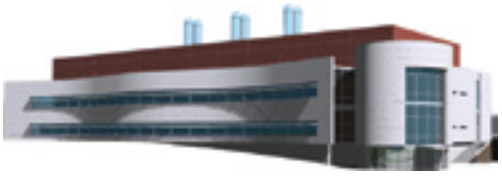
Energy and Daylight Modeling for high performance buildings

What is Energy and Daylight Modeling?

Energy modeling for new high performance buildings is an early design decision making tool for the integrated project team – owner, architect and engineers. A detailed whole-building energy simulation completed during early design will quickly show the potential energy and utility cost savings associated with any number of possible envelope, lighting or HVAC options. The predicted energy savings will be incorporated in Simple Payback, Return on Investment, and Life Cycle Costing analyses to determine the optimum solution for your building.



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Daylight modeling includes detailed simulation of the amount and quality of natural light entering a building. The daylight simulation can estimate the amount of light entering a space and predict the energy savings from dimming the electric lighting. The simulation will allow the team to address glare issues during the design through proper selections of overhangs, louvers and glazing.

What are the benefits of Energy and Daylight Modeling?

- Reduced carbon footprint
- Future utility cost savings
- Reduced construction cost
- Improved daylighting with less glare
- Increased worker productivity and comfort
- Contributes to LEED certification

Energy and Daylight Modeling are a key part of LEED-NC

Energy efficiency and daylighting contribute to a number of potential points in the LEED 2009 for New Construction rating system.

- Energy modeling is required and can achieve up to 19 EA Credit 1 points
- Daylight modeling can achieve 1 point through IEQ Credit 8.1
- Up to 3 points can be awarded for daylighting in the LEED for Schools rating system

Eaton energy and daylight models have helped numerous projects reach LEED Gold and Platinum certification.

Energy modeling is accepted by many state and local jurisdictions for code compliance. One method of complying with ASHRAE 189.1 is through whole building performance as demonstrated with an energy model.

Incentives are available

Many electric and gas utilities provide incentives and rebates for energy modeling of high performance buildings. Eaton has worked within a number of these programs and will maximize your rebate.

Case Study: University of Utah Net-Zero Energy Renovation – College of Architecture and Planning

This project included EnergyPlus modeling of a 45,000 sq. ft. existing building with the goal of achieving net-zero energy emissions after a major renovation. Efficiency options such as a double-skin façade, radiant heating and cooling, indirect evaporative cooling, and efficient lighting and daylighting were modeled. The model results showed that the project will meet the net-zero energy goal through reducing usage by over 80% compared to the current facility.

Case Study: Ireland Army Community Hospital – Fort Knox, Kentucky

The 530,000 sq. ft. Army hospital and clinic will meet Department of Defense sustainability requirements and reduce energy consumption by at least 30% over an ASHRAE Standard 90.1-2007 code compliant building. An eQuest model estimated energy savings due to a number of efficiency options including a dual duct variable air volume system, a heat recovery chiller, efficient lighting design and daylighting controls and improved glazing.

Case Study: Colorado State University Pueblo Academic Resources Building

Eaton provided energy modeling services for the 125,000 sq. ft. fully renovated library building which includes a unique, efficient HVAC system with chilled beams, displacement ventilation, radiant heated floors, heat recovery and evaporative cooling. LEED Platinum is anticipated with 10 EA cr. 1 points under the LEED NC 2.2 rating system.

Additional experience:

Healthcare / Laboratory:

University of Colorado Denver Pharmacy and Pharmaceutical Sciences Laboratory – Denver, CO

- 160,000 sq. ft. LEED Gold anticipated with 6 EA cr. 1 points (v2.2)

Colorado State University Research Innovation Center – Fort Collins, CO.

- 65,000 sq. ft. LEED Gold Certified with 6 EA cr. 1 points (v2.2)

Education:

Eastern Washington University Patterson Hall Renovation – Spokane, WA

- 135,000 sq. ft. LEED Gold anticipated with 6 EA cr. 1 points (v2.2)

Fairplay P-12 School – Fairplay, CO.

- 124,000 sq. ft. LEED Gold anticipated with 12 EA cr. 1 points (v3.0)

Commercial / Office:

Central Park Tower at Interlocken – Denver, CO

- 330,000 sq. ft. LEED Gold Certified with 3 EA cr. 1 points (v2.2)

University Physicians Inc., II – Denver CO

- 200,000 sq. ft. LEED Gold Certified with 5 EA cr. 1 points (v2.2)

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