

EnergyPlus 2.0

Major Release • New Functionality

The Most Powerful Predictor of Energy Efficiency

EnergyPlus 2.0 is a building energy simulation program for modeling building heating, cooling, lighting, ventilating, water, and other energy flows. Using **EnergyPlus**, building designers get the real picture of how their building will respond given different combinations of systems before construction.

Based on the most popular features and capabilities of BLAST and DOE-2, **EnergyPlus 2.0** goes far beyond, exceeding its forerunners' ability to provide an integrated, simultaneous solution that predicts energy performance.

EnergyPlus 2.0 Takes Energy Simulation to New Level

	Predecessors	EnergyPlus 2.0	Additional Benefits
Surface Temperatures		<ul style="list-style-type: none"> Wall, window, roof, door, skylights 	<ul style="list-style-type: none"> Multiple time step approach, with user-defined time step (sub-hourly) for zone/environment interaction, and variable time intervals for zone air/HVAC system interaction No limits on number of walls, windows, thermal zones, systems, equipment
Heat Balance Calculation		<ul style="list-style-type: none"> Simultaneous calculation of radiation, convection, and conduction processes for each time step (also available in BLAST) 	
Renewable Energy Systems	<ul style="list-style-type: none"> Trombe wall 	<ul style="list-style-type: none"> Photovoltaic power, stand-off, and building integrated Flat plate solar thermal collectors 	
Integrated, Simultaneous Solution	<ul style="list-style-type: none"> Floating temperature 	<ul style="list-style-type: none"> Simultaneous calculation of loads, zone, and HVAC performance Tight coupling of loads, systems, plant Accurate space temperature and humidity prediction 	
Daylighting Illumination and Controls	<ul style="list-style-type: none"> Interior illumination from windows and skylights Dimming electric lighting including heating and cooling effects 	<ul style="list-style-type: none"> Complex fenestration systems based on bi-directional transmittance and radiosity Tubular daylighting devices, daylighting shelves, and light wells 	
Advanced Fenestration Calculations	<ul style="list-style-type: none"> Controllable window blinds Between-glass shades and blinds 	<ul style="list-style-type: none"> Electrochromic glazing More than 200 window types and users can create custom windows using WINDOW 5 Window blind model coupled to daylighting and solar gains Bi-directional shading devices 	



More on EnergyPlus 2.0

Based on a user's description of a building from the perspective of the building's physical make-up and associated mechanical and other systems, **EnergyPlus** calculates heating and cooling loads necessary to maintain thermal control setpoints, conditions throughout a secondary HVAC system and coil loads, and the energy consumption of primary plant equipment. Simultaneous integration of these—and many other—details verify that the **EnergyPlus** simulation performs as would the real building. The following is a representative list of **EnergyPlus** capabilities:

- + **Integrated, simultaneous solution** where the building response and the primary and secondary systems are tightly coupled (iteration performed when necessary)
- + **Sub-hourly, user-definable time steps** for the interaction between the thermal zones and the environment; variable time steps for interactions between the thermal zones and the HVAC systems (automatically varied to ensure solution stability)
- + **ASCII text based weather, input, and output files** that include hourly or sub-hourly environmental conditions, and standard and user definable reports, respectively
- + **Heat balance based solution** technique for building thermal loads that allows for simultaneous calculation of radiant and convective effects at both in the interior and exterior surface during each time step
- + **Transient heat conduction** through building elements such as walls, roofs, floors, etc. using conduction transfer functions
- + **Improved ground heat transfer modeling** through links to three-dimensional finite difference ground models and simplified analytical techniques
- + **Combined heat and mass transfer** model that accounts for moisture adsorption/desorption either as a layer-by-layer integration into the conduction transfer functions or as an effective moisture penetration depth model (EMPD)
- + **Thermal comfort models** based on activity, inside dry bulb, humidity, etc.
- + **Anisotropic sky model** for improved calculation of diffuse solar on tilted surfaces
- + **Advanced fenestration calculations** including controllable window blinds, electrochromic glazings, layer-by-layer heat balances that allow proper assignment of solar energy absorbed by window panes, and a performance library for numerous commercially available windows
- + **Daylighting controls** including interior illuminance calculations, glare simulation and control, luminaire controls, and the effect of reduced artificial lighting on heating and cooling
- + **Loop based configurable HVAC systems** (conventional and radiant) that allow users to model typical systems and slightly modified systems without recompiling the program source code
- + **Atmospheric pollution calculations** that predict CO₂, SO_x, NO_x, CO, particulate matter, and hydrocarbon production for both on site and remote energy conversion
- + **Links to other popular simulation environments/components** such as WINDOW5, DElight and SPARK to allow more detailed analysis of building components.