SSL V4.4: DRAFT Requirements for Horticultural Lighting

Review Webinar

April 18, 2018

Webinar Notes

- Slides will be posted on www.designlights.org after presentation

- Please use the GoToWebinar Interface (Question Pane) to ask questions during today's webinar

- Comments on the Draft Requirements for Horticultural Lighting are due by May 30, 2018

Comment Forms

The DLC now requires all comments to be submitted using DLC Comment Forms. Please download the Comment Form and submit the completed forms to info@designlights.org
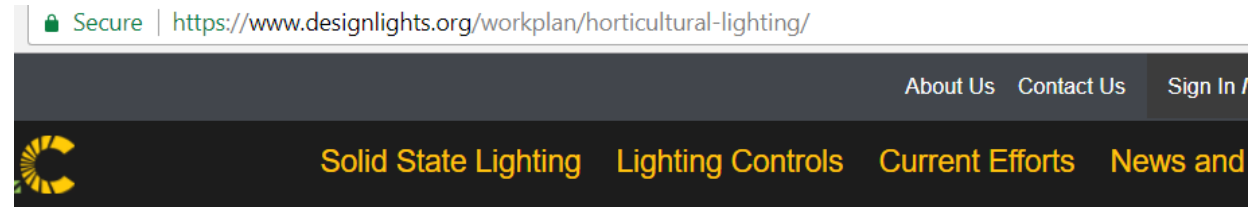
Current Drafts and Documents

First Draft Documents

- **Cover Letter: DRAFT Technical Requirements V4.4**
- **DRAFT Testing and Reporting Requirements for** Horticultural Lighting
- **Key Technical Questions**
- **Horticultural Lighting Comment Form**

Comment Report Form: Horticultural Lighting

Document:	Testing and Reporting Requirements for Horticultural Lighting
Version:	Draft 1 of SSL V4.4
Comments Due:	COB, Thursday May 30, 2018
Instructions and Background:	Enter your Organization, Name, Email Address and Phone Number at the top of the worksheet. Then enter any comments i Line, Table, or Row number of the document that your comment applies to. If applicable, please provide alternate approach Provide your proposed change corresponding to your comment in Column E "Proposed Change". Comments to the Technical Requirements that are not related to a specific line number may be added at the bottom of the Save the Excel file with your comments, with your initials appended to the end of the filename, and email the file to info@d

Reviewer Organization	Reviewer Name	Reviewer Email Address	Reviewer Pho

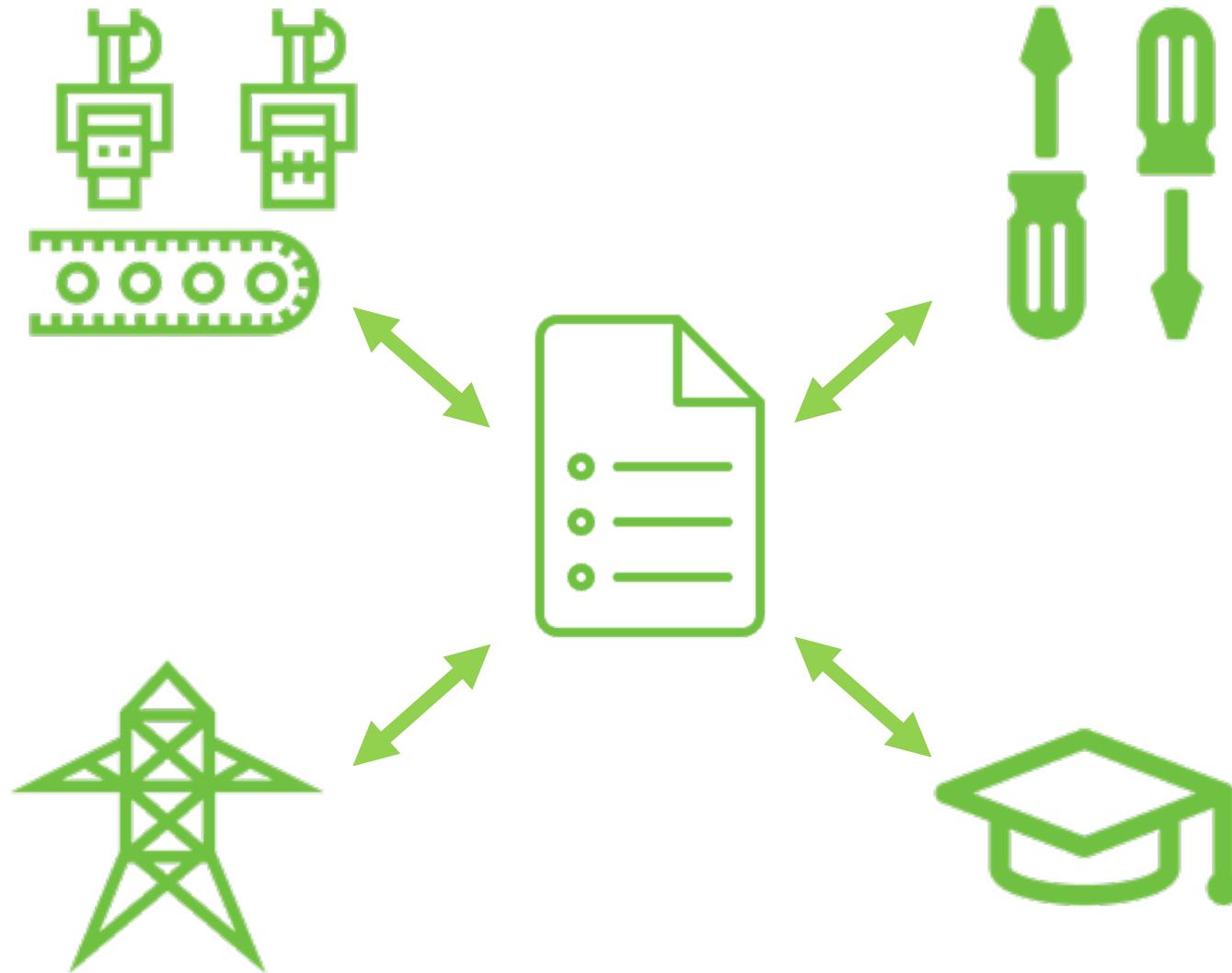| Comment	Location in TR (Line or Table & Row numbers)	Topic	Comment and Rationale	Proposed Chan
1				
2				
3				

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Agenda

Welcome

Intro to DLC & Its Spec Development

Review Draft Spec

Key Questions

Q&A

DLC Makes Tools, Stakeholders Use Them

General DLC Development Process

DLC Collects and Aggregates Requests for Development and Revision from All Stakeholders

- Categorize by topic area
- Spec Development (new primary uses)
- Spec Revision (new performance thresholds)
- Policy Development
- Policy Revision

Requests Are Prioritized

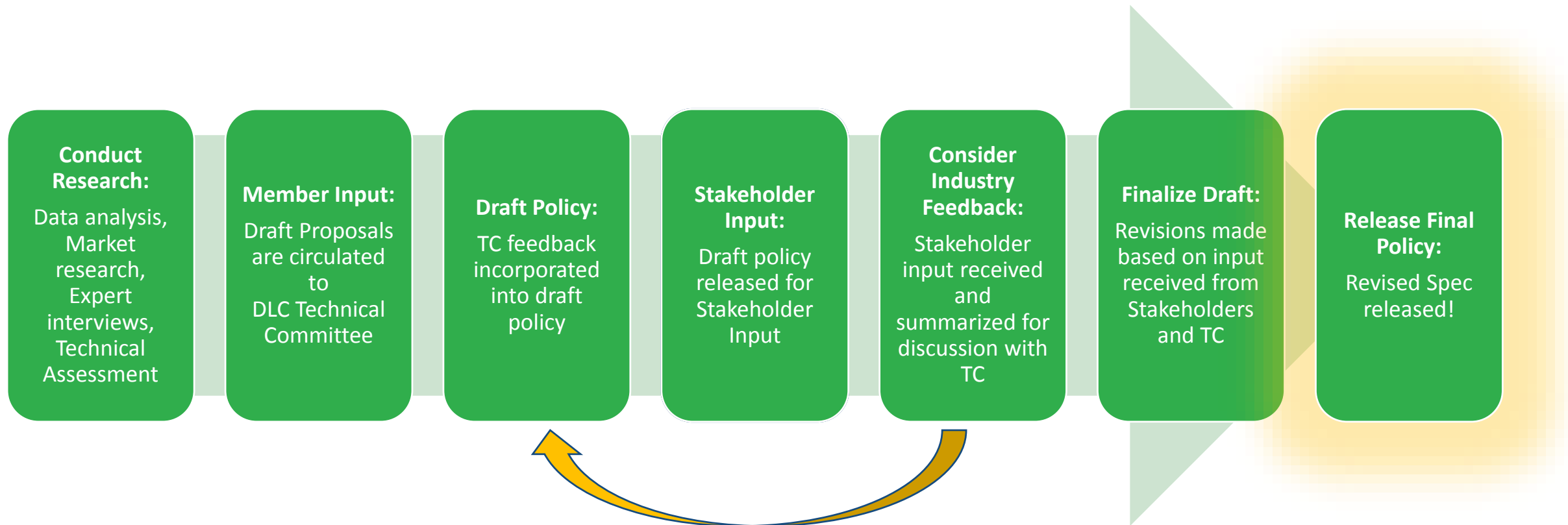- Active review with DLC Membership
- Input from Industry Stakeholders
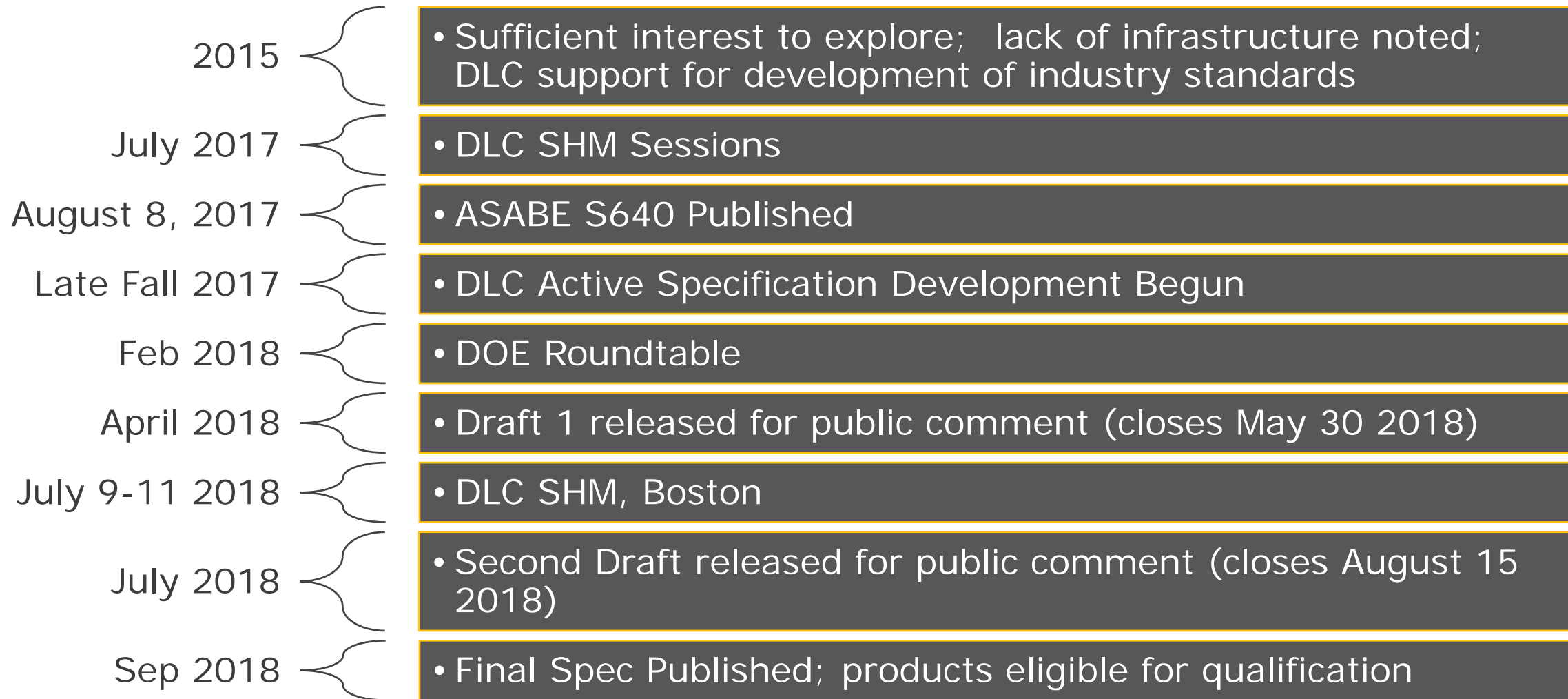- DLC capacity
- Alignment with DLC mission

Prioritized Tasks Are Undertaken for Research and Development

- Topic position, objectives, key considerations, and status published on DLC website: https://www.designlights.org/workplan/
- All major program changes undergo public comment period through DLC Stakeholder Input Process

Stakeholder Input Is Critical

Conduct Research:

Data analysis, Market research, Expert interviews, Technical Assessment

Member Input:

Draft Proposals are circulated to DLC Technical Committee

Draft Policy:

TC feedback incorporated into draft policy

Stakeholder Input:

Draft policy released for Stakeholder Input

Consider Industry Feedback:

Stakeholder input received and summarized for discussion with TC

Finalize Draft:

Revisions made based on input received from Stakeholders and TC

Release Final Policy:

Revised Spec released!

What is the Project Plan/Timeline?

2015	• Sufficient interest to explore; lack of infrastructure noted; DLC support for development of industry standards
July 2017	• DLC SHM Sessions
August 8, 2017	• ASABE S640 Published
Late Fall 2017	• DLC Active Specification Development Begun
Feb 2018	• DOE Roundtable
April 2018	• Draft 1 released for public comment (closes May 30 2018)
July 9-11 2018	• DLC SHM, Boston
July 2018	• Second Draft released for public comment (closes August 15 2018)
Sep 2018	• Final Spec Published; products eligible for qualification

Review Draft Requirements

So, what's the spec?

High Output

Low Output

Full Replacement

Supplemental

So, what's the spec?

- PAR, as defined by ASABE ES-311 S640, is the foundation of this specification

- It is *not* the global solution for all plant needs!
  - But good luck trying to grow plants without it

- Our judgements focus on balancing the tension between:
  - What is the most PAR-efficacious way to produce light for the plants with SSL sources, relative to incumbent sources?
  - What is a reasonable amount of efficacy headroom to leave for ex-PAR (280-400, 700-800 nm) 'light recipes' and crop diversity?
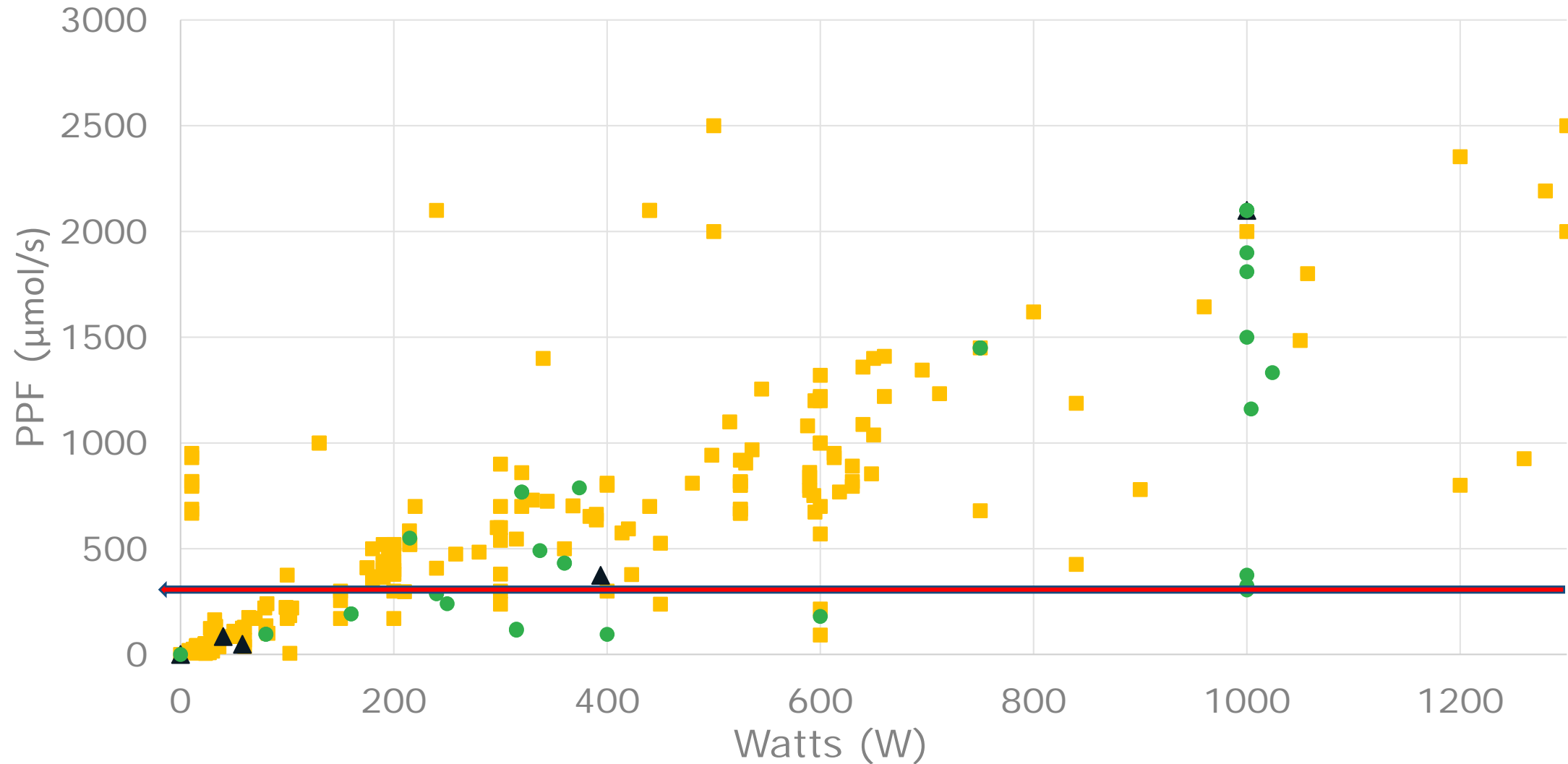
So, what's the spec?

Parameter/Attribute/Metric	Requirement	Requirement Type	Method of Measurement/Evaluation
Photosynthetic Photon Flux (PPF), (μmol/s)	High-Output Devices: ≥300 μmol/s	Reported, Category Differentiator	400nm-700nm range
	Low-Output Devices: <300 μmol/s		
Photon Flux (PF), (μmol/s)	n/a	Reported	280nm-800nm range
Spectral Quantum Distribution (μmol/s/nm)	n/a	Reported	280nm-800nm range
Photosynthetic Photon Intensity Distribution (μmol/s/sr)	n/a	Reported	400nm-700nm range

So, what's the spec?

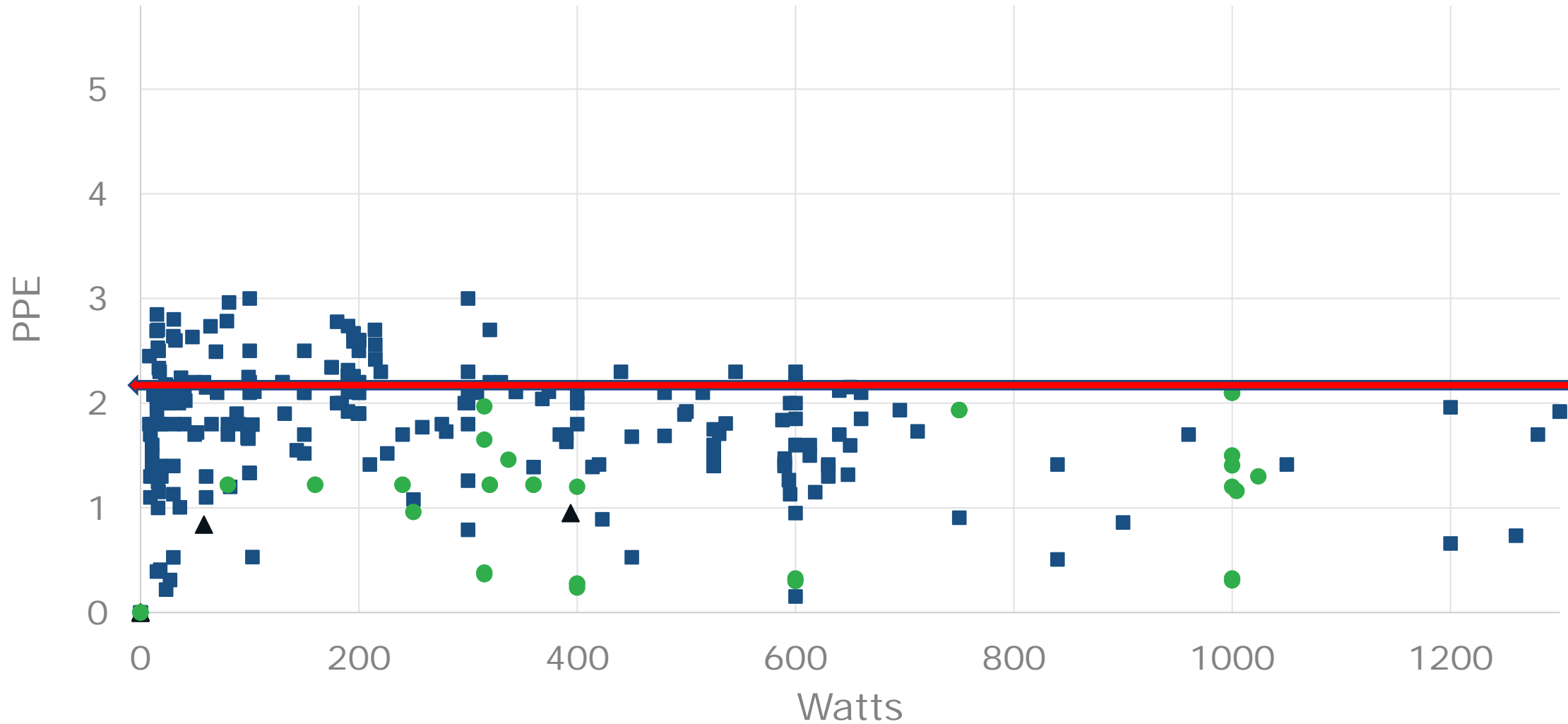| Parameter/Attribute/Metric	Requirement	Requirement Type	Method of Measurement/Evaluation
Photosynthetic Photon Efficacy (PPE), (μmol/J)	High-Output Devices: ≥2.1 μmol/J	Required/Threshold	400nm-700nm range
	Low-Output Devices: ≥2.1 μmol/J		
Flux Maintenance, PPF	Q90 ≥36,000h	Required/Threshold	400nm-700nm range
Flux Maintenance, PF	Report time to Q90	Reported	280nm-800nm range

All Technologies PPF

Legend: ■ LED ▲ Fluorescent ● HID

X-axis: Watts (W)
Y-axis: PPF (μmol/s)

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All Technologies PPE

■ LED ▲ Fluorescent ● HID

X-axis: Watts

Y-axis: PPE

DLC

So, what's the spec?

Parameter/Attribute/Metric	Requirement	Requirement Type	Method of Measurement/Evaluation
Warranty	5 years	Required/Threshold	Legal Warranty Terms & Conditions
Power Factor	≥ 0.9	Required/Threshold	IES LM-79
Total Harmonic Distortion	≤20%	Required/Threshold	IES LM-79
Safety Certification	Appropriate Horticultural Lighting designation by OSHA NRTL or SCC-recognized body	Required/Threshold	Per safety certification body

So, what's the spec?

Parameter/Attribute/Metric	Requirement Requirement Type Method of Measurement/Evaluation
Power Mode	AC line-voltage is the only approved means of powering fixtures. Future revisions may open this up to more modes, especially as we gain experience with DC / PoE in the general SSL category.
Labeling	A standardized labeling scheme (see Lighting Facts) is desirable. DLC is monitoring labeling discussions and is supportive of a practical, standardized approach.
Spectrally tunable	Test in the "all on" mode, then with isolated channels (CH1 = Max, all others = Min, etc). Display method of these details to end users is being considered through the stakeholder process.
Cooling Fans	Allowed, with MTBF (spec sheet) > 50,000 hours.

Key Questions

Existing Industry Efforts

- ASABE ES-311 efforts

- IES miscellaneous efforts
  - Data file adaptation to non-lumen products

- Labeling
  - Lighting Facts-style label on spec sheets?

- Testing
  - Round-robin testing of 280-800nm

Key Question:

The DLC seeks feedback on any industry efforts underway that should be considered. These include standardization of terms and definitions, and of labeling conventions

Technical Requirements - General

- Cooling methods
  - Fans are self-contained
  - Externally ducted cooling air and liquid loops make accurate and repeatable testing difficult

- Liftime extrapolation
  - Plants are more sensitive to decreases in flux – 10% set as the end-of-life threshold

Key Questions:

Should fans be allowed? If so, what are useful reliability requirements?

Does component-level testing + extrapolation (i.e. LM-80) give enough certainty, compared to whole-fixture testing (i.e. LM-84)?

Technical Requirements – Product Categories

- Split into Low and High Output
  - Application-specific break points are difficult to justify technically and tend to blend into each other
  - Close-to-plant and far-from-plant seem to be a useful distinction, considering the two different incumbent sources (HID / FL)

- Efficacy
  - High Output seems to be the most difficult fixture geometry for high efficacy, with the highest incumbent source efficacy

Key Questions:

Are the High and Low output categories sufficient?

Are the PAR efficacies technically achievable? Do they allow room for ex-PAR usage and crop diversity?

Technical Requirements – Product Categories

- Spectral tuning

  – Propose to collect data on all-on operation, then to collect per-channel information

  – Single-axis dimming may be reported separately, as a basic feature

Key Questions:

Are the proposed tests achievable? Is the test burden justified with a maximally educated customer?

DLC

Summary

Roadmap To A Spec

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Thank You!

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Thank you!