AABC Commissioning Group

AIA Provider Number 50111116

# DLC® Networked Lighting Controls Technical Requirements Enable Utility Incentives

Course Number: CXENERGY1722

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***Lumispec Consulting***

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# Course Description

Industry standards for lighting control technology are lagging as tremendous innovation is occurring at the manufacturer level to reduce the cost and complexity of installing and commissioning the systems. Attendees will learn how to use the non-profit DesignLights Consortium® (DLC) and its Networked Lighting Controls Qualified Products List as a tool in implementing and commissioning lighting control systems.

# Learning Objectives

At the end of the this course, participants will be able to:

1. Understand the need for standardized Networked Lighting Controls Technical Requirements for lighting systems.

2. Recognize the needed characteristic for Networked Lighting Controls Technical Requirements.

3. Participants will be exposed to the different Networked Controls for lighting systems that are available.

4. Learn how to use the DesignLights Consortium's Networked Lighting Controls (NLC) Qualified Products List as a tool in implementing and commissioning Lighting Control Systems.

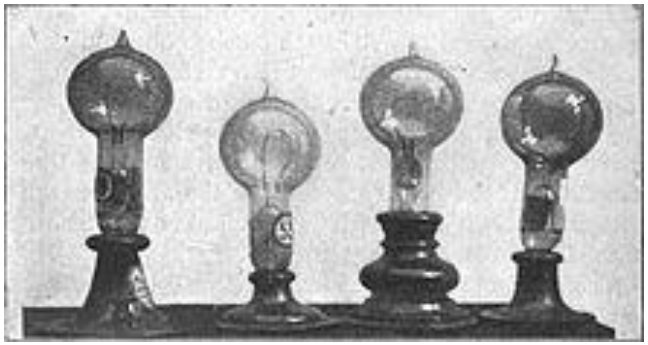
# What We Will Cover

- Background
- History of the DesignLights Consortium (DLC)
- DLC
  - Members
  - Resources
  - Structure
  - Processes
- Networked Lighting Controls

# Three questions…….

- Do you commission lighting systems
- Do you also assist in specifying lighting control systems
- Will you get involved in the above areas in the future

# Way, way back when……

# The dark ages of the early 1990's

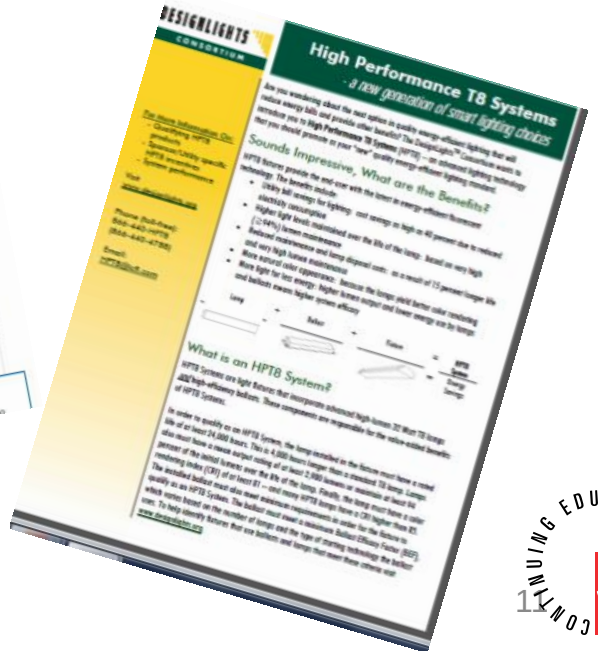
- Electric utility DSM programs mandated by state utility commissions
- Most electric utilities had their own, unique program qualification requirements
- Programs were primarily fluorescent component based - lamps and ballasts
- A manufacturer had to maintain files of each utility program and constantly update the files as each utility updated its program

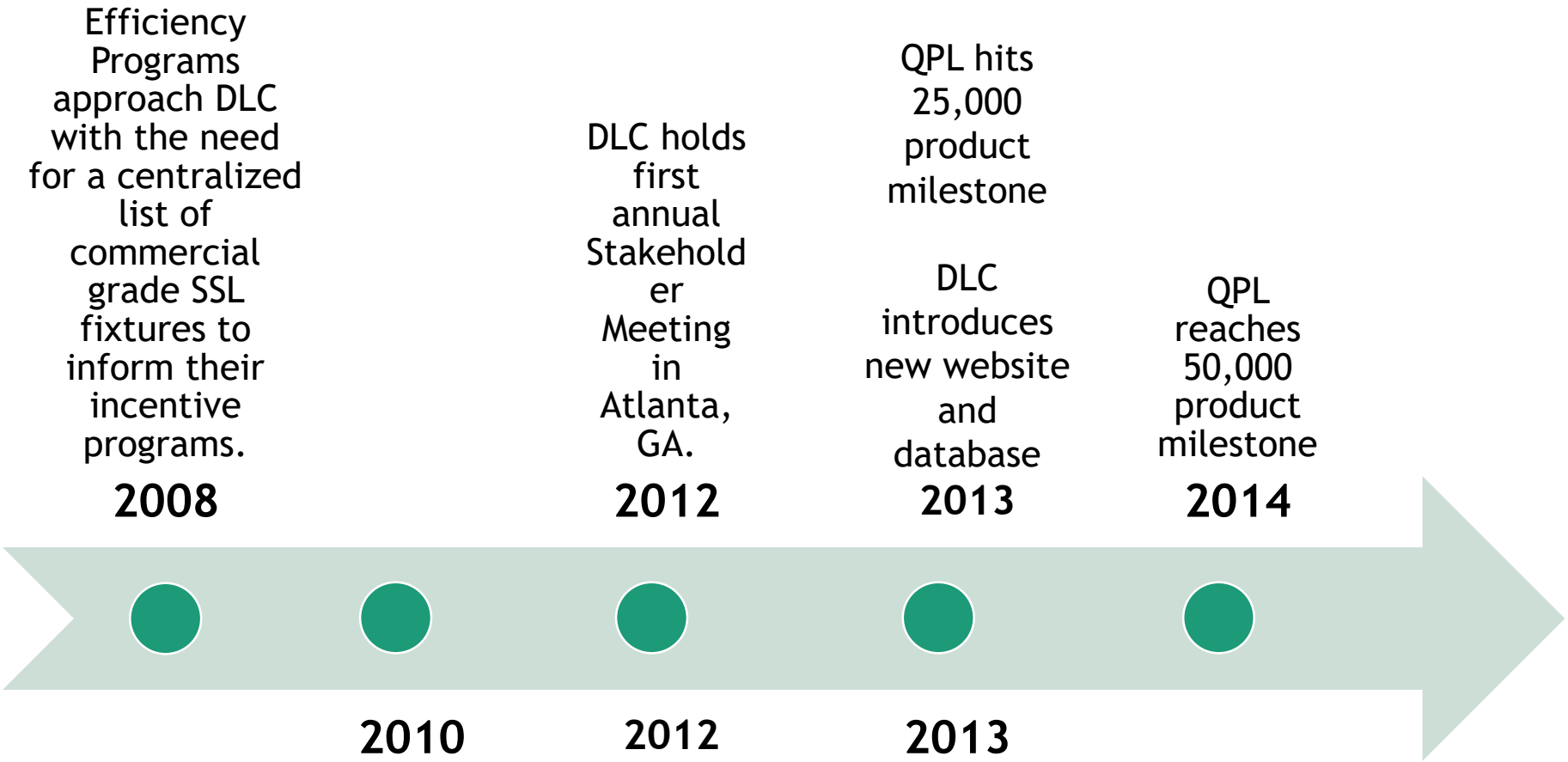
# The “enlightened” age of mid-2000’s


- The world of LED’s - reduced power and energy
- LED’s not only are easily dimmable, they “love” to be dimmed
- This single characteristic led to an expansion of lighting control systems

# History and Background

- Previously a project of NEEP
- Independent 501 (c)3 as of January 2017
- 1998: knowhow series
- 2006: HP T8 Project

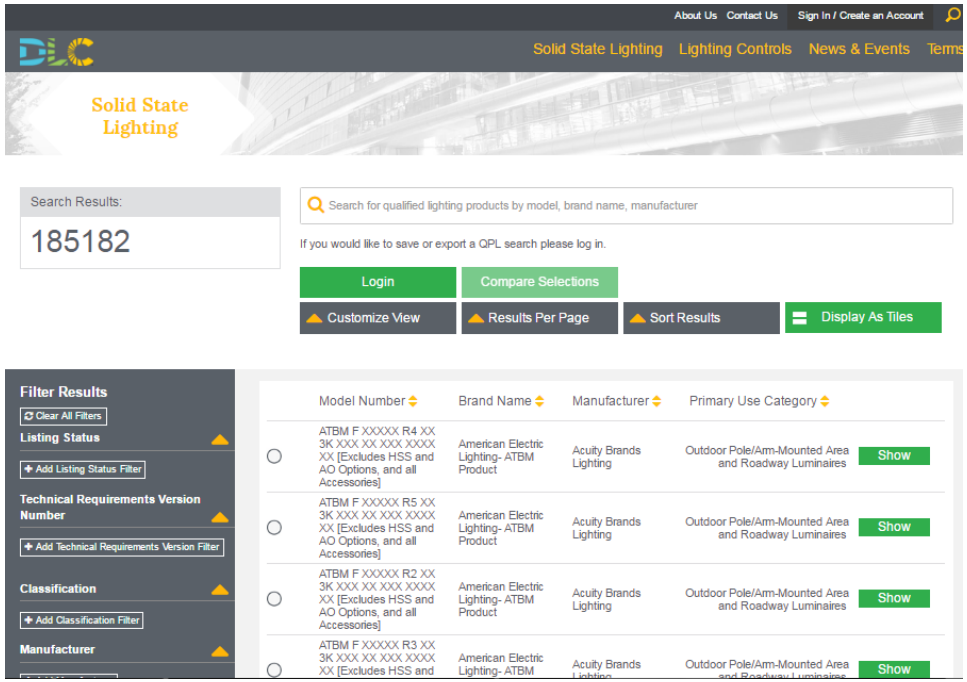




Efficiency Programs approach DLC with the need for a centralized list of commercial grade SSL fixtures to inform their incentive programs.
2008
2010
First version of QPL features 8 categories, 200 products, 50 manufacturers
DLC holds first annual Stakeholder Meeting in Atlanta, GA.
2012
2012
DLC introduced Stakeholder Input Process.
QPL hits 25,000 product milestone
DLC introduces new website and database
2013
2013
DLC revises technical requirements in April; 16,000 products are de-listed on December 31, leaving QPL at approx. 30,000 products.
QPL reaches 50,000 product milestone
2014

# DLC Qualified Products List

## 2014 - 2017

- Over 52,000 – 295,000 products listed on the QPL
- Over 750 -1800 participating manufacturers
- 37 product application categories - 7 categories and 71 Primary Uses
- Searchable, sortable web-based database tool
- SSL information resource

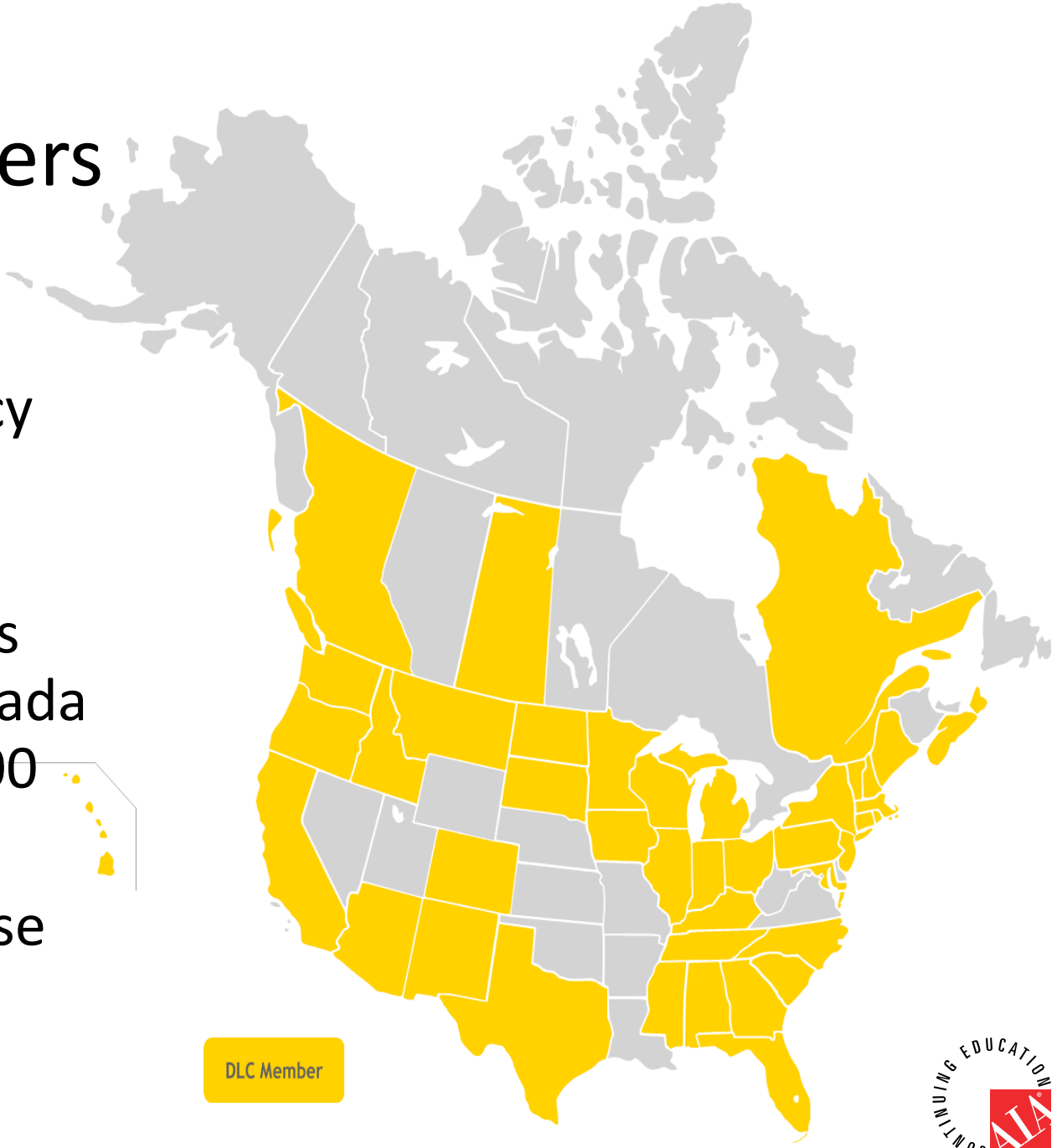


# DLC Membership

- DLC Members throughout US and Canada
  - Electric utility, regional, state, and national energy efficiency programs throughout the U.S. and Canada.
  - Provide financial support, guidance, and expertise
- Benefits of DLC membership include:
  - Authorized access to the QPL - No need to maintain individual QPL
  - Access to expert technical assistance
  - Leveraging resources towards a common effort
  - A seat at the table - Helping to shape the international commercial LED market.
  - Participating in peer exchange
  - Crowdsourcing among experts
  - Minimizing liability and ensure customer satisfaction
  - Reliable energy savings
  - Visibility - Supporting an international resource
  - Robust relationship with industry

# DLC Members

- Utilities and Energy Efficiency programs
- Currently at 85 members across the US and Canada representing 100 electric utilities
- Provide expertise and insight




ALLIANT ENERGY
DC SUSTAINABLE ENERGY UTILITY
EnergyTrust of Oregon™
Hydro Québec
nationalgrid THE POWER OF ACTION
PECO An Exelon Company
SMUD
Ameren ILLINOIS
DP&L
EUMMOT ELECTRIC UTILITY MARKETING MANAGERS OF TEXAS
neea
SNOHOMISH COUNTY PUD PUBLIC UTILITY DISTRICT NO. 1
SOUTHERN CALIFORNIA EDISON An EDISON INTERNATIONAL Company
BC hydro REGENERATION
IDAHO POWER An IDACORP Company
EVERSOURCE
BGE
DTE Energy
ieso Independent Electricity System Operator
your NEW HAMPSHIRE Electric Co-op
AEP PUBLIC SERVICE COMPANY OF OKLAHOMA A unit of American Electric Power
SOUTHERN MINNESOTA MUNICIPAL POWER AGENCY Bringing power to your life.
EWEB
BONNEVILLE POWER ADMINISTRATION
DUKE ENERGY
focus on energy Partnering with Wisconsin utilities
Liberty Utilities
nyserda Energy. Innovation. Solutions.
PSE PUGET SOUND ENERGY
SRP Delivering more than power.™
BURLINGTON Electric DEPARTMENT
efficiency NOVA SCOTIA
FORTIS BC™
OUC The Reliable One
santee cooper
TACOMA POWER TACOMA PUBLIC UTILITIES
LIPA Long Island Power Authority
efficiency MAINE
GEORGIA POWER A SOUTHERN COMPANY
Natural Resources Canada
TVA
Cape Light Compact
MEEA Midwest Energy Efficiency Alliance
SaskPower Powering the future®
EFFICIENCY$MART
Hawaii Energy YOUR CONSERVATION & EFFICIENCY PROGRAM
MidAmerican ENERGY OBSESSIVELY, RELENTLESSLY AT YOUR SERVICE.
PG&E
Seattle City Light
ui The United Illuminating Company
ComEd
Efficiency Vermont
Unitil
conEdison
El Paso Electric
HOOSIER ENERGY A Touchstone Energy® Cooperative
MISSOURI RIVER ENERGY SERVICES®
PNM
SMECO Southern Maryland Electric Cooperative
Xcel Energy
EDUCATION CONFERENCE AIA

# DLC Technical Requirements Table

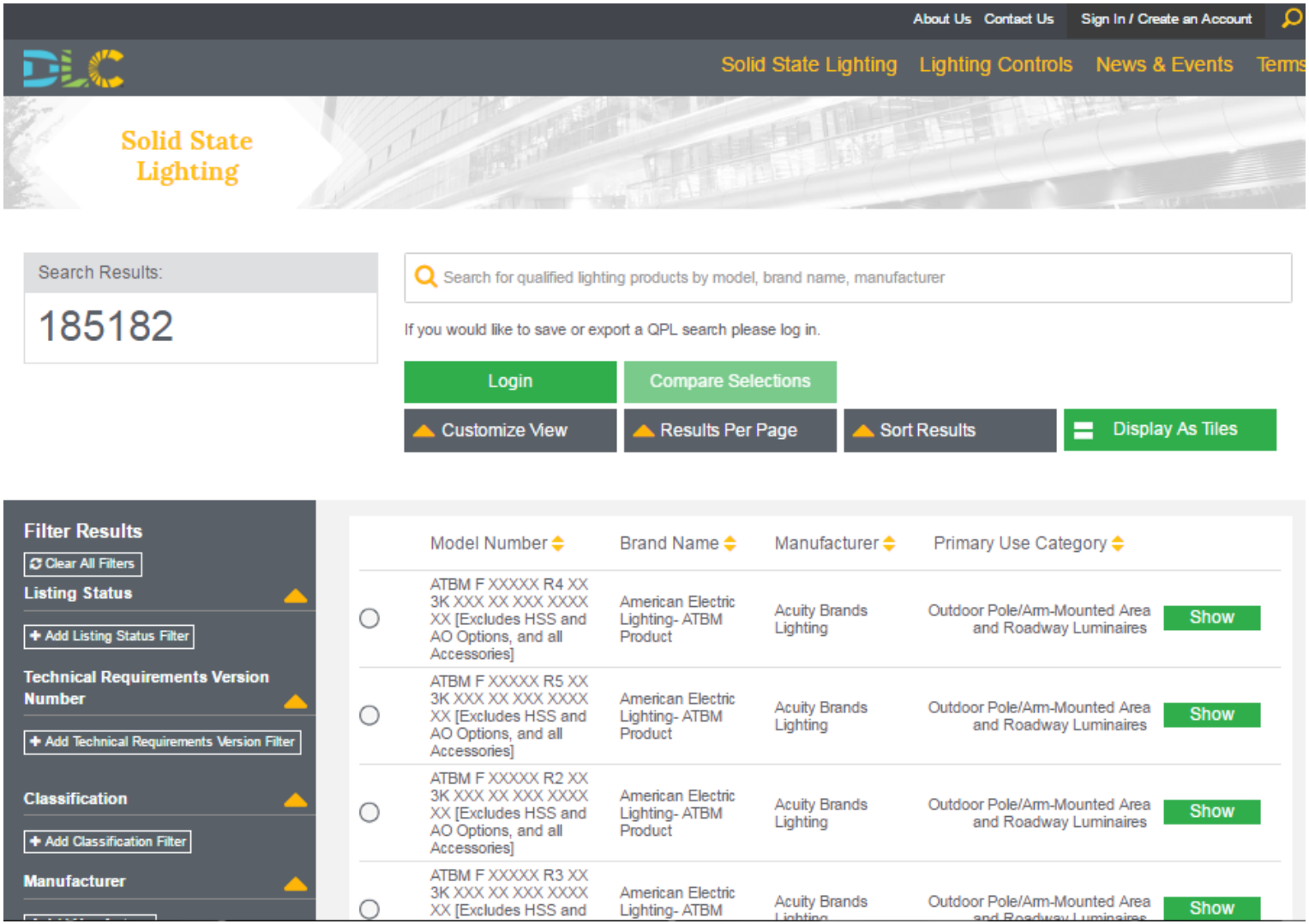
## Table 1: Luminaire Requirements

| # | Category | General Application | Requirements | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Minimum Light Output (lm) | DLC Standard | | | DLC Premium** | | | Primary Use*** | Distribution |
| | | | | Minimum Efficacy (lm/W) | Minimum Warranty (years) | CCT / CRI / $L_{90}$ | Minimum Efficacy (lm/W) | Minimum Warranty (years) | CCT / CRI / $L_{90}$ / $L_{70}$ | | |
| 1 | Outdoor | Outdoor – Low Output | 250-5,000 | 90 | 5 | ≤5700 / ≥65 / ≥50,000 | 110 | 5 | ≤5700 / ≥65 / >36,000 / ≥50,000 | • Outdoor Pole/Arm-Mounted Area and Roadway Luminaires<br>• Outdoor Pole/Arm-Mounted Decorative Luminaires<br>• Outdoor Full-Cutoff Wall-Mounted Area Luminaires<br>• Outdoor Non-Cutoff and Semi-Cutoff Wall-Mounted Area Luminaires<br>• Bollards<br>• Parking Garage Luminaires<br>• Fuel Pump Canopy Luminaires<br>• Landscape/Accent Flood and Spot Luminaires<br>• Architectural Flood and Spot Luminaires<br>• Stairwell and Passageway Luminaires<br>• Specialty:_____ | See Primary Use Zonal Lumen Density Requirements in Table 4, below |
| 2 | | Outdoor – Mid Output | 5,000-10,000 | 95 | | | 115 | | | | |
| 3 | | Outdoor – High Output | 10,000-30,000 | 100 | | | 120 | | | | |
| 4 | | Outdoor – Very High Output* | ≥30,000 | 100 | | | 120 | | | | |
| 5 | Indoor | Interior Directional | 250-4,500 | 65 | 5 | ≤5000 / ≥80 / ≥50,000 | 90 | 5 | ≤5000 / ≥80 / >36,000 / ≥50,000 | • Wall Wash Luminaires<br>• Track or Mono-Point Luminaires<br>• Specialty:_____ | |
| 6 | | Case Lighting | ≥50 lm/ft | 80 | | | 125 | | | • Display Case Luminaires<br>• Horizontal Refrigerated Case Luminaires<br>• Vertical Refrigerated Case Luminaires<br>• Specialty:_____ | |
| 7 | | Troffer | ≥1,500 | 100 | | | 125 | | | • 2x2 Luminaires for Ambient Lighting of Interior Commercial Spaces<br>• 1x4 Luminaires for Ambient Lighting of Interior Commercial Spaces<br>• 2x4 Luminaires for Ambient Lighting of Interior Commercial Spaces<br>• Specialty:_____ | |
| 8 | | Linear Ambient | ≥375 lm/ft | 105 | | | 130 | | | • Direct Linear Ambient Luminaires<br>• Linear Ambient Luminaires w/ Indirect component<br>• Specialty:_____ | |
| 9 | | High Bay | ≥5,000 | 105 | | ≤5700 / ≥70 / ≥50,000 | 130 | | ≤5700 / ≥70 / >36,000 / ≥50,000 | • High Bay Luminaires for Commercial and Industrial Buildings<br>• Low Bay Luminaires for Commercial and Industrial Buildings<br>• High Bay Aisle Luminaires<br>• Specialty:_____ | |

*Under the next revision to the efficacy requirements (V5.0), DLC intends to split the "very high" outdoor lumen bin from the "high" lumen bin, and set unique efficacy requirements for each bin.

**Products seeking qualification in the DLC Premium classification will be required to pass an $L_{90}$ >36,000 hours, as evaluated using TM-21. This requirement is in addition to the $L_{70}$ requirements of the DLC Standard classification.

# DLC Qualified Products List



# Policy Development

Policy Request is identified, evaluated, researched, understood

Draft policy circulated to DLC Technical Committee

TC feedback incorporated into draft for Stakeholder Input via Stakeholder Input Process

Stakeholder input summarized and discussed with Technical Committee

Revisions made based on Stakeholder and Technical Committee input – New policy released!

# DLC Processes History

## Technical Requirements Revision

- Full review of all categories and parameters
- Results in new Technical Requirements Table

## Technical Requirements Development

- Creation of new DLC Categories
- Results in updates to Technical Requirements Table
- Begins with prioritization of “Wish List” of stakeholder suggested categories
- “Wish List” maintained throughout year
- Occurs according to Member need and program capacity

## Program Operation

- Process Applications
- Provide Tech Support
- Assess and address DLC Member needs
- Recruit new DLC Members

## Policy Development

- Lab Policy
- Logo Use Guideline

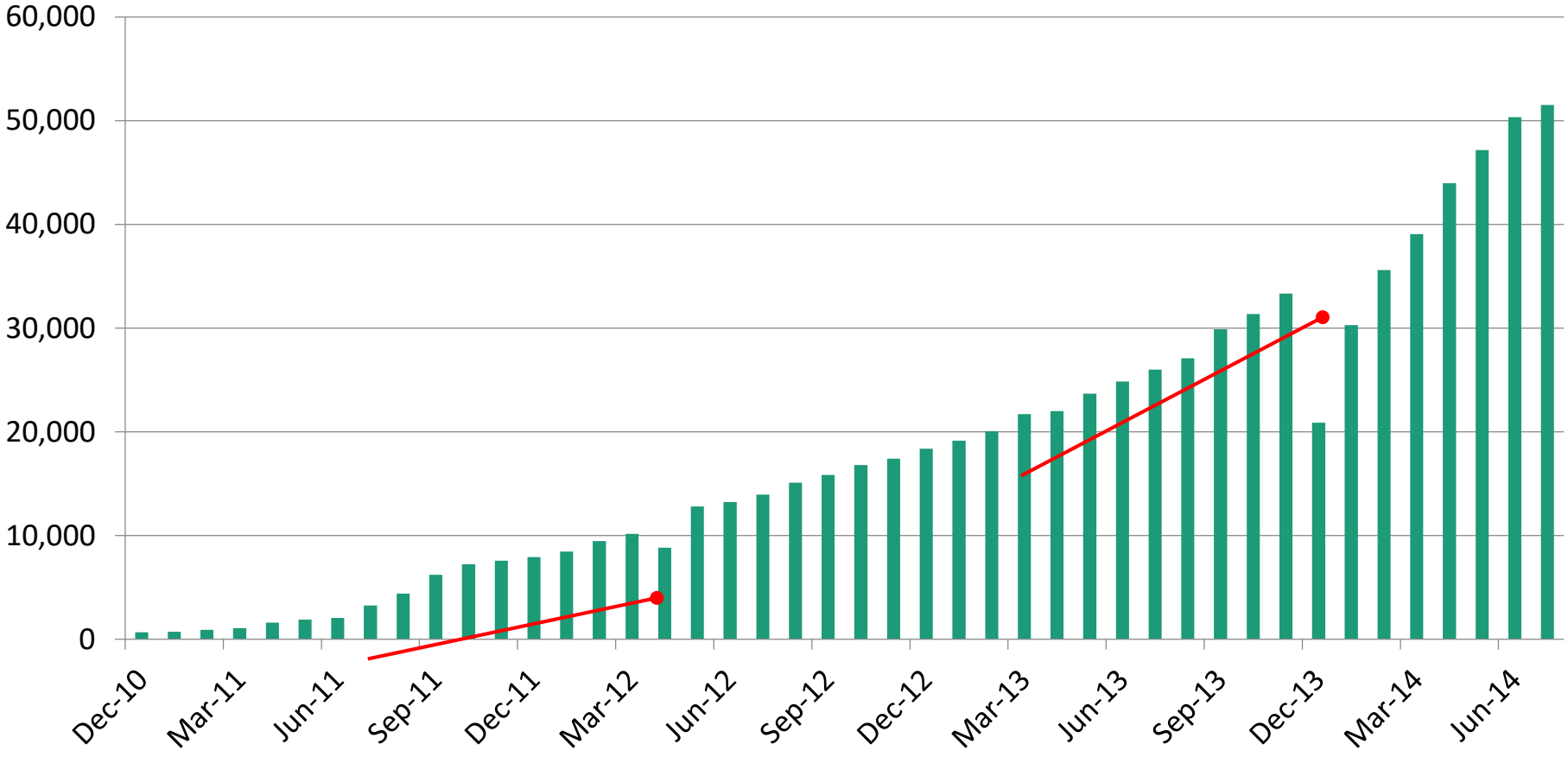
## Process Enhancement

- New Website
- DLC Manufacturer’s Guide

## Etc., Etc.

# QPL Over Time

2014 52,000
2016 196,000
2017 295,000



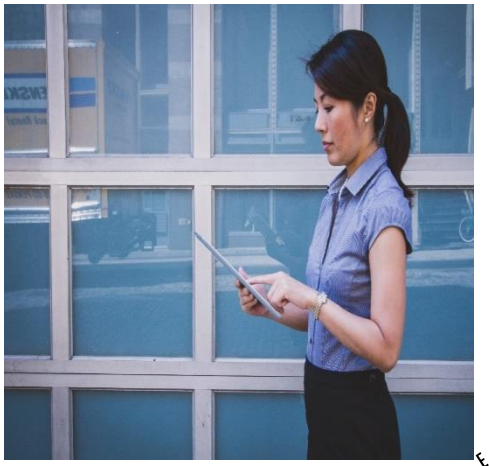
# Updates in the program

- Restructured the Technical Requirements Table
  - Created “Premium Classification” with higher efficacy and durability requirements
  - Combined 37 product application categories into 4 broad categories, subcategorized by 15 general application categories and designated “primary use”
- Implemented DLC Surveillance Testing Policy
  - A process to verify validity of data listed on the DLC QPL
  - Provides transparent, equitable process for manufacturers of qualified products, manufacturers of competing products, and DLC Members to submit challenges to products listed on the QPL

# Current Proposals

Released for comment in Nov;
Comment period ended Jan 20, 2017

1. Technical Requirements Table V4.2
2. Color Tuning Policy
3. DC/Power over Ethernet Policy



# V4.2: T5s, T5HOs, Allowances, HazLoc

**Status**

- Draft Policy issued: Nov 2016
- Commenters call: Jan 20
- Next Steps:
  - Discussion with Technical Committee, early March
  - Adjust proposal with industry input and release final policies, March-April

**Key Issues**

- With new T5 general application, what to do with existing T5s currently listed?
- CCT and CRI allowances: TM-30 requirement controversial; wide range of opinions from industry, will go conservative and adjust in future cycles if necessary
- Hazardous Location: industry concern regarding DLC using “hazardous” descriptor

# Color Tuning

**Status**

- Draft Policy issued: Nov 2016
- Commenters call: Jan 20
- Next Steps:
  - Discussion with Technical Committee, early March
  - Recommendation: rework proposal to accommodate dynamic color tuning, re-release for Stakeholder Input later this year

**Key Issues**

- Proposal for white-white “selectable” tuning is too restrictive, need to evolve to dynamic and RGB tuning
- How much testing to require to capture system performance along tunable range? Are there implications based on control strategies?
- Whether and how to incorporate dimming?

# DC and Power over Ethernet (PoE)

**Status**

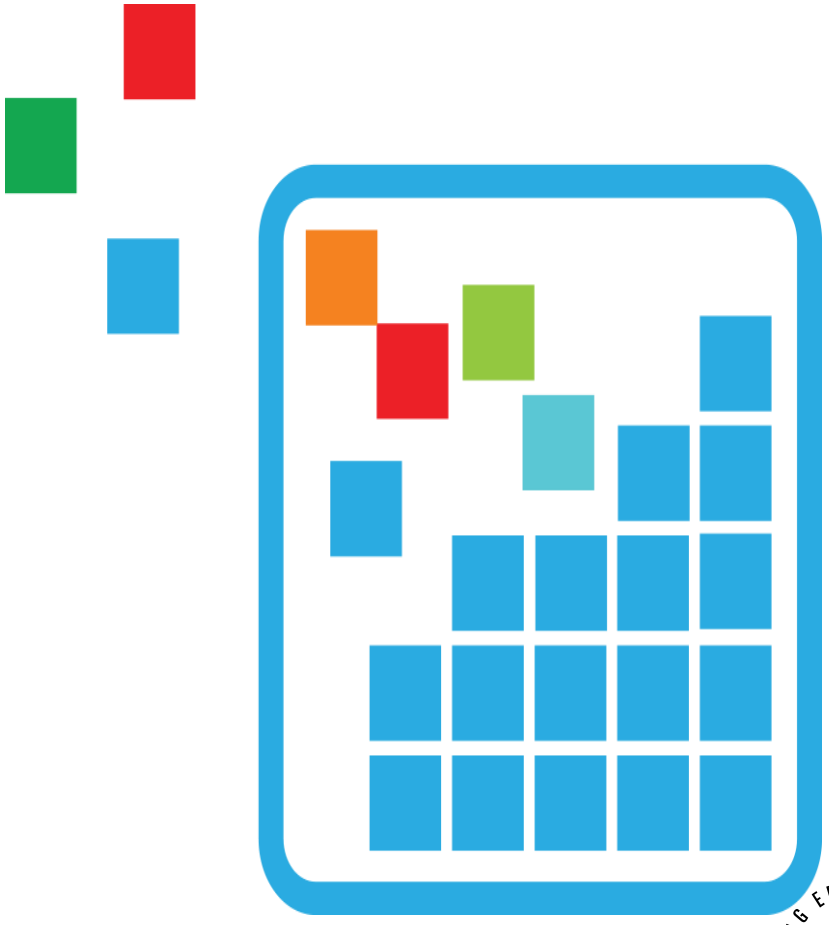
- Draft Policy issued: Nov 2016
- Commenters call: Jan 20
- Next Steps:
  - Discussion with Technical Committee, early March
  - Updated proposal for Stakeholder Input, April

**Key Issues**

- How to account for system efficiency losses, needed by utilities to support technology
- Test Protocol and loading criteria for Power Supplies
- Line loss factors for non-PoE
- DC/PoE luminaires that are not sold with corresponding control system or power supply

# Surveillance Testing

- Surveillance Policy finalized and distributed Dec 2016
- “Targeted random sampling” approach
  - Lowest performing
  - Highest performing
  - Applications issues
  - Stakeholder concern
- First cycle of product selection beginning in March



# The LED Market Explosion

LEDs for general illumination hit the market in 2008

… and quickly became the new NEXT BIG THING!

LED

High Pressure Sodium

Energy efficient, user friendly components , and Control and Connectivity became the lighting industry buzz words – all of which led to…….

# Networked Lighting Controls

# The Networked Lighting Controls Program/Technical Requirements is…..

- The DLC's Networked Lighting Controls (NLC) program
  - a suite of tools and resources to enable widespread adoption of Networked Lighting Controls in commercial buildings
- Networked Lighting Controls Technical Requirements
  - A comprehensive set of requirements including
  - Required parameters
  - Reported parameters
  - Manufacturer two-hour presentation to DLC
  - Interview with customer(s)
- Networked Lighting Controls Qualified Products List
  - A Qualified Products List to compare networked lighting control systems and find systems eligible for utility incentives and rebates.

# Networked Lighting Controls Definitions

- A NLC system is defined as the combination of sensors, network interfaces, and controllers that effect lighting changes to interior luminaires, but does not include the luminaires themselves
- All systems must be fully commercially available and able to be purchased, with complete, final documentation and literature readily available on the manufacturer's website before they can be listed.
- The DLC also requires that a qualified system has been installed and operated successfully in at least one actual field installation before listing on the Qualified Products List.
- The Technical Requirements are specifically for interior control systems for control of interior luminaires

# Networked Lighting Controls Definitions

- "Systems" are listed on the NLC QPL according to the "system" name that the system is marketed under. Variations of system configuration that are marketed under a single name will be treated as a single system for qualification and listing purposes. The QPL will stipulate what configurations or components are required to meet the Technical Requirements.
- Systems that are marketed under a different name using different components by the same manufacturer, even if they share some of the same components, must be qualified and listed separately with a full qualification and fee for each additional system name.
- DC and PoE-based lighting control systems are not eligible to be qualified until Version 2.0 of the Technical Requirements is released on June 1, 2017

# What manufacturers need to review, do, and submit to DLC

- Review Frequently Asked Questions
- Submit General Information
- Submit Required Capabilities
- Submit Reported Capabilities

# FAQs

| | | DLC Networked Lighting Control System Application FAQ v1.01 |
|---|---|---|
| Topic | Question | Answer |
| Required | What system capabilities are required in order for a system to be qualified and listed on the Networked Lighting Control System QPL? | For the system, a few key capabilities are required. These are underlined, and shaded in green, on the "Required Capabilities" worksheet. These key capabilities must be functional in at least one field installation, as documented by either a case study or a customer reference. |
| Required | On the "Required Capabilities" worksheet, what exactly is required, and what is optional? | Answers must be provided to each question in the worksheet. Rows highlighted in green and underlined must contain a positive answer for a product to be qualified and listed on the Networked Lighting Control System QPL. Yellow rows should describe the product, or answer "NA" if Not Applicable. In the yellow rows any answer is acceptable, provided that it fully provides the requested information and matches product documentation and performance. Providing incomplete and/or inaccurate information will delay the qualification process and may result in disqualification if not resolved. |
| Reported | Under "Reported Capabilities" worksheet, what is required, and what is optional? | Answers must be provided to each question in the worksheet. Answers should describe the product, or answer "NA" if Not Applicable. Any answer is acceptable, provided that it fully provides the requested information and matches product documentation and performance. Providing incomplete and/or inaccurate information will delay the qualification process and may result in disqualification if not resolved. |
| General | What is a System? | Systems are defined as the combination of sensors, network interfaces, and controllers that effect changes to interior luminaires. 'Systems' will be listed on the Network Lighting Control Qualified Products List according to the "system" name that the system is marketed under. Variations of system configuration that are marketed under a single name will be treated as a single system for qualification and listing purposes. The Qualified Products List will stipulate what configurations or components are required to meet the specification.<br><br>Systems that are marketed under a different name using different components by the same manufacturer, even if they share some of the same components, must be |

# General Systems Information ≈ 25 questions

| | |
|---|---|
| Name of Control System being submitted: (The primary product and marketing name for the whole system; not detailed names of particular system components) | Yes |
| Scope/Scale of System: | Yes |
| Product Website: | Yes |
| Do all system components have a warranty of 5 years or more? | Yes |
| What is the warranty for the system and/or components of the system? Attach the warranty. | No |
| Is there a technical support phone number for troubleshooting this system? If so, please provide. | Yes |
| If the system is available in some configurations that meet the DLC specification, and other configurations that do not meet the specification, what components or combinations are necessary to meet the specification? | Yes |
| Provide a source where the system is commercially available for purchase. | No |
| If this is a private-label system, provide a copy of your agreement with the Original Equipment Manufacturer. | No |
| If this system is a combination of products from multiple manufacturers, please provide a list of all manufacturers. | |
| Provide any case studies available for this system, with URL if available online. | Yes |
| If no case studies are available, then provide a customer reference (name, phone, email) that DLC may contact. DLC will not share this contact with any other parties. A beta site with a pre-production system is acceptable. DLC wishes to confirm that the system has been installed and operated successfully in at least one actual field installation. **DLC WILL VERIFY THAT EACH OF THE "REQUIRED CAPABILITIES" HAVE BEEN DEMONSTRATED WITH EITHER A CASE STUDY OR A CUSTOMER REFERENCE.** | No |
| System Overview Presentation: As part of the Application Review Process, to help DLC | |

# Current V1.01 Specification Capabilities Areas

| Required Capabilities | Reported Capabilities |
| --- | --- |
| • *Networking*<br>• *Occupancy Sensing*<br>• *Daylight Harvesting*<br>• *High-End Trim*<br>• *Zoning*<br>• *Luminaire and Device Addressability*<br>• *Continuous Dimming*<br>• *5 year warranty*<br>• *Field installation*<br>• *Commercial availability* | • *Type of User Interface*<br>• *Luminaire Level Control (LLC)*<br>• *Integrated Luminaire Level Control (LLCi)*<br>• *Localized Processing / Distributed Intelligence*<br>• *Scheduling*<br>• *Personal Control*<br>• *Load Shedding*<br>• *Plug Load Control*<br>• *Other Building System Integration*<br>• *Energy Monitoring*<br>• *Device Monitoring / Remote Diagnostics* |

# Required Capabilities ≈ 94 Questions

| Question | Brief answer to be publicized |
|---|---|
| Can individual luminaires and control devices exchange digital data with other luminaires and control devices on the system, at the room or space level? Please note that the answer to this question must be "Yes" according to the definition above to qualify. | Yes |
| What are the size limitations of the data communication system, in terms of number of devices? Describe the theoretical maximum, and also the recommended number that can operate without degradation of commissioning or performance. | Maximum 50 devices per gateway; Maximum 500 devices per system; Maximum 350 devices recommended for optimal system performance. |
| What are the size limitations of the data communication system, in terms of distances between wired or wireless nodes? | 100 ft between wireless nodes |
| Is communication within the lighting system wired, wireless, or both? If both, identify what parts use wired and what use wireless. | wired and wireless |
| What standards and/or protocols does the communication comply with? (not including required regulatory communication standards such as FCC and IC). | 3GPP 2015-12, BACnet ISO 16484-5:2014, Bluetooth LE, DALI 2, enOcean ISO/IEC 14543-3-10:2012, KNX ISO/IEC 14543-3, Thread, Wi-Fi 802.11ac, Wi-SUN, Zigbee Light Link 2.0 |
| Are any components of the system certified for compliance with any communication standards or industry specifications (not including required regulatory communication standards)? If yes, which components and which standards/specifications? | All modules, DALI 2 |

## Occupancy Sensing

**The capability to affect the operation of lighting or other equipment b**

| Question | Brief answer to be publicized |
|---|---|
| Does the system have occupancy sensing capability? (Please note that the answer to this question must be yes according to the definition above to qualify.) | Yes |
| Does the system have a vacancy mode option? (manual on, automatic off) | Yes |
| Is automatic-on or vacancy-mode the default setting? How is this setting changed? | Yes |
| What are the mode(s) of detection offered by the system? If more than one mode is used (i.e. "dual technology") | PIR, ultrasonic, microphonic, |

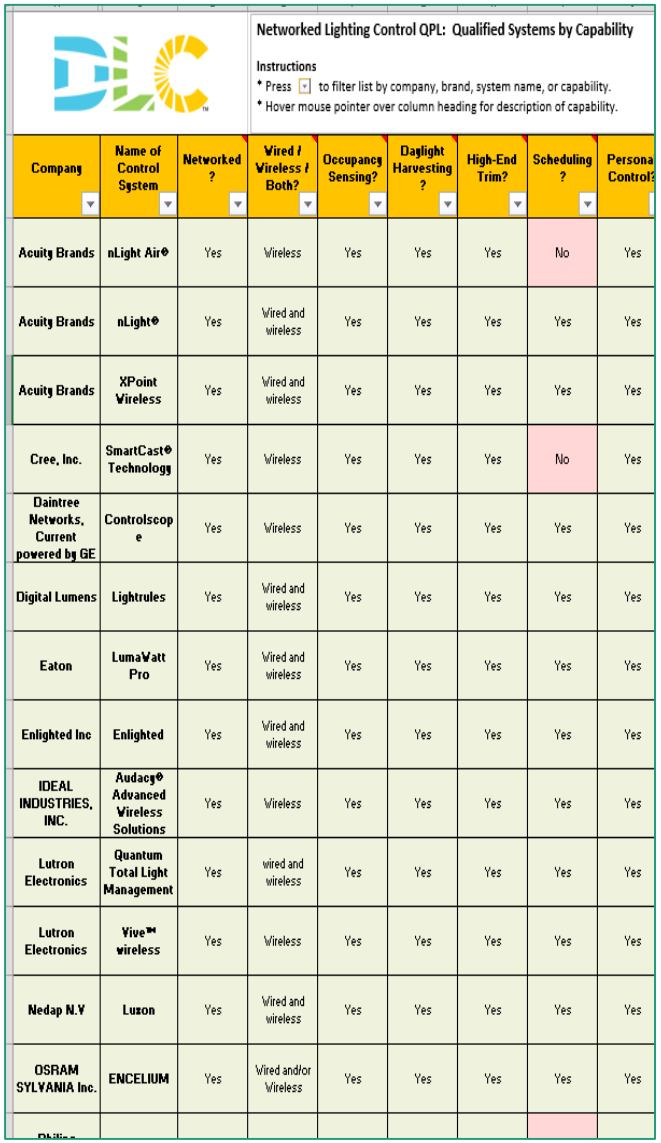
# Reported Capabilities ≈ 50 Questions

**Type of User Interface**

**The type of interface used by the control system for reading and adjusting control sys**

| Question | Brief answer to be publicized | Ok to publicize brief answer? |
|---|---|---|
| Startup/Commissioning: What type(s) of user interface is/are used by the control system to start-up/commission the system? | GUI, Remote Control, DIP switches, etc. | Yes |
| Startup/Commissioning: If GUI, what platform(s) does the interface use? | Android App, IOS App, Web Browser, etc. | Yes |
| Startup/Commissioning: If GUI, does the system have the capability to upload a floorplan? How? Explain. | Yes | Yes |
| Startup/Commissioning: Do the interface(s) utilize two-way communication? (i.e. can it both read settings from the device it is commissioning and adjust settings?) | GUI and Remote Control yes; DIP switches no | Yes |
| Startup/Commissioning: Do the interface(s) have the ability to display | | |

| | | |
|---|---|---|
| Startup/Commissioning: Do the interface(s) have the ability to display existing system settings? What settings? How are they displayed? Explain. | Yes | Yes |
| Ongoing System Configuration: What type of user interface(s) are used by the control system after it has been installed and commissioned to adjust system settings? Explain. | Remote Control | Yes |
| Ongoing System Configuration: If GUI, what platform(s) does the interface use? | NA | Yes |
| Ongoing System Configuration: If GUI, does the system have the capability to modify settings displayed on a floorplan? How? Explain. | No | Yes |
| Ongoing System Configuration: Do the interface(s) have the ability to display existing system settings? What settings? How are they displayed? Explain. | Yes | Yes |
| Ongoing System Configuration: Do the interface(s) utilize two-way communication? (i.e. can it both read | Yes | Yes |



Networked Lighting Control QPL: Qualified Systems by Capability

Instructions
* Press to filter list by company, brand, system name, or capability.
* Hover mouse pointer over column heading for description of capability.

| Company | Name of Control System | Networked ? | Wired / Wireless / Both? | Occupancy Sensing? | Daylight Harvesting ? | High-End Trim? | Scheduling ? | Persona Control? |
|---|---|---|---|---|---|---|---|---|
| Acuity Brands | nLight Air® | Yes | Wireless | Yes | Yes | Yes | No | Yes |
| Acuity Brands | nLight® | Yes | Wired and wireless | Yes | Yes | Yes | Yes | Yes |
| Acuity Brands | XPoint Wireless | Yes | Wired and wireless | Yes | Yes | Yes | Yes | Yes |
| Cree, Inc. | SmartCast® Technology | Yes | Wireless | Yes | Yes | Yes | No | Yes |
| Daintree Networks, Current powered by GE | Controlscope | Yes | Wireless | Yes | Yes | Yes | Yes | Yes |
| Digital Lumens | Lightrules | Yes | Wired and wireless | Yes | Yes | Yes | Yes | Yes |
| Eaton | LumaWatt Pro | Yes | Wired and wireless | Yes | Yes | Yes | Yes | Yes |
| Enlighted Inc | Enlighted | Yes | Wired and wireless | Yes | Yes | Yes | Yes | Yes |
| IDEAL INDUSTRIES, INC. | Audacy® Advanced Wireless Solutions | Yes | Wireless | Yes | Yes | Yes | Yes | Yes |
| Lutron Electronics | Quantum Total Light Management | Yes | wired and wireless | Yes | Yes | Yes | Yes | Yes |
| Lutron Electronics | Vive™ wireless | Yes | Wireless | Yes | Yes | Yes | Yes | Yes |
| Nedap N.V | Luxon | Yes | Wired and wireless | Yes | Yes | Yes | Yes | Yes |
| OSRAM SYLVANIA Inc. | ENCELIUM | Yes | Wired and/or Wireless | Yes | Yes | Yes | Yes | Yes |

# Networked Lighting QPL

- 16 Systems now qualified
  - Acuity nLight Air
  - Acuity nLight
  - Acuity Xpoint Wireless
  - Cree Smartcast
  - Daintree GE Controlstope
  - Digital Lumens Lightrules
  - Eaton LumaWatt Pro
  - Enlighted
  - Ideal Audacy
  - Lutron Quantum
  - Lutron Vive
  - Nedap Luxon
  - OSRAM Encelium
  - Philips SpaceWise
  - Philips EasySense SNS200
  - RAB Lightcloud
- 1 more under review

# Networked Controls Revision Cycle

Specification Revised Annually every June 1

Revision process begins every February to allow time for stakeholder input

*One Year* Grace Period

# Controls Technical Requirements V2.0

**Status**

- 1st Draft Issued February 3
- Comments due March 8
- Review and discuss comments at DLC March Lighting Controls Summit

**Key Changes**

- Expand to Exterior Lighting Controls
- Require Energy Monitoring Capability
- Require Scheduling Capability
- Require Localized Processing / Distributed Intelligence
- Refine reported characteristics to better enable system selection

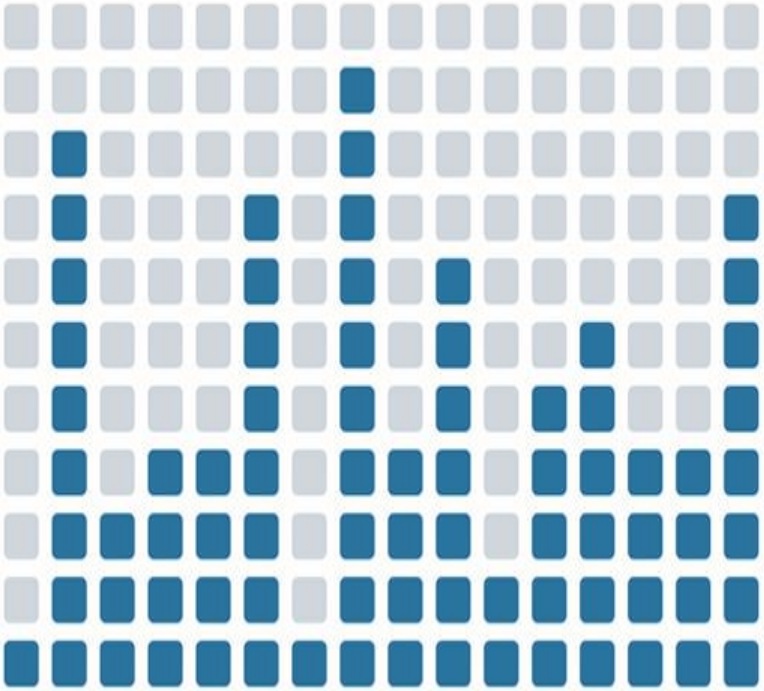
# Data Collection & Analysis Project

- Networked Lighting Controls systems can save **40% or more** of lighting energy use while enabling significant non-energy benefits to customers

- Utilities report that **less than 1%** of commercial lighting projects seen by their programs incorporate networked lighting controls

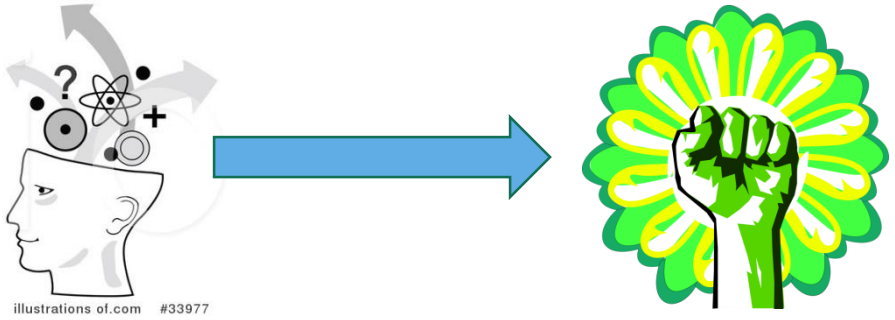
# Data Collection & Analysis Project

- New program offerings
- Establish reliable savings and cost assumptions
- Collects, normalize, and analyze data from available 3rd party studies and from manufacturers of control systems that collect energy data.



# Summary – Looking into the not-so-far future

- With the increasing vertical integration of functions and businesses, I expect that commissioning-only firms will eventually move to design, specify, build and commissioning including lighting, so……
- Since **knowledge** is **power**…..
- **Knowledge** about lighting incentive or rebate programs based on DLC/NLC and embraced by electric utilities is **power** for you and your businesses and will enable you to better serve your clients and customers



For more information regarding the DesignLights Consortium or the Networked Lighting Controls Program see:

https://www.designlights.org/

The DLC® is a non-profit organization whose mission is to drive efficient lighting by defining quality, facilitating thought leadership, and delivering tools and resources to the lighting market through open dialogue and collaboration.

**Sample Last Slide**

This concludes The American Institute of Architects
Continuing Education Systems Course

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