ComTAG Agenda – April 29, 2014

• Present scoring results
• Discussion, comments
• Discussion – Integrated Design Strategies
Total Scores for Final Six Technologies

<table>
<thead>
<tr>
<th>Technology</th>
<th>TAG Member Rating</th>
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<tbody>
<tr>
<td>Interior Storm Windows</td>
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<tr>
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<td><strong>NON-ENERGY</strong></td>
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<td><strong>READINESS</strong></td>
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**Legend**
- 1st place
- 2nd place
- 3rd place
2014 High Performance Commercial Buildings TAG

- Interior Storm Windows
- Intelligent Outlets, Commercial
- Mechanical Ventilation for Nighttime Cooling
- High Performance Elevators
- Natural Ventilation for Nighttime Cooling
- Daylight Redirecting Film

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Interior Storm Windows
Interior Storm Windows

- Static technology unlikely to malfunction
- Saving dependent on climate and HVAC energy use, and best for buildings with electric heating
- Risk of condensation and mold in air space?
- Energy savings estimates need more research
- Concern about savings persistence with acrylic that occupants may remove
Interior Storm Windows

- Acrylic likely has fewer solar control options
- Significant potential improvement with comfort, noise, and glare—but maintain enough transmittance for daylighting
- Good for maintaining historic appearance
- Scaling up supply should be no problem
- Local installers may need training
- Acrylic lower cost, better payback
• Precludes use of operable windows
• Some scored acrylic unit higher while others scored glass units higher
• Higher costs may make payback challenging
• There are plenty of single-pane commercial windows in the Northwest
• Less invasive and costly than window replacement
Mechanical Ventilation for Nighttime Cooling
Mechanical Ventilation Cooling

• Be sure increase in fan energy use adequately exceeds decrease in compressor energy use
• Critical to get controls right or energy use may increase, as happens with some economizers
• Occupants appreciate fresh air, better IAQ
• This is well understood and not new but under-adopted, but unclear why not
• Need to look into morning warm-up issue
Mechanical Ventilation Cooling

• Cost and payback for RTUs with DDC and those without are notable
• Utility modeling assistance may be required to assess performance of thermal mass
• If diurnal temperature swings and dryness of air in I-5 corridor cities is inadequate, adoption will be much lower
• May introduce security risks
High Performance Elevators

Energy Savings: 3.1
Non-Energy: 3.0
Readiness: 3.7
Adoption Ease: 2.8
Value: 2.2
Total: 3.3
High Performance Elevators

- Elevators use a small portion of total energy use
- Energy savings good only in low-rise buildings
- Improvements in speed and dispatch control are primary benefits, but user interface can be challenging
- New elevator technologies all seem ready for widespread use
High Performance Elevators

• Good for new construction but difficult and expensive for renovation unless it’s required,
• The expected life of elevators is long and they are often under long-term service contracts
• Reduced maintenance costs is a bigger driver than energy savings
Intelligent Outlets

• Energy savings depends on HVAC system efficiency, plug loads, and current plug load management; if occupants or IT already turn off loads at night, savings will be minimal.

• Granular reporting make this a good candidate for guarantied energy savings.

• If savings are as high as 40% of 60% of plug load, which is 20-40% of total energy use, savings could be 4-12% of total energy use.
Intelligent Outlets

- Good to try a few out before a big deployment
- Could be that monitoring plug load for a few months will identify waste, and afterwards a monitoring service fee isn’t cost-effective
- Could have occupant push-back if the wrong equipment (refrigerator, computer) is turned off and causes frustration
- Key to select most appropriate outlets & loads
Intelligent Outlets

- Products costs are likely to decline in the future; subsidize now
- Unclear how these tie into EMCS
- May have high cost and long payback
- Setup may be a complex process
- For non-ZNE buildings, local rather than networked controls are more cost-effective
Natural Ventilation for Nighttime Cooling
Natural Ventilation Cooling

• Additional operable windows and louvers may increase infiltration, decrease envelope R-value
• Need assistance and training from groups such as Dr. Brown’s lab at the University of Oregon
• Provide application guidelines
• Need affordable window and louver actuators
• Need to avoid adjacent pollution sources
• Need to respond to high wind and rain
Natural Ventilation Cooling

- Much easier in new construction and certain types of buildings and engaged occupants
- Thin buildings cost more to build and heat/cool
- Need to ensure heating costs don’t increase
Daylight Redirecting Film

- Energy Savings: 2
- Non-Energy: 3
- Readiness: 3
- Adoption Ease: 3
- Value: 2
- Total: 3
Daylight Redirecting Film

- Energy savings require proper installation, commissioning, and daylight harvesting
- Energy savings varies by orientation, and reported savings were for south-facing glass
- Occupants like sunlight, but productivity gains are difficult to quantify
- Film can decouple light and glare and double the daylight penetration from 15’ to 30’
Daylight Redirecting Film

• 1 sf of film can illuminate 50-100 sf of floor area
• Energy savings require open layout, clerestory, non-view windows, and daylighting controls, so not a good application in most buildings
• Energy savings depend on lighting system
• Daylighting is a great opportunity, and the film makes it more cost-effective and feasible
• Retrofit applications have too high payback
Daylight Redirecting Film

- Other architectural features can be used to reduce glare and improve daylight penetration
- Non-energy benefits are well accepted, even if they’re not well understood (spectrum, view, variability of light, connection to outside, etc.)
- Glare control is only on the upper windows
- May test film on top part of floor-to-ceiling windows without diffusion pane
Daylight Redirecting Film

- Unclear if window manufacturers are ready to install the film on their products
- 3M seemed reluctant to provide technical data
- Field test results are good but there’s room for improvements in efficiency and reduction of glare and cost
- Sunnier inland locations may be better applications than coastal locations
Daylight Redirecting Film

- May have limited number of manufacturers
- Manufacturers can likely ramp up well
- For many users, some demonstrations and tools may be needed for learning curve
- Applying film is common, but getting alignment correct will be the challenge
- Better for new construction than retrofit unless windows need replacement
Daylight Redirecting Film

- Costs likely to decline as usage increases
- Great applications are limited
- Could be hard to support with utility programs
- More research needed on economics
- More economical than light shelves
- Needs a motivated owner with deep energy savings goals
Thank you!!!

We appreciate your expertise, time and energy to make this a successful TAG!