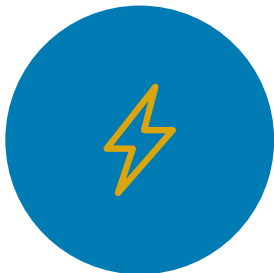


MIDWEST MARKET TRANSFORMATION COLLABORATIVE

Opportunity Brief

LUMINAIRE LEVEL LIGHTING CONTROL SYSTEMS

Luminaire level lighting control systems (LLLC) incorporate controls and sensors embedded into the luminaire, such as occupancy, daylighting and dimming controls, that are capable of networked communications. The luminaire becomes a semi-autonomous lighting zone that uses these sensors to optimize the lighting level in that area. LLLC is one coherent system, where the fixture, sensor and controller are designed to work together and communicate with other fixtures to provide lighting and levels where and when they are needed. This opportunity brief describes the potential for a LLLC market transformation initiative, focused on the opportunity for LLLC to become the standard practice for commercial lighting in buildings, as the majority of lighting products come with embedded sensors or controls as the default option.



FUEL SOURCE



ESTIMATED COST FOR BUSINESS PLAN



ESTIMATED SAVINGS POTENTIAL



NATIONAL COLLABORATION OPPORTUNITY



CURRENT MIDWEST MARKET PENETRATION



INTERESTED FUNDING UTILITIES



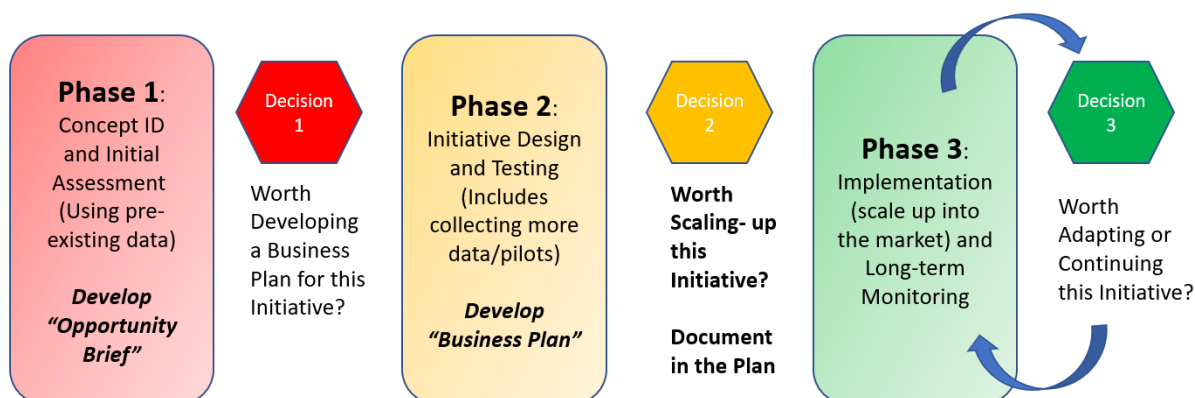
JOIN THE BUSINESS PLAN WORKING GROUP

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Market Transformation Opportunity Brief: Luminaire Level Lighting Controls (LLLC)

Purpose of the Idea Brief: This Idea Brief presents initial ideas and data based on pre-existing information to describe potential market transformation initiatives. It serves as the document by which a decision can be made to move to Phase 2 in the “MT Initiative Review Process” (depicted below). During Phase 2 more research or piloting can occur and a Business Plan is developed.

MT Initiative Development Process



Initiative Description

Luminaire lighting level control systems (LLLC) incorporate controls and sensors embedded into the luminaire, such as occupancy, daylighting, and dimming controls, that are capable of networked communications. The luminaire becomes a semi-autonomous lighting zone that uses these sensors to optimize the lighting level in that area. LLLC is one coherent system, where the fixture, sensor and controller are designed to work together and communicate with other fixtures to provide lighting and levels where and when they are needed.



These integrated luminaires address issues that have held back previous generations of lighting controls by providing a better user experience, simpler installation with less wiring, smart configuration tools¹ for set-up and verification, and more adaptability when changes in space use require controls or fixture reconfiguration. Additionally,

¹ These include software-enabled handheld devices, phone apps.

building owners/managers and tenants can self-regulate the LLLC systems without having to reprogram the controller when a tenant changes or the office configuration changes. The flexibility and granularity of these systems offer greater savings potential over non-controlled LED fixtures due to reduced hours of use (via occupancy) and wattage reduction (via high-end trim and daylighting sensing).

LLLC systems are a simplified subset of the emerging category of networked lighting control systems (NLC). NLCs consist of an intelligent network of individually addressable luminaires and control devices, allowing for application of multiple control strategies and programmability for building or enterprise level control. LLLCs may or may not be networked and provide the flexibility to the building owner to choose or not. Many building owners have concerns about connecting systems to the network and LLLC gives them the choice. LLLCs provide similar savings without the requirement of a connection to a network; although they all have the capability to do so if desired.

- *Target markets:* New construction, major renovation, and retrofit of commercial office and warehouse.
- *Market Situation:* The market shift toward LEDs creates opportunities for adding controls but also brings the risk of lost opportunity if the rate of controls adoption does not keep pace. Where there is a robust current market in commercial new construction, there is a natural opportunity to transform the lighting controls market using LLLC to influence the market trajectory of LLLC adoption and avoid the lost opportunity from adoption of non-controlled LED luminaires. The extensive stock of fixtures in existing building presents a significant opportunity for LLLC retrofit installations.
- *MT long-term vision:* Implementation of LLLC becomes standard practice for commercial buildings, as the majority of lighting products come with embedded sensors or controls as the default option.
- *MT Savings:* Potential savings are substantial, with estimates depending on space type of 25-75% savings compared with non-controlled LED fixtures.

Hypothesis on leverage points

A strategic partnership with NEEA to implement this initiative will allow Illinois/MW to leverage the success of NEEA's initial work in the Northwest and accelerate LLLC adoption, since more partners increases the likelihood of success if the market is more national than local. NEEA's work provides the foundation of product readiness with specifications as part of the [DesignLight Consortium's \(DLC\) Networked Lighting Controls Qualified Products List \(QPL\)](#)²; Northwest savings rates/calculations; and strong and increasing availability of LLLC products. The DLC QPL lists 26 products from 16 manufacturers, representing more than half of total NLC QPL. The comprehensive market development plans for NEEA's next phase, combined with the strong regional collaboration already underway in the Northwest will influence the market trajectory and speed up LLLC adoption to both realize the savings potential from LLLC and avoid lost opportunity from the adoption of non-controlled LEDs. Further leverage points with lighting market actors are listed below.

² The DLC's Networked Lighting Controls QPL identifies systems that are eligible for utility rebates and incentives by meeting minimum DLC [Technical Requirements](#). Currently, LLLC is an option, not required for QPL status.

Barriers:

While market momentum on the supply side has been strong, demand has been soft. Accordingly, NEEA's next phase will require increased levels of collaboration and commitment to national and local/regional partnerships with the lighting/control industry, sales channels, specifiers, utilities and trade allies to address the following barriers:

- Limited number of products (and manufacturers), not standardized protocols and difficult to configure
- Cost
- Lack of installation and configuration skills
- Lack of product awareness in sales channels
- Lack of confidence in lighting specifiers/designers that products are easy to install

Leverage points:

- Manufacturers making LED luminaires (with and without controls)
- Regional and national lighting manufacturer rep agencies (promotion/sales data collection) DLC/utilities supporting LLLC qualified products with incentives to hedge against first-cost
- DOE's [Next Generation Lighting Systems](#) (NGLS) installation evaluations (working with manufacturers to reduce installation complexities)
- Lighting standards organizations: Illuminating Engineering Society (IES) and American National Standards Institute (ANSI), the North American Utility Lighting Exchange (NULX)
- Large commercial real estate (CRE) property owners/managers (such as CBRE)

Key outcomes desired

- Broad product array that complies with national specification and QPL
- Products cheaper and easier to install
- LLLC training curriculum offered by manufacturers
- Some key market actors, such as lighting designers/firms, lighting sales agencies becoming champions and specifying systems for installation in projects alongside the demos and trainings currently offered for networked lighting control systems.
- Building codes and standard practice guides require LLLC

Key activities/interventions proposed

- Refine LLLC specifications for QPLs (partner with NEEA)
- Influence manufacturers for increased product availability in MW through distributor/sales agency channels distributor and sales representative channels and improved functionality (partner with NEEA)
- If appropriate for utilities in the MW, influence/promote codes, standards and test procedures
- Educate and train distributors/sales agencies, installers, specifiers and building/business owners (leverage NEEA materials, but locally implemented)

- Encourage utility program support and incentives for LLLC qualified products and installation through existing platforms such as the Lighting Utility Midwest Exchange Network and NULX

Hypothesis on any lasting impacts

- Change in DLC's Networked Lighting Controls Qualified Products List (QPL) specifications to require LLLC
- LLLC becomes required by energy code for all new construction projects

Rough estimate on 3-5 year IL budget

- Example: NEEA budget=\$5.5 million 2019-2026.
- TBD for ComEd and/or Xcel/Ameren IL

Determining savings potential from net market effects by 2025:

- NEEA's projected potential savings are estimated to be 25-75% savings depending on space type compared with non-controlled LED fixtures, which aggregates to total market savings 473,000 MWh/year over the long-term (105,000 MWh/year from net market effects).
- NEEA estimates LLLC baseline of 0.5% in commercial office and 0.8% in warehouse.
- NEEA estimates for control savings fraction have been calculated by building type.
- Cost-effectiveness will depend on scale. As demand increases, economies of scale and competition will drive down prices.
- TBD for ComEd and/or Xcel/Ameren IL

Manufacturers who have LLLC qualified products on the Designlights Consortium NLC QPL:

- | | |
|--------------------------|------------------------------|
| • Acuity Brand | • LG Electronics |
| • Avi-on Labs | • Leviton |
| • CREE | • Lutron |
| • Digital Lumens (Osram) | • Molex |
| • Eaton | • OmniSolu Technology |
| • Enlighted | • RAB Lighting |
| • Hubbell Lighting | • Signify (formerly Philips) |
| • J2 Light | • Xeleum Lighting |

Current Midwest Controls Incentive Programs

ComEd has a networked lighting incentive for both indoor and outdoor applications

- Offers \$0.60 per watt reduced for new LED fixtures that are connected
- Offers \$0.25 per watt controlled for the installation of a networked lighting control system on the new LED fixture
- Offers an additional \$0.15 per kWh saved for systems which include EM&V capabilities

Ameren Illinois

- All connected/advanced/controls lighting incentives go through the custom program at a rate of 12 to 18 cents depending on customer segment.
- No dedicated networked lighting/ LLLC incentives through standard program offering available
- No distinction made between connected systems and just plain controls (occupancy sensing)

AEP Ohio

- Offers two different programs depending on usage density of controlled space; low lumen (office, classroom) high lumen (warehouse, manufacturing)
- Low lumens are incentivized at \$.75 per sq. ft.
- High lumens are incentivized at \$0.30 per sq. ft.
- No distinction is made between connected lighting and LLLCs at this point

DTE Energy

- Offers a higher incentive for installing both networked lighting controls and upgraded lights at the same time
- Offers a two-tiered program for networked lighting controls based on usage type

DP&L

- Offers cash back for sensors and controls bought online
- Flat rate incentives for controls bought

Xcel Energy

- Currently offers dedicated incentives for controls and LLLCs through the standard program
- Networked/connected lighting must go through the custom program
- Incentives only apply to the control systems/ lighting controls, fixtures are considered separately

Focus on Energy

- Incentive offered based on sq. ft. of controlled space
- Controls must be DLC listed on NLC QPL (goes for all controls programs on this page)
- Tiered incentive structure similar to AEP Ohio which is based on lumen density
 - \$.25/ft for commercial offices, classrooms etc.
 - \$.125/ft for warehouses, industrial/manufacturing
 - \$.05/ft for energy monitoring added capability and willing to share data with utility