U.S. DEPARTMENT OF ENERGY | Energy Efficiency & Renewable Energy

DOE SSL Program: In the Pipeline from PNNL

DOE SSL R&D Workshop

January 31 – Feb 2, 2017

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PNNL Role in DOE Program

Core Research

Scientific research to fill technology gaps, provide enabling data

Product Development

Projects to develop or improve commercially viable materials, devices or systems

Manufacturing R&D

R&D to reduce costs through improvements in equipment, processes

Technology Application R&D

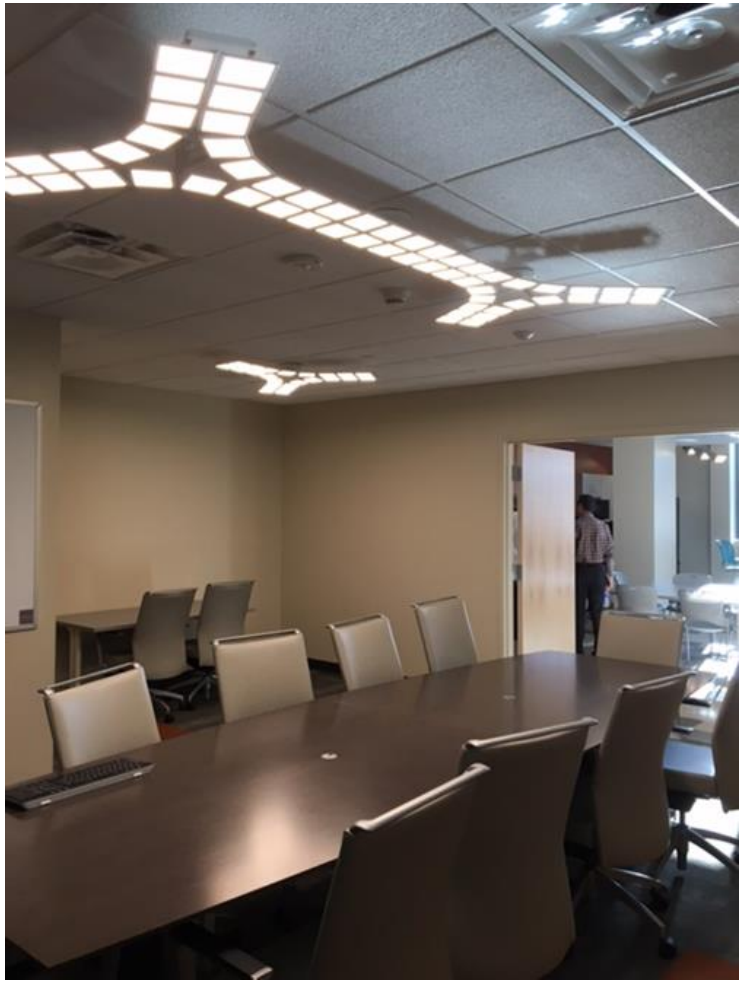
Field and laboratory evaluations, technical support for standards, technology competitions

Sky Glow Study

- Most discussion about the potential impacts of LED road lighting on sky glow have focused on the effects of changing CCT
- We are working with an established, well-reviewed model (SkyGlow Simulator) to investigate, among other things, the combined effects of:
  - Spectrum
  - Flux
  - Uplight
- Draft report is complete; public release expected by end of February

OLED GATEWAY Study: DKB Offices, Rochester, NY

- Next in series of three OLED reports will be on installation in DKB Offices
- Previous reports included CALiPER testing and market characterization
- Many OLED luminaires of various types in accounting firm offices
- On-site data collection and interviews planned for February
- Report this spring



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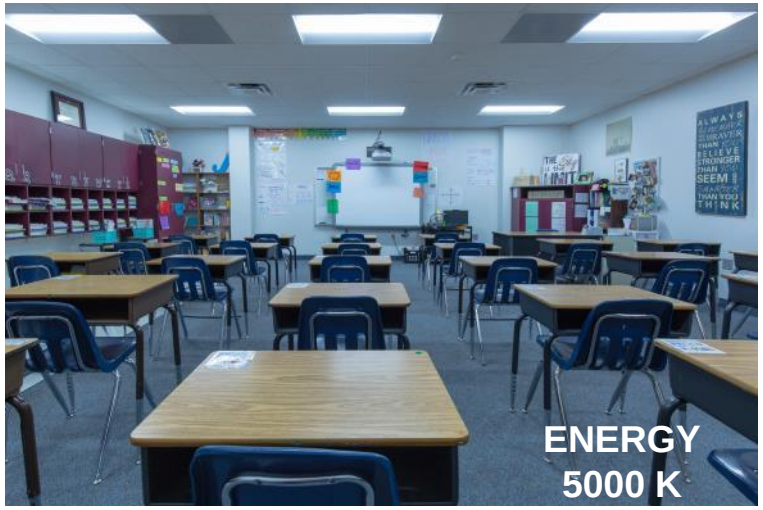
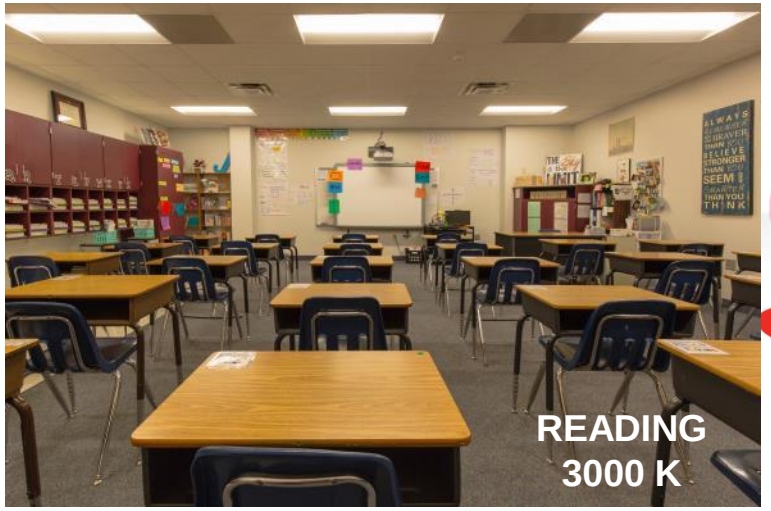
NEW: Next Generation Lighting Systems

- ALL NEW: Announced this month; will focus on systems, not stand-alone luminaires
- First competition announced on Jan. 17
- Will focus on indoor systems; participants will submit a complete system of luminaires, integrated controls, and supplemental equipment
- Systems will be permanently installed at Parsons School of Design in NY

Color Tunable Luminaires in Classroom Lighting





- DOE partnering with manufacturer, school district, & engineering firm
- Four CCTs: 3000, 3500, 4200, 5000 K
- Four scenes for teaching modes
- Full range dimming
- Evaluating energy, photometric & color performance
- Teacher feedback
- Usage patterns: CCT & Dimming
- Student responses?

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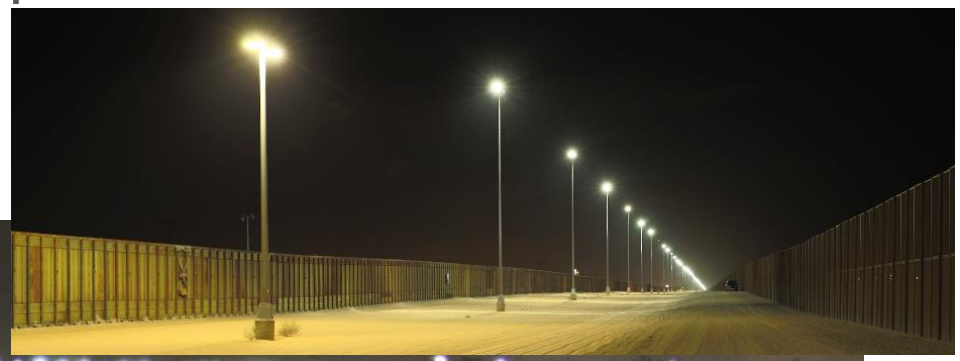
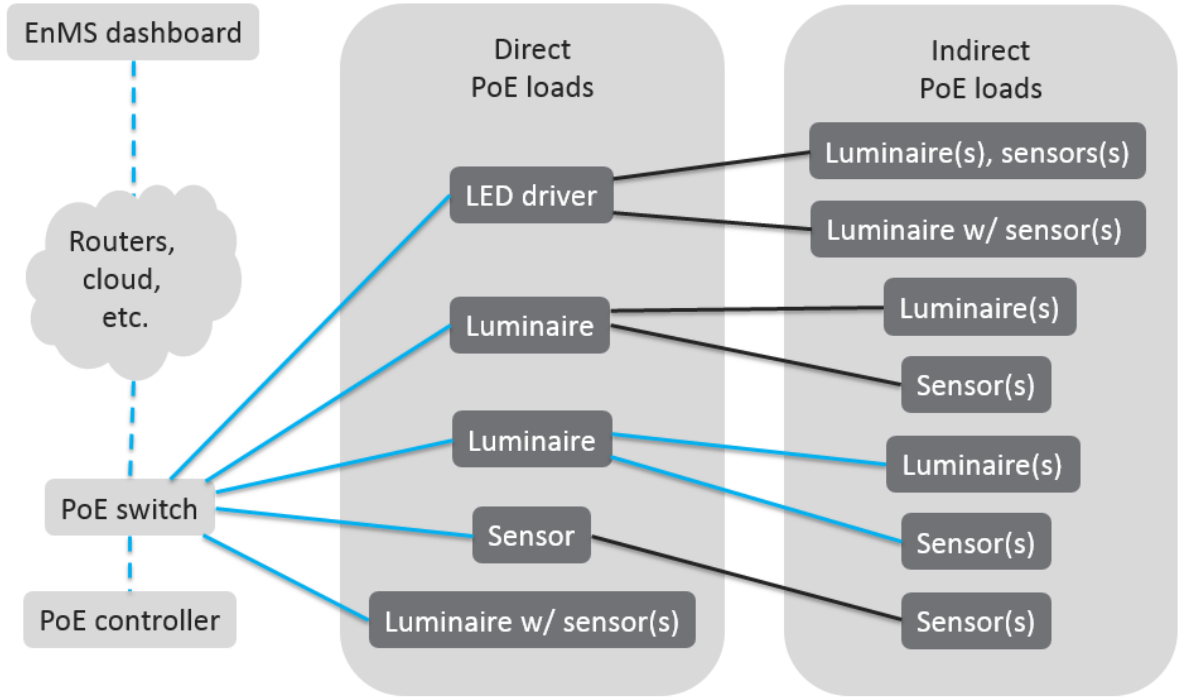
Effects of High Temperature Environment on LED Luminaires: Yuma, AZ

- High-flux lighting installations in high-temperature environments are a challenge for LED fixtures
- DOE investigating security lighting near Yuma, AZ on US/Mexican border.
- First long-term detailed documentation of LED technology field performance
- Began documenting light levels in Feb. 2014 and temperature of internal components in Sep. 2015, resulting in multiple presentations and 3 reports, with one more report coming in FY 17
- 11,000 hr measurements show large changes



PoE Lighting System Energy Reporting Accuracy Study

- Doing Phase 1 study
- Surveying and characterizing existing systems, and claims
- What have prior studies found on accuracy?
- Which existing test methods are most applicable?
- What differences among systems need to be addressed to maintain reporting accuracy?



Long-term Downlight Testing for Cycling Effects

- Two-operating cycles: Continuous, 8 hours on / 4 hours off
- 35 models in four categories:
  - Dedicated Luminaires (12)
  - Color-tunable (6)
  - Retrofit Kits (9)
  - Modules (8)
- Hypotheses:
  - Lumen and chromaticity maintenance (and failures) will vary by cycling condition.
  - Lumen and chromaticity maintenance (and failures) will vary by product category
- 2000 hours of cycling data so far
- Interim report when we see something interesting going on; final report in 2018.

Figure 1. A portion of the downlight test racks in operation. A total of six racks house 70 luminaires.

Stay Tuned!