LUTRON®

LIGHTING CONTROL INSTITUTE

Why Dim?

Why Dim?

Agenda

What Impact Does Lighting Control Have on Commercial Buildings

- Costs / Revenues
  - Energy Savings
  - Availability of Power; Demand Response; Avoiding Penalties
  - Productivity Gains
  - Government Incentives
- Prestige
  - LEED Buildings
- Increased Utilization of Space
  - Vertical Market Specifics

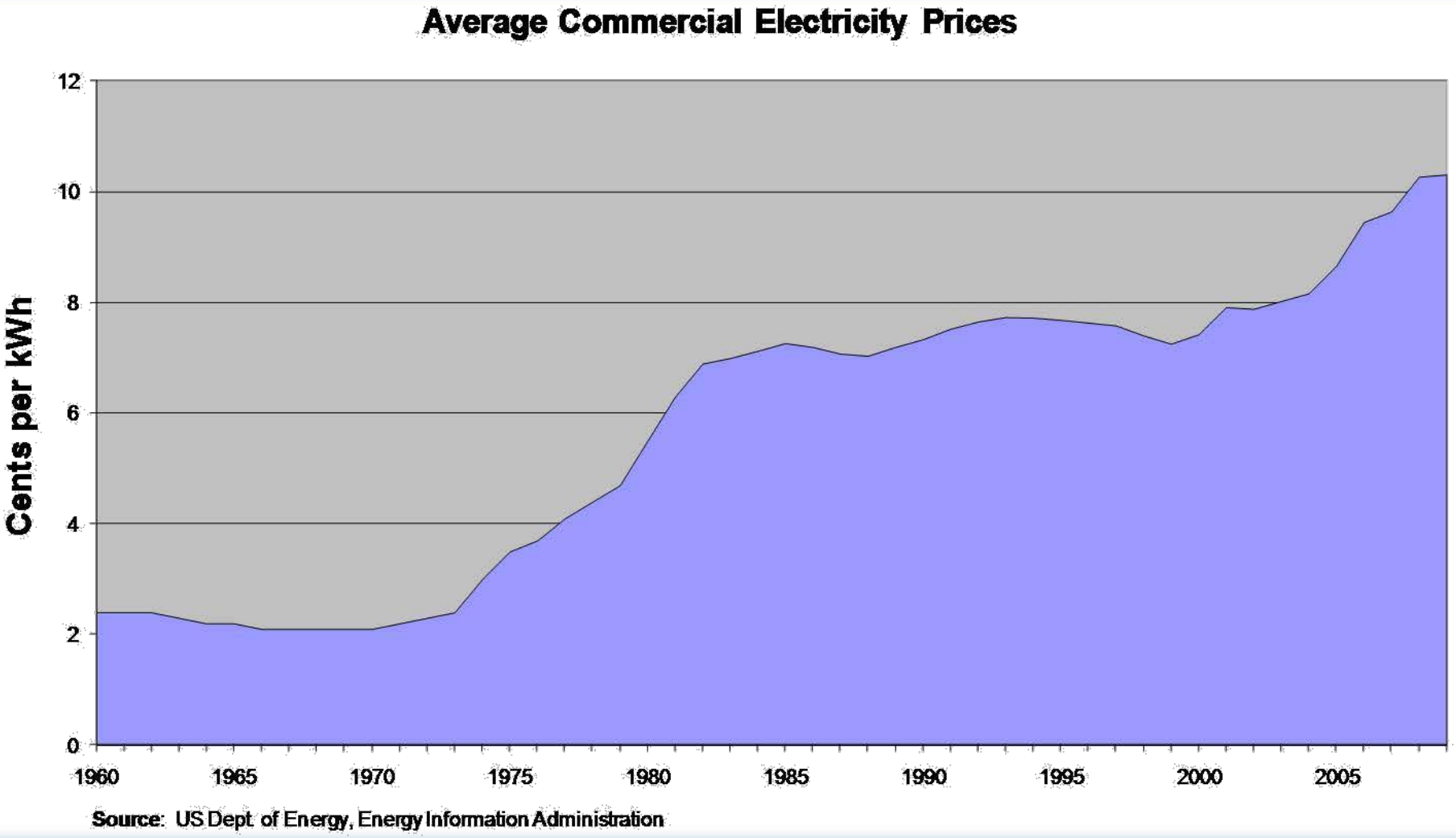
Why Dim?

Why has Energy Usage Become Such a Hot Topic?

World energy consumption
is projected to increase
by 44% from 2006 to 2030

Source: U.S. Department of Energy

Why Dim?


Average Commercial Electricity Prices
Cents per kWh
12
10
8
6
4
2
0
1960
1965
1970
1975
1980
1985
1990
1995
2000
2005
Source: US Dept of Energy, Energy Information Administration

Why Dim?

The Plan of Attack

“The biggest gains in terms of decreasing the country’s energy bill, the amount of carbon dioxide we put into the atmosphere, and our dependency on foreign oil, will come from energy efficiency and conservation in the next 20 years.”

Steven Chu
Secretary of Energy

Why Dim?

Attack the Low Hanging Fruit

Energy saving strategies are often looked at with trepidation…

- Are they convenient?
- Is its impact worthwhile?

Energy saving strategies with lighting add convenience and have a strong impact to the bottom line:

Source: Energy Information Administration, 2003 Commercial Buildings Energy Consumption Survey, released September 2008

Why Dim?

Savings Can Be Easily Achieved

"Most buildings don't deliver the right amount of light where and when it is needed. Lighting is often set at a 'worst case' level, which is usually higher than desired."

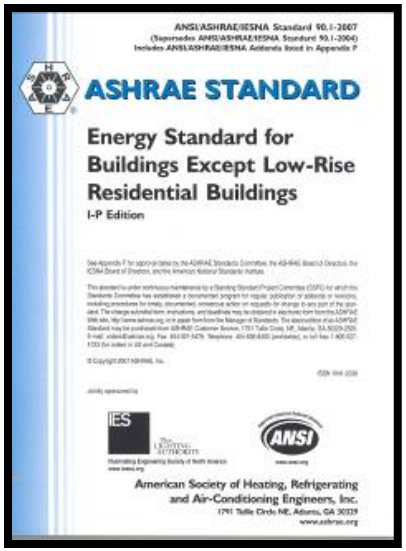
– Stephen Selkowicz LBNL

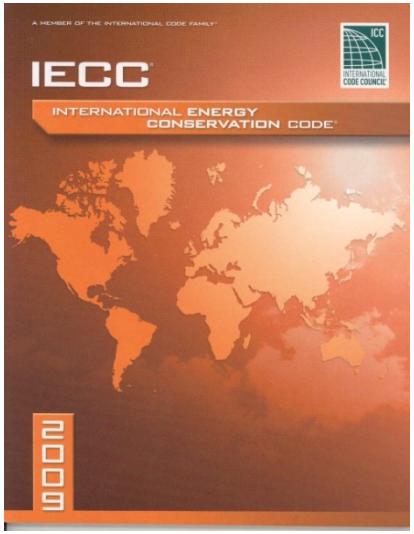
Why Dim?

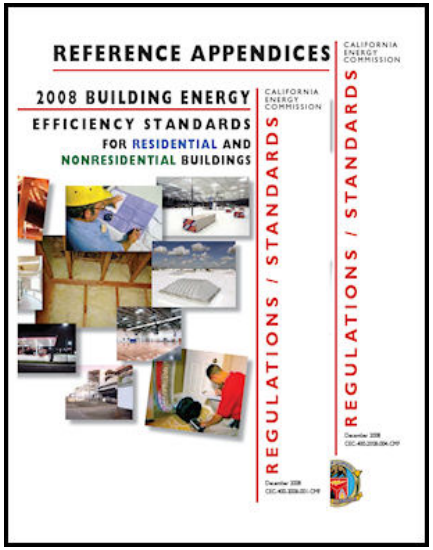
…You May Have to Do It Anyway…

Upcoming Code Revisions

- Mandatory Lighting Control Requirements
- Watts / Square Foot Incentives







Why Dim?

Dimmers Save Energy

As the lights dim, less energy is used

- Incandescent
- Halogen
- Fluorescent
- LED

A Lutron commercial dimmer typically saves $85.68 per year over a standard switch

Resources at www.lutron.com/energy

- Energy Calculator
- White Paper: Financial Analysis

Why Dim?

How Does Lighting Control Help?

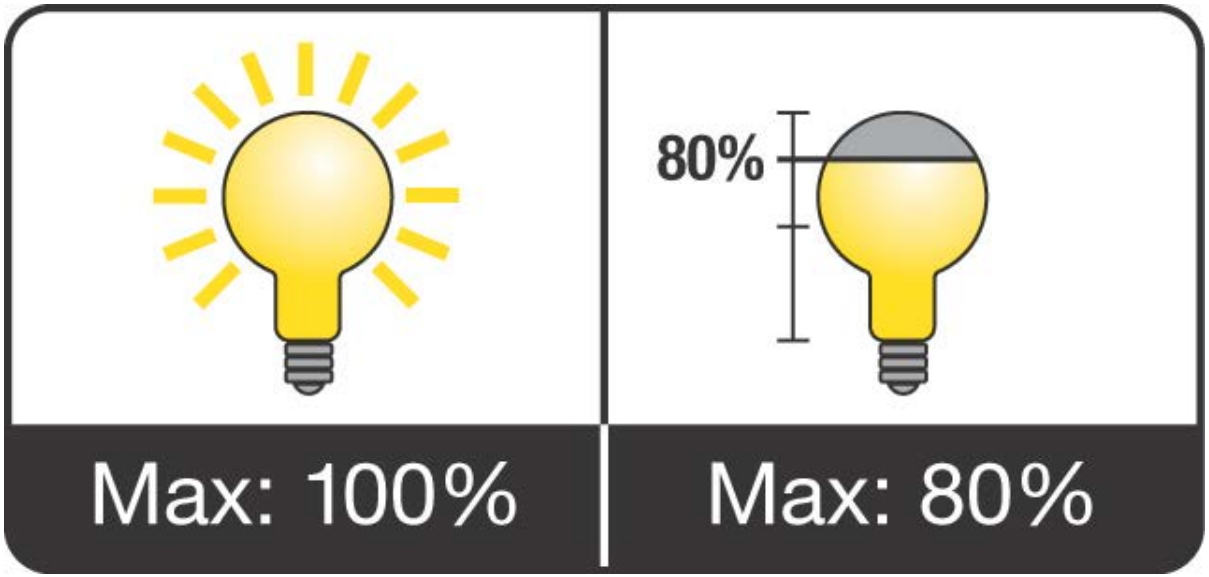
Dimmers save energy,
but that's only
a piece of the story…

Lutron solutions incorporate
as many as seven
different strategies for
saving energy…

Why Dim?

High-End Trim/Tuning

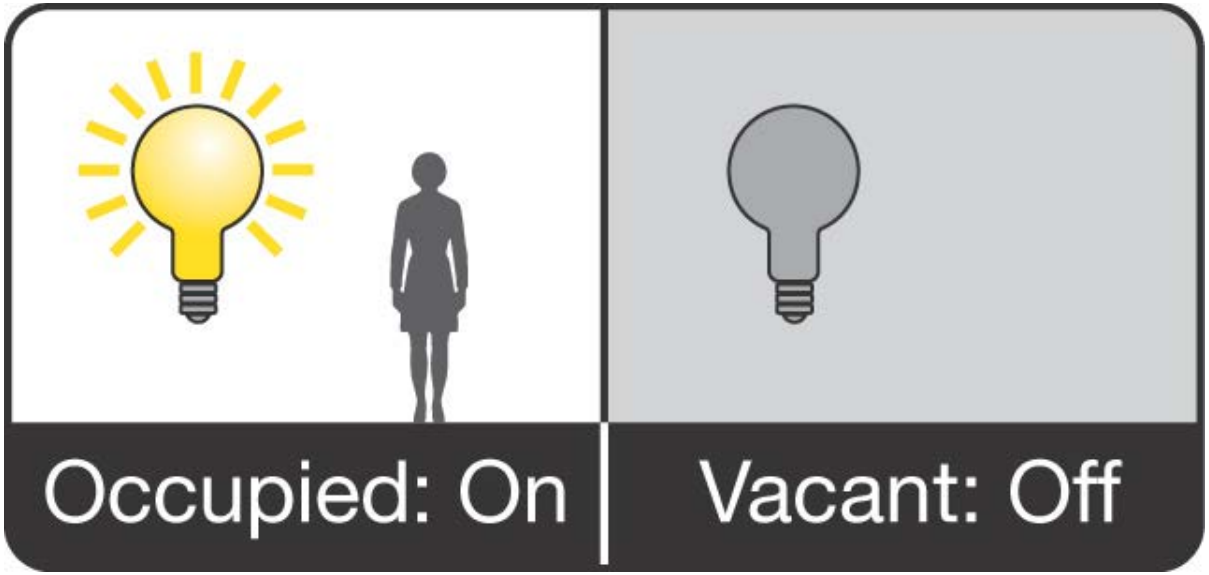
Limit the maximum light output of fixtures



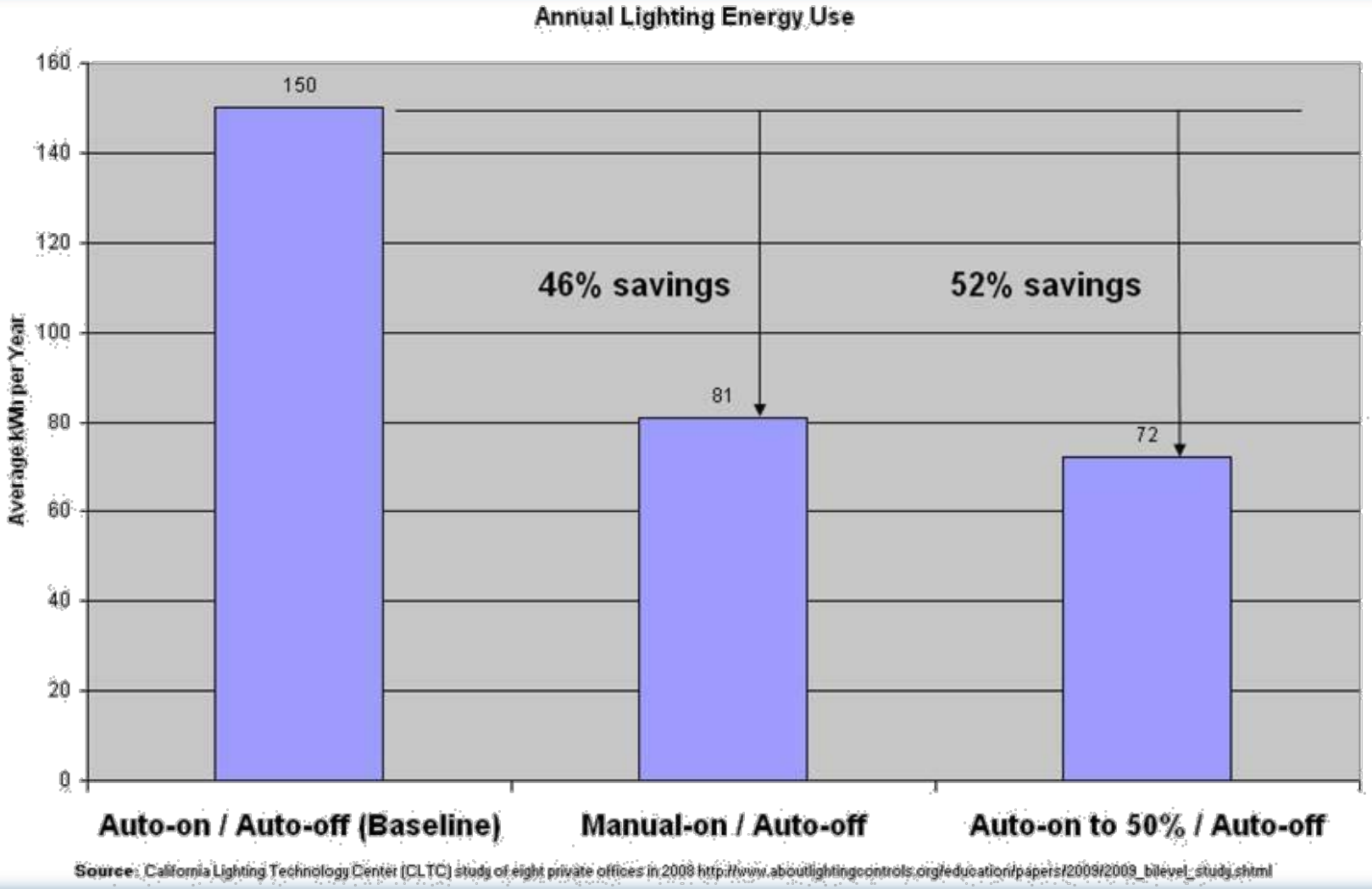
Why Dim?

Occupancy / Vacancy Sensing

Turns lights off when people vacate the space



Why Dim?

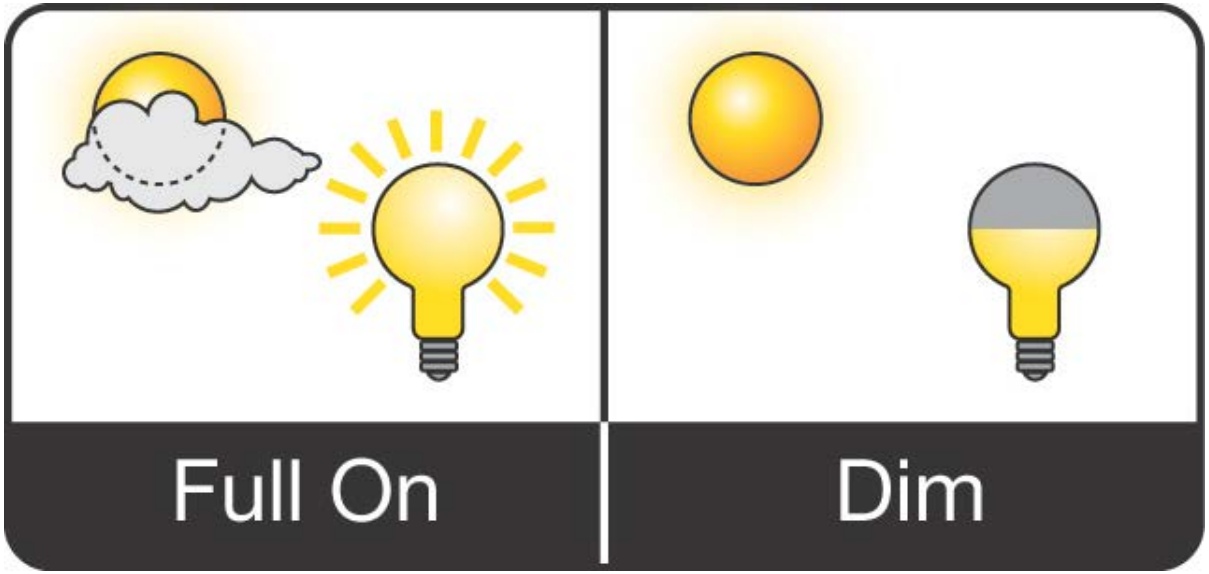


Source: California Lighting Technology Center (CLTC) study of eight private offices in 2008 http://www.aboutlightingcontrols.org/education/papers/2009/2009_bilevel_study.shtml

Why Dim?

Daylight Harvesting

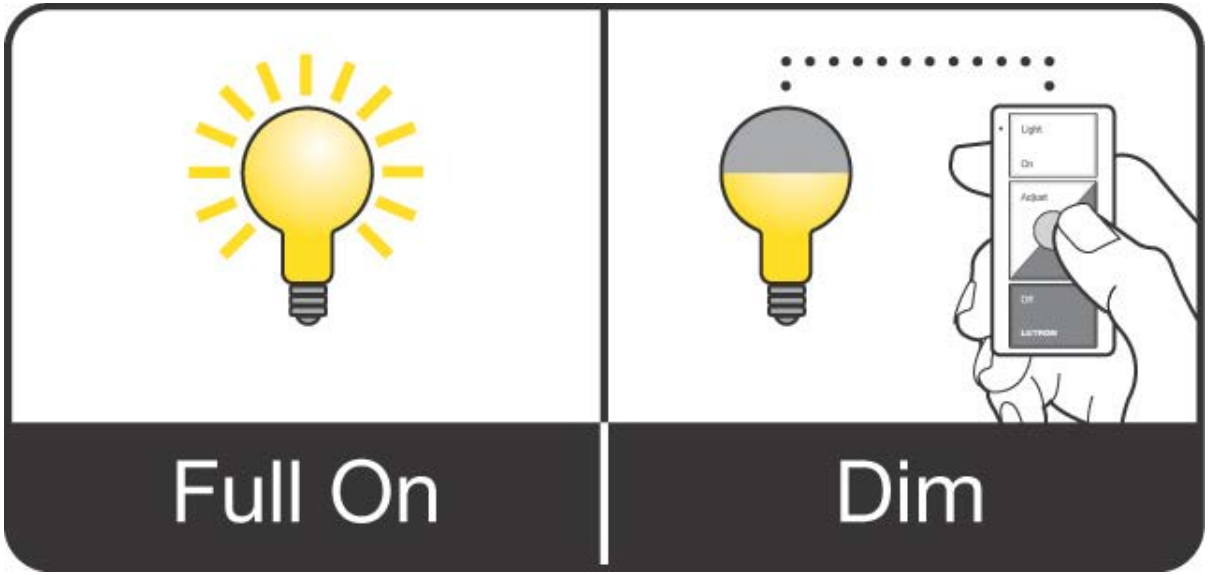
Dims fixtures to take advantage of available daylight



Why Dim?

Personal Dimming Control

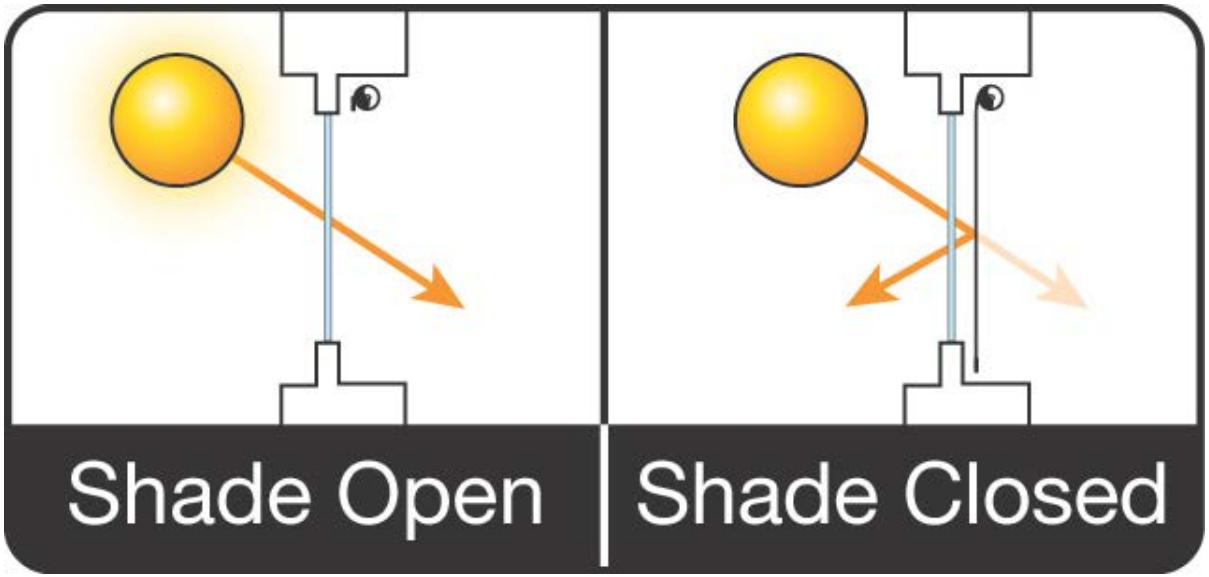
Gives occupants control of the lighting



Why Dim?

Controllable Window Shading

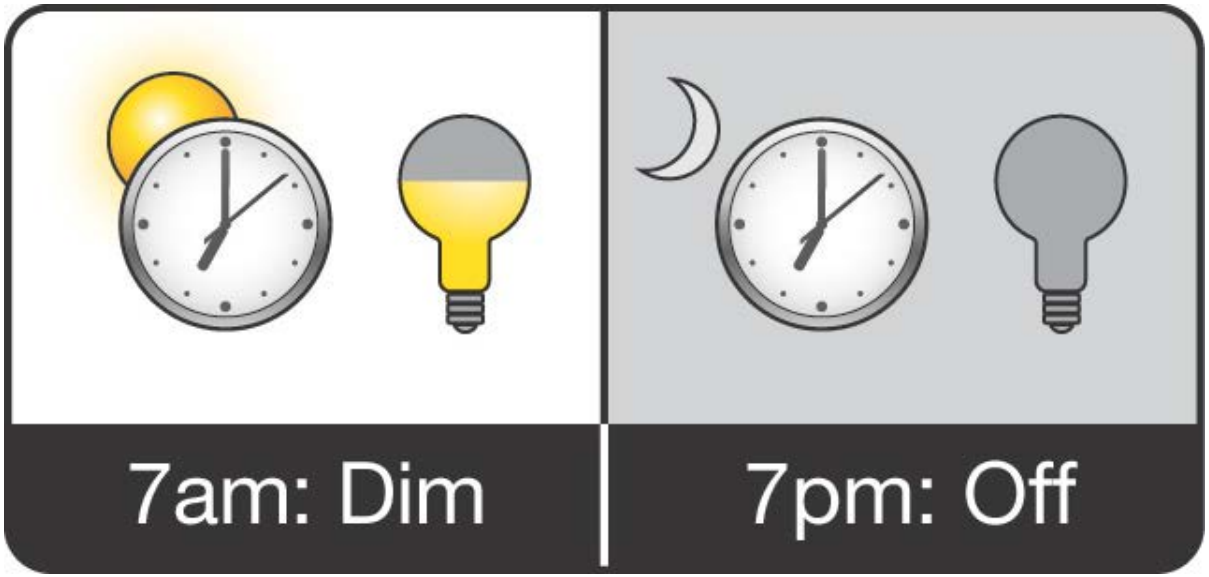
Reduces glare and solar heat gain



Why Dim?

Scheduling

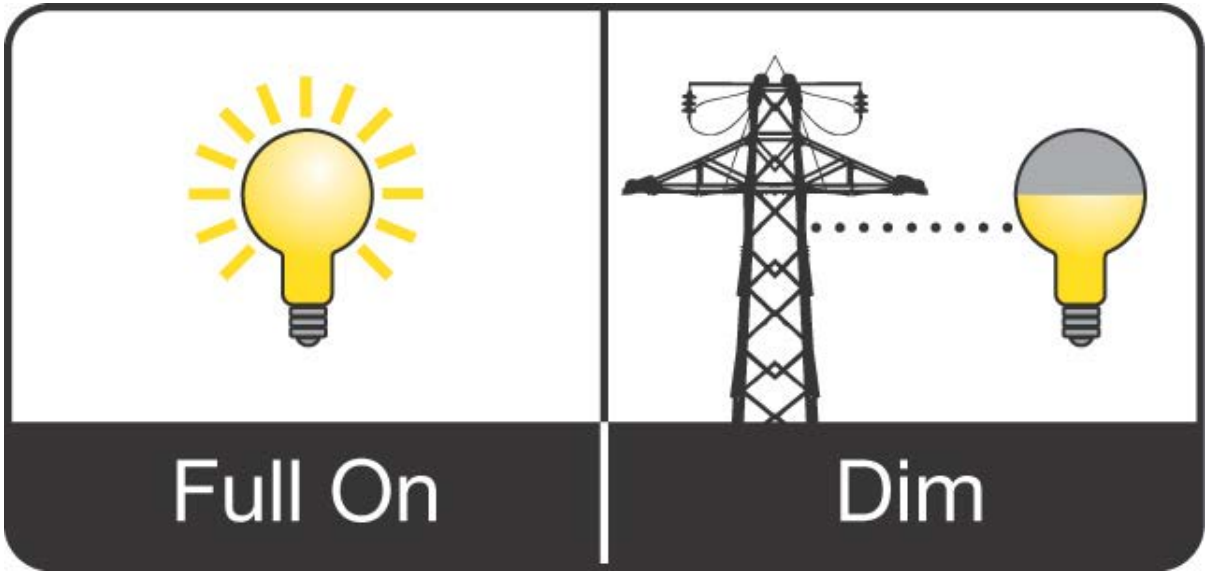
Controls light levels based on time of day or astronomical events



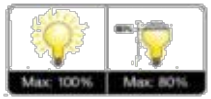
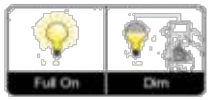
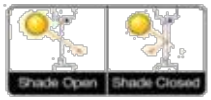
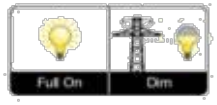
Why Dim?

Demand Response

Sheds lighting load during peak energy usage times



Why Dim?

Strategy	Maestro Wireless®	GRAFIK Eye® QS	Energy Savr Node™	Quantum®
 High-end trim			X[1]	X
 Occupancy/vacancy sensing	X	X	X	X
 Daylight harvesting	X	X	X	X
 Personal dimming control	X	X	X	X
 Controllable window shading		X		X
 Scheduling		X	X[2]	X
 Demand response			X[1]	X

1 Available with Ecosystem ESN only
2 Available by connecting to GRAFIK Eye QS integral timeclock

Why Dim?

Lighting Controls Save Energy

Lighting contributes to heat,
which contributes to
air-conditioning costs

Though it varies by region,
by saving energy on the lighting,
you are also saving
an additional percentage
in HVAC costs

Typical Lighting Impacts on HVAC Use by Climate
HVAC interaction with lighting savings

Location	Cooling loads
Phoenix, AZ	-30%
Los Angeles, CA	-23%
San Francisco, CA	-16%
Denver, CO	-16%
Tampa, FL	-33%
New Orleans, LA	-29%
Detroit, MI	-14%
Philadelphia, PA	-17%
Providence, RI	-13%
Knoxville, TN	-21%
Seattle, WA	-7%

Advanced Lighting Guideline, New Buildings Institute, Inc., 2003

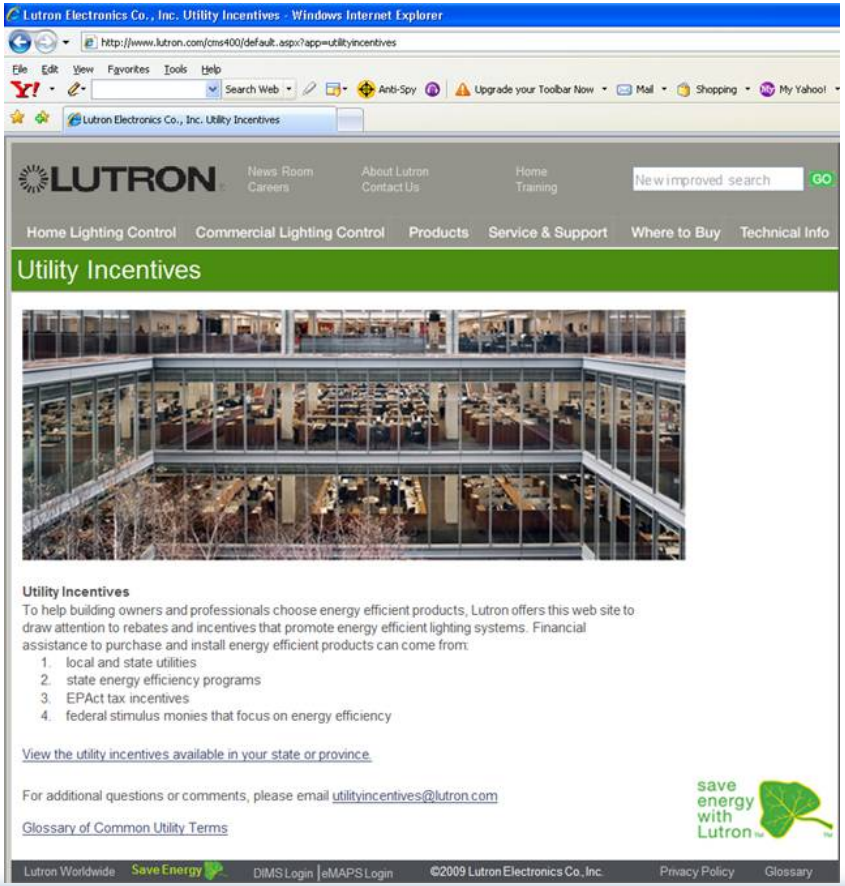
Why Dim?

Lighting Controls Provide Incentives

In addition to conserving energy,

Lutron lighting controls can further reduce costs by qualifying the facility for government sponsored financial incentives

- http://www.lutron.com/incentives



Why Dim?

Lighting Controls Improve Productivity

Productivity can easily be increased by giving building occupants control over their visual environment

- Provide optimal lighting for each task
- Reduce eye strain, worker fatigue, and absenteeism

Resource: www.lutron.com/energy

- White Paper: Improving Productivity

Why Dim?

Lighting Control Provide Prestige

LEED 2009

- Light control can contribute to 40 or more out of the 110 possible points in LEED NC 2009

Why Dim?

Opportunities are Everywhere

The challenge is identifying the proper lighting control strategy that best suits each particular environment

This is where Lutron can help!

Why Dim?

Opportunities in Office Buildings

Lighting Control Saves Energy & Increases Productivity

- Between conference rooms, bathrooms, private offices, & utility areas, there are many opportunities for reducing energy consumption on floor space that is over-lit, yet underutilized
- Open offices are key candidates for intelligent daylight harvesting strategies
- Studies show strong correlation between quality of light & worker fatigue / absenteeism

Why Dim?

Opportunities in Healthcare

Lighting Control Enhances the Healthcare Experience

- Patient control can contribute to the quality of stay & rate of healing
- Patient control reduces demand on hospital staff
- Better lighting provides increased productivity & reduces errors
  - Reading charts
  - Dispensing medications
  - Working on computers

Why Dim?

Opportunities in Hospitality

Lighting Control Enhances Guest Experiences & Manages Costs

- Guests encounter a subtle approach for utilizing energy saving strategizes while being exposed to a simplified, yet luxurious, experience
- Guestroom conveniences and forward appearances differentiate one hotel from the next
- Conference Rooms & Ballrooms are made more versatile for multiple functions
- Basic controls & sensors minimize energy usage in the ‘Back of House’ areas

Why Dim?

Opportunities in Education

Lighting Control Saves Energy & Improves the Learning Environment

- Studies indicate a direct correlation between good lighting and student progress
- Specific programs use lighting controls as learning tools through energy metering & curriculum based resources
- Control strategies allow gymnasiums & multi-purpose rooms to significantly reduce energy costs and improve versatility

Why Dim?

Opportunities in Entertainment

Lighting Control Seamlessly Provides Ambiance

- Lighting scenes & extended fade-rates allow subtle, drawn-out transitions throughout the day that allow customers to appreciate the experience without distraction
- Automated control reduces the staff workload and minimizes the opportunities for confusion & error

Why Dim?

Opportunities are Everywhere

Lighting controls enhance any commercial facility's triple bottom line:

- The People
- The Planet
- The Profits

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