

New Radiance daylight calculation programs are utilized by an OpenStudio measure to enhance OpenStudio's daylight modeling. These enhancements expand the complexity of daylight modeling and enhance the analysis of lighting energy savings in daylight area control zones. Additional features include the calculation of space-by-space and full-building Spatial Daylight Autonomy (SDA) and Annual Sunlight Exposure (ASE) analysis, as specified in the most recent version of LEED (LEED v4).

Daylighting Measures

Overview

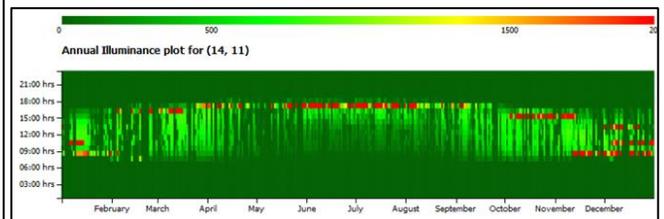
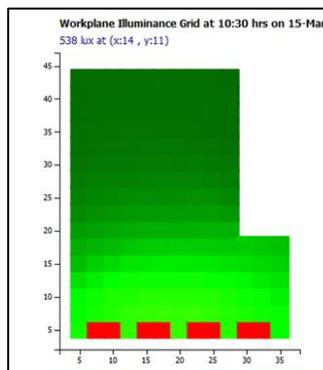
The Daylighting Calculation Measure in OpenStudio applies Radiance to daylighting analysis in spaces for the purpose of assessing lighting energy savings in spaces with photocontrol. Hourly power levels from this analysis are then inserted back into the OpenStudio model as lighting power schedules. Operable shading devices can be applied using a number of different algorithms and triggers. Feedback on daylighting system performance is provided through the analysis of annual metrics such as daylight autonomy, spatial daylight autonomy, annual sunlight exposure, and others. A Daylighting Metrics Viewer is also provided as a separate measure.

Getting Started

Standard OpenStudio photocontrol zones can be processed using the Daylighting Calculation Measure. The measure will export the required data related to each space in an OpenStudio model for which daylighting simulation is reported to a JSON control file that will be read and processed by the new Radiance Dxdaylight program. Once these calculations are completed, performance details can be assessed using the Daylighting Metrics Viewer. Lighting power schedules will be inserted into the model file for inclusion in the EnergyPlus analysis.

Radiance Synthetic Imaging System

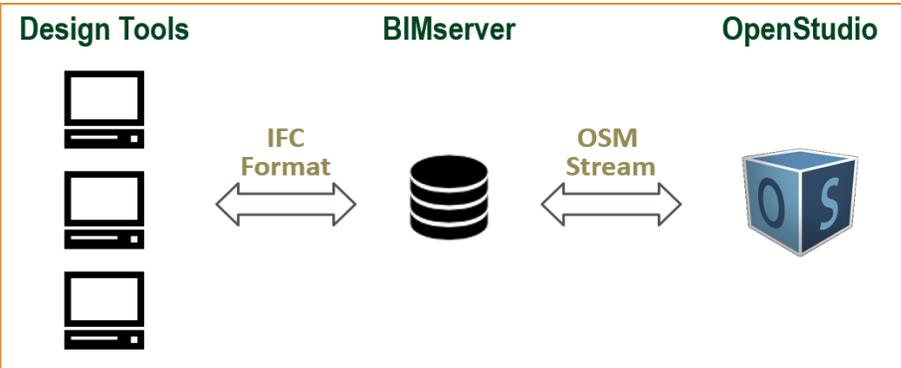
A number of new Radiance utility programs were developed for application in these measures. These include: Dxdaylight – a daylight calculation control program; as well as a number of minor utilities: Dxgridmaker, Dxleakcheck, Dxanalemma, Dxcombine, Dxshadecontrol, and Dxmetrics



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The Daylighting Calculation Measure and the Daylight Metrics Viewer will be available for implementation in OpenStudio through NREL's Building Component Library (BCL) in the near future. NREL's Radiance distribution package is also required to be installed on the computer for these measures to operate.





The BIMserver Integration enhances OpenStudio with a new model import function to import building geometries from IFC models. Leveraging the strength of BIMserver in BIM model management, a user can easily import basic building geometries such as walls, floors, ceilings, roofs, windows and doors from IFC into OpenStudio through our user-friendly graphical interface with several clicks.



Building Information Modeling server (BiMserver) is an open source software provided by BIMserver.org that enables a user to centralize and manage BIM projects. We developed an OSMSerializer plugin for BiMserver to perform the model transformation from IFC to OSM.

BIMserver Integration

Overview

The BIMserver integration enhancement extracts and transforms the building geometries from IFC files produced by design tools (i.e., Revit, SketchUp, etc.) into the OSM format used by OpenStudio. This enhancement consists of two components: (1) An OSMSerializer plugin in BiMserver to extract and transform building information from IFC to OSM. (2) A user-friendly interface inside OpenStudio that can easily access the BiMserver and initiate the geometry importation function.

Getting Started

The transformation of geometries from the IFC into the OSM takes place behind the scenes in OpenStudio using BiMserver. Once you have BiMserver correctly setup, you can use this enhancement's step-by-step graphical user interface (GUI) in OpenStudio via File → Import → IFC to initiate an "Import from IFC" process. Typically, a user can use this GUI to create a new BIM project, upload an IFC file onto BiMserver, and then import the building geometries into BiMserver as OpenStudio models.

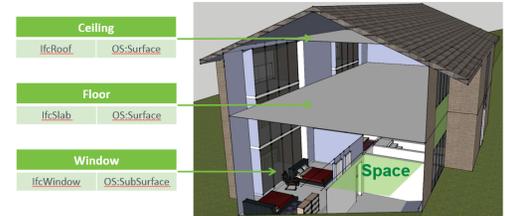
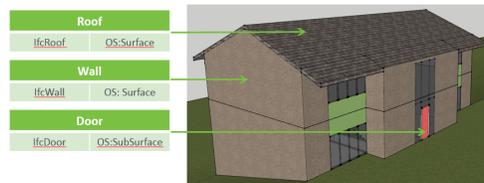
This BIM Integration enhancement to OpenStudio can import the geometries from the following IFC elements: spaces, walls, roof, ceilings, floors, windows, and doors. More elements such as curtain walls will be supported in future releases.

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The BiMserver Integration module is incorporated in the OpenStudio release available in June 2015. You can simply download the latest OpenStudio software to access to this functionality under the File → Import → IFC. In order to import IFC models into OpenStudio, you need to install BiMserver either locally or on a server as a prerequisite. Please see the full instructions on setting up BiMserver and installing this enhancement here: <http://tinyurl.com/po6zmno>.

