



March 12, 2008

PIER DAYLIGHTING PLUS – OFFICE DAYLIGHTING

To: Program Advisory Committee (PAC) Members
From: Heschong Mahone Group, Inc.
Re: Office Daylighting Potential Project Description

1. PROJECT GOALS

The goal of this project is to create an updated, complete and detailed understanding of the ways in which daylighting can be implemented in California office buildings. This knowledge is intended to be used to facilitate and justify a utility retrofit program to achieve demand savings and energy savings from daylight in existing office buildings, and to inform the next round of Title 24 changes.

2. PROJECT OBJECTIVE

The objectives of this project are to assess the size and potential energy savings of the office daylighting retrofit market, and to identify what improvements to office buildings are likely to create cost-effective savings. The project will develop implementation tools to assess individual sites for their energy savings potential using daylight, and will communicate this new knowledge to key decision makers including program designers, controls manufacturers and Commission staff.

This project will contribute to PIER's objectives by improving the reliability of demand savings from daylighting, thereby improving the reliability of the overall electric system, reducing the cost of electricity and reducing environmental impacts. It will support the California economy because many of the major lighting controls manufacturers are based in California and will be included on the Project Advisory Committee so they have a first-hand understanding of the new knowledge created. This project also fulfills PIER's goal of advancing technologies in a way that is not accomplished by regulated markets alone, because in the case of daylighting this advancement requires research on a scale too large to be undertaken by small manufacturing companies.

3. PROJECT TEAM

This project is funded by the California Energy Commission PIER Program. Principal Investigator for this project is Lisa Heschong, of the Heschong Mahone Group. During the project we will subcontract with Itron to bring in their extensive experience of

developing and analyzing the CEUS (California Commercial End-Use Survey) database. The Project Advisory Committee (PAC) will also provide input throughout the project, to ensure that we take advantage of as many opportunities as possible.

4. PROJECT TASKS

4.1 Statewide Impact of Photocontrols

The objective of this task is to create a statistically valid statewide analysis of the lighting energy savings (and the associated secondary savings such as for air conditioning) that would be achieved by the following measures:

- ♦ Implementing a daylighting retrofit program that might include photocontrols.
- ♦ Requiring effective photocontrol systems in offices under Title 24.
- ♦ Incorporating daylighting and photocontrols in demand response programs.

This analysis will indicate which office building types and which building characteristics offer the most cost-effective savings, and will quantify these savings and their associated costs.

We plan to analyze the database from HMG’s Sidelighting Photocontrols Field Study and databases of office building characteristics such as NRNC (Non Residential New Construction) and CEUS (California Commercial End-Use Survey) to quantify the impact of key variables on photocontrol savings. We will then calculate energy impact of installing photocontrols in existing and new-construction California office buildings.

4.2 Impact of Daylighting and Controls Improvements

The objective of this task is to produce a robust calculation of the energy savings that would result from improved daylighting in retrofit and new construction applications. Note that the previous task assesses the magnitude of savings that would be achieved by applying typical photocontrols in buildings statewide, whereas this task looks at the effect of improving the characteristics of the buildings to maximize savings. “Improved daylighting” will includes features such as improved windows, exterior and interior shading and glare control devices, higher window head heights, improved interior layout, bidirectional daylighting, lower partitions and smaller electric lighting circuits.

We plan to calculate the additional energy impact from daylighting improvements and report on the results.

4.3 Create Daylight Assessment Tool

The objective of this task is to develop an on-site daylight assessment tool and protocols that can be used by utility program staff or contractors to identify office spaces that are good candidates for photocontrol retrofits, to evaluate what type of electric lighting controls that would be most successful, and to evaluate what specific daylighting improvements would lead to the greatest occupant satisfaction and thus additional

potential savings in that space. The tool and protocols will be intended to maximize program cost-effectiveness by avoiding expenditure on systems that are unlikely to work, and by identifying inexpensive improvements that will increase savings.

We plan to develop the daylight assessment tool, protocols for its use and test the tool through a round of trials in real buildings.

4.4 Project-level Market Connections Activities

The objective of this task is to ensure that key decision makers are aware of the findings of the study, and of the daylight assessment tool. Their awareness should include knowledge of important findings, an awareness of the capabilities of the tool, and an understanding of the methodology and implications of the study. The key decision makers include utility and Commission staff, and lighting controls manufacturers. Apart from participating in the program level market connection activities, the project team will conduct face-to-face meetings with key decision makers and generate a report on code implications of the project findings.

We plan to present findings at various face-to-face meeting, report on code implications of our findings, and participate in program level market connection activities.

4.5 Project-level Technology Transfer Activities

The objective of this task is to make the project’s knowledge gained, experimental results and lessons learned available to key decision-makers, the public and other intended audiences, as part of the program-wide technology transfer plan.

We plan to develop a technology transfer plan and participate in the preparation and implementation of the Technology Transfer Plan developed in the Program-wide Market Connections Element of this Program.