

Tax Deduction Qualified Software

IES <Virtual Environment> version2012

On this page you'll find information about the IES <Virtual Environment> version 2012 [Qualified Software for Calculating Commercial Building Tax Deductions | Department of Energy](http://energy.gov/eere/buildings/qualified-software-calculating-commercial-building-tax-deductions) <http://energy.gov/eere/buildings/qualified-software-calculating-commercial-building-tax-deductions>, which calculates energy and power cost savings that meet federal tax incentive requirements for commercial buildings.

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Statements in quotes are from the software developer.

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| Internal Revenue Code §179D (c)(1) and (d) Regulations Notice 2006-52, Section 6 requirements as amplified by Notice 2008-40, Section 4 requirements. | |
| (1) The name, address, and (if applicable) web site of the software developer; | Integrated Environmental Solutions Limited Helix Building, West Of Scotland Science Park, Glasgow G20 0SP United Kingdom http://www.iesve.com |
| (2) The name, email address, and telephone number of the person to contact for further information regarding the software; | Liam Buckley Integrated Environmental Solutions +1 (617) 426-1890 IES North America support@iesVE.com |
| (3) The name, version, or other identifier of the software as it will appear on the list; | IES <Virtual Environment>2012 |
| (4) All test results, input files, output files, weather data, modeler reports, and the executable version of the software with which the tests were conducted; and | "Provided to DOE" |
| (5) A declaration by the developer of the software, made under penalties of perjury, that— | "On behalf of the IES <Virtual Environment> development team, I certify the following:" |
| (a) The software has been tested according to ANSI/ASHRAE Standard 140-2007 Standard Method of Test for the Evaluation of Building Energy Analysis Computer Programs; | "The software has been tested according to ANSI/ASHRAE Standard 140-2007 Standard Method of Test for the Evaluation of Building Energy Analysis Computer Programs." |
| (b) The software can model explicitly— | "The IES <Virtual Environment>2012 software is fully compliant with ASHRAE 90.1-2001 and meets all of the requirements below." |
| (i) 8,760 hours per year; | "The <VE>2012 software complies." |
| (ii) Calculation methodologies for the building components being modeled; | "The <VE>2012 software complies." |
| (iii) Hourly variations in occupancy, lighting power, miscellaneous equipment power, thermostat setpoints, and HVAC | "The <VE>2012 software complies. This includes both schedules and the use of formula profiles to control gains based upon sensed variables." |

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| system operation, defined separately for each day of the week and holidays; | |
| (iv) Thermal mass effects; | "The <VE>2012 software complies. This includes thermally massive constructions receiving direct and diffuse solar gain after it has passed through envelope apertures, heating and cooling of thermal mass via encapsulated hydronic circuits or air flow paths, and direct radiant exchange between interior surfaces." |
| (v) Ten or more thermal zones; | "The <VE> 2012 software complies and is capable of running with multiple thousands of thermal zones (limits determined by number of complex controls in detailed single-zone HVAC system models, or other similarly detailed models duplicated in numerous zones)." |
| (vi) Part-load performance curves for mechanical equipment; | "The <VE>2012 software complies." |
| (vii) Capacity and efficiency correction curves for mechanical heating and cooling equipment; and | "The <VE>2012 software complies." |
| (viii) Air-side and water-side economizers with integrated control. | "The <VE> 2012 software complies with both of these requirements. The <VE> 2012 software provides for air-side economizer control to outdoor dry-bulb high limit, outdoor dew-point temperature high limit, differential enthalpy, zone demand for heating vs. cooling, etc. The <VE> 2012 software provides water-side economizer (WSE) with both fully integrated and non-integrated controls for chilled water loops served by electric water-cooled chillers and either cooling tower or fluid cooler. The integrated waterside economizer can operate the heat rejection device to maintain water temperatures just sufficient to address load when WSE is active or can be controlled to constant approach or similar, which may use a formula profile with sensed outdoor weather variables to model other heat rejection controls. Parallel (strainer cycle) WSE applications can also be modeled using dedicated coils and cooling tower models." |
| (c) The software can explicitly model each of the following HVAC systems listed in Appendix G of Standard 90.1-2004: | |
| (i) Packaged Terminal Air Conditioner (PTAC) (air source), single-zone package (through the wall), multi-zone hydronic loop, air-to-air DX coil cooling, central boiler, hot water coil. | "The <VE> 2012 software models this system, including a Standard 90.1 Baseline version and three other pre-defined configurations." |
| (ii) Packaged Terminal Heat Pump (PTHP) (air source), single-zone package (through the wall), air-to-air DX coil heat/cool. | "The <VE> 2012 software models this system, including a Standard 90.1 Baseline version and three other pre-defined configurations." |
| (iii) Packaged Single Zone Air Conditioner (PSZ-AC), single-zone air, air-to-air DX coil cool, gas coil, constant-speed fan. | "The <VE> 2012 software models this system, including the required Standard 90.1 Baseline version, plus pre-defined configuration for cooling & ventilation only (CRAC or hot climate)." |

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| <p>(iv) Packaged Single Zone Heat Pump (PSZ-HP), single-zone air, air-to-air DX coil cool/heat, constant-speed fan.</p> | <p>"The <VE>2012 software models this system."</p> |
| <p>(v) Packaged Variable-Air-Volume (PVAV) with reheat, multi-zone hydronic loop, air-to-air DX coil, VAV fan, boiler, hot water VAV terminal boxes.</p> | <p>"The <VE> 2012 software models this system, including the required Standard 90.1 Baseline version, four other pre-defined configurations, including indirect-direct evaporative systems, and numerous other options and controls. Options and controls include, but are not limited to CV and VAV operation, "single-max" and "dual-max" VAV controls, override of VAV damper position (forced additional flow) and/or system OA reset according to zone CO² sensors, variation of economizer minimum OA according to zone VAV damper positions, reset of both economizer mixed-air target temperature and system cooling coil LAT according to zone cooling/heating demand, and reset of system cooling coil LAT for dehumidification according to supply air DBT, supply air DPT, zone RH, or return air RH. VAV systems can also supply make-up air to zones conditioned by other systems, such as PTACs, local FCUs, etc., and separate VAV systems—e.g., multiple floor-by-floor AHUs—can receive pre-conditioned OA from a common DOAS."</p> |
| <p>(vi) Packaged Variable-Air-Volume with parallel fan powered boxes (PVAV with PFP boxes), multi-zone air, DX coil, VAV fan, fan-powered induction boxes, electric reheat.</p> | <p>"The <VE> 2012 software models this system, including the 90.1 Baseline configuration and other series and parallel configurations for fan-powered boxes and induction units, "dual-max" VAV airflow controls, and other options and controls noted above for Packaged VAV."</p> |
| <p>(vii) Variable-Air-Volume (VAV) with reheat, multi-zone air; multi-zone hydronic loop, air-handling unit, chilled water coil, hot water coil, VAV fan, chiller, boiler, hot water VAV boxes.</p> | <p>"The <VE> 2012 software models this system, including detailed coil models, chilled-water loops, condenser-water loops, hot-water loops, sequencing of heating and cooling plant equipment, air and water supply temperature resets, air-handling units, "dual-max" VAV airflow controls, and all other control and configuration options noted for PVAV systems."</p> |
| <p>(viii) Variable-Air-Volume with parallel fan powered boxes (VAV with PFP boxes), multi-zone air, air-handling unit, chilled water coil, hot water coil, VAV fan, chiller, fan-powered induction boxes, electric reheat.</p> | <p>"The <VE> 2012 software models this system, including all airside components, controls, and options noted for packaged VAV with PFP boxes, plus all waterside loops and equipment noted for (vii) VAV reheat above."</p> |
| <p>(d) The software can—</p> | |
| <p>(i) Either directly determine energy and power costs or produce hourly reports of energy use by energy source suitable for determining energy and power costs separately; and</p> | <p>"The <VE> 2012 software complies. This includes detailed energy end-use results, dedicated tools for calculating energy cost based on complex utility rate structures including fixed fees, demand charges, time-of-use charges, block charges, and other similar rate components. The <VE> 2012 software also includes a life-cycle cost module for determining simple payback periods, net present value of future savings, or return on investment."</p> |
| <p>(ii) Design load calculations to determine required HVAC equipment capacities and air and water flow rates.</p> | <p>"The <VE> 2012 software complies and does so using the ASHRAE Heat Balance Method and design day data for determination of design space loads, including oversizing factors when specified, plus actual simulation of the model and systems to determine sizing for water loops, boilers, chillers, other heating and cooling sources, fans, and coils."</p> |

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| (e) The software can explicitly model: | |
| (i) Natural ventilation. | "The <VE> 2012 software models multi-zone natural ventilation, including single-sided, cross-ventilation, and thermal stack effect. The <VE> 2012 software uses a fully integrated bulk-airflow model. All openings are controllable and can be individually user-defined or selected from a list of pre-defined opening types with associated aerodynamic properties. Each is assigned wind-pressure coefficients reflecting height, degree of exposure/sheltering, and relationship to wind angle of attack (as this varies at each time step). The integrated bulk-airflow model runs for each time step of the thermal model and HVAC system modeling, thus accounting for pressure differentials associated with wind, mechanical system airflow and thermal inputs, including solar gains, internal gains, and both surface and air temperatures." |
| (ii) Mixed mode (natural and mechanical) ventilation. | "The <VE> 2012 software models mixed-mode ventilation, as described above for natural ventilation, plus controls for seasonal change-over, zone-by-zone operation, coincident operation, and demand control integration with zone- and/or system-level CO ² sensors. The software also supports modeling of specialized types of mixed-mode systems, such as passive-downdraft cool towers driven by a cooling coil, indirect evaporative, or direct evaporative cooling." |
| (iii) Earth tempering of outdoor air. | "The <VE> 2012 software models earth tempering of outside air through earth tubes and thermal labyrinths with airflow driven by mechanical system fans, thermal stack effects, wind pressure, or any combination of these." |
| (iv) Displacement ventilation. | "The <VE> 2012 software models both thermal displacement ventilation and underfloor air distribution systems, either separately or in combination with other systems. This includes accounting for thermal gain in the underfloor plenum for UFAD systems (heat transfer paths through the floor deck below and down through the raised floor itself as a result of diffuse or direct-beam insolation, internal radiant heat exchange, and convection), separate occupied and stratified zones, separate return plenum where applicable, and a wide range of configurations for return-air bypass, heat-pipe/wheel "free" reheat (and fan energy associated with added static pressure in the HX), underfloor fan-powered boxes (series, parallel, two-pipe and four-pipe "beams", etc.), and associated controls." |
| (v) Evaporative cooling. | "The <VE> 2012 software models both indirect and direct evaporative cooling, and includes a pre-defined system of this type with bypass dampers and accounting for the additional static pressure that must be overcome when air is passing through cooling components (as can be accounted for with any similar coil, heat exchanger, or heat/enthalpy recovery element)." |
| (vi) Water use by occupants for cooking, cleaning or other domestic uses. | "The <VE> 2012 software models water use by occupants. This includes tools for estimating fixture water consumption, rainwater collection, graywater recycling, etc." |
| (vii) Water use by heating, cooling, or other equipment, or for on-site | "The <VE> 2012 software does not model water use by heating, cooling, and other equipment or for on-site |

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| landscaping. | landscaping, and shall not be used for modeling this parameter." |
| (viii) Automatic interior or exterior lighting controls (such as occupancy, photocells, or time-clocks). | "The <VE> 2012 software models automatic interior and exterior lighting controls, such as occupancy sensors, time-clocks, and daylight-sensitive photocells for stepped or continuous dimming of electric lighting and the associated reduction of energy use and thermal gains." |
| (ix) Daylighting (sidelighting, skylights, or tubular daylight devices). | "The <VE> 2012 software provides detailed modeling of daylighting through all orientations of glazed fenestration, including side-lighting and skylights, inter-zonal borrowed light, custom-positioned and oriented daylight sensors, contrast ratios, and glare. An electric lighting module supports placement and accurate representation of light distribution from fixtures or luminaires, and this can be combined with daylight modeling to study combined effects. Options are provided for running either a faster and simpler daylighting model or using the LBNL Radiance engine for which the <VE> 2012 software provides an extensive interface. The detailed Radiance-based tool is also used to drive daylight sensors for dimming controls on electric lighting in the thermal and energy model." |
| (x) Improved fan system efficiency through static pressure reset. | "The <VE> 2012 software models improved fan system efficiency associated with static pressure reset via user entry of fan performance curve data representing static pressure reset, such as that provided by ASHRAE and California-based Energy Design Resources. The software can also model improved fan system efficiency through static pressure reset via controlled mixing of alternate flow paths, each with an associated static pressure curve; however, this is not a pre-defined system configuration. The maintenance of a static pressure setpoint to control a variable speed fan, on the other hand, is standard on all predefined VAV configurations." |
| (xi) Radiant heating or cooling (low or high temperature). | "The <VE> 2012 software models low-temperature radiant systems, including radiators, chilled ceiling panels, and hydronic radiant heating and cooling slab systems. Hydronic radiant slab modeling includes slab surface temperature sensors. All radiant systems and related room units (hydronic or electric) include fully integrated control for coincident operation of radiant heating and cooling either independent of or in any combination with airside systems." |
| (xii) Multiple or variable-speed control for fans, cooling equipment, or cooling towers. | "The <VE> 2012 software models constant, multi-speed, and variable-speed controls for fans, cooling equipment, and cooling towers or fluid coolers, as well as constant- and variable-speed pumps on hot-water, heat transfer, and chilled water loops." |
| (xiii) On-site energy systems (such as combined heat and power systems, fuel cells, solar photovoltaic, solar thermal, or wind). | "The <VE> 2012 software models on-site energy systems, including solar thermal DHW systems, solar thermal collectors coupled to HVAC hot-water and heat-transfer loops, wind power generators, photovoltaic arrays, and combined heat & power systems." |

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