



ENERGY CENTER OF WISCONSIN

We show you how



EnergySmart Schools

Task 4:

Advanced Daylighting Research

Status Summary
April 10, 2003



Advanced Daylighting Research

- ✍ Numerous recent reports continue to show the potential benefits of daylit school design
- ✍ A push-pull focus: information for school designers and decision-makers.



February 2002

www.ecw.org



2

Task 1: Baseline Information

Lead: Lawrence Berkeley Labs – Steve Selkowitz/Eleanor Lee

- ✍ Adding to existing information currently developed by LBL
- ✍ Gathering data in CA, FL, NY, IA, WI
- ✍ Goal: You have to know where you are to know where you want to go and how to get there
- ✍ Deliverable: Report documenting actual design practices in different regions



Task 2:

Roundtable/Technical Review

Lead: Lighting Research Center – Russ Leslie

- ✍ **Initial review held in conjuncture with the NYSERDA Daylighting Collaborative program**
- ✍ **Included Joel Loveland, Lisa Heshong, Steve Ternoey, Russ Leslie, Peter Boyce**
- ✍ **Second to be held this summer: anticipated participants:**
 - ✍ **Gregg Ander – Southern California Edison**
 - ✍ **Diana Grant – Lighting Design Lab**
 - ✍ **Charlie Brown – Portland Daylighting Lab**
 - ✍ **Mark Rea – Lighting Research Center**



Task 3: HVAC Performance Testing

Lead: Energy Center of Wisconsin – Iowa Energy Center

- ✍ Goal is to document/quantify various daylighting design strategies on HVAC performance to determine overall potential energy impact of daylighting designs
- ✍ Research protocol:
- ✍ Conducting 4 separate tests in summer and shoulder season:
 - ✍ Standard window/lighting patterns
 - ✍ High performance glazing with direct/indirect lighting
 - ✍ Light shelves
 - ✍ Window pattern



Task 3: HVAC Performance Testing

Control Parameters

- ✍ Each test will include side-by-side rooms, each with only one exposed exterior wall, with one room serving as the control; IEC will control to ensure that side-by-side rooms are the same except for test variables (e.g., interior temperature and humidity, air supply, human behavior, glazing dimensions and sealing, lighting levels)
- ✍ East, south, and west tests will be run simultaneously to control for weather variables; to the extent possible, IEC will also control temperature and humidity levels for consistency across all orientation conditions
- ✍ Tests will run six to seven days each; one summer, another in late summer to early fall



Task 3: HVAC Performance Testing

Control Parameters (con't)

- ✍ Lighting levels will be set to simulate normal classroom lighting so that lighting levels will not drop below 50 foot-candles during times of scheduled occupancy. Lighting demand will be based on a normal classroom schedule from 7:30 AM to 4:30 PM; contrast, reflectance, and glare will be assessed qualitatively, with an attempt to simulate typical classroom conditions.
- ✍ Daylighting controls will be operated on dimmers and photosensors
- ✍ Weather variables including outdoor temperature, relative humidity, solar radiation, solar angles, and time will be measured synchronous with each test.



Task 4: Demonstration Sites – Monitoring and Evaluation

Lead: Lighting Research Center/LBL/ECW

- ✍ **Goal: To document human factors and the energy performance related to various daylit schools**
- ✍ **Have identified schools in Iowa, Wisconsin, Illinois and New York who may be willing to participate**



February 2002

www.ecw.org



8

Task 4: Demonstration Sites – Monitoring and Evaluation

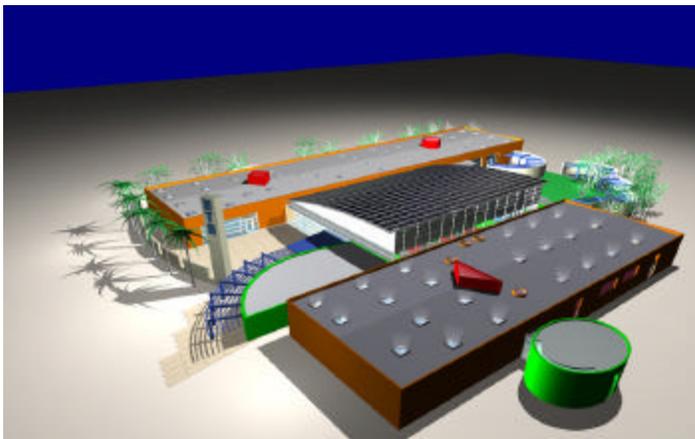
- ✍ **This specific task has/is facing the most difficulty in realizing completion by the October 2003 project end date**
 - ✍ Reason: Schools identified through other efforts have had construction delays, are not yet occupied, etc.
 - ✍ Reason: Difficulty in gaining school participation due to potential disclosure of student learning rates, etc.



Task 5: Design Guidelines and Training Materials

Lead: Energy Center of Wisconsin

- ✍ Coordinate recommendations from various sources specifically on daylighting design
- ✍ Regionalize design approaches and recommendations
- ✍ Customize Daylighting Collaborative technical training “Daylight Every School”



February 2002

www.ecw.org



10

Outreach/Information Dissemination

- ✍ **Work within existing efforts**
 - ✍ Daylighting Collaborative
 - ✍ High Performance Buildings
 - ✍ Energy Center of Wisconsin Information Clearinghouse
- ✍ **Provide other efforts with information to incorporate into future revisions (Energy Smart Schools Design Guidelines, CHPS)**

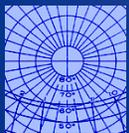




Daylighting Collaborative

Improving Human, Economic, and Environmental Performance

- Technical trainings
- Lunch and Learns
- Web site – www.daylighting.org
- Demonstration sites
- Project Profiles





HIGH PERFORMANCE BUILDINGS

PRESENTED BY

Energy Center
of Wisconsin



Integrating High Performance

Improving the way our buildings
are designed, built and used

- Training
- Sales Package of Materials
- Virtual Tour/Case Studies
- Project Profiles
- Coordination with the Advanced Building Guidelines/New Buildings Institute



**HIGH PERFORMANCE
BUILDINGS**

Related Activities

Energy Center of Wisconsin is coordinating with the New Buildings Institute on the Advanced Building Guideline content and implementation in Wisconsin

Energy Center of Wisconsin is developing daylighting design guidelines for the State of Wisconsin Division of Facilities Development

Energy Center of Wisconsin is coordinating with Iowa and New York in providing daylighting trainings for A/Es through the Daylighting Collaborative

Energy Center of Wisconsin actively seeks and develops daylighting demonstration sites in Wisconsin for schools



Issues/Discussion/Questions

- ✍ Are there future projects steps that the team should identify to further assist in disseminating the information?
- ✍ Are other states willing to take up action steps/recommendations as a result of this daylighting research?
- ✍ The activities and results of this project are focused on market preparation – need additional activities that actually infuse into the market....

