



Bringing Efficiency to Light.

December Policy Development Efforts

DC/PoE Luminaires and White Color Tuning Products

December 13, 2016

Agenda

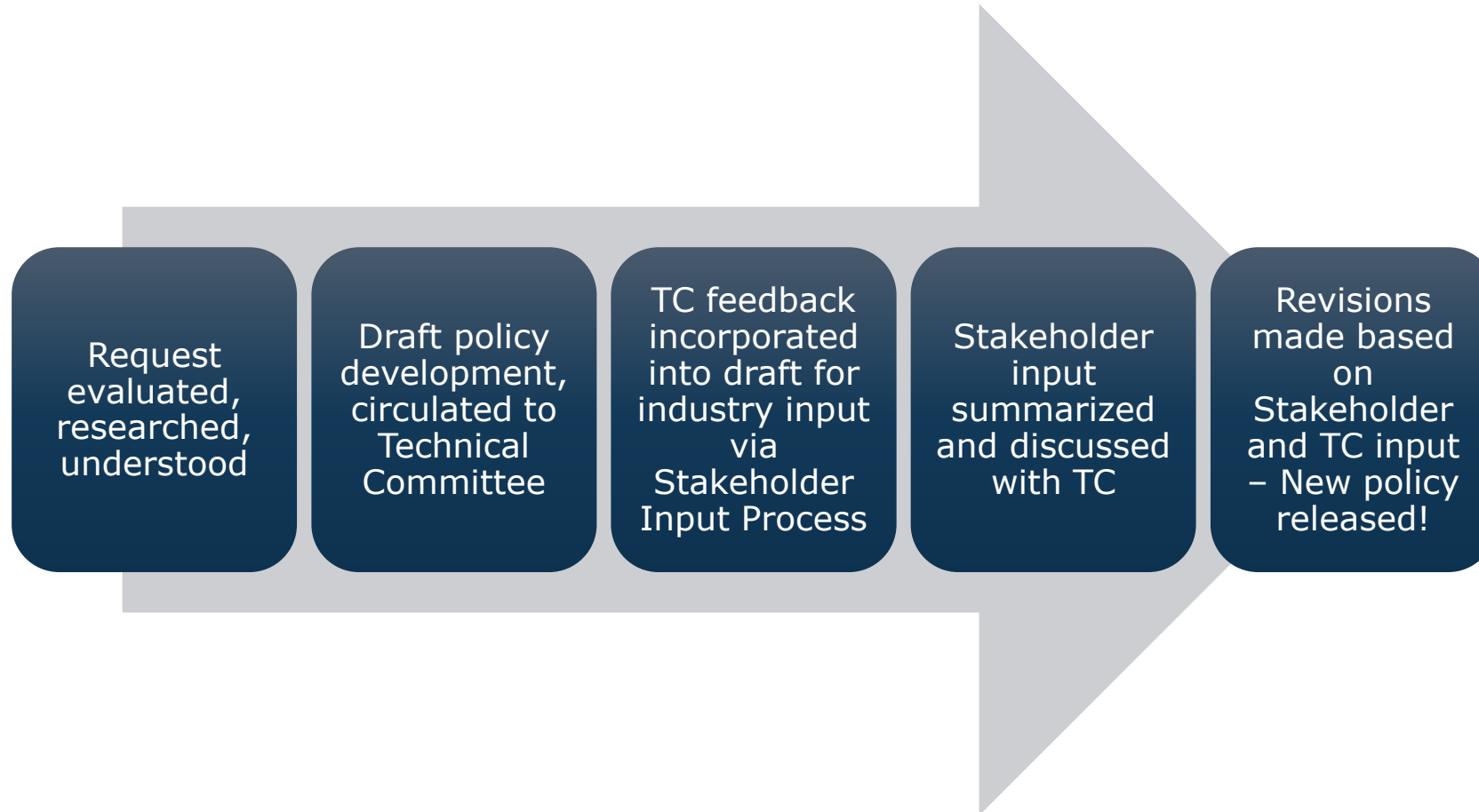
- Policy Development Overview
- DC/PoE Luminaires Proposal
- White Color Tuning Products Proposal
- Comment Period Reminders

Policy Development Overview

Policy Development Overview

- DLC aggregates requests/suggestions for development
 - Maintain “wish lists” of new policies or revisions to existing policies
- Prioritize wish lists periodically
 - Program management judgement
 - Active review with the Technical Committee (TC)
 - Surveys of DLC Members
- Prioritized tasks undertaken for development
 - Any significant program changes go through the Stakeholder Input Process (SIP)

Policy Development Overview



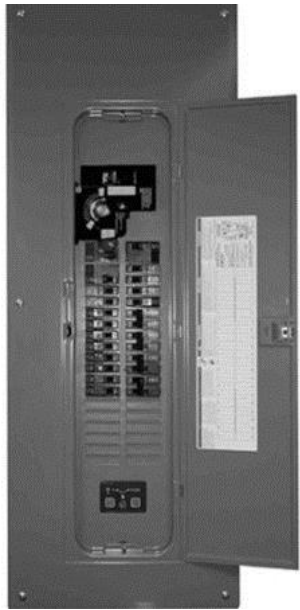
Policy Development Overview

- Requested proposals for DC/PoE and White Color Tuning
- Discussed DC/PoE and White Color Tuning during 2016 Stakeholder Meeting
- Conducted additional research and held discussions on approaches to both policy efforts
- Next step: develop framework policy documents for Stakeholder Input
 - Frameworks include policy structure with key questions for stakeholders to respond to regarding direction of policy
 - Goal of frameworks is to get clarity on key issues that are still unresolved from research

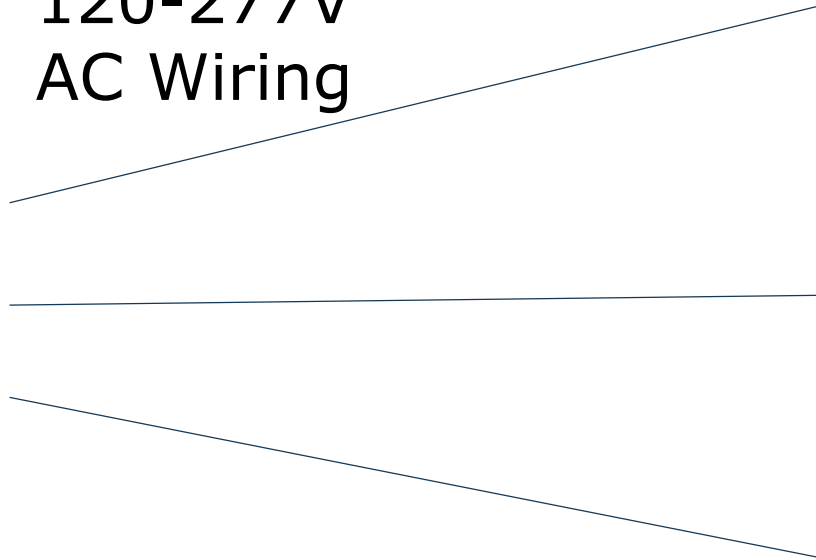
DC/PoE Luminaires

DC/PoE Background

Traditional System



120-277V
AC Wiring

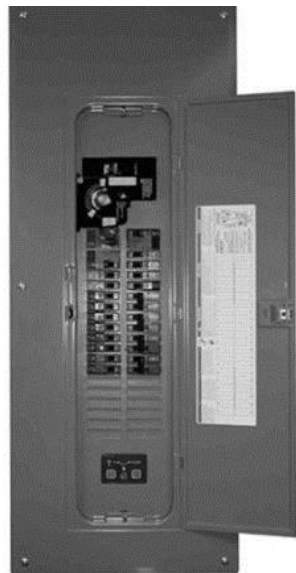


AC to DC Driver



DC/PoE Background

DC System



120-277V AC
or 380V DC
Wiring

**Corresponding
DLC Box**

Remote AC/DC
Power Supply
or PoE Switch



Ethernet
or other
DC
Cable



DC to DC Driver



DC/PoE Challenges

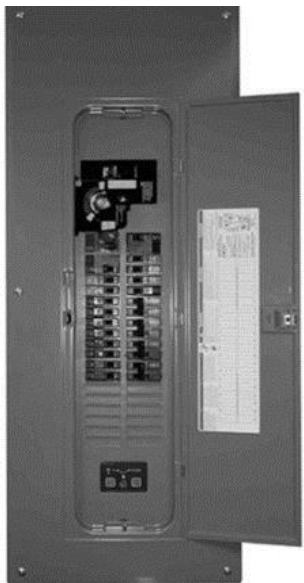
- Efficiency of the system is most important for DLC Member programs
- Losses are dependent upon system parameters
 - Line losses – cable and length
 - Remote AC/DC power supply – loading conditions
- Information published in QPL could be misleading
 - Performance of DC luminaire only excludes system losses
 - AC luminaire performance is not comparable to DC performance if system efficiency is not included
- Ease of use for Member programs
 - Differing specifications between AC and DC products could create administrative challenges
 - If different efficacy requirements for AC and DC products

DC/PoE Challenges

- Few contacts in industry as of yet
 - 4 contacts for PoE systems
 - 3 contacts for DC systems
- Standards either non-existent or still in development
 - ANSI C137 for PoE line losses in development
 - No standard for non-PoE
- Marketing material either not yet publically available or lacking detail DLC is looking for
- Some contacts do not have experience with DLC and its qualification processes to date
 - Suggestions received not always actionable with how DLC works/member interests

DC/PoE Proposed Approach

Test Components



120-277V AC
or 380V DC
Wiring

**LM-79 test of luminaire,
adjust with tested power
supply efficiency and
calculated line loss**

Separate test for efficiency

Remote AC/DC
Power Supply
or PoE Switch



Calculate line losses

Ethernet
or other
DC Cable



LM-79 test

DC to DC Driver



DC/PoE Framework

- Three main parts of policy framework based on proposed approach
 - 1) Performance at luminaire level
 - DC-DC
 - 2) Evaluation of line losses
 - Separate approach for POE and non-POE
 - 3) Power supply efficiency
- Propose that DC/PoE luminaire systems (at system level) be held to same requirements as AC luminaire systems

DC/PoE: Performance at Luminaire Level

- Leverage existing LM-79 standard to test DC luminaire (DC-DC)
- Set requirements at the luminaire level based on LM-79 (lumen output, color characteristics)
- *Seeking commentary from stakeholders on how LM-79 should be conducted*
 - Testing in laboratory does not factor in real-world installation as there will be voltage drop to luminaire based on length/size of cable
 - DLC proposing to test at worst-case input voltage
 - Propose that manufacturers provide documentation of voltage range luminaire can accept, and impact on performance based on voltage range
 - *Seeking feedback on this approach*

DC/PoE: Evaluation of Line Losses

- Use LM-79 performance at luminaire level and apply losses
 - Losses applied by DLC reviewer during application review
- Rely on ANSI C137 standard for PoE line losses
 - Standard development only focused on PoE
- Rely on manufacturer marketing material for non PoE line losses
 - Calculate losses based on information (i.e. installation instructions) provided by manufacturers
 - Expecting too much variation from manufacturer to manufacturer to apply losses generically
 - Challenges:
 - Requires reliance on marketing material, to date no consistency between spec sheets reviewed

DC/PoE: Power Supply Efficiency

- Leverage existing DOE test procedure and standard (Energy Conservation Standards for External Power Supplies)
 - Requires testing at 4 loading conditions
 - Efficiency requirements based on average efficiency across tested loading conditions
 - Mixed feedback in research thus far on applicability of DOE standard for DC/PoE power supplies
 - Some manufacturers feel that standard does not apply as it only covers “small” power supplies
 - Have not been able to confirm this claim based on language in the standard
 - *Seeking comment on applicability of standard in framework*

DC/PoE Listing Overview

- Obtain lumen output, efficacy, wattage, etc. from DC luminaire LM-79
 - Apply efficiency losses to DC luminaire performance based on line loss calculations
 - Apply efficiency losses to DC luminaire performance based on power supply efficiency
- List total system performance on QPL
 - Includes AC-DC power supply, cables, DC-DC driver

Leveraging NLC QPL

- Only allow DC luminaires to be qualified if corresponding control system is qualified on NLC QPL
- Require manufacturers to clearly specify power supply and wire characteristics on control system literature
- Require PoE systems to comply with forthcoming ANSI C137 Standard
- Incorporate compatibility concerns by using NLC QPL

White Color Tuning Products

White Color Tuning Background

- Intention at onset of development process was to focus on white color tuning
 - Achievable by two methods
 - Linear white tuning: inclusion of 2 white LEDs (i.e. warm white and cool white), adjust LEDs to mix CCTs in between
 - Will not have same Duv throughout color range
 - No conclusive studies to date that Duv change is objectionable
 - Simpler approach
 - Black body white tuning: inclusion of multiple white LEDs, can include color LEDs
 - Will follow black body, no change to Duv
 - More complicated than linear white tuning

White Color Tuning Background

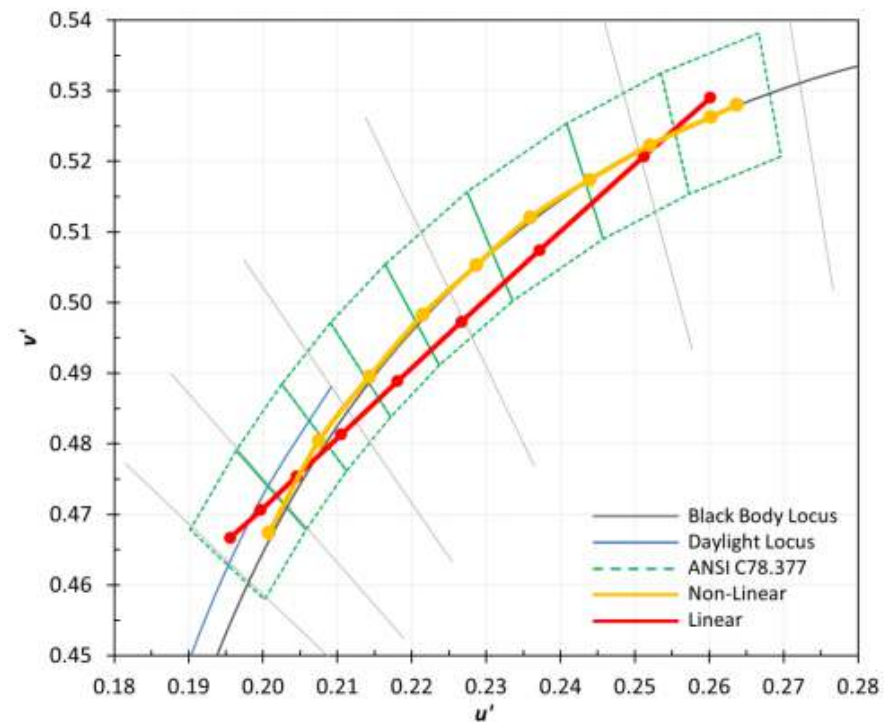


Figure 1. Examples of linear and nonlinear (blackbody) white tuning. The exact curves will vary from product to product, but the key difference is that linear (two-primary) systems can only mix to chromaticities that are directly between the two primaries, whereas products with more than two primaries can be used to create mixes that approximately follow the blackbody locus.

White Color Tuning Background

- Various methods of varying complexities
- Understanding that white color tuning products unlikely to have higher incentive
 - Manufacturers/members most interested in pathway for DLC qualification
- Decision to start simple, expand with more experience with white color tuning
 - Can expand to “dynamic” tuning, RGB, etc.

White Color Tuning Background

- 2016 Stakeholder Meeting Discussion Session
 - Feedback that linear white tuning is the simpler approach
 - Introduced idea of “settable CCT” products
 - If customer is not happy with installed CCT, can switch to preferred CCT without uninstalling and reinstalling new luminaire
 - Distributors only need to stock one product with a range of settable CCTs rather than multiple products with only one CCT option

White Color Tuning Framework

- Propose to only cover products with settable CCTs
- Products must use only white LEDs
 - Linear tuning, not along black body
- Marketing material must include information of available CCT settings
 - *Seek feedback from industry on how these products are marketed*
- Propose testing at all marketed CCT settings
 - *Seek feedback from industry on burden*
 - Heard during Stakeholder Meeting that manufacturers of these products already conducting testing at all settings

White Color Tuning Framework

- Propose that White Color Tuning products be held to the same requirements as fixed CCT products
 - CCT range limited to current requirements (2200K-5000K or 5700K)
 - Allowances to address concerns that lower CCTs cannot meet requirements
- Propose no requirements on applicable Primary Use designations; any product type currently eligible can leverage White Color Tuning policy

Timeline

Task	Tentative Timeline
Draft frameworks for industry feedback	Early December
Industry comment period	December – late January
Comments reviewed/Commenter's Call	Mid February
Discuss comments with Technical Committee	Late February
Publish policies or release for another round	

Comment Period Reminders

Comment Period Reminders

- Comments on DC/PoE and White Color Tuning due by **January 20, 2017**
- Submit comments in writing to info@designlights.org
- Relevant documents accessible on DLC website:
<http://designlights.org/content/QPL/ProductSubmit/SpecificationandPolicy#PolicyDev>

Comment Period Reminders

- Comments on V4.2 Specification Development and Allowances also due by January 20, 2017
- Submit comments in writing to info@designlights.org
- Relevant documents accessible on DLC website:
 - V4.2:
<http://designlights.org/content/QPL/ProductSubmit/SpecificationsandPolicy#SpecDev>
 - Allowances:
<http://designlights.org/content/QPL/ProductSubmit/SpecificationsandPolicy#SpecRevision>
- Webinar held 12/12 to review drafts, slides available via links above

Thank You!

Slide deck will be posted online!

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