Next Generation Lighting Industry Alliance

Keith Cook
Chair
**The Next Generation Lighting Industry Alliance**

**What Is It?**

- Alliance of for-profit corporations formed to accelerate Solid State Lighting (SSL) development and commercialization through government-industry partnership

**Charter – Support of Inorganic and Organic based SSL:**

- Public Advocacy for SSL and Next Generation Lighting Initiative
- Promotion and support of DOE’s ongoing assessment of SSL potential, the state of SSL technology, and DOE’s SSL R&D Program (we work to be a good partner today)
- Facilitation of communication between NGLIA members and other parties with a substantial interest in SSL and the Next Generation Lighting Initiative
The Next Generation Lighting Industry Alliance
Major Activities

- Participating in and providing input to DOE workshops and roundtables for SSL technology. These workshops are open to the public;

- At DOE’s discretion, nominating potential evaluators and participating in technical evaluations for research projects in DOE’s SSL Core Technology Program;

- Encouraging the development of metrics, codes, standards for measurement and utilization of SSL products for general illumination, and providing input for voluntary DOE deployment programs such as Lighting Facts™; and

- Planning and promoting outreach activities by NGLIA members for SSL technologies used for general illumination applications.
Members

- 3M
- Acuity Brands Lighting
- Applied Materials, Inc.
- CAO Group Inc.
- Corning, Inc.
- Cree Inc.
- Eastman Kodak Company
- GE-Lumination
- Light Prescriptions Innovators, LLC (LPI, LLC)
- LSI Industries
- Luminus Devices, Inc.
- OSRAM Sylvania Inc.
- Philips Solid-State Lighting Solutions
- QuNano, Inc
- Ruud Lighting, Inc.
- Universal Display Corporation
The Next Generation Lighting Industry Alliance

Structure

- Separate from, but managed by NEMA; no NEMA membership required
- All members have one vote on Board of Directors
- BOD annually elects Chair and Vice Chair
  - 2010 Chair: Keith Cook – Philips
  - 2010 Vice Chair: Jeff Quinlan – Acuity Lighting Brands
- Annual dues set to cover public advocacy expenses + NEMA administrative & coordination expenses – divided equally among member companies
Electric Lighting

Luminaires w/
Components:
Sockets, Lamps, Ballasts

Dumb (on/off)

Electronic Systems

1st: Non-standard Integrated Systems
2nd: Standardized Light Engines, modules & Lamps
Smart: Integrated Sensors, Intelligence & control
Haitz’ Law

LED Light Output Increasing / Cost Decreasing

Figure 2.4: Haitz’s Law: LED Light Output Increasing / Cost Decreasing
Source: Roland Haitz and Lumileds.
White Light Efficacy Projections

Projections from US DoE 3/09

[Graph depicting LED efficacy projections from 1970 to 2030, showing different types of lighting technologies and their projected increases in efficacy.]
Lighting Industry Transformation

Value (Bil. $)

- General Illumination: conventional light sources
- General Illumination: LED
Lighting Industry Transformation
How will luminaire designs evolve?

- LED Lamps
- Light Engines & Modules
- Integrated Luminaires
### SSL Product Manufacturing Options

<table>
<thead>
<tr>
<th>Regional / Local</th>
<th>Global</th>
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<tbody>
<tr>
<td>LEDs</td>
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<tr>
<td>Drivers</td>
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<td>Optics</td>
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<td>Lamps</td>
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<td>Modules</td>
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<td>Luminaires</td>
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<td>Spec. Grade</td>
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<td>Mainstream</td>
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<td>Sales</td>
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<td>Services</td>
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SSL Product Manufacturing Options

- LED & Driver Costs 60% => 30%
- Assembly & Metal 35% => 50%
- Short product lifecycle => Development challenge

Projected LED Luminaire Cost

Source: 2009 US DOE Manufacturing Roadmap
Successful US Programs

L•Prize Competition
- 60W Incandescent ($\leq 10\text{W}$)
- 90W PAR 38 ($\leq 11\text{W}$)
- 21st Century lamp

- 31 Partners to promote and develop markets
- Drove innovation, creative solutions, new platforms
SSL Lamps gaining mainstream visibility – “L” Prize

The $10 Million Lightbulb

Thursday, Nov. 12, 2009

With the flick of a switch, Philips Electronics may have just dramatically lowered America’s electric bill. In September the Dutch electronics giant became the first to enter the U.S. Department of Energy’s L Prize competition, which seeks an LED alternative to the common 60-watt bulb. Sixty-watt lights account for 50% of the domestic incandescent market; if they were replaced by LED bulbs, the U.S. could save enough electricity per year to light 17.4 million households. If Philips wins the L Prize, it will claim a cash award and federal purchasing agreements worth about $10 million.

Philips’ LED bulb emits the same amount of light as its incandescent equivalent but uses less than 10 watts and lasts for 25,000 hours — or 25 times as long.
**Conventional Lighting Sources**

- Incandescent
- Halogen
- Fluorescent
- HID

**LED Lighting Source**

- Light emitting diodes (LEDs)

**Benefits of LED Lighting:**

- Ultra long source life
- Low power consumption
- Low maintenance
- No moving parts
- No UV radiation
- Cool beam of light
- Digitally controllable
- Sustainability

**LEDs are the Lighting Source for Tomorrow**
### Efficacy of LEDs vs Traditional Sources

<table>
<thead>
<tr>
<th>Light Source</th>
<th>Typical Luminous Efficacy (lm/W)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Incandescent (no ballast)</td>
<td>10-18</td>
</tr>
<tr>
<td>Halogen (no ballast)</td>
<td>15-20</td>
</tr>
<tr>
<td>Compact Fluorescent (incl. ballast)</td>
<td>35-60</td>
</tr>
<tr>
<td>Linear Fluorescent (incl. ballast)</td>
<td>50-100</td>
</tr>
<tr>
<td>Metal Halide (incl. ballast)</td>
<td>50-90</td>
</tr>
<tr>
<td>Cool White LED 5000K (incl. driver)</td>
<td>66-80</td>
</tr>
<tr>
<td>Warm White LED 3000K (incl. driver)</td>
<td>50-73</td>
</tr>
</tbody>
</table>

*(varies depending on wattage and lamp type)*
Using LEDs for General Illumination

■ Advantages
  - Directional Light
  - Size
  - Instant On/Off
  - Rapid Cycling Capability
  - Dimming/Control
  - Shock Resistance
  - Cool Light
  - Lifetime
  - Cold Temperature Operation
  - Mercury Free
  - No IR or UV Emissions

■ Disadvantages
  - Cost
  - Thermal Dependence
  - Light Quality ???
  - Reliability ???
  - Blue Pollution
Applications
• **Description**
  – Custom House Tower, Boston, MA
  – October 2008
  – Customer very pleased with quality of light / aesthetics
  – LED long-life / reduced maintenance benefits are key in outdoor installations

• **Financial Impact**
  – Cut energy consumption by 67% vs. former halogen lighting system
  – Reduced waste with an LED system projected to last 20 years at six hours of use per day
  – TCO savings of over $600 per fixture
  – Leveraged existing building management system to turn LED system on/off at any preselected time; eliminating wasteful light and energy use

• **Products Used**
  – LED Floodlight, LED Graze Light
• **Description**
  – Old North Church, Boston, MA
  – February 2008
  – "By incorporating warm white LED lighting, we can better showcase the charm of the architectural details of this classic structure …," said Lana Nathe of Light Insight. “We were able to achieve precisely the right visual impact while creating an energy-efficient and sustainable design for the future. We did not have to sacrifice on quality of light to conserve energy ….”

• **Financial Impact**
  – Cut energy consumption by 85% vs. former linear incandescent lighting system
  – Reduces maintenance
  – Lack of UV and IR in light output helps to preserve the historical building

• **Products Used**
  – LED Cove
• **Description**
  – Con Edison Building, New York, NY
  – September 2008
  – LED systems provide both energy savings and vibrant dynamic color changing effects

• **Financial Impact**
  – Cut energy consumption by 63% vs. former HID lighting system
  – Reduced waste with an LED system projected to last 15 years
  – Further reduced waste and maintenance by eliminating the need for colored filters to enable dynamic effects

• **Products Used**
  – LED Floodlight
Description
- TUMI, New York, NY
- Summer 2009
- LED Candles replaced in Chandeliers

Financial Impact
- Cut energy consumption by 80% vs. 15W incandescent candles.
- Eliminates about $3500 in maintenance costs per year to replace lamps.

Products Used
- LED Candles
• **Description**
  – Accor Hotel, Eindhoven The Netherlands
  – February 2008
  – Replaced 4000 incandescent lamps

• **Financial Impact**
  – Cut energy consumption by 80% vs. 35W halogen spots
  – Estimates about $425 thousand in savings per year in electricity costs.

• **Products Used**
  – LED Halogen Spot Replacements
LED Lighting Applications

- Undercabinet Lighting
- Task Lighting
LED Lighting Applications

- Refrigerated Case Lighting
LED Lighting Applications

- Accent Lighting
- Cove Lighting
LED Lighting Applications

- Architectural Lighting
LED Lighting Applications

- Entertainment Lighting
LED Lighting Applications

- Step and Path Lighting
LED Lighting Applications

- Outdoor Lighting
LED Streetlights - New Bridge I-35 Minneapolis

US DOE Technology Solid State Lighting Technology Demonstration Gateway Program.

Demonstration Assessment of Light-Emitting Diode (LED) Roadway Lighting
Host Site: I-35W Bridge, Minneapolis, Minnesota
Uniformity:

400 watt HID

225 watt LED
LED Lighting Applications

- Recessed Downlighting
“There is nothing more difficult to carry out, or more doubtful of success, nor more dangerous to handle, than to initiate a new order of things. For the reformer has enemies in all those who profit from the old order.”

Machiavelli
Questions?