OpenStudio Version 1.9.0

Release Notes – 9/25/2015

These release notes describe version 1.9.0 of the OpenStudio software suite developed by the National Renewable Energy Laboratory (NREL), Buildings and Thermal Systems, Commercial Buildings Research Group, Tools Development Section, and associated collaborators. The notes are organized into the following sections:

- Where to Find OpenStudio Documentation
- Installation Notes
- Overview

Where to Find OpenStudio Documentation

- OpenStudio release documentation, including these release notes, tutorials, and other user documentation, is available at https://www.openstudio.net/.
- C++ API documentation is available at https://openstudio-sdk-documentation.s3.amazonaws.com/index.html.
- Measure development documentation is available at http://nrel.github.io/OpenStudio-user-documentation/reference/measure_writing_guide/.

Installation Notes

OpenStudio is supported on Windows 7 – Windows 10, OS X 10.9 – 10.10, and 64-bit Ubuntu 14.04.

OpenStudio 1.9.0 supports EnergyPlus Release 8.3.0, which is bundled with the OpenStudio installer. It is no longer necessary to download and install EnergyPlus separately. However, an installer is available at https://github.com/NREL/EnergyPlus/releases/tag/v8.3.0. Other builds of EnergyPlus 8.3 are not supported by OpenStudio 1.9.0.

OpenStudio 1.9.0 supports Radiance 5.0.a.4, which is bundled with the OpenStudio installer. It is no longer necessary to download and install Radiance separately. However, an installer is available at https://github.com/NREL/Radiance/releases/tag/5.0.a.4. Other builds of Radiance are not supported by OpenStudio 1.9.0.

Installation Steps

- The OpenStudio SketchUp Plug-in requires SketchUp 2015 (not available for Linux). The OpenStudio SketchUp Plug-in does not support older versions of SketchUp. SketchUp 2015 is available in 32 and 64-bit versions; the 32-bit version of OpenStudio on Windows will only work with the 32-bit version of SketchUp 2015, and the 64-bit version of OpenStudio will only work with the 64-bit version of SketchUp 2015.
- Download and install OpenStudio.
- Setup a Building Component Library (BCL) account to access online building components and measures. View instructions on how to setup your account and configure the key in OpenStudio.

Overview

OpenStudio 1.9.0 adds a substantial number of new HVAC features. Among the new features are three entirely new categories of HVAC capability beyond the routine component additions. The first new category is a family of availability managers that allow for detailed control over the air system period of operation. With these new availability managers, it is possible to have detailed control over night cycling, night ventilation, optimum morning start, temperature-based on/off and more. The second new category of HVAC capability included in this release is another family of control related inputs known as plant operation schemes. With plant operation schemes, it is possible to control the sequencing of plant system supply components relative to one another while considering ambient conditions. Third, OpenStudio has added support for dual duct air based systems. These new features are available through the OpenStudio API and Measures; user interface controls will be added in a future release. All of these features are backwards compatible, meaning users now have access to detailed control inputs, but the established OpenStudio default control remains in place. Therefore, these new features can be utilized on an as-needed basis and existing models will continue to operate in the same way. Examples and tutorials of applying these new features will be available in the weeks following the release of OpenStudio 1.9.0.

There are significant additions at the HVAC component level, including a large number of new coil types, Zone HVAC, and plant components. Of particular interest are a number of new variable speed DX coils, new zone mixing inputs, a new Zone HVAC model that accommodates natural ventilation, idealized plant components that allow a user defined constant temperature source on the supply side, and a user defined load on the demand. The full list of new input object types is included below. All of these are available in the OpenStudio API and Measures, and many of them are available in the graphical interface through drag and drop.

• ZoneCrossMixing • ZoneMixing • SolarCollectorPerformanceFlatPlate • SolarCollectorFlatPlateWater • SolarCollectorIntegralCollectorStorage • SolarCollectorPerformanceIntegralCollectorStorage • SolarCollectorFlatPlatePhotovoltaicThermal • ZoneVentilationDesignFlowRate • FluidCoolerTwoSpeed • FluidCoolerSingleSpeed • PipeOutdoor • PipeIndoor • Duct• AvailabilityManagerHybridVentilation • CoilSystemCoolingWaterHeatExchangerAssisted • CoilSystemCoolingDXHeatExchangerAssisted • PlantEquipmentOperationOutdoorDewpoint • PlantEquipmentOperationOutdoorWetBulb • TemperingValve • ChillerAbsorption • ChillerAbsorptionIndirect • CoilCoolingDXTwoStageWithHumidityControlMode • AirTerminalDualDuctVAV • AvailabilityManagerOptimumStart • AvailabilityManagerDifferentialThermostat • ThermalStorageIceDetailed • GroundHeatExchangerHorizontalTrench • PlantEquipmentOperationOutdoorRelativeHumidity • AvailabilityManagerNightVentilation • PlantEquipmentOperationOutdoorDryBulbDifference • PlantEquipmentOperationOutdoorDewpointDifference • PlantEquipmentOperationOutdoorWetBulbDifference • PlantEquipmentOperationOutdoorDryBulb • HeaderedPumpsConstantSpeed • HeaderedPumpsVariableSpeed • WaterHeaterHeatPump • CoilPerformanceDXCooling • CoilWaterHeatingAirToWaterHeatPump • CoilHeatingWaterToAirHeatPumpVariableSpeedEquationFit • CoilHeatingDXVariableSpeed • CoilCoolingWaterToAirHeatPumpVariableSpeedEquationFit • SetpointManagerSingleZoneHumidityMaximum • ThermalStorageChilledWaterStratified • SetpointManagerColdest • EvaporativeFluidCoolerTwoSpeed •

SetpointManagerMultiZoneCoolingAverage • SetpointManagerMultiZoneHeatingAverage • ZoneHVACDehumidifierDX • ZoneHVACEnergyRecoveryVentilatorController • ZoneHVACEnergyRecoveryVentilator • CoilCoolingDXVariableSpeed • CentralHeatPumpSystem • SetpointManagerMultiZoneHumidityMaximum • CoilHeatingDXMultiSpeed • SetpointManagerFollowSystemNodeTemperature • SetpointManagerSingleZoneOneStageCooling • SetpointManagerSingleZoneOneStageHeating • SetpointManagerMultiZoneMaximumHumidityAverage • SetpointManagerMultiZoneMinimumHumidityAverage • SetpointManagerReturnAirBypassFlow • SetpointManagerFollowGroundTemperature • ChillerHeaterPerformanceElectricEIR • PlantComponentTemperatureSource • ZoneHVACUnitVentilator • WaterHeaterStratified • ZoneHVACBaseboardRadiantConvectiveWater • ZoneHVACBaseboardRadiantConvectiveElectric • LoadProfilePlant

There are a number of enhancements in areas beyond HVAC capability particularly to the OpenStudio application and the Measure ecosystem:

- The OpenStudio application has been enhanced with new grid views for the design day and facility interfaces
- Users can now specify costs and ECMs on external models imported to PAT for export to EDAPT
- A new standard reporting Measure has been added
- Radiance functionality has been refactored as a Measure; as a result, the "select daylight simulation engine" radio buttons have been removed from the Run Tab. Users wishing to use Radiance for their daylight simulations must apply the "Radiance Daylighting Measure" from their measures library (under Electric Lighting → Electric Lighting Controls → Radiance Daylighting Measure) as an "Always Run Measure". Support for shadecloth (e.g. Mechoshade) and daylight redirecting louvers (exemplified in this release with Lightlouver) have been added to the shade material types along with the existing venetian blind option. Daylight metrics reporting has been improved, and a fully automated 3-phase simulation workflow that supports multiple window groups is part of this new measure. As a measure, this also allows users to run Radiance-based daylighting simulations with PAT and OpenStudio Server.
- OpenStudio ships with select gems (https://github.com/NREL/OpenStudio/wiki/OpenStudio-Version-Compatibility-Matrix#packaged-gems)
- Improvements have been made to EpwFile allow direct access to timeseries properties from the weather file
- IFC import improvements were contributed by the BIMDataHub team at Penn State/CBEI
- This release resolves a long-standing issue using OpenStudio with Honeybee: https://github.com/mostaphaRoudsari/Honeybee/issues/214.

OpenStudio 1.9.0 includes several other minor features as well as many bug fixes. For a full list of changes included in OpenStudio 1.9.0, please see the complete changelog.

Issue Statistics Since Previous Release
- 93 new issues were filed since the 1.8.0 release of OpenStudio (not including opened pull requests).
- 99 issues were closed since the 1.8.0 release of OpenStudio (not including closed pull requests).