

# Controllable Linear Fluorescent Ballasts

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# Mass Save Lighting Incentive Programs

## *Background Info*

- Retrofit and New Construction Programs
- Product Codes are designed to promote use of energy efficient lighting products (lamps, ballasts, luminaires)
  - 11 of the 17 new construction product codes are for linear FL systems
  - 13 of the 26 retrofit product codes are for linear FL systems
- Measure Codes are designed to promote using efficient lighting only when you need it.
  - 7 measure codes are for installing controllable systems

# Mass Save Lighting Incentive Programs

## *Background Info*

- Mass Save Measure Codes
  - 61 – Remote Occupancy Sensors
  - 62 – Daylight Dimming System
  - 63 – Occupancy Sensors w/ Step Dimming
  - 64A – Wall Mount Occupancy Sensors
  - 64B – Wall Mount Vacancy Sensors
  - 65 – Photocell Sensors
  - 68 – High Bay FL Fixture Occupancy Sensors

# Fluorescent Electronic Ballasts

## *Linear Fluorescent Ballast Product and Application Trends*

Most ballasts now are range voltage ballasts (120-277Vin)

High Performance ballasts readily available for T8's (HPT8)

Higher Efficiency ballasts for other lamp types, not just T8

Programmed Rapid Start ballasts

Occupancy/Vacancy sensor controls

Photo sensor controlled (daylight harvesting/daylight dimming)

Dimming Ballasts

- Bi-level or Multi-level (step dim)

- Continuous Dimming

- DALI Continuous Dimming

- Demand Response Dimming

# T8 Fluorescent Electronic Ballasts

## *Primary Ballast Types – IS vs PS*

### Instant Start T8 (IS):


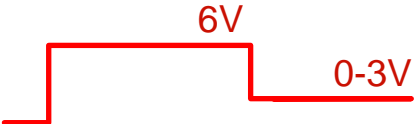
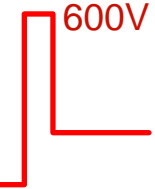
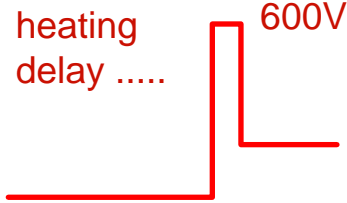
- Most efficient (no coil heat)
- Short lamp life in short cycle applications
- Lower Cost
- Available in CEE qualifying HPT8 versions in low, normal, and high BF

### Programmed Rapid Start T8 (PRS or PS):

- Becoming just about as efficient as IS ballasts
- Best combination of switching cycles and lamp life
- Much longer lamp life in short cycle applications
- Higher Cost
- Available in CEE qualifying HPT8 versions in low, normal, and high BF

# T8 Fluorescent Electronic Ballasts

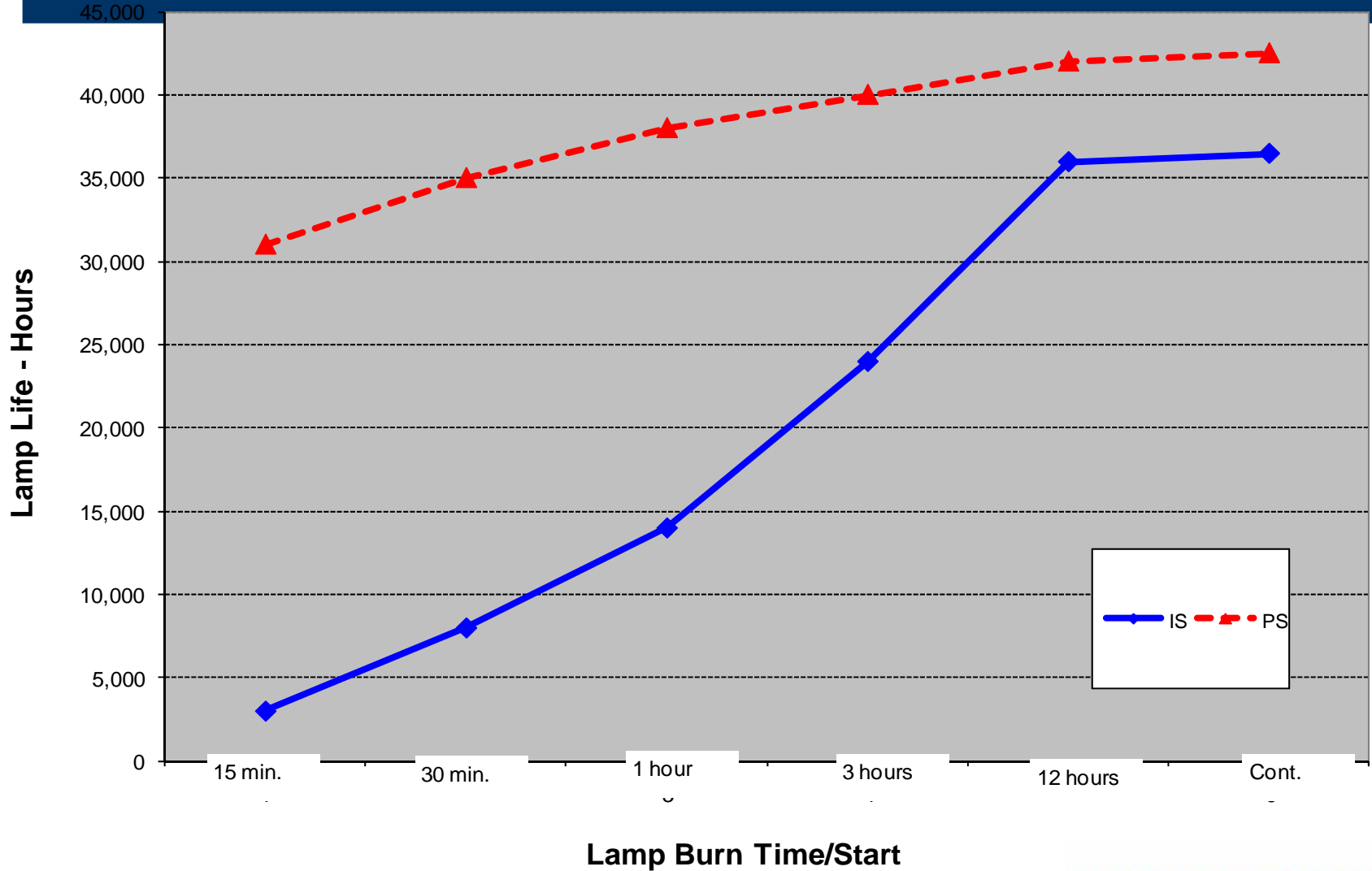
## Primary Ballast Types – IS vs PS

	<u>Instant Start</u>	<u>Programmed Rapid Start</u>
Cathode Voltage		
Starting Voltage		
Start Cycles	10k to 20k	Up to 100k+
Start Temp	-20° F	0° F
Input Power (2 Lamp <sup>1</sup> )	55W	55W
Wiring	Parallel	Some Series, Some Parallel
Lamp Life <sup>2</sup> (3hrs/start)	24,000hrs	40,000hrs
Lamp Life <sup>2</sup> (15min/start)	3,000hrs	31,000hrs

<sup>1</sup> IS system wattage based on SylvaniaQHE ISN ballast w/ 32W lamps.

<sup>2</sup> Based on Sylvania 800XP, 800XPS, or 800XP/SS series lamps

# LONG LIFE T8 LAMP LIFE CURVES



# Controllable T5 & T8 Ballasts



**OSRAM**  
**SYLVANIA**





# HPT8 Programmed Start



Ideal for  
Occupancy  
Sensors

- **Low Ballast Factor (0.71)**
- **Normal Ballast Factor (0.87)**
- **High Ballast Factor (1.15)**
  - **Parallel operation**
  - **90°C Max. Case Temperature**
  - **UL Type CC**
  - **LSC (Lamp Striation Control)**
  - **Universal Voltage (120-277V)**
  - **0°F Starting (60°F reduced wattage lamps)**
  - **Applications:**
    - **High bay**
    - **Warehouses**
    - **Occ. Sensors**



# HPT8 High Efficiency Bi-level

**NEMA**  
**Premium**

Easily switch from 100% to 50% with standard wall switches

Available in normal and low ballast factor for 2ft, 3ft, and 4ft T8 lamps

Example of 2-lamp Normal BF

*55 watts @ 0.87 BF*

*27 watts @ 0.37 BF*

CEE qualifying HTP8 ballast

Meets energy code switching requirements

- California Title 24
- ASHRAE
- EPACK

Programmed Start

- Extends lamp life
- Occ. Sensor compatible

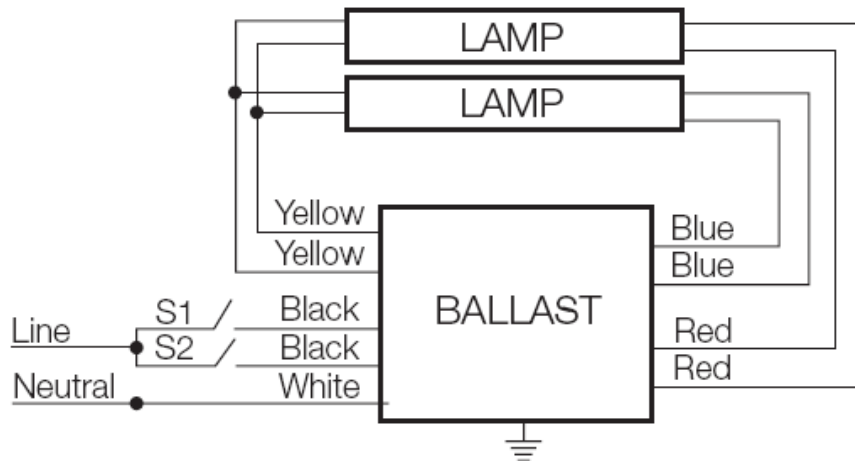
Applications: Offices, schools & conference rooms



# HPT8 High Efficiency Bi-level Systems

**NEMA**  
**Premium**

## *T8 Bi-level Systems*



### 2-Lamp QHES (QUICKSTEP)

Full light output (full power)	S1 & S2 closed (on)
Bi-level mode (50% power)	S1 or S2 open (off)



# T5HO Bi-Level System

## 54W T5HO Ballast

### Two light levels

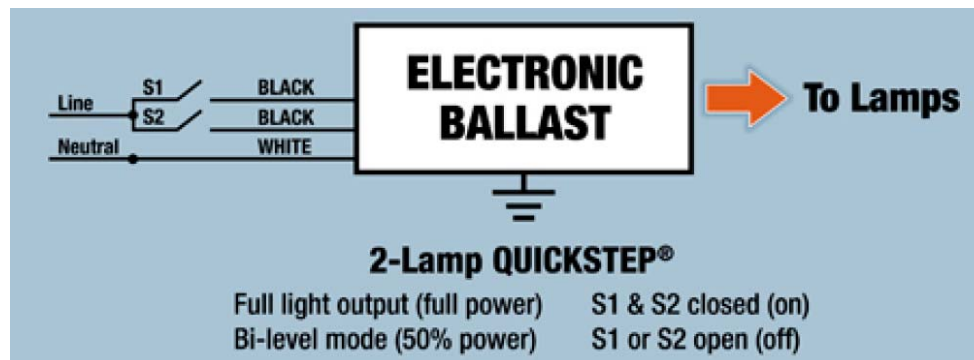
**96 watts @ 0.80 BF**

**52 watts @ 0.40 BF**

- Meets Energy Code Requirements  
California Title 24 Compliant, ASHRAE, EPACK
- Applications: Offices, Schools, Conference Rooms



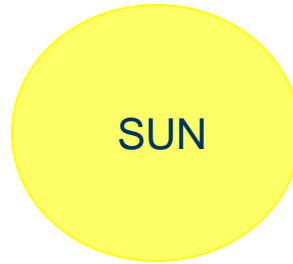
Ideal for  
Occupancy  
Sensors



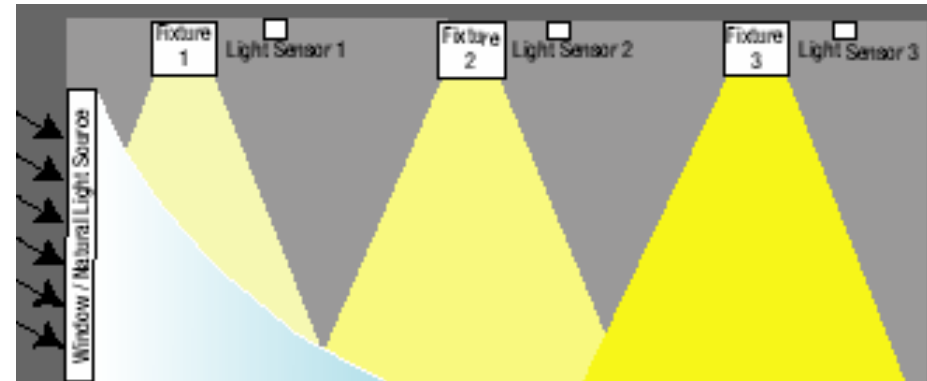
# Daylight Harvesting – Continuous FL dimming

It's sunny ..

Save money \$\$\$\$

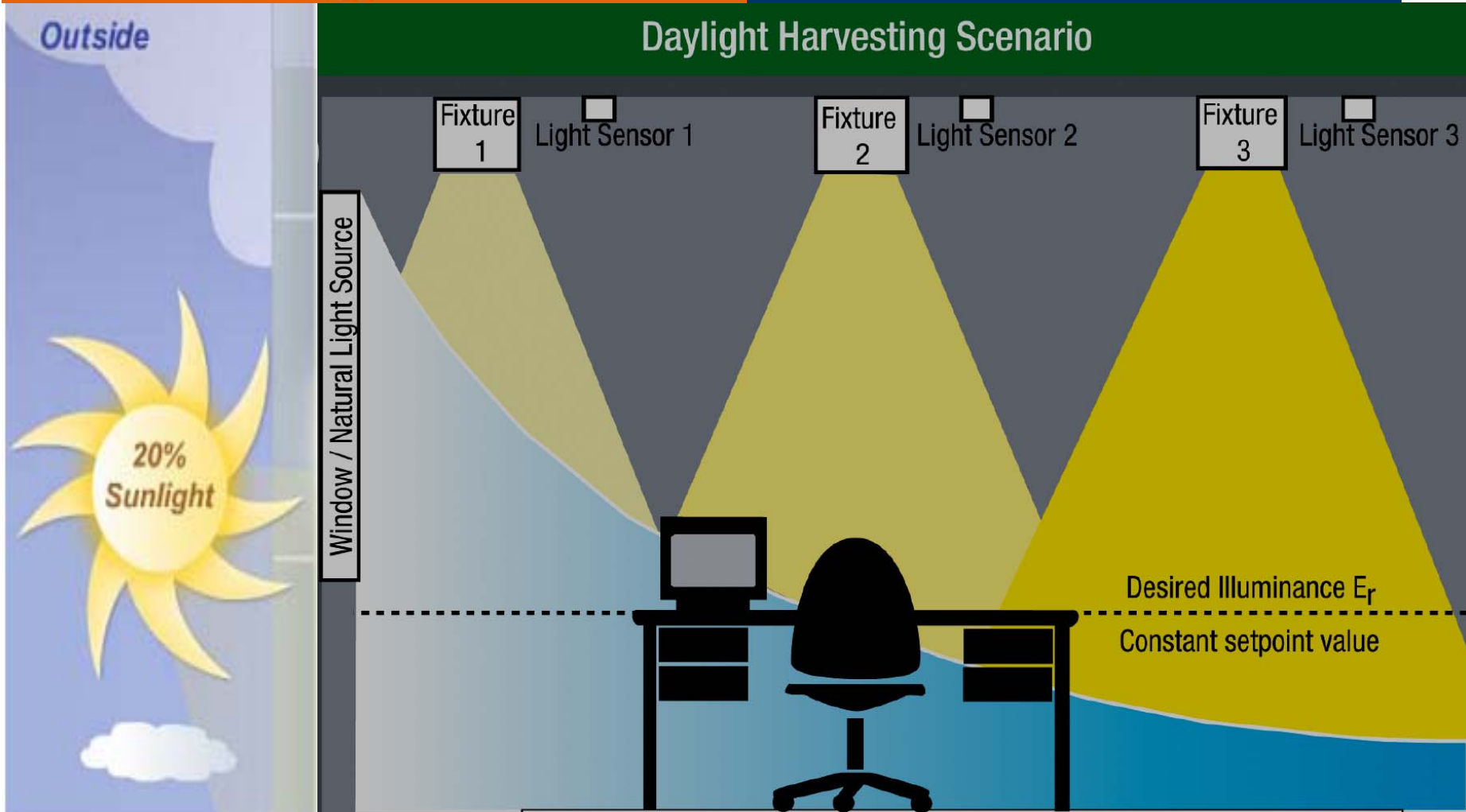


- Sun gets brighter ...  
less power required to light office
- Sun goes behind cloud ...  
more power required to light office



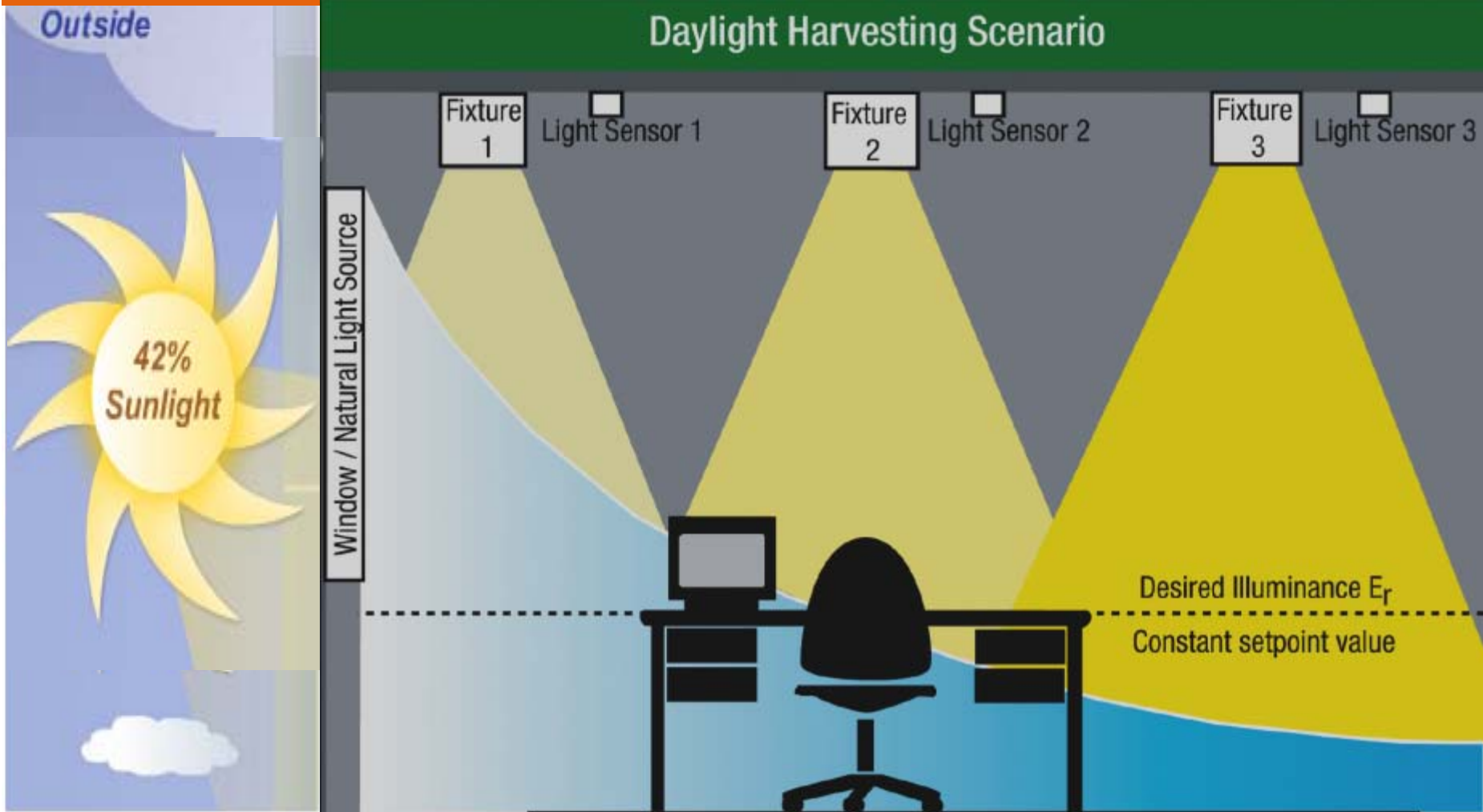
# Daylight Harvesting or Building Automation Applications:

## Dimming



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## Dimming

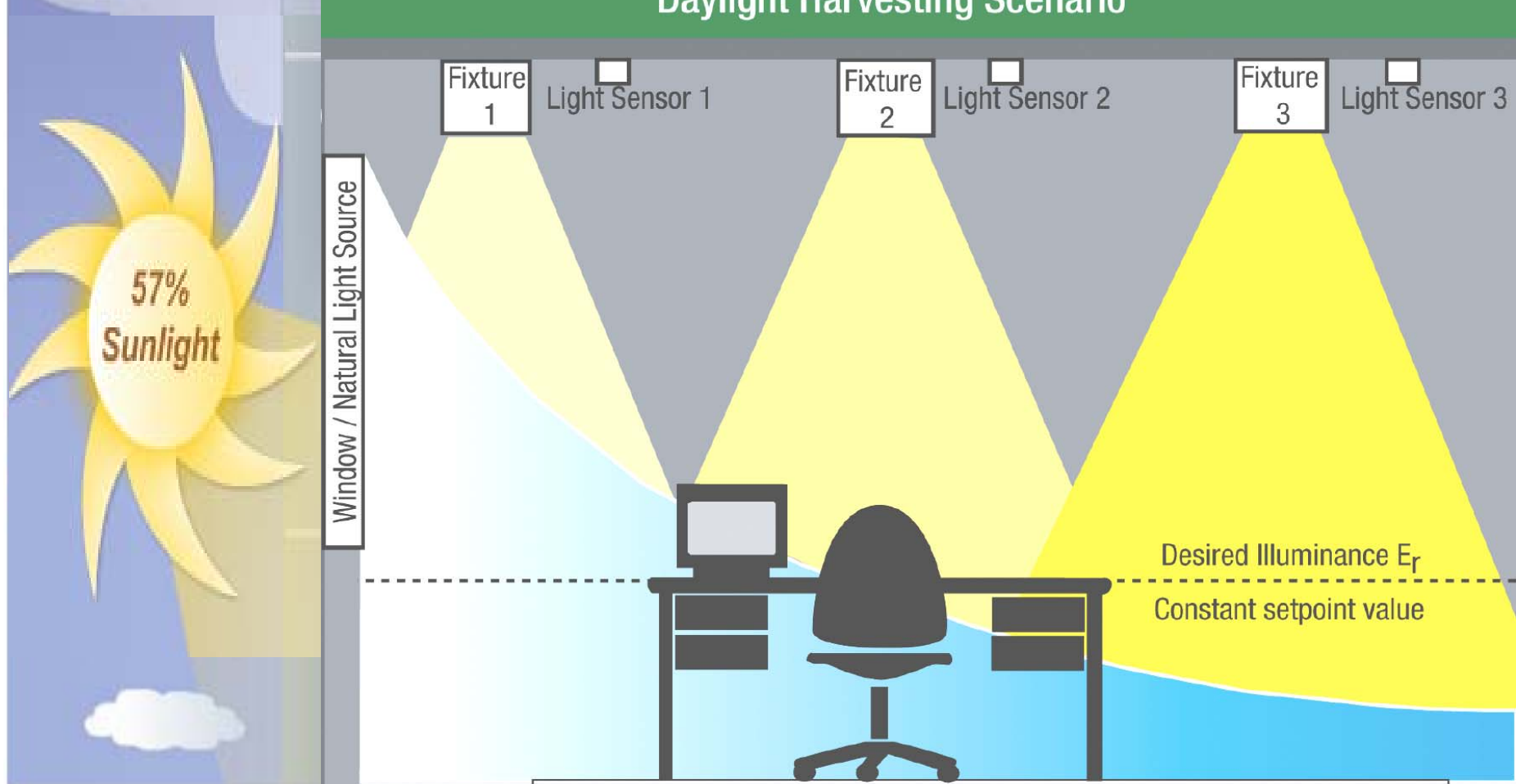


# Daylight Harvesting or Building Automation Applications:

## Dimming

Outside

### Daylight Harvesting Scenario



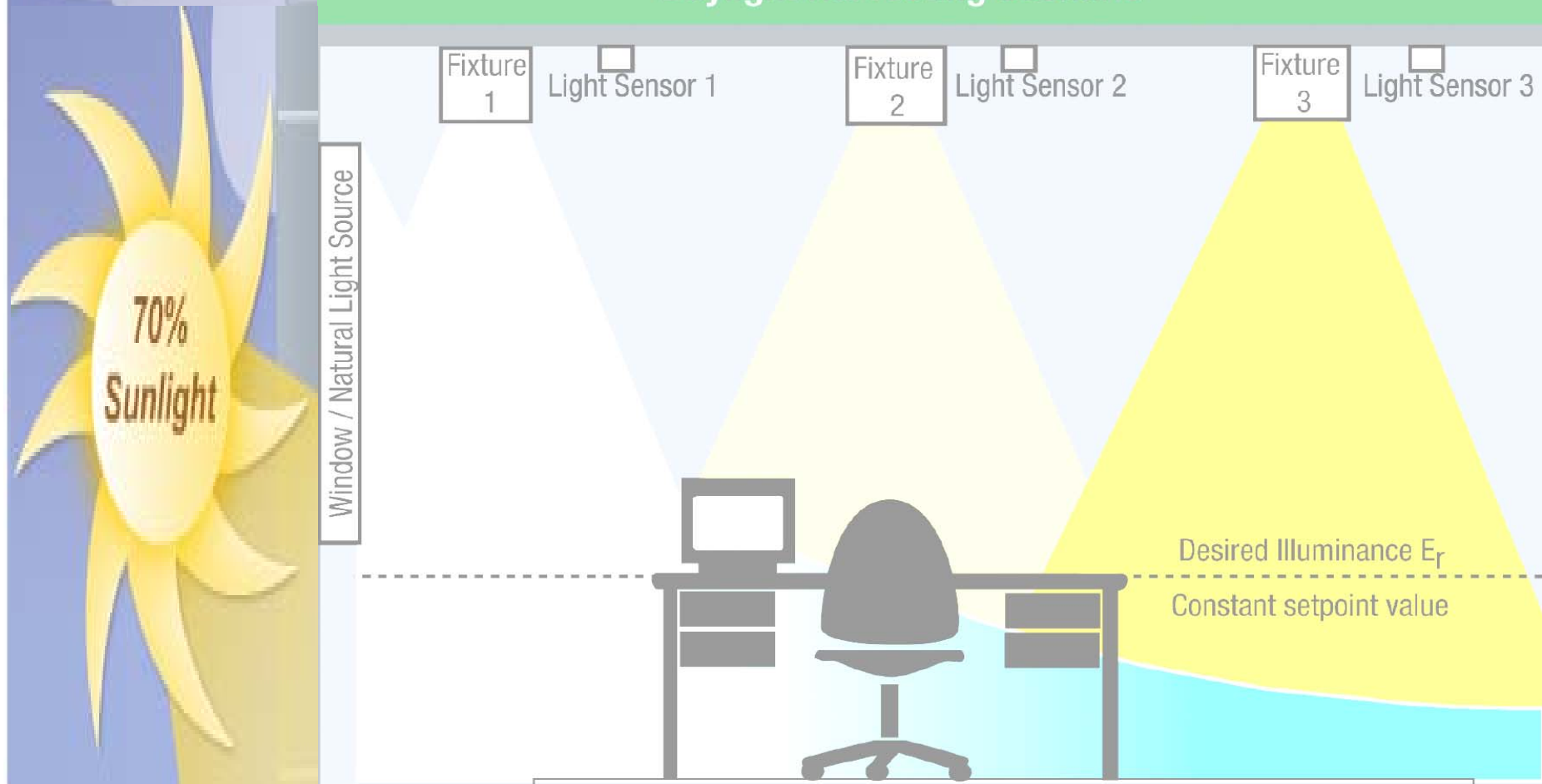


# Daylight Harvesting or Building Automation Applications:

## Dimming

Outside

### Daylight Harvesting Scenario



# Continuous FL Dimming



100%

Great for conference rooms and offices

Simple to install and operate

All you need is...



T8 5%  
T5 1%

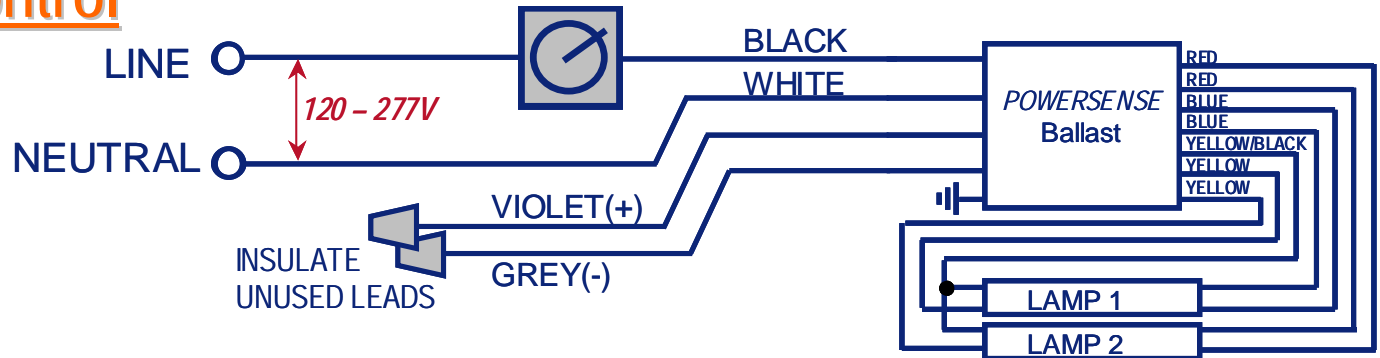


No control wires if using 2 wire fluorescent power-line controls

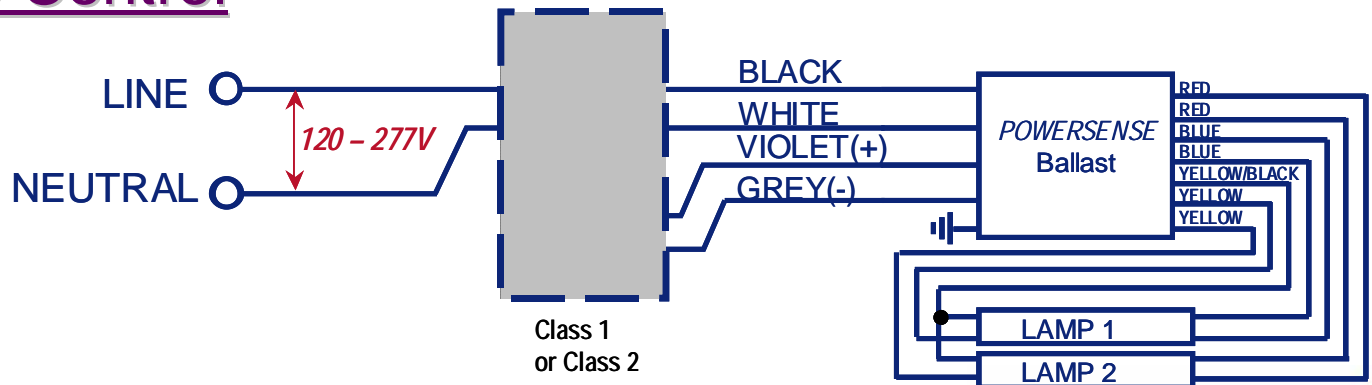
# Continuous FL Dimming

2-Wire or 4-Wire... Choose the control type that best fits your project:

## Power-line Control

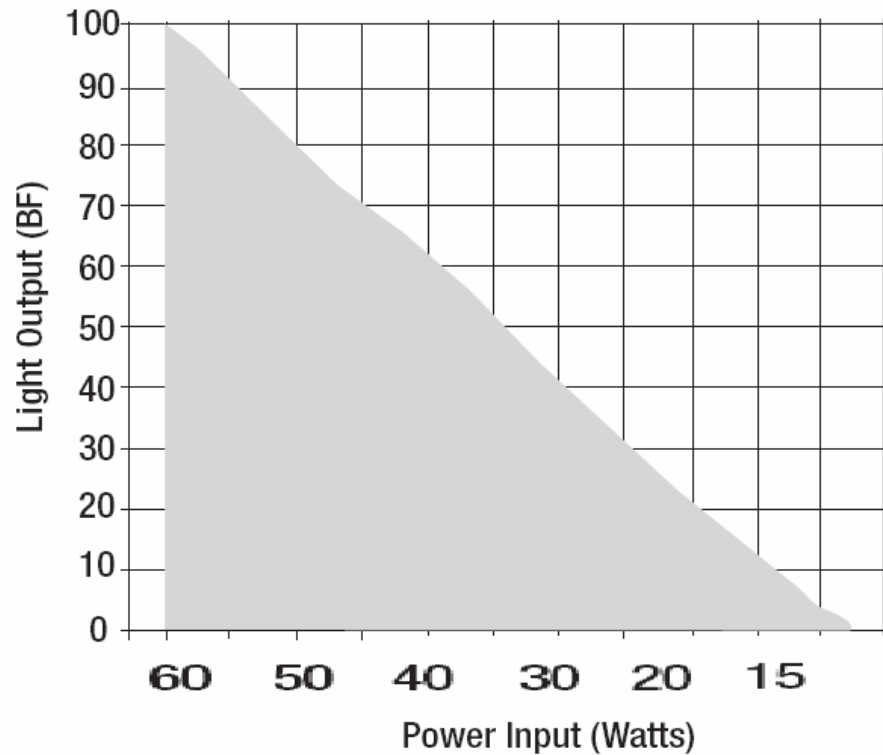


## Low-voltage Control

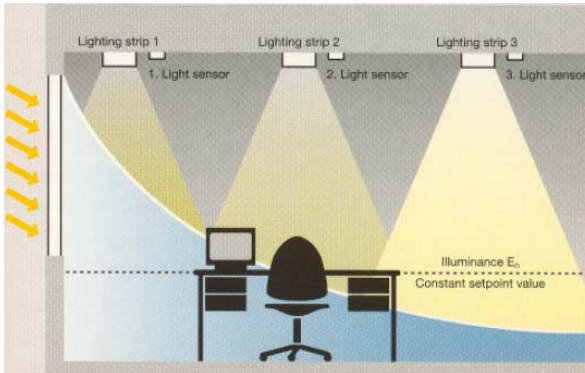


# Continuous FL Dimming

It's Sunny  
Save Money



# Daylight Harvesting - Retrofit Lighting Control



Add daylight harvesting to T5 or T8 fixture using a 0-10V dimming ballast with a new daylight sensor. Perfect for retrofit applications. No new wires.

Add occupant control over light levels using dimming ballasts and Wallbox control. No new wires.

Add daylight harvesting and occupancy switching to single offices using dimming ballasts and line-powered ceiling mounted control.



# Why use Lighting for Load Shedding?

Lighting is 30% of Commercial Sector Load

Lighting is a major electric load that is:

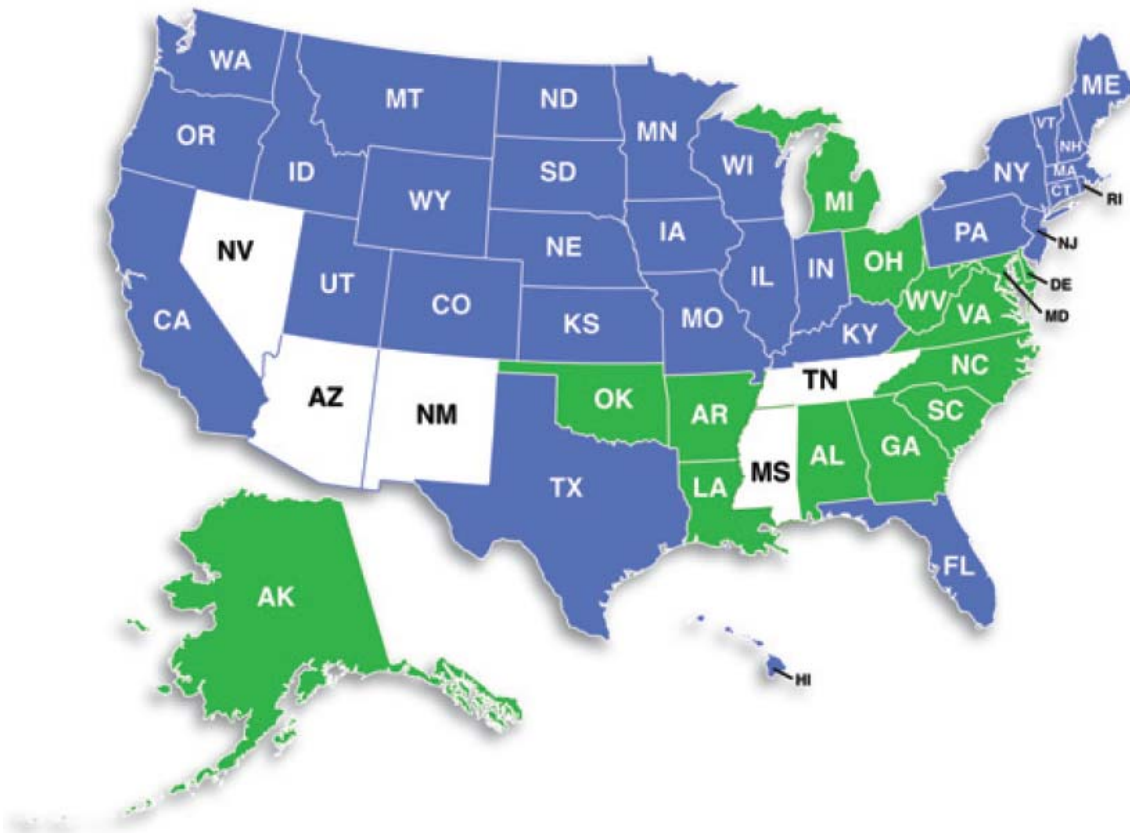
- Repeatable, predictable load reduction with immediate response
- Don't need to switch off. Dim to maintain productive environment
- Permanent - No "Snap Back" loads (like HVAC)

Managing the Peak Demand with Lighting is:

- Environmentally friendly – reduces dependence on "dirty" sources of emergency power generation (coal)
- Sustainable – it's better to reduce loads than build excess power capacity
- Cost-effective – often cheaper than emergency generation

# Why Manage Peak Loading?

## Nearly every state has a Demand Response Program



States with public purpose and/or utility energy efficiency programs as well as **demand response/load management** programs.



States with **demand response/load management** programs.

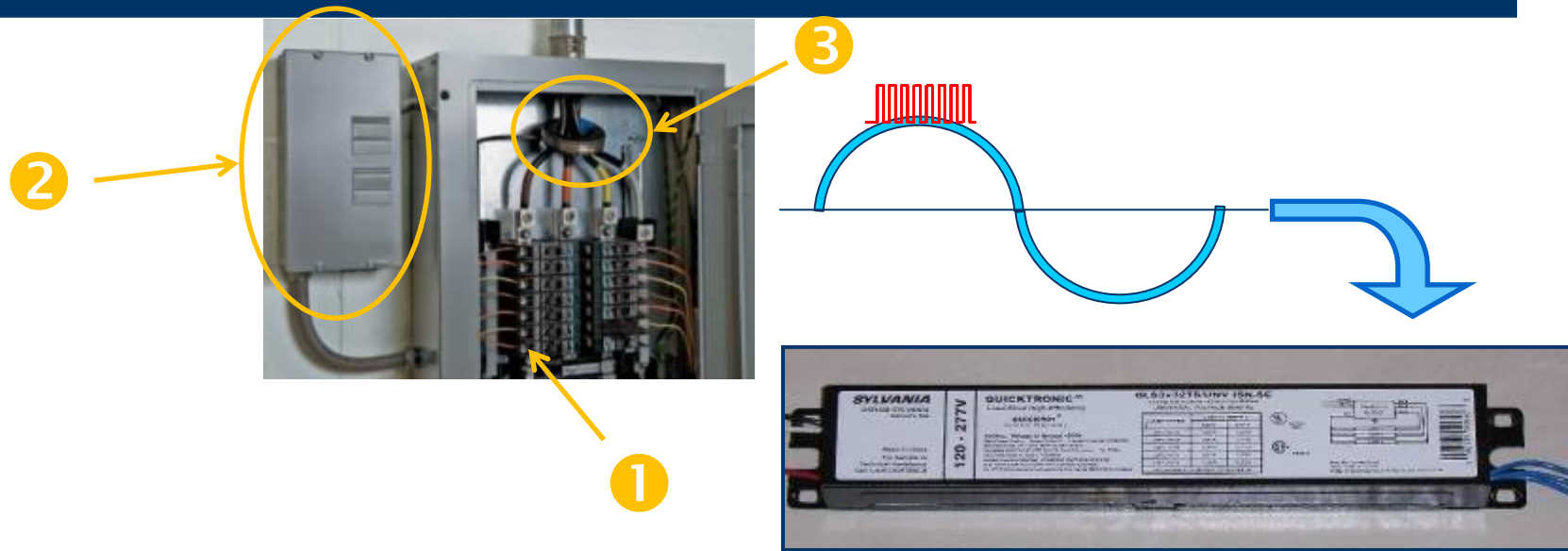
Source – US DOE/FEMP – May 2008, [http://www1.eere.energy.gov/femp/program/utility/printable\\_versions/utilityman\\_energymanage.html](http://www1.eere.energy.gov/femp/program/utility/printable_versions/utilityman_energymanage.html)

# What is a Loadshed Lighting System?

- Cost-effective demand response technology
  - Reduce lighting power and maintain reasonable light levels
  - Easy to install
  - High-efficiency T8 ballast systems
  - Suitable for use during Emergency Demand Response events
  - Simple to activate
  - Can link to building or network systems for automated control
- Various Demand Response Linear FL Systems Exist



# Demand Response Load Shedding



# Various Linear FL Controllable Systems

## *Programmed Rapid Start*

- HPT8 high efficiency in L, N, H BF
- Long lamp life in short cycle applications

## *Continuous FL Dimming*

- HPT8 high efficiency
- Dual Control Versatility
- Universal Voltage
- T5, T5HO, T8

## *Bi-level FL Dimming*

- 100% to 50% dim.
- Available T5, T5HO, and T8

## *Demand Response Bi-level FL Dimming*

- Various ballast system options available to shed lighting load during demand response events

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