Setting the Stage

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U.S. Department of Energy Lighting R&D Workshop • Co-sponsored by the Illuminating Engineering Society

U.S. DEPARTMENT OF ENERGY | Office of ENERGY EFFICIENCY & RENEWABLE ENERGY

IES Illuminating ENGINEERING SOCIETY

Lighting Opportunities from RDO

- Lighting Application Efficiency: Source, Optical Delivery, Spectral, Intensity Effectiveness

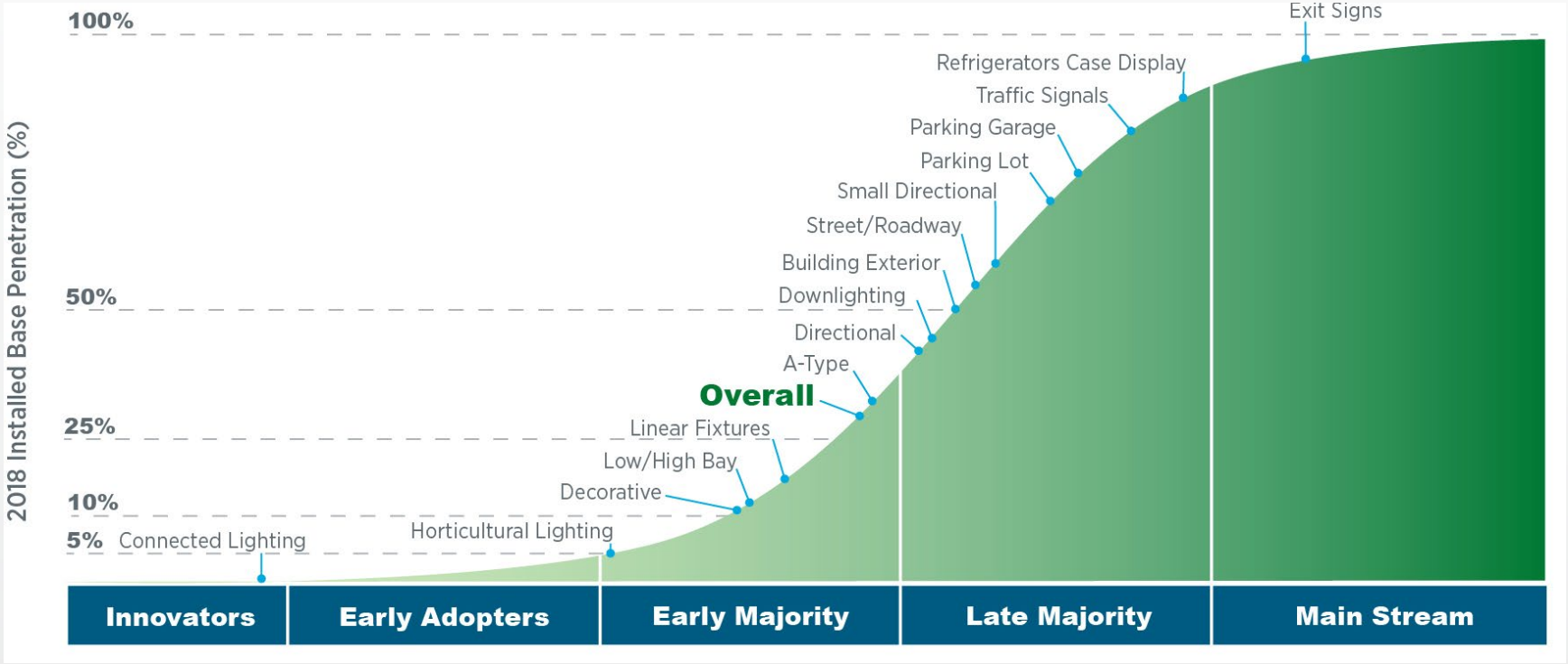
- Supporting Science and Technology
  - Computational Modeling
  - Building Integration
  - Electronics: Power, Functional, Control, Communication, Sensor
  - Advanced Manufacturing Technologies
  - Connecting Lighting
  - Reliability
  - Lighting Science: Visual and non-visual human response, horticulture and animal responses to Light

- **New Frontiers**

DOE targets push technology to performance levels that might not otherwise be achieved.

Analysis of emerging products prompts improvements, informs R&D priorities.

Lighting Technology Pipeline



New Frontiers in Light (RDO)

- First focus: saving energy via more efficient **light sources for general illumination**.
- Now (LAE): saving energy via **more efficient sources and control of generation/delivery**
- Potentially: saving energy **beyond general illumination where there are opportunities for impact.**

Evaluate technology problems/solutions based on energy savings, productivity benefits, and occupant comfort.

- Current total energy consumptions in the application;
- Projected future energy consumption;
- Prospects for technology enabled efficiency improvements;
- Impacts of DOE Lighting R&D support;
- Productivity, comfort, and other non-energy benefits associated with application; and
- Technology leverage with general illumination technologies

Lighting Request for Information (RFI)

Stakeholders asked to:

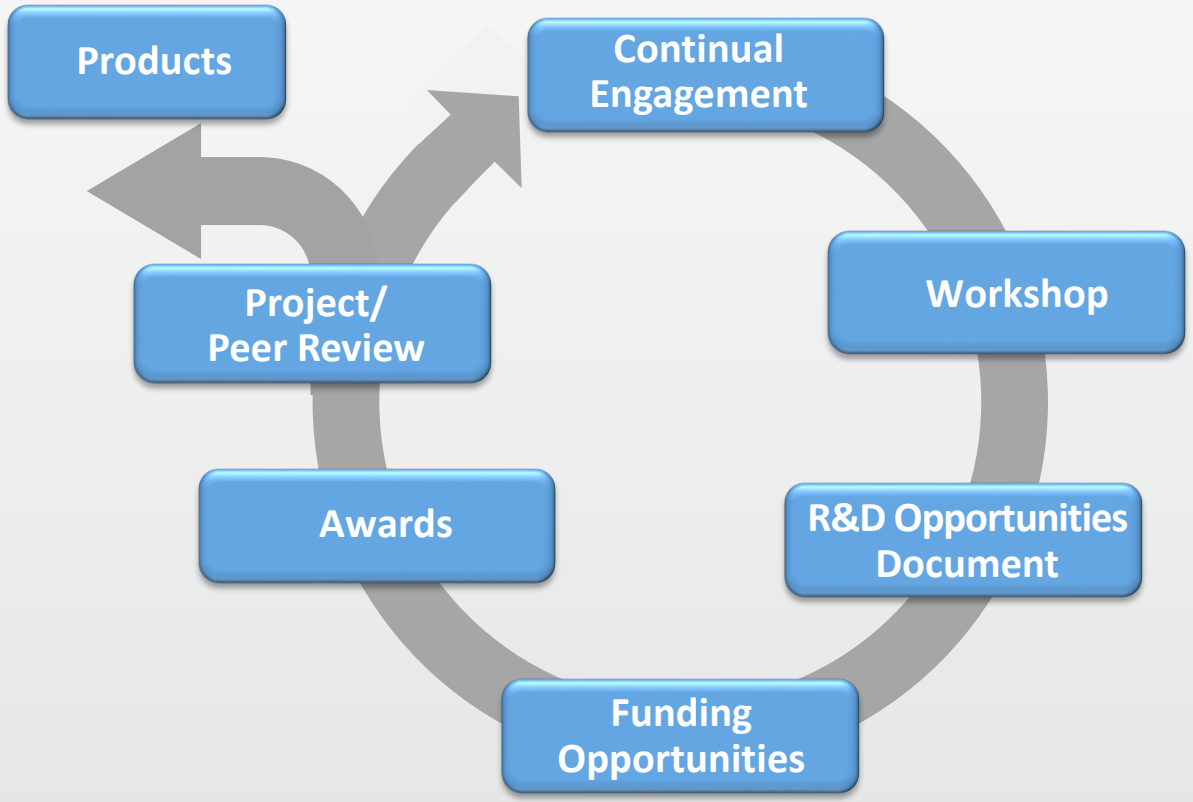
1. Provide critical input on **current program direction, activities, opportunities**
2. Identify impactful lighting R&D **opportunities within general illumination that are absent (or underrepresented)** in the 2018 DOE Solid-State Lighting RDO document
3. Identify impactful lighting R&D **opportunities where immediate applications are beyond general illumination** but have potential to help save energy in the built environment

Summary of RFI Responses

- **Application efficiency**: general illumination + e.g. agriculture, health, auto
- **Tools** to drive efficacy, luminance, color, glare, flicker, melanopic response, other benefits e.g. occupant comfort and productivity
- **Systems research**: package/device/technology/building/grid. Automation, architectural/daylight integration, agriculture, health, security, resilience
- **Electrical integration**: power quality, controls, sensors, data, DC power/PV
- **Optical integration**: luminaire/architectural, barriers to new form factor (e.g. µLEDs, diffuse emitters, displays), spatial control, antennas, light for data
- **Materials**: manufacturing, fabrication, encapsulation, downconverters, FET/LED integration, LED/OLED, thermal management
- **Capabilities**: National labs; OLED, reliability, installation testing; engagement

DOE R&D Plan Process

SSL community input from workshops and stakeholder engagement shape R&D priorities and DOE solicitations



https://energy.gov/eere/ssl/research-development