Are LED lights in the future of your campus

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March 06, 2016

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LED lighting

- Energy efficient
- Long life
- Cold environments
- Small size
- Easily controlled
- Instant on
- No mercury
- No UV or IR (virtually)
- Attractive ROI – Lower maintenance, Rebates, Less inventory

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LED upgrade: Lamp replacement to LED

Existing System

(3) F32T8/741 lamps

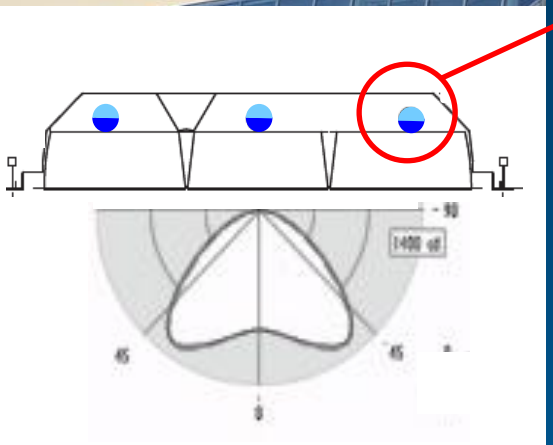
(2) .88 Electronic ballasts

3 x 2700 lumens = 8100 lumens

.88 BF = 7128 lumens

.70 efficiency = 4990 lumens

90 system watts



20% higher luminaire efficiency because all lamp light output is emitted downwards

T-LED Upgrade

(3) LED T8 lamps

(2) Electronic ballasts

3 x 1600 lumens = 4800 lumens

Ballast delivers rated lumens

.85 efficiency = 4080 lumens

44 system watts

Input power: 49% savings

Initial lumen output: 18% decrease

Lighting quality: similar

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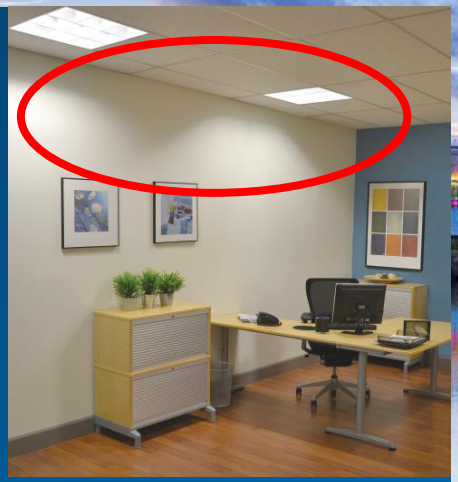
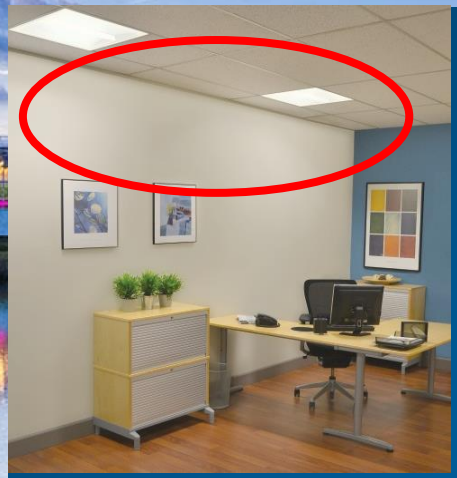
LED upgrade: Luminaire upgrade to LED

Differences in function and fashion

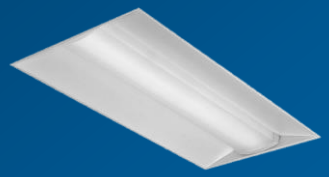
Existing Parabolic
4990 lumens
87 watts



Sharp Cut Off
Dark upper walls
Direct view of lamps
1970's style



Soft Lighting
Bright walls
Fully shielded
Contemporary



LED Luminaire
4380 lumens
41 watts

Input power: 53% savings

Initial lumen output: 12% reduction

Light quality: improved

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Expanding on your LED system

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Connected systems and controls

- Different controls for classrooms
  - Occupancy sensor
  - Daylight harvesting
  - Programmable controls
  - Corridor systems
  - Dimming
- Why controls are important
- Different types on controls

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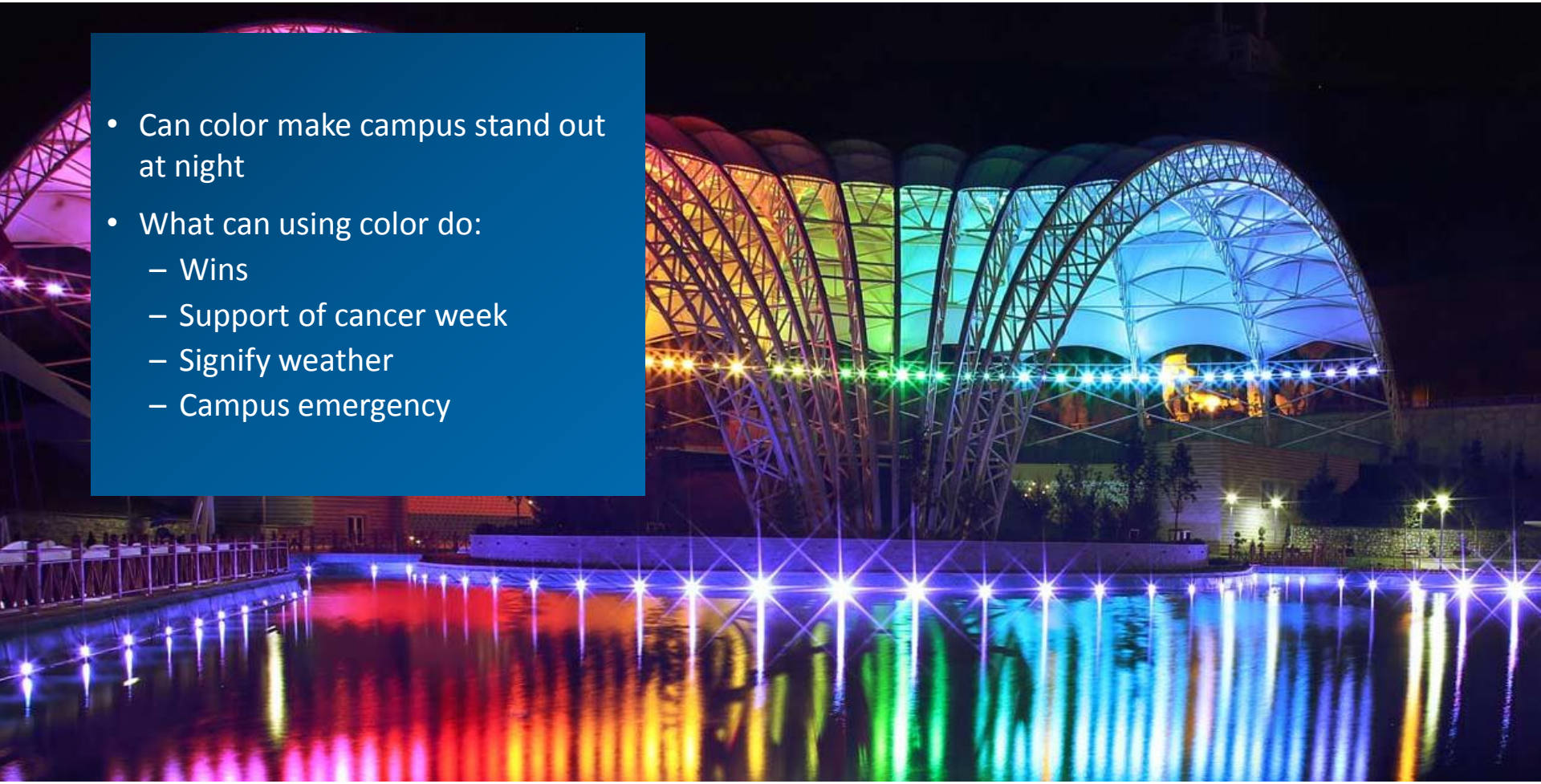
Use of color to make buildings stand out



- Can color make campus stand out at night
- What can using color do:
  - Wins
  - Support of cancer week
  - Signify weather
  - Campus emergency

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Safety of students

- Pathway lighting
- Parking lots
- Roadway lighting
- Parking garages

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Taking control of the LED upgrade process

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How do you go about doing an LED upgrade

- 2 vector strategy
  - Is this the right building for LED? (New Construction)
    - No brainer, cheaper more efficient
  - Is this the right project for an LED upgrade? (R&R)
    - Level of renovation, Complexity , ROI etc…

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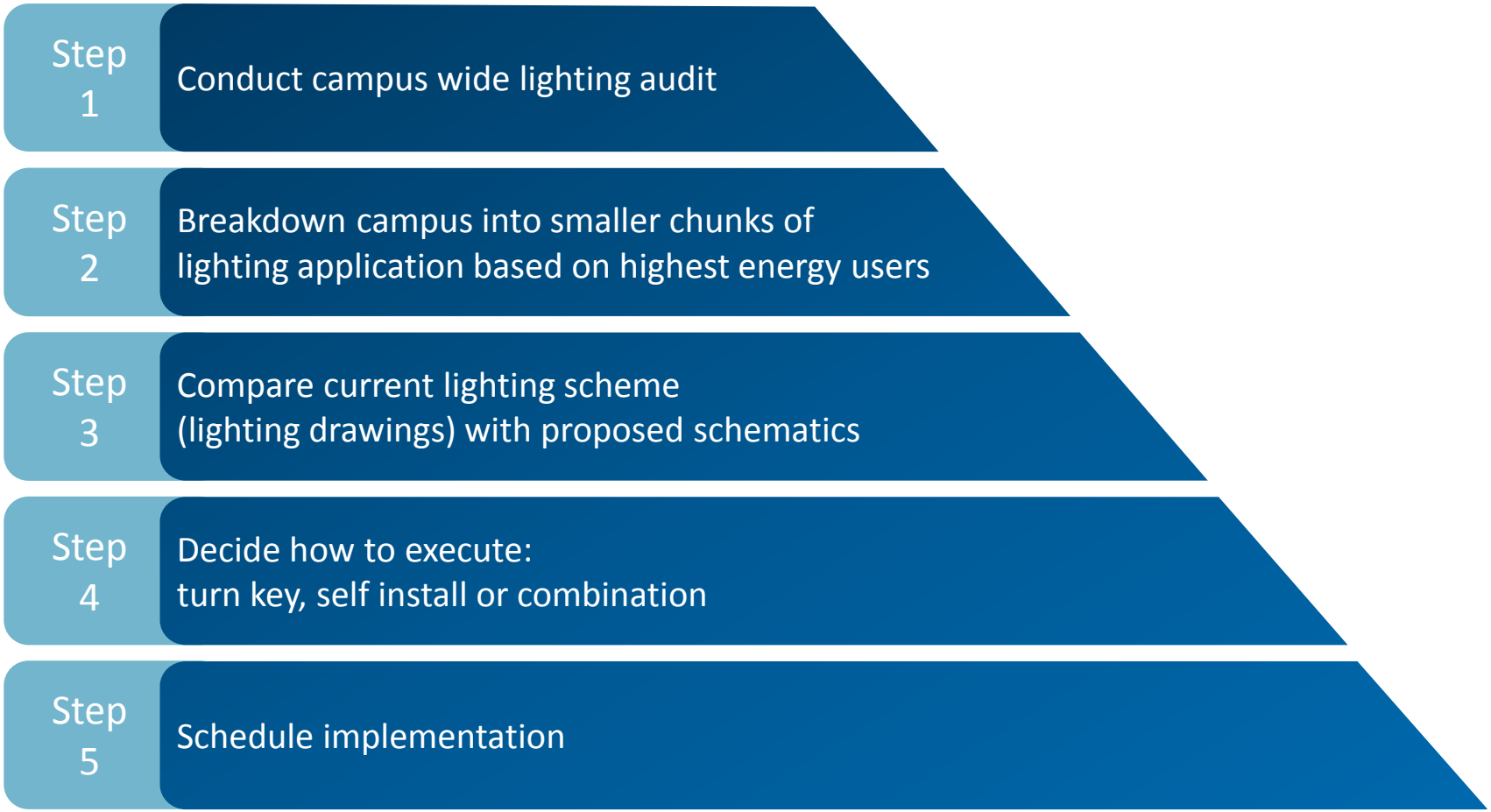
…if the answer is “YES”, here is a recommended process



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Conduct campus wide lighting audit

- Determine number of buildings that need to be walked
- Collect all lighting designs for use during audit
  - Count luminaires and note type of luminaire
- Drive / walk campus at night to assess current roadway and pathway lighting

- Gather all energy bills to understand costs per kWH
- Educated guess for burn hours
- Understand how much annual maintenance costs
- Any costs for carrying inventory for maintenance?

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Breakdown campus into smaller projects

- Prioritize your campus
  - Highest energy using buildings
  - Age of lighting
  - Most difficult / expensive to maintain
- Common breakdown
  - Parking garages
  - Gymnasiums
  - Buildings – classrooms
  - Buildings – corridors
  - Pathway / roadway lighting
  - Highest energy users

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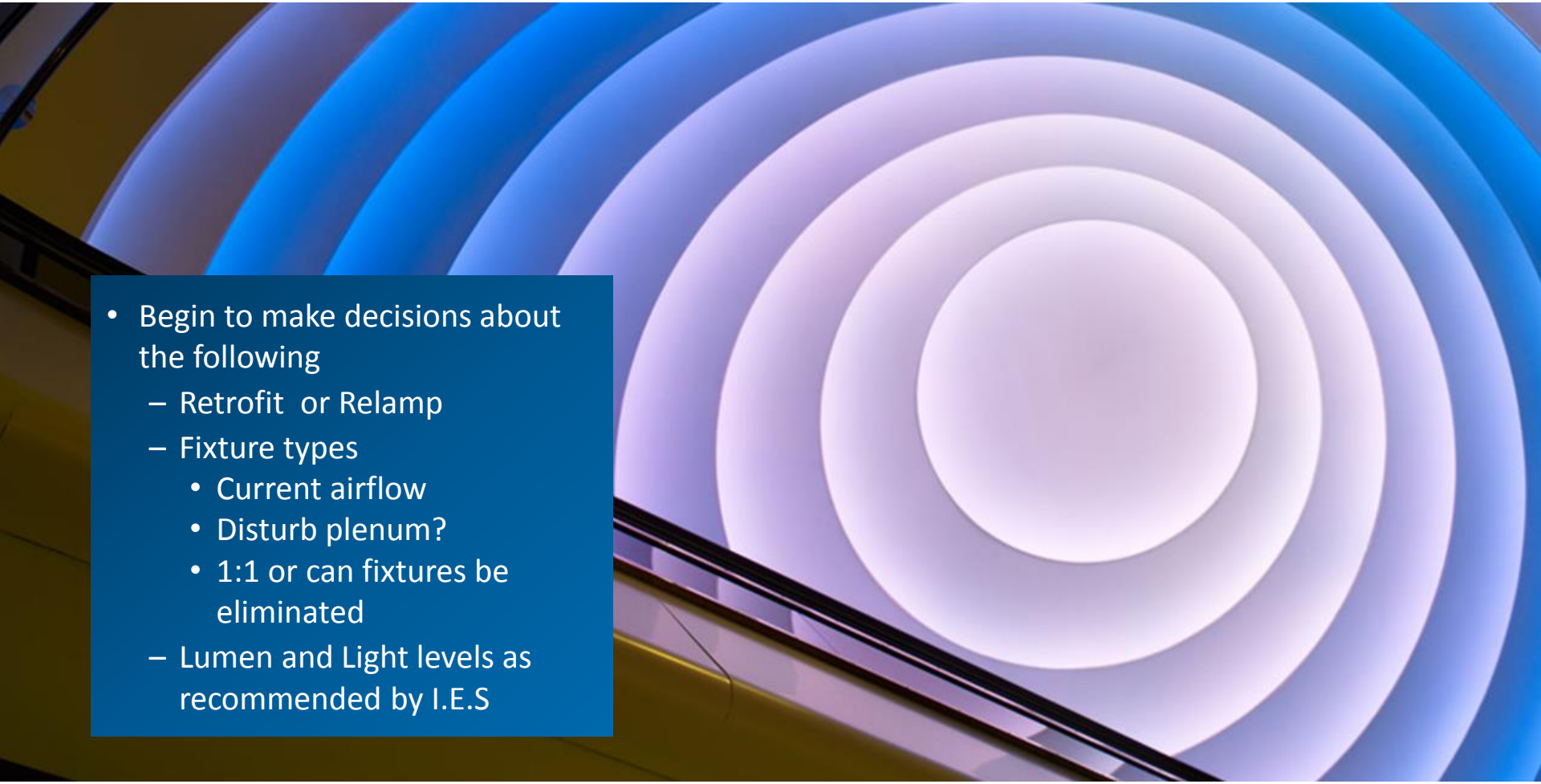
Compare current lighting scheme (lighting drawings) with proposed schematics



- Begin to make decisions about the following
  - Retrofit or Relamp
  - Fixture types
    - Current airflow
    - Disturb plenum?
    - 1:1 or can fixtures be eliminated
  - Lumen and Light levels as recommended by I.E.S

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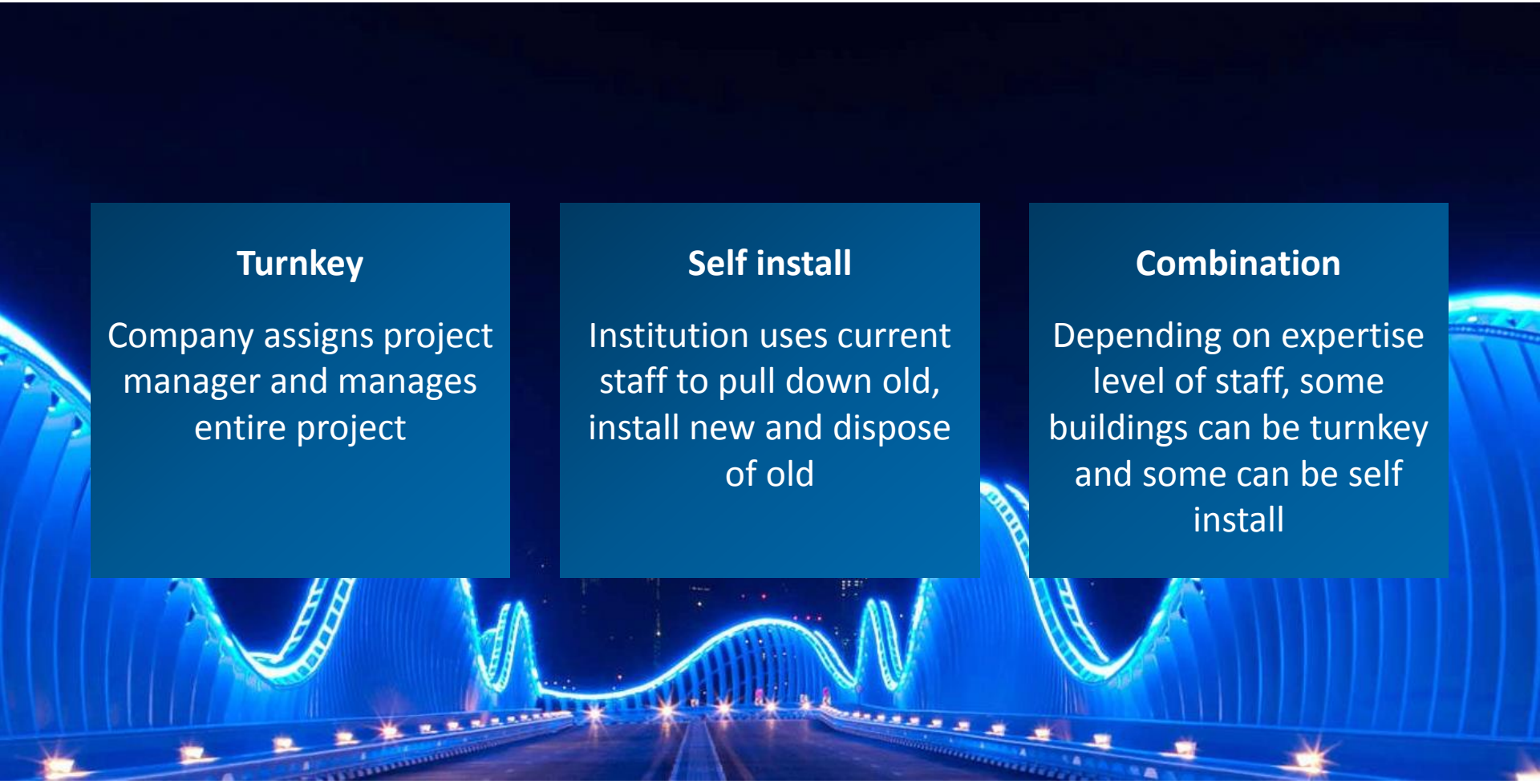
Decide how to execute – turn key, self install or combination



Turnkey

Company assigns project manager and manages entire project

Self install

Institution uses current staff to pull down old, install new and dispose of old

Combination

Depending on expertise level of staff, some buildings can be turnkey and some can be self install

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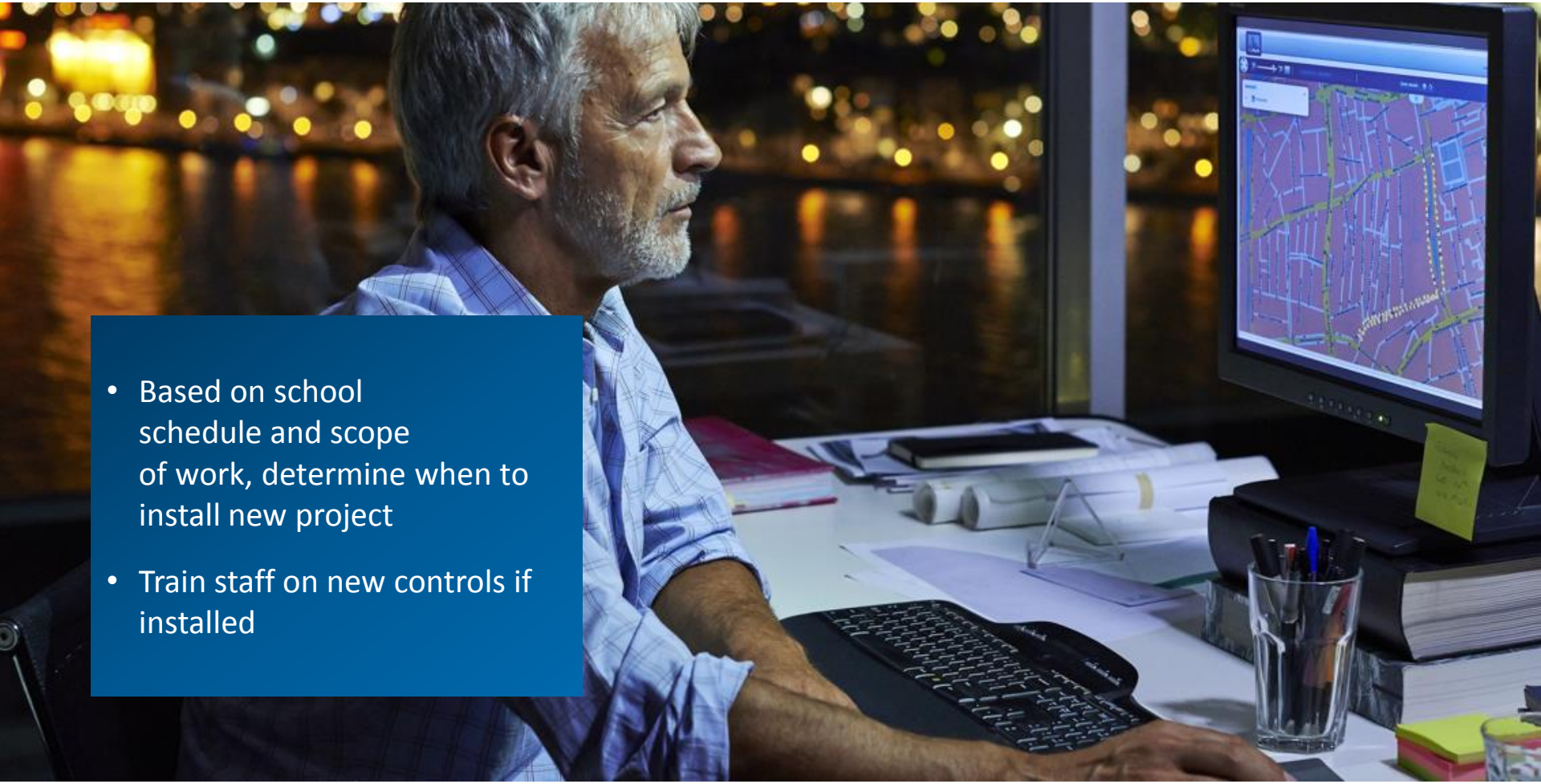
Schedule implementation



- Based on school schedule and scope of work, determine when to install new project
- Train staff on new controls if installed

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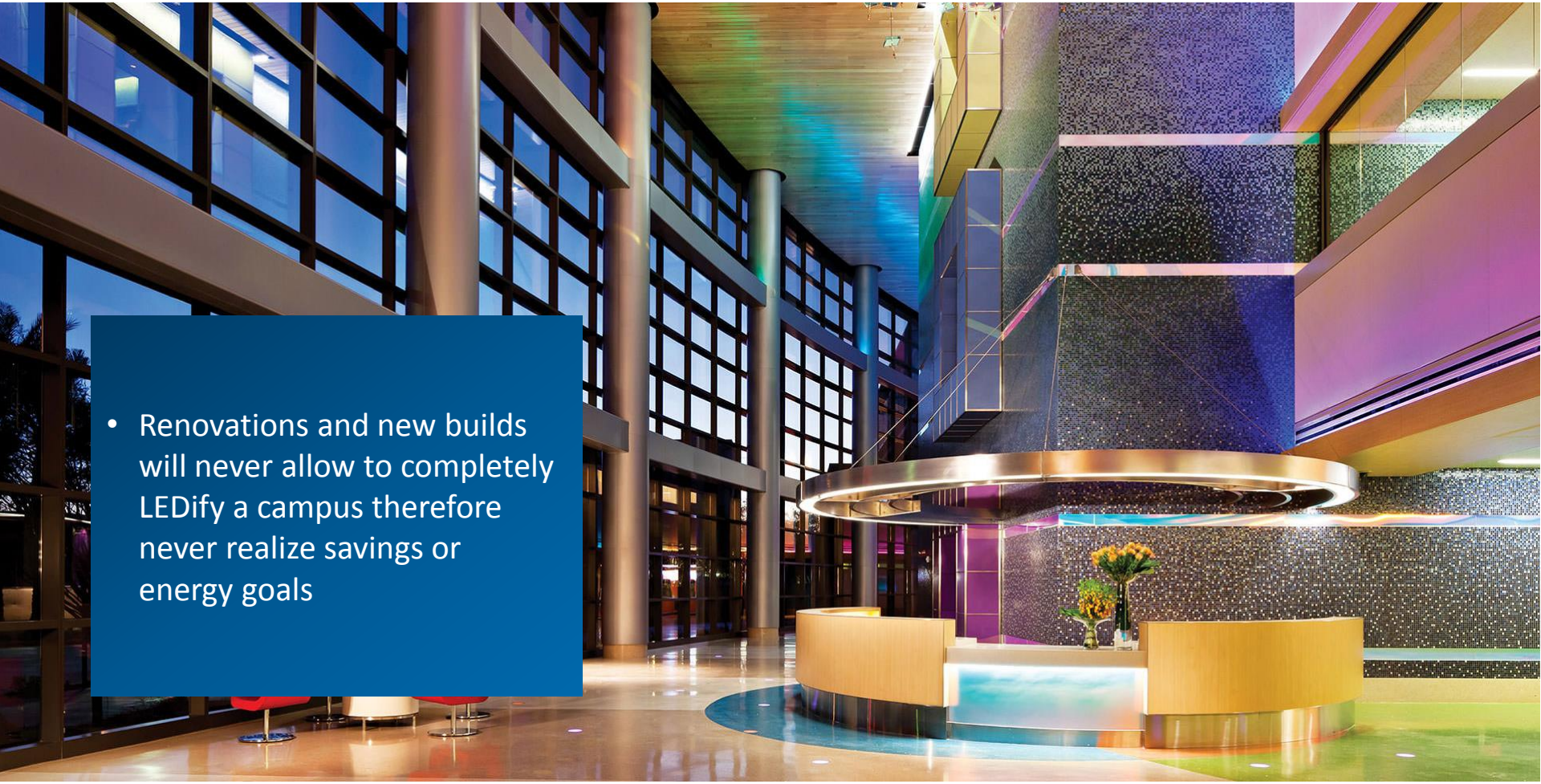
Game of renovations – never catch up



- Renovations and new builds will never allow to completely LEDify a campus therefore never realize savings or energy goals

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Appendix

Life expectancy for LED *systems*

- *Products* are a component "chain"
  - LED
  - Driver
  - Optics
  - Mechanical assembly
  - Electrical connections
- *Lamps* should be rated as *products*
- Luminaires with replaceable components

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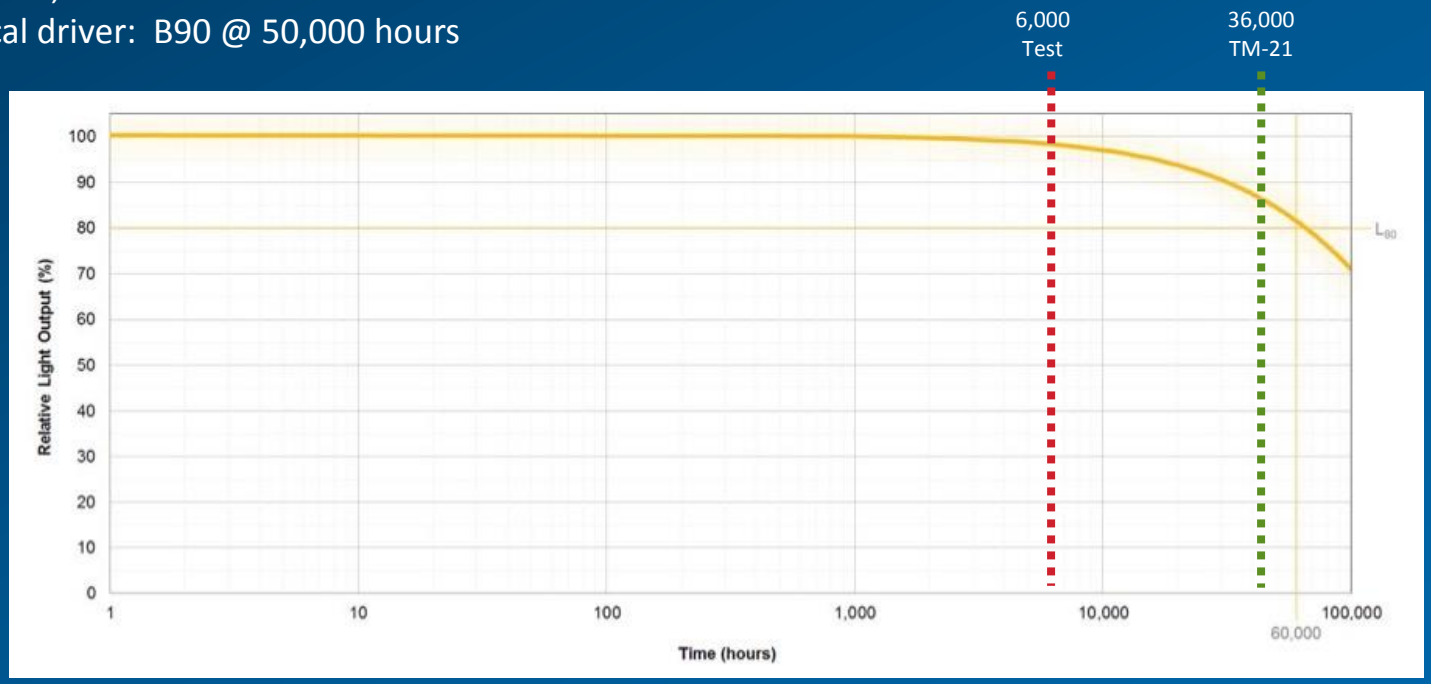
Lumen maintenance projection

Lumen maintenance Projection:

- TM-21-11: L85 (6K) >36,000 hours*
- L80 > 60,000 hours
- Typical driver: B90 @ 50,000 hours



* IES TM-21-11 only allows lumen maintenance projections up to 6 times the test duration (in hours) of LM-8—08 measured data.

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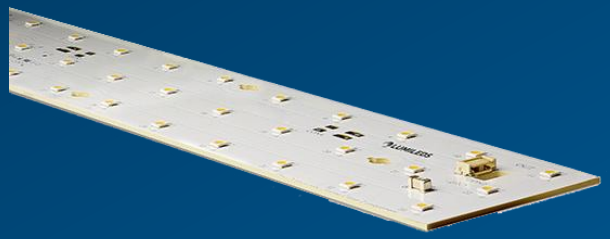
Life and reliability



LED Array in General Area Luminaires
Affected by ambient heat and thermal design
Metric: Lumen maintenance (L70 and higher)
50,000–80,000 hours

20,000hours *50,000hours* *80,000hours*

Linear Fluorescent Lamps
Affected by starting frequency and method
Metric: 50% survivorship
20,000–80,000 hours

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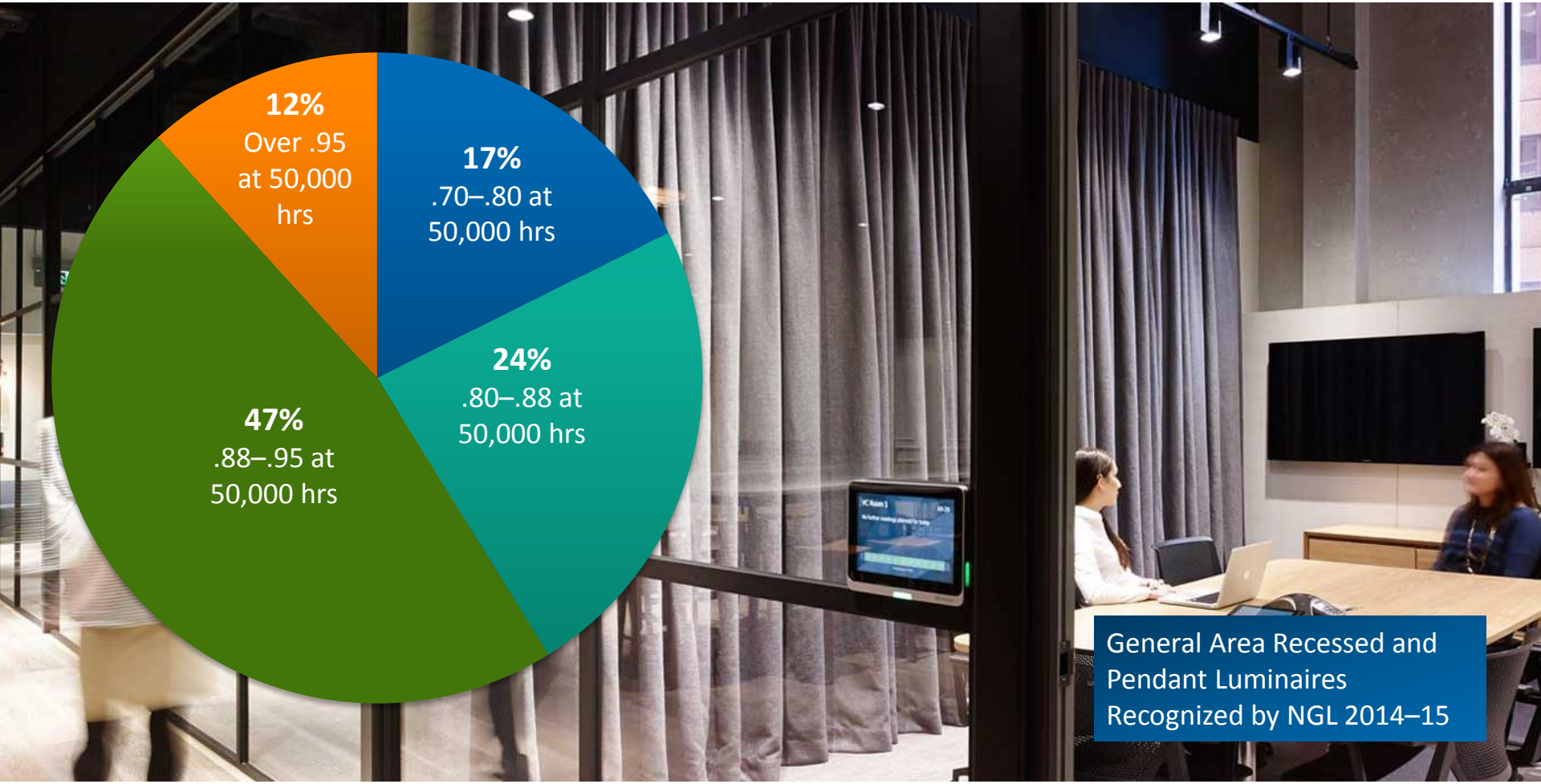
Lumen maintenance at NGL



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