The Future of Lighting Efficiency

An Industry Perspective

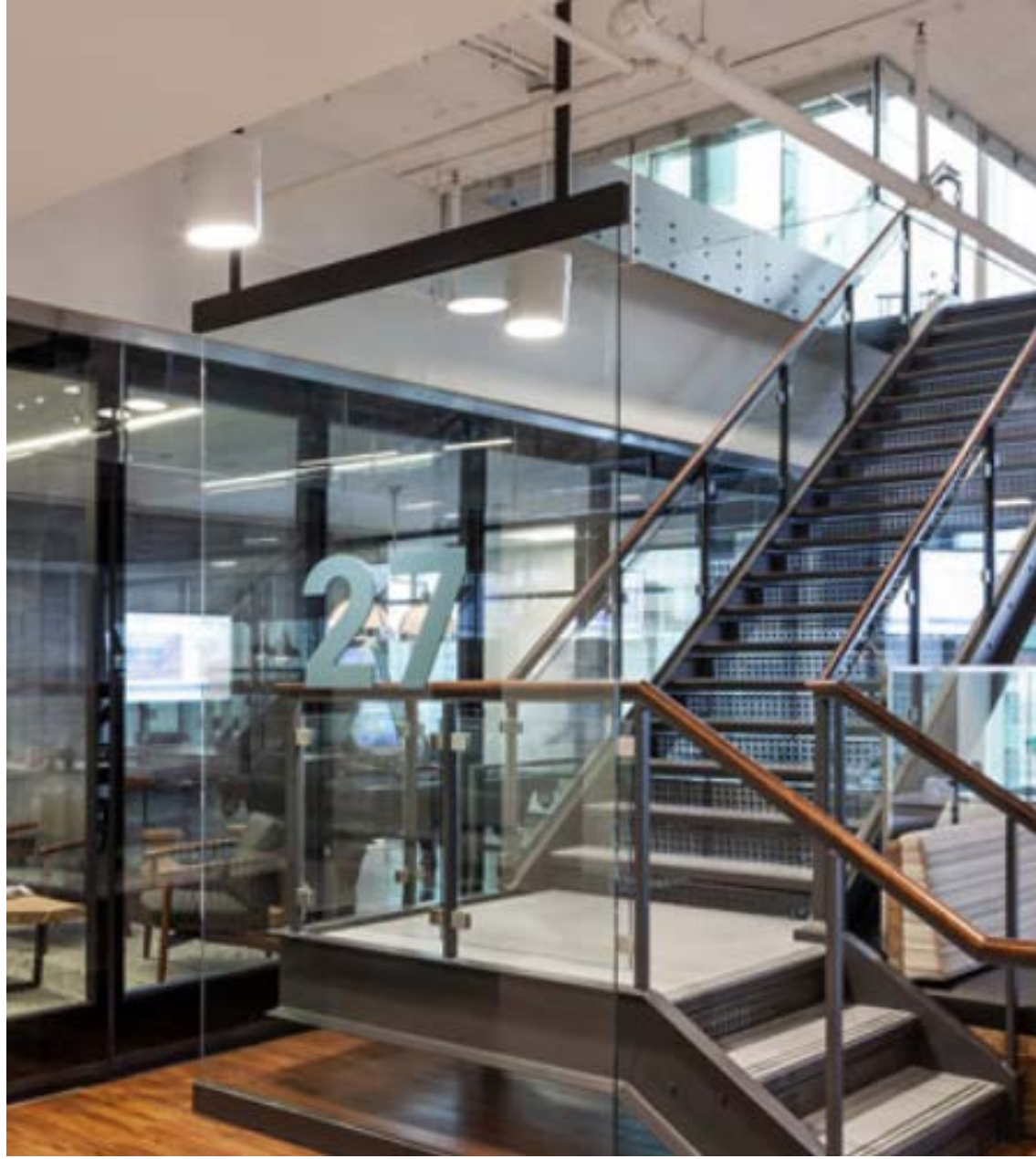
DLC Stakeholder Meeting July 2018

Kelly Seeger, MSc, LC, IES, LEED AP

Technical Policy Manager, Building Codes & Standards, Signify

Trends

- Emergence of an innovative lighting industry
- 100% LED baseline in 2019 energy codes
- Smart lighting, IoT, connectivity
- Renewed focus on lighting quality
- The wellbeing and performance of people matters
- “Health is the new sustainability”… green buildings give rise to healthy buildings
- “Investing in well-being is a vital, long-term real estate strategy”



signify

The New Light Paradigm

- Light is no longer *just* for vision
- Light is also for circadian support, wellbeing, performance, ecology, productivity, alertness, data …
- Quality of light
- Driven by research
- Industry is aligned with professional, trade, and research organizations for lighting
- A balanced approach is needed

signify

How the New Light Paradigm Will Affect Lighting Efficiency

Expansion of our understanding of lighting efficiency

Source efficiency (LED efficacy)

+

System efficiency

+

Building-level systems efficiency

New focus areas for lighting

Efficiency and sustainability

+

Lighting quality

+

Smartness, data-driven decision-making

+

Circadian support

+

Wellbeing…alertness…productivity

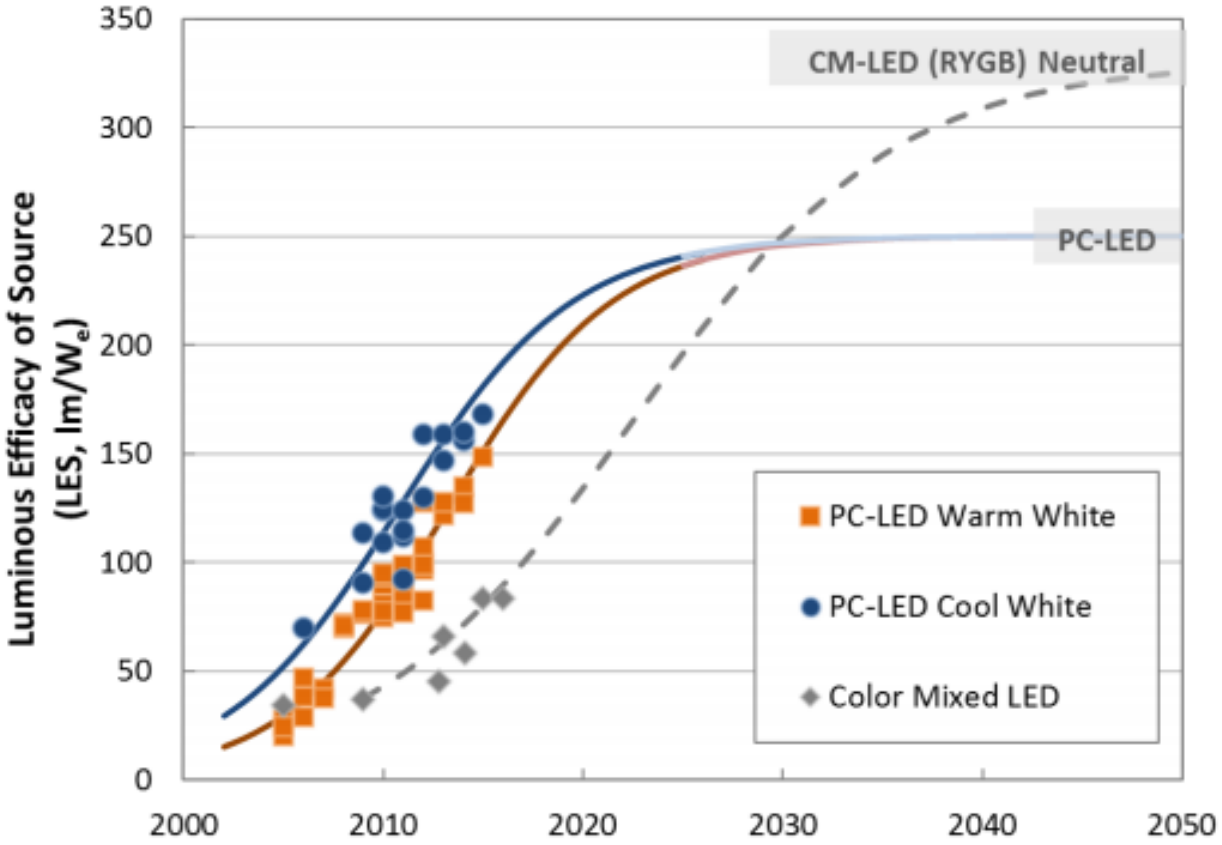
signify

Source Efficiency (LED efficacy)

- Phosphor-converted-LED (pc-LED) architecture is dominant, continued improvement anticipated

Opportunities & challenges

- Emitter materials: address current density, thermal droop, green and red efficiency, and red thermal stability
- Down-converter materials: develop efficient, stable, and narrow linewidth materials
- Encapsulation materials: target approaches that improve LED package efficiency and extended operating ranges in terms of temperature and light output
- Light extraction & mixing, scattering, absorption: improve efficiency

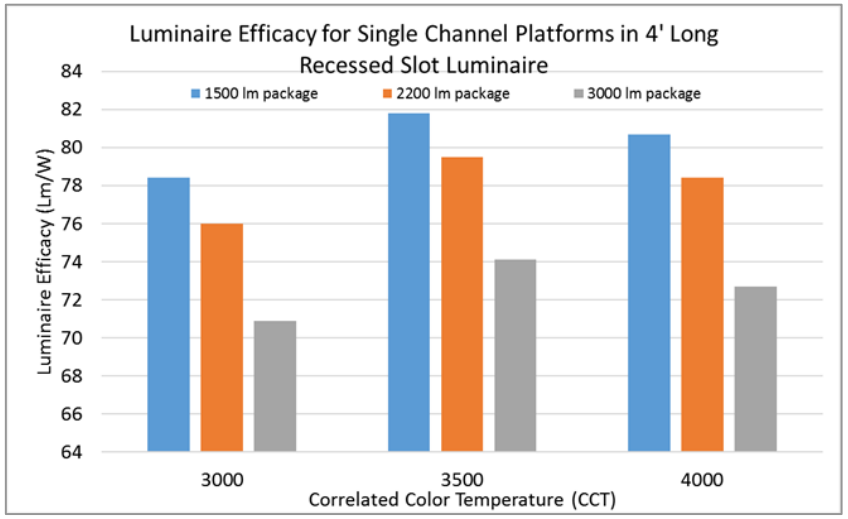


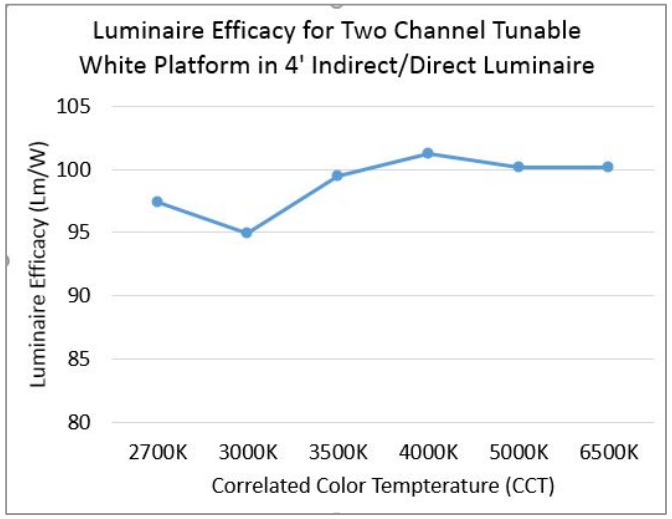
Source: U.S. DOE SSL 2017 Suggested Research Topics Supplement, U.S. DOE SSL 2016 R&D Plan

signify

System Efficiency

- Component efficiency ⇨ system efficiency
- Inherent savings in systems
- Significant untapped opportunities exist to increase overall energy savings by focusing on building systems
- Few attempts yet to quantify the energy savings or develop strategies, methodologies or metrics to achieve these savings
- 2 Examples:
  - Dynamic lighted environments may not be able to comply with installed power allowances
  - Efficiency in multi-channel tunable-white LED systems is not static nor predictable



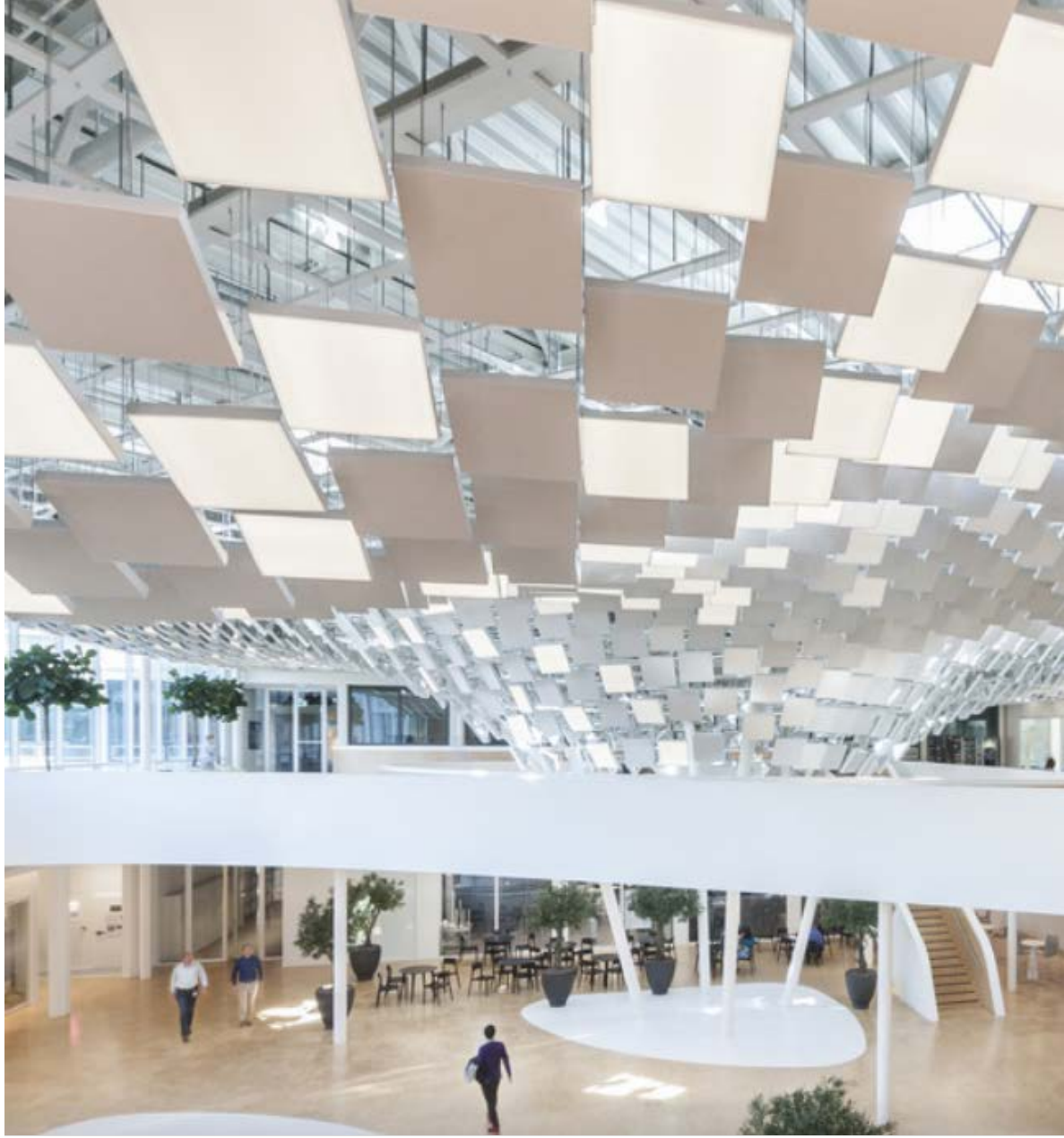


signify

Building-Level Systems Efficiency

"There is growing consensus in the buildings industry that focusing on building systems—a combination of equipment, controls, operations and interconnections—will become increasingly necessary to achieve future meaningful and cost-effective energy savings in buildings." – Alliance to Save Energy

- Sharing of data and programming among systems
- Network of connected, integrated systems in buildings
- Connected lighting and IoT are enablers that unlock the value of human-centric lighting propositions, NEBs, and healthy buildings
- Highly efficient systems that use responsible amounts of energy while providing for vision and other needs of occupants
- Healthy buildings = healthy for people, healthy for the environment, including a network of systems that use the most efficient technologies in the most optimized ways



Signify Headquarters Atrium at the High Tech Campus, Eindhoven, The Netherlands

signify

A Ripple Effect Through the Market…

Paradigm shifts

From	To
Lighting just for vision	Lighting for vision, ecology, wellbeing, circadian support, data….
Focus on the widget, e.g. luminaire, control, building	Focus on the person and their needs…human-centric
Singular, siloed development approach	Holistic, multi-faceted approach that considers many factors in product, system, and program design
Just enough light	Nutritive light…the right amount, spectrum, exposure of light for the person
Designing lighting to meet code; designing products to meet efficiency standards	Designing lighting to meet the needs of people. This means re-designing codes and standards around the installation of highly-efficient, integrated systems in buildings that provide for vision, circadian support, and other needs of occupants.

signify

Utilities and Manufacturers

Strategies for success

- Shared market transformation goals
- Considering the lighting needs of people together with efficiency in the assessment of products, systems, and developing programs
- Supporting growth of the innovative lighting industry; utility rebate programs are more important than ever to spur the transition of lighting
- Utilities can benefit from a new focus on systems efficiency, building system integration, and data abilities
- New avenues for utility programs – training, support, advisory role on building energy performance
- Sustainable products, systems, and services will contribute to 80% of Signify revenues by 2020[1]

signify

The Transition of Lighting

Global Lighting Association

- Group of national and regional lighting associations representing over 5,000 lighting manufacturers and US $75B annual sales
- Primary mission is to share information, within the limits of national and EU competition law, on political, scientific, business, social and environmental issues of relevance to the lighting industry
- Develop, implement and publish the position of the global lighting industry to relevant stakeholders in the international sphere

signify

The Transition of Lighting

Global Lighting Association Strategy Roadmap

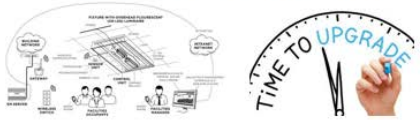
Lighting for vision

Lighting for well-being and performance

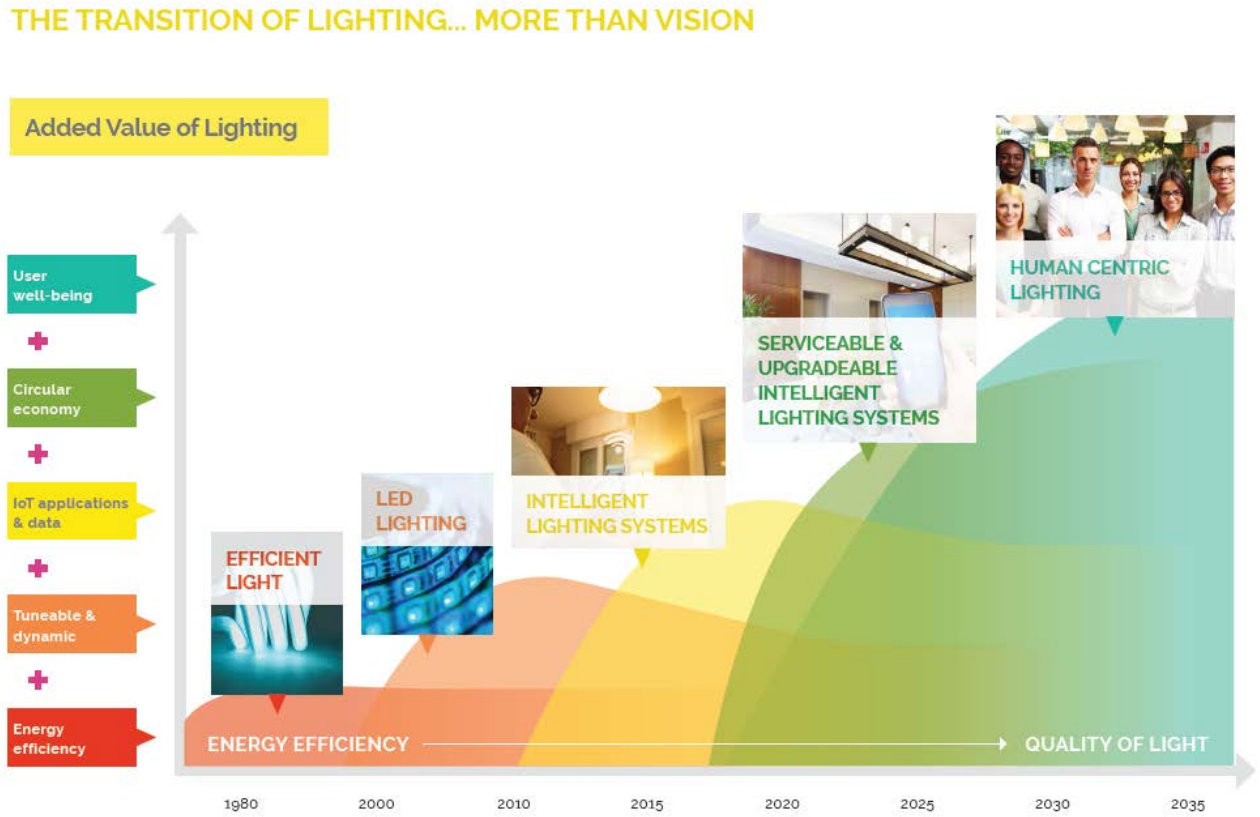
Lighting controls

Connected systems

Product efficiency & longer life time



System efficiency & Circular economy



Source: Global Lighting Association, 2018. http://www.globallightingassociation.org/

signify

signify