Emerging Technologies (LEDs and Beyond)

Good and Bad Application Lessons Learned

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Have you heard the one…

- 100,000 hours of operation without problems
- Will Save you over half of your lighting electric bill
- Will Reduce your maintenance budget
- It is a one-for-one replacement
- The color is so bright because it reaches further
- People won't notice the brighter color as much
- You can control the light better
- It is the same as the 150 watt, 250 watt, fill in the blank…

Continued Advancements…

ELECTRICAL CONTRACTOR
POWER & INTEGRATED BUILDING SYSTEMS

The First Single-Molecule LED

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By Timothy Johnson

Among the industries seeking ways to make technology smaller, lighting is no exception. Now, a team of scientists at the University of Strasbourg in France has developed the first single-molecule light-emitting diode (LED).

LED Uses

- LEDs have been around since Transistors
- They are used for many applications

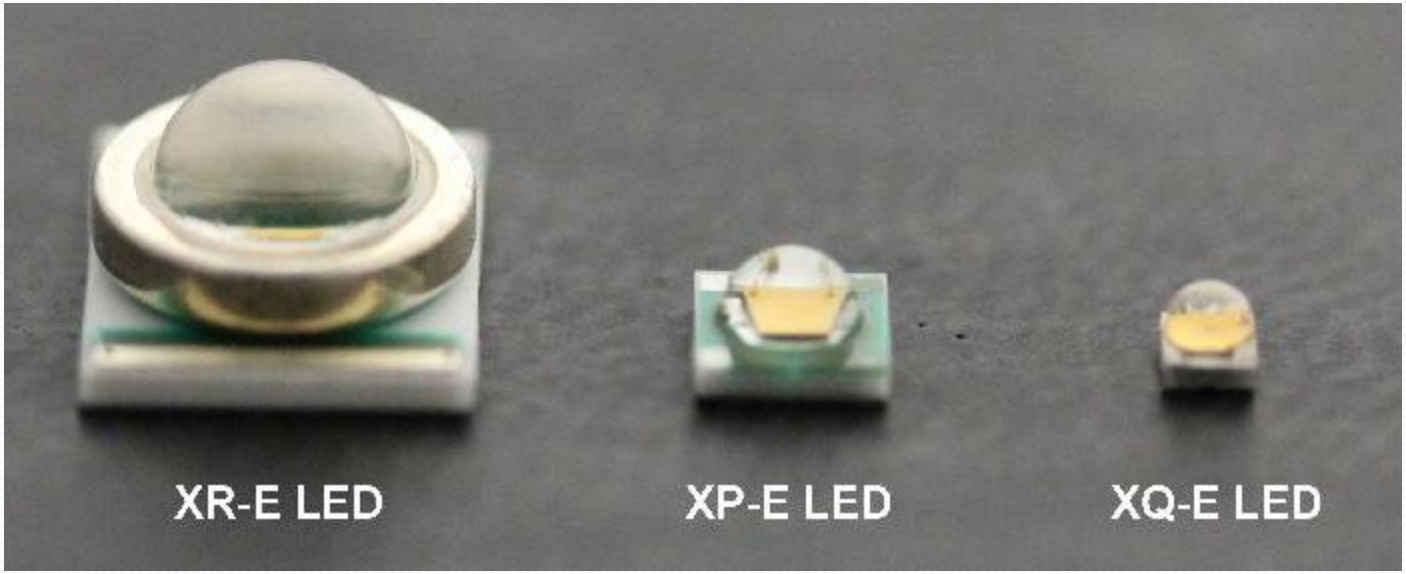
Engineering LED and Other…

- Emerging technologies are being almost nearly on a weekly basis:
  - LEDs are being revised and new and improved versions released every few months
  - TVs (201" LED TV @ $655,000)
  - Cars touting LED technologies

- The Biggest Issue is "POWER"
  - What does it take to light a large area with a very small LED

LED Components

Technologies



Size comparison with the XR-E LED and XP-E LED. (LEDinside/Cree)

LED Size Comparison…

Single LED

Size compared with the tip of a pencil. (LEDinside/Cree)

Challenges in Application to Transportation…

"If it sounds too good to be true, it probably is!!!"

Oxford English Dictionary-1580

Challenge - 1

Implement a one-for-one fixture replacement with the same light quality.

Actual Situation…

The Names were changed to protect… (Everyone)

Problem:

- Vendor had a contact on the board of an agency
- Vendor was able to give the sale pitch to the board member
- The board member liked the product

Solution:

- Perform the analysis
- Not make enemies in the process
- Be honest without hurting the relationship with the board member.

Perform the analysis:

- Take an existing situation
- Perform the Photometric Analysis
- Prepare a report
- Present the results to the agency

Results

- The proposed fixtures did not meet current design constraints
- Many hours were used of a GEC contract
- The vendor was not happy

Issue: The Light from a small LED has a hard time putting out enough light to be the same intensity as a conventional lighting system.

Lessons Learned

- What may sound great must be tested and evaluated
- Salesman that go to the board members wield a lot of power (Especially ones that are good friends of the board member)
- Some people never give up. (The vendor came back 2 additional times and the third with an entirely new product)
- Demand a test site or view an existing installation

Challenge - 2…

The light from the LED is better… People will love it.

Project

- Replacement of 250 watt HPS cobra heads on a loop ramp to a toll plaza

Expectation:

- One for One replacement no additional changes

Calculations:

- Photometrics backed up the design

Lesson Learned

- Since all the design and savings numbers all appeared to be aligned and the design feasible the installation proceeded.
- Actual length of time installed - 1 Week
- Why removed:
  - Complaints from too many drivers…
  - The patrons said they didn't like the look of the lights.
  - Lights are too white/bright.
  - The lights are a driving distraction.

Challenge - 3

Maintenance costs will be much less…

Project:

- Toll Plaza Under-deck lighting

- Scope
  - Replace the existing fixtures with new LED canopy fixtures.

- Benefit
  - Better Lighting
  - Lower Maintenance (Fewer Lane Closures)
  - Proven Product

Lessons Learned

- Heat is our enemy
- Fixtures tested and currently in use may not be exactly the same application

- Results:
  - A large percentage of the LED drivers for the fixtures have burned out in less than a year and a half
  - Maintenance Costs have not decreased
  - Price of the fixtures were three times the original scoped fixture with no realized savings

Design Challenges…

- Adjustments needed to Standard Photometric Design Programs (Such as AGI32)
- The throw of the fixture
- Color temperature required.
- People/Patrons perception
- Application and Heat considerations
- Is this a proven product

Lessons Learned Lead to Victories…

- Currently have LED's in all Toll Plazas to replace incandescent lights
- LED bulbs implemented in high reach areas where special equipment is needed to access the fixtures
- Underdeck lighting on roadways and overpasses have had successes utilizing LEDs
- Other projects such as ones mentioned earlier in this session are being implemented with great successes.

Cautions…

- ***Caveat emptor***
  - Let the Buyer beware
- Require a prototype test installation for proof of performance
- Get a guarantee if there are failures
- Watch out for Snake Oil Salesmen

What is Emerging ?

- Mixed Technologies
  - Solar
  - Wind
  - Utility
  - Alternative
- Better efficiencies in current technologies
- New technologies are popping up
- Mandates and putting on the pressure

Federal Mandate Pushing Net Metering…

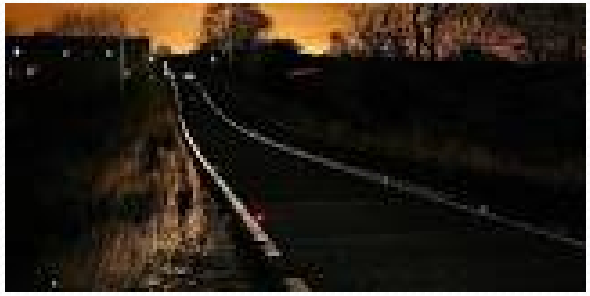
- **Executive Order 13514** titled **Federal Leadership in Environmental, Energy, and Economic Performance** issued on October 5, 2009 by President Obama.
- …At least 15% of existing federal buildings and leases meet Energy Efficiency Guiding Principles by 2015, with a goal of 100% of all new federal buildings achieving zero-net-energy by 2030.

Under-deck LEDs

Kehoe Road, OOCEA

Solar Powered Roadway Lights

LED RPMs



Flexible Solar

Off Grid Lighting Solutions…

The Next Generation…

- Generating Power for net-zero solutions
- Solar Powered Roads

Mixed: Solar and Wind Powered…

Questions