Final Report

LED Streetlights Market Assessment Study

October 16, 2015

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Funded By:

Prepared By:

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Acknowledgement

We would like to thank Energy Trust of Oregon for conceiving of this project and giving Research Into Action the support needed to conduct it. We also wish to acknowledge the many staff of Oregon municipalities and other stakeholders who agreed to participate in the interview and provided their responses to our questions; we appreciate their willingness to participate.

Executive Summary

This report presents findings from a market assessment of Energy Trust of Oregon's (Energy Trust) LED streetlight incentive program ("the program"). Research Into Action, Inc. conducted this research between May and October 2015.

The goal of this study was to understand the current practices and plans, as well as barriers, to upgrading streetlights to light-emitting diodes (LED) and to explore opportunities for program improvement. The focus of the research is Oregon municipalities in Energy Trust's service territory. This study relied on reviews of data and program documents, including Utility Customer Information (UCI) and primary data Research Into Action collected through interviews with program staff; a sample of municipalities, utility contacts, contacts of manufacturers and distributors; and other stakeholders.

In Energy Trust's service territory, two investor owned utilities (IOU) power almost all the municipal streetlights – 62% of the streetlight inventory powered by Portland General Electric (PGE) and 38% of the inventory powered by Pacific Power. The two IOUs own about half of the streetlight inventory, and municipalities own the other half. Each IOU sets fixed monthly rate per light based on the ownership, technology and wattage or lumen. Energy Trust provides municipalities – regardless of the ownership – with $40-$100 incentive per fixture to replace high intensity discharge (mostly commonly high-pressure sodium or HPS) cobra head with equivalent wattage-to-lumen LED light as a prescriptive offering, as well as a custom lighting project offering.

Below, we present a summary of key findings, and our conclusions and recommendations.

Key Findings

Knowledge and Awareness

- A majority of the municipality respondents were very familiar with the extended lifecycle (74%) and energy cost savings (65%) benefits of LED streetlights, but more than one-quarter of respondents said they wanted to know more or did not know of these benefits. Knowledge and awareness levels drop substantially for other benefits, such as reduced carbon emissions, superior lighting quality, reduced light pollution, and greater perceived public safety.
- About three-quarters (74%) of the surveyed municipalities, or 67% among the program non-participants, reported awareness of the program. Those unaware of the program are mostly in the Pacific Power service territory.

Streetlight Inventory, Current Practices and Plans

- The penetration of LED streetlights in Energy Trust's service territory's entire inventory is 37%. The rate is particularly low among utility-owned streetlights (8%) and in Pacific

Power territory (12%). The rate is significantly higher in PGE territory (52%) especially among its municipally-owned streetlights (80%).

- Of the surveyed municipalities that have not fully completed streetlight upgrades to LED (78%), the majority have no future upgrade plans. These municipalities are mostly in Pacific Power territory and they have a large utility-owned streetlight inventory.
- For utility-owned streetlights, PGE pays the full upgrade costs while municipalities pay the full cost in Pacific Power's service territory. Both IOUs replace failed lights on a light-for-light basis, and do not have future upgrade plans.
- Streetlight manufacturer and distributor contacts reported cobra head fixture orders have been almost exclusively LED in the last two years, and the remaining demand of HPS products is primarily for replacement parts. LED costs have come down considerably over this period, and one contact said LEDs are now cheaper than HPS for existing fixtures.
- Though most municipalities' new LED fixtures are equipped to add advanced control features – off-peak hours dimming or notification of failed lights – later, none of the municipalities reported current use nor having plans to add such features.

Barriers

- By far, the municipality respondents most frequently reported a lack of up-front capital as a significant barrier to upgrading their streetlights to LED (82%). More than half of respondents rated several other items as somewhat or a significant barrier, including uncertainty about future LED cost reduction (68%), a lack of time to implement upgrades (65%), LED tariffs providing little or no cost savings (59%), and a lack of resources to evaluate economics of new systems (52%).
- Other influential contacts reported they are skeptical of LED performance. Among their concerns are light quality, lifecycle, and maintenance costs and lack of use cases and field-testing.

Conclusions and Recommendations

Conclusion 1: Although LED streetlight penetration rate in Energy Trust's service territory has reached about one-third of the entire streetlight inventory, it has yet to reach self-sustaining critical mass.

Our data suggests 37% of the entire streetlight inventory in Energy Trust's service territory will use LED technology by 2016, but the majority of the interviewed municipalities and IOUs reported having no future upgrade plans for the remaining inventory beyond 2017. Gaps in LED adoption also exist in certain IOU service areas and by ownership patterns – significantly low penetration rates in Pacific Power's service territory and for utility-owned streetlights across both IOUs. Although the streetlight market on the supply-side is fully accepting of LED technologies and makes a variety of products available, replacement lamps of the conventional HPS

technology will continue to be available for some time in the future as the market remains strong. For these reasons, we conclude that the LED streetlight market in Energy Trust's service territory has not yet reached the point at which the technology will naturally and self-sustainably continue to grow without a strategic market push like Energy Trust's incentive program.

Recommendations:

- **Place stronger program emphasis on upgrading utility-owned streetlights and streetlights in Pacific Power service territory.** This strategy should include: increasing outreach efforts to municipalities with Pacific Power-owned inventory; providing detailed information on LED streetlight benefits as well as program opportunities for both utility-owned and municipality-owned streetlights; and if needed, establishing multiple incentive tiers that encourage upgrading streetlights for specific ownership types and IOU areas, for instance setting higher incentives for utility-owned streetlight upgrades.

- **Continue to closely monitor the region-wide progress.** Using accurate and up-to-date UCI data, Energy Trust should continue to monitor the territory-wide LED penetration rate. Particular attentions should be paid to penetration rates by streetlight ownership, IOU, and light type ("functional" cobra head vs. decorative).

Conclusion 2: LED streetlights' up-front capital costs and doubts about the technology – specifically light quality, lifecycle, and maintenance costs – are the major remaining barriers for wider adoptions.

The contacts of municipalities and IOUs almost unanimously suggested that up-front capital costs of LED streetlight fixtures is a significant hurdle to move toward LED conversions. A few influential players in the Oregon LED streetlight market also believe that LED technology is in its early adoption stage, which has kept them from moving forward with this new technology. These contacts' concerns were particularly about LEDs' light quality, lifecycle, and maintenance costs, as they think the promoted performance and benefits have not been adequately proven in the field.

Recommendations:

- **Improve program collateral by building stronger use cases.** Energy Trust should work with manufacturers and municipalities that have successful LED streetlight upgrade experiences to develop more evidence of use cases: documenting specific applications; technology performances, and cost benefits from rate savings and maintenance.

- **Coordinate municipality-wide demands and help bring the LED fixture prices down region-wide.** Energy Trust should consider coordinating the region-wide demands of LED streetlight fixtures and negotiate a buy-down price with manufacturers so municipalities could access LED streetlight fixtures at lower prices. Energy Trust should also investigate the existing purchase agreement the City of Portland made, which is reported to extend their negotiated price to other Oregon municipalities.

MEMO

Date: January 11, 2016
To: Board of Directors
From: Spencer Moersfelder, Business Sector Senior Program Manager
Dan Rubado, Evaluation Project Manager
Subject: Staff Response to the LED Streetlights Market Assessment Study

This market assessment of LED streetlight upgrades in Energy Trust's electric service territory establishes the current state of the market and assesses the remaining opportunities and barriers, based on interviews with a number of stakeholders and utility customers. The findings of this report show that there is still a substantial amount of opportunity and energy savings remaining in the Oregon market for streetlights to be upgraded to LEDs. Although, the market is nearing saturation among municipally owned streetlights in PGE territory, utility owned streetlights are lagging behind. In addition, Pacific Power territory is a lagging market for upgrading streetlights to LEDs. The current utility rate structures appear to be impeding the market, as they do not provide significant cost savings to customers for LED upgrades.

There is still a role for the Existing Buildings program to play in supporting and transforming the market for LED streetlights. Municipal respondents reported that cost was one of the biggest barriers to adoption and many past participants stated that Energy Trust incentives were influential in their upgrade decisions. As such, the program will continue to provide incentives until the major market barriers are overcome and the market has been transformed. In particular, the program will target the lagging markets identified in this report to ensure that they are on the path to market transformation as well. There is a need for Energy Trust to continue monitoring the adoption of LED streetlights to determine when the market has been transformed and when it no longer needs to support this technology with incentives. Even once the market has been successfully transformed and LEDs become the predominant streetlight technology across the state, there will still be an opportunity for the Existing Buildings program to support advanced streetlight controls in the market.