



**NRC-CNRC**

Institute for  
Research in  
Construction

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## *Commercial Building Design – Optimizing Overall Energy Use and Occupant Comfort in the Perimeter Zone*

### *Objectives*

To develop an integrated design tool to help practitioners design facade and roofing fenestrations that function in harmony with energy-efficient lighting controls and occupant use of commercial interiors (e.g., offices and classrooms).

### *Background*

This project builds on the results of several previous projects:

- **Lightswitch Wizard:** An on-line, non-expert daylighting design tool to predict daylight availability and electric lighting use in private offices and classrooms ([www.buildwiz.com](http://www.buildwiz.com)).
- **Skyvision:** An easy-to-use design tool to predict optical performance of various types of skylights ([irc.nrc-cnrc.gc.ca/ie/lighting/daylight/skyvision\\_e.html](http://irc.nrc-cnrc.gc.ca/ie/lighting/daylight/skyvision_e.html)).
- **Home Energy Analyzer:** an on-line tool to help people understand what they can do to make their homes more comfortable and energy efficient.

The methods developed previously will be integrated into the Lightswitch Wizard to convert it into a truly integrated daylighting design tool that considers occupant comfort and behaviour and total energy use, and allows for the use of skylights and shading devices.

### *Statement of Work*

- Integrate thermal energy simulation (ESP-r) into Lightswitch Wizard
- Develop optical and thermal models for skylights and various shading devices
- Collect field data on occupant use of lighting and shading controls in new commercial building settings such as open-plan offices and classrooms
- Expand the existing user behaviour model to include these interior settings

### *Expected Outcomes*

- Modified and updated Lightswitch Wizard
- Integrated version of ESP-r that allows for advanced user behaviour modelling
- Reliable, and relevant information on energy use and occupant comfort to support green building design decisions.

### *Partners*

Natural Resources Canada, Public Works and Government Services Canada.

### *Start/Completion Dates*

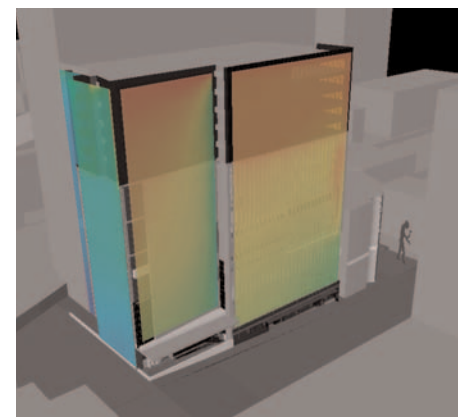
The project began in April 2005 and will be completed in May 2008.

### *Project Manager*

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For more information, see [http://irc.nrc-cnrc.gc.ca/ie/lighting/office/comfort\\_e.html](http://irc.nrc-cnrc.gc.ca/ie/lighting/office/comfort_e.html)

Factsheet 39, May 2005



*Daysim case study – Arup Lighting, New York, used Daysim to estimate annual daylight exposures for the art galleries in a multi-phase museum and office building complex in Seattle.*



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