

New Features by EnergyPlus Version

New features included in the current and earlier releases of EnergyPlus (3.1.0, 3.0.0, 2.2.0, 2.1.0, 2.0.0, 1.4.0, 1.3.0, 1.2.3, 1.2.2, 1.2.1, 1.2.0, 1.1.1, 1.1.0, 1.0.3, 1.0.2, 1.0.1, 1.0).

| | Version 3.1, 9 April 2009 | Version 3.0, 13 November 2008 |
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| Data Sets | <ul style="list-style-type: none"> • | <ul style="list-style-type: none"> • Refrigerant properties for R404a, R410a, and R507a added to the refrigerant database. • New library of compressor performance curves for refrigeration systems created. • New performance curves for condensing and high-temperature boilers. • California Title 24 Time Dependent Valuation (TDV) factor schedules (2008) dataset added. • California Title 24 operating schedules dataset added. |
| Design Day | <ul style="list-style-type: none"> • | <ul style="list-style-type: none"> • |
| Input | <ul style="list-style-type: none"> • Users can now define surfaces as simple rectangles (Simple Rectangular Surfaces) for walls, roofs, ceilings, floors, windows, doors, glazed doors, and shading. • New detailed surfaces objects (Wall:Detailed, RoofCeiling:Detailed, FloorDetailed). • InputProcessor can now output defaults, autosizing, and autocalculation statistics. • New Constant Schedule allows simpler schedule definition. | <ul style="list-style-type: none"> • Version 3.0 includes widespread changes to input syntax. The complete set of input objects was revised to make the EnergyPlus' input "language" more consistent, logical, and informative. Although the majority of words used to describe input object names, field names and key choices have changed, the underlying meanings remain the same. (Yes, this will require substantial changes to existing input data files—aided by the Transition program which can be accessed through the EP-Launch utility.) • New examples input files for all new features. |
| Geometry/Window/Wall/Shading | <ul style="list-style-type: none"> • | <ul style="list-style-type: none"> • |
| Daylighting | <ul style="list-style-type: none"> • New variables for reporting visual discomfort: Time Exceeding Glare Index Setpoint at Ref Point 1 and Time Exceeding Glare Index Setpoint at Ref Point 2. | <ul style="list-style-type: none"> • |
| Zone Model | <ul style="list-style-type: none"> • Thermochromic windows can now be modeled. • New Adiabatic Surface option for Outside Boundary Condition. • New Sinusoidal option for Other Side Coefficient Boundary Conditions allows users to apply a sinusoidal schedule to the surface boundary conditions. • Two new simplified infiltration models added: Sherman-Grimsrud and AIM-2. • Ventilated slab has additional SerialSlab system configuration option, allowing multiple ventilated slabs in different zones to be connected in series. | <ul style="list-style-type: none"> • New Ventilated Slab model includes radiant heating and cooling interactions with hollow core slabs • Infiltration models now allow air flow rate per unit of exterior wall area as an optional input. • Interior pipe heat transfer loads added into zone air heat balance calculations. • New optional algorithms for fully-coupled, 1-D finite element heat and moisture transport model for simulating the movement and storage of heat & moisture in and through building surfaces. • The algorithm for variable system timestep was revised. Changes include uniform system timestep length across zone timestep and stricter management of history terms for zone air conditions. |
| Natural and Mechanical Ventilation | <ul style="list-style-type: none"> • UFAD model upgraded. • AirflowNetwork wind speed model for height-dependency improved. • Air Distribution System Model includes more components: heating coil and three heat exchangers. • Demand Control Ventilation model based on ventilation rate | <ul style="list-style-type: none"> • Additional hybrid (mixed-mode) ventilation controls added to allow global control of surface openings based on master zone, limit opening levels based on wind speed, and allow control of Mixing and Ventilation objects. • Temperature limit controls added to Mixing and Cross-Mixing objects. |

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| | <p>procedure of Standard 62.1-2007.procedure of Standard 62.1-2007.</p> | <ul style="list-style-type: none"> • New Thermal Chimney model added--uses solar radiation to enhance natural ventilation. • New CoolTower model added--uses natural evaporative cooling to cool incoming air. • Added new outside air minimum and maximum fractions to easily model 100% (or any fixed value) OA systems, leakage or stuck OA dampers. |
| HVAC | <ul style="list-style-type: none"> • New Unitary Air-to-Air Heat Pump and Packaged VAV HVAC Templates. • Improved control of unitary equipment under low-load conditions (Furnaces, Heat Pumps, PTAC, PTHP, and Window AC). • Furnaces/Unitary Systems now allow high humidity control with cycling supply air fan systems. • Cool Beam model added. • Option to size system flow rate and terminal units based on minimum ventilation requirements added; other zone equipment will be sized on zone loads • Fan:OnOff now models multi-speed fan performance. • Minimum stops on VAV terminals with reheat can now be scheduled. • SensibleAndLatent and Desiccant Heat Exchangers now have economizer lockout option. • Revised air-bypass logica for HeatExchanger:AirToAir:FlatPlace to match the logic used for HeatExchanger:AirToAir:SensibleAndLatent. • Refrigeration racks and systems now accept either the name of a case or caselist, and compressor or compressorlist. • Improved moisture condensation controls for Low Temperature Radiant systems. • EvaporativeCooler:Direct:ResearchSpecial model added. • Water consumption model for Indirect Evaporative Cooler extended. Secondary air flow rate can now be autosized. | <ul style="list-style-type: none"> • Refrigeration system capabilities expanded with more detailed component models. Users can now simulate: (1) variable evaporating temperatures, (2) variable condensing temperatures, (3) mechanical subcoolers that transfer refrigeration loads from less efficient low- temperature systems to more efficient medium-temperature systems, and (4) liquid suction subcoolers. • Improved error trapping for refrigerant and glycol properties at extreme temperatures and pressures. • Single-speed cooling towers can now use fluid bypass as capacity control, saving water but requiring more fan energy. • New linear curve to complement other curve objects. • Absorption chiller now can connect to steam or hot water loop. • Enhanced absorption chiller model added. • Radiant-convective baseboard model added. • Boiler model upgraded to include performance curve which accounts for load as function of operating temperatures. • Set Point Managers now test for control node conflicts. • New system availability managers added: Scheduled On and Scheduled Off. • New Underground Pipe object added; upgraded Pipe Heat Transfer objects. • New Fluid Cooler objects added--single and two-speed dry cooling towers for hydronic loops. • Component sizing factors added for boilers, chillers, and cooling towers. • Added chilled water thermal storage tank models for both mixed and stratified tanks. • New Compact HVAC objects: <ul style="list-style-type: none"> ○ Packaged single-zone heat pump system (PSZ-HP) ○ Packaged variable volume system (PVAVS) ○ Constant volume chilled water/hot water system (single-zone and multi-zone) |
| Electrical Systems | • | • |
| Water Manager | • | • |
| On-Site Energy Supply | • | <ul style="list-style-type: none"> • PV model restructured to separately model inverters and storage systems. • DC-to-AC inverter model added along with simple battery model. • Simple Photovoltaic-Thermal model added for pre-heating outside air and hot water heating. |
| Economics | • | <ul style="list-style-type: none"> • Energy cost calculations now includes real time pricing, minimum monthly charge, and buy/sell/net metering as new inputs |

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| | | <ul style="list-style-type: none"> • A new monetary unit object (Currency Type) added • Additional economic reporting of energy and demand for each charge |
| Environmental Impacts | • | • |
| Output | <ul style="list-style-type: none"> • New tabular reports to support LEED EA Credit 1 forms. • Tabular reports now can be in Inch-Pound units. • Improved diagnostics, warnings, and informative messages throughout. • Output:Reports object converted to simpler Ouput:Surfaces:List, Output:Surfaces:Drawing objects. | <ul style="list-style-type: none"> • SQLite added as another output format option, providing optional export of time-series results directly to database. • Standard monthly reports can now be specified by name in the predefined report object without having to include a detailed monthly report object. |
| Utilities | <ul style="list-style-type: none"> • New AppGPostProcess utility in combination with Building:Compliance object averages the results from four building rotation runs for Standard 90.1 Appendix G compliance. • Datasets can now be directly opened from a menu in IDFEditor. • Weather Converter updated to allow more custom date formats. • Weather Converter now can include rainfall information (where available) in EnergyPlus weather data files. | <ul style="list-style-type: none"> • EP-Launch now handles blank weather files as if no weather file is specified in group simulations. • IDF Editor new features include wrapping long text strings over multiple lines within cells, required fields now shown with blue field names, and added recently used file list. |
| Documentation and Guides | <ul style="list-style-type: none"> • Input/Output Reference and Engineering Reference updated and extended for all new features and updates. Total documentation now exceeds 4,000 pages. | <ul style="list-style-type: none"> • Input/Output Reference and Engineering Reference updated and extended for all new features and updates. Total documentation now exceeds 3800 pages. |
| Validation and Testing | • | • |
| Platforms | • Windows, Linux, Mac | • Windows, Linux, Mac |

| | Version 2.2, 22 April 2008 | Version 2.1, 31 October 2007 | Version 2.0, 12 April 2007 |
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| Data Sets | <ul style="list-style-type: none"> • Electronic enthalpy air-side economizer curves • Microturbine electric generators | <ul style="list-style-type: none"> • Color schemes for DXF (original and default) | <ul style="list-style-type: none"> • New materials data set based on ASHRAE 2005 HOF replaces legacy DOE-2 and BLAST data. • Updated solar collector data set from the SRCC adds 55 more collectors for a total of 173. • Added air change rate to ventilation loads report in StandardReports data set. |
| Design Day | <ul style="list-style-type: none"> • Design days now allow scheduled input for Beam and Diffuse Solar values. • Design days allow users to select periods from weather files to be used in design/sizing calculations. | | |
| Input | <ul style="list-style-type: none"> • Example input files created for all new features (More than 245 example input files now available). An additional set of realistic, benchmark files (15) have been added. | <ul style="list-style-type: none"> • Example input files created for all new features (More than 225 example input files now available). | <ul style="list-style-type: none"> • Objects and name lengths can now be 100 characters. (Previous limit was 60). • New weather data for 86 locations added: 69 in Australia, 16 in Canada, and 1 in Iran. • Three new unit ventilator input files created: UnitVent5Zone.idf, UnitVent5ZoneAuto.idf, UnitVent5ZoneFixedOANoCoilOpt.idf. • Three new thermal storage example input files created: IceStorage-Parallel.idf, IceStorage-Series-ChillerDownstream.idf, IceStorage-Series-ChillerUpstream.idf. • Example input files created for all new features (More than 225 example files now available) |
| Geometry/Window/Wall/Shading | | <ul style="list-style-type: none"> • Surface Surround Subsurface error detection more robust (less false errors) • Autocalculate now allowed for shading surfaces (number of vertices) | <ul style="list-style-type: none"> • Shadowing Calculations object now allows user to specify maximum figures in shadowing overlaps. • Phase change materials (PCM) with variable thermal conductivity and a temperature-enthalpy function incorporated in conduction finite difference solution algorithm. • Basement program now outputs EnergyPlus IDF for wall and floor surface temperatures. • Users can now enter interzone surfaces once and EnergyPlus will automatically create the mirror interzone surface. |
| Daylighting | <ul style="list-style-type: none"> • Reference point Illuminance levels calculated by DELight now included in standard output variables. • DELight reference points now show up on DXF outputs. | | |
| Zone Model | <ul style="list-style-type: none"> • Internal gains can now be entered in intensity: <ul style="list-style-type: none"> ○ People can be entered as number of people, people/floor area or vice versa (area/person). ○ Lighting can be entered as total Watts, Watts/floor area or Watts/person. ○ Equipment (electric, gas, other) can be entered as Watts, Watts/floor area or Watts/person. | <ul style="list-style-type: none"> • Zone sizing calculations now include heat gains from domestic/service hot water uses and water heaters. • User now can choose between ASHRAE Clear Sky and Zhang-Huang solar radiation models for use in design day calculations. | <ul style="list-style-type: none"> • Zone Sizing modified to allow standards-type calculation of design outside air flow rates; allows min cooling and max heating limits on design supply air flow rates. |
| Natural and Mechanical Ventilation | <ul style="list-style-type: none"> • Outside Air Controller now allows boosted air flow rates for high humidity control. A schedule may also be used to operate the outside air economizer based on a time-of-day schedule. Each of these features is also included in the controller for the stand-alone energy recovery ventilator. | <ul style="list-style-type: none"> • Added new system availability manager to allow system-level control of hybrid ventilation systems. | <ul style="list-style-type: none"> • Zone forced air units added to reporting of mechanical ventilation rate and loads • Simple Ventilation object now reports air changes per hour • New options in UnitVentilator include no coil option and fixed amount for outside air control strategy. |

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| | <ul style="list-style-type: none"> • Infiltration can be entered as total volume, volume/floor area, volume/interior surface area, or air changes per hour. • Ventilation, mixing and cross mixing can be entered as total volume, volume/floor area, volume/person, or air changes/hour. • Airflow network model now includes more coil types, including water cooling, water heating, detailed flat water cooling, multimode DX cooling, and multispeed cooling and heating. • Multiple infiltration and ventilation objects now allowed in each zone, and the temperature control limits for the ventilation object can now be scheduled (instead of constant). | | <ul style="list-style-type: none"> • AirflowNetwork model can now use Zone Exhaust Fan, OnOff supply fan and the DX heating coil objects. |
| HVAC | <ul style="list-style-type: none"> • Dual-setpoint humidistat with deadband now available. • Water heater volume and capacity can be autosized. • New desiccant dehumidifier with additional capabilities and flexibility compared to the existing solid desiccant dehumidifier model. • Supply air fan operating mode (continuous versus cycling) can now be scheduled based on time-of-day for window air conditioner, packaged terminal heat pump and water-to-air heat pump. • New economizer controls added to Controller:Outside Air and Controller:Stand Alone ERV objects. New controls include Dew Point Temperature limit and Electronic (Variable) Enthalpy limit. • DX System (DXSystem:Airloop object) now allows cool-reheat dehumidification control type. | <ul style="list-style-type: none"> • Water-cooled condenser option added to refrigeration compressor racks for useful heat recovery. • Chilled and hot-water coils can now be used in the outside air system to preheat or precool outside air. • New desiccant dehumidifier with additional capabilities and flexibility compared to the existing solid desiccant dehumidifier model. • Water side economizer (including simulation of integrated and non-integrated water side economizers). • Water heater improved for indirect heating (e.g. with remote boiler) and autosizable design flow rates for plant connections. • Packaged terminal air conditioner (PTAC) added to model a fan, DX cooling coil, and a gas, electric, hydronic or steam heating coil serving a single zone. • Multispeed heat pump with up to four discrete speeds for both cooling and heating. • Heat losses (and gains) from plant piping. • New and updated Compact HVAC objects: <ul style="list-style-type: none"> ○ Compact HVAC chilled water coils now use the COIL:WATER:COOLING model by default, COIL:Water:DetailedFlatCooling can be selected as an option. ○ Compact HVAC unitary system now supports the draw-thru fan placement option, and allows a schedule for the supply fan operating mode (continuous or cycling). ○ New Compact HVAC options for dehumidification and humidification controls for unitary and VAV system types. ○ New primary-secondary loop options for Compact HVAC chilled water loops. • Compact HVAC expanded to support specification of outside air as a combination of flow/person, flow/area and flow/zone. • Compact HVAC baseboard heat option added for unitary and VAV zones. • New Compact HVAC objects for unitary heat pump, unitary VAV, packaged terminal air conditioner, and packaged terminal heat pump. | <ul style="list-style-type: none"> • Water-to-air heat pumps now use RegulaFalsi solution technique to improve robustness and to speed up simulation. • Applicability schedule added to System Availability Manager:Low Temperature Turn Off (to support thermal storage). • Evaporative condenser option added to existing refrigerated case compressor racks including availability schedule and basin heater with controls. • Draw-through fan configuration added for furnaces, unitary system and air-to-air heat pumps. • Different supply air flow rates now allowed for cooling, heating and when no cooling or heating is required in unitary, furnace and air-to-air heat pumps. • Common Pipe for Primary-Secondary systems provides an alternative to the Connection component object to model Primary-Secondary systems • Balanced flow desiccant heat exchanger option added for the existing heat exchanger-assisted DX cooling coil object. • Stratified water heater model added. • Uniform load distribution option added to plant load range based operation scheme. • Height-dependent air temperature and wind speed now available for most HVAC systems. |
| Electrical Systems | | | |
| Water Manager | | | <ul style="list-style-type: none"> • Green roof simulation added |

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| On-Site Energy Supply | <ul style="list-style-type: none"> • New operating scheme for electric generators to follow thermal loads. • New microturbine electric generator model. • Upgraded equivalent one-diode PV model to include options for BIPV and inverter. | | <ul style="list-style-type: none"> • Fuel cell model updated. • Combustion micro cogeneration model added. |
| Economics | | | |
| Environmental Impacts | <ul style="list-style-type: none"> • Environmental emissions can now be scheduled for all fuel types. | | |
| Output | <ul style="list-style-type: none"> • New detailed reports on Internal Gains (People, Lights, Equipment) as well as Simple Air Flow (Infiltration, Ventilation, Mixing, Cross Mixing) in the .EIO file. • New report variables for summed zone load components. • Added additional column in internal heat gains reporting that shows the sum of gains/floor area. | <ul style="list-style-type: none"> • New tabular reports: surface shadowing, shading, lighting, HVAC sizing, system and component sizing, and outside air. • New Report:SurfaceColorScheme allow users to select their own colors for building elements in the DXF output. | <ul style="list-style-type: none"> • Report Variables and Meter Variables (rdd and mdd) separately reported and output as IDF. • Meters can now report cumulative value in addition to resetting at reporting time interval. |
| Utilities | <ul style="list-style-type: none"> • Many enhancements in the IDF Editor and HVAC Diagramming tools. | <ul style="list-style-type: none"> • WeatherConverter now produces KML output (for Google Earth) of latitude, longitude, elevation, and a few climate statistics for locations in a list processing run. • Add comma delimited form of CLM (ESP-r ASCII files) conversion to WeatherConverter. • WinEPDraw produces in new default colors. | <ul style="list-style-type: none"> • New EP-Launch utility tab added where users can launch Basement, CalcSoilSurfTemp, CoeffCheck, CoeffConv, Slab and Weather utilities. • CSVproc now supported in EP-Launch. • IDF Editor now preserves the order of user IDFs and includes a large number of other new features. |
| Documentation and Guides | <ul style="list-style-type: none"> • Input/Output Reference and Engineering Reference updated and extended for all new features and updates. Total documentation now exceeds 3700 pages. | <ul style="list-style-type: none"> • Completely rewritten Getting Started manual provides more hands-on example exercises and other information for getting up to speed on EnergyPlus. • Input/Output Reference and Engineering Reference updated and extended for all new features and updates. Total documentation now exceeds 3500 pages. | <ul style="list-style-type: none"> • Input/Output Reference and Engineering Reference updated and extended for all new features and updates. Total documentation now exceeds 3300 pages. |
| Validation and Testing | | | |
| Platforms | <ul style="list-style-type: none"> • Windows, Linux, Mac | <ul style="list-style-type: none"> • Windows, Linux, Mac | <ul style="list-style-type: none"> • Windows, Linux, Mac |

| | Version 1.4, 12 October 2006 | Version 1.3, 20 April 2006 | Version 1.2.3, 9 October 2005 |
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| Data Sets | <ul style="list-style-type: none"> • New chiller dataset for Chiller:Electric:EIR and Chiller:Electric:ReformulatedEIR (162 chillers) • Composite AllDataSets.idf updated with new chiller dataset and window screens dataset. | <ul style="list-style-type: none"> • Updated utility tariff data sets • New composite AllDataSets.idf with all datasets in a single file | <ul style="list-style-type: none"> • Updated all design conditions to match new 2005 ASHRAE Fundamentals data in the weather files and associated design day data • StandardReports dataset includes the new system level "reports" as well as the Ventilation Loads reports • Extensive set of new example summary report templates for: <ul style="list-style-type: none"> o Space Gains/ Envelope/ Daylight/ Comfort o Peak Demand and Consumption o Unglazed Transpired Solar Collector o HVAC/Electrical Systems/ Loops/Components o Outdoor Conditions |
| Input | <ul style="list-style-type: none"> • Example input files created for all new features (More than 215 example files now available) | <ul style="list-style-type: none"> • Example input files for all new features (More than 200 example files available) • All example input files have been updated and new documentation of features added • New weather data for more than 200 locations in China, 11 in Egypt, 2 in Kuwait, and 1 in Israel in the EnergyPlus/ESP-r weather format (more than 1100 locations available worldwide) | <ul style="list-style-type: none"> • Example input files for all new features (More than 200 example files available) • All example input files have been updated and new documentation of features added • New weather data for 100 international weather locations including India, Portugal, Brazil, China, Ethiopia, Ghana, Kenya, and Nepal in the EnergyPlus/ESP-r weather format (975 locations available worldwide) • Revised design days to accommodate "enthalpy" and "humidity ratio" as potential humidity indicating types based on 2005 ASHRAE Fundamentals |
| Geometry/Window/Walls/Shading | <ul style="list-style-type: none"> • Allow window or door multipliers in AirFlowNetwork components • Allow multipliers with doors and glass doors • Allow triangular doors and glass doors • More accurate modeling of exterior window screens (Material:WindowScreen) | <ul style="list-style-type: none"> • Outside air temperature is now varied as a function of zone or surface height above ground. Wind profile options can be set separately for the weather station and the building site. Includes new zone and surface report variables for height dependent properties. There will be differences in results, particularly in files with Ventilation or Infiltration. | <ul style="list-style-type: none"> • User-definable radiation view factors |
| Daylighting | | <ul style="list-style-type: none"> • Clear turbid and intermediate sky types added to DELight daylighting calculations (not yet fully used in daylight factor calculations). • Improved ability to read complex fenestration system (CFS) bi-directional transmittance data function (BTDF) data files as input to DELight daylighting calculations. | |
| Zone Model | <ul style="list-style-type: none"> • New Zone thermostatic control options: <ul style="list-style-type: none"> o Operative Temperature using mix of mean radiant and air temperatures (ZONE CONTROL: THERMOSTATIC: OPERATIVE TEMPERATURE) o Thermal comfort control using Fanger PMV values as setpoints (ZONE CONTROL: THERMAL COMFORT) • Added new root finder module and air loop simulation speedup | <ul style="list-style-type: none"> • UFAD (Underfloor Air Distribution) room air model for exterior zones is now available as an alternative room air option. | <ul style="list-style-type: none"> • User-definable room air temperature distribution model (research only) • Ventilation improved with the addition of maximum indoor temperature, minimum/maximum outdoor temperatures, and maximum wind speed to help control ventilation • Interior zone UFAD (Underfloor Air Distribution) added as an alternative Room Air option |
| Natural and Mechanical Ventilation | <ul style="list-style-type: none"> • New ventilation flow report variables for individual zones • Interior surface ventilation control can be based on adjacent zone conditions (temperature or enthalpy) | <ul style="list-style-type: none"> • Completely reworked airflow modeling—the new Airflow Network model replaces both COMIS and ADS and has the combined capabilities. • Calculation of infiltration, ventilation, mixing and cross mixing moved to system time step for future feature development of hybrid ventilation control. • Simple earth tube model for outside air preconditioning (heating/cooling) | |
| HVAC | <ul style="list-style-type: none"> • New component control type SeriesActive for improved temperature set point control • New simple duct leakage model simulates energy impact of supply duct leaks in a VAV system with return plenum and | <ul style="list-style-type: none"> • New equation fit model for water to air heat pump. • Tempering valve (3-way valve emulation) for effective and safe use of stored thermal energy • Variable and constant speed headered pumps. | <ul style="list-style-type: none"> • Simple Water to Water GSHP • Packaged Terminal Heat Pump • Return air bypass • Heat Pump Water Heater |

| | Version 1.4, 12 October 2006 | Version 1.3, 20 April 2006 | Version 1.2.3, 9 October 2005 |
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| | <ul style="list-style-type: none"> constant static pressure setpoint New reformulated version of the DOE 2.1E EIR chiller (Chiller:Electric:ReformulatedEIR) New HVAC system type for Changeover-bypass VAV systems (Unitary System:VAV:ChangeoverBypass) | <ul style="list-style-type: none"> Detailed Ice Storage. New loop connection component allows control of secondary loop to a different setpoint than the primary loop, and removes restrictions on primary vs. secondary flow rates. Improved single zone reheat setpoint manager to control reheat to appropriate setpoint New Compact HVAC equipment types: fan powered VAV and fan coil. New Compact HVAC options: night cycle controls, outside air heat recovery, supply air temperature reset, chilled/hot water temperature reset, VAV supply fan part-load options, VAV fan blow through or draw through option and zone supply and return plenums. | <ul style="list-style-type: none"> Desuperheater Water Heating Coil Steam loop, steam coil, steam boiler Restructured plant loop modeling to support branch pumps and future headered pumps and extensions of controls simulation Branch supply pumps for supply side equipment such as chillers, boilers, heat pumps, and water heaters Simple ice storage tank Detailed coil models can now be auto-sized |
| Electrical Systems | | | <ul style="list-style-type: none"> Demand limiting controls |
| Water Manager | <ul style="list-style-type: none"> New water manager to control and report water use throughout the building Update of existing HVAC components to calculate and report water consumption or condensate production (for those that didn't already) Generalized water end-use objects that allow hot and cold water mixing at the tap, zone latent gains, drainwater heat recovery, and stand-alone or plant loop operation Rainwater collectors for harvesting precipitation Groundwater wells with pumping Water storage tanks for storing and reusing reclaimed water to/from end-uses, HVAC components, rainwater collectors, and groundwater wells | | |
| On-Site Energy Supply | | <ul style="list-style-type: none"> Numerous improvements to Solid Oxide Fuel Cell (SOFC) model New Track Schedule and Track Meter generator control schemes | <ul style="list-style-type: none"> Solid Oxide Fuel Cells (research only) |
| Economics | | | |
| Environmental Impacts | | | |
| Output | <ul style="list-style-type: none"> New predefined reports to aid in complying with beyond-code programs such as the new high performance commercial building tax deduction: <ul style="list-style-type: none"> Input Verification and Results Summary Climate Summary Envelope Summary Equipment Summary | <ul style="list-style-type: none"> New user-definable end-use subcategories added. New report variable for Zone Operative Temperature. Improved ABUPS report format and layout. New zone-level flag to control reporting of floor area in ABUPS report. User-definable custom meters added, including capability to create a custom meter based on an existing meter and removing specific variables or meters from the results. | <ul style="list-style-type: none"> DXF:Wireframe Report, Surfaces, DXF, Triangulate3DFace produces triangulation for >4 sided surfaces — allowing the solid model to be viewed in many DXF viewer programs New report variables including power and breakout of separate object-level variables for all internal gains objects. New report variables to monitor zone temperature when heating and cooling setpoints are not met and when they are not met during occupancy, when zone temperatures oscillate due to poor simulation, and when zone conditions are outside the ASHRAE Standard 55-2004 comfort region. Output reporting enhancements include optional unit conversion for J into kWh, MJ or GJ in tabular output; new schedule support for TimeBins report; and table of contents for HTML tabular output files. |
| Utilities | <ul style="list-style-type: none"> EP-Launch has new options to support: <ul style="list-style-type: none"> Converting Report Variable (.csv) and Report Meter (Meter.csv) results to IP units Options centralized in a new Options dialog box Supports new output files including SCREEN, SHD and VRML | <ul style="list-style-type: none"> IDF Editor improvements include window layout options remain between uses, search for object class name, and hiding empty object class names. EP-Launch option allows user to minimize DOS box when group runs are performed. New Slab preprocessor output of Schedule:Compact objects for monthly average, core, and perimeter temperatures, and an example OtherSideCoefficients object. | <ul style="list-style-type: none"> New features in EP-Launch including new quick open panel for opening output files, composite error file for group simulations, and integration with the Transition utility to automatically update files to the latest version. Many improvements to IDF Editor including resizable window regions, opening DDY files, and pull-down list of report variable names from RDD output file. |

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| | | <ul style="list-style-type: none"> • New capabilities for transitioning old files. This is particularly important for COMIS objects — they are both internally and externally transitioned but will not be internally transitioned in the next release. If you have both COMIS and ADS objects in your input file — please contact email support for assistance. | <ul style="list-style-type: none"> • New unit conversion utility produces output in user-definable units • Many new HVAC Diagram capabilities including draws "dangling" pieces that fit together that were not drawn as part of loop, draws lines to represent the loop coming back to the start, long names now wrap to two lines within boxes, and faintly drawn lines connect items that appear in multiple loops such as coils. |
| Documentation and Guides | <ul style="list-style-type: none"> • Input/Output Reference and Engineering Reference updated and extended for all new features and updates. Total documentation now exceeds 3100 pages. | <ul style="list-style-type: none"> • Input/Output Reference and Engineering Reference updated and extended for all new features and updates. Total documentation exceeds 2700 pages. | <ul style="list-style-type: none"> • Input/Output Reference and Engineering Reference updated and extended for all new features and updates, bringing total documentation to more than 2500 pages. |
| Validation and Testing | <ul style="list-style-type: none"> • | <ul style="list-style-type: none"> • | <ul style="list-style-type: none"> • |
| Platforms | <ul style="list-style-type: none"> • Windows, Linux | <ul style="list-style-type: none"> • Windows, Linux | <ul style="list-style-type: none"> • Windows, Linux |

| | Version 1.2.2, 22 April 2005 | Version 1.2.1, 1 October 2004 | Version 1.2, 9 April 2004 |
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| Data Sets | <ul style="list-style-type: none"> • Schedule data can be read from an outside file • New dataset with commercial customer utility tariffs • System convergence limits now allow the user to set minimum system time step and maximum HVAC iterations (can significantly reduce execution time) • New control option for Exterior Lights that turns them off when the sun is up • Updated dataset of measured input parameters from the Solar Rating and Certification Corporation for 115 different solar thermal (hot water) collectors • Example input files for all new features (More than 200 example files available) • More than 240 new international weather locations including new data for Bangladesh, Brazil, China, Ethiopia, Ghana, Kenya, Italy, Maldives, Nepal, and Sri Lanka in the EnergyPlus/ESP-r weather format (more than 900 locations in 100 countries available worldwide) | <ul style="list-style-type: none"> • Default fluid properties for water, ethylene glycol, and propylene glycol • Example input files for all new features (More than 180 example files available). • More than 100 new international weather locations including data for Belize, Cuba, El Salvador, Guatemala, Honduras, Maldives, Nicaragua, Spain, and Sri Lanka in the EnergyPlus/ESP-r weather format. (More than 680 locations available worldwide.) | <ul style="list-style-type: none"> • Dataset of measured input parameters from Sandia National Laboratory for 128 different photovoltaic modules. • Dataset of measured input parameters from Solar Rating Coordinating Council for 96 different solar thermal (hot water) collectors. • Datasets of environmental emissions factors for electricity (US national- and state-average) and combustion—natural gas, diesel, gasoline, LPG, propane, fuel oil (#1, #2, #4, #6), and coal. • Example input files for all new features |
| Input | | | |
| Geometry/Window/Walls/Shading | <ul style="list-style-type: none"> • New special heat transfer surface—Exterior Vented Cavity—allows modeling of ventilated photovoltaic roof paver systems and other cladding systems | <ul style="list-style-type: none"> • Multi-sided polygons | <ul style="list-style-type: none"> • User-selectable outside convection algorithm (BLAST/TARP, DOE-2, MoWiTT, or ASHRAE simple) • Radiation-to-air component separated from detailed convection (exterior) models • Added scheduled temperature to other side coefficient object • Solar gain and daylighting calculations now account for beam and sky diffuse solar reflected from building sections, fins, overhangs, and neighboring buildings, including specular reflection from highly-glazed neighboring building facades. • Improved ground-reflected solar calculations account for shadowing on ground of target building and other shadowing surfaces. • Generalized multipliers for organizing identical groups of zones, e.g. floors in a multi-story building • Dirt correction factor added for glass solar and visible transmittance • Interior solar report variables added, including beam and diffuse solar incident on inside face of surfaces. • Movable storm windows. • Solar gain through blinds now accounts for different transmittances for sky and ground diffuse solar. • Photovoltaic systems can be integrated with heat transfer surfaces (building integrated photovoltaic systems) to account for energy removed as electricity. |
| Daylighting | | <ul style="list-style-type: none"> • Skylight Light Wells • Daylighting through interior windows • Translucent Glass | <ul style="list-style-type: none"> • More daylighting reporting variables added, including daylight illuminance from individual windows. • An alternative daylighting analysis method has been added, called DELight, which is similar to the detailed method with two key differences: <ul style="list-style-type: none"> o DELight can analyze geometrically and optically complex fenestration systems that have been characterized using bi-directional light transmittance data. o DELight uses a radiosity method for calculation of interior |

| | Version 1.2.2, 22 April 2005 | Version 1.2.1, 1 October 2004 | Version 1.2, 9 April 2004 |
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| | | | interreflection of light. |
| Zone Model | <ul style="list-style-type: none"> • User can specify sensible fraction of load due to people • New room air model for natural cross ventilation (coupled to COMIS) • Outside face temperature of zone surfaces can now be specified with a schedule | <ul style="list-style-type: none"> • Improved displacement ventilation interaction with thermal mass | <ul style="list-style-type: none"> • Mundt room air model • Displacement ventilation model (UCSD) • Example files to illustrate modeling of UFAD system. |
| Natural and Mechanical Ventilation | | | <ul style="list-style-type: none"> • Venting through interior windows and doors now has same control options as venting through exterior windows and doors. |
| HVAC | <ul style="list-style-type: none"> • Simplified definition of HVAC implemented—Compact HVAC allows user to specify a generic system type which is then automatically expanded into the traditional branches and nodes • Refrigerated cases and associated compressor racks • Variable speed cooling tower model with user-selectable performance based on either the CoolTools correlation, YorkCalc correlation, or user-defined coefficients for either the CoolTools or YorkCalc correlations • Three new setpoint managers for single zone heating, single zone cooling, and outside air pretreatment • Improved night ventilation capability • Evaporative coolers can now be included in outside air path • Desuperheater heating coil with heat source from fixed percentage of DX cooling coil waste heat or refrigerated case compressor rack • DXSystem:AirLoop can now be used as outside air equipment • DX heating coil can be defined with a biquadratic curve • Dehumidification controls added to DXSystem:AirLoop • Multimode DX coil added to model 2-stage, subcool reheat and partial bypass • Compressor selection, latent degradation and antifreeze mixture models added to water to air heat pump • Water mains temperature based on correlation or schedule as input for domestic hot water and water heater • Water Heater:Mixed object can interact with zone heat balance, has off- and on-cycle parasitic load inputs, PLR curve, and can model tankless/instantaneous water heater • Domestic hot water can be run stand-alone • Domestic hot water and plant load profile now accept fractional schedules and supply temperatures can default to water mains temperatures • Added electric consumption of forced draft fan (or other parasitic load) to Boiler:Simple • Link to SPARK for simulating complex equipment and systems not currently supported by EnergyPlus • New Component Setpoint-based Operation control scheme added for Plant Loop for Chiller and Boiler control. This control scheme allows control of constant flow equipment to an outlet setpoint that is set by a Scheduled Setpoint Manager. The design flow rate for the components specified in the control scheme can be autosized along with the component. • Automatic intelligent setting of controller convergence tolerance | <ul style="list-style-type: none"> • Plate heat exchanger component added to facilitate realistic configuration of hydronic systems • Two- and four-pipe induction units • Variable-speed fan-powered VAV reheat terminal units • DOE-2.1E electric chiller model • Dual Setpoint Controls for Plant Loop for Water Loop Heat Pump • New Water Cooling Coil (replaces Simple Coil) which is completely autosizable, options for wet/dry coil evaluation using cross- or counter-flow heat exchanger configurations • Glycol concentrations can be specified | <ul style="list-style-type: none"> • New latent capacity degradation model for DX cooling coil, constant supply air flow with cycling coil/compressor to meet zone load • Cooling coils (DX or chilled water) can now be modeled in combination with an air-to-air heat exchanger to improve dehumidification performance. • New crankcase heater power modeling for DX cooling coil • Autosizing of gas turbine driven chiller • Outside air economizer implemented for cycling systems • Economizer lockout for packaged systems • Added a condensation cut-off to the radiant cooling systems to avoid cases when the radiant cooling surface temperature is so low that it results in condensation • New evaporative condenser option for DX cooling coils based on simple effectiveness model • Water usage and water pump power can be calculated and metered. • New air distribution system model for calculated energy losses due to conduction and air leakage for constant volume systems. • Water-to-air heat pumps • Extended the wet bulb and saturation pressure functions to cover temperatures from -100C to 200C (up from -60 to 100C). • Autosizing of multiple hot water, cold water, and condenser water loops. • Added new algorithms for the electric chillers to calculate heat recovery and to simulate a double bundled condenser • Improved water heater to operate by itself (does not require plant loop). • Added a plant loop component to allow scheduling domestic hot water demand and cold water supply from mains • Added a load profile object for simulating plant loops without defining a building. • Added hot water tank model. • Allow multiyear simulation for heat pump simulation startup • Allow 'Design Week' and 'Design Month' simulation • Delta temperature plant loop operating controls allows loop control based on environmental and loop temperature differences. • Added ability to allow multiple supply plenums • Upgraded the simplified demand-controlled ventilation model • Ventilation now composed of rate per occupant and rate per unit floor area • Added availability schedule to allow ventilation air flow to be stopped while the remainder of the HVAC system can continue to operate • Plant system availability managers added: differential thermostat, high temperature cutoff, and low temperature cutoff. |

| | Version 1.2.2, 22 April 2005 | Version 1.2.1, 1 October 2004 | Version 1.2, 9 April 2004 |
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| | | | <ul style="list-style-type: none"> • Changed the temperature schedule to a setpoint manager for the plant and condenser loop to allow use of scheduled temperature setpoint manager on the loop setpoint, or the outside air temperature reset temperature setpoint manager. • Changes to evaporative condenser option for DX coils <ul style="list-style-type: none"> ◦ Changed "approach temperature" to effectiveness. ◦ Added field for evaporative condenser air flow to allow water usage to be calculated and metered. ◦ Added field for evaporative condenser water pump power. |
| Electrical Systems | | | |
| Water Manager | | | |
| On-Site Energy Supply | <ul style="list-style-type: none"> • Transpired solar air collectors | | <ul style="list-style-type: none"> • Added new flat plate solar thermal collectors for domestic hot water that can also be connected to HVAC plant loops for space heating systems. • Added two new options for photovoltaic power calculations—simple and Sandia. • Allow solar panels to use and be shading surfaces. • Electric power generators now determine electric utility purchases and surplus. • Net Site and Source Energy Use Intensities calculated to account for on-site production. |
| Economics | | <ul style="list-style-type: none"> • Utility rate calculations • Project construction cost estimating | |
| Environmental Impacts | <ul style="list-style-type: none"> • Source energy factors can vary using a schedule • California Title 24 Time Dependent Valuation (TDV) factor schedules (2005) in Datasets | | <ul style="list-style-type: none"> • Extended pollution calculations to include all major greenhouse gases, precursors and criteria pollutants as well as water and nuclear waste. Environmental emissions calculated include: CO₂, CO, CH₄, NO_x, N₂O, SO₂, PM, NH₃, NMVOC, Hg, and Pb as well as water consumed by electricity generation and high- and low-level nuclear waste from nuclear electricity generation. |
| Output | <ul style="list-style-type: none"> • Heating and cooling loads and energy due to ventilation now can be reported • Standard water heater ratings reported including energy factor and recovery efficiency • Improved reporting of error context throughout • Many other new variables now can be reported | <ul style="list-style-type: none"> • Ventilation load report • Each zone defined as layer in DXF • Advanced Runtime Variables can be requested | <ul style="list-style-type: none"> • Added new Annual Building Utility Performance report (similar to DOE-2 BEPS) with detailed end-use reporting by energy source as well as water and on-site generation. • Meters can now be reported to eplusout.mtr to reduce file size • Added reporting of schedule values • Added reporting of specific enthalpy, volumetric flow rate and wet-bulb temperature for all HVAC nodes |
| Utilities | <ul style="list-style-type: none"> • IDF Editor updates: <ul style="list-style-type: none"> ◦ Removed all file size limits ◦ Allow multiple objects to be copied and pasted ◦ Supports autosize as default • Weather converter updates: <ul style="list-style-type: none"> ◦ Custom format processing ◦ Better missing data controls (user can specify to an extent) • WinEPDraw — Windows version: <ul style="list-style-type: none"> ◦ Allows more control over >4 sided figure drawing ◦ Will execute Drawer from inside program | <ul style="list-style-type: none"> • Major updates to the IDFEditor including ability to open multiple IDF files and copy/paste objects between files. • Major updates to EP-Launch including ability to select a group of simulations to run and maintaining a history of simulations. • WeatherConverter now reads new format (TMY3) developed under the SWERA project. | <ul style="list-style-type: none"> • New HVAC diagramming tool |
| Documentation and Guides | <ul style="list-style-type: none"> • Revised Guide for Module Developers • Revised Programming Guide • Input/Output Reference and Engineering Reference updated and extended for all new features and updates, bringing total | <ul style="list-style-type: none"> • Input/Output Reference and Engineering Reference updated and extended for all new features and updates, bringing total documentation to more than 2,000 pages. | <ul style="list-style-type: none"> • Revised Module Developers Guide • Revised Programming Guide • Input/Output Reference and Engineering Reference Updated and Extended for all new features and updates, bringing total documentation |

| | Version 1.2.2, 22 April 2005 | Version 1.2.1, 1 October 2004 | Version 1.2, 9 April 2004 |
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| | documentation to more than 2200 pages. | | to more than 1,800 pages. |
| Validation and Testing | • | • | • |
| Platforms | • Windows, Linux | • Windows, Linux | • Windows, Linux |

| | Version 1.1.1, 17 September 2003 | Version 1.1, 17 April 2003 | Version 1.0.3, 29 November 2002 |
|---|---|---|---|
| Data Sets | | <ul style="list-style-type: none"> • More weather data. • Design Conditions produced as Location-Design Day combo data set file. • Composite Constructions data set. • Rain and snow indicators. | <ul style="list-style-type: none"> • Composite Constructions data set • Entire Design Conditions produced as Location-Design Day combo data set file • Design Day "inputs" from weather files • New input file example for each new feature |
| Input | <ul style="list-style-type: none"> • Complete set of compact schedules for EnergyPlus use (including ASHRAE 90.1-1989 schedules) • All schedules are extensible--fields can be added to IDD as needed • EPMacro variable names no longer case sensitive • Users can change the number of warmup days for certain input files if warranted • Users can additionally specify dewpoint temperature in the design days or a relative humidity schedule • Users can also set when minimum and maximums occur. | <ul style="list-style-type: none"> • New input file example for each new feature. • Updated HVAC templates with autosizing. • User-enterable system design (autosizing) flow rates. • Sub-hourly (interval) schedule input added. • Compact schedule entry. | |
| Geometry/Window/Walls/Shading | <ul style="list-style-type: none"> • Transform geometry automatically while rotating • Shading surface transmittance accounted for in detailed daylighting calculation • Added return air as destination choice for airflow windows • Radiant system surface group is now extensible to any number of surfaces | <ul style="list-style-type: none"> • Between-glass shades and blinds. • Airflow windows. | |
| Daylighting | <ul style="list-style-type: none"> • Daylight illuminance maps • Tubular daylighting devices including illuminance, solar gains, and thermal resistance • Daylighting shelves | | |
| Zone Model | | <ul style="list-style-type: none"> • User-enterable surface convection coefficients. | <ul style="list-style-type: none"> • Weather data interpolation (hourly to time step) |
| Natural and Mechanical Ventilation | <ul style="list-style-type: none"> • Added venting availability schedule to COMIS venting control at zone level • Individual window/door COMIS venting control • Automatic calculation of COMIS wind pressure coefficients for rectangular buildings | <ul style="list-style-type: none"> • Simple ventilation when outdoor temperature is greater than indoor temperature. | <ul style="list-style-type: none"> • Many COMIS improvements (e.g. COMIS air flow through interzone windows and doors, venting through openable doors, add "no vent" strategy) |
| HVAC | <ul style="list-style-type: none"> • All chillers report COP at the time step • Flow limits, outside air, and schedules added to Purchased Air • Free cooling chiller works with all chiller types and may be on any branch. • Autosizing for Chiller: Direct Fired Absorption • Air-to-air heat exchanger with frost control options and supply air temp control by setpoint when the air-side economizer is active • Light-heat-to-return now included in air loop autosizing • Lights return air fraction as function of return plenum temperature and air flow • Simplified demand controlled ventilation • Stand-alone energy recovery ventilator zone equipment (directly connected to a zone) • Autosized HVAC templates for Purchased Air, 4 pipe fan coil, VAV, and boiler and chiller loops • New variable speed DX coil performance curves (5ZoneAutoDXVAV example file) • Conversion utility for DOE-2 performance curves | <ul style="list-style-type: none"> • Coldest Zone supply air set point strategy. • Air-to-air heat recovery (sensible energy, latent energy, or both). • Outdoor dry bulb and outdoor wet bulb controls. • Free cooling, hydronic heat exchanger. • Variable Speed Fans. | <ul style="list-style-type: none"> • Pond heat exchanger added • Ground surface heat exchanger added • Cooling Tower improvements • Variable Speed Fans • Coldest Zone supply air set point strategy |

| | Version 1.1.1, 17 September 2003 | Version 1.1, 17 April 2003 | Version 1.0.3, 29 November 2002 |
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| | <ul style="list-style-type: none"> • New temperature controlled (constant flow) hydronic low temperature radiant systems • Additional evaporative cooler model • Fluid properties set • Pond heat exchanger • Glycol reference data set • Four new condenser loop operation control schemes based on environmental parameter ranges for hybrid ground source heat pumps | | |
| Electrical Systems | <ul style="list-style-type: none"> • Photovoltaic power calculations now integrated at time step, along with better reporting | <ul style="list-style-type: none"> • Demand limit and track electric operation scheme. | |
| Water Manager | | | |
| On-Site Energy Supply | | | |
| Economics | | | |
| Environmental Impacts | | | <ul style="list-style-type: none"> • Atmospheric pollution calculation reporting |
| Output | <ul style="list-style-type: none"> • Standard, sizing, and daylight map reports can now be saved as CSV, TXT, or tab-separated • New standard report for time-binned outputs • End Use category for electric equipment • Overcast sky daylight factors written to the EIO file • New monthly reports which can be written in CSV, TXT, tab or HTML formats. • The user can define custom reports, or use predefined reports similar to DOE-2 standard reports: <ul style="list-style-type: none"> o Building Loads (DOE-2 LS-D) o Space Loads (DOE-2 LS-E) o Energy Consumption (by energy source, DOE-2 PS-B) o End-Use Energy Consumption (by energy source, DOE-2 PS-E) o Peak Energy End-Use by Source (by energy source, noncoincident) | <ul style="list-style-type: none"> • Zone daylight illuminance map. • Pollution calculation reporting. • Added Daylighting reference points to DXF file; also documented the DXF file more completely. • "Internal Gains" report for each zone. | <ul style="list-style-type: none"> • Improved reporting (EnergyPlus, Weather statistics) |
| Utilities | <ul style="list-style-type: none"> • Many enhancements to IDFEditor including support for new units, pull down lists for choices, and zero values. • Significant improvements (more than 20x) in execution speed for ReadVars • ReadVars now can write more than 254 variables (Excel still will only read in the first 255 columns). • ReadVars users can now specify the delimiter on their output files by selection of the proper file extension. • WinEPDraw detects non-planar surfaces and degenerate surfaces but will still produce a DXF • EP-Launch supports the new style output (delimiter) files | <ul style="list-style-type: none"> • Many features added to the IDF Editor: editing and displaying IP units, supporting autosizable fields, in-cell editing. | |
| Documentation and Guides | <ul style="list-style-type: none"> • Input/Output Reference and Engineering Reference Updated and Extended for all new features and updates, bringing total documentation to more than 1,500 pages. | <ul style="list-style-type: none"> • Input/Output Reference and Engineering Reference Updated and Extended for all new features and updates, bringing total documentation to more than 1,400 pages. • Web site now includes link to directly translate the web pages into more than 8 languages. | <ul style="list-style-type: none"> • Improved documentation (Output Details document, Input Output Reference, Engineering, Auxiliary Programs) • Searching capability (Acrobat index) for all documentation • Input/Output Reference and Engineering Reference Updated and Extended for all new features and updates, bringing total documentation to more than 1,300 pages. |
| Validation and Testing | <ul style="list-style-type: none"> • | | |
| Platforms | <ul style="list-style-type: none"> • Windows, Linux | <ul style="list-style-type: none"> • Windows, Linux | <ul style="list-style-type: none"> • Windows, Linux |

| | Version 1.0.2, 31 July 2002 | Version 1.0.1, 26 April 2002 | Version 1.0, 12 April 2001 |
|---|---|---|--|
| Data Sets | <ul style="list-style-type: none"> • New input file example for each new feature | <ul style="list-style-type: none"> • Weather data now available for more than 550 locations (80 countries). | <ul style="list-style-type: none"> • Reference Data Sets (idf "libraries" for materials, constructions, etc.) • Example Passive Trombe wall input template • HVAC input templates • Extensive example HVAC input files |
| Input | <ul style="list-style-type: none"> • User input of cooling and/or heating zone design air flow rates; mix & match with calculated rates; subsequent sizing calcs work as if user input were calculated. • Ground temperatures and slab constructions have been redone (in the Example Files) along the lines of the new Ground Temp Calc program | <ul style="list-style-type: none"> • Versioning on all input data files • New input file example for each new feature • New HVAC system templates: <ul style="list-style-type: none"> ○ Zone Thermostat ○ Purchased Air ○ Four Pipe Fan Coil ○ VAV Single Duct with Reheat ○ Packaged Furnace with DX Air Conditioner ○ Purchased Hot Water and Chilled Water Supply Loop ○ Single Boiler Supply Loop ○ Single Chiller Supply Loop | <ul style="list-style-type: none"> • Ability to read multiple interval per hour weather data files |
| Geometry/Window/Walls/Shading | <ul style="list-style-type: none"> • Current Detached Shading is also aka Fixed Detached Shading and added Building Shading (which will move with respect to building origin for "relative" coordinates) • Bi-directional shading devices • Reflection of beam solar radiation from outside and inside window reveal surfaces. • Restriction for reveal on Triangular Windows, FullExterior (1.0.1) have been removed | <ul style="list-style-type: none"> • Movable transparent insulating material • New Window-Related Features: • Window blind model (slat-type shading devices such as Venetian blinds). • Coupling of window blinds to daylighting calculation. • More control types for shading devices, including heating season controls. • Capability to import window data file from WINDOW 5; allows EnergyPlus to do annual energy run on a window designed in WINDOW • Ability to assign a shading device to a window imported from WINDOW • Calculation of beam solar radiation passing through interior windows (needed for modeling double-envelope buildings). • Window blinds with movable slats and associated slat-angle control options. • Window gap fill as a mixture of gases rather than a single gas. • Triangular windows • Trombe wall | <ul style="list-style-type: none"> • 3D surface coordinates • Fenestration calculations include WINDOW5 calculations, frame and dividers, window multiplier, spectral input for glass, and window U-value and solar heat gain coefficient report • Shading of sky IR by obstructions |
| Daylighting | | | <ul style="list-style-type: none"> • Daylighting (simple and more complex) • Improved sky model for daylighting calculations |
| Zone Model | | | <ul style="list-style-type: none"> • Thermal Comfort modeling and reporting (Fanger, KSU, Pierce two-node, MRT) • Moisture calculations • Return air heat gain (from lights) enhancement calculation • Interior surface convection • More operative controls for all radiant modeling (MAT, MRT, operative) |
| Natural and Mechanical Ventilation | <ul style="list-style-type: none"> • Simple Ventilation (addition of simple ventilation--similar to what was done in BLAST with the addition of infiltration type coefficients to modify the flow rate based on temperature difference and wind speed) | | <ul style="list-style-type: none"> • Controls for natural ventilation through windows • Interzone Air Flow and Natural Ventilation (COMIS) |
| HVAC | <ul style="list-style-type: none"> • Warmest zone supply air set point strategy; new Node output "System Node Setpoint Temp" • Water-to-water heat pumps • Added simulation of a variable flow secondary loop and a constant flow primary loop simulation using existing simulation structure | <ul style="list-style-type: none"> • Gas Turbine Chiller • Heat Recovery in Gas Turbine Chiller • Electric Baseboard option • Boilers, • Plant Supply | <ul style="list-style-type: none"> • Simultaneous simulation of zone loads and HVAC systems • Fan Coil • Unit Heater, • Unit Ventilator, • Window AC |

| | Version 1.0.2, 31 July 2002 | Version 1.0.1, 26 April 2002 | Version 1.0, 12 April 2001 |
|---------------------------------|--|--|--|
| | <ul style="list-style-type: none"> • Auto sizing of plant equipment (boiler, electric chiller, cooling tower, engine driven chillers) | <ul style="list-style-type: none"> • Condenser Supply • DX Coil • System night cycle control • Gas heating coil updated to include electric parasitics, part-load performance curve, and fan and coil cycling controls • Node connection validation • Air-to-air heat pumps • Water-to-water heat pumps • Ground loop heat exchanger • Ground Source Heat Pump • Air Cooled Condenser • Evaporatively cooled condenser (simplified) • Dehumidification Control (Cooling Coil) added for unitary systems. DX coil meets the dehumidification load; uses heating coil to offset excess sensible cooling that is provided • Auto sizing of system components and equipment | <ul style="list-style-type: none"> • Exhaust fan • Fan control, fan motor placement • HVAC loop modeling, including branch-based input and flow resolver • Furnace • Flat plate exhaust air heat recovery • Air flow sizing (based on zone requirements) • Evaporative cooler models • Steam absorption chiller • Low temp radiant heating/cooling • Air Cooled condenser • Gas/electric coil options for unit heater and unit ventilator • Gas absorption chiller heater • Desiccant dehumidifier • System sizing • Plenum (return and supply) • HeatCool option on Furnace • DX System (Air Loop) • High temperature radiant heating/cooling |
| Electrical Systems | | | |
| Water Manager | | | |
| On-Site Energy Supply | | <ul style="list-style-type: none"> • Photovoltaic power | |
| Economics | | | |
| Environmental Impacts | | | |
| Output | | <ul style="list-style-type: none"> • Surface Details report • Branch and Node Details report (.bnd file) • End-use meters | <ul style="list-style-type: none"> • Energy meters |
| Utilities | <ul style="list-style-type: none"> • Faster ReadVars program (post processing) • Ground Temp Calc program is included | <ul style="list-style-type: none"> • Introduction of translation programs for converting previous version input files to latest release (Main folder, TransitionV1-0-0-to-V1-0-1.exe, Rules1-0-0to1-0-1.xls, Report Variables 1-0-0-023 to 1-0-1.csv • WinEPDraw utility program • DOE-2 Translator Improvements: INTERIOR-WALL, FIXED-SHADE, LIKE, SET DEFAULT, purchased air solution, bug fixes • IDFEditor (support for ',' as decimal) • Weather utility updates—now automatically includes ASHRAE 2001 HOF design conditions, typical/extreme periods within weather file, new summary report, and processes new formats such as ASHRAE IWEC and ESP-r text. | <ul style="list-style-type: none"> • Simple input and output preprocessor • Simple launch program for EnergyPlus • EPMacro—macro capability for input Files (auxiliary program) • DOE-2 Translator • IFC to IDF generation capability (CAD interoperability) • Weather processor • Windows-based IDF editor • BLAST translator (.bin files) to EnergyPlus input files |
| Documentation and Guides | <ul style="list-style-type: none"> • Input/Output Reference and Engineering Reference Updated and Extended for all new features and updates, bringing total documentation to more than 1,200 pages. | <ul style="list-style-type: none"> • Input/Output Reference and Engineering Reference Updated and Extended for all new features and updates, bringing total documentation to more than 1,100 pages. | <ul style="list-style-type: none"> • Input/Output Reference and Engineering Reference Updated and Extended for all new features and updates, bringing total documentation to more than 700 pages. |
| Validation and Testing | | <ul style="list-style-type: none"> • HVAC BESTEST (IEA SHC Task 22 Building Energy Analysis Tools) • ASHRAE RP-1052 Development of an Analytical Verification Test Suite for Whole Building Energy Simulation Programs - Building Fabric • ANSI/ASHRAE Standard 140-2001 | |
| Platforms | <ul style="list-style-type: none"> • Windows, Linux | <ul style="list-style-type: none"> • Windows, Linux | <ul style="list-style-type: none"> • Windows, Linux |