



Bringing quality
to the
built environment

Demand Responsive Buildings

Objectives

To evaluate how occupants respond to ramps (steady changes) in indoor environment conditions, particularly degradation of conditions from prevailing recommended practice. To better define the limits of reducing building power demand during periods of electrical grid stress (load shedding).

Background

When electricity demand exceeds supply, brownouts or blackouts may occur unless utilities import additional capacity or switch in peak-capacity generators. A third option is for end-users to respond to the peak power difficulty by reducing their demand. In this context, it is increasingly likely that buildings will need to curtail their grid electrical usage during peak periods by shedding load. Many load-shedding scenarios involve adjusting building systems. For example, lighting may be dimmed, chillers switched off, and ventilation fan speeds reduced. While these adjustments will degrade the indoor environment, such practice may be a reasonable alternative to a brownout or blackout. IRC's focus in this project is to gain a better understanding of occupants' tolerance for such degradation. How quickly they detect the changes, and the effects on their mood, satisfaction and performance will be key outcomes.

Statement of Work

This work will be carried out in two parts:

1. Literature review of previous research.
2. Laboratory studies investigating the response of occupants to ramps in indoor environment conditions, in particular, degradation of conditions from recommended practice. Elements to be varied might include: temperature, humidity, ventilation rate, and light level, and the amplitude and rapidity of changes in these variables. Mediating variables might include: availability of daylight, active/passive control opportunities, and information about why the indoor environment changes are occurring.

Expected Outcomes

- Separate reports on each part of the research
- Papers in scientific journals and conferences
- Guidelines for practitioners and industry

Partners

Public Works and Government Services Canada, Panel on Energy Research and Development, Natural Resources Canada

Start/Completion Dates

The project began in 2004 and will be completed in 2008.

Project Manager

Dr. Guy R. Newsham: 613-993-9607; Guy.Newsham@nrc-cnrc.gc.ca

For more information, see http://irc.nrc-cnrc.gc.ca/ie/lighting/office/demand_e.html

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