2016 U.S. DEPARTMENT OF ENERGY SOLID-STATE LIGHTING TECHNOLOGY DEVELOPMENT WORKSHOP AGENDA

November 16–17, 2016 • Grand Hyatt • Denver, CO

WEDNESDAY, NOVEMBER 16

7:00 a.m.	*Registration Opens and Continental Breakfast*

MORNING SESSIONS

8:00 a.m.

Welcome and Introduction

JAMES BRODRICK, U.S. DEPARTMENT OF ENERGY

8:15 a.m.

Keynote: Taking Full Advantage of SSL Technology Potential

Advancements in LED technology are enabling new value in lighting and a range of new applications. These new opportunities in lighting in turn drive new developments in LED technology. This talk will discuss ongoing technical advancements at the LED, package, and luminaire level that are driving and enabling the new world of lighting.

JYOTI BHARDWAJ, LUMILEDS

9:00 a.m.

Panel | The Rise of TLEDs: What Have We Learned?

Linear LED lamps, or TLEDs, are now 6.9% of the market and growing in popularity, particularly in retrofit applications. Now that we have large-scale installations that have been in service for an extended period of time, has their performance equaled their hype? How does the market transformation community treat them? How do today's TLEDs stack up against earlier generations? This panel will share perspectives from a retrofit consultant, an electric utility, and a manufacturer who will explore technology issues and questions that need answers.

MODERATOR: JEFF MCCULLOUGH, PACIFIC NORTHWEST NATIONAL LABORATORY
ALEX TRUONG, MAXLITE
TEREN ABEAR, SOUTHERN CALIFORNIA EDISON
STAN WALERCZYK, LIGHTING WIZARDS

10:30 a.m. *Refreshment Break*

11:00 a.m.

Panel | Connected Lighting: What Is It, What Makes It Different, and Where Is It Going?

The intersection of solid-state lighting and the Internet of Things is resulting in a new class of lighting devices and systems. This panel will share three perspectives on how "connected lighting" is different (or not) from the lighting control technology of yesteryear, and whether its future is more evolution, or revolution.

MODERATOR: MICHAEL POPLAWSKI, PACIFIC NORTHWEST NATIONAL LABORATORY
MATTHEW PETTI, EATON
MATTHEW DeLOGE, JOHNSON CONTROLS
MAHADEV EAKAMBARAM, INTEL

12:30 p.m. *Lunch*

AFTERNOON SESSIONS

1:30 p.m.

Spectral Power Distribution: The Building Block of Applied Lighting

This primer on spectral engineering will explore how we quantify light using a spectral power distribution in combination with various weighting functions, based on visual or non-visual responses. There will be quick refreshers on many concepts, such as lumens, chromaticity, CCT, D_{uv}, and LER, as well as discussion of newer concepts such as blue light hazard, circadian stimulation, material damage, and lighting for plants and animals.

MICHAEL ROYER, PACIFIC NORTHWEST NATIONAL LABORATORY

2:15 p.m.

Panel | The Lighting Specifier's Wish List for Tunable Lighting

Are designers and engineers specifying white-tunable lighting? Where are they the best fit? Experienced lighting designers will tell you what they look for in a product, and what they *wish* they had looked for, once they saw it installed on the job. Hear their unvarnished stories — the good, the bad, and the ugly — and ask all your questions.

MODERATOR: NAOMI MILLER, PACIFIC NORTHWEST NATIONAL LABORATORY
DARCIE CHINNIS, HORTON LEES BROGDEN LIGHTING DESIGN
EILEEN PIERCE, SBLD STUDIO

3:30 p.m. *Refreshment Break*

4:00 p.m.

Panel | White-Tunable Case Studies

The ability to tune the spectrum and output of LED lighting systems provides new opportunities for addressing human needs and preferences. Can tunable LED lighting support the visual needs of caregivers in 24-hour senior care facilities, while also addressing the non-visual needs of both caregivers and residents? Can it transform older office spaces with little daylight and minimum illuminances into productive workplaces that consider workers' visual and non-visual needs? Or prove to be a valuable tool for teachers as they try to accomplish demanding educational goals in often poorly lighted K–12 and university classrooms? Come see the results from current projects seeking to answer these questions and more.

MODERATOR: ROBERT DAVIS, PACIFIC NORTHWEST NATIONAL LABORATORY
TERRY CLARK, FINELITE
JUDITH HEERWAGEN, U.S. GENERAL SERVICES ADMINISTRATION
CONNIE SAMLA, SACRAMENTO MUNICIPAL UTILITY DISTRICT

5:30–7:30 p.m. *Evening Networking Event*

THURSDAY, NOVEMBER 17

7:00 a.m. *Continental Breakfast*

MORNING SESSIONS

8:00 a.m. **Market Trends**

The SSL market continues to evolve rapidly. Form factors are changing, market penetration is rising, and new features are being added. This talk will provide an overview of major trends and changes, drawing from the DOE market adoption study and energy savings forecast.

MARY YAMADA, NAVIGANT

8:30 a.m. **Panel | OLEDs—How Far Have They Come in Viability?**

OLEDs have struggled to compete with LEDs, and they have not yet been widely embraced in the architectural market. Where is the technology headed, how big are the current obstacles, and where is OLED's niche?

MODERATOR/SPEAKER: FELIPE LEON, PACIFIC NORTHWEST NATIONAL LABORATORY
MIKE LU, ACUITY BRANDS
MICHAEL ARNDT, VISA LIGHTING

10:00 a.m. *Refreshment Break*

10:30 a.m. **Panel | Are LEDs More Glaring?**

We've heard that LEDs are more glaring than conventional sources. Is it true, and if so, why? Spectral effects? Non-uniform luminance distribution? A stripe effect from arrays? Three researchers will share their insights into glare and possible solutions for designers.

MODERATOR: NAOMI MILLER, PACIFIC NORTHWEST NATIONAL LABORATORY
RON GIBBONS, VIRGINIA TECH TRANSPORTATION INSTITUTE
YULIA TYUKHOVA, ACUITY BRANDS
MAURICE DONNERS, PHILIPS EINDHOVEN

Noon *Lunch*

AFTERNOON SESSIONS

1:00 p.m. **Panel | Sky Glow Impacts**

There is a lot of buzz about the impact of LED street lighting on sky glow, but comparing the published research is challenged by its breadth and complexity. This panel will offer perspectives from researchers and scientists interested in both modeling artificial sky radiances from the ground up and assessing sky glow through photography, along with a lighting manufacturer with a pulse on what is technologically probable and possible with LEDs. The discussion will address modeling challenges, the accuracy and shortcomings of photography, the measurement techniques currently available, a global perspective on artificial light at night, and the light and color possibilities with LED street lighting.

MODERATOR/SPEAKER: TESS PERRIN, PACIFIC NORTHWEST NATIONAL LABORATORY
HÉCTOR SOLANO LAMPHAR, CONACYT – CENTROMET, INSTITUTO MORA
MIROSLAV KOCIFAJ, SLOVAK ACADEMY OF SCIENCES AND COMENIUS UNIVERSITY
DAN DURISCOE, NATIONAL PARK SERVICE NATURAL SOUNDS AND NIGHT SKIES DIVISION
ERIC HAUGAARD, CREE

2:30 p.m. *Refreshment Break*

3:00 p.m. **Panel | Leveraging the Full Potential of Outdoor Lighting Dimming and Controls**

While LED technology offers the most advanced capabilities of any exterior lighting source to date, a few key capabilities remain to be fully exploited. Outdoor lighting controls and dimming offer tremendous advantages for both increasing energy savings and addressing community needs, but these capabilities continue to face stubborn technical and market hurdles to their widespread implementation. This roundtable session will explore various issues related to the use of outdoor controls, dimming, and adaptive lighting, as well as ideas for overcoming the hurdles and maximizing the performance of LED street and area lighting systems.

MODERATOR: BRUCE KINZEY, PACIFIC NORTHWEST NATIONAL LABORATORY
RON GIBBONS, VIRGINIA TECH TRANSPORTATION INSTITUTE
PATRICK GRAVES, COMMONWEALTH EDISON
PAUL LUTKEVICH, WSP | PARSONS BRINCKERHOFF
ADAM MILES, CITY OF SPOKANE, WASHINGTON
ALEX VALENTI, SIEMENS

5:00 p.m. *Adjourn*