Pathways to Connected Lighting

1 Background information about this project

2 How to navigate and use this guide

3 Findings from the project survey and interviews

4 Evaluating and assessing your program

5 Understanding your goals and objectives

6 Selecting and calling your play(s)

7 Advanced strategies to accelerate your program

8 Additional resources to help execute your play(s)

Best Practices for DLC Member Energy Efficiency Programs

1. ABOUT THE PROJECT

Learn the background on this project, how the research was performed, and who worked on it.

A Background

B Research

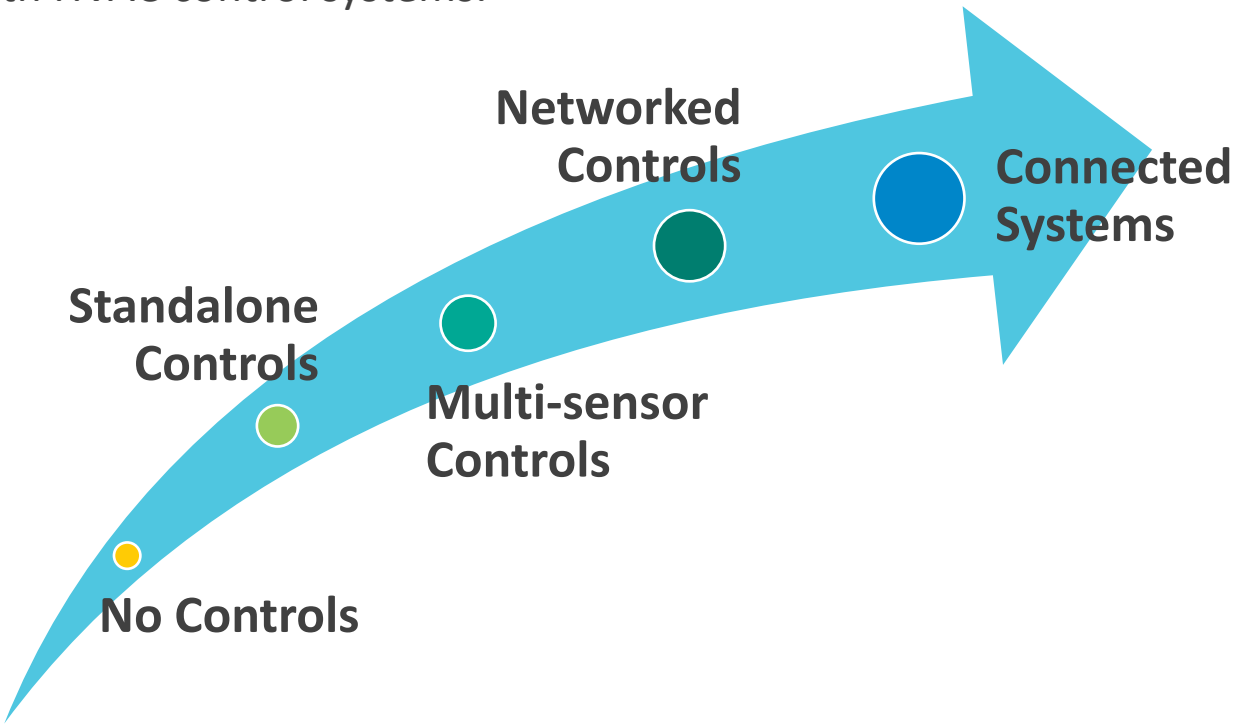
C Authors

1. ABOUT THE PROJECT

1-A. Background

As lighting baselines evolve to LEDs, energy efficiency programs will need to move from offering incentives for simple, uncontrolled LED lighting components to incentives for **connected lighting systems** to keep capturing savings. This project will help DLC members who are not yet focused on connected lighting systems to move in that direction and will help members to be more effective at each step along the path.

This work builds on a previous DLC potential study for networked lighting controls that explored the potential value for DLC members of connected lighting systems and integration with HVAC control systems.

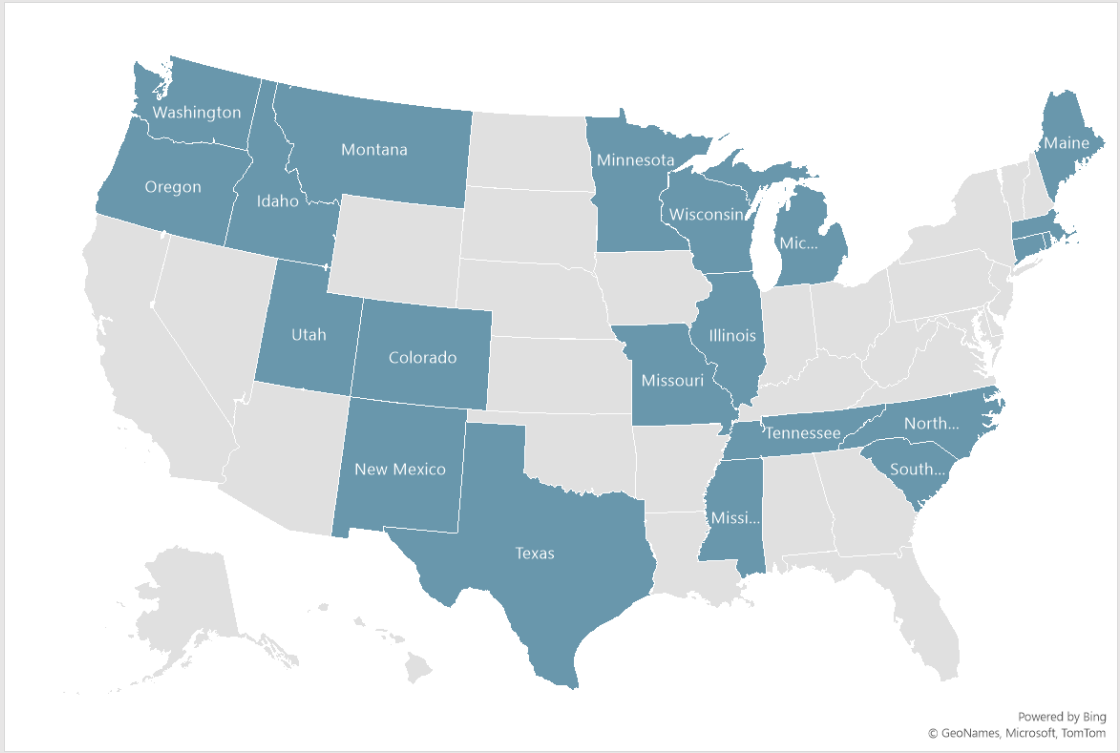


1. ABOUT THE PROJECT

1-B. Research

This work was informed by the input of dozens of lighting program administrators. Information was collected from online surveys and in-depth interviews, to gather information about a variety of program offerings, best practices, and challenges. The participants who provided input represent programs in 21 U.S. states and 4 Canadian provinces.

To view of the findings of the research, visit Section 3.



1. ABOUT THE PROJECT

1-C. Authors

This guide contents were developed by Energy Futures Group and Fernhill Shopworks, on behalf of the DesignLights Consortium for its Members. It is intended to help DLC members who are not yet focused on connected lighting systems to move their programs to include connected lighting systems (LED + NLC) and will help members to be more effective at each step along the path to connected lighting.

In-depth interviews were completed by Fernhill Shopworks.

The interactive guide was designed by Energy Futures Group.

2. HOW TO USE THIS GUIDE

Section 2 will help you navigate and use this guide.

A Navigation

B Definitions

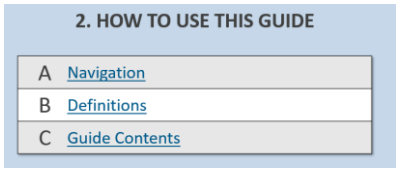
C Guide Contents

D Follow the Pathway to Connected Lighting

2. HOW TO USE THIS GUIDE

2-A. Navigation

This guide is intended to be a visual and interactive tool. While the content can be reviewed sequentially, the design is intended to allow users to “jump” immediately to the desired information. Quickly find what is relevant and most important to you or spend some time exploring and learning.

Start at the visual table of contents	Each section contains its own navigation menu	Use the tabs to jump between sections	Return to the main table of contents via the book icon in the upper right corner
			

(Tip: Note what page you are on in the document before clicking on a link so that you can navigate back to that page after viewing linked content.)

2. HOW TO USE THIS GUIDE

2-B. Definitions

Networked Lighting Control (NLC) refers to lighting systems with bi-directional communication between sensors, network interfaces, and controllers that enable lighting changes in luminaires, retrofit kits, or lamps.

Luminaire level lighting control (LLLC) is a subset of NLC, with sensing for occupancy and daylight on every networked luminaire.

A **connected lighting system** consists of LED luminaires/fixtures combined with a Networked Lighting Control (NLC) system.

Midstream programs provide incentives instantly at the wholesale point of purchase, typically through a participating electrical distributor.

Downstream programs pay incentives to the customer (or the customer's contractor) after completion of a project. Typically, paperwork or an electronic form must be completed and submitted.

Trade Ally Network is a group of contractors, suppliers, or professionals that partner with an energy efficiency program to promote program offers. These networks are typically designed to support and expand the reach of energy-saving initiatives by providing services, products, and expertise to residential, commercial, or industrial customers.

2. HOW TO USE THIS GUIDE

2-C. Guide Contents

Section	Name	Icon	Description
1	About the Project		Learn the background about why this project was completed, how it was performed, and who completed the work.
2	How to Use This Guide		You are here! Section 2 will help you navigate and use this guide.
3	Research Findings		Looking for a specific finding? Data and charts? Section 3 contains everything we learned during this process.
4	Assessing Your Program		It is impossible to chart your course without establishing your current location. Section 4 contains tools to assess your existing program, which will help you identify your needs and priorities.
5	Setting Your Goals		Section 5 helps you define what you want to achieve and determine where you want to go. Selecting your “play(s)” in section 6 will be easier once you establish what you hope to achieve.
6	Playbook		What are your options to improve or expand your lighting control offerings? What is your logical next step? What has worked well elsewhere? Section 6 has the answers.
7	Advanced Strategies		Section 7 expands your playbook by introducing advanced strategies and solutions for connected lighting. The concepts presented here are new or emerging opportunities.
8	Resource Library		Finally, Section 8 provides a library of resources to help get you where you want to go. Learn about existing resources to implement your plan. Model your program after best practices.

2. HOW TO USE THIS GUIDE

2-D. Follow the Pathway to Connected Lighting

3. RESEARCH FINDINGS

Looking for a specific finding? Data and charts? Section 3 contains everything we heard and learned.

A Member Survey – Background

B Member Survey – Responses

C In-Depth Interviews – Background

D In-Depth Interviews – Themes

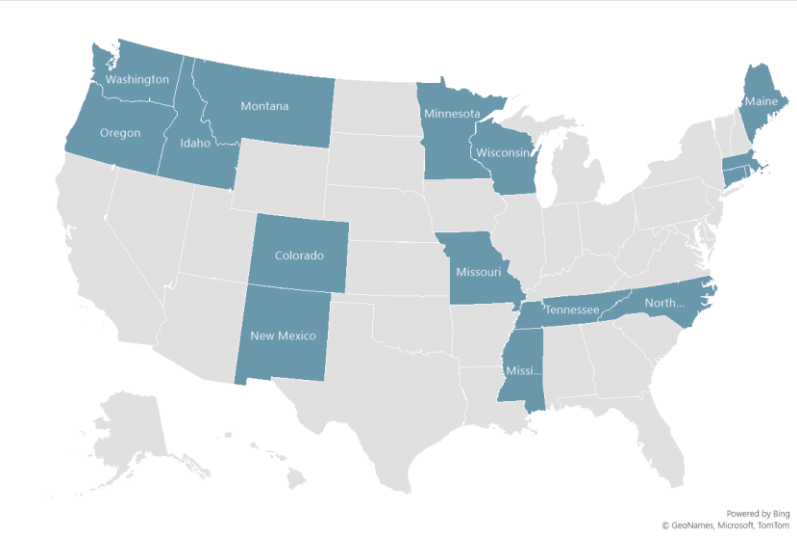
3. RESEARCH FINDINGS

3-A. Member Survey – Background

An online survey of DLC members was completed in May 2024. The survey was intended to directly inform the findings of this project, informed by a variety of DLC members, related to:

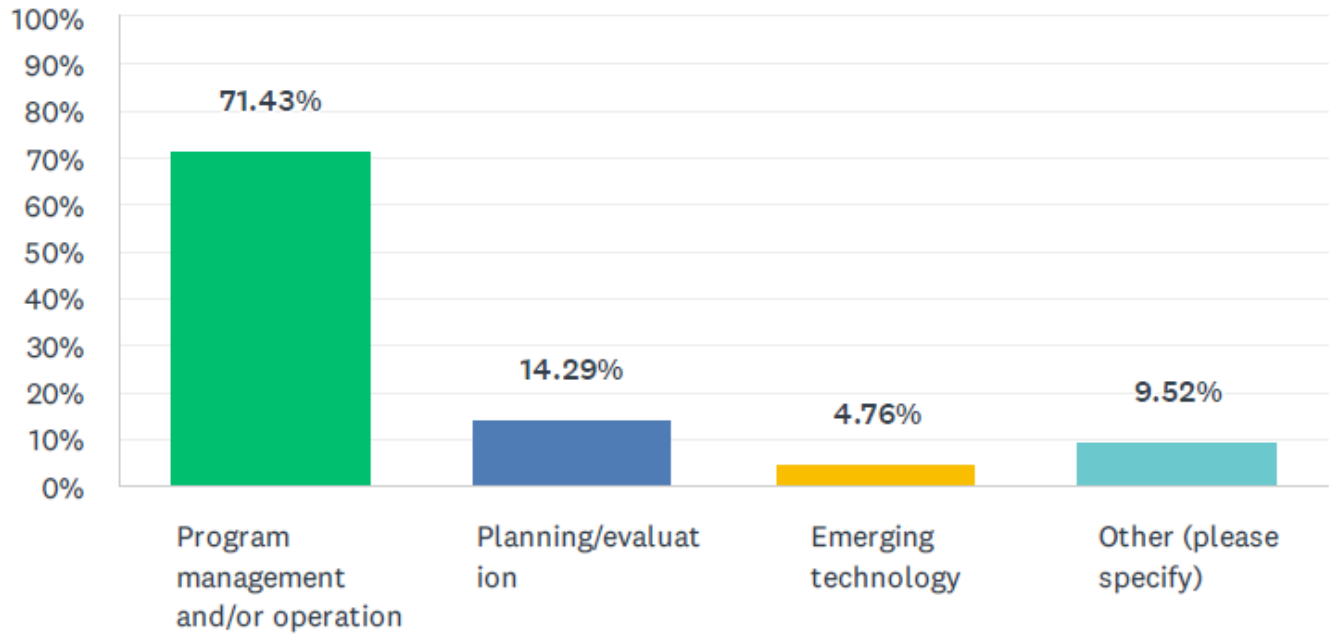
- Mapping energy efficiency lighting programs by tiers;
- Identifying horizons for sunsetting standalone measures; and
- Informing the resources most used (and most needed) by efficiency programs

Twenty-one DLC members responded to the survey, representing programs in sixteen U.S. states and three Canadian provinces as depicted in the maps below. Sixteen of the members are employed directly by a utility or energy efficiency program, while five support programs as an implementation vendor/contractor.



3. RESEARCH FINDINGS

3-B. Member Survey – Responses

Topic	Q5: What is your role within your company?
Responses	
Observations	More than two-thirds of the respondents have a direct role in the management and/or operation of their company's lighting program(s).

3. RESEARCH FINDINGS

3-B. Member Survey – Responses

Topic Q7: Midstream vs. downstream offerings

Responses

	IMPLEMENTED MIDSTREAM	IMPLEMENTED DOWNSTREAM
LED Lamps	47% 7	47% 7
LED Fixtures	31% 5	63% 10
Stand Alone Controls (e.g. occupancy, daylight)	13% 2	60% 9
NLC	25% 3	58% 7
LLLC (if distinct from NLC)	25% 2	63% 5

Results may not add up to 100% since respondents could select just one option, both, or none.

Observations

Controls are much less likely to be implemented in a midstream offering (wholesale point of purchase) compared to a downstream program (prescriptive or custom). Midstream programs can typically reach greater levels of participation.

3. RESEARCH FINDINGS

3-B. Member Survey – Responses

Topic Q7: Deemed vs. calculated incentives

Responses

	DEEMED INCENTIVES (E.G. $/FIXTURE)	CALCULATED INCENTIVES (E.G. $/KWH)
LED Lamps	60% 9	53% 8
LED Fixtures	63% 10	75% 12
Stand Alone Controls (e.g. occupancy, daylight)	67% 10	53% 8
NLC	42% 5	75% 9
LLLC (if distinct from NLC)	63% 5	63% 5

Results may not add up to 100% since respondents could select just one option, both, or none.

Observations

NLC is much more likely to have calculated incentives than deemed (prescriptive) incentives. LLLC, if offered as a distinct measure, has a similar rate of deemed incentives (63%) as standalone controls and LED fixtures. Deemed incentives typically make participation easier and more transparent.

3. RESEARCH FINDINGS

3-B. Member Survey – Responses

Topic Q7: Deemed vs. calculated savings

Responses

	DEEMED SAVINGS (E.G. TRM)	CALCULATED SAVINGS (E.G. CUSTOM)
LED Lamps	40% 6	40% 6
LED Fixtures	56% 9	56% 9
Stand Alone Controls (e.g. occupancy, daylight)	40% 6	53% 8
NLC	42% 5	67% 8
LLLC (if distinct from NLC)	50% 4	75% 6

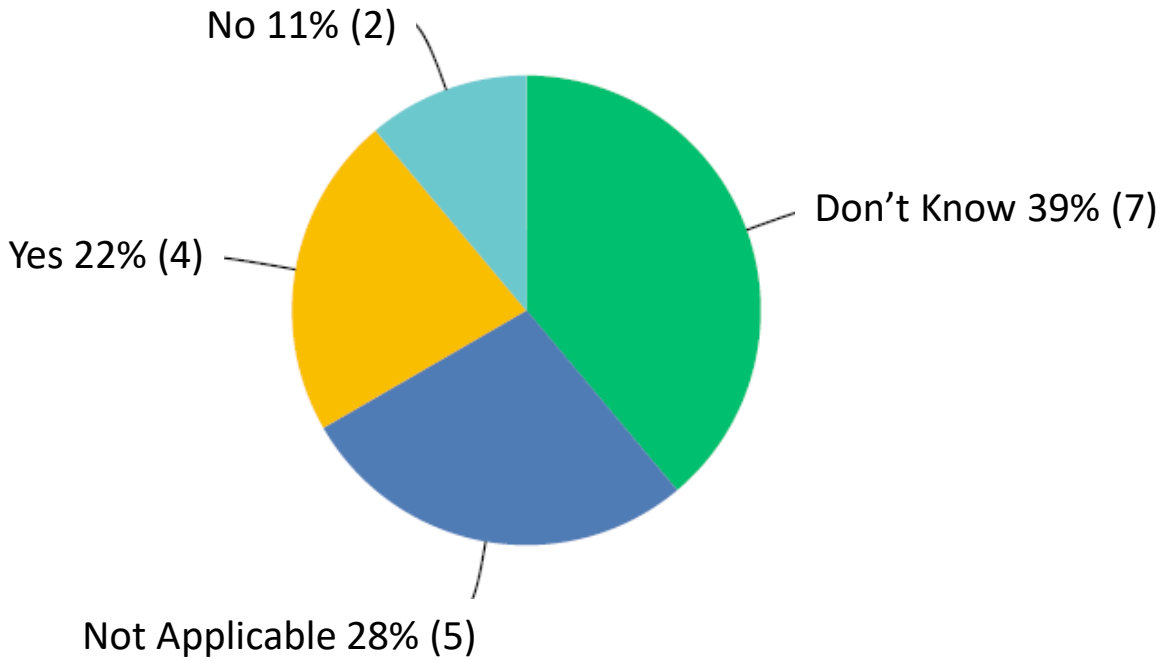
Results may not add up to 100% since respondents could select just one option, both, or none.

Observations

Most programs rely on calculated rather than deemed savings for lamps, fixtures, and controls. A prescriptive program offering can rely on either deemed or calculated savings. For a midstream program, however, deemed savings are required.

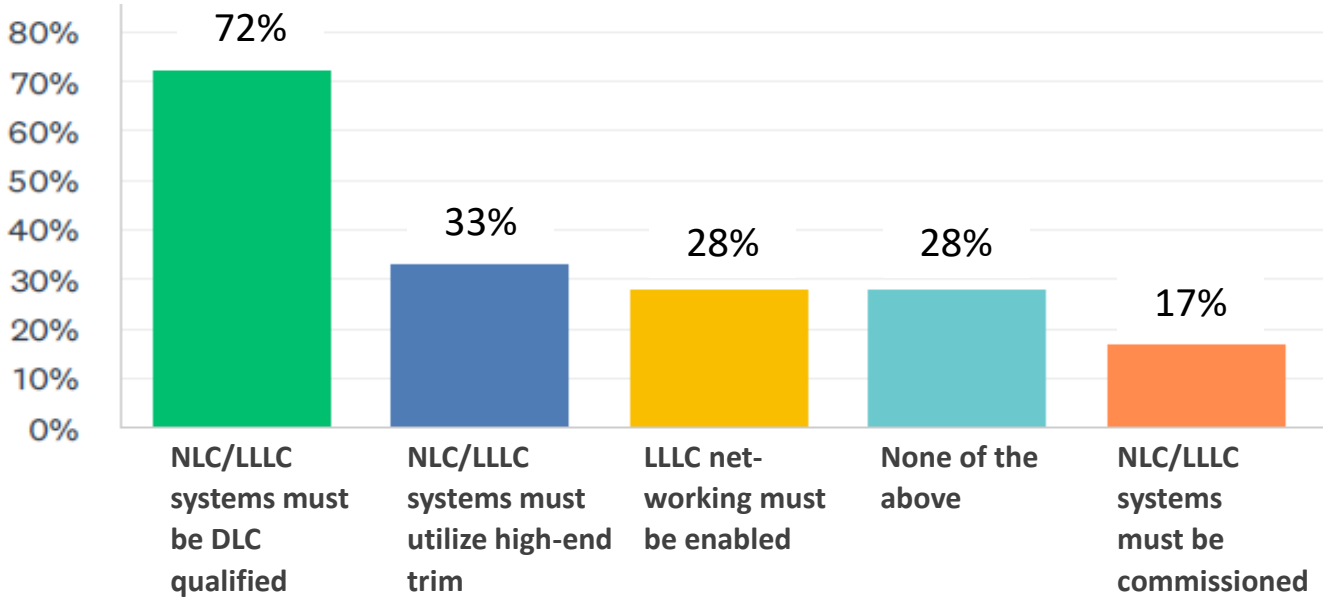
3. RESEARCH FINDINGS

3-B. Member Survey – Responses

Topic	Q8: If you have offerings for stand alone controls, NLC, or LLLC, does your program use Control Savings Fractions/Factors (CSF) to estimate deemed values for lighting controls by space type?
Responses	
Observations	Most programs do not have or use control savings factors, or the respondent is unaware of them. Control savings factors are a key assumption used in deemed savings for control measures offered through prescriptive and midstream programs.

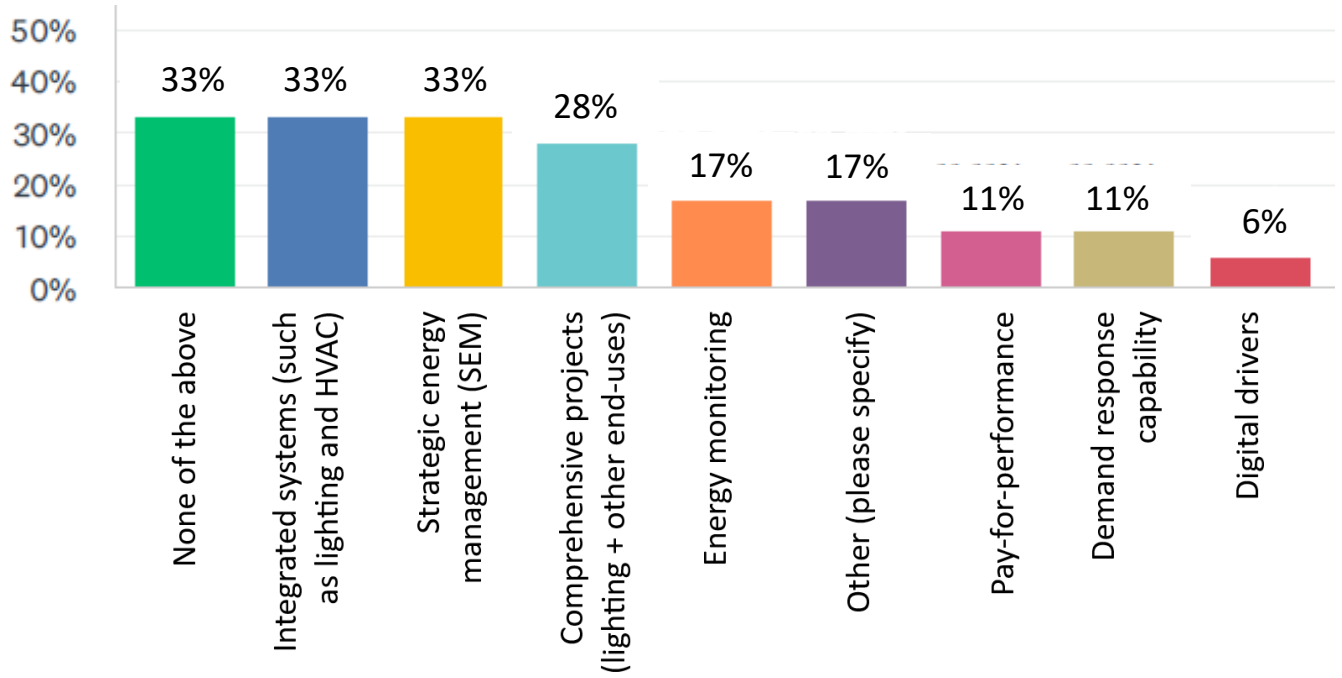
3. RESEARCH FINDINGS

3-B. Member Survey – Responses

Topic	Q9: Does your program require any of the following? (select all that apply)
Responses	
Observations	Nearly three-quarters of programs require NLC and LLLC systems that are listed on the DLC NLC Qualified Products List (QPL). Approximately one-third of respondents indicated that their program requires the use of high-end trim (shown in blue) or networking when LLLC is installed (yellow). Approximately 17% of programs require commissioning.

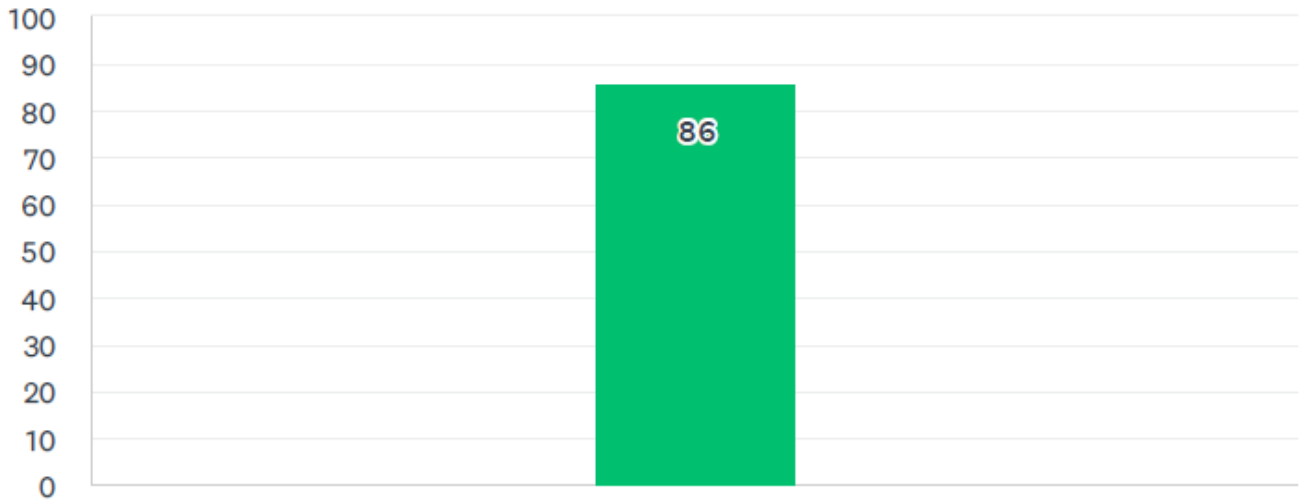
3. RESEARCH FINDINGS

3-B. Member Survey – Responses

Topic	Q10: Does your program offer incentive premiums for any of the following? (select all that apply)
Responses	
Observations	While nearly 70% of programs offer some form of a premium feature incentive, there is little commonality across programs. The most common is integrated systems (33%) and strategic energy management (33%). The full category names for question 10 can be seen in Section 8-H.

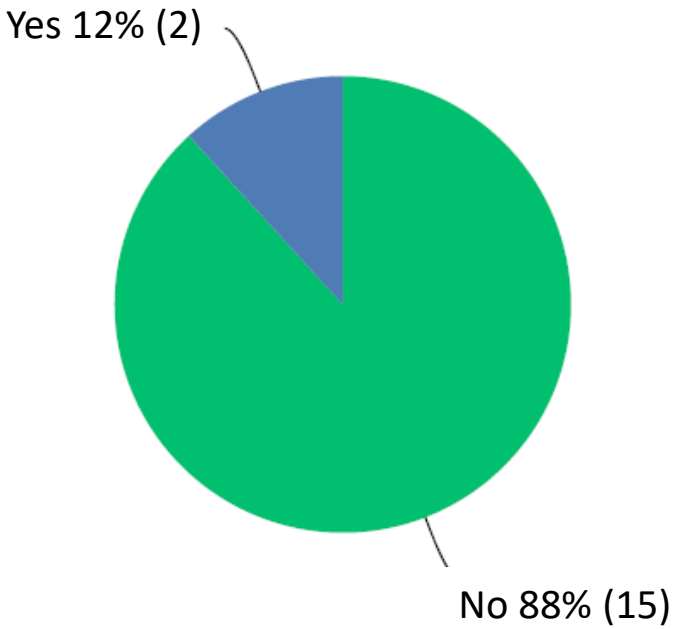
3. RESEARCH FINDINGS

3-B. Member Survey – Responses

Topic	Q11: Approximately what percentage of your lighting program savings come from existing buildings (rather than from new construction)?
Responses	
Observations	The vast majority (86%) of lighting program savings comes from projects at existing buildings.

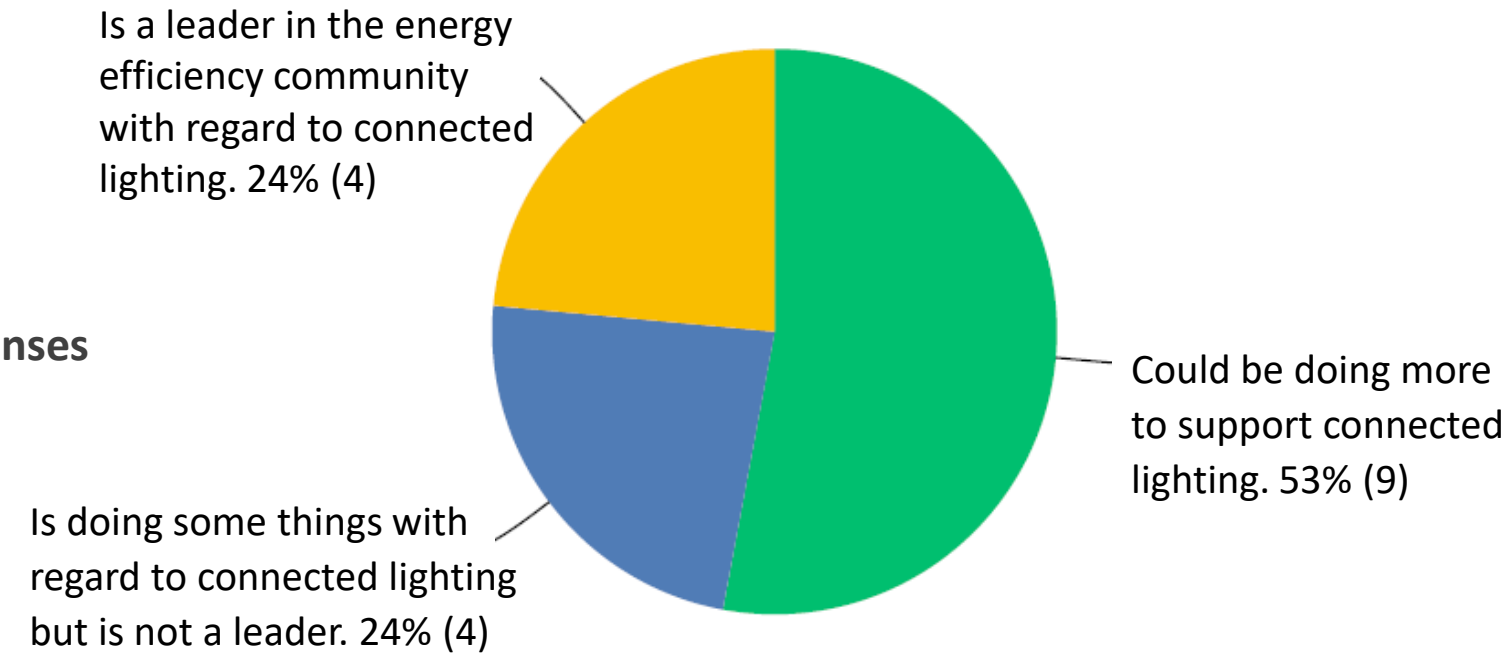
3. RESEARCH FINDINGS

3-B. Member Survey – Responses

Topic	Q12: Are you aware of any projects completed in your service territory that successfully integrated lighting with HVAC or any other building system?
Responses	
Observations	Very few projects have been completed in which lighting was integrated with other building systems.

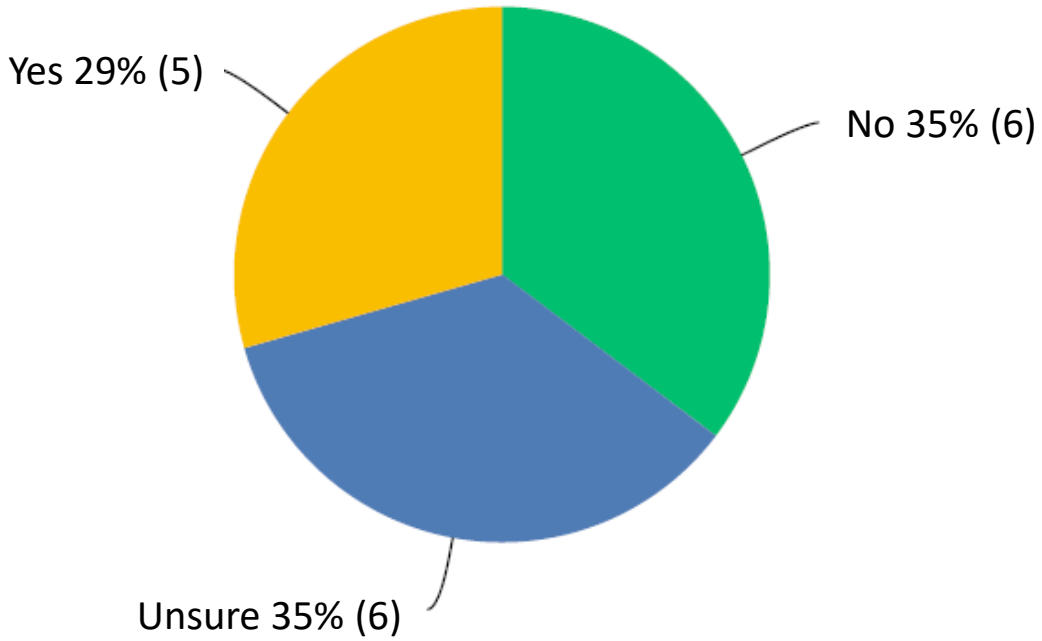
3. RESEARCH FINDINGS

3-B. Member Survey – Responses

Topic	Q13: When it comes to connected lighting controls, I think my program:
Responses	
Observations	Most respondents (53%) felt that their program could be doing more to support connected lighting controls. Approximately one-quarter of programs self identified as a leader when it comes to connected lighting.

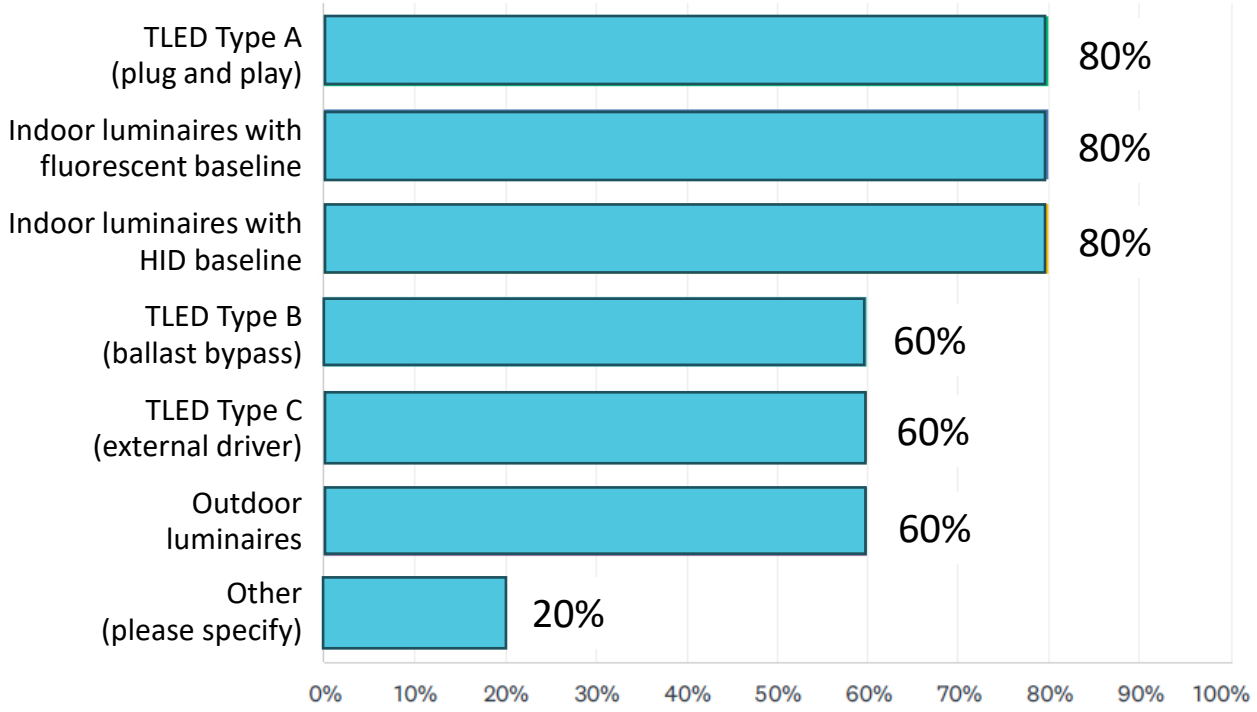
3. RESEARCH FINDINGS

3-B. Member Survey – Responses

Topic	Q14: Are you considering removing or reducing incentives for standalone (uncontrolled) LED measures in the next 12-24 months?
Responses	
Observations	One-third of programs plan to eliminate or reduce LED-only incentives within the next two years.

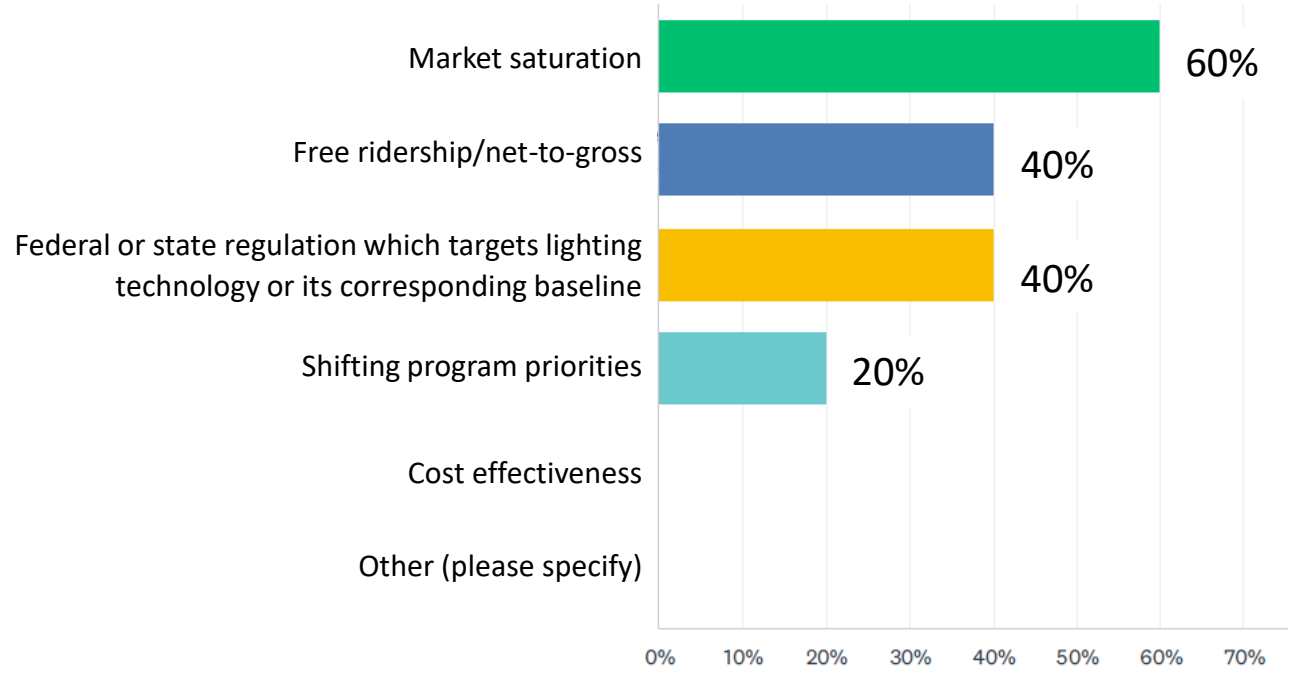
3. RESEARCH FINDINGS

3-B. Member Survey – Responses

Topic	Q15: For which LED measures are you considering removing or reducing incentives for standalone (uncontrolled) LED measures?
Responses	
Observations	TLED Type A, interior luminaires with a fluorescent baseline, and interior luminaires with an HID baseline are the measures most likely to be eliminated or reduced.

3. RESEARCH FINDINGS

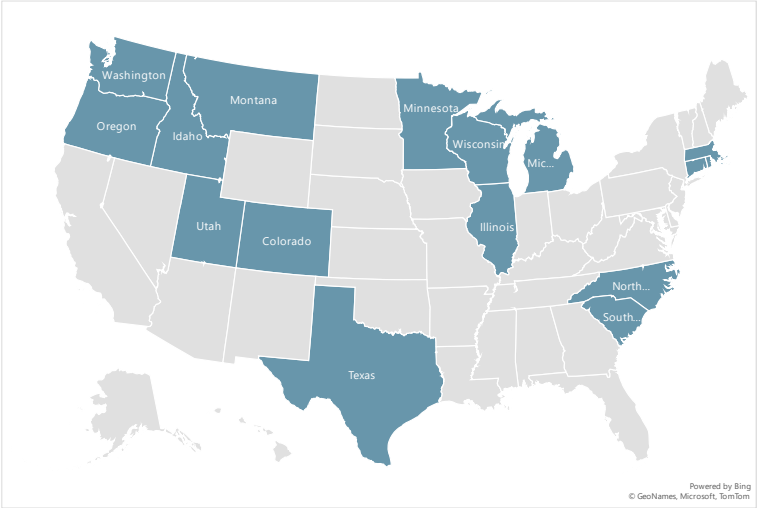
3-B. Member Survey – Responses

Topic	Q16: For which reasons are you are considering removing or reducing incentives for standalone (uncontrolled) LED measures?
Responses	
Observations	Market saturation of LED products is the most common reason for removing or reducing LED incentives. Free ridership, which can be related to market saturation, is next, followed by federal or state regulations. Eight states plus Canada have current or pending laws that prohibit sales of linear fluorescent due to mercury content.

3. RESEARCH FINDINGS

3-C. In-Depth Interviews – Background

Sixteen in-depth interviews were completed in June and July 2024. Interview candidates represented programs from sixteen U.S. states and two Canadian provinces.



Interviewees were asked to:

- Self-identify their program within in a set of performance tiers
- Share pain points and drivers within programs
- Discuss plans related to lighting and controls
- Highlight helpful resources

Key themes are summarized on the next page. The details shared during the interviews helped shaped the Playbook Plays (Section 6), Advanced Strategies (Section 7), and Resources (Section 8).

3. RESEARCH FINDINGS

3-D. In-Depth Interviews – Themes

1. Controlled vs. Connected
   - Efficiency Programs are split on basic definitions, what is achievable, and what matters.
2. Meet the market vs. ideal state for programs:
   - Need for programmatic approach over technical base approach
   - This point was made multiple times in multiple ways
3. Small and medium businesses are key to program success.
4. Lighting is still the top contributor, but programs are shifting resources to diversify savings portfolio and utilities are investing in electrification opportunities.
5. Perception that NLC technology has over-promised and under-delivered.
6. Trade Ally Networks are a critical resource for efficiency programs.
7. Lamp bans are not currently driving overall program direction:
   - Immediate savings targets are the primary driver
   - A stated desire to “serve all markets” is a secondary driver
8. Including prescriptive NLC and LLLC incentives with prescriptive control savings via TRMs is the critical step for connected pathways.
9. There is a role for DLC to promote existing resources, drive alignment around key definitions, and function as an information aggregator promoting TRM’s before developing new resources.

4. ASSESSING YOUR PROGRAM

It is impossible to chart your course without establishing your current location. Section 4 contains tools to assess your existing program, which will help you identify your needs and priorities.

A Program Design Baseline Assessment

B Program Design Performance Tiers

C Baseline Scorecard

D Identifying Program Priorities

4. ASSESSING YOUR PROGRAM

4-A. Program Design Baseline Assessment

The Pathways to Connected Lighting guide includes two methods for efficiency programs to self-assess.

The first method assists with determining how their programs rank across a range of implementation strategies, from basic to more advanced.

- The following table outlines the six program strategies most identified by participants as critical to advancing lighting programs. The program strategies include custom projects, deemed NLC, deemed LLLC, trade ally networks, financial incentives, and mid-stream program delivery.

- Efficiency program performance tiers are ranked from 1 through 4 with practical examples of program milestones provided for each. To self-assess, programs should consider each strategy and determine where their programs fit within the matrix.

- It should be noted that most programs will self-identify in different tiers for different implementation strategies. The goal for this exercise is to identify where opportunity for improvement exists and what activities should be prioritized.

4. ASSESSING YOUR PROGRAM

4-B. Program Design Performance Tiers

Program Strategy	TIER 1	TIER 2	TIER 3	TIER 4
1. Custom Delivery Path	Prescriptive standalone controls **only**	NLC / LLLC projects require custom path	Lighting projects rarely require custom path	
2. Deemed NLC	NA	Prescriptive incentives for NLC		Prescriptive bonus incentives for commissioning or energy monitoring
3. Deemed LLLC	NA	NA	Prescriptive incentives for LLLC	Prescriptive bonus incentives to commission LLLC

Table is continued on the next page

4. ASSESSING YOUR PROGRAM

4-B. Program Design Performance Tiers

Program Strategy	TIER 1	TIER 2	TIER 3	TIER 4
4. Trade Ally Network	- Identify active trade allies - Proactive email outreach re: program updates	- Host at least one annual training event - Expands network to include design allies	- Sponsors multiple workshops annually - Offers on-demand 101 level training for lighting and controls	- Recognizes Trade Ally Network contributions - Host tech-symposium for end-users to build demand - Recognizes and targets top tier performers
5. Financial Incentives	NA	- Temporary incentive bonus - Raise incentive cap	- Project Design/Development Incentive - Incentive for Systems Integration - Demand response enabled	
6. Midstream Delivery Path	NA	Midstream programs for TLEDs & select commodity products	Midstream delivery for multiple lighting measures including standalone controls	Midstream delivery for LLLC only (no standalone)

4. ASSESSING YOUR PROGRAM

4-C. Baseline Scorecard

Once you've reviewed the program design performance tiers matrix, score your program using the table below. For any program strategies that you rank as Tier 1-3, consider using the suggested "plays" to enhance your efforts toward connected lighting. Advanced strategies can be used to complement programs that are already at Tier 4.

Program Strategy	TIER 1	TIER 2	TIER 3	TIER 4	Suggested Plays
1. Custom Delivery Path	☐	☐	☐	☐	6-A: Deemed NLC 6-B: Deemed LLLC
2. Deemed NLC	☐	☐	☐	☐	6-A: Deemed NLC
3. Deemed LLLC	☐	☐	☐	☐	6-B: Deemed LLLC
4. Trade Ally Network	☐	☐	☐	☐	6-C: Outreach Plan 6-D: Workshops / Trainings 6-E: On-Demand Resources 6-F: Building User Demand
5. Financial Incentives	☐	☐	☐	☐	6-G: Project Design/Development Incentives 6-H: System Setup Incentives
6. Midstream Delivery Path	☐	☐	☐	☐	6-I: Midstream LLLC

4. ASSESSING YOUR PROGRAM

4-D. Identifying Program Priorities

The second self-assessment method assists efficiency programs with identifying the organizational drivers that are setting strategic objectives.

- For most organizations there is an ongoing tension between getting the cheapest savings today versus investing in your programs now to acquire the most savings at the best price in the future.
- In lighting controls, this manifests as efficiency programs incentivizing standalone controls now versus designing programs that invest in connected lighting systems which may require systems integration, data reporting, and at least some of interoperability.
- Identifying these drivers is essential as they ultimately need to manifest and align in everything from external communication to program guidelines.

4. ASSESSING YOUR PROGRAM

4-D. Identifying Program Priorities

What does your Program prioritize?

Controlled by Sensors

Connected & Communicating

	"Sensors" Get Savings Today	**"Connected" Invest for the Future**
Focus	Turning the lights on and off and dimming them	Systems talking to systems
Mission	We're saving energy and achieving targets – that's our job…	The research supports massive savings beyond standalone lighting. We will never achieve the potential unless…
Key issue	Getting more sensors into more fixtures is the key	Integrating and connecting systems through standards is the key
Program Position	This is an important part of the market that efficiency programs can influence, and that has an immediate savings impact	Without utilities forcing the standard – none of this integration savings potential will become real

5. SETTING YOUR GOALS

Section 5 will help you determine what you want to achieve and where you want your programs to go. Selecting your play(s) in section 6 will be easier once you establish what you hope to achieve.

A Connected Lighting Goals

B Impact vs. Effort

C Goal/Play Matrix

5. SETTING YOUR GOALS

5-A. Connected Lighting Goals

Setting realistic and achievable goals is an important step on the pathway to connected lighting. To assist you with your goal-setting process, first evaluate your program's unique needs and priorities using the self-assessment process. Then, consider which of the three categories below are most important for you and your program. Some programs may choose to pursue goals in more than one category.

Improve Program Design to Increase Participation

- Make it easier to access NLC/LLLC incentives
- Create multiple channels for NLC/LLLC incentives
- Offer incentives to encourage more comprehensive projects

Maximize Savings

- Increase the number of projects using/installing NLC/LLLC
- Encourage setup/commissioning on NLC/LLLC projects
- Engage more trade allies

Transform the Market

- Evolve programs so that connected lighting is the central focus
- Increase trade ally knowledge and awareness
- Test new/emerging technologies and approaches

5. SETTING YOUR GOALS

5-A. Connected Lighting Goals

Next, define your goals within each category as relevant for your program. Several example goals have been included below to help you get started.

Improve Program Design to Increase Participation

1. Include a deemed NLC and/or LLLC measure in the TRM.
2. Add LLLC to the midstream program.
3. Create an offer for project development incentive (PDI) or lighting designer incentive (LDI).

Maximize Savings

1. Increase total savings from C&I lighting controls by X kWh.
2. At least X% of projects include NLC/LLLC.
3. At least X% of projects verify completion of a setup/commissioning process.

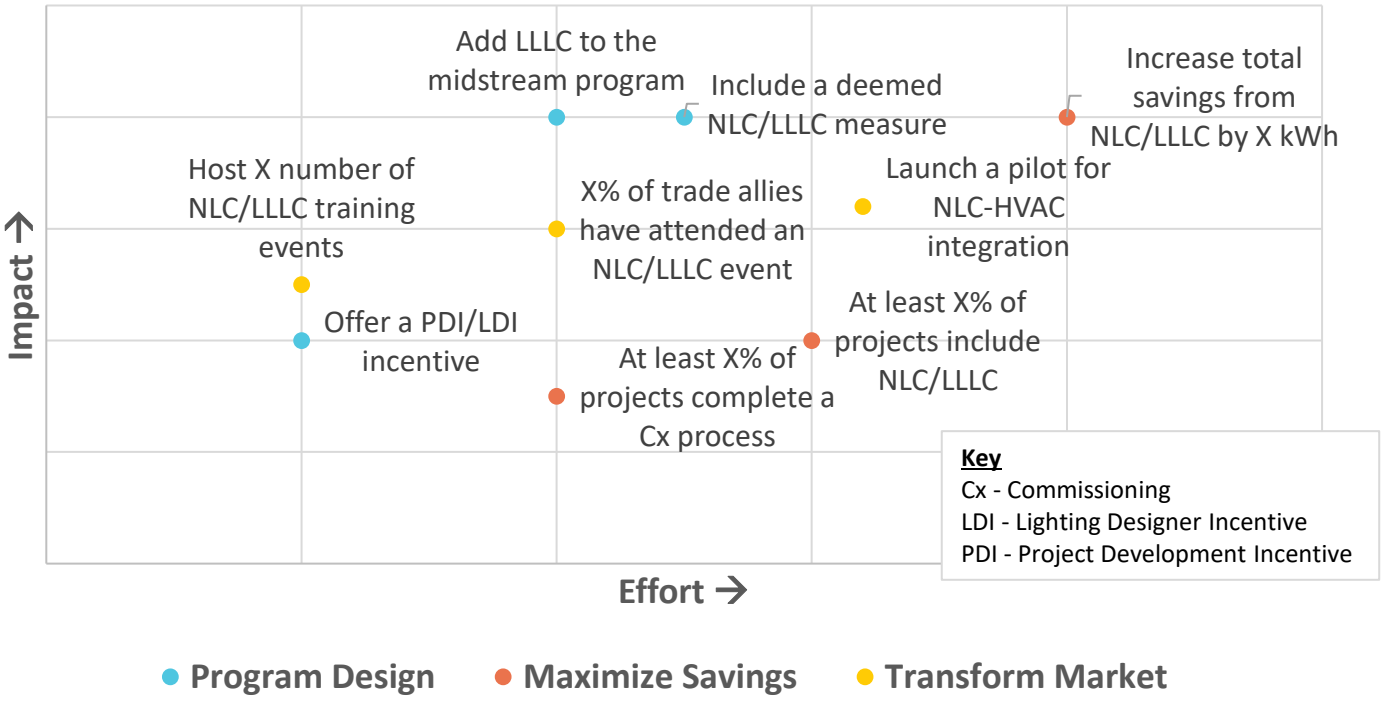
Transform the Market

1. Host X number of NLC/LLLC training events.
2. X% of participating trade allies have attended an NLC/LLLC training event.
3. Launch a pilot for an emerging strategy, such as NLC-HVAC integration.

5. SETTING YOUR GOALS

5-B. Impact vs. Effort

Once you set your goals, evaluating them for impact vs. effort can help you prioritize and plan. This process will be unique to each program. For example, if you already have a midstream program and a deemed LLLC measure, adding LLLC to midstream is relatively low effort. Conversely, if your program doesn't have a midstream offering, creating an LLLC midstream offer requires a high level of effort.



This chart represents an example of what the exercise results might look like, for one program. Think about the potential goals that you're considering, and plot them on your own chart, in terms of effort and impact for your program.

5. SETTING YOUR GOALS

5-C. Goal/Play Matrix

Finally, link your goals to one or more of the "plays" outlined in this playbook. The matrix below shows this linkage for the example goals. The associated plays become your action plan to achieve your goals.

If this is your goal ↓	Consider these plays →	6-A Deemed NLC	6-B Deemed LLLC	6-C Trade Ally Outreach	6-D Trade Ally Workshops	6-E On-Demand Training	6-F Building Demand	6-G PD/LD Incentives	6-H System Setup	6-I Midstream LLLC	7-A-D Advanced
Include a deemed NLC and/or LLLC measure in the TRM		✓	✓								
Add LLLC to the midstream program			✓	✓						✓	
Create an offer for project development or lighting designer incentives				✓				✓			
Increase total savings from C&I lighting controls by X kWh		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
At least X% of projects include NLC/LLLC		✓	✓	✓				✓		✓	
At least X% of projects complete a setup/commissioning process				✓					✓		
Host X number of NLC/LLLC training events				✓	✓		✓				
X% of participating trade allies have attended an NLC/LLLC training event				✓	✓	✓	✓				
Launch a pilot for an emerging strategy, such as NLC-HVAC integration				✓	✓						✓

6. PLAYBOOK

What are your options to improve or expand your lighting control offerings? What is your logical next step? What has worked well elsewhere? Section 6 has the answers.

A Measure Development – Deemed NLC

B Measure Development – Deemed LLLC

C Trade Ally Network – Outreach Plan

D Trade Ally Network – Workshops / Trainings

E Trade Ally Network – On-Demand Resources

F Trade Ally Network – Building User Demand

G Project Design/Development Incentives

H System Setup Incentives

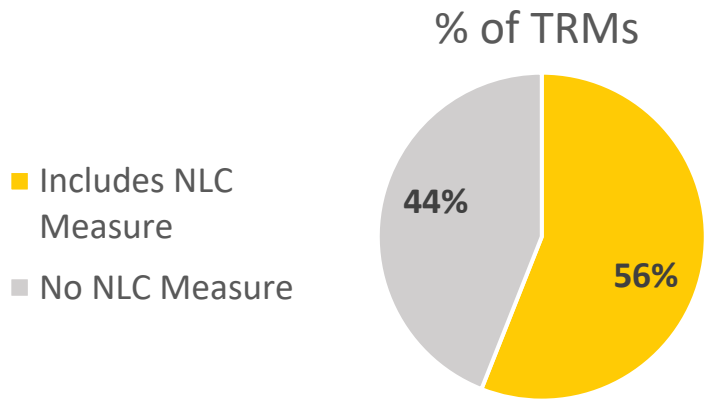
I Midstream LLLC

6. PLAYBOOK

6-A. Measure Development – Deemed NLC

WHAT & WHY:

- Providing deemed incentives for Networked Lighting Controls is a critical first step for any program seeking to increase lighting savings both today and tomorrow.
- Deemed measures benefit programs and projects alike by managing savings risk and providing confidence in incentive levels and customer paybacks.
- Without deemed measures, NLC savings estimates and incentives must follow the custom project path which is typically a more expensive and resource intensive way of implementing projects.
- A 2024 DLC review of 36 state/provincial technical reference manuals found that only 56% include a deemed NLC measure.



6. PLAYBOOK

6-A. Measure Development – Deemed NLC

THE PLAY: Incorporate Deemed Savings Measures for NLC

Programs that do not have deemed measures for NLC should consider the following:

- Adopt the DLC's definition of NLC as a starting place for program language and measure development.
- Leverage publicly available Technical Reference Manuals (TRMs) or equivalent guiding documents from states or regions that share similarities with your program service territory to fast-track NLC measure development.
- Hedge risk factors and increase savings confidence by arriving at prescriptive savings values for NLC systems installed in different building types.
- Incorporate new deemed NLC measures in program lighting calculators and workbooks.

6. PLAYBOOK

6-A. Measure Development – Deemed NLC

DOs and DON'Ts:

When developing deemed NLC measures, programs should consider the following:

DO

- Leverage the DLC's existing definitions for NLC.
- Reference existing TRMs that have been updated within the last two years.
- Established deemed savings values for NLC systems by building type, rather than an all-building average.
- Consider requiring a Sequence of Operations as part of the requirement for project documentation.
- Consider requiring at least two control methods be configured for incentive eligible fixtures.
- Consider screen shots of system configuration as practical project documentation.

DON'T

- Require data reporting for typical NLC projects, as this can inhibit participation.
- Reference TRMs that are more than three years old.
- Require NLC projects be wireless, but rather accept both wired and wireless solutions.

6. PLAYBOOK

6-A. Measure Development – Deemed NLC

RESOURCES:

When developing deemed NLC measures, efficiency programs should leverage the following resources:

- Resource Library (section 8-B): Existing TRMs with deemed NLC measures
- DLC-NEEA Study: Energy Savings from Networked Lighting Control (NLC) Systems with and without LLLC

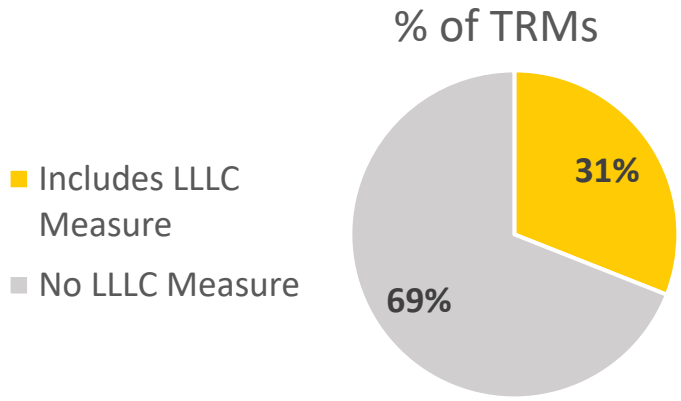
For information about lighting Sequence of Operations, see ANSI/IES LP-16-22

6. PLAYBOOK

6-B. Measure Development – Deemed LLLC

WHAT & WHY:

- Luminaire Level Lighting Controls are a distinct subset of NLC and are defined by the DLC and other industry organizations.
- Providing deemed and distinct incentives for Luminaire Level Lighting Controls (LLLC) is a critical step for programs seeking to increase lighting savings both today and tomorrow.
- Research and program evaluations have shown increased savings for LLLC systems over conventional NLC systems.
- Deemed measures benefit programs and projects alike by managing savings risk and providing confidence in incentive levels and customer paybacks. Deemed measures for LLLC systems reward projects that save more energy while streamlining project implementation.
- A 2024 DLC review of 36 state/provincial technical reference manuals found that only 31% include a deemed and distinct LLLC measure.



6. PLAYBOOK

6-B. Measure Development – Deemed LLLC

THE PLAY: Incorporate Deemed Savings Measures for LLLC

Efficiency programs that do not have distinct and deemed measures for LLLC should consider the following:

- Adopt the DLC's definition of LLLC as a starting place for program language and measure development to provide consistency in language.
- Leverage publicly available Technical Reference Manuals (TRMs) or equivalent guiding documents from states or regions that share similarities with your program service territory to fast-track LLLC measure development.
- Hedge risk factors and increase savings confidence by arriving at prescriptive savings values for LLLC systems installed in different building types.
- Incorporate new deemed LLLC measures in program lighting calculators and workbooks.

6-B. Measure Development – Deemed LLLC

DOs and DON'Ts:

When developing deemed LLLC measures, programs should consider the following:

DO

- Leverage the DLC's existing definitions for LLLC.
- Reference existing TRMs that have been updated within the last two years.
- Established deemed savings values for NLC systems by building type, rather than an all-building average.
- Consider requiring a Sequence of Operations as part of the project documentation.
- Consider requiring at least two configured control methods for incentive eligibility.
- Consider screen shots of system configuration as practical project documentation.
- Offer specific guidance on non-networked LLLC systems and their incentive eligibility.

DON'T

- Require system capabilities that require a network gateway *(ex. certain types of scheduling or remote access).*
- Require data reporting for typical LLLC projects.
- Reference TRMs that are more than three years old.

6-B. Measure Development – Deemed LLLC

RESOURCES:

When developing deemed LLLC measures, efficiency programs should consider the following resources:

- DLC Member Resource: Existing TRMs with deemed LLLC measures
- DLC-NEEA: Energy Savings from Networked Lighting Control (NLC) Systems with and without LLLC
- NEEA: 2022 LLLC Incremental Cost Study
- NEEA: LLLC Replacement vs. Redesign Comparison Study

For information about lighting Sequence of Operations, see ANSI/IES LP-16-22

6. PLAYBOOK

6-C. Trade Ally Network – Outreach Plan

WHAT & WHY:

- Developing and sustaining communication with local trade ally networks was widely cited as the most important thing an efficiency program can do to increase savings today and ensure savings tomorrow.
- In the most traditional sense, trade ally networks consist of electrical contractors, distributors and manufacturer's rep. agencies who work directly with programs to implement EE lighting programs.
- The phrase "Design Ally" is often used when talking about lighting designers, architects, and electrical engineers who specify products for larger or new construction projects.
- For most programs, the phrase "Trade Ally" covers the full spectrum of program partners including trade allies, design allies, and even facility operators.
- Developing a trade ally communication plan is an effective way for efficiency programs to share program updates, build awareness for training events, and as a means of initiating the feedback cycle.

6-C. Trade Ally Network – Outreach Plan

THE PLAY: Initiate a Proactive Outreach Plan to engage Trade Allies

Efficiency programs that do not have a proactive outreach plan for communicating with trade allies should prioritize this effort. A proactive Trade Ally Network outreach plan should include the following:

- Identify all trade allies who have participated in projects within the last three years and organize their information in a format that can be filtered and searched like the example provided below.
- Develop an annual communications plan that targets trade allies on regular intervals like once quarterly or every other month.
- Use the Trade Ally database to promote relevant events like Trade Ally workshops and webinars.
- Provide participation benefits such as directory listing, preferred communication channels, access to financing, co-op marketing/advertising opportunities.

Name	Organization	Industry	Category	Email
Max Sparks	Star Electric	Lighting	Contractor	MS@acme.com
Sally Ground	Light Sales USA	Lighting	Distributor	SG@acme.com
Jesse Fix	First Choice Hospital	End-use customer	Facility Operator	JF@acme.com
Raphael Cool	Heat n' Cool	HVAC	Contractor	RC@acme.com

6-C. Trade Ally Network – Outreach Plan

☑ DOs and DON'Ts:

When developing a trade ally outreach plan, programs should consider the following:

DO

- Expand the networks to include design allies, facility operators, and even trade professionals outside just lighting.
- Include sign-in sheets at events to identify new trade allies to the communication database.
- Include a "sign-up here" link in trade ally E-newsletters to help identify new trade allies.
- Be mindful of communication frequency and content brevity to prevent outreach fatigue.
- Consider leveraging an email service that is capable of:
  - Sending emails from a trusted program email account.
  - Providing anonymity for all contacts.
  - Allowing recipients to *opt out* or unsubscribe from further communications.

6-C. Trade Ally Network – Outreach Plan

RESOURCES:

When developing a trade ally network communication plan, efficiency programs should leverage the following trade ally network examples:

- Bonneville Power Administration: Trade Ally Field Guide
- Consumers Energy (MI): Preferred Trade Allies and Distributors
- Efficiency Vermont: Efficiency Excellence Network
- Energy Trust of Oregon: Trade Ally Network
- Focus on Energy (WI): Focus on Trade Allies

6. PLAYBOOK

6-D. Trade Ally Network – Workshops / Training

WHAT & WHY:

- Developing the skills, knowledge, and abilities of trade allies is critical to getting connected lighting systems specified and installed properly.
- Without repeat exposure to new technologies, and best practice resource guides to support them, trade allies are likely to keep installing what they know and are comfortable with. For most trade allies, that means stand-alone controls and a code-minimum approach to project compliance.
- When efficiency programs host trade ally workshops, they create a neutral platform that invites in multiple vendors and the opportunity for working professionals to participate directly in continuing education.
- Trade ally workshops are also a great way to share program updates, highlight program successes, expand the network, and to receive feedback.

6. PLAYBOOK

6-D. Trade Ally Network – Workshops / Training

THE PLAY: Offer In-person Workshops and Training Events

Efficiency programs should commit to hosting a series of recurring lighting workshops for trade allies which include the following:

- Given a program's service territory, consider multiple events or a workshop roadshow that seeks to meet trade allies closer to where they are.
- Consider inviting manufacturer's reps and distributors to participate in the workshops. When space permits, consider providing a table allowing them to feature relevant technologies. Including industry partners in this way legitimizes the events with contractors and designers.
- Promote hands-on learning opportunities so participants can experience the technologies and try to minimize PowerPoint as a means of professional education.
- Offer a diverse range of topics throughout the year covering technology, sales strategies, best practices, and program participation.

6-D. Trade Ally Network – Workshops / Training

☑ **DOs and DON'Ts:**

When planning a trade ally workshop series, programs should consider the following:

DO

- Conduct outreach to a full spectrum audience of trade allies including facility operators and design allies.
- Schedule the event around *contractor availability* which means an early start and early release. Partial day events, such as 8:30am to 2:30pm, have proven to be an effective format.
- Provide breakfast and/or light refreshments to registered participants.
- Make the workshop free to attend but consider including a "valued at" figure on the workshop flyer (it is important to remind participants that there is a real value associated with it).
- Use the opportunity with trade allies to introduce the face of efficiency programs and highlight how feedback and routine program communication is handled.

DON'T

- Feature a single brand / controls system at Trade Ally workshops
- Schedule full day or multi-day Trade Ally workshops

6-D. Trade Ally Network – Workshops / Training

RESOURCES:

Efficiency programs seeking to develop and deliver a trade ally workshop series should leverage the following resources:

- Bonneville Power Administration: Trade Ally Field Guide
- Fernhill Shopworks: Hands-on NLC & LLLC Demo Boards
- Steve Mesh: Lighting Education & Design

6-D. Trade Ally Network – Workshops / Training

RESOURCES:

Example of Workshop Agenda

LLLC Workshop Agenda | For Trade Allies & Facilities Professionals			
Time	**Min.**	**Activity**	
8:30 – 9:00	30	Doors Open & Welcome	
9:00 – 9:30	30	Workshop goals & activity introduction + utility program information	
9:30 – 10:30	60	LLLC Fundamentals	
10:30 – 11:00	30	System 1 Activity	(break into 4 groups)
11:00 – 11:15	15	Break and Networking	
11:15 – 11:45	30	System 2 Activity	(rotate groups)
11:45 – 12:15	30	System 3 Activity	(rotate groups)
12:15 – 12:30	15	Prep for Lunch	
12:30 – 1:00	30	Selling LLLC	
1:00 – 1:30	30	System 4 Activity	(rotate groups)
1:30 – 2:00	30	Next Steps and Resources	
2:00 – 2:30	30	Discussion + Q&A	(Optional)

6. PLAYBOOK

6-E. Trade Ally Network – On-Demand Resources

WHAT & WHY:

- In-person workshops and training events are a great way to build skills and create program awareness but are commonly limited to only a few events per year.
- To meet trade allies where they are at, and when they are ready, it is wise for programs to invest in on-demand training and resources that help fill the gaps between in-person events.
- On-demand training can provide education on foundational concepts that support and enhance in-person workshops.

6-E. Trade Ally Network – On-Demand Resources

THE PLAY: Offer On-Demand Training

- Efficiency programs should consider leveraging on-demand training and trade ally certification tools available on the market.
- Offering a program-specific version of on-demand training and trade ally certification accomplishes the following:
  - Provides basic lighting controls education so in-person workshops can focus on specific skills.
  - Creates stratification within the trade ally ranks by establishing course-certified personnel.
  - Promotes existing resources so efficiency programs can realize value from them.

6-E. Trade Ally Network – On-Demand Resources

☑ DOs and DON'Ts:

When offering Trade Ally on-demand resources, programs should consider the following:

DO

- Consider on-demand training opportunities.
- Consider making program requirements and incentives a part of the offering.
- Allow trade allies who complete the course to add their certification to business cards and sales proposals.
- Be mindful of how the procurement of a 3rd party service will integrate with your existing web page and marketing guidelines.
- Be mindful of organizational Personally Identifiable Information (PII) guidelines when discussing data requirements related to populating a learning management system.

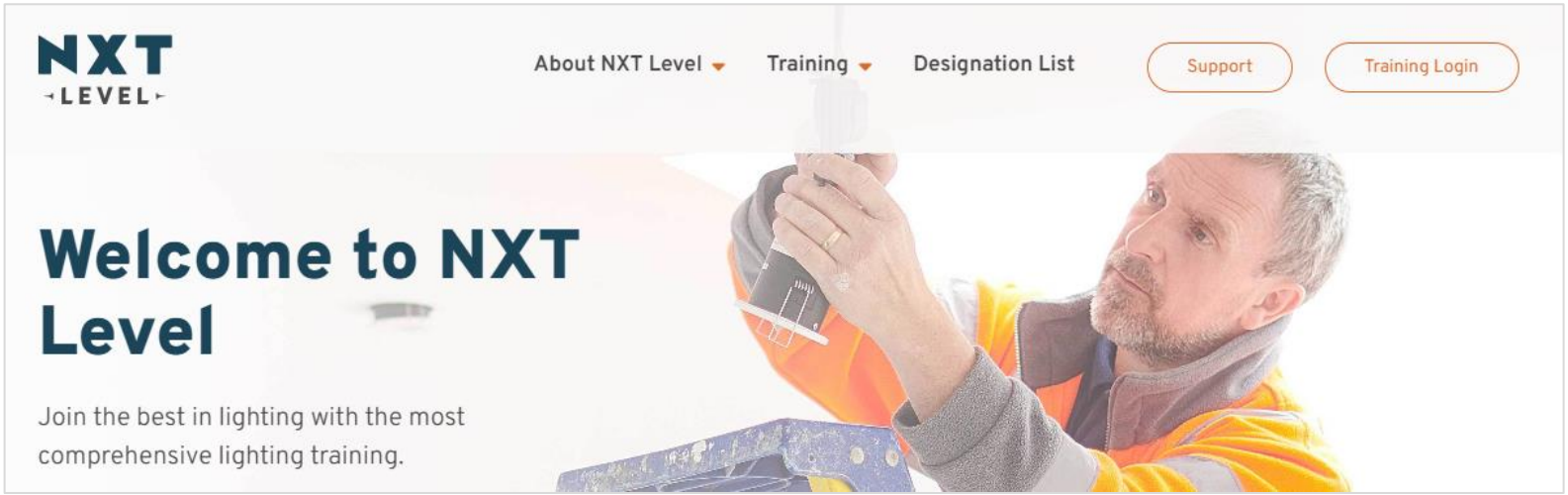
6. PLAYBOOK

6-E. Trade Ally Network – On-Demand Resources

RESOURCES:

Efficiency programs seeking to develop on-demand resources should consider leveraging resources such as the following:

- Lighting Controls Association: Education Express (Free)
- Bonneville Power Administration: Online Course Catalog (Free)
- Bonneville Power Administration: Trade Ally Field Guide (Free)
- NAILD: Lighting Specialist in Controls Training Program (Subscription based)
- Evergreen Energy Partners: NXT Level (Paid service)



6-F. Trade Ally Network – Building User Demand

WHAT & WHY:

- Building demand for connected lighting systems is just as important as building the skills sets necessary to support the supply side.
- Energy efficiency programs have a unique ability to create a neutral platform that brings together facility operators, building owners, and key decision makers who all share common goals to reduce operating expenses and improve tenant comfort.
- Educating end-use customers and creating demand for NLC and LLLC systems reduces the chances a connected lighting system will be value engineered out of the project.
- Building demand for connected lighting within market segments and with key accounts is also a great way for programs to generate a large pipeline of project savings.

6-F. Trade Ally Network – Building User Demand

THE PLAY: Host a Technology Trade Show

- Programs seeking to develop their trade ally networks should consider hosting an *EE Technology Trade Show* for end-use commercial and industrial customers.
- The trade show should invite and leverage multiple connected lighting vendors and provide them with booth space allowing them to highlight competitive advantages.
- The trade show should include complimentary C&I measures including HVAC and refrigeration.
- In addition to featuring products, the trade show should offer short educational sessions that speak directly to end-users, puts the value proposition in their terms, and connect them with resources for when they are ready to make a decision.

6-F. Trade Ally Network – Building User Demand

☑ DOs and DON'Ts:

When trying to build user demand, programs should consider the following:

DO

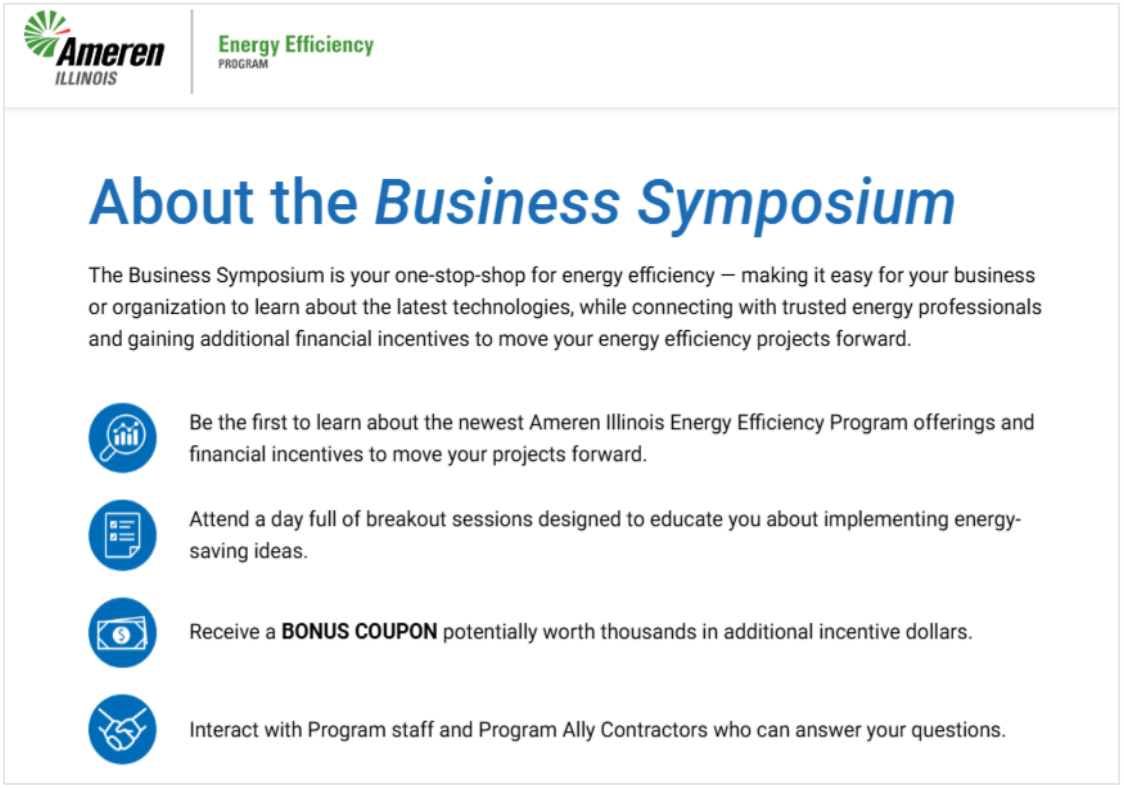
- Leverage utility account executives and EE outreach staff to identify key accounts and to target specific market verticals including schools/universities, car dealerships, healthcare, warehouses/logistics, government/military, grocery, large office, etc.
- Open the invitation to all trade allies and design allies, but make sure the primary focus is on reaching end-use customers.
- Consider charging a reasonable fee from participating vendors for booth space to help offset event costs. Vendors typically have budget for such events and the opportunity to present their products to utility/efficiency program customers is well worth the price of admission.
- Consider highlighting previous projects to draw attention to positive success stories.
- Consider cross-promoting TAN events with strategic organizations such as the International Facilities Managers Association (IFMA) or Building Owners and Managers Association (BOMA).

6-F. Trade Ally Network – Building User Demand

RESOURCES:

Efficiency programs seeking to build user demand via their Trade Ally networks should leverage the following resources:

- Utility Sponsored: Powerful Facilities Energy Conference
- Ameren Illinois: Business Symposium
- Efficiency Vermont: Best Practices Exchange



6-G. Incentives – Project Design/Development Incentives

WHAT & WHY:

- Completing a lighting project proposal can be a burden for medium and small-sized projects – and when projects get large, they can even become cost prohibitive.
- A complete lighting audit and proposal for a large commercial or industrial customer may take well over a week to complete and that's just for the initial submittal.
- Generating a project proposal that establishes efficiency program incentives and payback is a critical step to getting large projects into the pipeline so they can be converted to energy savings that count toward program targets/goals.
- Projects that use professional lighting design have been shown to deliver more comprehensive energy savings but require an additional cost by the customer.
- Project design/development incentives generate meaningful leads that allow programs to better understand existing savings potential and help ensure projects receive controls and recognize the time and effort of trade allies.

6-G. Incentives – Project Design/Development Incentives

THE PLAY: Offer Incentives for Design/Development

- To encourage trade allies to conduct audits of large commercial and industrial projects, and to ensure those proposals include NLC or LLLC, programs should consider offering a Project Development Incentive (PDI).
- To encourage customers to use professional lighting designers, programs should consider offering a Lighting Design Incentive (LDI).
- A PDI/LDI offers a very low incentive amount (between $0.01 - $0.03 / kWh) directly to the trade/design allies when qualifying project proposals are submitted.
- Offering a PDI/LDI is a proven method of generating project proposals that arm customers with the information they need to say yes.

6-G. Incentives – Project Design/Development Incentives

☑ **DOs and DON'Ts:**

When offering Project Design/Development incentives, consider the following:

DO

- Set a minimum savings threshold to qualify for a PDI/LDI (*ex. 1 million kWh)*
- Require that qualifying PDI/LDI projects include either NLC or LLLC
- Require a sequence of operations demonstrating at least two control methods are applied to all incentive eligible luminaires.
- Consider including credential requirements for an LDI, such as Lighting Certification (LC) from NCQLP or Certified Lighting Designer (CLD) from IALD, Lighting Specialist in Controls (LS-C) from NAILD, or Certified Lighting Controls Professional (CLCP) from NALMCO.
- Consider budget implications and potential caps. A 1 million kWh project with a PDI of $0.01/kWh would generate an incentive of $10K. This may sound like a lot but is probably a very small percentage of the overall program incentive budget.
- Communicate PDI/LDI budget limits and the communication process for verifying budget availability with trade allies.

6-G. Incentives – Project Design/Development Incentives

RESOURCES:

- Seattle City Light offers a Project Development Incentive of $0.025/kWh for qualifying projects.

Seattle

Project Development Incentive (PDI)

The Project Development Incentive (PDI) is a limited-time, supplemental incentive designed to offset contractor or customer administrative costs of participating in efficiency programs.

City Light is offering program participants an opportunity to earn more on commercial and industrial HVAC, lighting, and multifamily weatherization retrofit projects. This supplemental incentive means that participants are eligible for an additional $0.025 for every kilowatt-hour of electricity saved on eligible projects that are completed, with all required documentation submitted to City Light, by June 15, 2025.

This supplemental incentive will also allow City Light to fund a project beyond the 70% incentive cap, but not to exceed 100% funding for a project.

6-H. Incentives – System Setup Incentives

WHAT & WHY:

- Ensuring NLC and LLLC systems are properly configured is critical to achieving user acceptance and expected energy savings.
- It is common for utilities to require a sequence of operations so the basis for controls design can be established, but verifying actual system configuration represents an additional burden that stymies many projects in their final phase
- At present, few NLC systems can produce concise reports of system configuration, so a report might consist of a massive spreadsheet or hundreds of screenshots, which are burdensome to produce and unlikely to be reviewed
- System setup incentives help mitigate the risk that controls are installed and only nominally configured to align with the sequence of operations.

6-H. Incentives – System Setup Incentives

THE PLAY: Offer an Additional Incentive for System Setup

- A per fixture incentive kicker, with required practical documentation to verify configuration at the space type zone or luminaire level, can be an effective method for ensuring system configuration at the time of installation.
- As little as $5 -10 per fixture may be all that's required to ensure system operations match the sequence of operations.
- Ensuring *System Setup Incentives* are at the fixture level for LLLC projects and at the zone level for NLC projects will help streamline implementation.

6-H. Incentives – System Setup Incentives

☑ DOs and DON'Ts:

When offering system setup incentives, consider the following:

DO

- Consider allowing screenshots from systems apps to verify control settings.
- For NLC systems, consider incentive tiers by wattage at the zone level for the purposes of incentive equity and streamlining implementation.
- Where applicable, consider the *System Setup Incentive* as a complimentary quality control method for LLLC products that go through midstream programs.

DON'T

- Require energy monitoring or remote access to verify system settings as a requirement unless:
  - The data format and reporting intervals have been defined and agreed to by the utility/efficiency program, vendor, and building owner / tenant.
  - There is a plan and dedicated resources to make use of the data.

  Without a data collection plan, utilities risk creating an administrative burden that delivers no real value.

6-H. Incentives – System Setup Incentives

RESOURCES:

- Puget Sound Energy (PSE) offers NLC and LLLC incentives based on energy ($/kWh) *plus* a bonus incentive of $50-100 per fixture. The bonus incentive is intended to cover the incremental cost of controls and "help cover the costs associated with the startup programming process" for NLC/LLLC systems. During startup programming, the lighting control logic and networking capabilities are calibrated, adjusted, programmed, and assured to operate.
- ANSI/IES LP-16-22: Documenting Control Intent Narratives and Sequences of Operations

6. PLAYBOOK

6-I. Midstream LLLC

WHAT & WHY:

- The midstream delivery path allows vendors to offer instant rebates for qualifying products at the point of sale (most commonly with lighting distributors).
- This delivery channel has proven to be an effective method for increasing efficiency program savings and has the added benefit of diversifying lighting kWh savings sources.
- Midstream programs capture participation that wouldn't have otherwise occurred due to lead times, paperwork burden, and/or product stock availability.
- By applying incentives at the point of sale, efficiency programs expand their influence and touch points beyond traditional *downstream* programs.

6. PLAYBOOK

6-I. Midstream LLLC

THE PLAY: Offer Midstream Incentives for LLLC

- As the savings programs can claim for stand-alone lighting wane, consider an LLLC midstream offering.
- LLLC's integrated sensors and easily quantified per-unit nature make them ideal candidates for midstream incentives.
- There are several examples of programs that have adopted midstream LLLC into their TRMs or (regional equivalents).
- Midstream LLLC program offerings commonly count prescriptive savings based on *building type* as opposed to specific *space use type*, which are commonly used to provide more granular savings estimates in traditional *downstream* projects.
- Note: Deemed LLLC is a prerequisite to including the measure within a midstream program.

6. PLAYBOOK

6-I. Midstream LLLC

☑ **DOs and DON'Ts:**

When creating a midstream LLLC measure, programs should consider the following:

DO

- Consider adopting the DLC's definition of LLLC to ensure streamlined product eligibility.
- Expect savings estimates for LLLC midstream to be lower than that of custom or traditional downstream projects which require at least some completed project oversight.
- Consider follow-up phone calls with a sample of building owners / tenants to ensure lighting systems were installed and are operating as expected.
- Design the midstream rebate to cover most of the incremental cost for LLLC.

DON'T

- Implement midstream programs for NLC systems. NLC systems that have *one sensor controlling many fixture* relationships obfuscate savings estimates beyond an acceptable tolerance for prescriptive measures.

6. PLAYBOOK

6-I. Midstream LLLC

RESOURCES:

The following midstream programs include incentives for LED fixtures with LLLC.

- Energize CT Instant Lighting Discounts
- Energy Trust of Oregon Business Lighting Instant Discounts
- MassSave Instant Lighting Incentives
- Rhode Island Lighting Instant Incentives

Rhode Island Commercial and Industrial Lighting Instant Incentives

Effective March 1, 2024

Rhode Island Energy™
a PPL company

	Product Category	Lamp & Fixture Type	Incentive	Incentive w/ Occ Sensor	Incentive w/ Dual Sensor	Incentive w/ LLLC/ NLC	Minimum Contribution*	Qualified Product List	Pre-Approval Quantities**
uantities 50+	LED Troffer & Troffer Retrofit Kits	1x4, 2x2, 2x4 LED Troffer – Standard/Premium	$25.00	$70.00	$80.00	$90.00	$15.00	DLC	50+
		1x4, 2x2, 2x4 LED Troffer Retrofit Kit – Standard/Premium	$20.00	$65.00	$75.00	$75.00	$15.00		
	High/Low Bay	Low Bay: Mid Output (5,000–10,000 lumens)	$50.00	$80.00	$90.00	$100.00	$20.00	DLC	50+
		High Bay: High Output (10,000–30,000 lumens)	$130.00	$195.00	$205.00	$205.00	$30.00		
		High Bay: Very High Output (≥30,000 lumens)	$165.00	$230.00	$240.00	$250.00	$40.00		

7. ADVANCED STRATEGIES

Section 7 expands your playbook with advanced strategies and solutions for connected lighting. The concepts presented here are new or emerging opportunities.

A NLC-HVAC Integration

B Market Transformation Savings

C Demand Response

D "Controls Ready" Digital LED Drivers

7. ADVANCED STRATEGIES

7-A. NLC-HVAC Integration

WHAT & WHY:

- When occupancy and schedule information from an NLC/LLLC system is shared with an HVAC system, heating and cooling demand can be reduced in unoccupied areas.
- HVAC savings of 30% are possible, and **the combined savings from NLC/LLLC and HVAC can be more than 20% of the whole building energy consumption.**
- Integration of NLC/LLLC with HVAC is more cost effective than controls alone.
- NLC-HVAC integration is not appropriate or possible for all buildings. Use of a master systems integrator can help identify opportunities.

In Commercial Buildings in 2018, lighting accounted for 10% of energy usage; HVAC for 52%.

3 Types of LED Lighting Retrofits

1. **Uncontrolled**: simple LED retrofits (without NLC) save 50% to 60% of the old incumbent lighting load (or less when replacing old LED).

2. **NLC**: LED retrofits with Networked Lighting Controls that change light levels based on occupancy sensors, scheduling, etc. can save 80% of the lighting load: LED conversion saves 50% to 60% (or less when upgrading from old LED); NLC saves 50% of the remaining load.

3. **NLC-HVAC Integration**: NLC (see above) plus a communication channel between the NLC system and HVAC control system, that provides occupancy data for HVAC "occupied standby mode". In appropriate buildings, this can save over 20% of the whole building energy usage.

Nock et al, 2024, ACEEE Summer Study

7. ADVANCED STRATEGIES

7-A. NLC-HVAC Integration

THE PLAY: Include NLC-HVAC Measures in Your Portfolio

- Use the DLC NLC-HVAC Integration Toolkit to help your trade allies and design professionals learn about integration and identify opportunities.
- Include NLC-HVAC integration in your trade ally network education offerings to help break down silos and communication barriers.
- Offer a structured custom incentive for NLC-HVAC integration projects.
  - Structured custom incentives have a pre-defined incentive amount (such as X% of project cost) with custom savings calculations on the back end.
  - If necessary, include a hold back provision for a portion of the incentive until savings are verified.
- Pursue pilot programs and/or demonstration projects to assess the energy savings potential and increase market awareness of NLC-HVAC integration.

7. ADVANCED STRATEGIES

7-A. NLC-HVAC Integration

RESOURCES:

If considering incentives for NLC-HVAC integration, leverage the following resources:

Research

- DLC study: Future-Proofing Energy Efficiency with Networked Lighting Controls
- ACEEE Summer Study: 2030 Goals Require Long Term Energy Efficiency Plans that Specify Networked Lighting Controls
- PNNL: Integrating Lighting Within Your Building: Opportunities Ahead
- Efficiency Vermont: One Control System to Rule Them All

Resources

- DLC: NLC-HVAC Toolkit
- Slipstream: Integrating Lighting and HVAC Controls: Solutions for High Performance Buildings
- Slipstream: Integrated Controls Implementation Guide
- LBNL & Xcel Energy: System Program Manual
- USGBC Course: Integrating Lighting and HVAC Controls for Deeper Energy Savings

7. ADVANCED STRATEGIES

7-B. Market Transformation Savings

WHAT & WHY:

- Market Transformation is the strategic process of intervening in a market to create lasting change that results in the accelerated adoption of energy efficient products, services, and practices.
- Key characteristics of a market transformation program include:
    1. Long-term change by influencing supply chains, customer behavior, and industry standards.
    2. Target market-oriented approach to make the energy-efficient option the default choice.
    3. Reduction of market barriers such as cost, customer awareness, and trade ally education.
    4. Strategic interventions such as incentives, demonstration projects, codes, and standards.
    5. Collaborative partnerships with manufacturers, trades, and other market actors.
    6. Energy savings framework and evaluation plan.
- A market transformation program can be used independently of or in conjunction with a traditional product-based incentive program.
- At least three programs have LLLC market transformation initiatives: Ameren Illinois, Center for Energy and Environment (CEE) in Minnesota, and Northwest Energy Efficiency Alliance (NEEA).
    - The Ameren program experienced a 2,100% increase in LLLC projects in one year!
- The Illinois TRM includes a framework for counting market transformation savings.

7. ADVANCED STRATEGIES

7-B. Market Transformation Savings

WHAT & WHY:

Market transformation varies from traditional resource acquisition in many ways:

	Traditional Resource Acquisition	Market Transformation
Scale	Program Administrator's service territory	Entire defined market
Target	Whoever can be induced to participate	All consumers of a particular product or service
Goal	Near-term savings	Structural changes in the market leading to long term savings
Approach	Save energy through customer participation	Save energy through mobilizing the market
Scope of Impact	Results achieved from a single program	May achieve results from effects of multiple programs or interventions
Level of Program Administrator (PA) Control	Program Administrators can control the pace, scale, geographic location, and can usually identify participants	Markets are very dynamic, and the PAs are only one set of actors. Whether and how the impacts occur are usually beyond the direct control of the program administrators
Evaluation and Measurement	Energy use and savings, participants, free-ridership, and sometimes spillover	Interim and long-term indicators of market progress and structural changes, attribution to the program, and cumulative energy impacts
Timeframe for planning, savings measurement, and cost-effectiveness	Typically based on annual or multi-year planning and reporting cycle savings	Typically planned and implemented over a 10-to-20-year timeframe

7. ADVANCED STRATEGIES

7-B. Market Transformation Savings

THE PLAY:

- Use the Ameren, CEE Minnesota, and/or NEEA market transformation initiatives as a model to supplement your own LLLC incentive offering.
- Use the Illinois TRM as a framework for designing your own market transformation initiative and/or as a model to update your jurisdiction's TRM.
- Trade ally networks play a key role in market transformation programs. Leverage your trade ally network and education offerings to support your market transformation efforts.

7. ADVANCED STRATEGIES

7-B. Market Transformation Savings

RESOURCES:

If considering NLC/LLLC market transformation savings, programs should leverage the following resources:

- ACEEE Summer Study: Lighting the Way Equitably with Ameren Illinois' Luminaire Level Lighting Controls Market Transformation Initiative
- Ameren (IL): Luminaire Level Lighting Controls Market Transformation Initiative Business Plan Summary
- Illinois TRM: Version 13.0, Volume 4, Attachment C
- Center for Energy and Environment (MN): Luminaire Level Lighting Controls Market Transformation Plan
- NEEA: Luminaire Level Lighting Controls Market Progress Evaluation Report #2

7. ADVANCED STRATEGIES

7-C. Demand Response

WHAT & WHY:

- Demand response (also known as load shedding) is the capability to reduce the energy consumption of a lighting system on a temporary basis in response to a signal without manual intervention.
- Demand response is a reported capability within the DLC Networked Lighting Control System Technical Requirements v5.1. 60% of DLC-qualified NLC/LLLC systems are capable of load shedding in reaction to a demand response signal.
- Commercial interior lighting is highly coincident with the summer peak, which typically occurs in the late afternoon. Interior and exterior lighting can be coincident with a winter peak, which occurs in the early evening.
- Lighting can be dimmed by 20-30% without being noticed by most occupants. This fact can be used to manage peak demand on a temporary basis.
- A connected NLC/LLLC system can be a conduit for demand response control of other building systems such as HVAC.
- Fewer than 5% of buildings utilize demand responsive lighting controls, according to the 2018 Commercial Building Energy Consumption Survey.
- Many utilities and efficiency programs offer incentives for demand response.

7. ADVANCED STRATEGIES

7-C. Demand Response

THE PLAY: Require Demand Response Capability

- Include demand response capability as a minimum requirement for NLC and LLLC incentives.
- Include non-residential lighting “direct load control” in your utility or energy efficiency program’s demand response program.
- Offer an incentive toward DR hardware costs such as a gateway.
- Pursue pilot programs and/or demonstration projects to assess the load shedding potential of lighting (and HVAC) through demand response capable NLC/LLLC systems.

7. ADVANCED STRATEGIES

7-C. Demand Response

RESOURCES:

If considering incentives for lighting demand response, programs should leverage the following resources:

- Lighting Control Association: Lighting Control and Demand Response
- DLC/Alliance to Save Energy: Commercial & Industrial Lighting Lifetime and Peak Demand Savings Analysis
- California Title 24: 2022 Nonresidential and Multifamily Compliance Manual, Appendix D (Demand Responsive Controls)

7. ADVANCED STRATEGIES

7-D. “Controls Ready” Digital LED Drivers

WHAT & WHY:

- Digital LED drivers are programmable and addressable, allowing for easy integration into networked lighting control systems.
- Even if a customer is not planning to implement a networked lighting control system right away, there are still several compelling reasons to choose digital LED drivers over traditional analog drivers. Here’s why they can be a smart investment:
    1. Future-proof the lighting system by allowing for easier upgrades to NLC
    2. Improve dimming control
    3. Optimize power usage and improve power factor correction
    4. Increase reliability and lifespan through thermal management and fault protection
    5. Enable flexible integration with smart systems using a certified open full-stack protocol such as ANSI C137.4 (the North American version of D4i) or Bluetooth NLC.
- Efficiency program promotion of “controls-ready” luminaires with digital drivers may help achieve longer-term savings goals by enabling future control retrofits for already-installed luminaires.

7. ADVANCED STRATEGIES

7-D. “Controls Ready” Digital LED Drivers

THE PLAY: Bonus Incentives for LED Luminaires with Digital Drivers

- Offer bonus incentives for “controls-ready” luminaires that have digital LED drivers.
- Include a digital LED driver as a minimum requirement for incentives on uncontrolled luminaires.
- Specify that LED drivers must be capable of two-way digital communication using a certified open full-stack protocol such as ANSI C137.4 (the North American version of D4i) or Bluetooth NLC.
- Consider using this strategy initially in your outdoor lighting program, with ANSI C136.41 twist-lock photosensors which can be replaced later with networked control modules.

8. RESOURCE LIBRARY

Section 8 provides a library of resources to help get reach your program goal. Learn about existing resources to implement your plan. Model your program after best practices.

8. RESOURCE LIBRARY

8-A. Resources Related to the Plays

The following table summarizes all resources referenced in sections 6 and 7:

Play Number	Play Name	Resource Name & Link
6-A	Measure Development – Deemed NLC	Existing TRMs with deemed NLC measures DLC-NEEA: Energy Savings from Networked Lighting Control (NLC) Systems with and without LLLC
6-B	Measure Development – Deemed LLLC	Existing TRMs with deemed LLLC measures DLC-NEEA: Energy Savings from Networked Lighting Control (NLC) Systems with and without LLLC NEEA: 2022 LLLC Incremental Cost Study NEEA: LLLC Replacement vs. Redesign Comparison Study
6-C	Trade Ally Network – Outreach Plan	Bonneville Power Administration: Trade Ally Field Guide Consumers Energy (MI): Preferred Trade Allies and Distributors Efficiency Vermont: Efficiency Excellence Network Energy Trust of Oregon: Trade Ally Network Focus on Energy (WI): Focus on Trade Allies
6-D	Trade Ally Network – Workshops / Training	Bonneville Power Administration: Trade Ally Field Guide Fernhill Shopworks: Hands-on NLC & LLLC Demo Boards Steve Mesh: Lighting Education & Design

Table is continued on the next page

8. RESOURCE LIBRARY

8-A. Resources Related to the Plays

The following table summarizes all resources referenced in sections 6 and 7:

Play Number	Play Name	Resource Name & Link
6-E	Trade Ally Network – On-Demand Resources	Evergreen Energy Partners: NXT Level Lighting Controls Association: Education Express Bonneville Power Administration: Online Course Catalog Bonneville Power Administration: Trade Ally Field Guide NAILD: Lighting Specialist in Controls Training Program
6-F	Trade Ally Network – Building User Demand	Utility Sponsored: Powerful Facilities Energy Conference Ameren Illinois: Business Symposium Efficiency Vermont: Best Practices Exchange
6-G	Project Design/ Development Incentives	Seattle City Light: Project Development Incentive
6-H	System Setup Incentives	Puget Sound Energy: bonus incentive of $50-100 per fixture
6-I	Midstream LLLC	Energize CT Instant Lighting Discounts Energy Trust of Oregon Business Lighting Instant Discounts MassSave Instant Lighting Incentives Rhode Island Lighting Instant Incentives

Table is continued on the next page

8. RESOURCE LIBRARY

8-A. Resources Related to the Plays

The following table summarizes all resources referenced in sections 6 and 7:

Play Number	Play Name	Resource Name & Link
7-A	NLC-HVAC Integration	**Research** DLC: Future-Proofing Energy Efficiency with Networked Lighting Controls ACEEE: 2030 Goals Require Long Term Energy Efficiency Plans that Specify Networked Lighting Controls PNNL: Integrating Lighting Within Your Building: Opportunities Ahead Efficiency Vermont: One Control System to Rule Them All **Resources** DLC: NLC-HVAC Toolkit Slipstream: Integrating Lighting and HVAC Controls: Solutions for High Performance Buildings Slipstream: Integrated Controls Implementation Guide LBNL & Xcel Energy: System Program Manual USGBC: Integrating Lighting and HVAC Controls for Deeper Energy Savings

Table is continued on the next page

8. RESOURCE LIBRARY

8-A. Resources Related to the Plays

The following table summarizes all resources referenced in sections 6 and 7:

Play Number	Play Name	Resource Name & Link
7-B	Market Transformation Savings	ACEEE: Lighting the Way Equitably with Ameren Illinois' Luminaire Level Lighting Controls Market Transformation Initiative Ameren (IL): Luminaire Level Lighting Controls Market Transformation Initiative Business Plan Summary Illinois TRM: Version 13.0, Volume 4, Attachment C CEE (MN): Luminaire Level Lighting Controls Market Transformation Plan NEEA: Luminaire Level Lighting Controls Market Progress Evaluation Report #2
7-C	Demand Response	LCA: Lighting Control and Demand Response DLC/ASE: Commercial & Industrial Lighting Lifetime and Peak Demand Savings Analysis California Title 24: 2022 Nonresidential and Multifamily Compliance Manual, Appendix D (Demand Responsive Controls)

8. RESOURCE LIBRARY

8-B. TRM References for Deemed NLC

Deemed NLC measures:

State / Region	Effective Date	TRM Name	Measure ID	Page Num
CT	1/1/24	Connecticut's 2024 Program Savings Document	2.1.3	46
CO	1/1/24	Public Service Company of Colorado Technical Reference Manual, 2024-2026	14.1	511
IA	1/1/24	Iowa Energy Efficiency Statewide Technical Reference Manual v8.0 Volume 3	3.4.12	262
IL	1/1/24	Illinois Statewide Technical Reference Manual v12.0 Volume 2	4.5.10	754
MA	1/1/24	Massachusetts Technical Reference Manual 2024 Prospective Version	3.94	813
MI	1/1/24	Michigan Energy Measures Database (MEMD)	1.05.08	N/A
MN	1/1/24	State of Minnesota Technical Reference Manual v4.0	4.1	255
NJ	5/22/23	New Jersey 2023 Triennial Technical Reference Manual	3.7.2	455
NY	1/1/24	New York Standard Approach for Estimating Energy Savings from Energy Efficiency Programs v11.0		919
TX	1/1/24	Texas Technical Reference Manual v11.0 Volume 3	2.1.2	43
WI	1/7/24	Wisconsin Focus on Energy 2024 Technical Reference Manual	W0288	423

8. RESOURCE LIBRARY

8-C. TRM References for Deemed LLLC

Deemed LLLC measures:

State / Region	Effective Date	TRM Name	Measure ID	Page Num
CT	1/1/24	Connecticut's 2024 Program Savings Document	2.1.3	46
IA	1/1/24	Iowa Energy Efficiency Statewide Technical Reference Manual v8.0 Volume 3	3.4.12	262
IL	1/1/24	Illinois Statewide Technical Reference Manual v12.0 Volume 2	4.5.10	754
MA	1/1/24	Massachusetts Technical Reference Manual 2024 Prospective Version	3.94	813
MN	1/1/24	State of Minnesota Technical Reference Manual v4.0	4.1	255
NJ	5/22/23	New Jersey 2023 Triennial Technical Reference Manual	3.7.2	455
NW	4/7/2023	Regional Technical Forum, Non-Residential Lighting	N/A	37

8. RESOURCE LIBRARY

8-D. Lighting Controls Case Studies

DLC has created an online repository of lighting controls case studies. This resource will grow over time as new case studies are identified or completed.

8. RESOURCE LIBRARY

8-E. Connected Lighting Technical Guides

1. LED Lighting and Controls Guidance for Federal Buildings
2. Control Tech Terms
3. Wireless Tech in Lighting
4. Primary Control Strategies
5. Sequence of Operations (NEEA Guide)
6. Sequence of Operations (IES Lighting Practice 16)
7. Wall Station Interfaces
8. Communicating the Value
9. Emerging Tech Trends
10. DALI Alliance Resources
11. Bluetooth NLC

8. RESOURCE LIBRARY

8-F. General Resources for LLLC

1. Introducing LLLC Benefits Video
2. Lighting Performance Specification Language
3. LLLC Overview for Buildings Owners & Operators
4. LLLC FAQ
5. LLLC for Schools
6. LLLC For Hospitals
7. Healthcare Facilities
8. Smarter Controls, Big Benefits Infographic
9. Finding the Right Lighting System for You

8. RESOURCE LIBRARY

8-G. Additional LLLC Resources & Case Studies

1. LLLC MythBusters video
2. Energy Savings from NLC Systems with and without LLLC
3. LLLC Replacement vs. Redesign Comparison Study
4. Marketing Tool Kit
5. Video Case Study – Novanta
6. Video Case Study - Vision Profile Extrusions
7. Industry Voices - LLLC
8. Business Park Adopts LLLC

8-H. Member Survey – Question List

Section 1: About You

1. Name
2. Email Address
3. Organization Name
4. Organization Role
   - Energy Efficiency Program (you are employed by a utility or state)
   - Third-party Implementer (you are employed by a company that implements programs for one or more utilities or states, under contract)
5. What is your role within your company?
   - Program management and/or operation
   - Planning/evaluation
   - Emerging technology
   - Other (please specify)
6. Job Title

8-H. Member Survey – Question List

Section 2: About Your Lighting Program

7. Fill out the table below to identify your program's non-residential lighting program offerings(check all boxes that apply).

	Implemented midstream	Implemented downstream	Deemed incentives (e.g. $/fixture)	Calculated incentives (e.g. $/kWh)	Deemed savings (e.g. TRM)	Calculated savings (e.g. Custom)
LED Lamps	☐	☐	☐	☐	☐	☐
LED Fixtures	☐	☐	☐	☐	☐	☐
Stand Alone Controls (e.g. occupancy, daylight)	☐	☐	☐	☐	☐	☐
NLC	☐	☐	☐	☐	☐	☐
LLLC (if distinct from NLC)	☐	☐	☐	☐	☐	☐

8. If you have offerings for stand alone controls, NLC, or LLLC, does your program use Control Savings Fractions/Factors (CSF) to estimate deemed values for lighting controls by space type?
   - Yes
   - No
   - Don’t Know
   - Not Applicable

8-H. Member Survey – Question List

Section 2: About Your Lighting Program

9. Does your program require any of the following? (select all that apply)
   - NLC/LLLC systems must be DLC qualified
   - NLC/LLLC systems must utilize high-end trim
   - LLLC networking must be enabled
   - NLC/LLLC systems must be commissioned
   - None of the above
10. Does your program offer incentive premiums for any of the following? (select all that apply)
   - Integrated systems (such as lighting and HVAC)
   - Strategic energy management (SEM)
   - Comprehensive projects (lighting + other end-uses)
   - Energy monitoring
   - Pay-for-performance
   - Demand response capability
   - Digital drivers
   - Open-source protocols (e.g. Bluetooth lighting spec)
   - Other (please specify)
   - None of the above

8-H. Member Survey – Question List

Section 2: About Your Lighting Program

11. Approximately what percentage of your lighting program savings come from existing buildings (rather than from new construction)?
12. Are you aware of any projects completed in your service territory that successfully integrated lighting with HVAC or any other building system?
    - If yes, how many?
13. When it comes to connected lighting controls, I think my program:
    - Is a leader in the energy efficiency community with regard to connected lighting.
    - Is doing some things with regard to connected lighting but is not a leader.
    - Could be doing more to support connected lighting.

8-H. Member Survey – Question List

Section 3: Impact of Regulation

14. Are you considering removing or reducing incentives for standalone (uncontrolled) LED measures in the next 12-24 months?
15. For which LED measures are you considering removing or reducing incentives for standalone (uncontrolled) LED measures?
    - TLED Type A (plug and play)
    - TLED Type B (ballast bypass)
    - TLED Type C (external driver)
    - Interior luminaires with fluorescent baseline
    - Interior luminaires with HID baseline
    - Exterior luminaires
    - Other (please specify)
16. For which reasons are you are considering removing or reducing incentives for standalone(uncontrolled) LED measures?
    - Market saturation
    - Free ridership/net-to-gross
    - Federal or state regulation which targets lighting technology or its corresponding baseline
    - Shifting program priorities
    - Cost effectiveness
    - Other (please specify)

8-H. Member Survey – Question List

Section 4: Program Metrics

17. Are you able to share the approximate percentage of your 2023 lighting program activity(savings and spending) for controls versus LED lighting in 2023?
18. Please share the approximate savings percentages of your 2023 lighting program below.
    - % Basic controls
    - % NLC/LLLC
    - % Lighting
19. Please share the approximate spending percentages of your 2023 lighting program below.
    - % Basic controls
    - % NLC/LLLC
    - % Lighting
20. Are you able to share the approximate budget (spending and savings) of your networked lighting controls program (NLC and LLLC) in 2023?
21. Please share the approximate annual budget, spending, and savings of your networked lighting controls program (NLC and LLLC) in 2023 below.
    - Approximate budget
    - Approximate spending
    - Approximate savings

8-H. Member Survey – Question List

Section 5: Resources

22. Please list the resources you think are most helpful for supporting your program.
    - DLC marketing or technical resources
    - Better Bricks marketing or technical resources
    - Lighting Controls Association (LCA) marketing or technical resources
    - Efficiency program-specific marketing or technical resources
23. If you could have any resource (or improvement to an existing resource), what would it be?

8. RESOURCE LIBRARY

Need more help? Contact us for a consultation.

The DLC intends to follow up with members who downloaded this playbook to learn how you have used the information and provide additional updates and resources. We expect an updated version will be available in 2026. If you would like to reach out to our staff with questions, you may contact the individuals below. You can also join our Program Planning Working Group for members to learn from other program administrators and share your experiences.

Using the playbook in your programs:

- Levin Nock – lnock@designlights.org
- Jason Jeunnette – jjeunette@designlights.org

Membership Questions:

- Karla Winter – kwinter@designlights.org

Other:

- General Info – info@designlights.org