


What's New in AECOsim Energy Simulator:

Conceptual Design modeling to Drag-and-drop HVAC Systems

31 May 2013

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What is AECOsim Energy Simulator?

- Full featured, graphic interface desktop software designed for engineers and energy managers modeling the energy performance of new or existing buildings
- Ideal for identifying opportunities to reduce energy use in new or existing buildings – and evaluate alternatives for reducing energy use and carbon emissions.
- Built around US DOE's flagship energy simulation engine, EnergyPlus
- Provides users with intelligent default values for all EnergyPlus inputs rather than hard-wired data or templates with limited control of inputs
- Graphic interface built from the ground up on a Building Information Modeling (BIM) platform
- Easy import of building models through DGN, DWG, gbXML, PDF, and other formats
- Conceptual design energy modeling -- 10 inputs, sketch the floor plan, select HVAC system type, and simulate
- Standardized building design load calculations from ASHRAE and CIBSE, and ASHRAE energy and ventilation standards [ASHRAE Standards 90.1 and 62.1 (2004, 2007, and 2010 versions)].
- Automates the creation of baseline building and budget buildings models for Standard 90.1, easing complicated calculations for LEED energy points
- HVAC component-based, drag-and-drop interface for modeling HVAC systems with 31 preconfigured HVAC systems and 48 HVAC components available. Users can drill down, modify, reconfigure, and change all the HVAC inputs or create their own components and systems from EnergyPlus HVAC objects.
- Extensive databases of materials, constructions, schedules, room types, HVAC equipment, and system which users and customize and extend for their project-specific needs or their company's standards

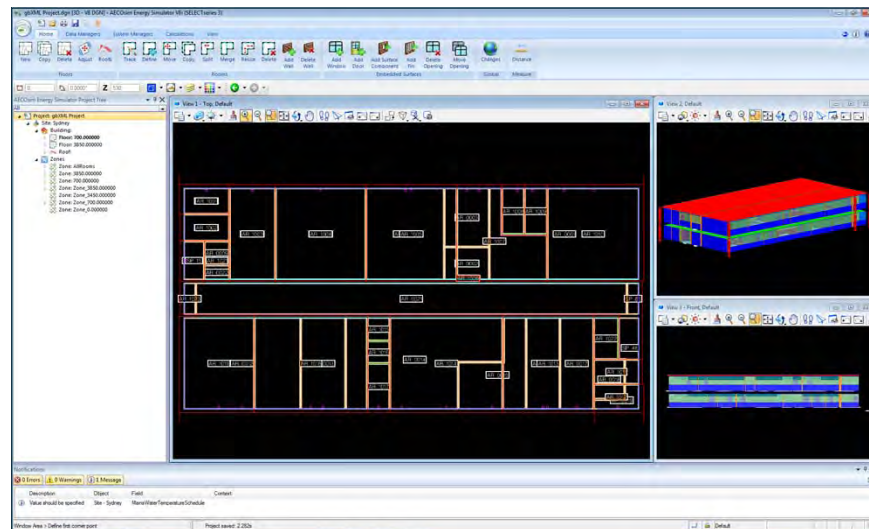
What's New in AECOsim Energy Simulator

- New features in AECOsim Energy Simulator V8i (SELECTseries 3) include:
 - Conceptual design modeling
 - Creating energy models from PDFs, BMP, and other formats
 - ASHRAE Standards 90.1-2010 and 62.1-2010 compliance and data sets
 - New EnergyPlus version 7.2 simulation engine
 - Drag-and-drop HVAC component-based interface for modeling HVAC systems.

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AECOsim Energy Simulator V8i



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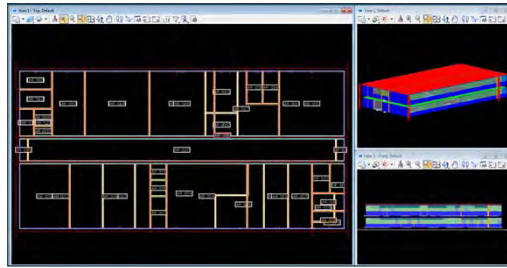


Key UI Components

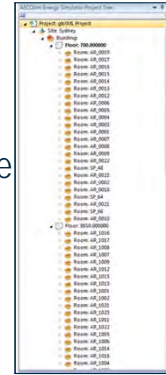
Ribbon bar



Views/display controls



Project tree



Notifications bar*

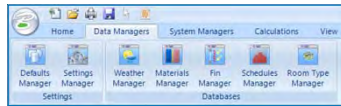
*New for SS3



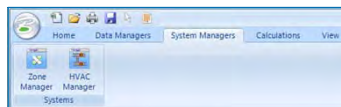
Ribbon bar tabs organized by function



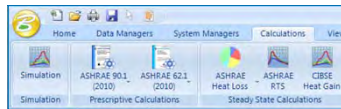
Home



Data Managers



System Managers



Calculations



Conceptual Design Templates

- New for SELECTseries 3
- 3 steps:
 - Enter building-level information
 - Draw floor outline, specify glazing and shading, select zoning
 - Select HVAC system
- Analyze in conceptual design mode or promote to full model

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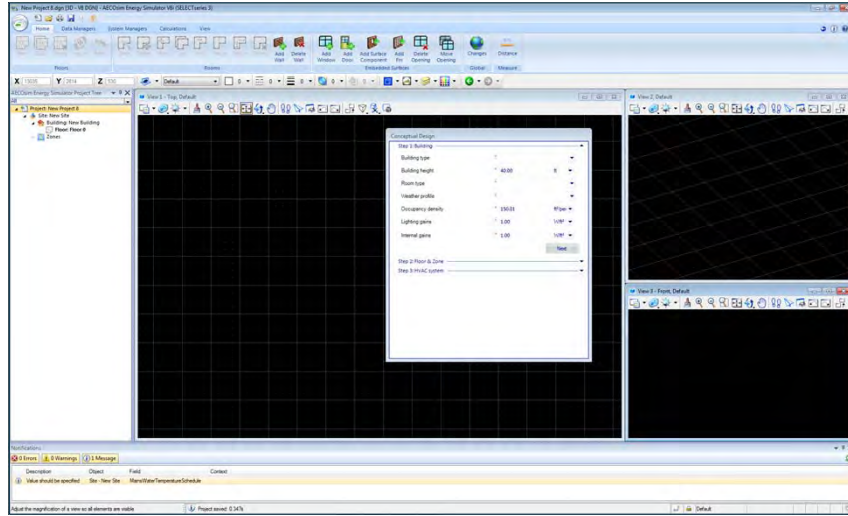


New Project, Select Template, Conceptual Model – IP or SI

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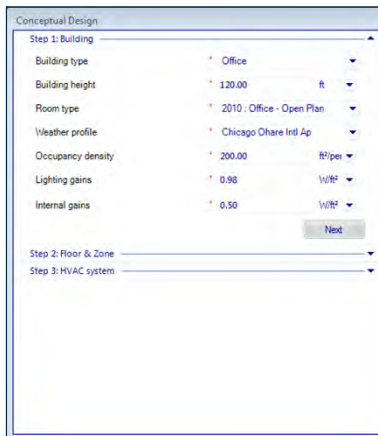


3 Steps: Building, Floors & Zoning, and HVAC



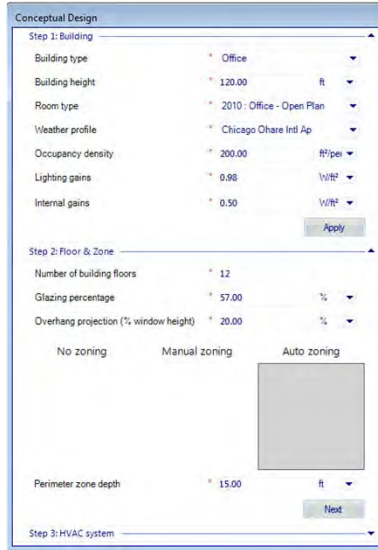
Conceptual Step 1: Building

- Select building type (ASHRAE 90.1)
- Enter overall building height
- Select predominant room type (90.1-2004, 2007, or 2010)
- Modify default values for occupancy, lighting, and internal loads



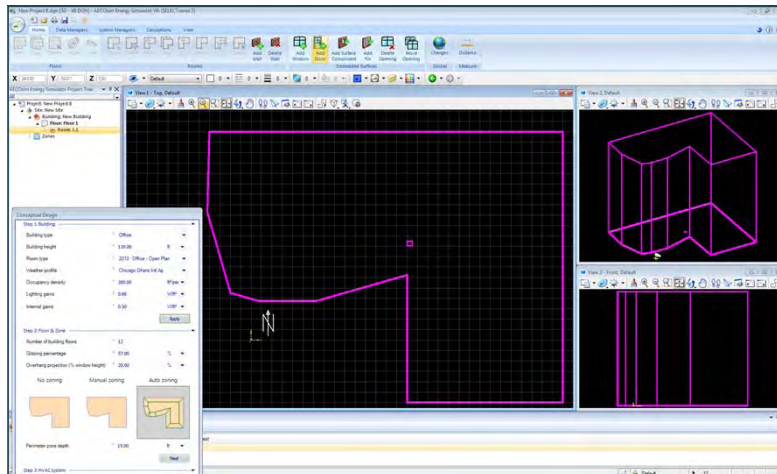
Conceptual Step 2: Floors & Zoning

- Enter number of floors
- Enter percentage glazing
- Enter overhangs (if any)



Conceptual Step 2: Floors & Zoning: Trace Floor Plan

- Trace floor plan outline on grid [grid is 4 ft (IP) and 1 m (SI)].



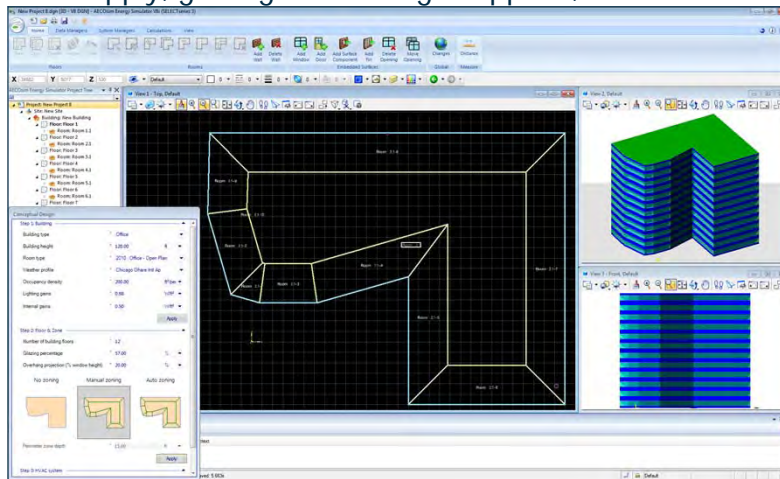
Conceptual Step 2: Floors & Zoning: Select Zoning

- Select from:
 - No zoning
 - Manual Zoning
 - Auto zoning
- If auto zoning, enter the perimeter zone depth



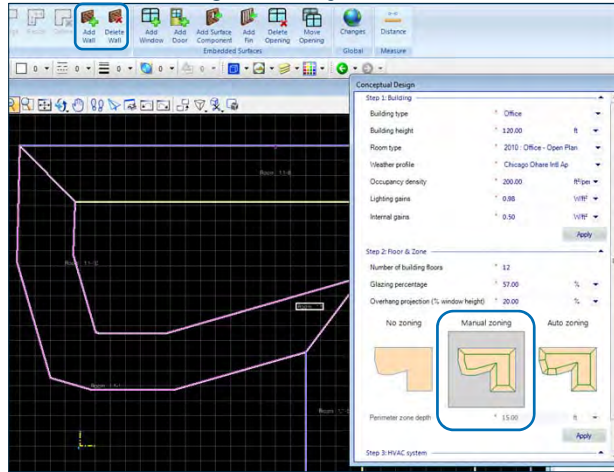
Conceptual Step 2: Floors & Zoning: Model Created

- Click Apply, glazing and zoning is applied, and model created



Conceptual Step 2: Floors & Zoning: Model Created

- Manual zoning allows you to add or delete interior walls

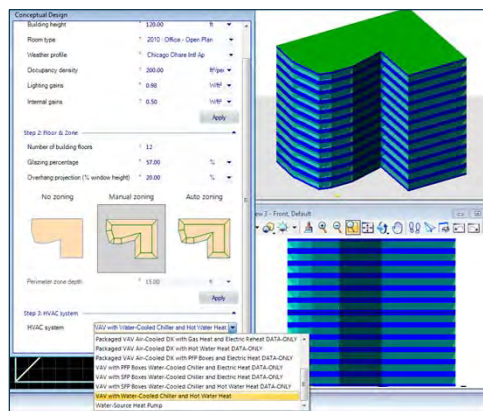


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Conceptual Step 3: HVAC System

- Select from list of Preconfigured HVAC systems:
 - Defaults include most ASHRAE 90.1 baseline and budget systems
 - Users can select systems to include and can create their own

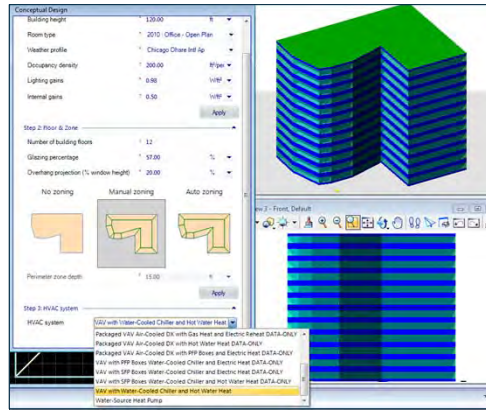


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Conceptual Analysis Options

- Full set of calculations in AES:
 - Heating and Cooling Load Calculations
 - ASHRAE 90.1/62.1 prescriptive requirements
 - EnergyPlus simulation
- Modify conceptual design input choices and repeat analysis
- Or 'Promote' to full model for complete control of data



Import BMP, JPG, PNG, PDF and trace rooms on images

Computer-Generated Residential Building Layouts

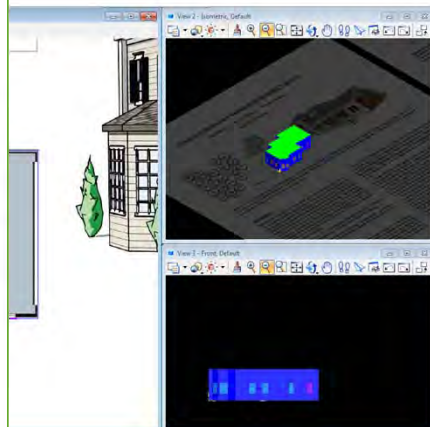
Figure 1: Computer-generated building layout. An architectural rendering, illustrated by a building elevation (left), generated by a Bayesian network model for real-world data. It is a 3D model (right) generated from the floor plan (left) and is used as a design input.

Abstract
 The present is needed for automatic generation of building layouts in computer graphics applications. This approach is motivated by the typical design process developed in architecture. Given a set of high-level requirements, an architectural program is constructed using a Bayesian network trained on real-world data. The architectural program is trained by a set of floor plans, obtained through automatic reconstruction. The floor plans are used to construct a complete, three-dimensional building with internal structure. We demonstrate a variety of computer-generated buildings produced by the presented approach.

CR Categories: I.3.4 [Computing Methodologies] Computer Graphics - Computer Graphics and Object Modeling; Computer-Aided Architectural Design - spatial algorithms, data-driven visualization

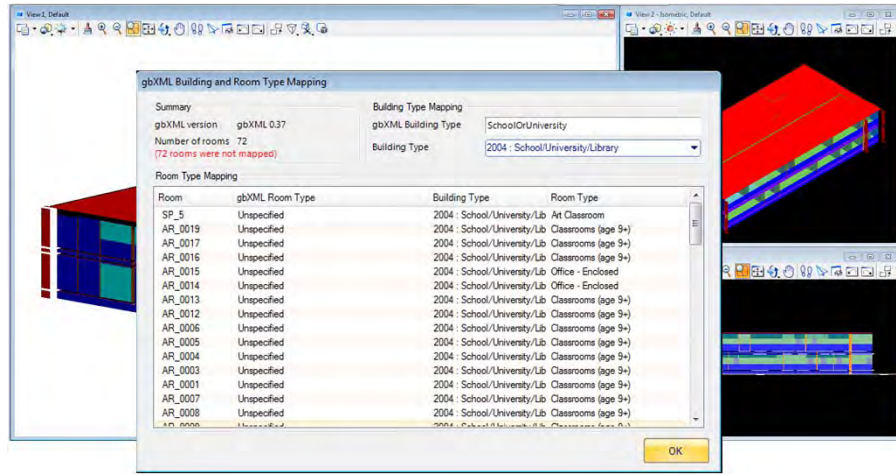
Keywords: procedural modeling, architectural modeling, computer-aided architectural design, spatial algorithms, data-driven visualization

1 Introduction
 Buildings with features are increasingly common in interactive computer graphics applications. Machine computer games feature sprawling virtual areas with buildings that can be entered and explored. Several virtual worlds feature building models with color and material layers. Some models are generated by hand, using modeling software such as Maya (http://www.autodesk.com/Products/). Other models are generated by automatic techniques for the automatic generation of visually plausible building layouts.

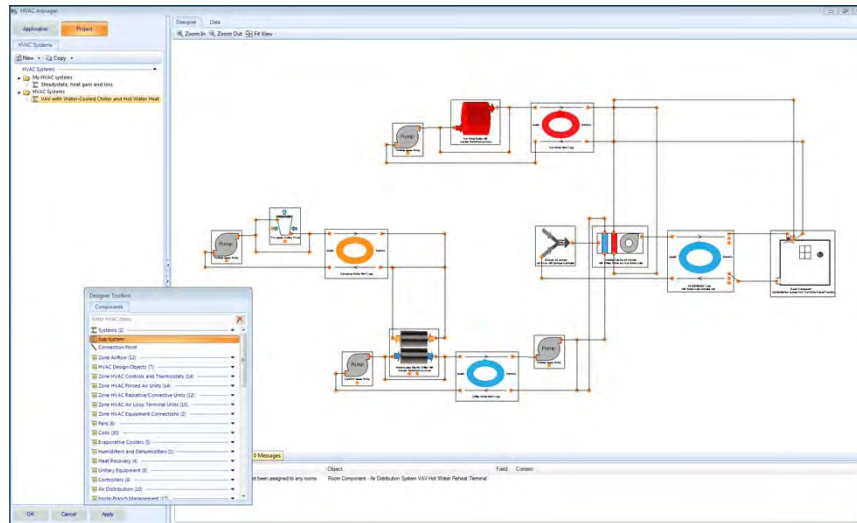


Import gbXML

User can fix missing space typing during import



HVAC Manager: Graphic Designer



HVAC Manager: Graphic Designer

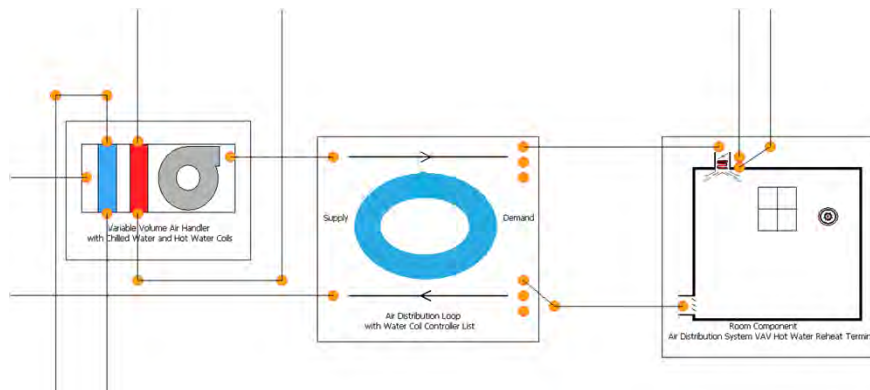
- HVAC Toolbox with preconfigured HVAC components
- Users can create new components or modify existing ones
- Drag components from the toolbox onto the palette
- Draw connections between components
- Right-click on components to change or edit properties
- Automatically creates the HVAC system from the components for simulation

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HVAC Manager: Graphic Designer

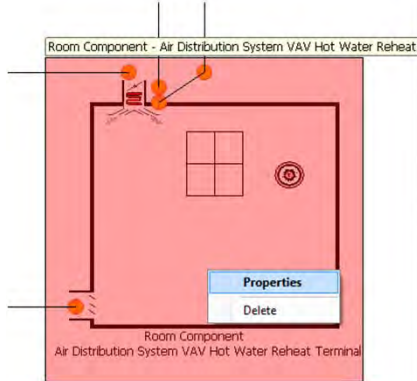
- Zoom in, out, pan
- Mouse over for more info



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HVAC Manager: Graphic Designer



Room Component - Air Distribution System VAV Hot Water Reheat Terminal

Name: Component - Air Distribution System VAV Hot Water Reheat Terminal

Description: Component - Air Distribution System VAV Hot Water Reheat Terminal

Comments: Room Component that contains a variable air volume terminal with hot water reheat coil for an air distribution system. Also contains a dual setpoint dry-bulb thermostat and design parameters for automatic air flow and equipment sizes.

Zone: AllRooms

Room Component Component

Rooms available to component (0)

Rooms using this component (216)

- Room 2.1-1
- Room 2.1-5
- Room 2.1-6
- Room 2.1-7
- Room 2.1-8
- Room 2.1-10
- Room 2.2-1
- Room 2.2-2

Heating Setpoint Temperature Schedule: Heating Setpoint (1) | Room Cooling Design Supply Air Temperature Input Method: Supply/Air Tempers | Room Heating Design Supply Air Temperature Input Method: Supply/Air Tempers

Cooling Setpoint Temperature Schedule: Cooling Setpoint (1) | Room Cooling Design Supply Air Temperature: 55.0 °F | Room Cooling Design Supply Air Humidity Ratio: 0.008 | Room Heating Design Supply Air Temperature: 104.0 °F | Room Heating Design Supply Air Humidity Ratio: 0.008

Room Design Outdoor Air Flow per Person: 0.00 cfm | Room Design Outdoor Air Flow per Room Floor Area: 0.00 ft³/m² | Room Air Distribution Effectiveness in Cooling Mode: 3.00

Room Air Distribution Effectiveness in Heating Mode: 1.00 | HVI Reheat Coil Availability Schedule: Always On

HVI Reheat Coil Performance Input Method: U-Factor Times Area | HVI Reheat Coil U-Factor Times Area Value: 0.00 (ft²·h)



Automatically Create Baseline Buildings for Standards Compliance

Simulation

Buildings: Unnamed building

Zones: AllRooms, Level 1, Level 2

Rooms: 101 Criteria, 102 Open Corridor, 103 Stair, 104 Conference, 105 Office, 106 Office, 107 File, 108 Office, 109 Office, 110 Print, 111 Stair, 112 Lobby, 113 Men, 114 Storage, 115 Elevator, 116 Women, 201 Open Corridor, 202 Conference, 203 Office, 204 Office, 205 File, 206 Office, 207 Print, 208 Men, 209 Storage, 210 Women, 211 Computer, 212 Board Room

Name: Simulation 1

Description: Simulation test for project model imported from gbXML

HVAC: None

Standard: ASHRAE 90.1 2007

Simple room model

Create baseline buildings Create budget building

Weather data: Philadelphia International Ap

Heating design day: January 21

Design temperature: 12.56 °F

Cooling design day: July 21

Design temperature: 90.68 °F

Run period: Start day: 01 Jan, End day: 31 Dec

Full year

Start



Summary (continued)

- Highlights for SELECTseries 3:
 - Conceptual Design modeling (10 inputs, sketch the floor plan, select HVAC system type, and simulate)
 - ASHRAE Standards 90.1-2010 and 62.1-2010 requirements and data added
 - HVAC Manager with graphic HVAC components
 - drag-and-drop, connect HVAC components
 - 31 preconfigured HVAC and SWH systems (16 graphic HVAC systems)
 - 48 preconfigured HVAC components (chiller, boiler, fan, pump, coil, room component, etc.)
- AECOsim Energy Simulator V8i SELECTseries 1 available since September 2011, SELECTseries 3 released May 2013.

Want More on AECOsim Energy Simulator?

- Bentley AECOsim Energy Simulator web site:
<http://www.bentley.com/en-US/Products/AECOsim+Energy+Simulator/>
- YouTube Channel:
<http://www.youtube.com/user/EnergySimulator>
- Free 30-day trial version available upon request