



OLED Lighting Product Development

Mike Lu, PhD LC

Director Electronics Engineering, Horizon Group

Acuity Brands Lighting, Inc.

The Acuity Brands logo, featuring the stylized 'A' icon followed by the text 'Acuity Brands' in a white sans-serif font.

Acuity Brands

Overview

- 1 LED and OLED Efficacy
- 2 Customized Drivers for OLED Luminaires
- 3 OLED Luminaire for an Intermediate Layer of Light



LED and OLED Efficacy Projections

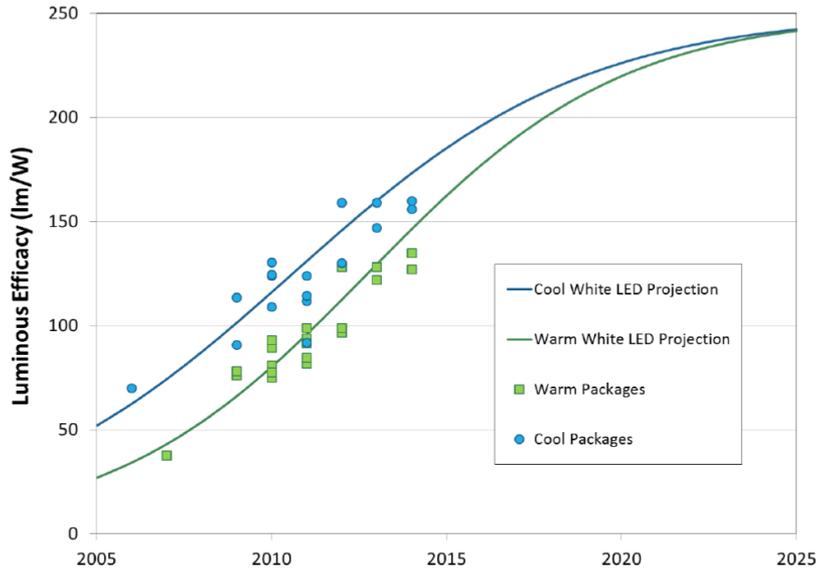


Figure 7.2 LED Package Efficacy Projections for Commercial Products

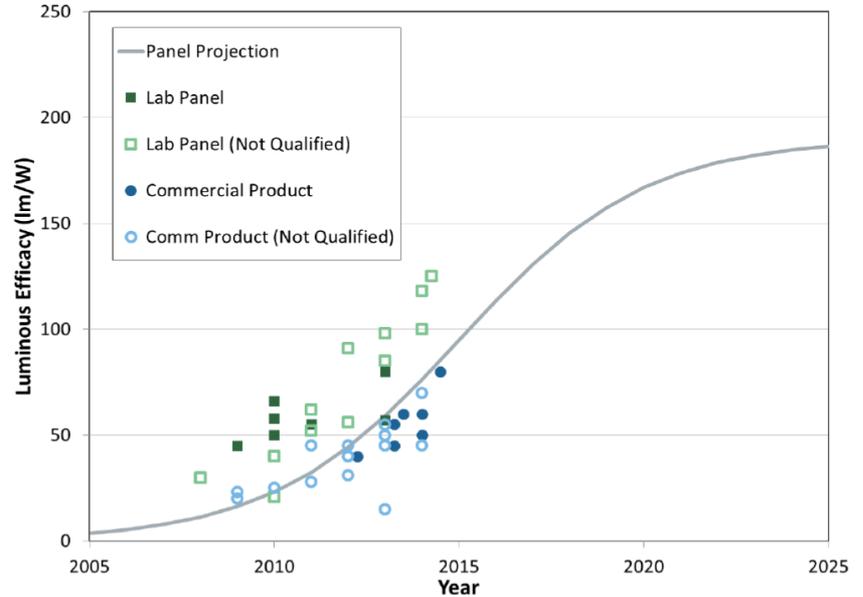
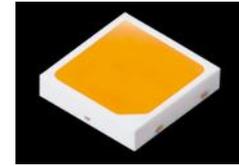


Figure 7.3 White-Light OLED Panel Efficacy Projections

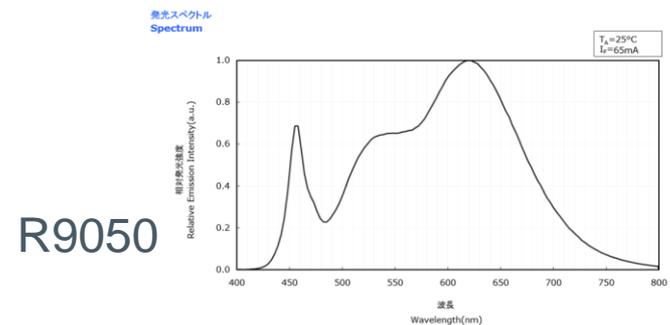
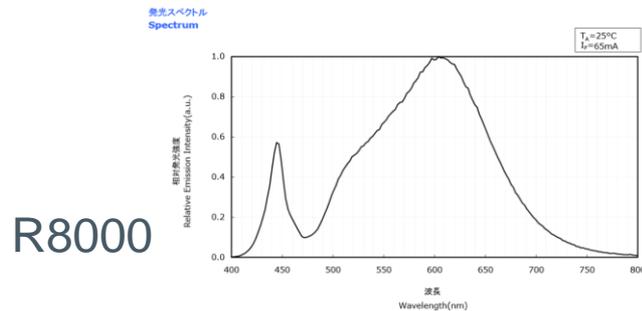
DOE SSL R&D Plan, May 2015

- Goal is ~240 lm/W for LED and 190 lm/W for OLED
- Not too different once taken higher optical/thermal efficiency for OLED into account.
- But ...

LEDs are Still Improving



- Nichia NF2L757GT-F1, 3000K
 - R8000, CRI Ra > 80, R9 > 0, 174 lm/W @ 25°C
 - R9050, CRI Ra > 90, R9 > 50, 137 lm/W @ 25°C



While OLEDs Lag

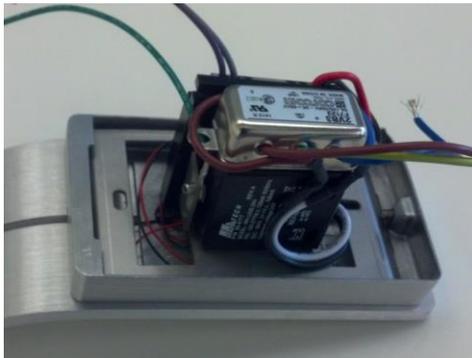
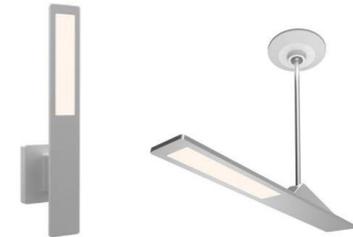
- Efficacy stuck at 55-60 lm/W for two years
- Challenges: internal light extraction, ...

Need for Appropriate OLED Drivers

- 350/700 mA are two popular currents for constant current LED drivers.
- There is no uniform standard for OLED current/voltage.
- For OLED luminaires with a large number of panels
 - Need to think through serial/parallel wiring schemes
 - Panels need to have high reliability (no early failures)
 - Advantageous to have programmable constant current drivers.

Custom Driver

- OLED luminaire with low panel count:
 - Example: Aedan™, one or two-panel sconce or pendant in retail channels



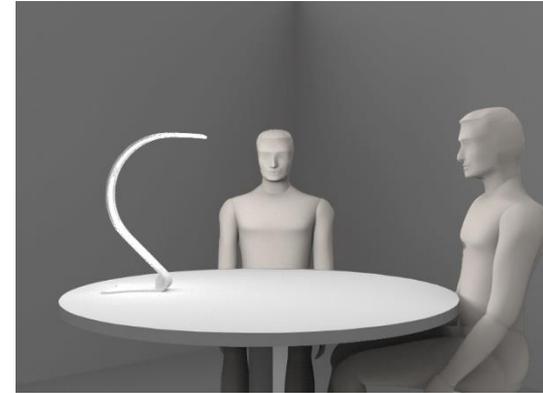
- First-generation solution
 - Separate power supply, DC/DC driver and a filter for EMI suppression
 - Expensive, poor PF, 0-10V dimming only



- Second-generation solution
 - Single package
 - 0-10V, phase cut dual dimming, PF > 0.9
 - Smaller form factor
 - Much cheaper

OLED as An Intermediate Layer of Light

- An intermediate layer of light, call it “surround” or “personal ambient” has many advantages.
- Gives more personal control of the lighting environment
- OLEDs’ light quality, form factor and low heat generation make them ideal for this application.



- Peter Ngai, *Creating an effective lighting environment with task – surround –ambient lighting*, SID Display Week, San Jose, CA, Jun 4, 2015.
- Peter Ngai, *Evaluations of a Task - Surround Lighting System in a Low Ambient Lighting Environment*, IES Annual Conference, Indianapolis, IN, Nov 10, 2015.