

DLC LUNA Dark Sky Market Characterization Project – Executive Summary

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Executive Summary

In May 2025, Commonwealth Edison's (ComEd) tasked ILLUME Advising (an E Source Company) and Swift Strategy with understanding the impacts created by using DesignLights Consortium's (DLC) Light Usage for Night Applications (LUNA) specifications for outdoor lighting.

The purpose of this project was to expand ComEd's understanding of the energy savings potential, cost-effectiveness, and additional benefits created by the adoption of energy efficient lighting products that meet the DLC's LUNA specifications.

Background

In June of 2024, the DLC released the results of a study they commissioned designed to compare the energy usage and cost of light-emitting diode (LED) luminaires for light pollution mitigation (LUNA) versus products focused solely on energy efficiency.¹ The results suggested LUNA-qualified products may offer several potential benefits, including reductions in energy use and light pollution, and may be a candidate for inclusion in utility energy efficiency programs.

Project Objectives

ComEd sought to understand the potential benefits of adding DLC LUNA and/or similar performance specifications to the energy efficiency (EE) portfolio, as well as how these specifications might be integrated into and/or complement existing measures. Therefore, the project objectives were to:

1. Determine an estimated achievable energy savings potential created by ComEd customers adopting products that meet DLC's LUNA and/or similar performance specifications.
2. Analyze the potential impact of adding these specifications to the ComEd EE portfolio given current offerings as well as anticipated upcoming changes to the Illinois Technical Reference Manual (IL-TRM) and any relevant Federal codes and standards.
3. Understand where and how utilities and/or municipalities are encouraging the adoption of these and similar specifications.

The following research questions guided our analysis:

- What does existing research, standards, and product specifications tell us about the performance, characteristics, and energy-saving potential of light-pollution-mitigation (LUNA or equivalent) outdoor-lighting products?

¹ Available online: [Choosing Both Energy Efficiency and Light Pollution Mitigation for Commercial Outdoor Lighting - DesignLights](#)

- How are other utilities and municipalities encouraging the adoption of lighting products that meet the DLC LUNA or similar specifications? Do they align with local ordinances?
- What is the potential energy savings of using DLC LUNA-qualified products using IL-TRM assumptions and algorithms?
- What is the potential cost effectiveness of using DLC LUNA-qualified products, and which products will provide the most likely cost-effective applications for ComEd? Are products cost-competitive?
- What is the estimated ComEd market potential for using DLC LUNA-qualified products using the standard and savings assumptions in ComEd's service territory? Can they be incentivized under current frameworks?

Methodology Overview

The project team completed two primary tasks to meet the project objectives and distill actionable findings and recommendations for ComEd.

Secondary Research

The project team reviewed publicly available data—including reports, evaluations, advocacy, ordinances, and utility program offerings—to identify examples of adoption that could inform ComEd's strategy.

Savings Assessment

The project team reviewed version 13 (v13) of the IL-TRM² to assess the potential energy savings and cost effectiveness of DLC LUNA-qualified products. Finally, the project team created a high-level estimate of ComEd's market potential for LUNA-qualified products using the output of the savings assessment and an assumed applicable customer population.

Findings and Recommendations

This study explored the technical, market, and programmatic implications of incorporating DLC LUNA and/or similar performance specifications into ComEd's energy efficiency portfolio.

Across the research questions, several consistent themes emerged: (1) LUNA v1.0 does reliably reduce energy use relative to Solid-State Lighting (SSL) fixtures as specified in v5.1, but primarily through dimming; (2) energy savings from LUNA alone will become far harder to capture under the new DLC LUNA specification changes set to take place in January 2026; (3) municipal and state policy is evolving and may create new opportunities to support LUNA-like products; and (4) meaningful program design around LUNA will depend less on product qualification and more on thoughtful application design.

² [Illinois Statewide Technical Reference Manual Version 13.0 \(IL-TRM Version 13.0\)](#)

Taken together, these insights point to a path forward that balances achievable energy savings with broader customer and societal benefits such as reduced light pollution, improved safety, and alignment with emerging state and local ordinances.

Findings

Impacts

LUNA fixtures achieve savings relative to SSL, primarily because of dimming, not efficacy.

Across baseline and retrofit scenarios, LUNA-qualified fixtures produced energy savings in all modeled conditions. However, the overwhelming share of savings came from the ability to dim to 20% and do so consistently through required control capabilities.

Upcoming specification changes (LUNA v2.0 and SSL v6.0 alignment) eliminate dimming as a differentiator. Beginning January 2026, SSL-qualified products must also dim to 20%, eliminating the key LUNA-based savings pathway identified in this study.

As a result:

- Dimming-based savings will no longer be attributable to LUNA qualification.
- Savings through qualifying product selection alone will become more difficult.
- Future program designs will increasingly depend on site-level lighting design, not product-level qualification.

Non-energy benefits may become essential to making LUNA an offering. Under current IL-TRM assumptions and with the adoption of SSLv.6.0, LUNA measures will generate significant savings beyond the LED products that meet the DLC's most current SSL specification. If ComEd can claim non-energy benefits (NEBs) – for example, safety, reduced glare, reduced complaints, wildlife benefits, or improved customer satisfaction – there may be an increased ability to structure an offering that incentivizes LUNA qualifying products.

Utility Program Design and Considerations

Very few utilities currently offer programs that directly incentivize DLC LUNA-qualified products. Outside of Ameren Illinois, there is little to no precedent for energy efficiency incentives tied specifically to LUNA-qualified or Dark Sky–approved equipment. Instead, where these specifications are emphasized, it is often in service to qualitative or community benefits. This suggests a nascent utility or energy efficiency program model nationally and limited ready-made examples for ComEd to follow.

Other Pathways

Illinois' new Responsible Outdoor Lighting Control Act (ROLCA) may accelerate demand for Dark Sky–aligned products. Illinois recently passed legislation directing state and local entities to procure Dark Sky–compliant outdoor lighting.

Although the Act does not standardize requirements across municipalities, it is expected to increase local consideration of Dark Sky principles and may create near-term opportunities to support these customers through education and/or technical assistance.

Municipal ordinances may become a driver of lighting design choices. Local governments, including some in Illinois, are adopting or revising outdoor lighting ordinances aimed at reducing light pollution, glare, and skyglow. These ordinances, although highly variable, may become increasingly aligned with Dark Sky principles.

Municipal adoption can create market pull for compliant equipment. It also creates a program opportunity for ComEd to help customers navigate requirements. The municipal incentive model in Truckee, California provides a replicable structure should ComEd wish to support local ordinance compliance.

Local outdoor lighting ordinances vary widely in scope, technical requirements, and enforcement. Even in the state of Illinois, ordinances differ dramatically in their treatment of color temperature, backlight, uplight, glare, and shielding. This variability makes a standardized prescriptive program approach difficult but creates an opportunity for ComEd to support customers through design guidance, technical assistance, or ordinance-aligned templates. There may also be opportunity for ComEd to support the adoption of these ordinances through equipment replacement rebates, notably for existing non-LED equipment.

Recommendations

Monitor and align with Illinois' Responsible Outdoor Lighting Control Act (ROLCA). The new ROLCA Act is likely to influence customer decisions and may motivate localities to encourage or require compliant lighting. ComEd can proactively respond by:

- Developing educational materials for customers and municipalities
- Exploring and offering incentives for meeting or exceeding ordinance requirements
- Partnering with local governments requesting support (e.g., similar to the Truckee, California model)

Consider a municipal pilot to evaluate program models. Given the lack of existing utility program models, ComEd may benefit from a small pilot designed to:

- Supporting one or more municipalities as they implement or update outdoor lighting ordinances.
- Incentivizing LUNA or equivalent Dark Sky-aligned retrofits.
- Testing customer acceptance, cost-effectiveness, NEB quantification, and achievable savings.
- Informing a future pathway for broader portfolio integration.

Leverage LUNA-aligned measures primarily for non-LED baseline situations. Where metal-halide or high-pressure sodium lamp baselines exist (e.g., at older commercial sites or certain municipal locations) savings are meaningful and cost-effectiveness improves. ComEd should consider:

- Targeting outreach to municipalities, park districts, industrial yards, and older small businesses
- Providing a bundled offer pairing LED retrofit incentives with guidance on Dark Sky-aligned design

Evaluate the feasibility of incorporating non-energy benefits. NEBs may be the determining factor in whether LUNA-like offerings can be cost-effective when dimming is no longer a differentiator. Next steps could include:

- Reviewing evaluation precedents for outdoor lighting NEBs
- Assessing which benefits could be defensibly quantified in Illinois (e.g., safety, wildlife impacts, complaint reduction)
- Piloting NEB tracking through a limited, ordinance-aligned municipal program

Track evolving specification changes and revisit savings algorithms as SSL and LUNA converge. As LUNA v2.0 comes online in January 2026 and SSL dimming requirements tighten, ComEd should reassess:

- Whether LUNA continues to provide incremental grid or environmental value
- How to integrate design-based savings into TRM pathways
- Whether new controls or sensing strategies can unlock post-2026 savings opportunities