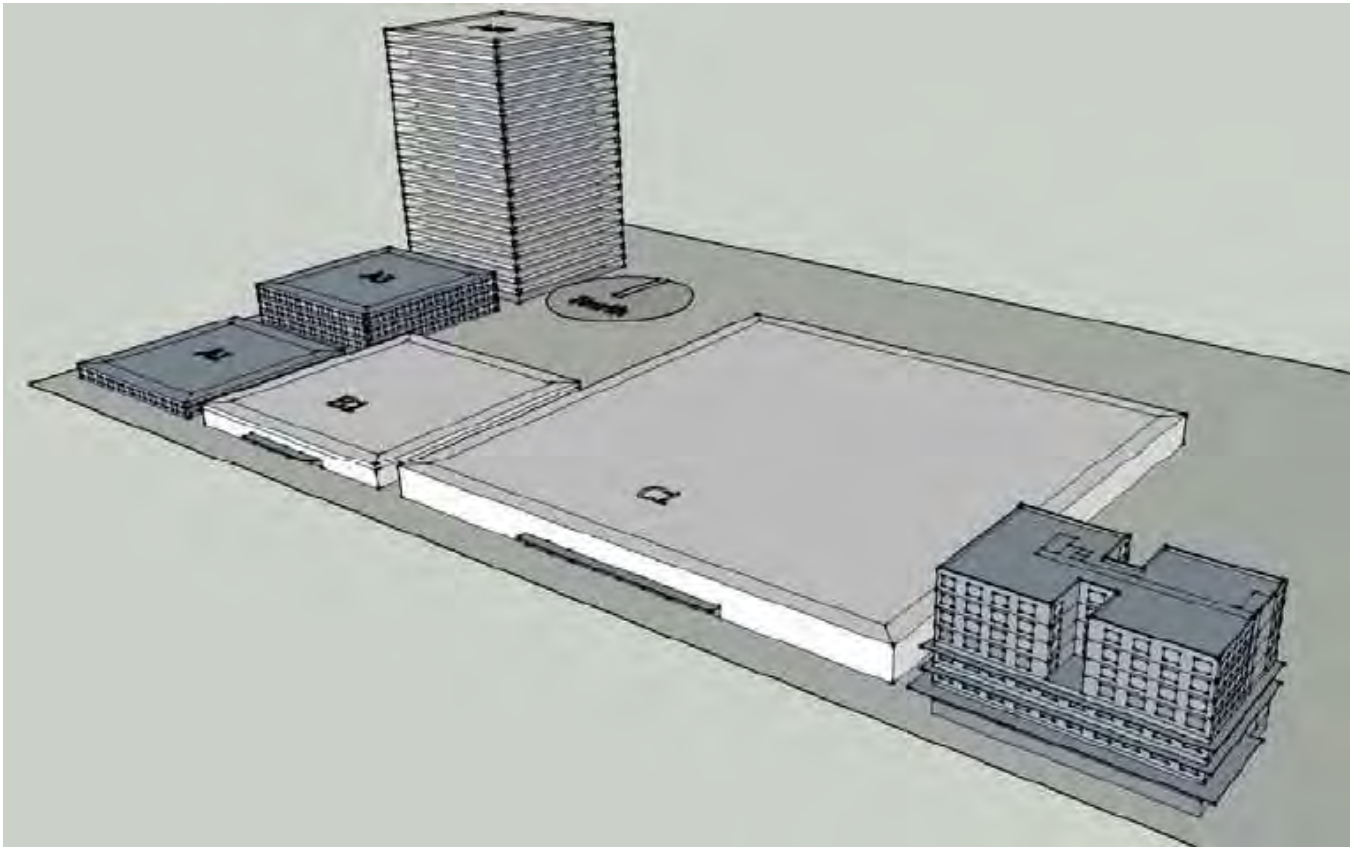


Chapter 2 – General Modeling Procedures



Chapter 3 – Software Requirements

- ASHRAE Standard 140-2007 with acceptance criteria added
- Supplemental tests to verify that prescribed or default modeling assumptions are correctly applied and that the baseline building is correctly created.



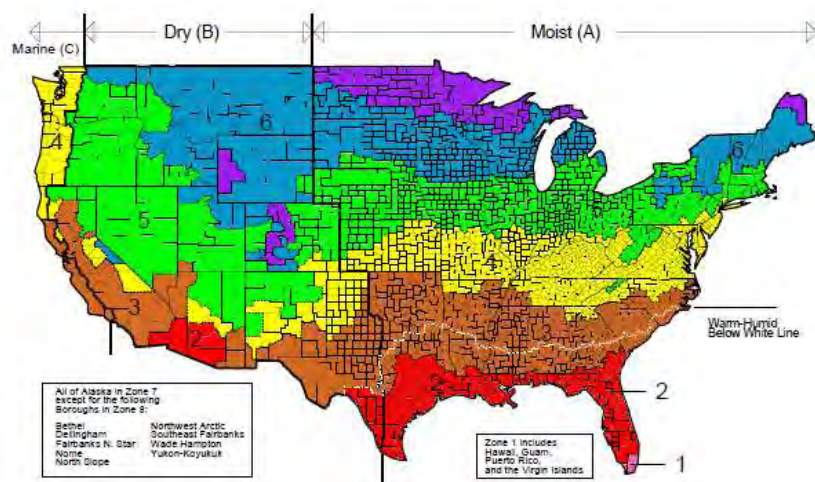
Chapter 4 – Content and Format of Standard Reports

- XML format developed for efficient data exchange
- Standard Reports to be developed for:
 - Building Summary
 - Energy Measures
 - Energy Results
 - Representations



Chapter 5 – Energy Costs and Currency

- Based on California approach to TDV
- Uses DOE/ASHRAE climate zones
- Built from wholesale energy prices
- Default time-of-use energy tariffs for 16 climate zones



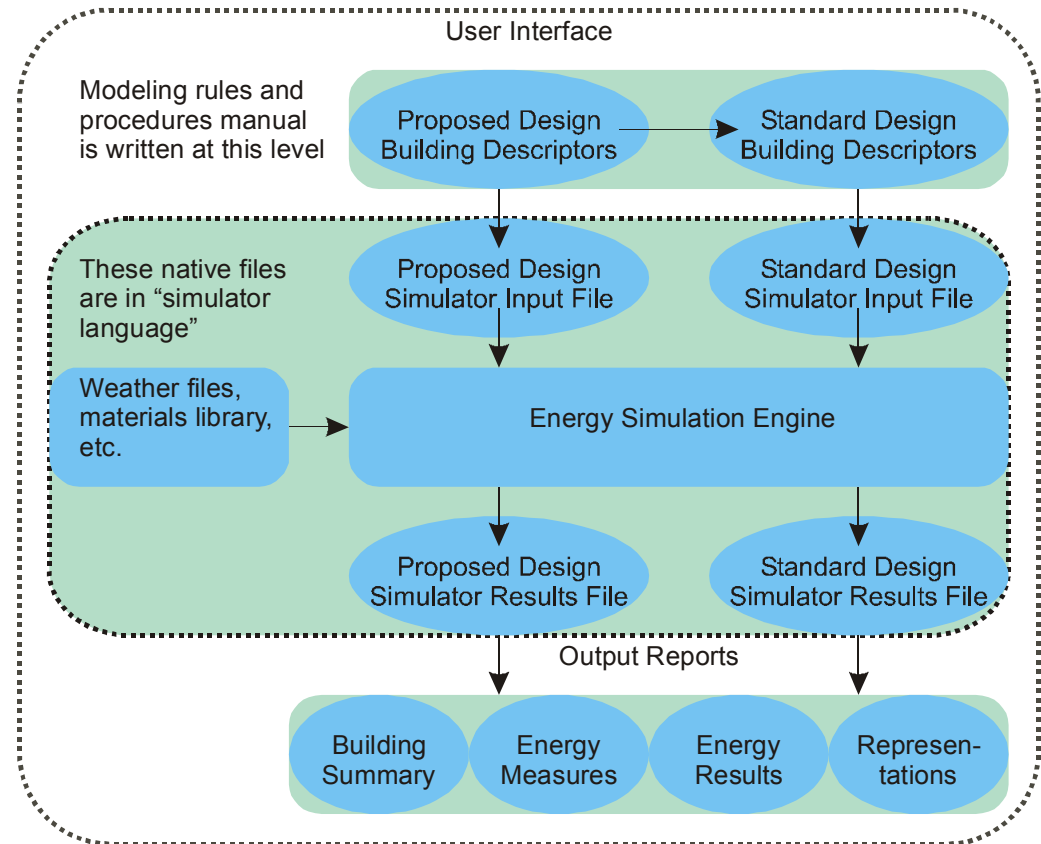
Example for Zone 4A

| Fuel | Seasons | Day Types | Time Periods | Hours in TOU Period (1-24) | Present Value of Energy Cost | |
|---------------------------|-------------------------------------|-------------------------------------|--------------|----------------------------|------------------------------|---------|
| Electricity (\$/kWh) | Summer (June-August) | Weekdays | Peak | 12-20 | \$3.41 | |
| | | | Mid-Peak | 8-11, 21-23 | \$1.02 | |
| | | | Off-Peak | 24-7 | \$0.83 | |
| | | Weekends/Holidays | Off-Peak | 1-24 | \$0.83 | |
| | | Fall (September-November) | Weekdays | Peak | NA | NA |
| | | | | Mid-Peak | 7-24 | \$0.88 |
| | Off-Peak | | | 1-6 | \$0.72 | |
| | Weekends/Holidays | Off-Peak | 1-24 | \$0.72 | | |
| | Winter (December-February) | Weekdays | Peak | NA | NA | |
| | | | Mid-Peak | 7-20 | \$0.96 | |
| | | | Off-Peak | 21-6 | \$0.83 | |
| | Weekends/Holidays | Off-Peak | 1-24 | \$0.83 | | |
| Spring (March-May) | Weekdays | Peak | NA | NA | | |
| | | Mid-Peak | 8-22 | \$0.95 | | |
| | | Off-Peak | 23-7 | \$0.77 | | |
| | Weekends/Holidays | Off-Peak | 1-24 | \$0.77 | | |
| | Gas (\$/therm) | Low Demand Season (April-October) | All | All | 1-24 | \$9.07 |
| | | High Demand Season (November-March) | All | All | 1-24 | \$11.99 |
| Steam (\$/Mlb) | Low Demand Season (April-October) | All | All | 1-24 | \$130.05 | |
| | High Demand Season (November-March) | All | All | 1-24 | \$171.95 | |
| Chilled Water (\$/ton-hr) | Low Demand Season (April-October) | All | All | 1-24 | \$1.12 | |
| | High Demand Season (November-March) | All | All | 1-24 | \$1.48 | |



Chapter 6 – Building Descriptors Reference

- In series with the Performance Rating Method (90.1 Appendix G)
- Establishes baseline and credits for:
 - Commercial refrigeration
 - Plug loads
 - Swimming pools
 - On-site power generation
 - Exterior lighting
- Establishes baseline (no credit) for vertical transportation and other components



Anatomy of a Building Descriptor

- Applicability
- Description
- Input Restrictions
 - Asset
 - Neutral Independent
 - Neutral Dependent
- Baseline Rules



Chapter 7 – Modeling Tips

- Challenging Building Types
 - Laboratories
 - Health Care
 - Data Centers
- Design Features
 - Automatically controlled window shades
 - Chilled Beams
 - Dedicated Outside Air Systems (DOAS)
 - Displacement ventilation
- Design Features (continued)
 - Gas engine driven heat pumps
 - Ground source heat pumps
 - Ice Bear type thermal storage
 - Radiant Heating or Cooling
 - Switchable glazing
 - UFAD
 - Variable flow refrigerant charge



COMNET content is multi-dimensional

- Flat file (the main manual)
- Spreadsheets (generally technical appendices)
- Google SketchUp files (of reference/test buildings)
- XML schemas for building descriptors and output reports
- EnergyPlus input files



Proposed System

Currently

- MGP exists as an Acrobat Portfolio
- Downloadable from www.COMNET.org

In a Couple of Months

- MGP will be ported to a web-based content management system:
 - Data can be filtered for specific purposes
 - Registered users can make comments on specific guidelines
 - Technical committee can maintain the document



Reaching Consensus through a Web-Based CMS

- Anonymous users or guests can view the material
- Registered users can make comments on the guidelines and procedures
- Technical committee can make edits directly on the website, but these are not published until a approval process is completed
- Public review drafts would be reviewed on the site



Empowering the COMNET Community

- Software developers
- Rating authorities
- ASHRAE special committees
 - Standard 140
 - Standard 90.1 ECB/PRM
 - TC 4.7
 - Building EQ
- IBPSA (International Building Performance Simulation Association)



Need for Filtering

- COMNET currently supports three purposes:
 - Green building ratings (LEED)
 - Federal tax deduction
 - Design to Earn ENERGY STAR
- Additional purposes (short term):
 - ASHRAE 90.1-2010
 - ASHRAE Building EQ
 - California Title 24
- Additional purposes (longer term):
 - IECC (various editions)
 - ASHRAE Standard 189.1



How Filtering will Work

- User states his/her purpose, e.g. tax deductions
- The content is then filtered to show just what is relevant

Create Book Page

Section/Page Title: **1**

Master Text: **2**

Select a purpose **3**

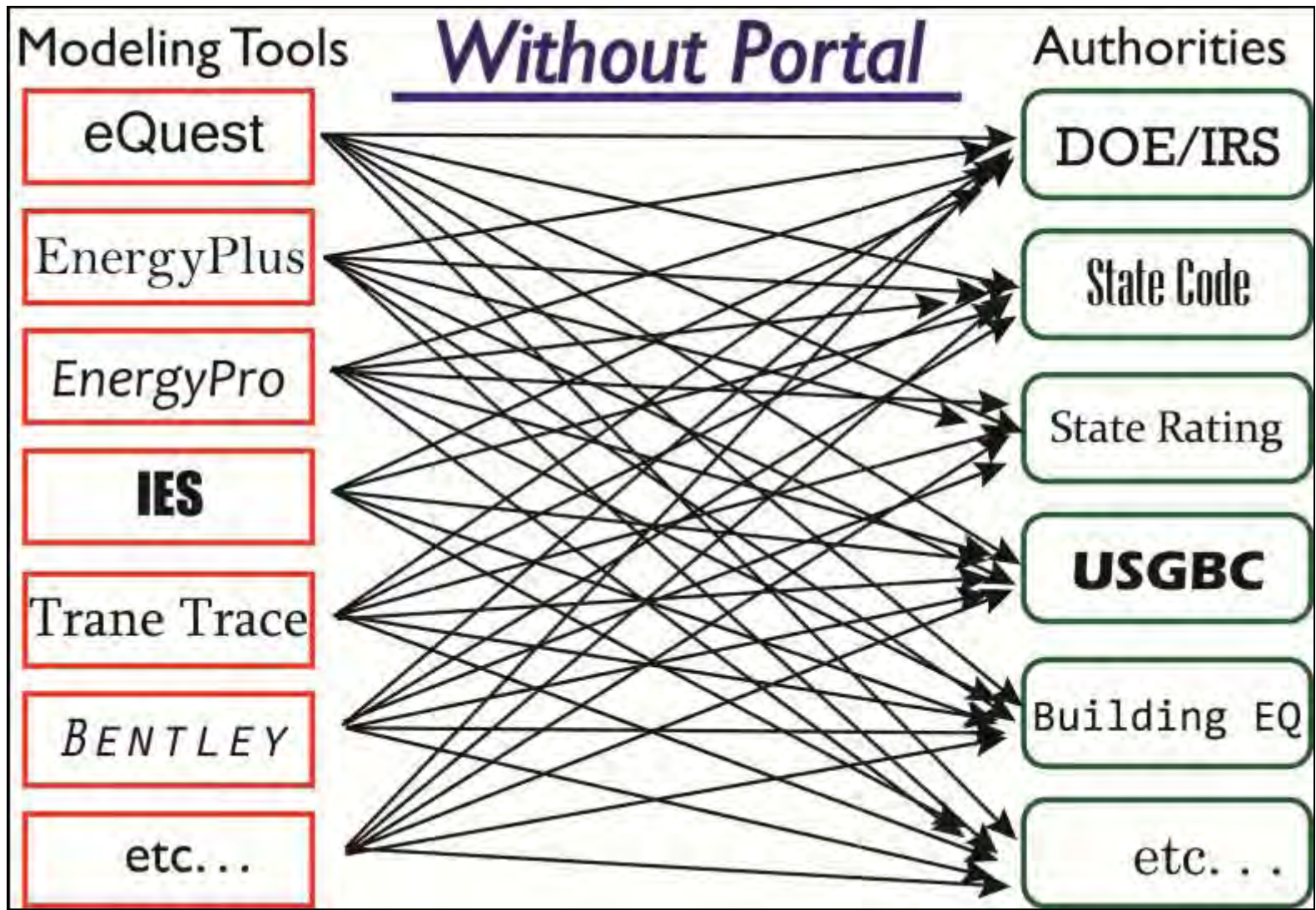
- Tax Deductions
- Green Building Ratings
- Energy Labels**
- Purpose 4
- Purpose 5
- Purpose ...

4

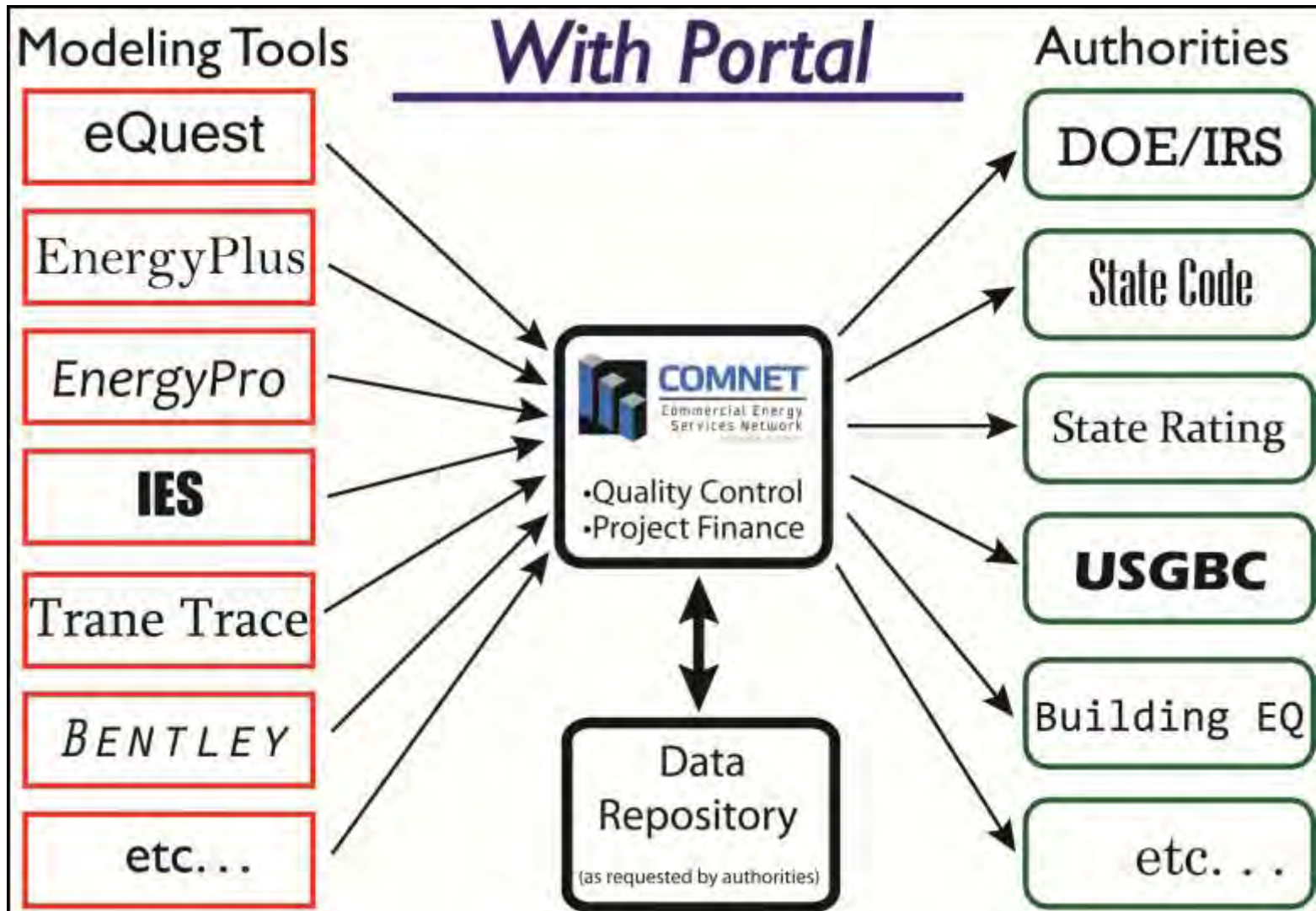
Editor selects a purpose and clicks on the 'Add Version' button (3). This action will trigger the view in WF-2.



Existing System

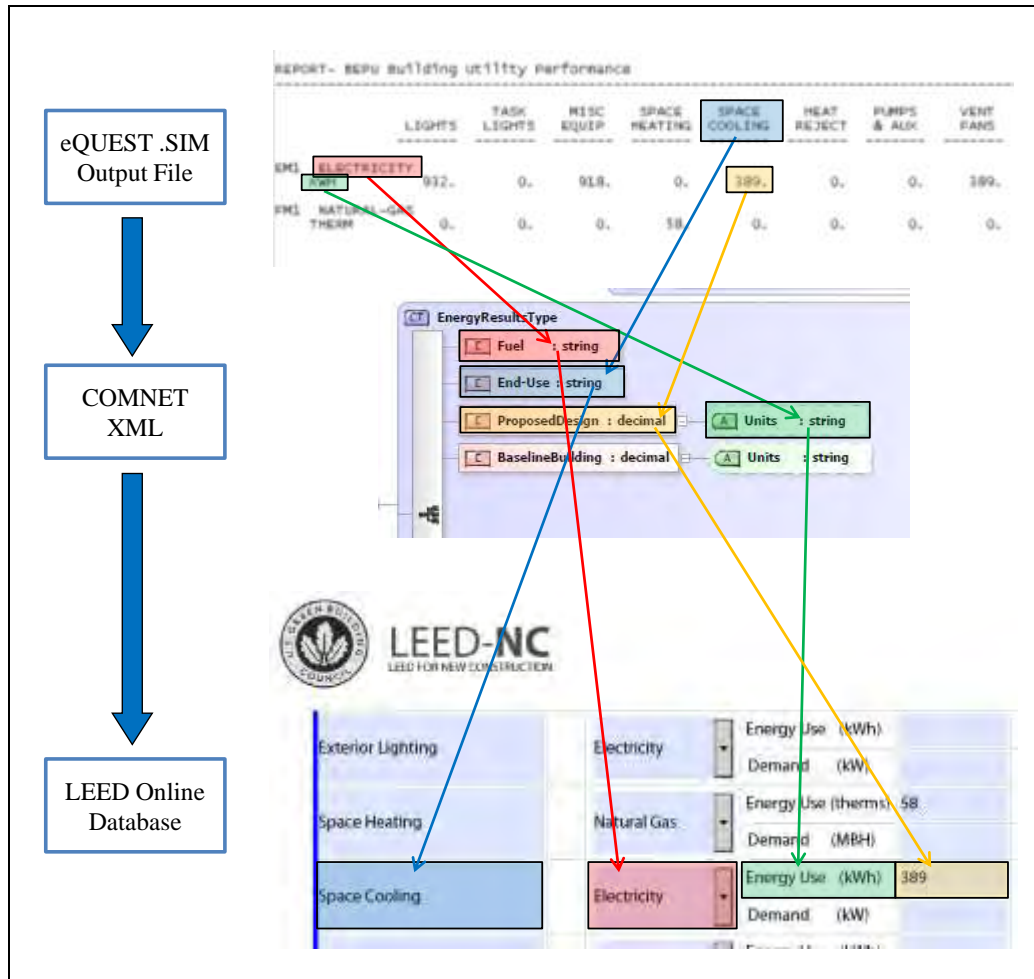


COMNET Portal



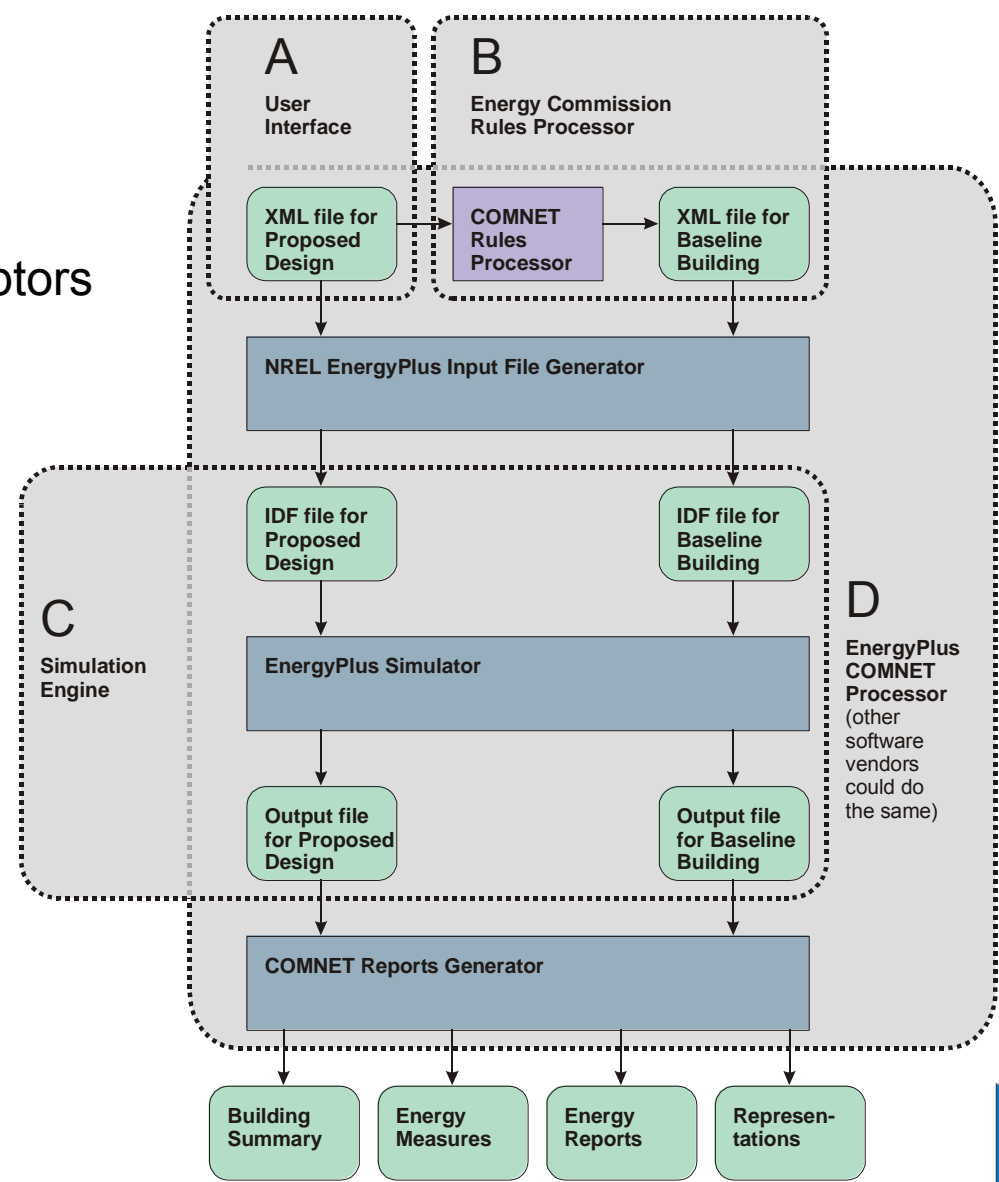
Phase I – One Rating Authority, One Simulation Program

Scope limited to data translation as proof of concept. This effort can be funded under the COMNET Phase 2 Contract.



XML Expansion

- Schema for output reports
- Schema for building descriptors



ANSI Standard Process

- Most of the Modeling Guidelines and Procedures simply interpret other ANSI standards like a User's Manual
- The portions that are standards are being pulled out and will each go through a ANSI consensus process, including:
 - Default gas, electric, chilled water and steam TOU rates.
 - Commercial refrigeration
 - Plug loads
 - Outdoor lighting
- Schedule is driven to some extent by the RESNET process to become an ANSI standards organization



Benefits to Energy Modelers

- Less effort and a more error free process
- Baseline building is automatically generated
- Only need to specify the proposed design
- Offers credit for reductions in non-regulated energy use such as commercial refrigeration and plug loads
- Same COMNET accredited software can be used for multiple purposes
 - Tax credits
 - Green building ratings
 - Energy labels
 - Other



Benefits to Software Developers

- One set of requirements and a single specification that serves multiple purposes:
 - Tax credits
 - Green building ratings
 - Energy labels
 - Other
- Consistent set of requirements vetted by peers and developed through a consensus process
- Reduced development costs
- Credibility from third-party (COMNET accredited)



Benefits to Rating Authorities

- More confidence in the results
- Less time required to review submittals (lower cost)
- Data flows seamlessly into the rating authorities database (through XML files)
- No “gaming” of the system
- Process is adaptable to new and changing baselines



More Information

www.COMNET.org

www.newbuildings.org

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The End

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