

## Quick Facts

Residential and commercial buildings account for 40% of energy use in the United States. To help architects design more efficient buildings, the U.S. Department of Energy and NREL have developed a suite of building design and visualization tools, called OpenStudio, that is simple to use and free to anyone.

OpenStudio tools use familiar “drag-and-drop” methods to make building energy modeling fast and easy. Building energy modeling now takes a fraction of the time that was needed just a few years ago.

OpenStudio is integrated with the online Building Component Library, which stores building components and measures for quick and reliable modeling.

The OpenStudio website and YouTube channel have more than 15 hours of videos that walk users through different workflow applications for the program.

OpenStudio supports parametric analysis with integrated energy modeling and life-cycle costs.

OpenStudio is available to anyone under the GNU Lesser General Public License, which allows third parties to easily integrate OpenStudio functionality into their own applications.

The website has full documentation for the application programming interface, which is continually being updated by NREL staff. The source code can be accessed on GitHub.

**National Renewable Energy Laboratory**  
15013 Denver West Parkway, Golden, CO 80401  
303-275-3000 • [www.nrel.gov](http://www.nrel.gov)

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## NREL’s OpenStudio Helps Design More Efficient Buildings

The National Renewable Energy Laboratory (NREL) has created the OpenStudio software platform that makes it easier for architects and engineers to evaluate building energy efficiency measures throughout the design process. OpenStudio makes energy modeling more accessible and affordable, helping professionals to design structures with lower utility bills and less carbon emissions, resulting in a healthier environment.

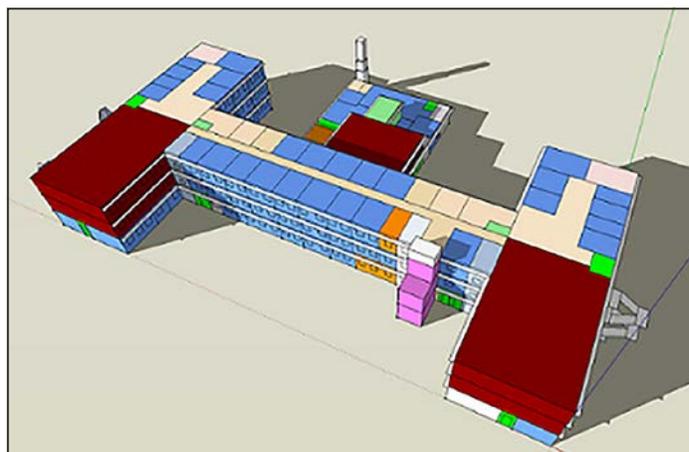
OpenStudio includes a user-friendly application suite that makes the U.S. Department of Energy’s EnergyPlus and Radiance simulation engines easier to use for whole building energy and daylighting performance analysis. OpenStudio is freely available and runs on Windows, Mac, and Linux operating systems.

One OpenStudio tool is the Trimble SketchUp plugin, which building designers are using to import or quickly model the structure of a proposed building and define how different parts of the building will be used. OpenStudio’s companion online database, the Building Component Library, makes it straightforward to specify the underlying data for a building’s construction, electrical loads, occupancy schedules, and other features that are required to make a complete model.

Another tool is the OpenStudio Application, which uses familiar mouse-driven user interfaces for adding and editing model data, including heating, ventilating, and air conditioning (HVAC) systems. Designers use this application to set up a baseline building design, simulate its performance, and visualize the results.

Designers are also using the OpenStudio Parametric Analysis Tool to easily apply energy conservation measures to their baseline model. These measures are convenient drag-and-drop resources that can automatically evaluate actions like adding overhangs to windows, changing out an HVAC system, adding wall or roof insulation, and much more. Comparative analyses examine the impact of these measures on the building’s annual and peak electricity consumption, annual gas consumption, simple payback period, and life-cycle costs. This helps designers decide which measures are right for their project.

OpenStudio is “software for making software” that enables rapid and low-cost development of new energy modeling and analysis tools for a variety of users. Many national laboratories, universities, and companies are using OpenStudio to create new desktop, web, and mobile apps that meet a wide range of market needs.



OpenStudio leverages Trimble SketchUp to create 3-D building geometry. NREL engineers used the program to analyze the energy performance of an existing Fort Carson headquarters building and to recommend the most efficient retrofit options.

*Illustration by Matt Leach, NREL*

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