

# Automating Energy Savings with Sensors

by, Fred Lehman & Neal Grove

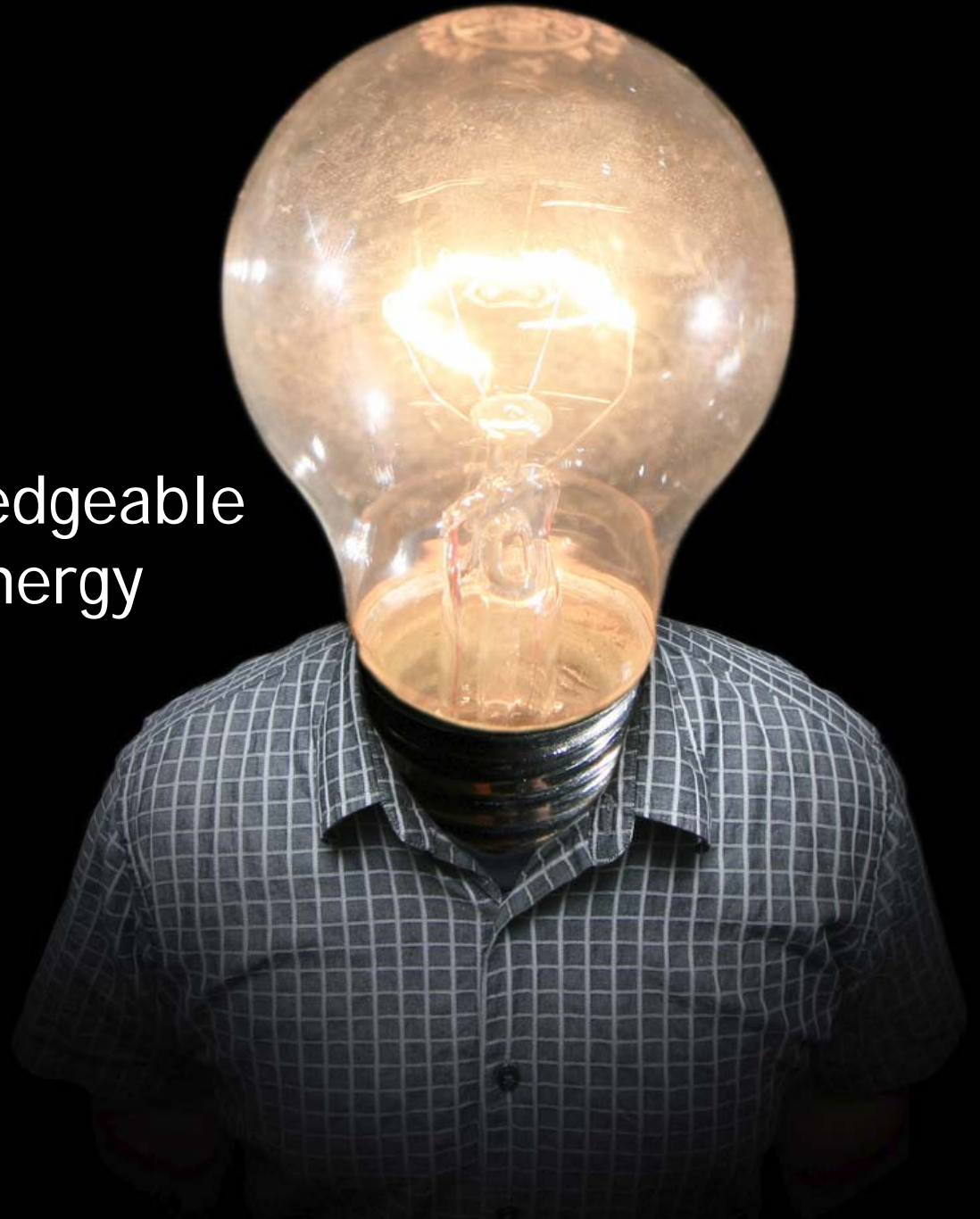
**Hubbell Wiring Device-Kellems Div.**



The emerging energy economy is changing building and facilities management responsibilities.



You need to be knowledgeable  
on new methods for energy  
management.



Energy saving methods are numerous and confusing.

*Daylighting*

*Automation*

*LED*

*PIR*

*CFL*

*Solar*

*Low Flow*

*Wind*

*US*

*OLED*

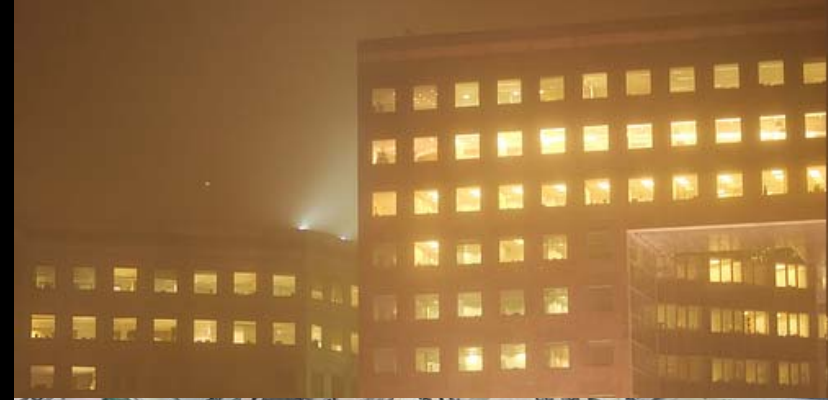


Sensors are proven ways to:

1. Reduce energy waste

2. Save money

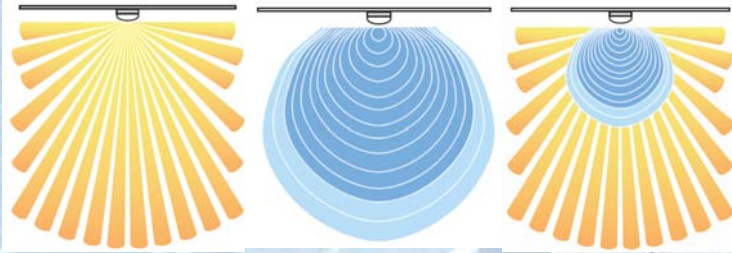
3. Obtain LEED credits



The key is to properly:

1. Identify areas

2. Specify sensing technology



3. Installation



Look for areas of low occupancy.



Find areas with irregular occupancy patterns.





Spaces with natural daylight offer maximum savings.



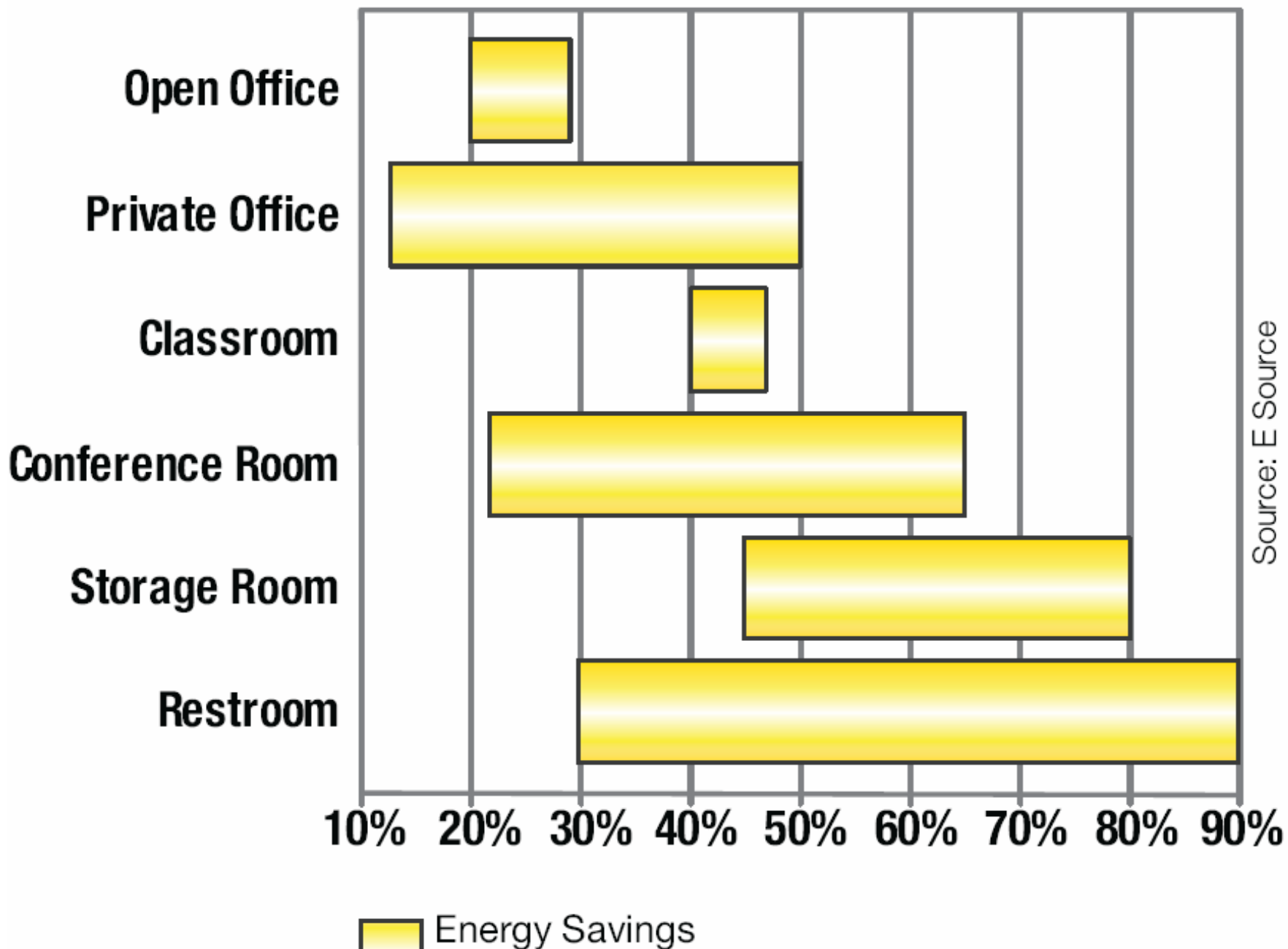
Count number of fixtures and multiply by wattage.



How many rooms and lights need to be controlled?

LOCATION	FIXTURE QTY	LAMP QTY	WATTAGE	TOTAL
CONFERENCE ROOM	15	3	32	1440
				0
ADMIN	10	3	32	960
OFFICE	2	3	32	192
OFFICE	2	3	32	192
OFFICE	2	3	32	192
OFFICE	2	3	32	192
OFFICE	2	2	32	128
OFFICE	2	3	32	192

# How to estimate saving rates.



Estimate savings and ROI with this formula.

<b>Watts Per Bldg</b>	<b>X</b>	<b>**Ballast Factor (1 or .85)</b>	<b>/1000</b>	<b>Total KW</b>	<b>X</b>	<b>Utility Rate Per KWH</b>	<b>X</b>	<b>Annual Operating Hours</b>	<b>=</b>	<b>Current Energy Cost</b>
6272		0.85		5.33		\$0.0900		8736		\$4,191.60

**Payback Calculation**

<b>Estimated % Savings</b>	<b>=</b>	<b>Estimated Savings</b>		<b>Material Costs</b>	<b>+</b>	<b>Labor Costs</b>		<b>Payback in Months</b>		<b>Projected Energy Cost</b>
35%		\$1,467.06		\$300.00		\$1,000.00		10.6		\$2,724.54

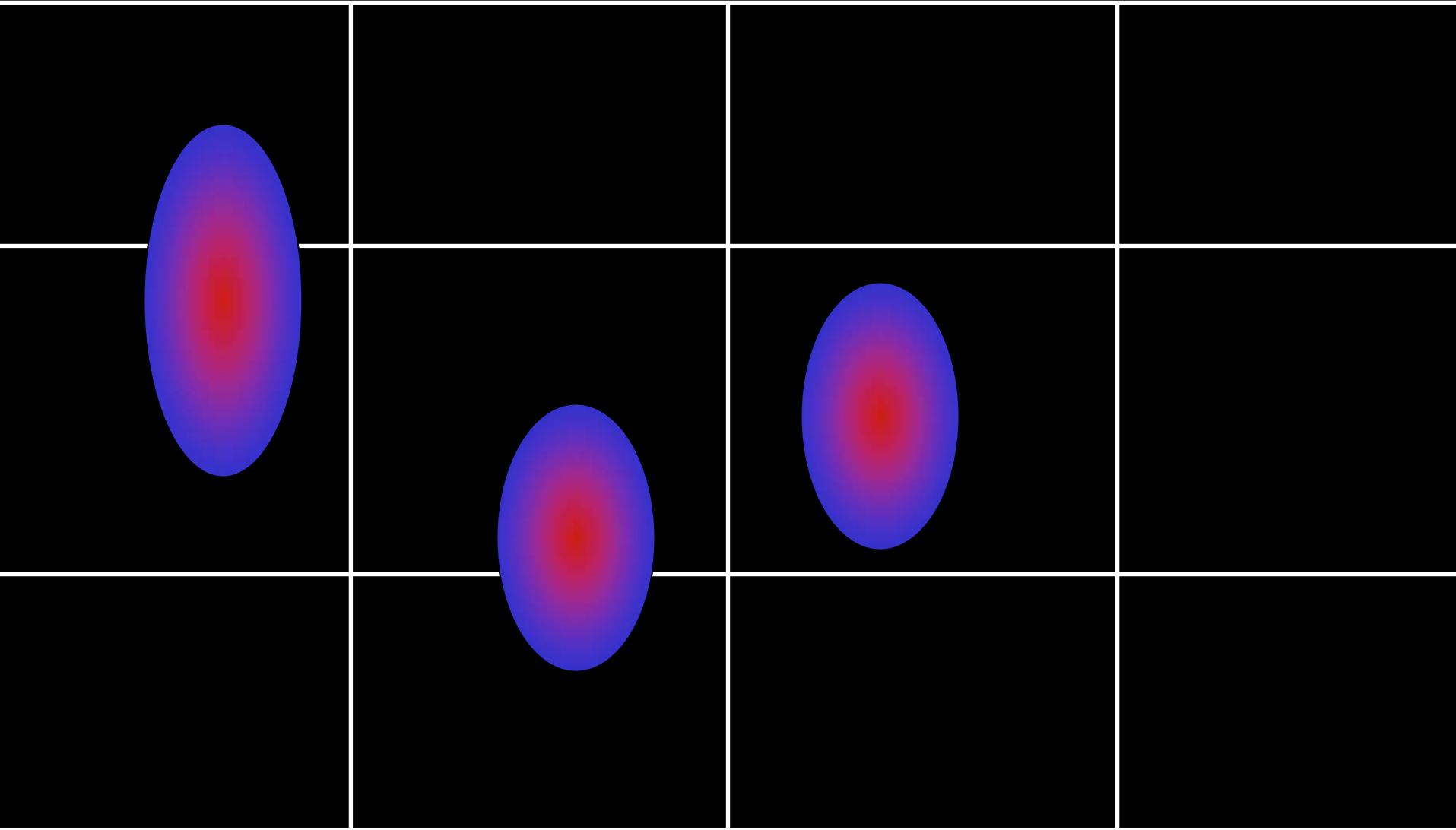
Cur.Cost X Savings

(Cost/savings) X 12

Select sensor style and control pack as needed.



How does a PIR sensor "see" the space?

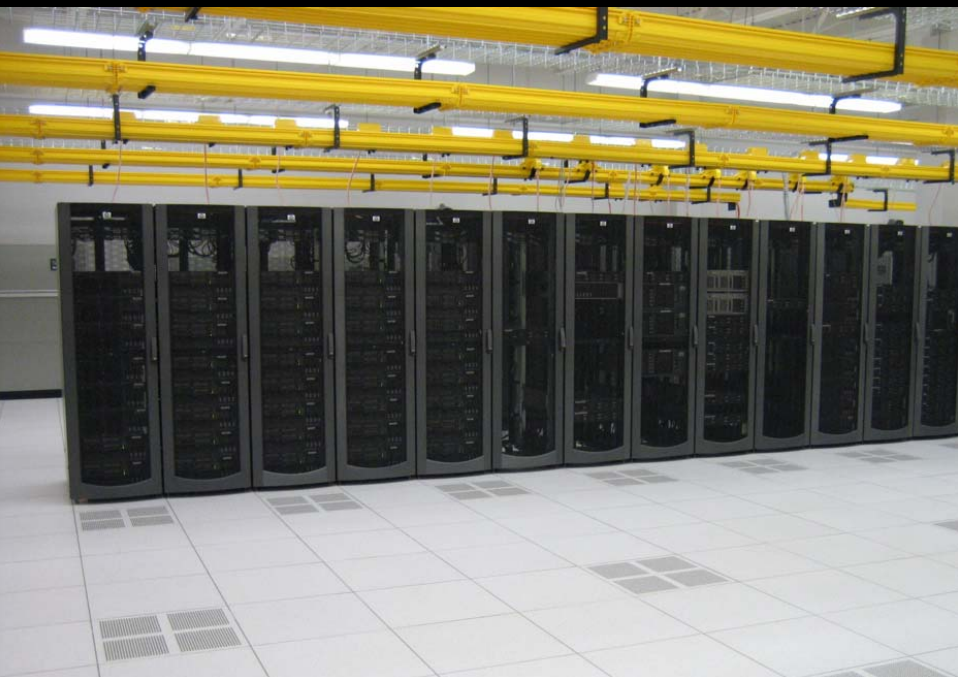


PIR is good for...

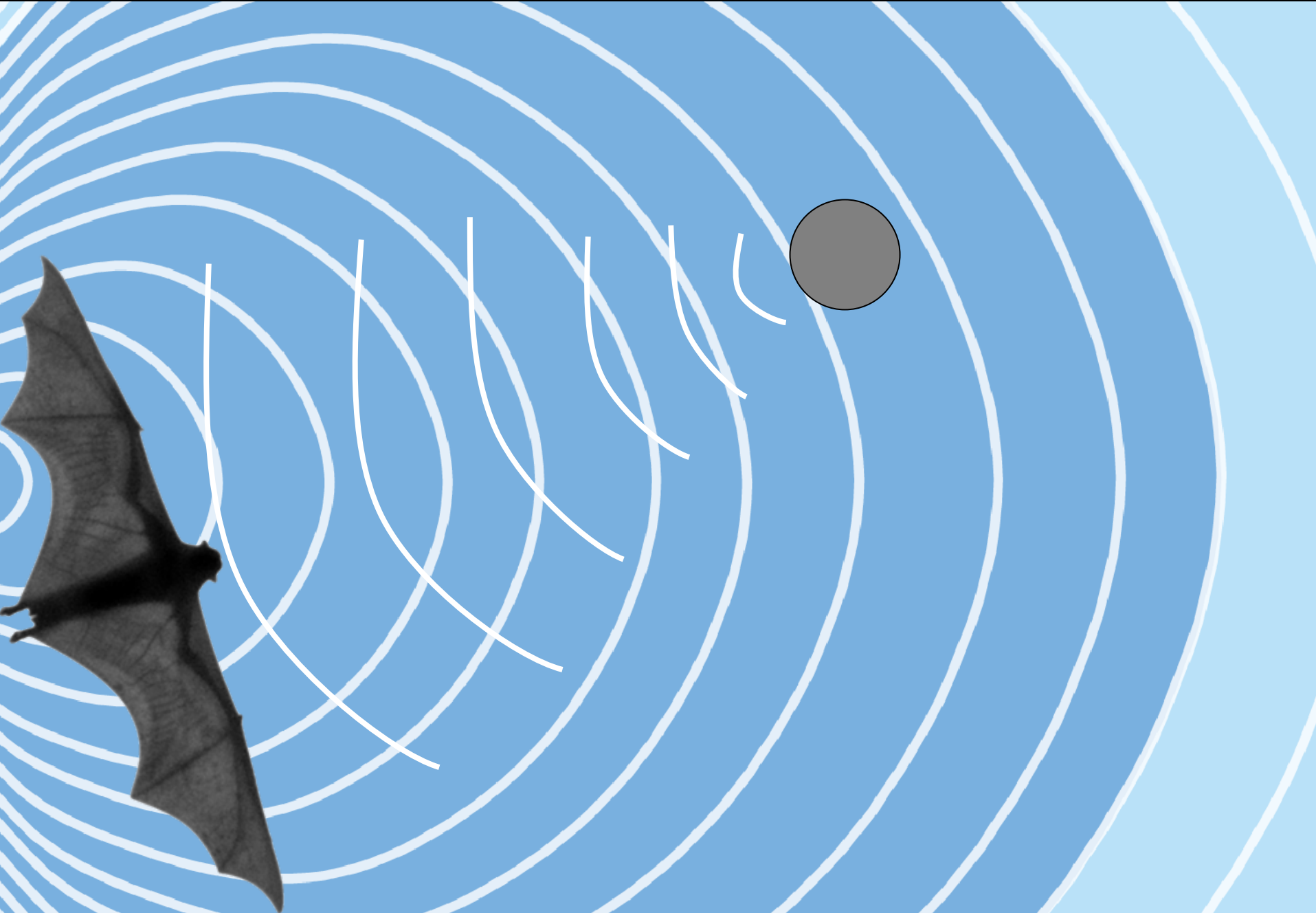




PIR doesn't work well with...



# How does a Ultrasonic sensor "see" the space?



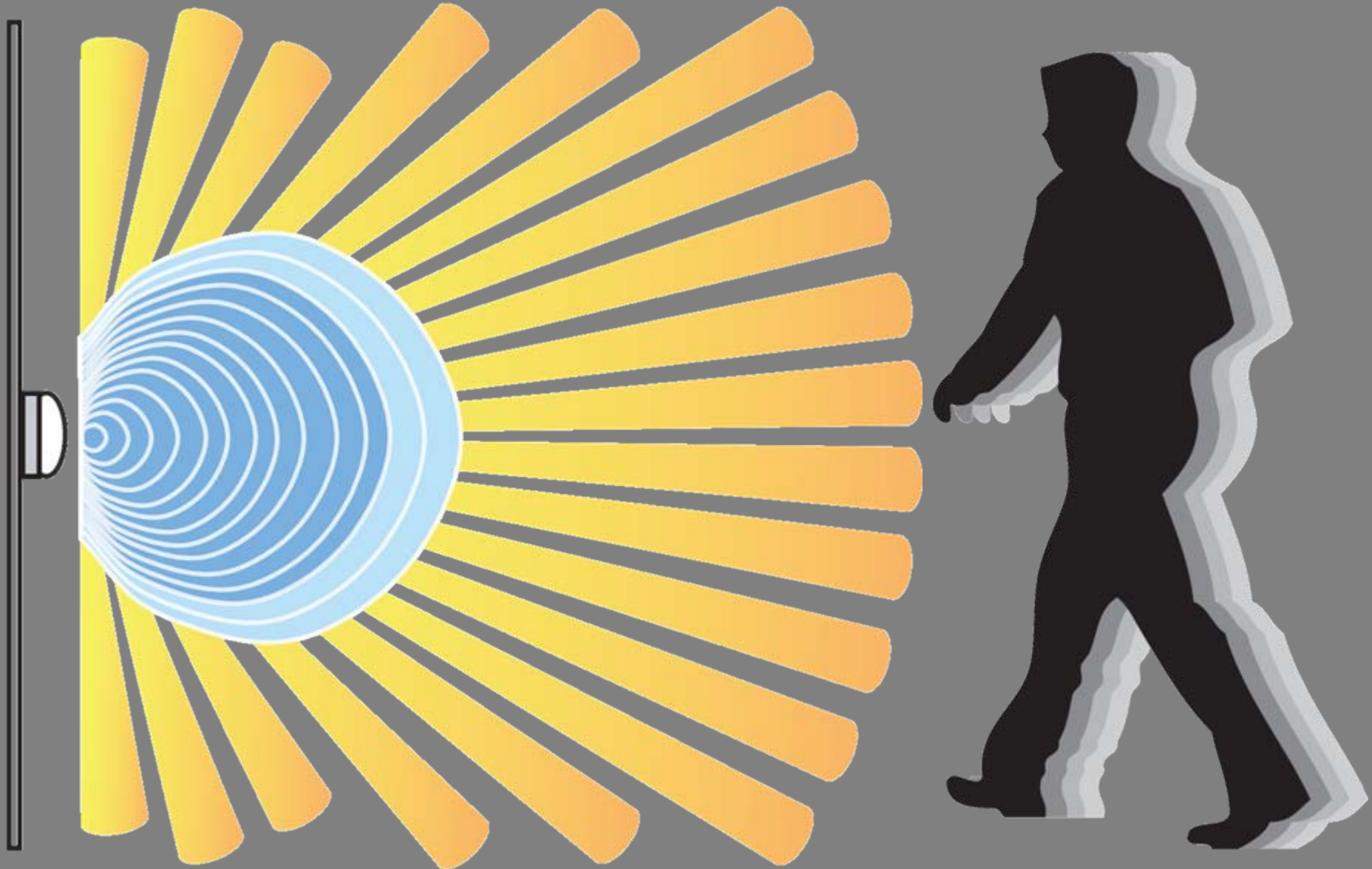
# Ultrasonic is good for...



Ultrasonic doesn't work well with...



How does a Dual Technology work?



How does a Dual Technology work?



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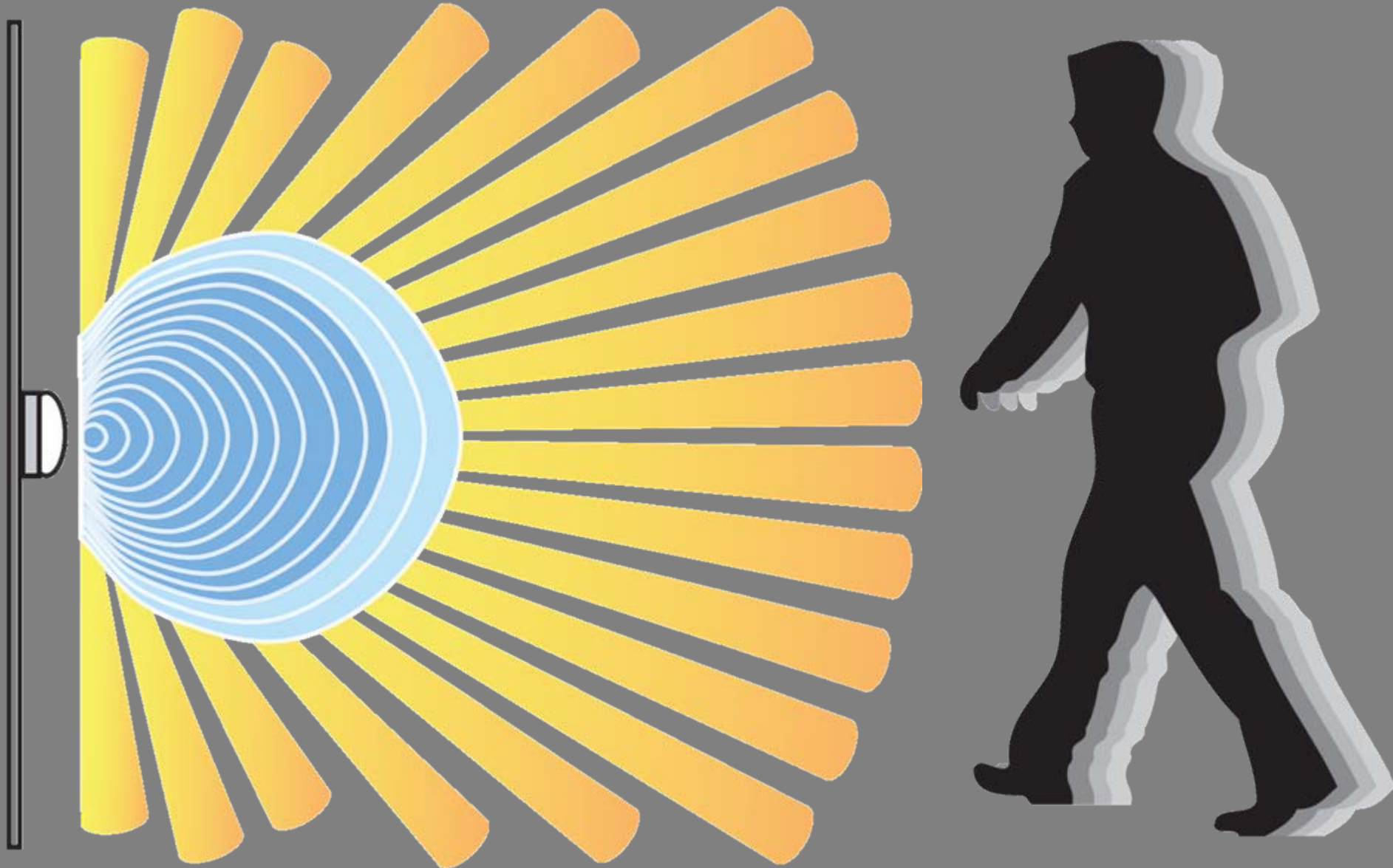


How does a Dual Technology work?



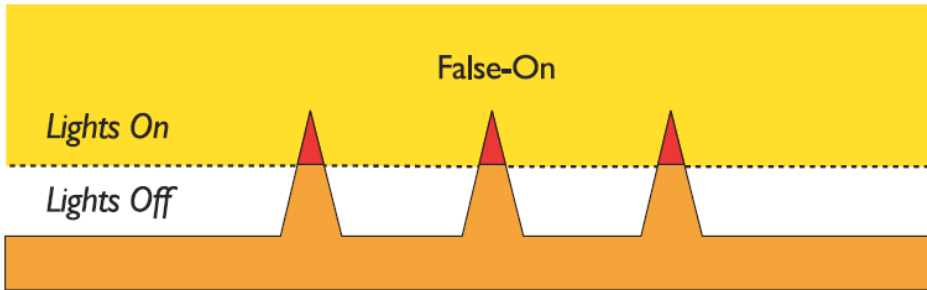


How does a Dual Technology work?



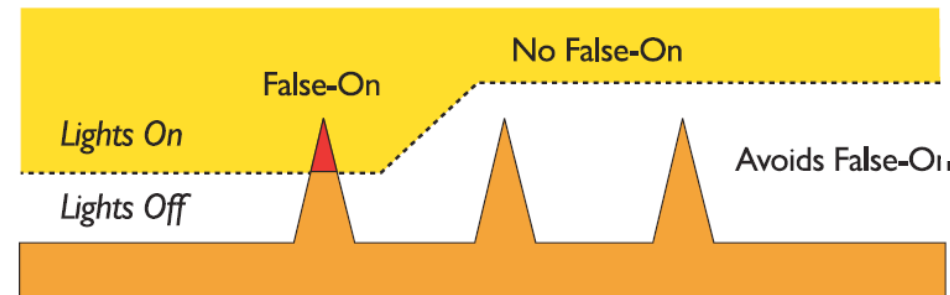
# Enhance any sensing method with Adaptive Technology

## Non-Adaptive



- Unoccupied Sensor Signal with interference spikes
- Occupancy Sensor timing and sensitivity setting

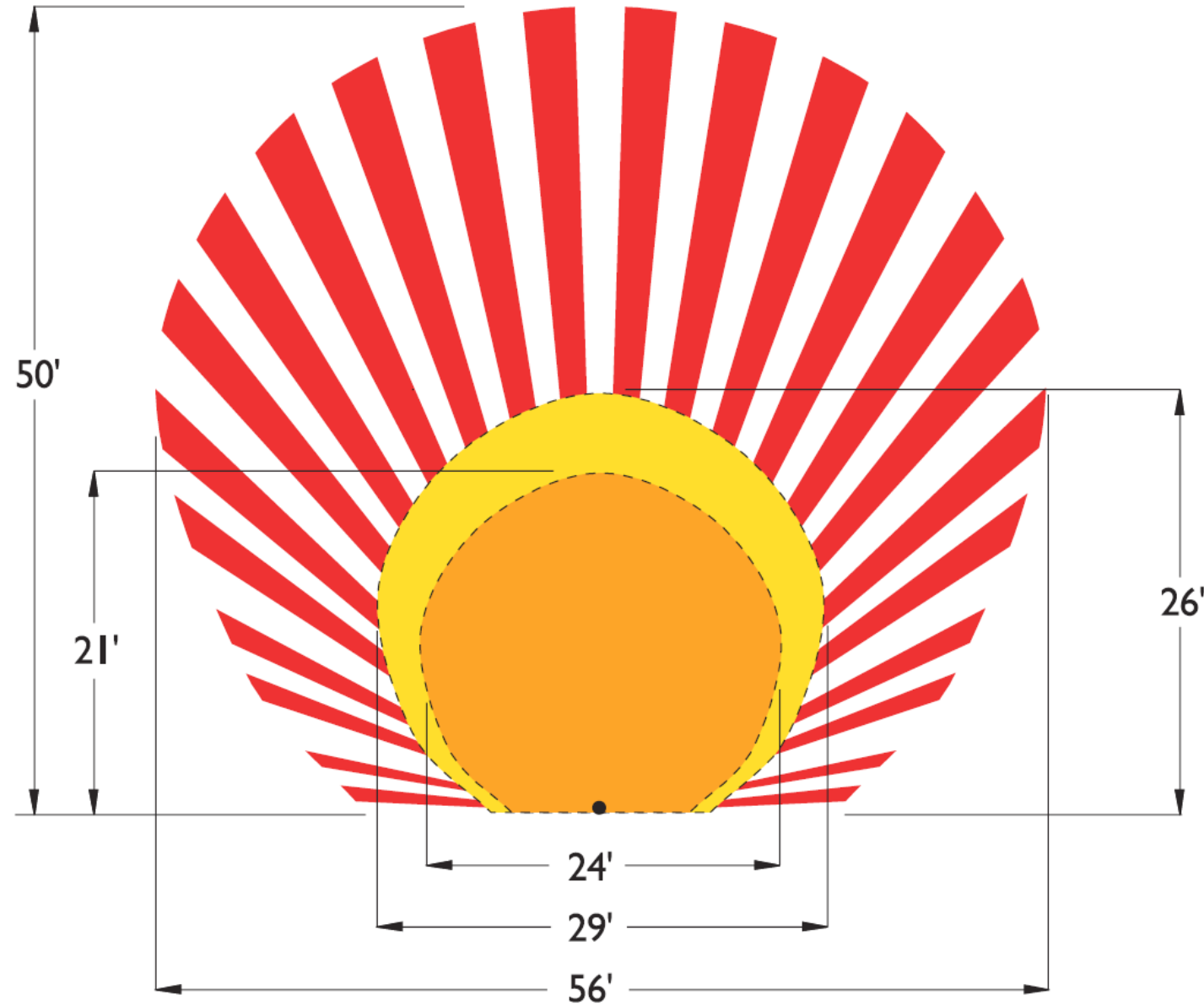
## Adaptive






- Unoccupied Sensor Signal with interference spikes
- Occupancy Sensor timing and sensitivity setting

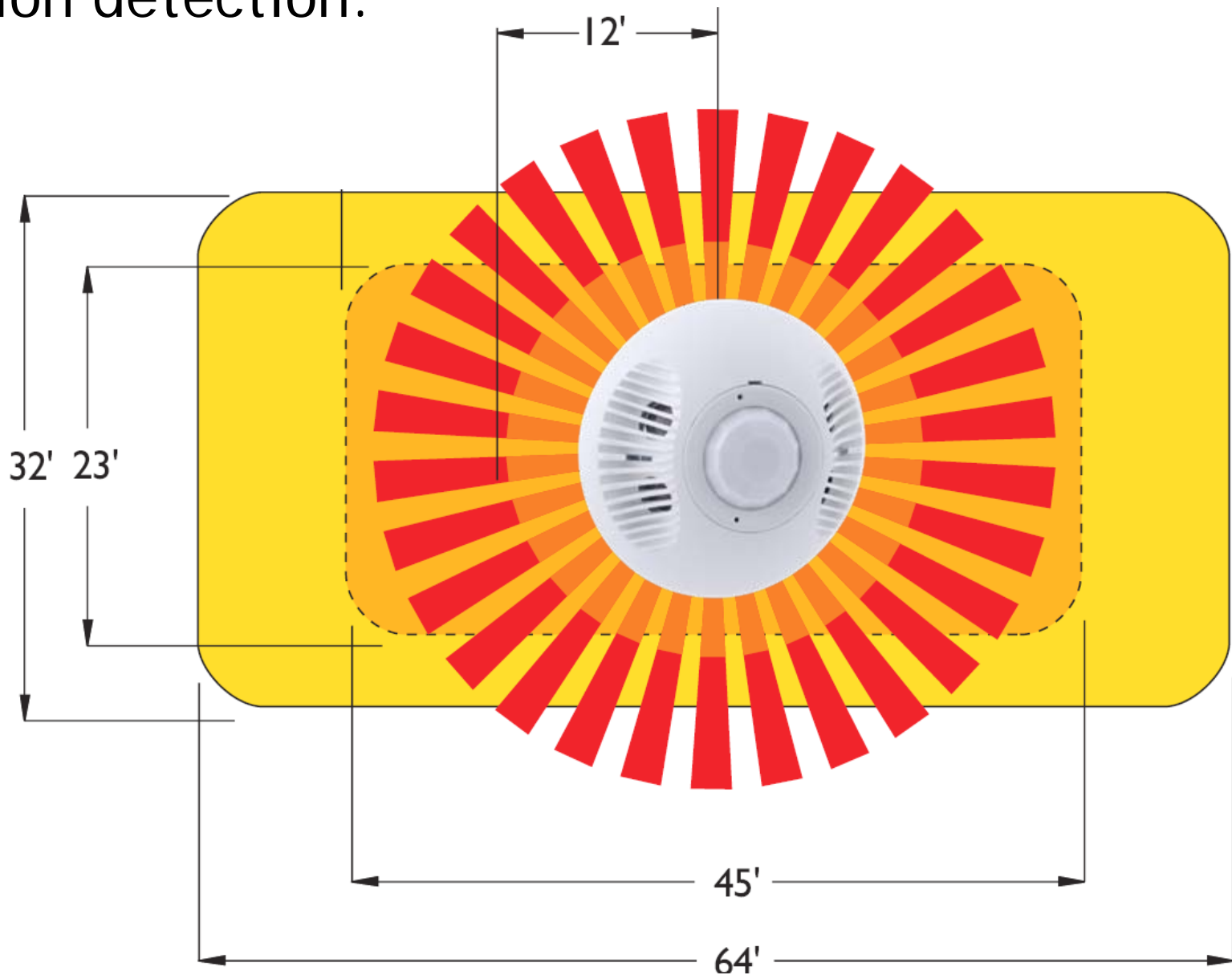


# Know your major and minor motion coverage patterns.

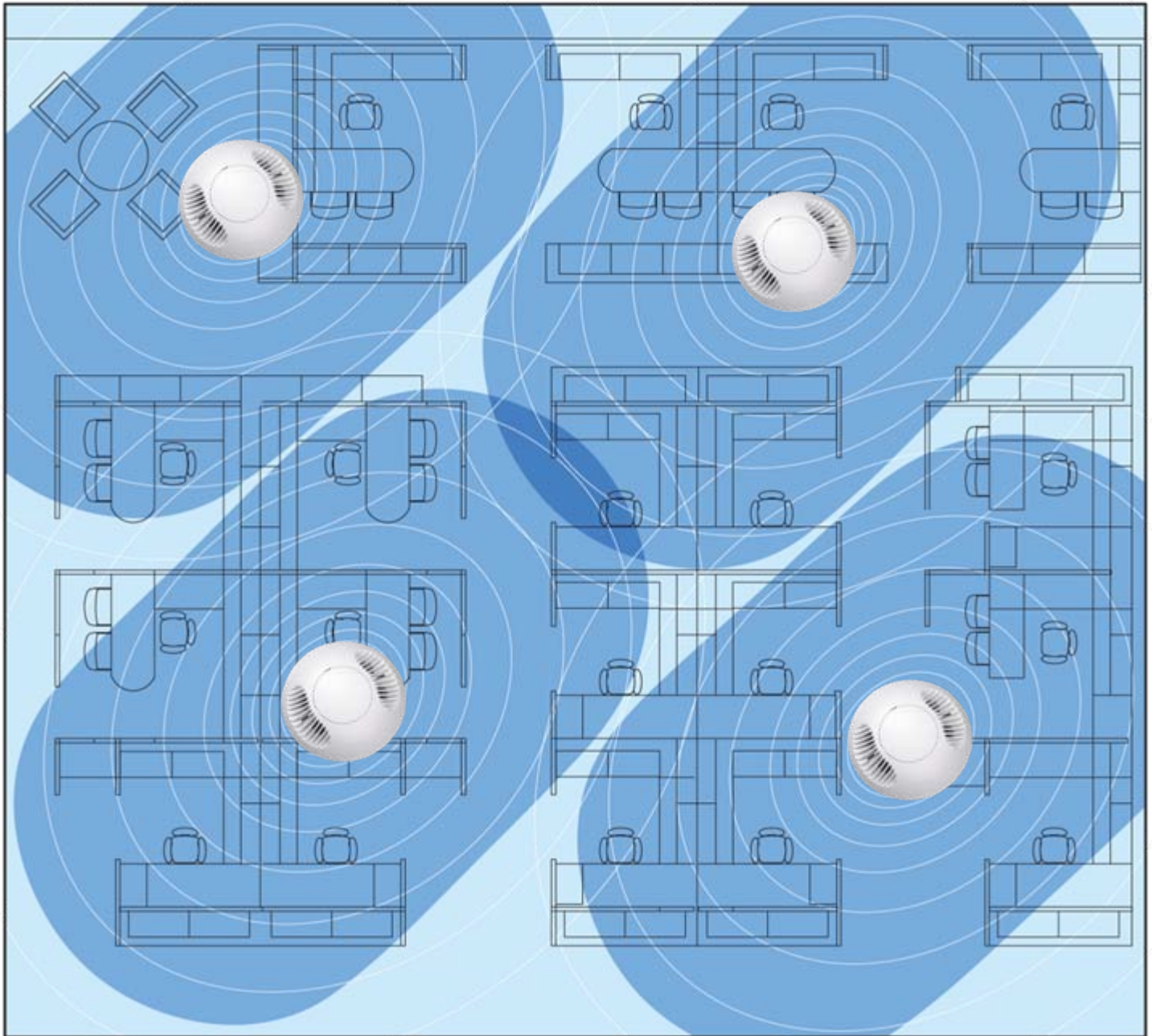


-  US Major Motion
-  US Minor Motion
-  IR Motion

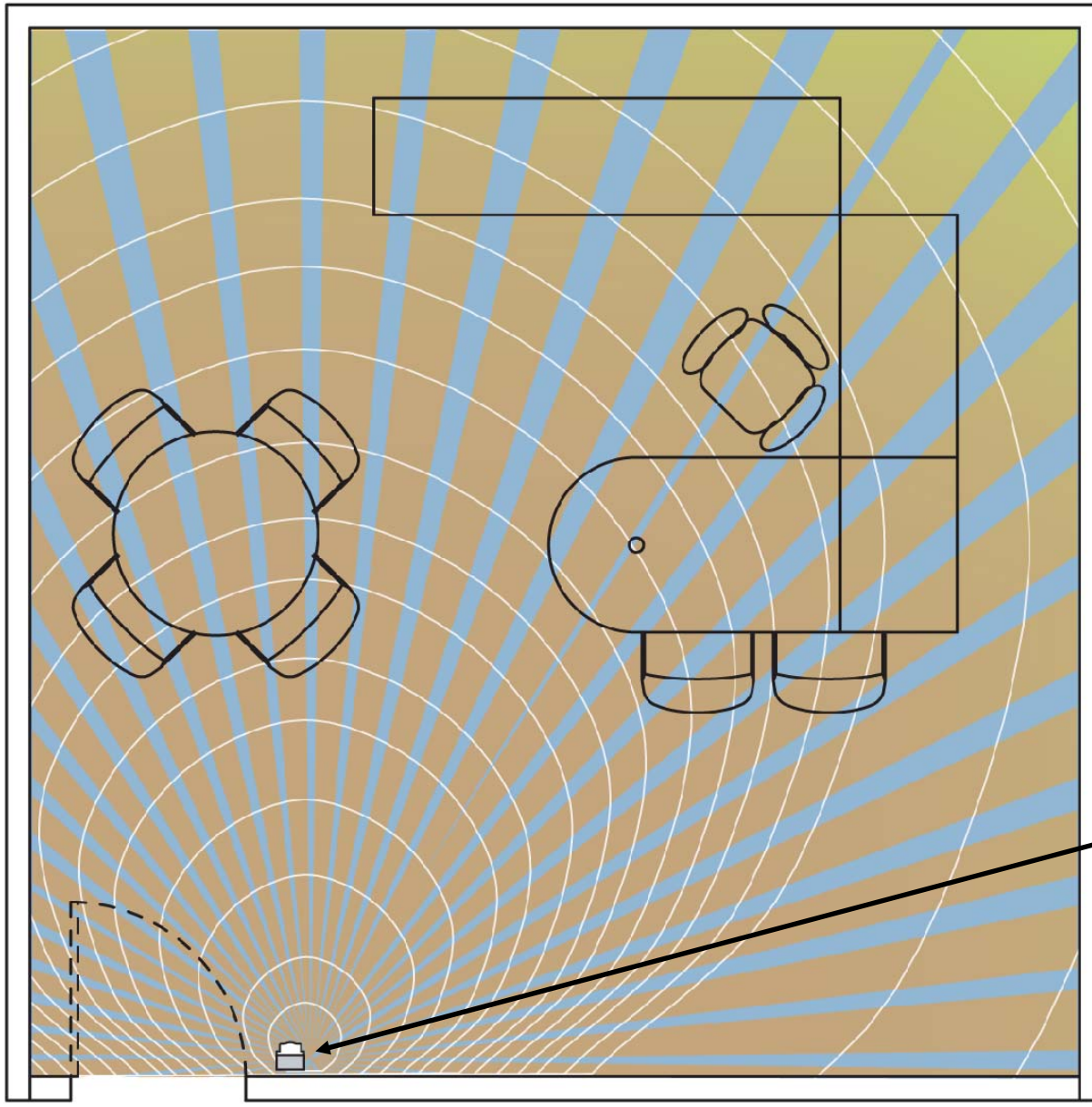
Use a 2:1 coverage area to room area maximize minor motion detection.



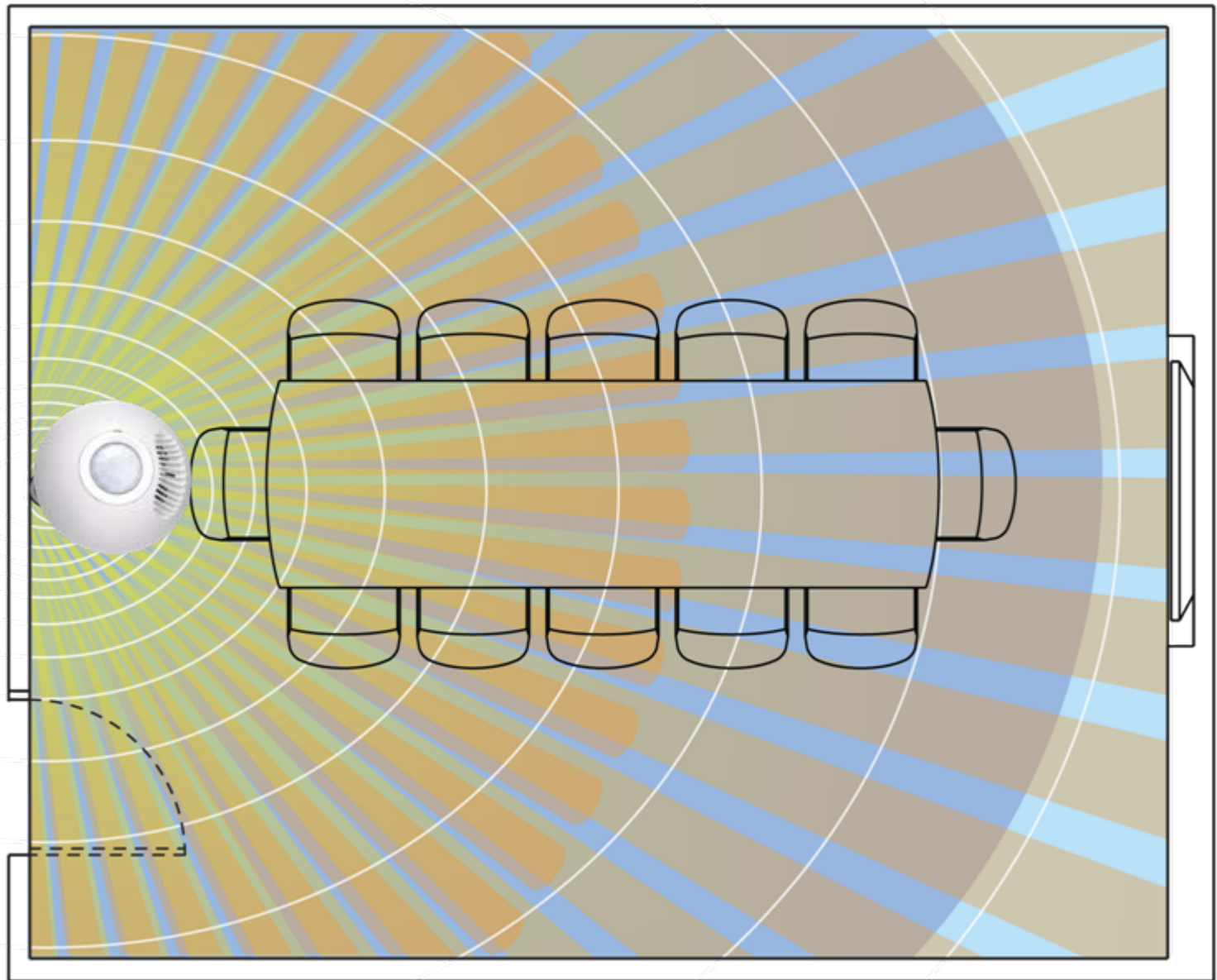
Position to minimize "dead zones".



Make sure you have coverage at the entryways and check open door position.

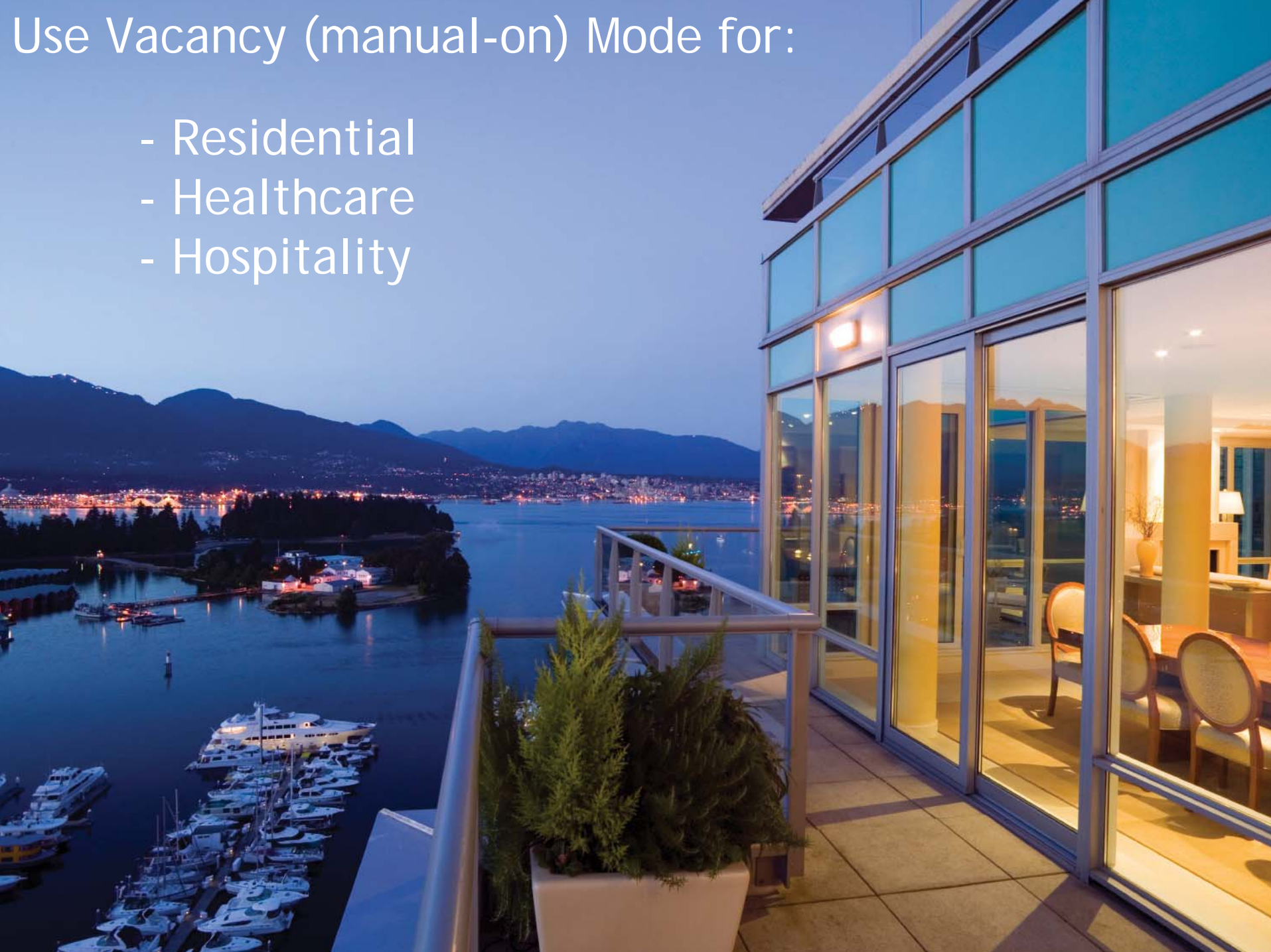


Position sensor to avoid "seeing" hallways and other adjacent areas.



# Use Vacancy (manual-on) Mode for:

- Residential
- Healthcare
- Hospitality





Are your buildings ready for the energy economy?



Even the most efficient lighting technologies are wasting energy and creating light pollution without proper control.

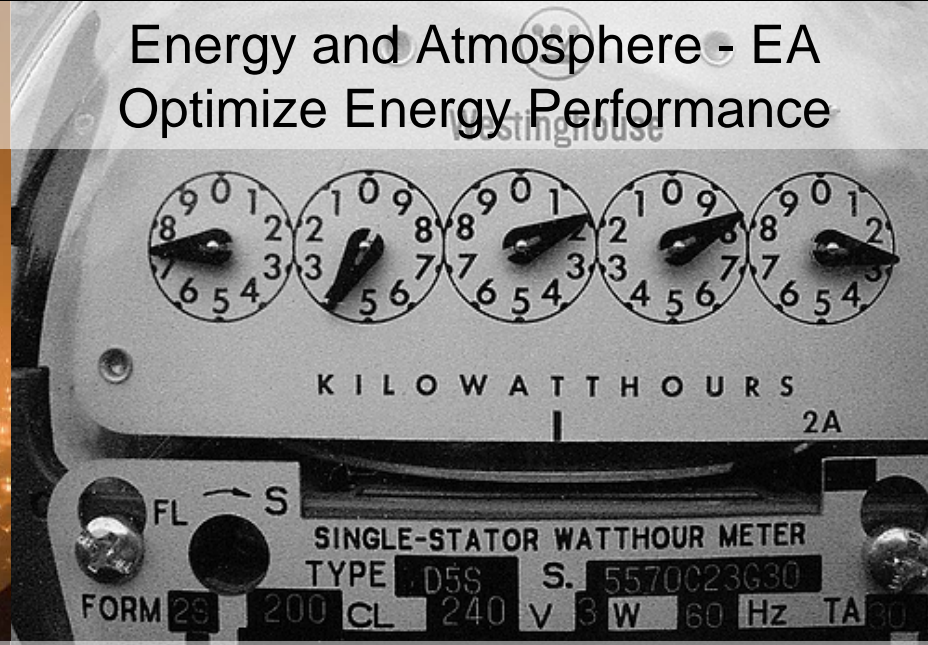


# Utilizing this process helps you obtain LEED credits in these categories.

Sustainable Sites- SS  
Light pollution reduction



Energy and Atmosphere - EA  
Optimize Energy Performance



Indoor Environment Quality- EQ  
Controllability of systems, lighting



Innovation & Design Process- ID  
Innovation in design



# Extensive support from Hubbell gives you piece of mind.

ROI Assistance

LEED APs on staff

Layout/Design Services

Online Tools

Online Training

USA Manufacturing

Specification Support

Walkthroughs



# Residential



# Commercial



# Industrial



Automated lighting control is easier and more effective than ever for any application.

Residential



Commercial



Industrial



*The overall green building market (both non-residential and residential) is likely to more than double from today's \$36-49 billion to \$96-140 billion by 2013.*



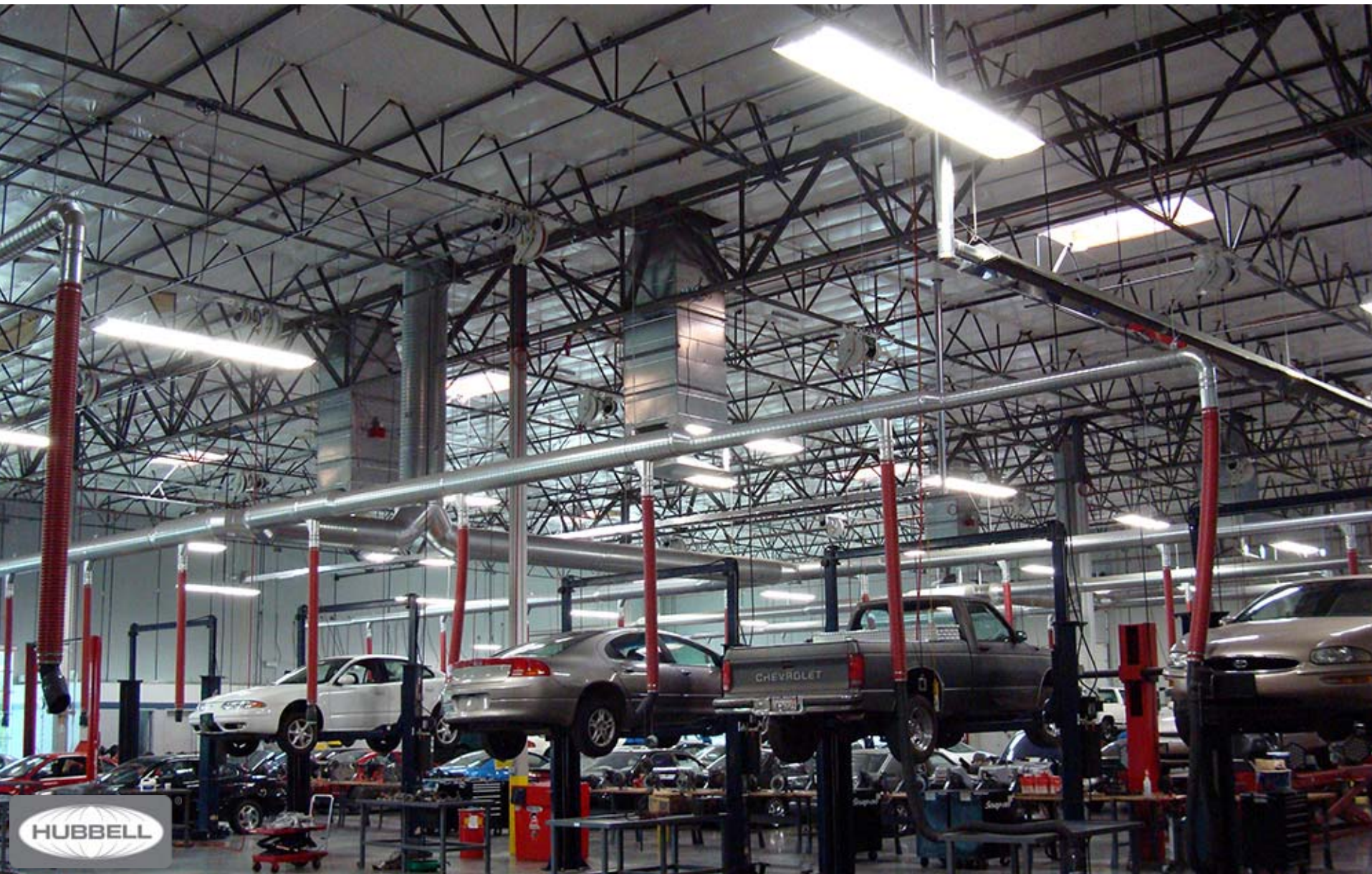
*(Source: McGraw Hill Construction (2009).  
Green Outlook 2009: Trends Driving Change.)*





RH 2







**Are you maximizing your lighting savings?**



What is wrong with this picture?

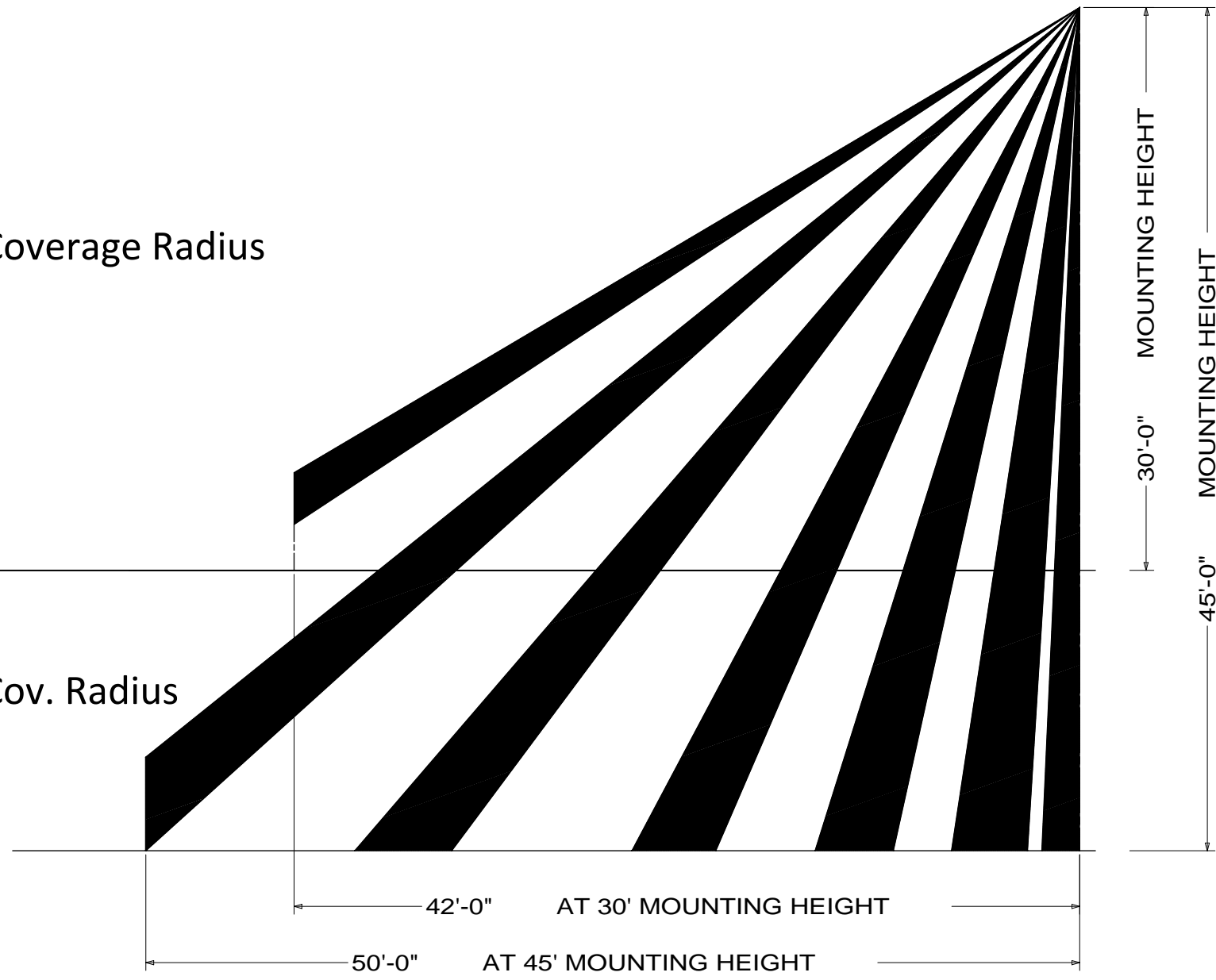


# Superior lens design means one lens does it all.

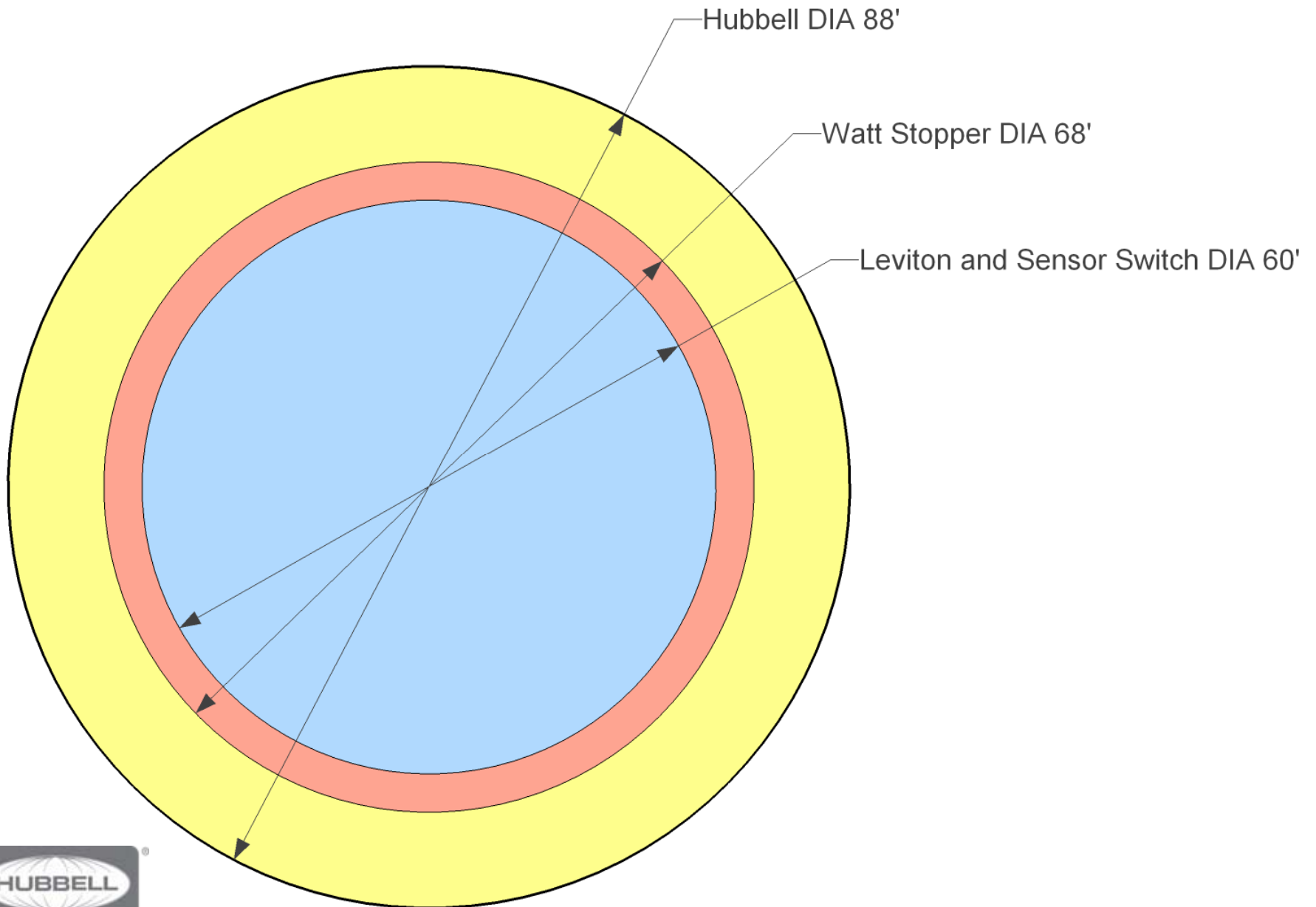
(Masks provided to customize pattern.)

30' and under:  
Height X 1.4 = Coverage Radius

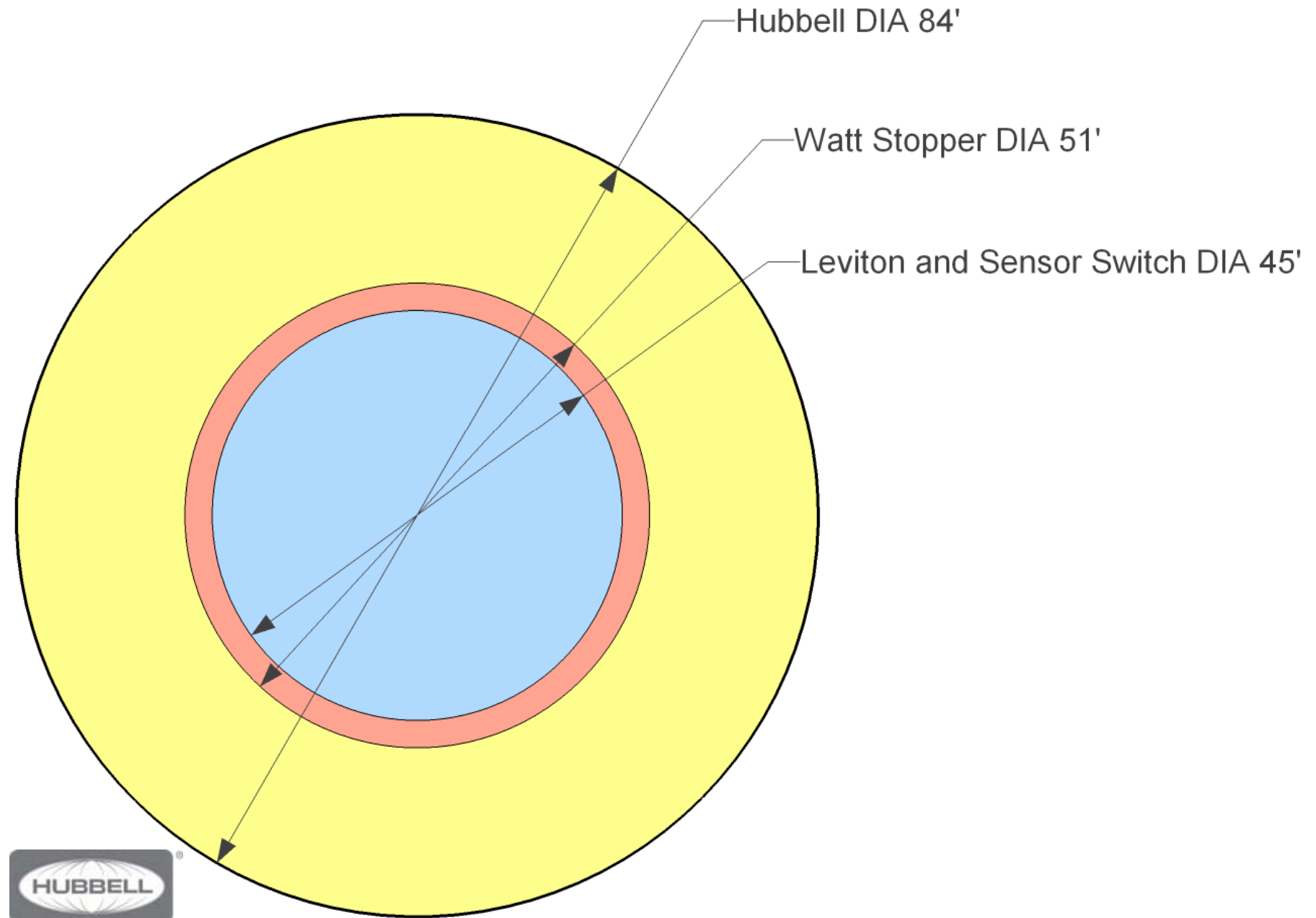
30' to 45'  
Height X 1.1 = Cov. Radius

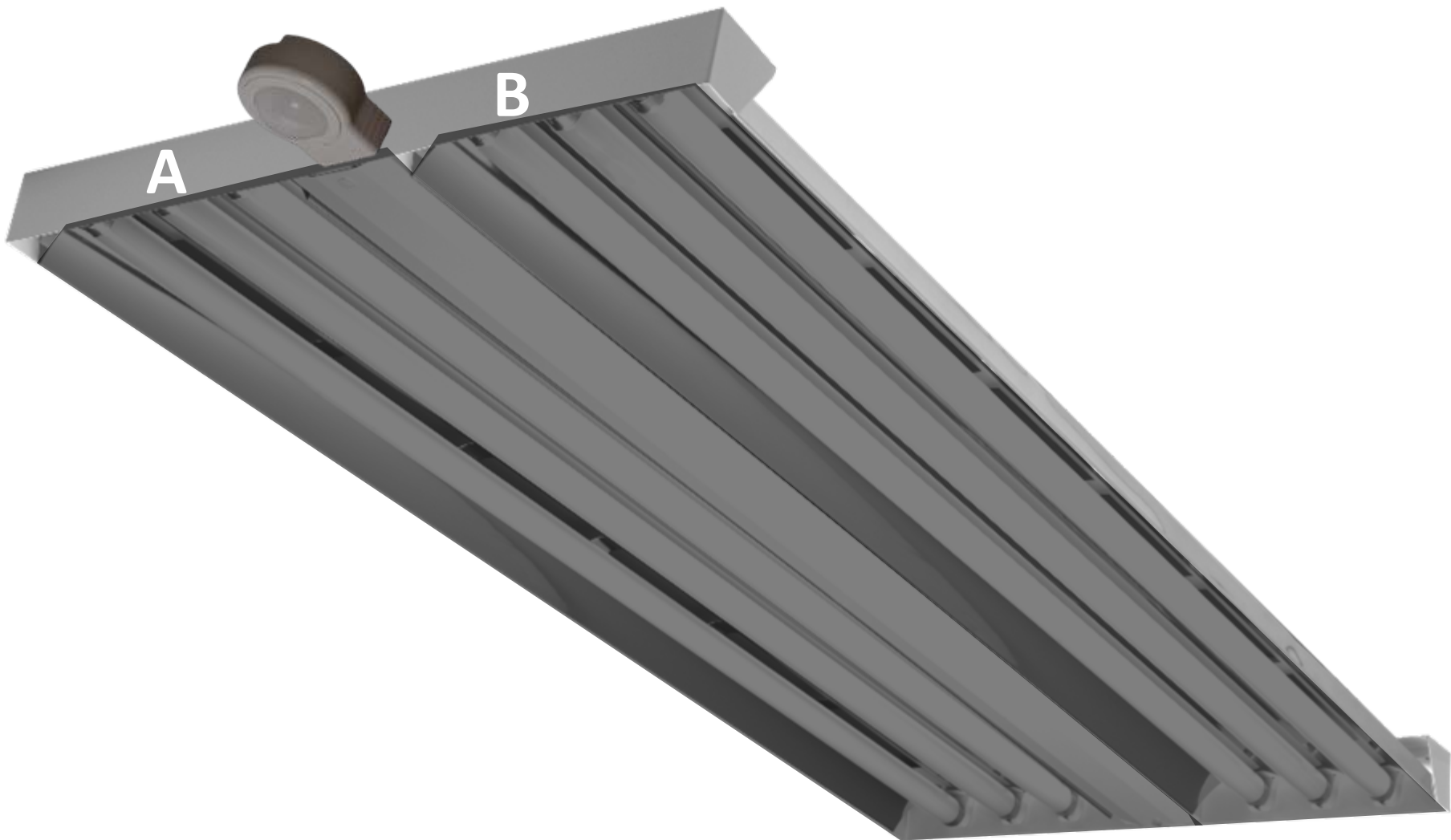


# Coverage vs. Competition at 40'



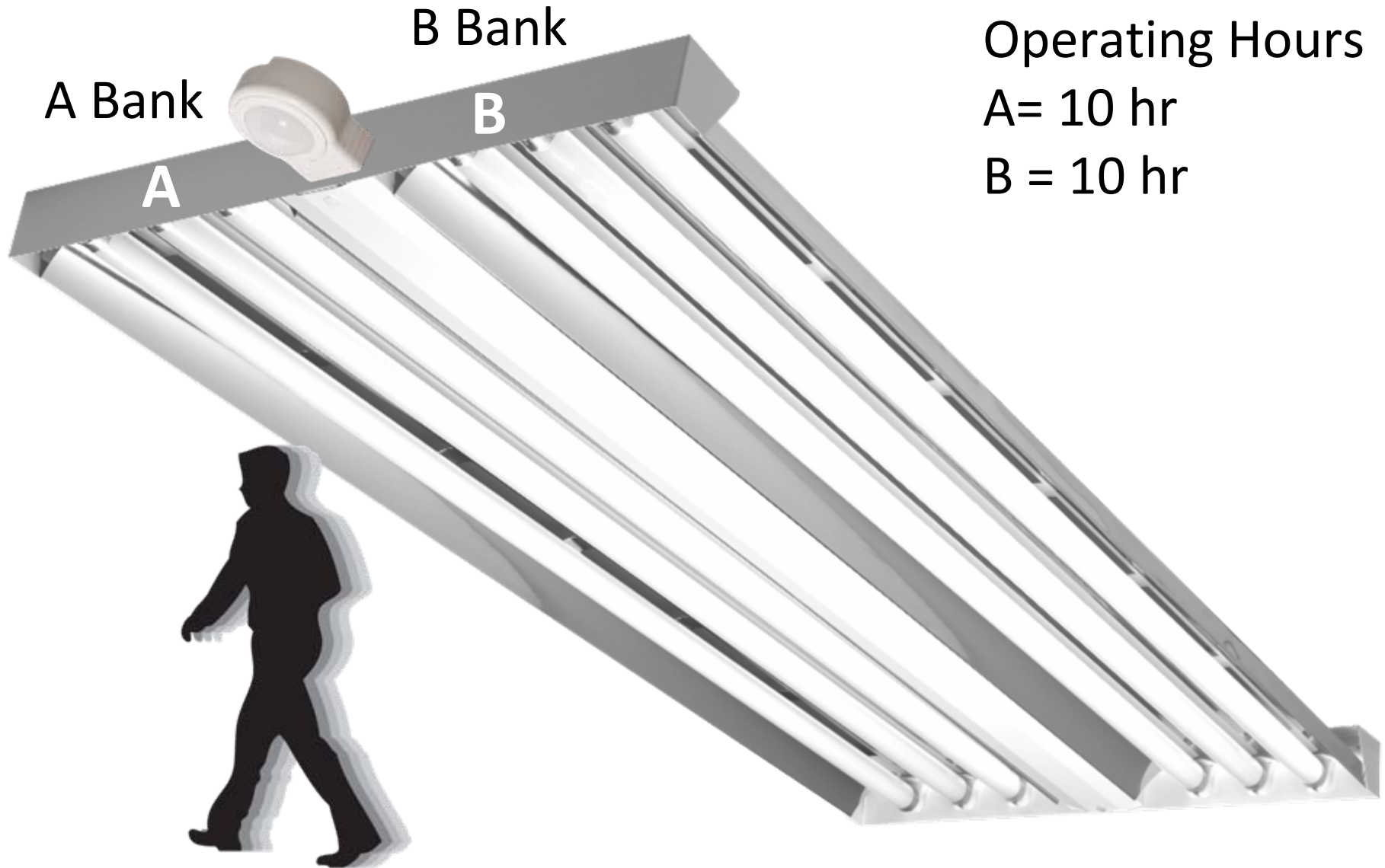
# It gets better - Coverage vs. Competition at 30'

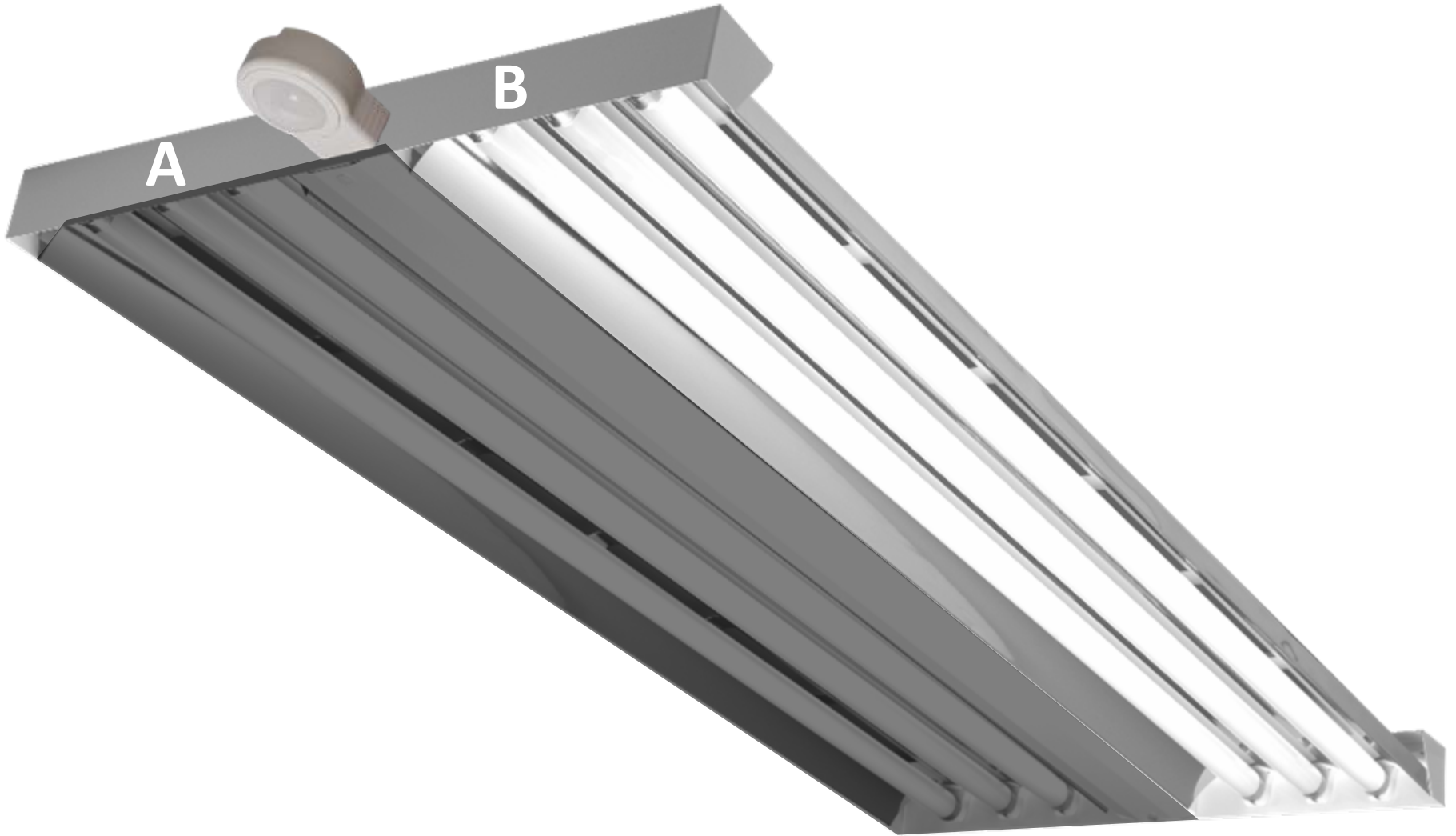


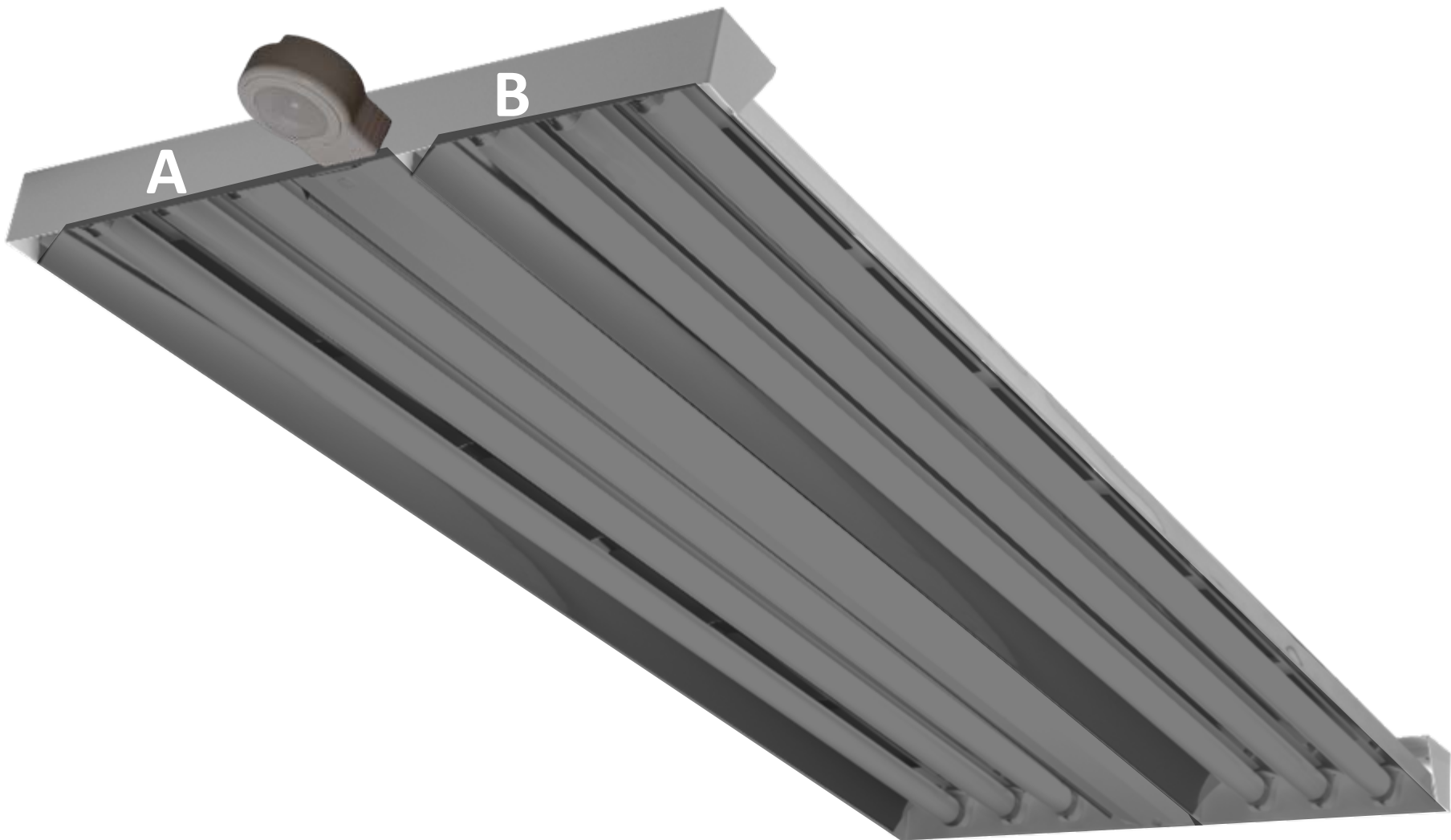




Exclusive Smart Cycling for 2 relay versions.  
Monitors and balances burn time between  
circuits/ballasts.





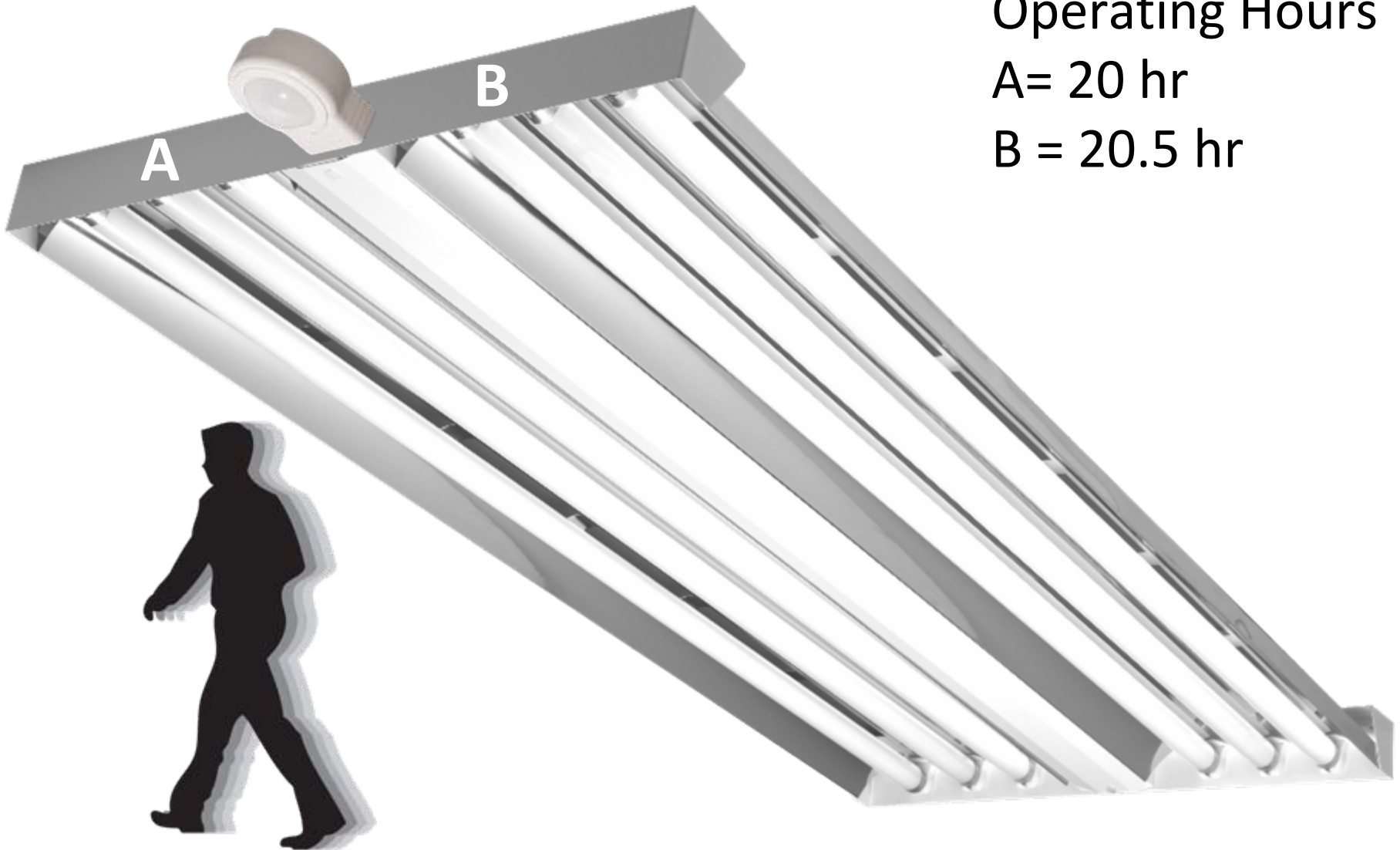


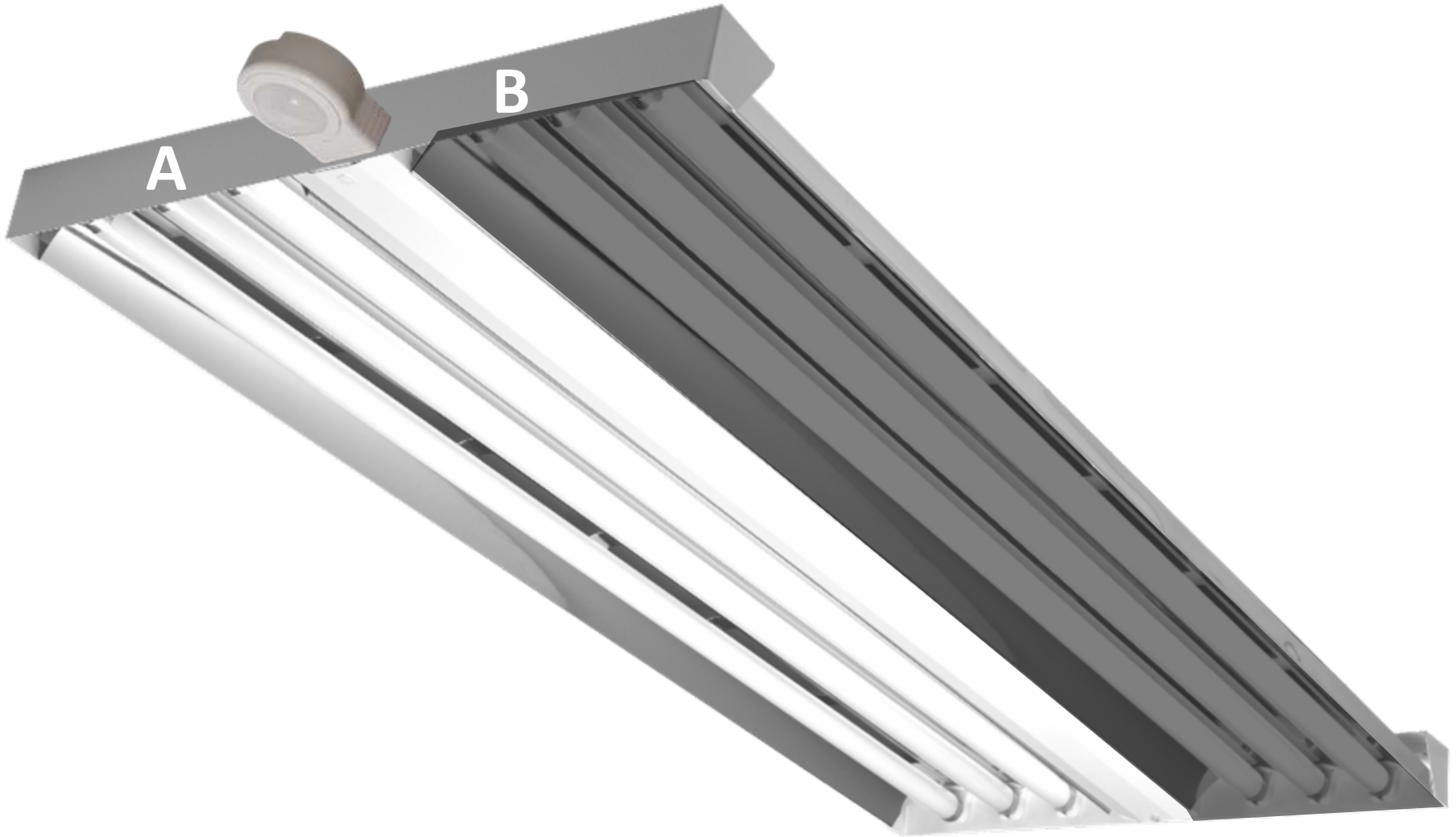
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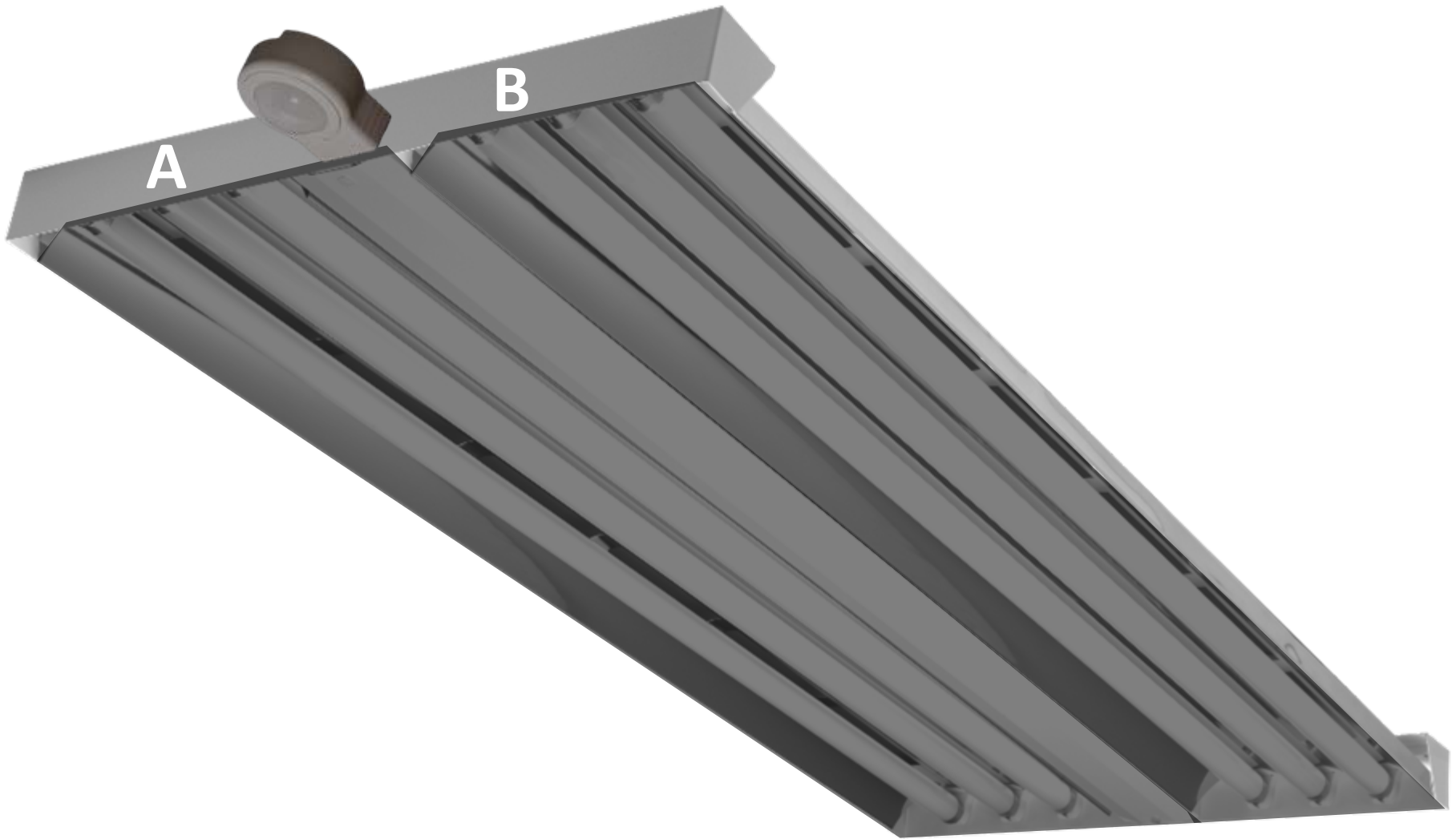
Operating Hours

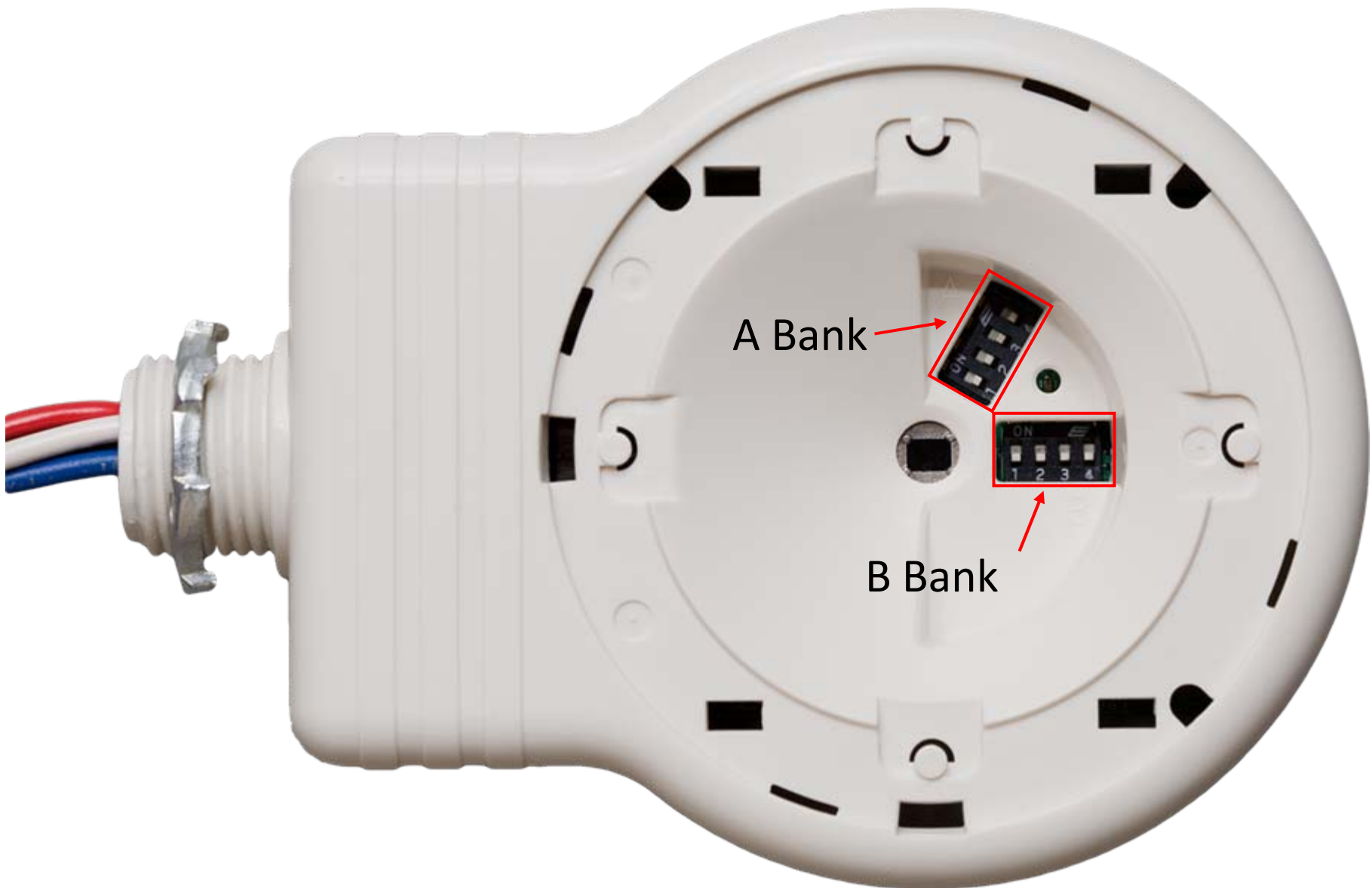
A = 20 hr

B = 20.5 hr

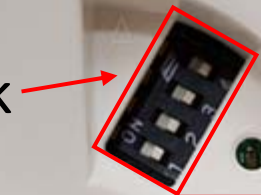








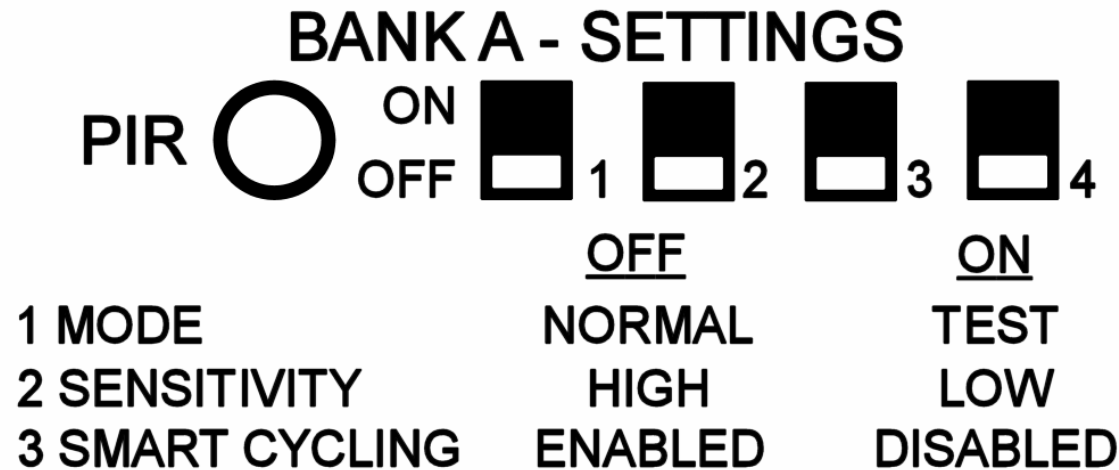
A Bank



B Bank



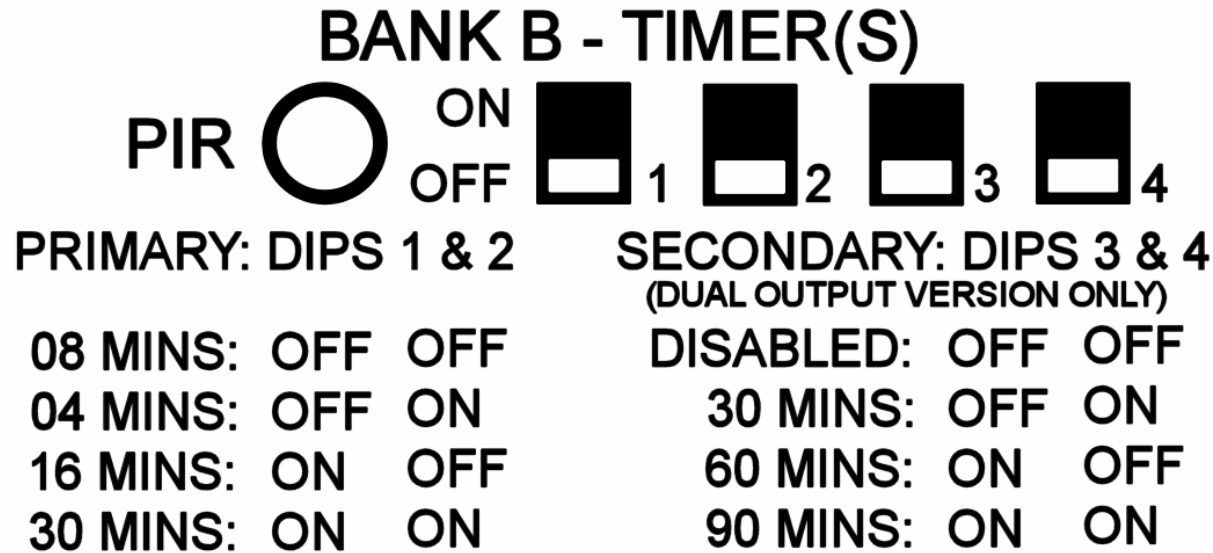
# Available Settings



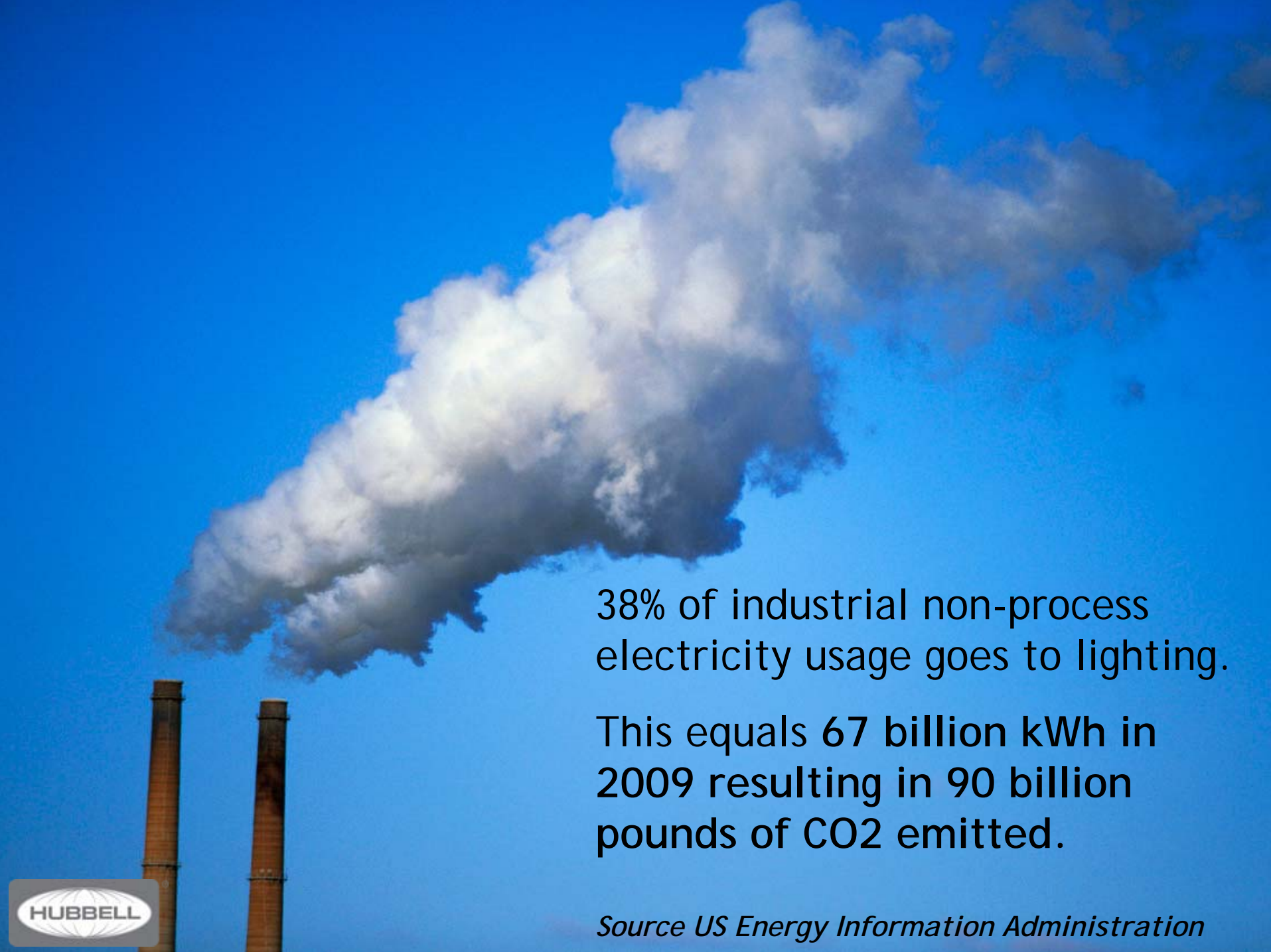
- **Switch 1** – Mode: Controls the operational mode of the sensor. When placed in Test Mode, the sensor will timeout after 8 seconds of no occupancy. Sensor will automatically exit test mode after 1 hour.
- **Switch 2** – Sensitivity: Controls PIR motion detection level. Use high sensitivity unless light(s) appear to turn on due to air currents, heat sources, etc. when area is unoccupied.
- **Switch 3** – Smart Cycling: Available on dual relay sensors only. When enabled, sensor balances the switches cycles of the different output loads.
- **Switch 4** – Photosensor: To be used at a later date



# Available Settings



- Primary Timer (DIPs 1 & 2): Controls time interval to turn off light(s) controlled by Primary Timer after the lighted space becomes unoccupied. Available settings are 8 (Default), 4, 16, and 30 minutes.
- Secondary Timer (DIPs 3 & 4): Used on two relay sensors only. Controls time interval to turn off light(s) controlled by Secondary Timer after the lighted space becomes unoccupied. Available settings are DISABLED (Default), 30, 60, and 90 minutes.



38% of industrial non-process electricity usage goes to lighting.

This equals 67 billion kWh in 2009 resulting in 90 billion pounds of CO<sub>2</sub> emitted.



*Source US Energy Information Administration*

# Residential



# Commercial



# Industrial

