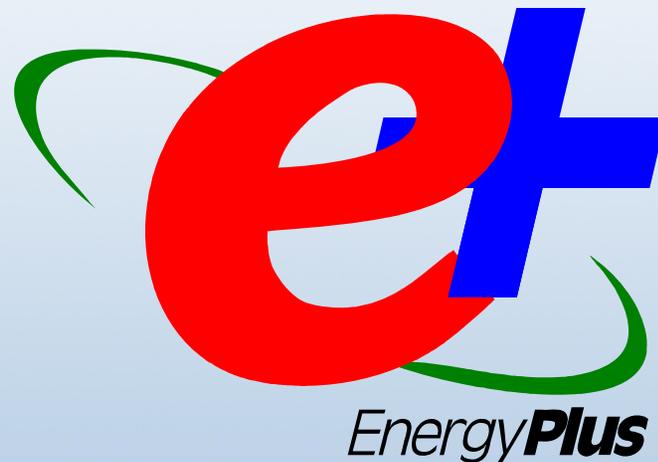


# EnergyPlus Plugin for Google SketchUp



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# EnergyPlus

- Simulation engine only
- Capabilities beyond other programs
- Certified for EPCACT and Title 24
- Continued funding \$\$\$ from DOE
- Free

# SketchUp

- Intuitive, easy-to-use 3-D drawing software
- Available from Google as free or pro versions
- Popular among architects
- Powerful API using Ruby programming language for plugins



# EnergyPlus Plugin for SketchUp

Adds EnergyPlus functionality  
to the SketchUp 3-D environment

- Create/Edit EnergyPlus Input Files
- Run EnergyPlus and view results
- Automatically create compliance model
- Integrate simulation into the early phases of the design process

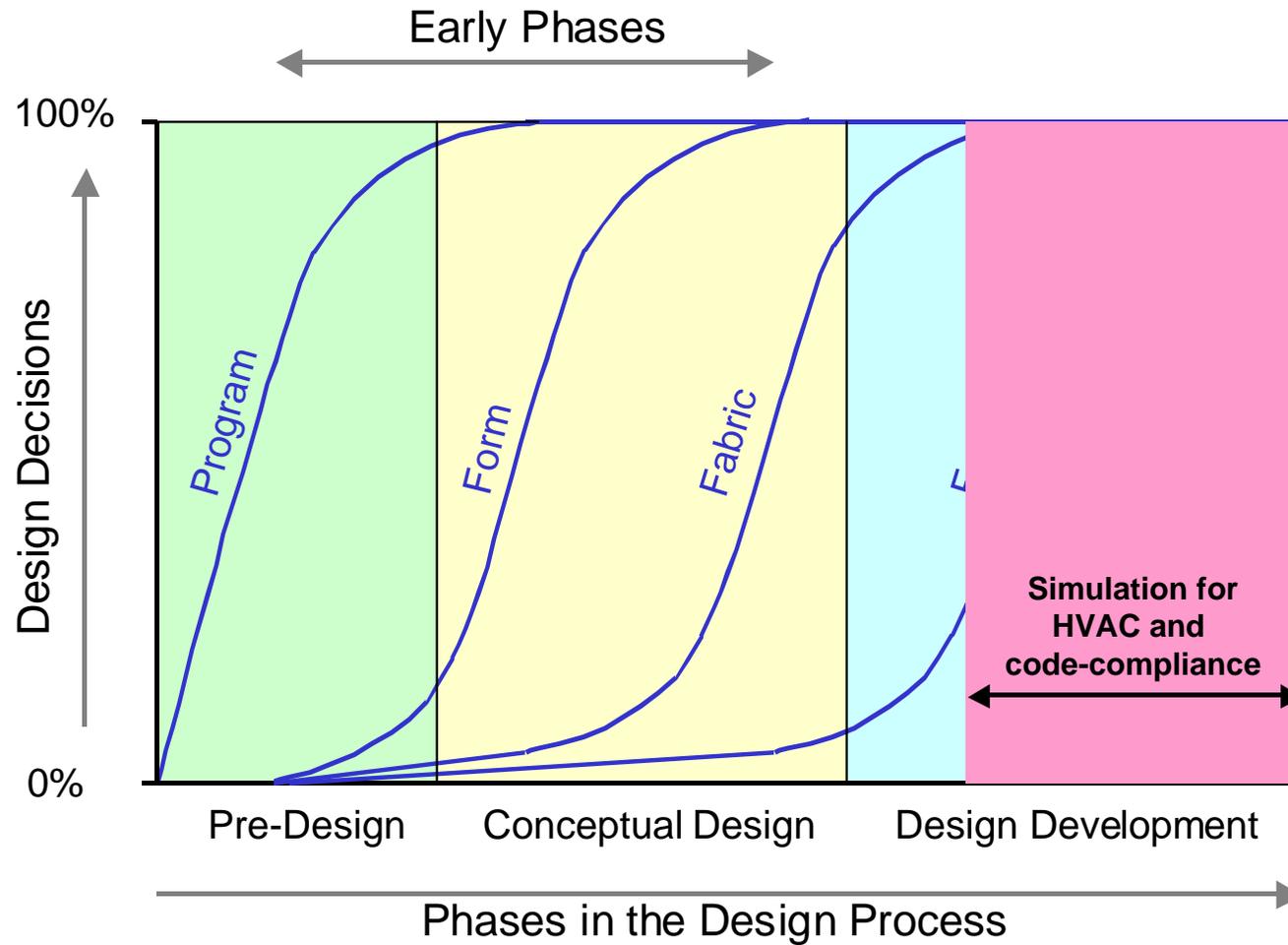
# EnergyPlus Plugin for SketchUp

- Developed by NREL
- Still in development
- Initial release scheduled for Sept 2007
- Available for **free** at [www.energyplus.gov](http://www.energyplus.gov)
- Works with free and pro versions of SketchUp
- Available for Windows and Mac

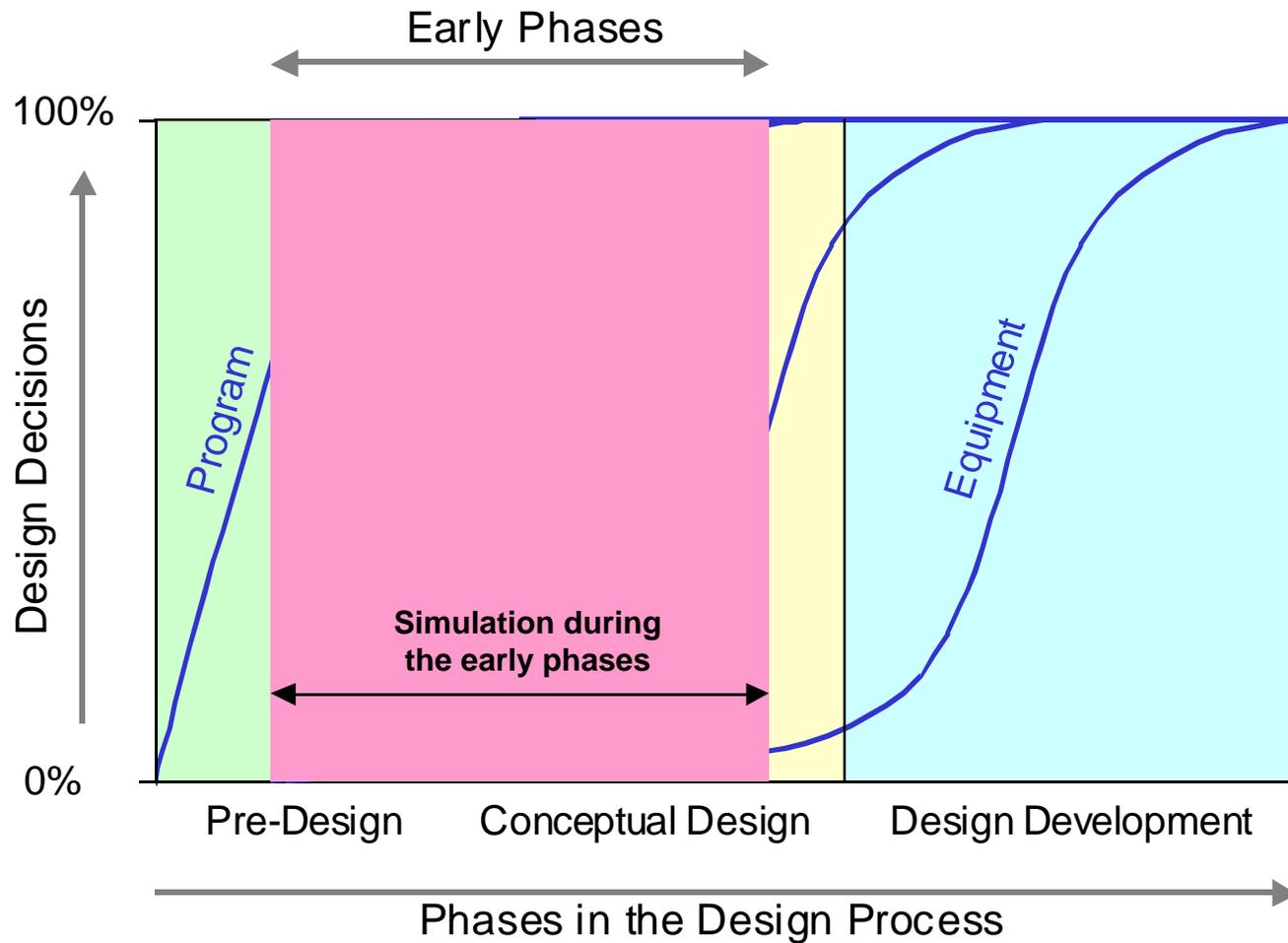
# Integrating Simulation into the Early Phases of the Design Process

- "Form" decisions made during the early phases of the design process have a big impact on energy performance
- Traditionally simulation only used for HVAC options and code-compliance
- Simulation during the early phases can help optimize energy performance without adding to the cost of the design

# Phases in the Design Process



# Phases in the Design Process



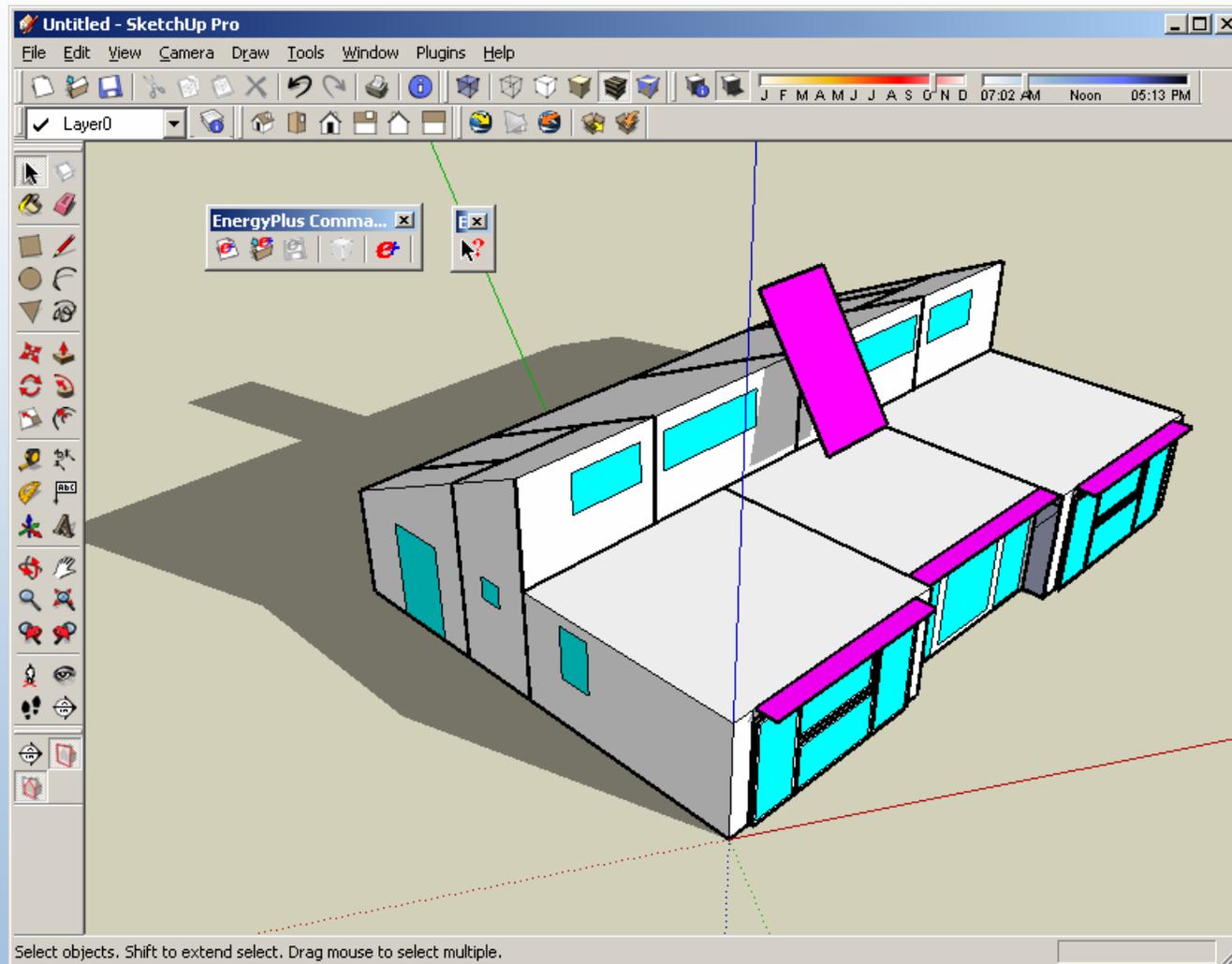
# SketchUp in the Design Process

- **Conceptual Phase:**
  - Quickly create building form and massing
  - Present design proposals to client
  - Changes based on client feedback
- **Design Development:**
  - Export from SketchUp to CAD tool
  - Design refinement with CAD

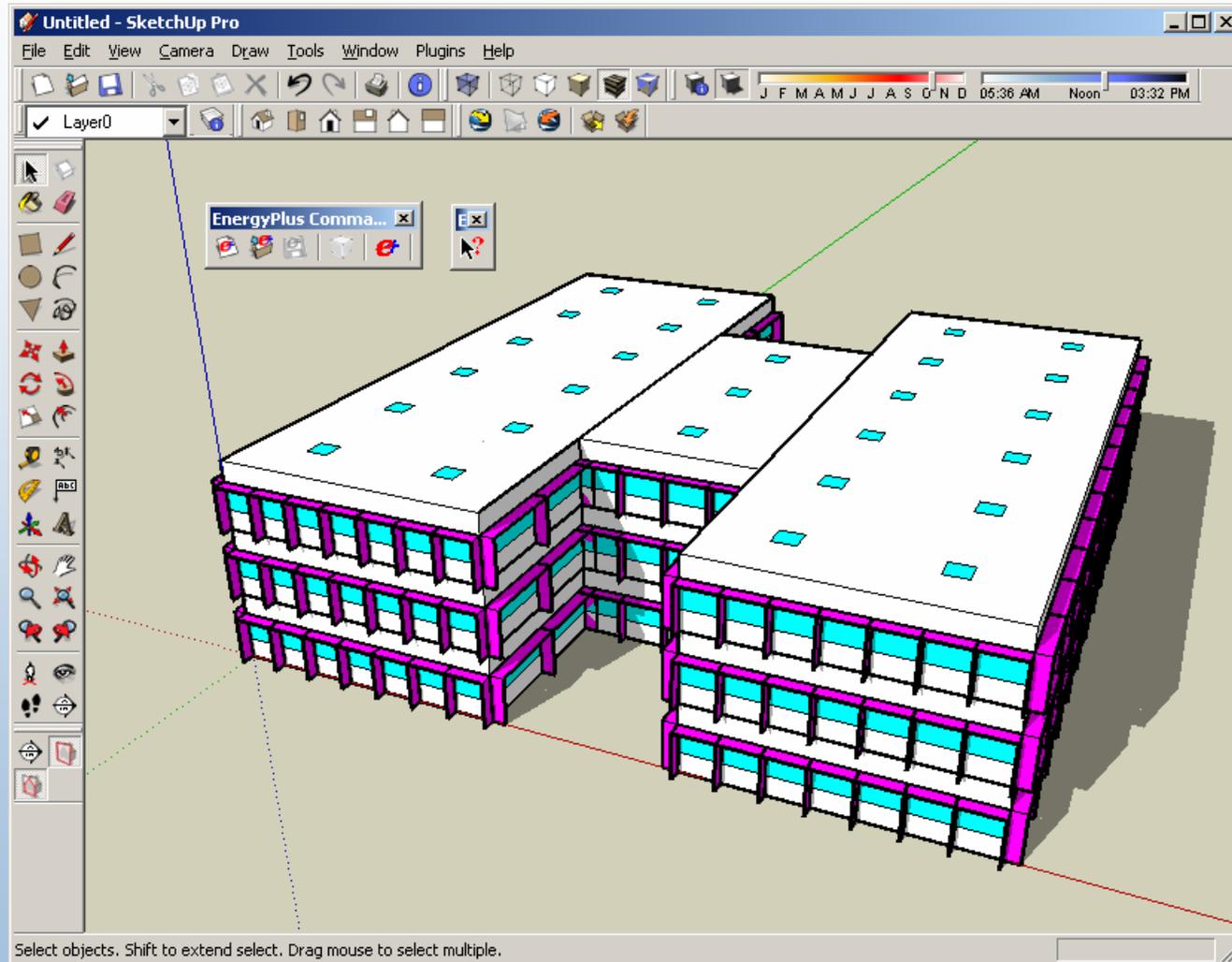
# SketchUp in the Design Process

- Conceptual Phase:
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  - **Changes based on simulation feedback**
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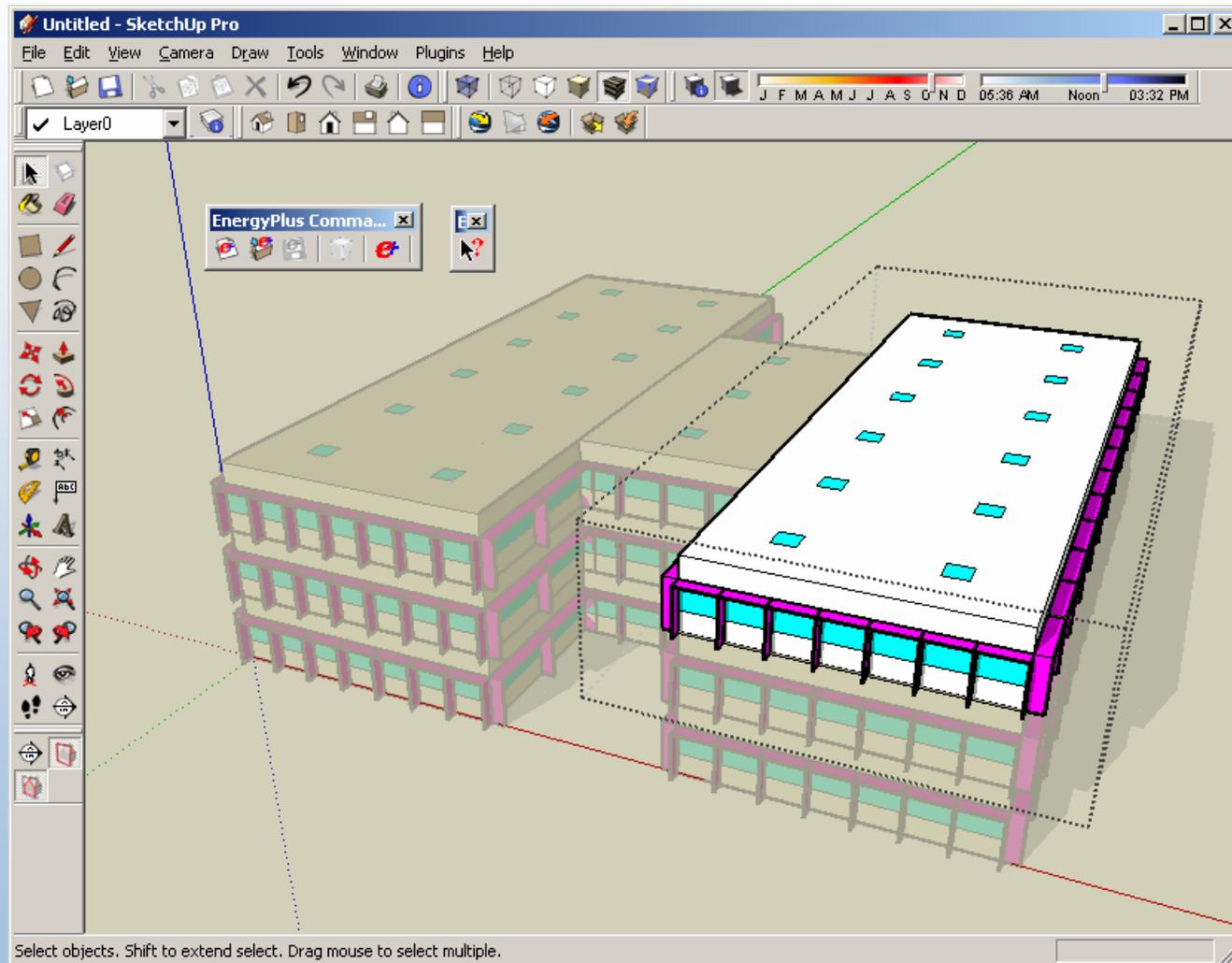
# Plugin Screen Shot



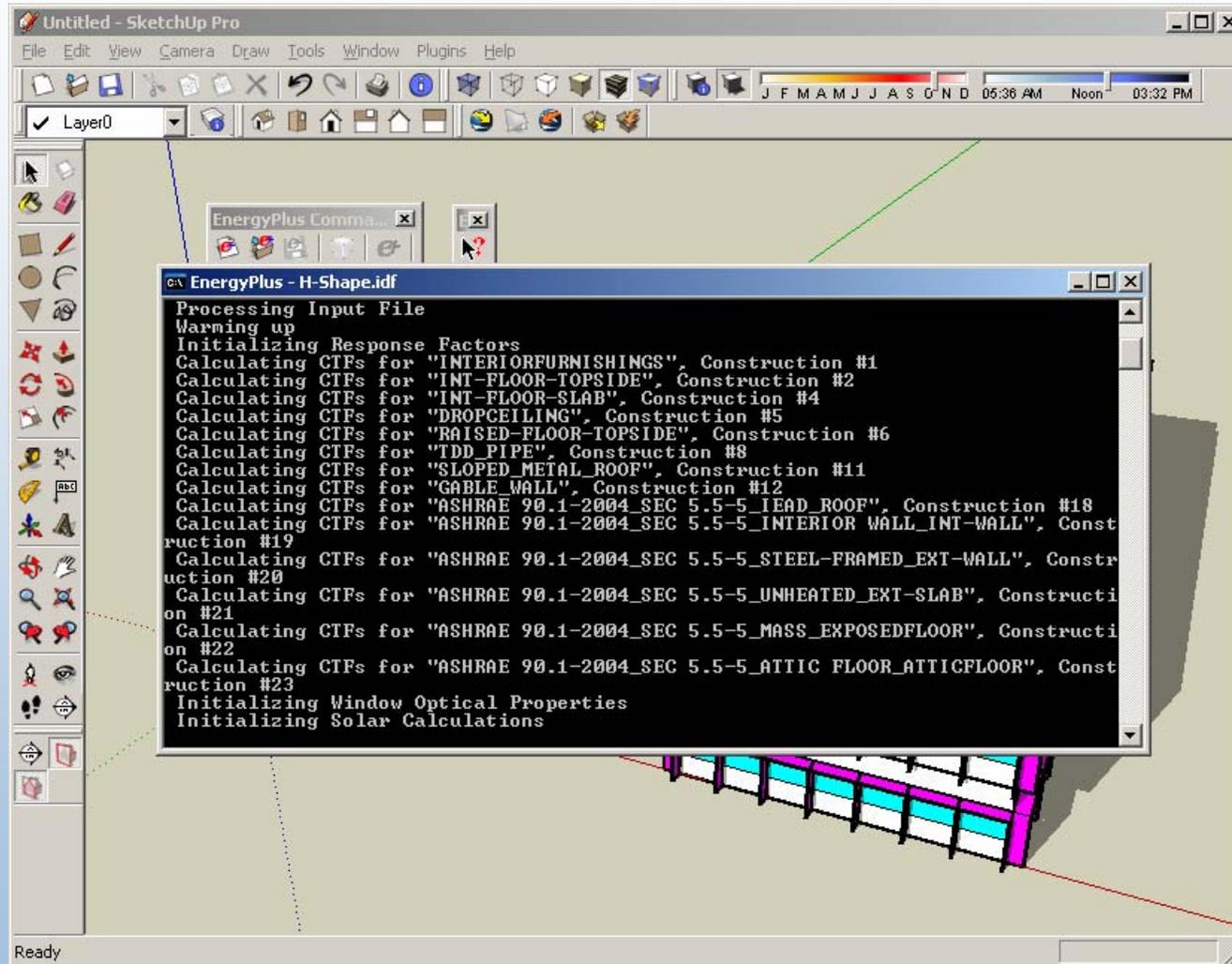
# Plugin Screen Shot



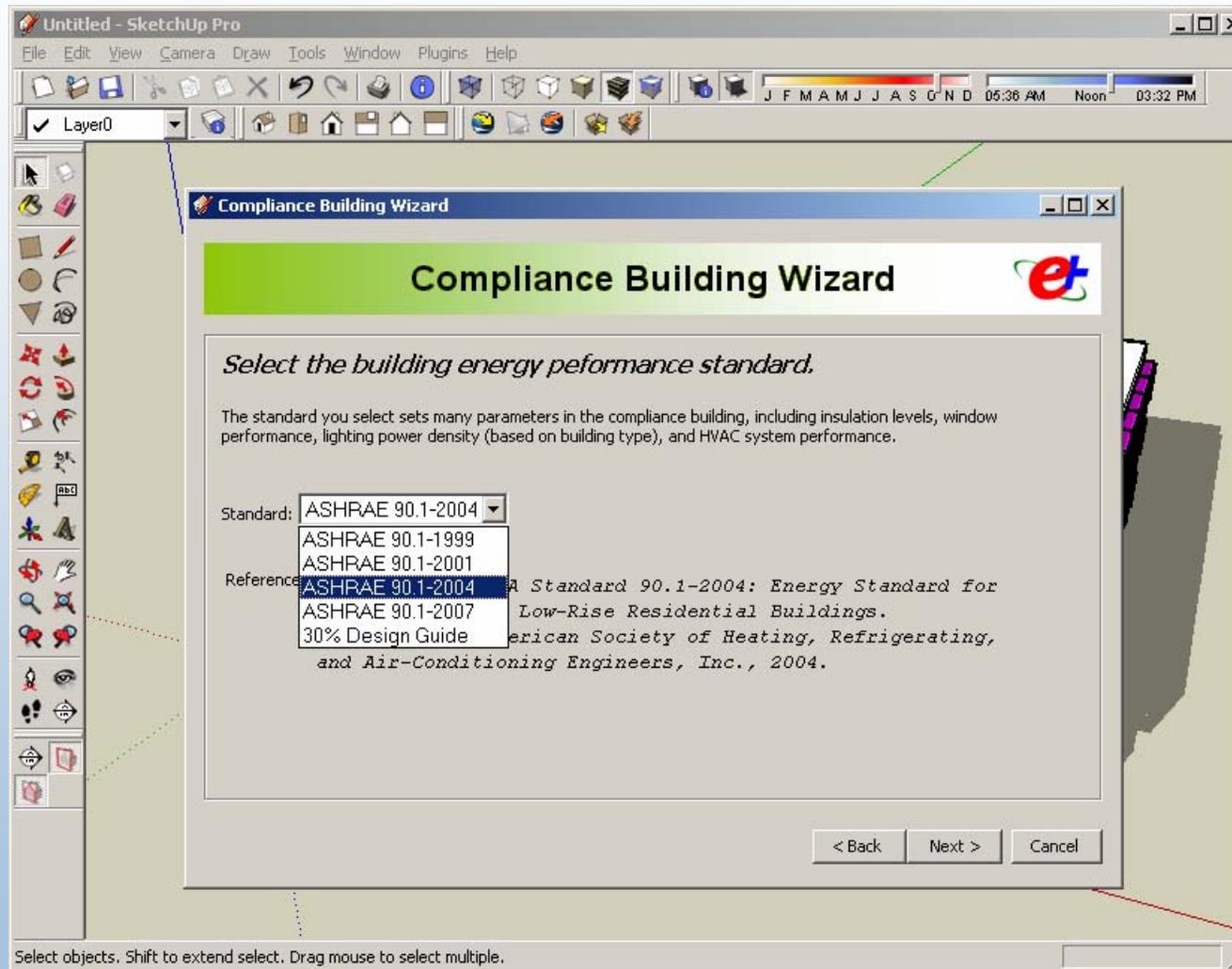
# Plugin Screen Shot



# Plugin Screen Shot



# Plugin Screen Shot



# Performance-Based Compliance

- Proposed Building Model
- Compliance Building Model
  - Also: Baseline or Budget Model

# Compliance Building Wizard

- Input
  - Code standard
  - Location
  - Construction type
  - Building type
- Output
  - EnergyPlus input file of compliance model

# Compliance Building Wizard

- What changes:
  - Insulation levels
  - Window performance
  - Window-to-wall ratio
  - Lighting power density
  - HVAC system
- What does not change:
  - Building form/geometry
  - People and equipment loads (optional)

# Prototype Building Wizard

- Input
  - Code standard
  - Location
  - Construction type
  - Building type
  - Total floor area
  - Building shape: Rect, H, L, U, T, Courtyard
  - Other: Window fractions, daylighting, overhangs, fins, HVAC system type, service hot water, PV
- Output
  - EnergyPlus input file of prototype “starter” model

# EnergyPlus Plugin, Version 1.0

- Goals
  - Make entering 3-D geometry easy
  - Automatic prototype “starter” model
  - Automatic compliance model
- Audience
  - Current E+ users
  - Prospective E+ adopters

# EnergyPlus Plugin, Version 2.0

- Goals
  - Manage and edit most simulation inputs
  - Couple to NREL optimization server?
- Audience
  - Simulation experts
  - Brave architects

# EnergyPlus Plugin, Version 2.0

- Goals
  - Launch open source project
- Audience
  - Developers in industry
  - Collaborators at national labs, universities
  - Enthusiasts, students

# EnergyPlus Plugin, Version X.X

- Goals
  - “Simulation for everyone”
  - Appeal similar to Energy-10
- Audience
  - Engineers
  - Architects
  - Homeowners

# Value to Industry

- Key to bringing energy simulation into the early phases of the design process (before architectural drawings or CAD)
- Bridges the gap between simulation tools and the design process
- Demonstration that an existing software tool can be leveraged to add energy functionality without reinventing the wheel

# Thank you!

## Questions?