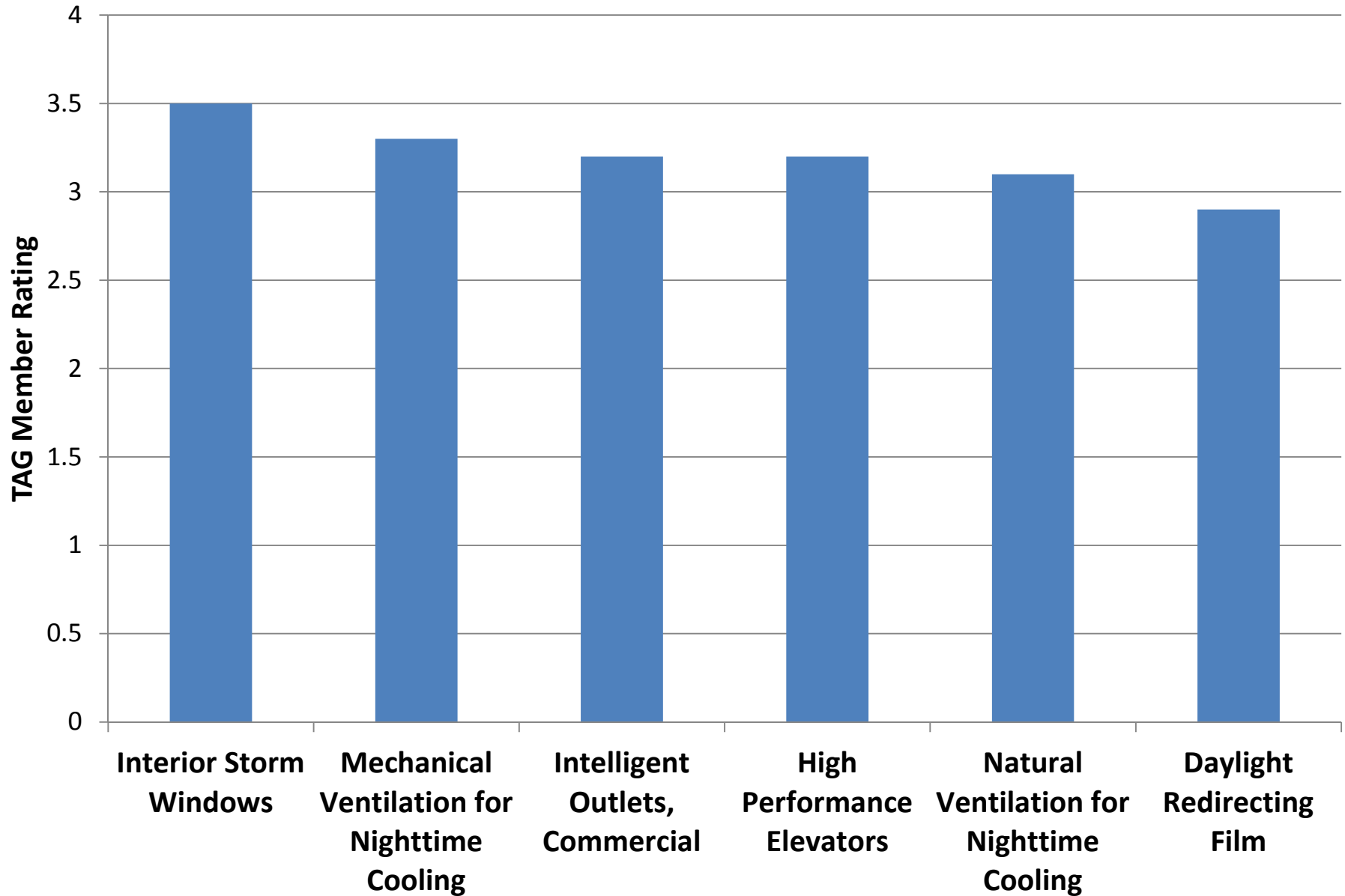


# ComTAG Agenda – April 29, 2014

- Present scoring results
- Discussion, comments
- Discussion – Integrated Design Strategies

## Total Scores for Final Six Technologies

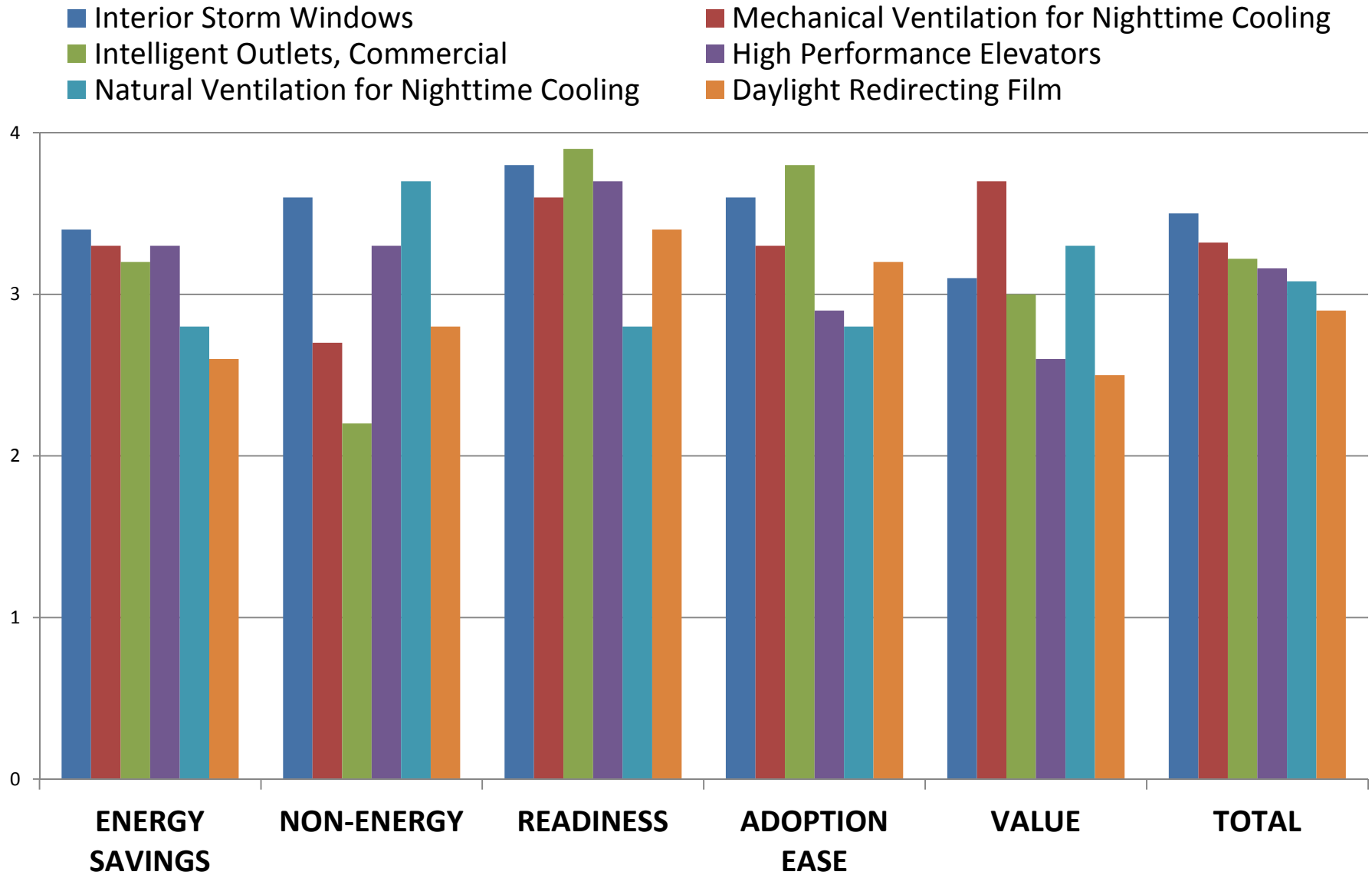


	Interior Storm Windows	Mechanical Ventilation for Nighttime Cooling	Intelligent Outlets, Commercial	High Performance Elevators	Natural Ventilation for Nighttime Cooling	Daylight Redirecting Film
<b>ENERGY SAVINGS</b>	3.4	3.3	3.2	3.3	2.8	2.6
<b>NON-ENERGY</b>	3.6	2.7	2.2	3.3	3.7	2.8
<b>READINESS</b>	3.8	3.6	3.9	3.7	2.8	3.4
<b>ADOPTION EASE</b>	3.6	3.3	3.8	2.9	2.8	3.2
<b>VALUE</b>	3.1	3.7	3.0	2.6	3.3	2.5
<b>TOTAL</b>	<b>3.5</b>	<b>3.3</b>	<b>3.2</b>	<b>3.2</b>	<b>3.1</b>	<b>2.9</b>

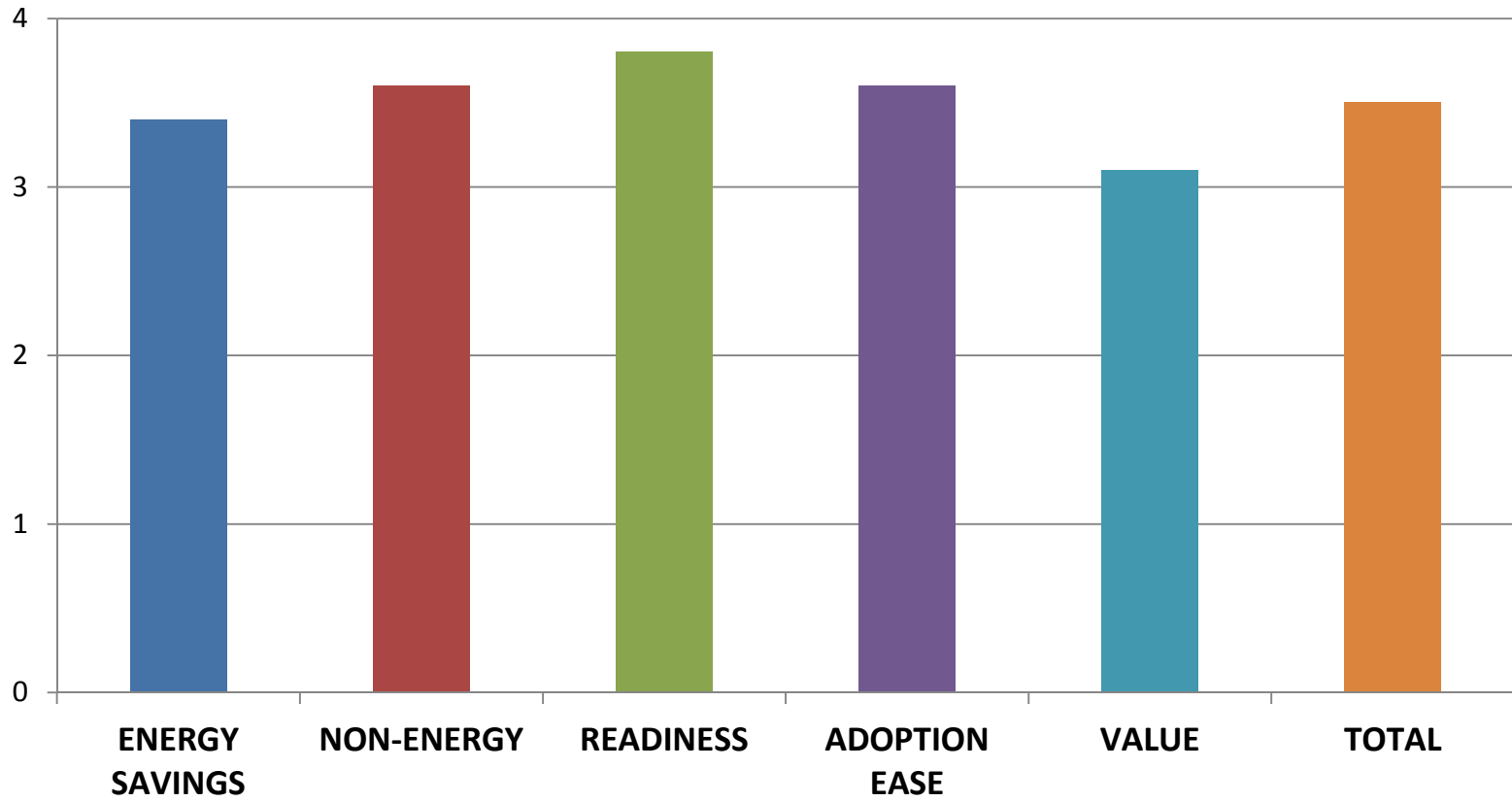
	Interior Storm Windows	Mechanical Ventilation for Nighttime Cooling	Intelligent Outlets, Commercial	High Performance Elevators	Natural Ventilation for Nighttime Cooling	Daylight Redirecting Film
<b>ENERGY SAVINGS</b>	<b>1</b>	<b>2</b>	4	<b>2</b>	5	6
<b>NON-ENERGY</b>	<b>2</b>	5	6	<b>3</b>	<b>1</b>	4
<b>READINESS</b>	<b>2</b>	4	<b>1</b>	<b>3</b>	6	5
<b>ADOPTION EASE</b>	<b>2</b>	<b>3</b>	<b>1</b>	5	6	4
<b>VALUE</b>	<b>3</b>	<b>1</b>	4	5	<b>2</b>	6
<b>TOTAL</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>

<b>Legend</b>
1st place
2nd place
3rd place

# 2014 High Performance Commercial Buildings TAG



# 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

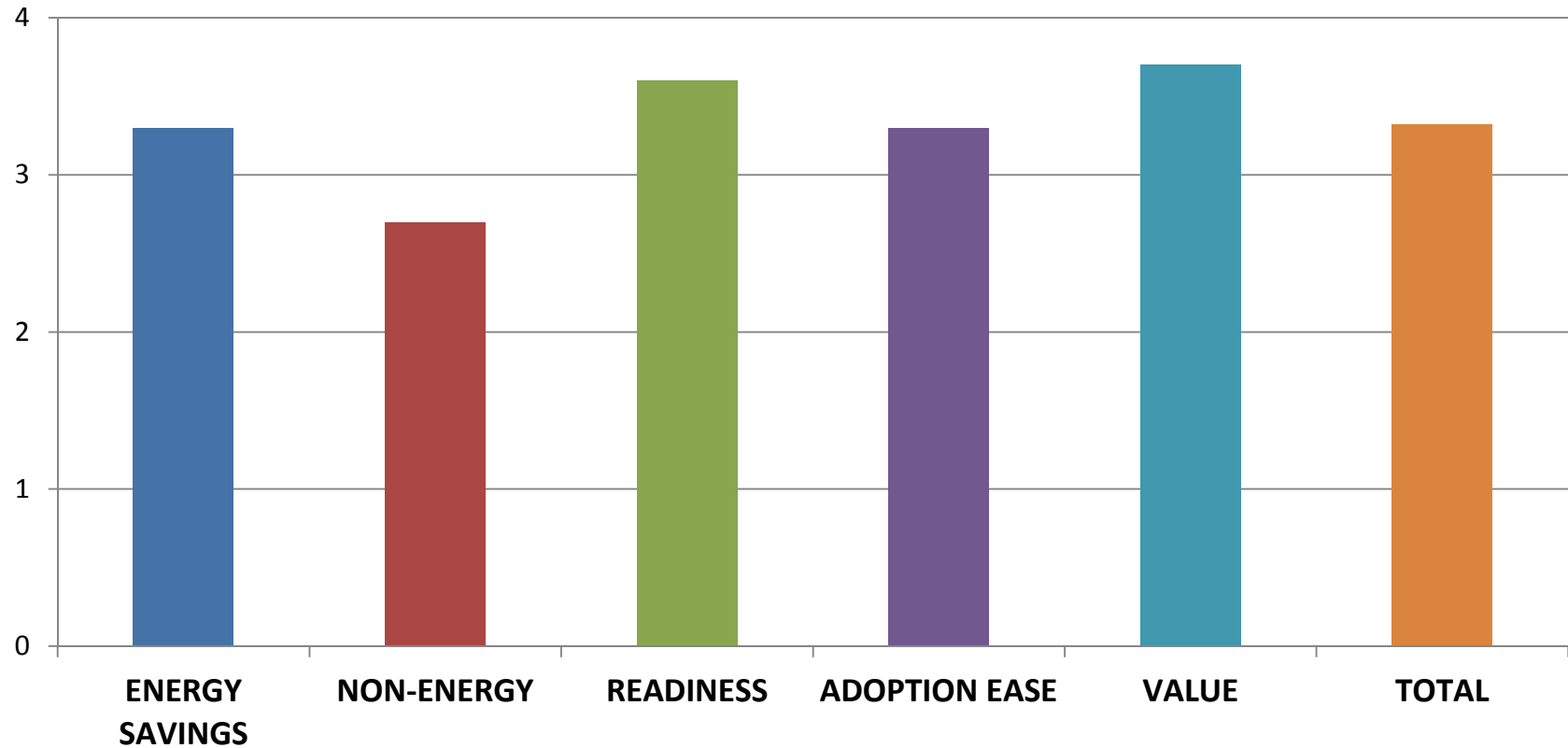
- Acrylic likely has fewer solar control options
- Significant potential improvement with comfort, noise, and glare—but maintain enough transmittance for daylighting
- Good for maintaining historic appearance
- Scaling up supply should be no problem
- Local installers may need training
- Acrylic lower cost, better payback

# Interior Storm Windows

- 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



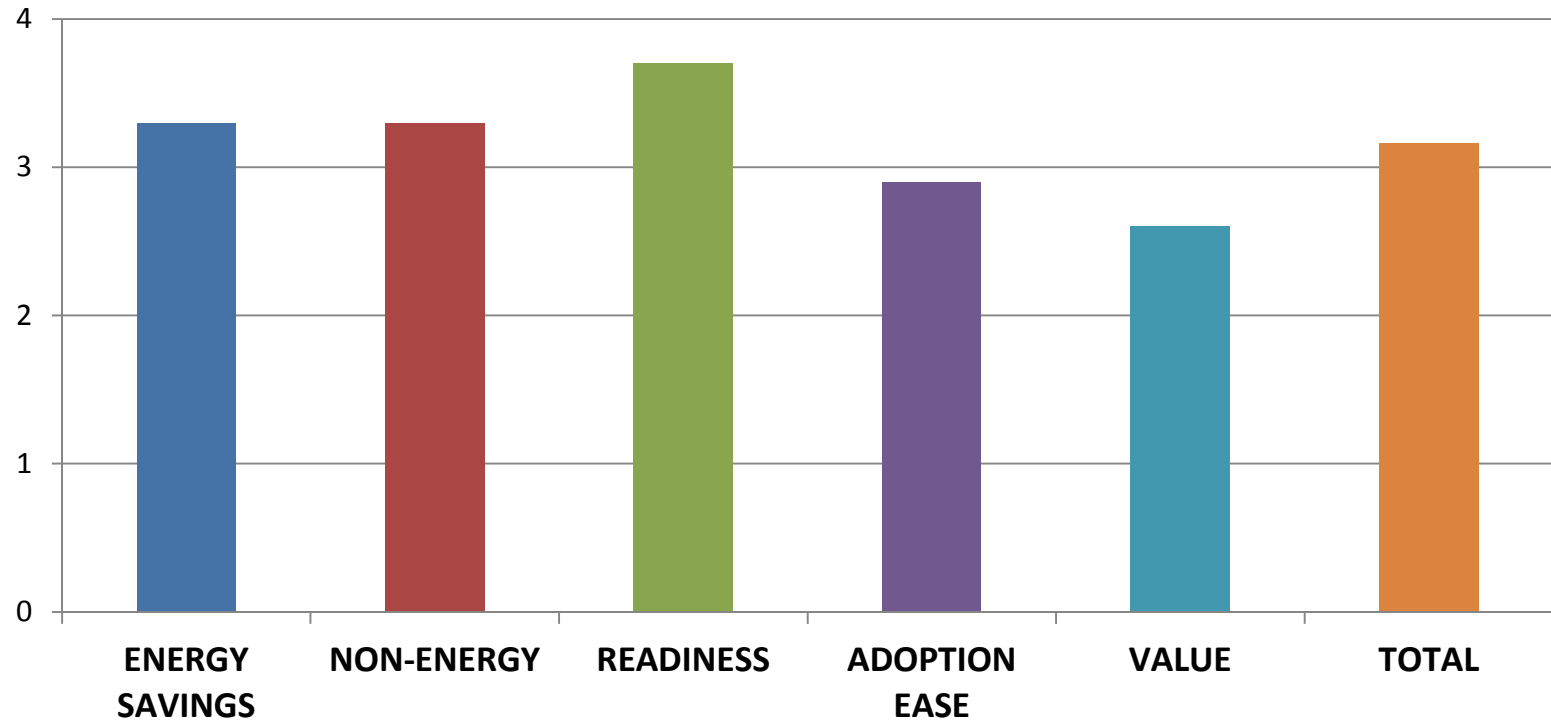
# Mechanical Ventilation Cooling

- 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



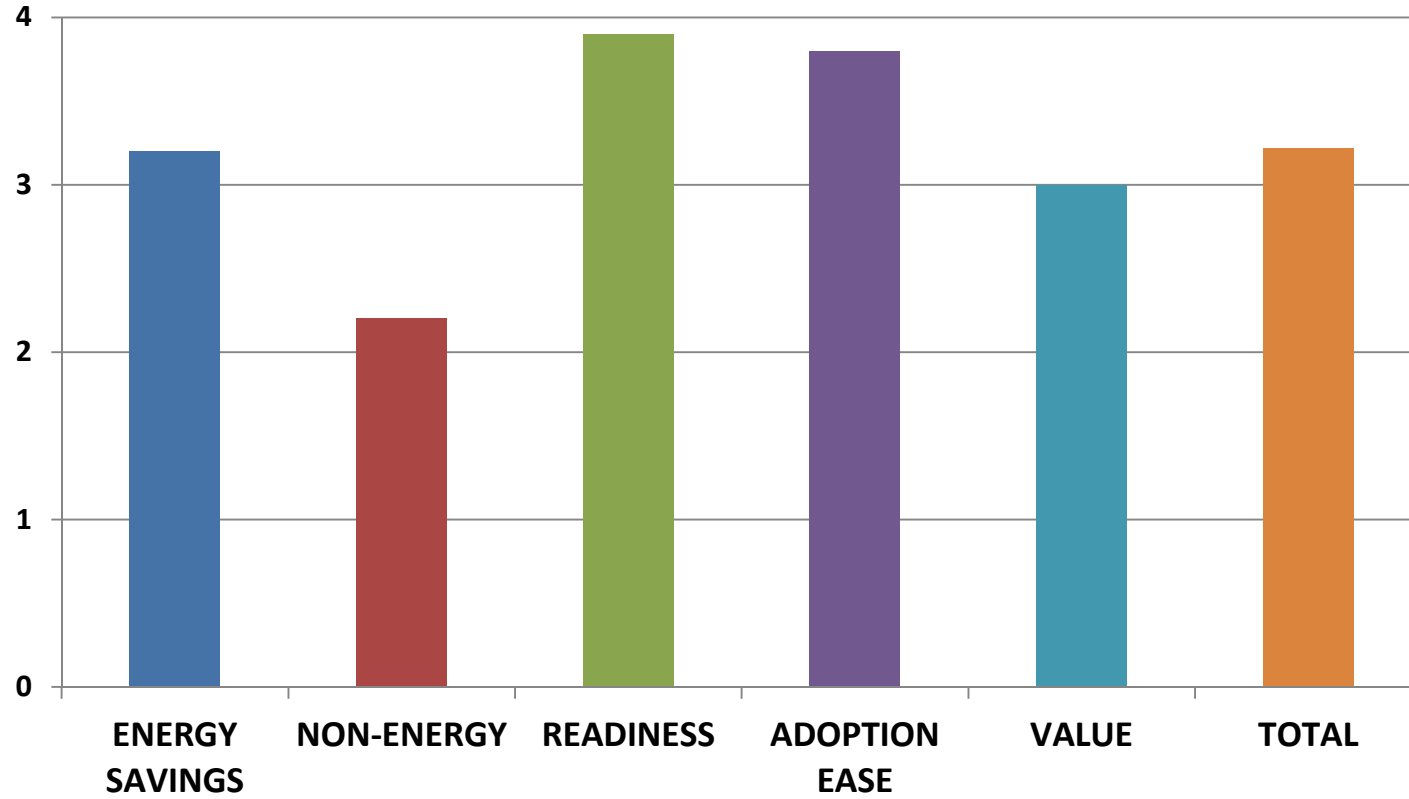
# High Performance Elevators

- 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, Commercial



# 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 guaranteed 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



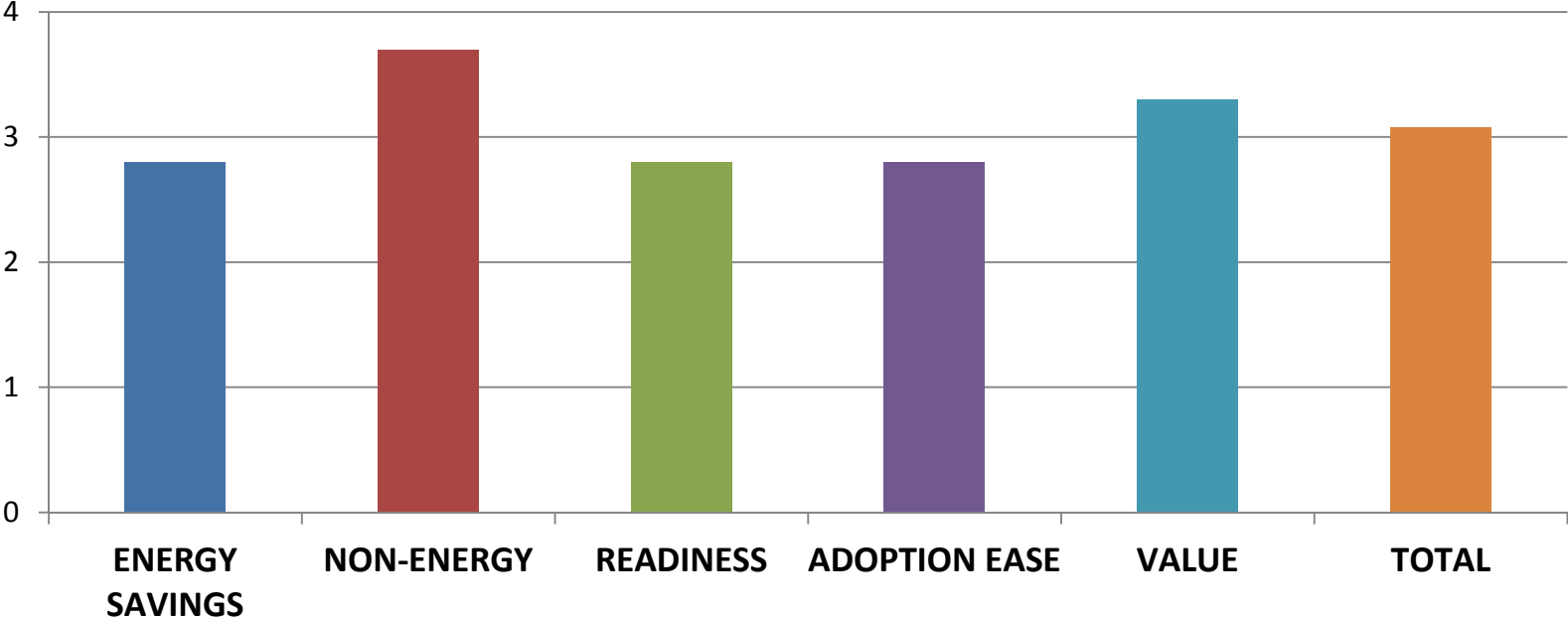
# Intelligent Outlets

- 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



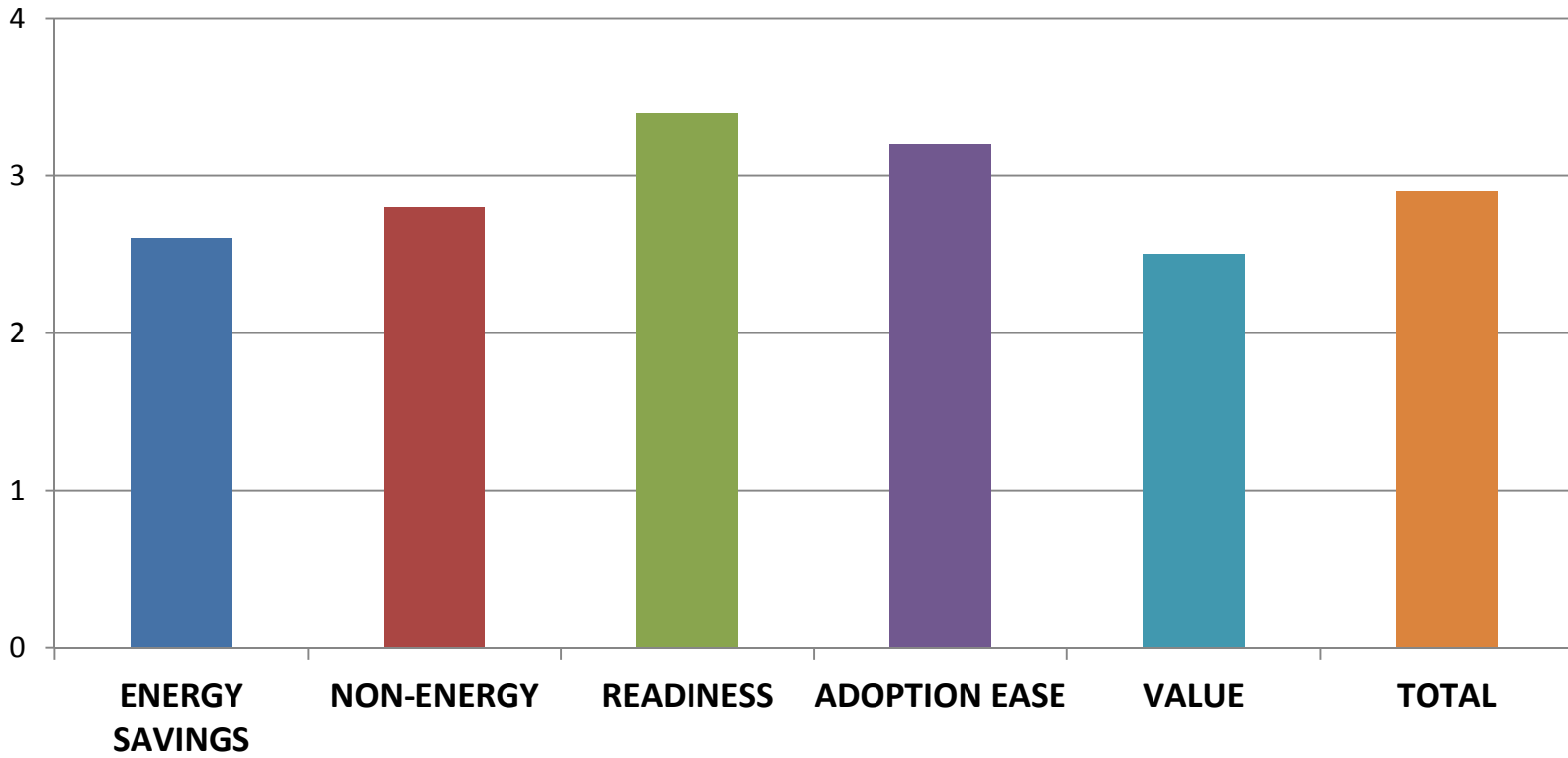
# Natural Ventilation Cooling

- 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



# 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 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!