PROMAT 2015

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The New Normal: Why Lighting Controls Are Now a 'Must Have'

Sponsored by:

DIGITAL LUMENS

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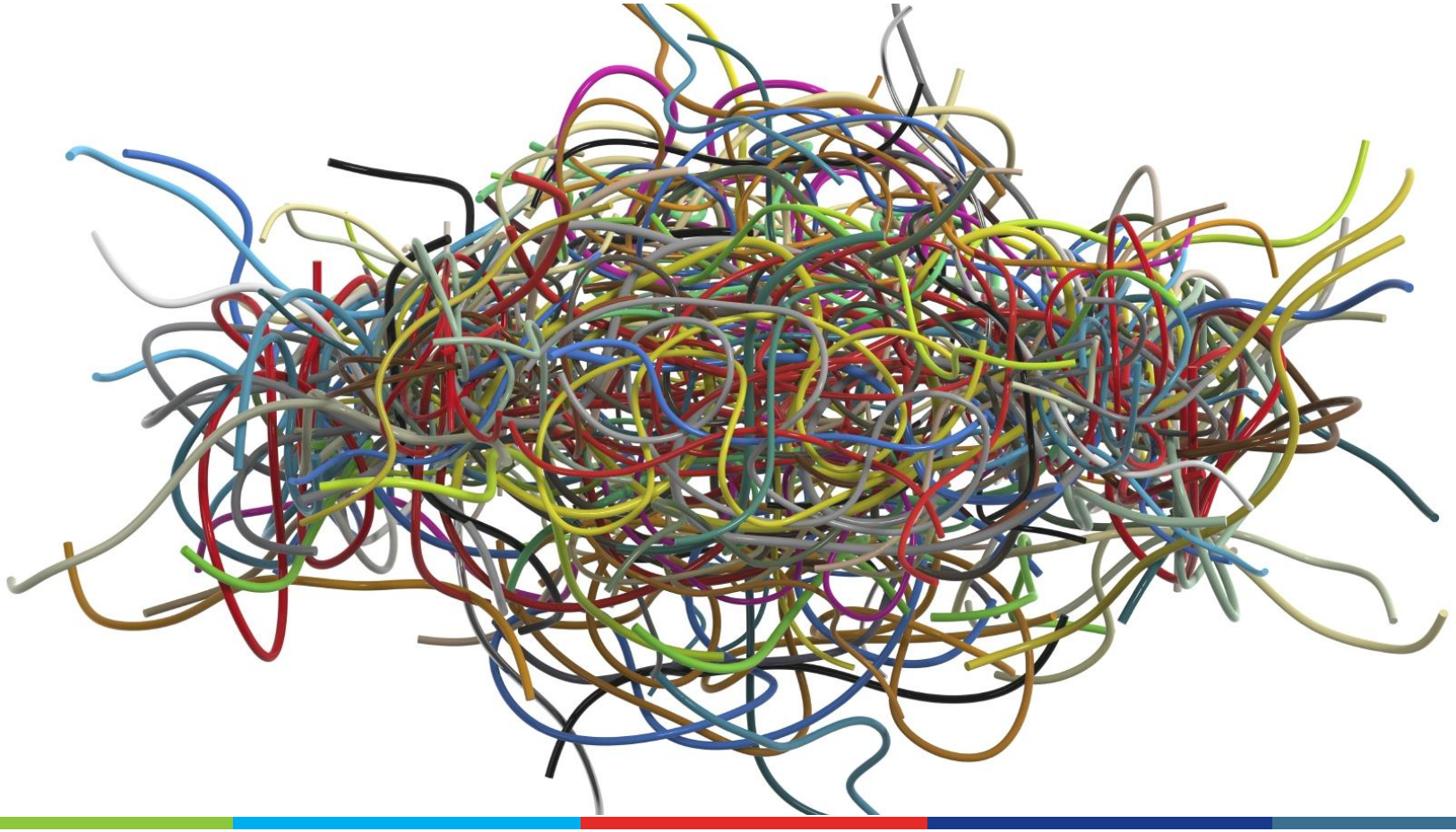
How Many Perceive Lighting Controls



How We Use Lighting Today

How We Should Use Lighting

Popular Misconceptions

"Lights need to be on all the time. Our facility is really busy."

"Controls can't save me that much in energy costs.

Popular Misconceptions

"LEDs are too expensive."

"We'll just add a motion sensor."

10 Years Ago, Those Were Valid

- Legacy lighting (HID, HPS, HIF)
  - Not suited to controls
  - Frequent on/off cycling shortened lamp and ballast life
- Controls were
  - Too costly to implement
  - Often complicated to install and service
  - Not guaranteed to have a compelling ROI
  - Often disabled when installed
- Energy intensity wasn't as much of a priority

Times Have Changed!

- LED technology
  - Widely accepted as the most energy-efficient illumination source available
  - Inherently controllable
- Controls are now
  - Fully integrated, eliminating need for after-market integration
  - Responsive to the environment
  - Easy-to-use, with intuitive software interfaces
  - More cost-effective
    - Cost of sensing, monitoring and other controls technologies has dropped dramatically
- Energy is a major concern

The Energy Climate

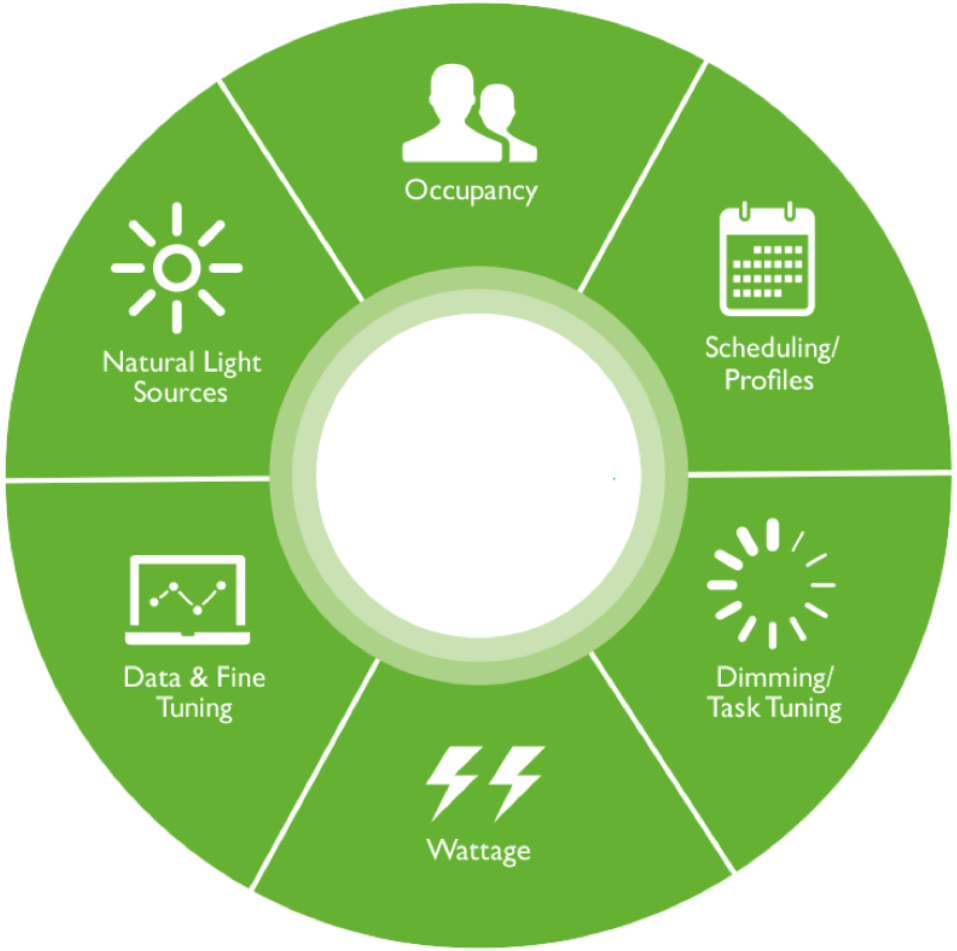
- Energy cost is a much more significant factor
  - In the U.S., rates from $.04 to $.35+/per kWh
    - That's before peak charges are reflected
  - In the EU, rates from €.04 to €.20
- Utilities aggressively trying to reduce load
  - Demand management programs
    - Peak charges
    - Demand-response/load-shedding programs
  - Energy-efficiency incentives
    - kWh-focused
    - Per kWh reduced
    - Custom vs. Prescriptive, depending on solutions employed
    - M&V required

DEEP DIVE: LIGHTING CONTROLS

Lighting Controls are a Must-Have

- Controls are key to significant energy savings
- Fully integrated, intelligent systems
  - Proven to reduce energy use by up to 90%
  - Have the lowest TCO
  - Create flexibility

CONTROL STRATEGIES

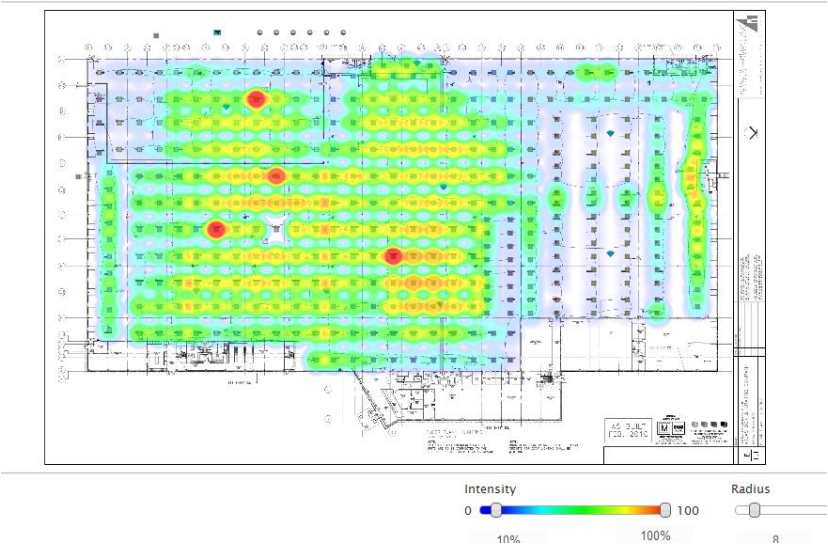


Energy Efficiency Drivers

Occupancy

- Light where you need it, when you need it

- Occupancy rates vary by application
  - Dock 40%
  - Dry storage 30%
  - Manufacturing 35%
  - Cold storage 15%



Lighting Occupancy

- Commercial and industrial facilities' occupancy rates are often much lower than expected

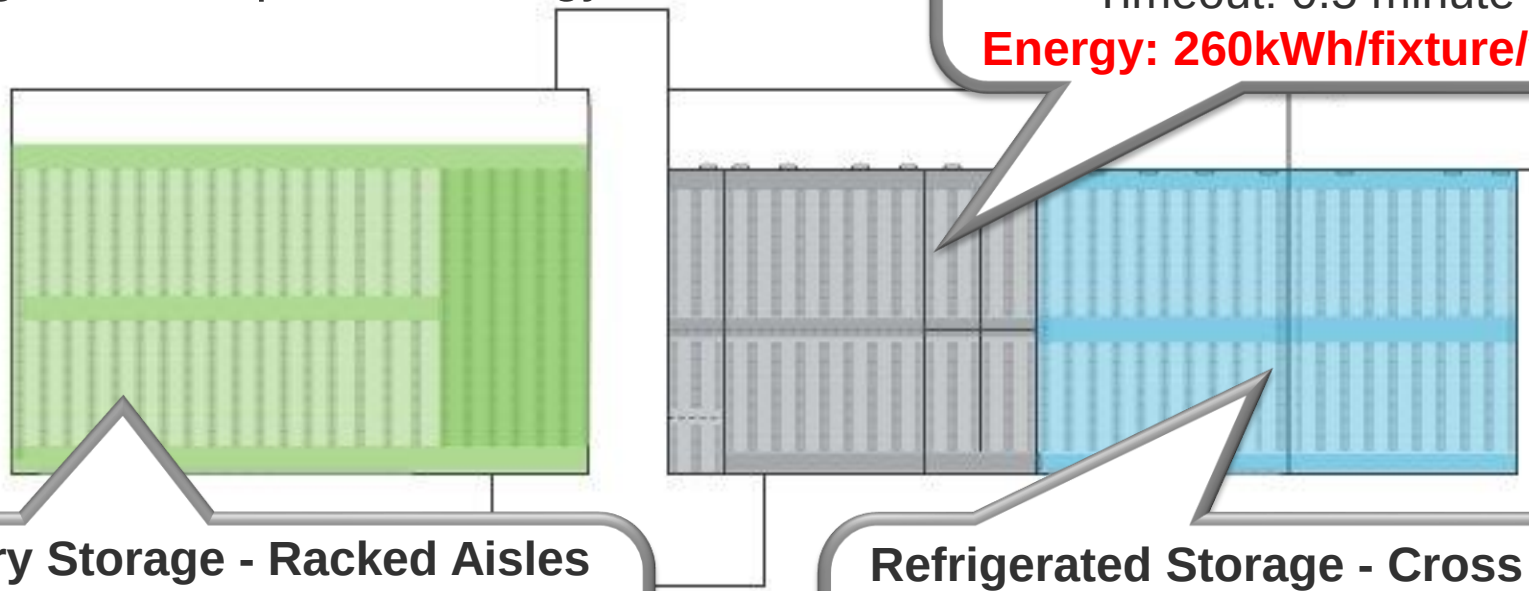
- Lighting-based on actual occupancy means that you:
  - Pay for the light you actually use
  - Don't light space that isn't occupied, or very rarely occupied

Integrated sensors can be used to:

- Turn on any number of fixtures
- Transition from active to inactive states
- Turn off or dim fixtures in unoccupied areas from 1-99% output
- Progressively dim down fixtures over time allowing for savings without disrupting occupants

Occupancy & Timeouts

Variable settings have a surprisingly significant impact on energy use



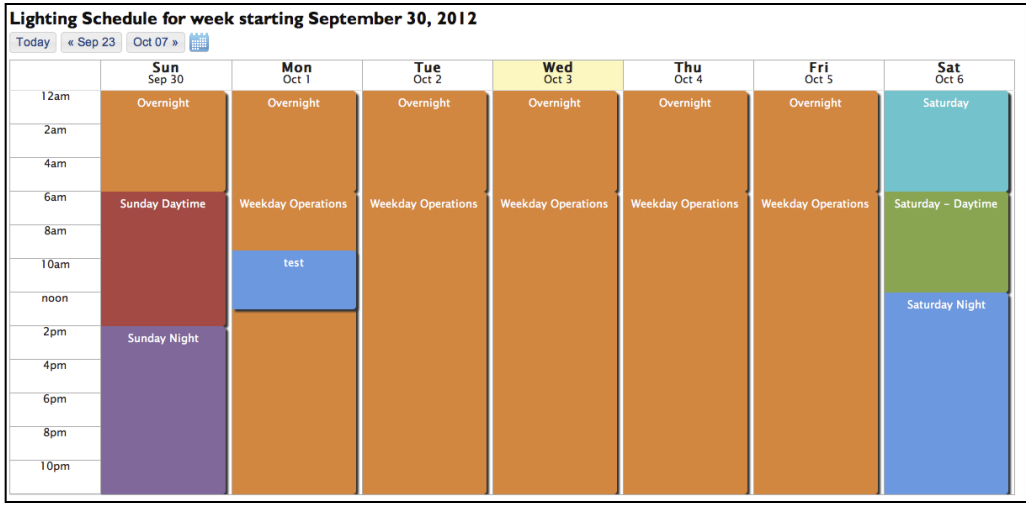
Cold Storage - Racked Aisles
Active: 75%
Inactive: 0%
Timeout: 0.5 minute
Energy: 260kWh/fixture/year

Dry Storage - Racked Aisles
Active: 100%
Inactive: 0%
Timeout: 1.5 minutes
Energy: 700kWh/fixture/year

Refrigerated Storage - Cross Aisles
Active: 100%
Inactive: 10%
Timeout: 3 minutes
Energy: 1000kWh/fixture/year

Scheduling & Profiles

- Program lighting settings to match facility's needs
  - Time of day
  - Day of week
  - Time of year
- Vary light levels by shift, if applicable



Dimming

- Decrease light output to reduce energy use when full brightness not required
  - Step-level
  - Digital
- Dimming options depend on lighting technology being used
  - Legacy lighting – HID, HPS, HIF – less susceptible to to being controlled
  - LEDs fully controllable (0-100%)

Task Tuning

- Align lighting settings to specific needs
- Not every ***area*** requires the same light levels and settings
- Not every ***activity*** requires same light levels and settings

Wattage

Switching to a lower-wattage illumination is a must

450 Watts

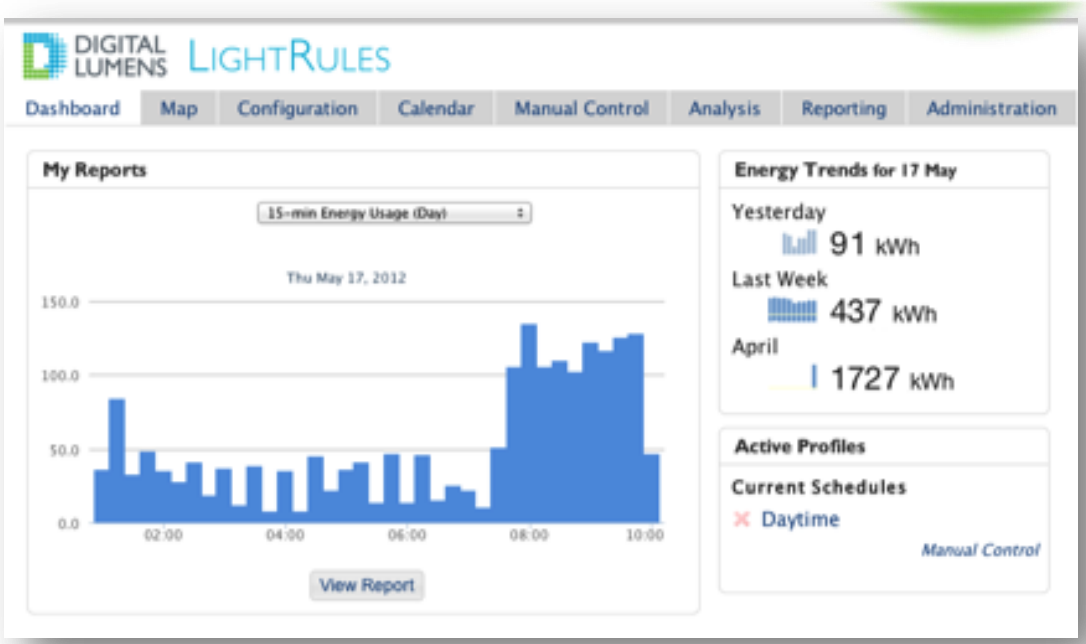
Locks in significant reduction that is often greater than 50%

248 Watts

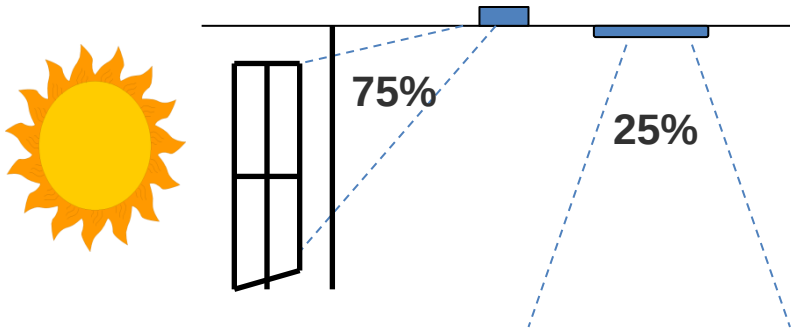
155 Watts

Data & Fine Tuning

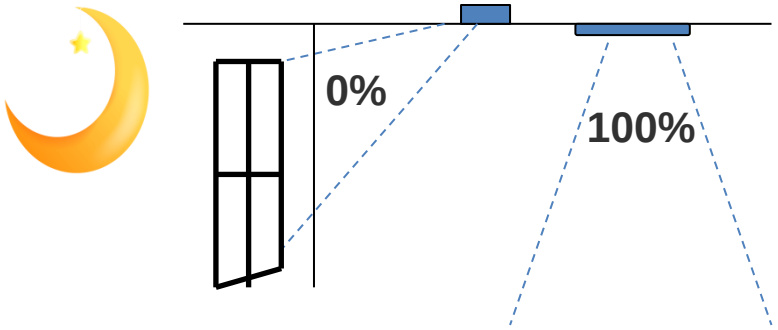
Data makes it possible to analyze energy use and identify opportunities for savings and employee comfort and safety.



Daylight Harvesting



Responds to available light and automatically adjusts fixture output



Fixture-by-fixture implementation required for optimal performance and savings

PG&E-Sponsored Study

CONTROLS AT WORK

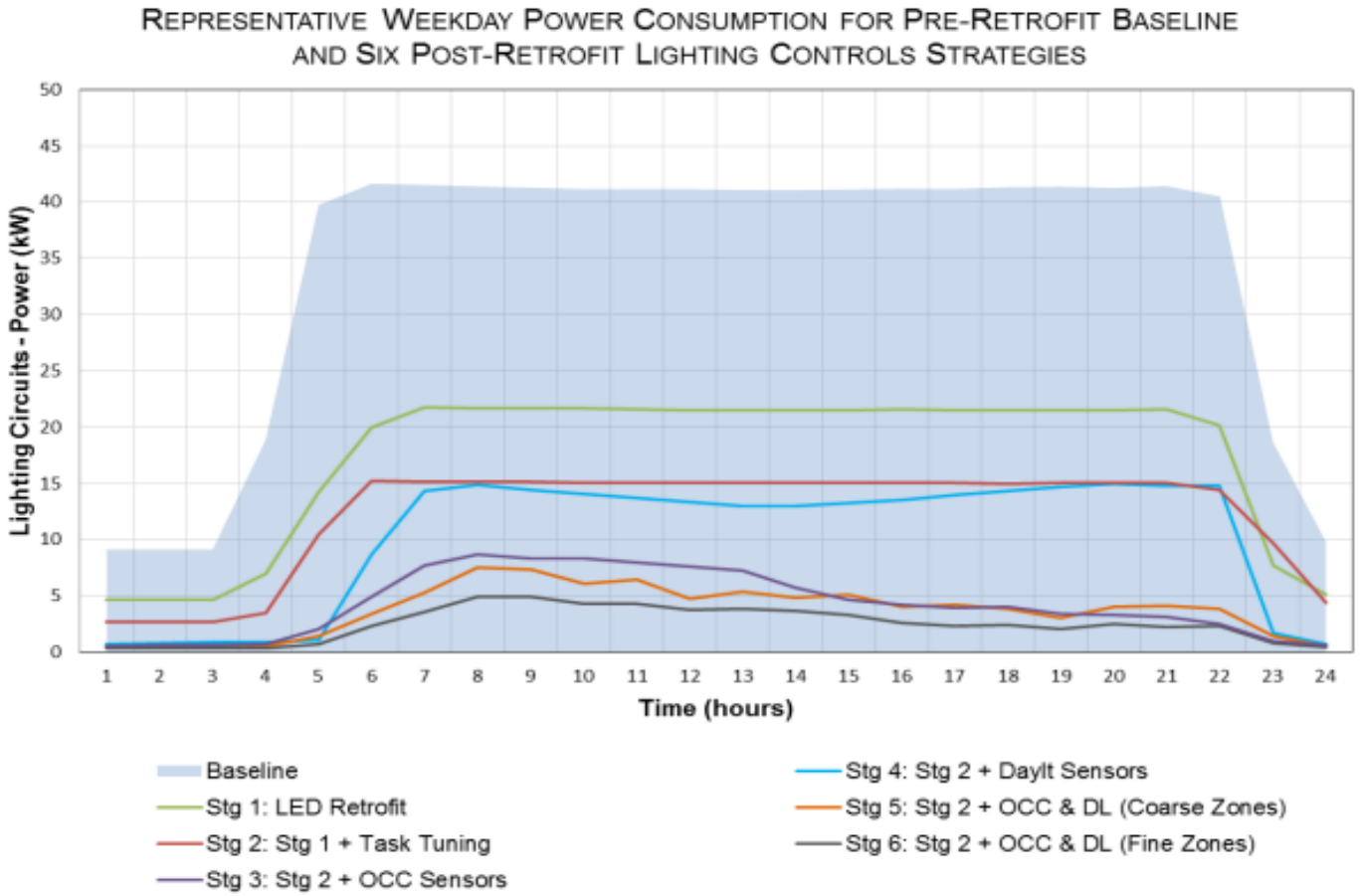
Study Background

- PG&E sponsored in-depth project to understand performance of networked, intelligent LED lighting
  - Project part of mandate to procure new technologies that help power companies determine which solutions will help them meet efficiency and renewables targets
- Tested Intelligent LED Lighting System in 44,800 square-foot section of Ace Hardware distribution center
  - Replaced 100+ metal halide fixtures with 13K & 18K intelligent LED luminaires

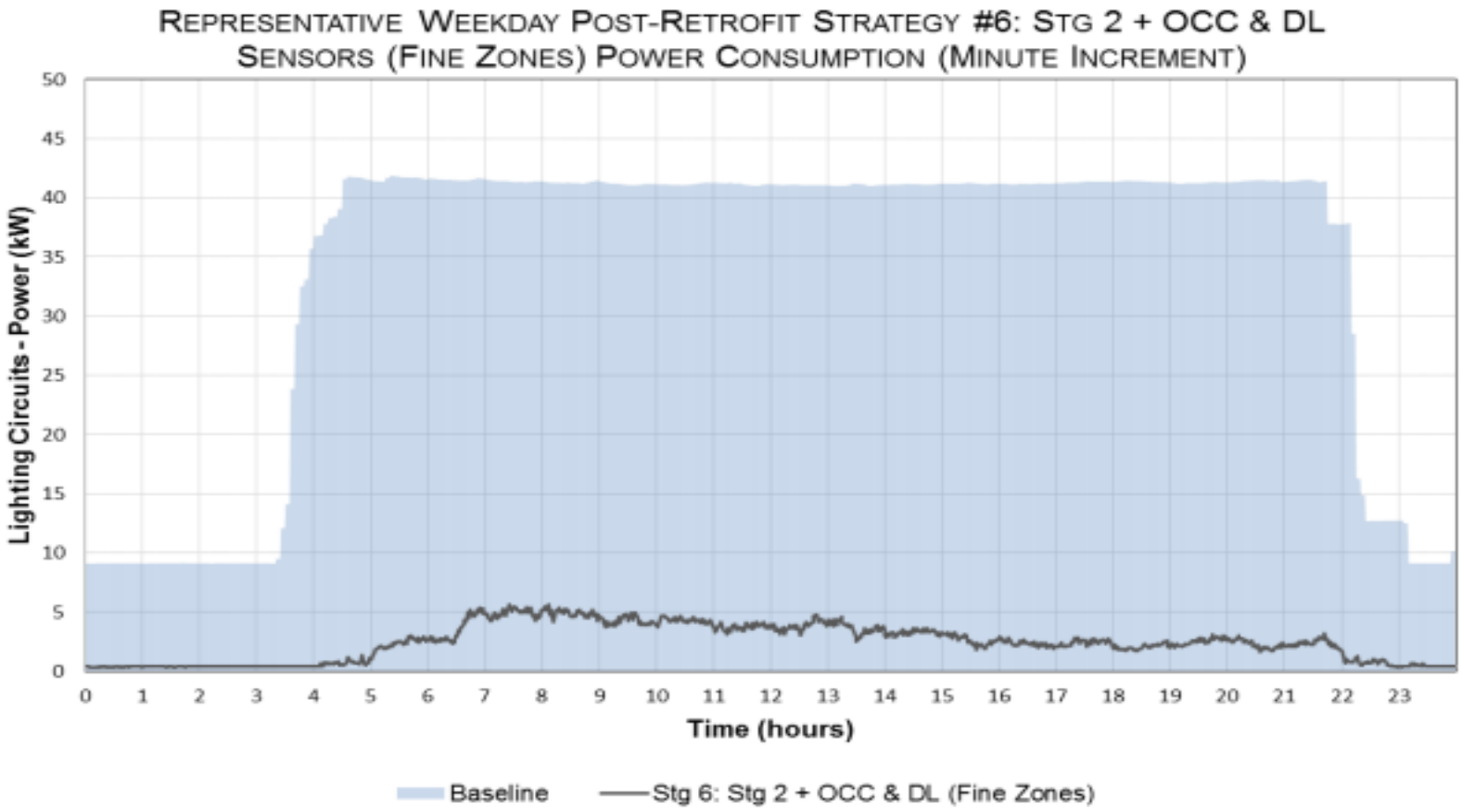
Methodology

- Tested a variety of usage scenarios across an 8-month test period and separated into six different phases
  - Energy use – LED lights all on (no controls)
  - Isolated individual controls measures
    - Dimming
    - Occupancy
    - Daylight harvesting
  - Aggregated engagement of all controls
- Quantified wattage-driven and controls-driven savings

Result: 93% Energy Savings



Study Findings



TAKEAWAYS

Regardless of Measure, Remember…

- Granularity drives savings
  - Goal is to use the resource ONLY as-needed
  - This is a fundamentally different mindset for lighting
- Controls must be
  - Implemented on individual fixtures
    - Circuit-based is problematic
      - Behavior of fixture farthest from the sensor usually inappropriate
      - Wastes tremendous amount of energy to light a zone when activity may be in a small area
  - Set to most aggressive time-out settings possible
    - 15-minute timeouts are virtually useless in most facilities

Questions?

THANK YOU

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