Are LED lights in the future of your campus

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March 06, 2016
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

LumiLEDs Luxeon Emitter
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

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

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

- Pathway lighting
- Parking lots
- Roadway lighting
- Parking garages
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...
...if the answer is “YES”, here is a recommended process

1. Conduct campus wide lighting audit
2. Breakdown campus into smaller chunks of lighting application based on highest energy users
3. Compare current lighting scheme (lighting drawings) with proposed schematics
4. Decide how to execute: turn key, self install or combination
5. Schedule implementation
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?
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
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
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
Schedule implementation

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

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

General Area Recessed and Pendant Luminaires
Recognized by NGL 2014–15

- 12% Over .95 at 50,000 hrs
- 17% .70–.80 at 50,000 hrs
- 24% .80–.88 at 50,000 hrs
- 47% .88–.95 at 50,000 hrs