Digging Deeper: Horticultural Lighting
Presenters

Irina Rasputnis
*DLC*

Dave Ryan
*D+R International*
Agenda

• Stakeholder Input Process
• Hort Lighting Scope and Timeline
• Background
• Spec Development Needs
• Discussion
Stakeholder Input Process

DLC receives requests from stakeholders

Prioritization process to identify items for development

Prioritized items are researched and drafts created

Drafts reviewed by Technical Committee and stakeholders

Drafts revised based on input

Finalize and publish policy
Horticultural Lighting

Problem Statement

Horticultural lighting is the fastest growing electric load for DLC-member utilities. Manufacturers and utilities would like to see DLC address this topic, but industry-accepted standards, metrics, and best practices do not yet exist.
Scope and Timeline

Hort Near-Term Tasks:

- Participate in industry working groups on standards development
- Create near term position paper or guidance doc to explain market development status and product considerations
- Investigate interim solution to report product data until standards are ready
ASABE ES-311

- ASABE: American Society of Agricultural and Biological Engineers
- ES-311: Plant Growth LED Lighting Committee

- Task Force 1: Metrics
  - Past final committee ballot, awaiting ASABE approval, will be submitted to ANSI for approval

- Task Force 2: Testing
  - Under committee ballot

- Task Force 3: Performance
  - Under development
Potential Market Paradigm

1. ASABE TF3 document will lay out parameters that need to be known/considered to determine installation/lighting needs

2. Grower/Specifier will take this information to build a spec for product selection

3. DLC QPL will have verified list of products meeting minimum thresholds
   a) Published performance data
   b) Enable utility incentives
Elements of a DLC Spec

1. What types of products need to be covered?
2. What are the metrics?
3. Where to set the minimum thresholds?
   a) Will products meet customer needs and save energy?
4. Is there a standardized test procedure?
   a) Are there labs accredited to that standard?
Categorization

- **Align with current structure?**  
  - Category → General Application → Primary Use Designation

- **Focus on form factor?**  
  - Lamps  
  - Luminaires  
  - Intended replacement?

- **Focus by application?**  
  - Top lighting  
  - Side lighting  
  - Multi-layer  
  - Greenhouse?

### Categorization Table

<table>
<thead>
<tr>
<th>#</th>
<th>Category</th>
<th>Application</th>
<th>Minimum Light Output (lm)</th>
<th>Optional: Minimum Efficiency (lm/W)</th>
<th>Optional: Minimum Warranty (years)</th>
<th>CTE / CR / lm</th>
<th>DLC Premium***</th>
<th>Primary Use****</th>
<th>Distribution</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Outdoor - Low Output</td>
<td>250,000</td>
<td>90</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Outdoor - Mid Output</td>
<td>5,000 - 10,000</td>
<td>95</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Outdoor - High Output</td>
<td>10,000 - 30,000</td>
<td>100</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Outdoor - Very High Output*</td>
<td>100,000</td>
<td>100</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Interior Directional</td>
<td>250,400</td>
<td>65</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Cabinet lighting</td>
<td>120 lm/W</td>
<td>80</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Trolley</td>
<td>1,500</td>
<td>100</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Linear Ambient</td>
<td>1.77 lm/W</td>
<td>100</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>High Bay</td>
<td>15,000</td>
<td>105</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Notes:**
- Outdoor: Pole/Arm-Mounted Area and Building Luminaire
- Interior: Track or Ring-Point Luminaire
- Specialty: Specialty Luminaire

*Optional: Minimum Efficiency (lm/W) | Optional: Minimum Warranty (years) | CTE / CR / lm | DLC Premium*** | Primary Use**** | Distribution

- Outdoor: Pole/Arm-Mounted Area and Building Luminaire
- Interior: Track or Ring-Point Luminaire
- Specialty: Specialty Luminaire
Spec Elements

- Currently
  - Output
  - Efficacy
  - Distribution/Uniformity
  - CCT/CRI
  - Power Quality
  - Lumen Maintenance
  - Safety
  - Warranty

- Horticultural?
  - PPF
  - µmol/J
  - Uniformity?
  - Spectral Distribution?
  - Power Quality
  - Flux Maintenance/Spectral Shift
  - Safety
  - Warranty
  - What Else?
Revisiting Timeline

• What if standards not ready?
  – Should DLC create interim spec?
  – What should we accept for data?
Miscellaneous Questions

• How to inform utility baselines?

• Do the growers know what their plants’ needs are for various stages of cultivation and different crops?
  – Product selection tool?

• How to address spectral tuning?
Thank You

Irina Rasputnis  
DLC

Dave Ryan  
D+R International