Energy Savings from Daylighting
An Opportunity Rediscovered
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“jewel box” buildings can inspire but also overwhelm
Ash Creek School – Pacific Northwest
Why we believe it’s a VERY real opportunity…

- Daylighting Collaborative – potential MT effects
- Appleton School District – retrofit savings in the field
- DOE/NASEO Daylighting in Schools Field Research
Daylighting Collaborative
Field MT Results

- No $ for incentives
- Education/training and tech. asst. only
- Interim field evaluation based on self reporting of changes in design approach and attitude towards daylighting
Survey results indicated architects and engineers:

- Are incorporating daylighting into some of their designs
- Have altered design elements as result of program’s training and technical assistance
- View potential cost issues as a barrier
- Believe a program offering training, technical assistance and real-life examples of daylighting should continue
<table>
<thead>
<tr>
<th>Design Element</th>
<th>% of Respondents*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Placement of windows</td>
<td>70%</td>
</tr>
<tr>
<td>Characteristics of glass specified</td>
<td>65%</td>
</tr>
<tr>
<td>Amount of installed electric lighting</td>
<td>65%</td>
</tr>
<tr>
<td>Use of shading devices</td>
<td>57%</td>
</tr>
<tr>
<td>Use of daylighting controls</td>
<td>51%</td>
</tr>
<tr>
<td>Sizing of cooling system</td>
<td>24%</td>
</tr>
</tbody>
</table>

*Pulled a sample of 89 from database of program participants*
## Appleton SD – Retrofit Savings from Daylighting

<table>
<thead>
<tr>
<th></th>
<th>Base case</th>
<th>Daylighting (with dimming)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Lights (kWh)</strong></td>
<td>2773</td>
<td>471</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(83% reduction)</td>
</tr>
<tr>
<td><strong>Equipment (kWh)</strong></td>
<td>890</td>
<td>890</td>
</tr>
<tr>
<td><strong>Pumps/auxiliary (kWh)</strong></td>
<td>156</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(36% reduction)</td>
</tr>
<tr>
<td><strong>Fans (kWh)</strong></td>
<td>1216</td>
<td>1216</td>
</tr>
<tr>
<td><strong>Total (kWh)</strong></td>
<td>5035</td>
<td>3664</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(27% reduction)</td>
</tr>
<tr>
<td><strong>Peak kW (September)</strong></td>
<td>2.2</td>
<td>1.6</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(27% reduction)</td>
</tr>
</tbody>
</table>
Daylighting –
A Controlled Experiment

Daylighting controls + high performance glazing =
- reduced electricity for lighting
- reduced HVAC loads
- a more pleasant environment

dimmable ballasts + light sensors to automatically adjust the level
electric lighting in response to the available daylight

reduced visible transmittance (VT) to reduce glare, and reduced
solar heat gain coefficient (SHGC) to reduce cooling load
Lighting savings

Overall: 41% savings (32% incl. interior rooms)
- Only considering sidelighting – very conservative approach
- Due to time of day when usage decreased, significant demand reduction
What could a program look like?

- Cannot take primary research and put in field
- More than one way to daylight a building – bldg type, climate and budget
- Use realistic examples for success stories
- Energy savings \textit{and} human performance benefits
- Not “state of the art” but “straight off the shelf”
- Incorporate strategy of working with product manufacturers
- Mix of “incentives” - $ measure, $ design grant, technical assistance, local examples of success
Light every building with only the sky
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