



High Performance Street and Area Lighting Upgrades: The Time to Act is Now

Bruce Kinzey, Pacific Northwest National Laboratory

Matthew Gray, Cleveland, OH, Mayor's Office of Sustainability

Georgia Nesselrode, Mid-America Regional Council

Penni Redford, West Palm Beach, FL

A Tour Through the Municipal Solid State Streetlighting Consortium Resources

May 8, 2014

Better Buildings Summit 2014

Session: *High Performance Street and Area Lighting
Upgrades: The Time to Act is Now*

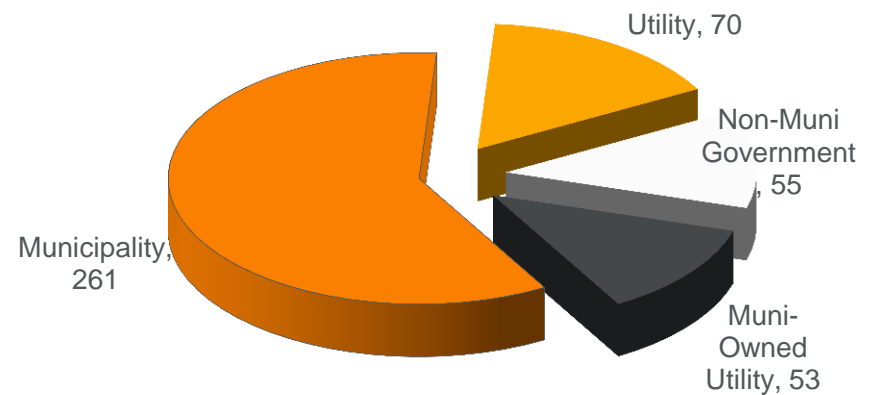
Bruce Kinzey

Director, Municipal Solid-State Street Lighting Consortium

Pacific Northwest National Laboratory

Who We Are

- The MSSLC itself is a great resource!
 - 439+ member orgs
 - User-focused
 - Purpose is sharing information and tools
 - Membership is free but not required for access to most materials



Feature Activity - Demonstrations

Example: Kansas City



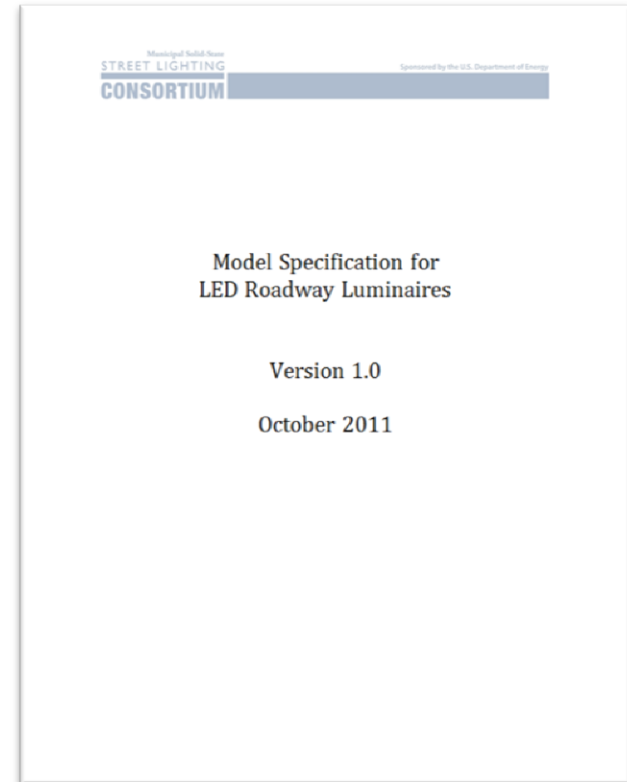
- Nine products on nine streets
- 100W, 150W and 250W sample replacements
- Provided early feedback for the Luminaire Spec
- Results of demonstrations are on the MSSLC website:
<http://www.ssl.energy.gov/resources.html>

Resources – Model Luminaire Spec

Model Specification for LED Roadway Luminaires

Scope

- Municipalities, utilities, large public spaces, etc.
- Streets, roadways, and nearby pedestrian ways
- Initial and maintained quality and quantity of illumination
- Warranty coverage
- Input power, electrical immunity, housing finish, vibration, etc.
- Drivers, including lighting controls interface
- Photocontrol receptacles



Download: <http://www.ssl.energy.gov/specification.html>

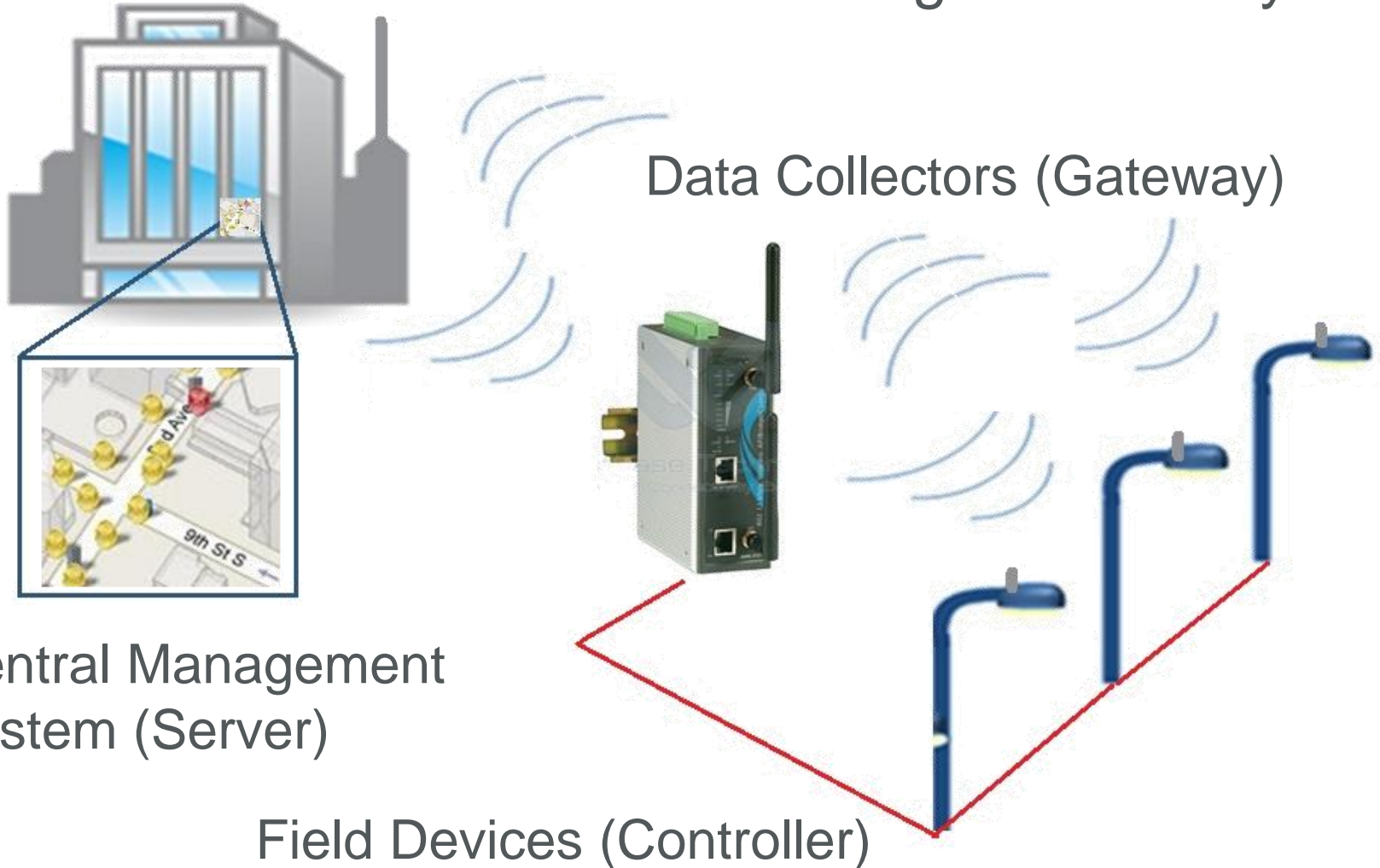
Resources – Model Controls Spec

- Motivation
 - Developed in response to demand from Consortium members and others
 - Useful-to-all does not mean one-size-fits all
 - Recommended criteria and user options
- Purpose
 - To compile experience gained by members
 - To establish a common language and framework
 - To serve as a checklist to minimize errors/omissions
 - To serve as a living document, undergoing continual revision
 - **To allow for customization by each adopting entity**

Download: <http://ssl.energy.gov/control-specification.html>

Resources – Model Controls Spec

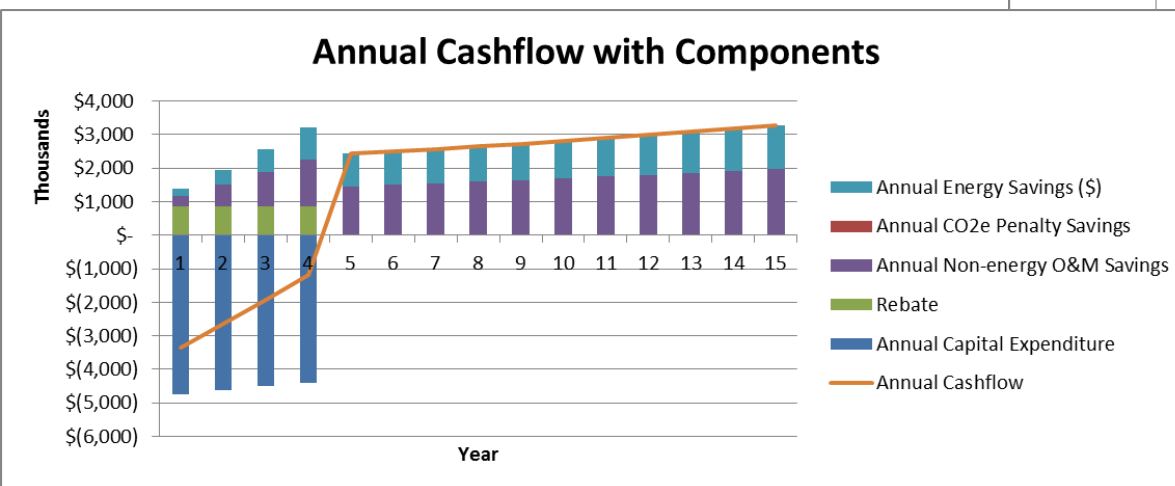
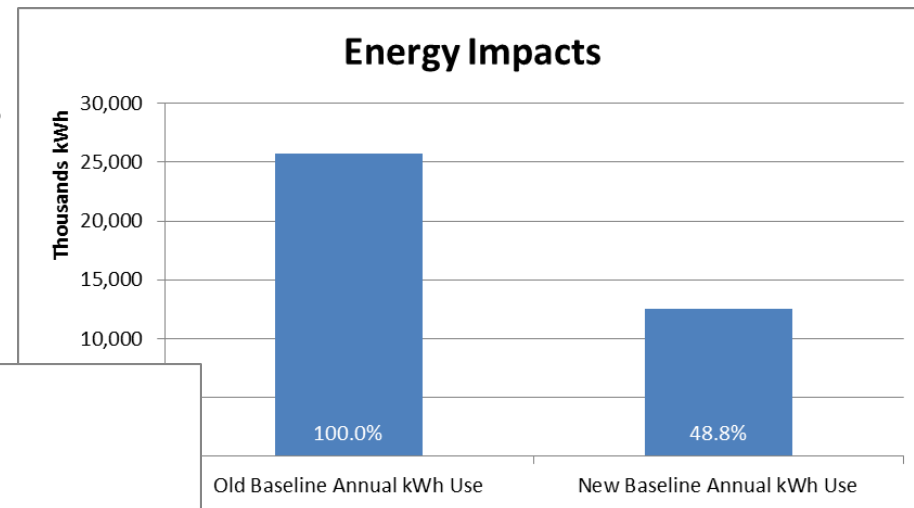
What is a streetlight control system?



Resources – Financial Analysis Tool

Retrofit Financial Analysis Tool for Street & Parking Facilities

- Evaluates costs and benefits of LED conversion
- Performs detailed analysis and provides numerous outputs, including:
 - Annual energy and energy-cost savings
 - Annual maintenance savings
 - Annual greenhouse gas reductions
 - Simple payback, IRR
 - Net present value



Download:

<http://www.ssl.energy.gov/financial-tool.html>

Municipal Solid-State
STREET LIGHTING
CONSORTIUM
Sponsored by the U.S. Department of Energy



THE LIGHT POST

Official MSSLC E-Newsletter

March, 2013
Volume 2, Number 3

In This Issue

[Director's Update](#)

[LED Street Lighting in Vermont](#)

[Consortium Webcast Recap](#)

[LED Street Lighting in the News](#)

[Upcoming Consortium Events](#)

Consortium Director
Edward Smalley
Seattle City Light

To have your LED project featured in THE LIGHT POST contact us at:
MSSLC@Seattle.gov

Committees:

Executive Committee
Edward Smalley, Seattle City Light

Ghanshyam Patel, New York City Street Lighting Division

Tod Rosinbum, Portland Ore, Traffic Signal & Street Lighting

Michael Stevens, Georgia Power

Ed Ebrahimian, Los Angeles Bureau of

Top of The Light Post-Director's Update

While the Consortium's central focus is to provide technical assistance to municipalities, states and utilities as LED street lighting programs are considered, most LED street lighting installations have occurred at the municipal level. It is encouraging to hear that there is significant activity at the state level to convert the roadway luminaires of state highways to LED. The most recent examples include the California Department of Transportation's (CALTRANS) purchase and installation of 42,000 roadway LED units, the Washington State Department of Transportation's (WSDOT) announcement of an LED roadway project on U.S. Highway 101, the Florida Department of Transportation's (FDOT) LED installation on U.S. Highway 98, the Colorado Department of Transportation closed its bid process on March 12 for the purchase of approximately 10,000 LED streetlight fixtures for installation over the next three years, and the Alaska Department of Transportation has plans to install 800 LED streetlights in Fairbanks by this summer.

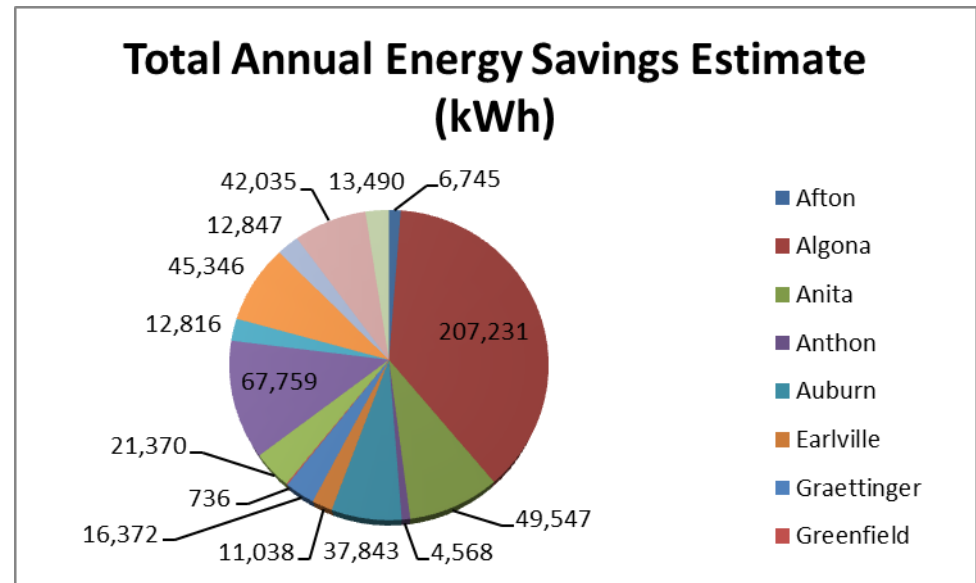
WSDOT plans to install 88 LED roadway luminaires on the Black Lake Boulevard interchange in Olympia with estimated annual energy savings of 1.7 million kWh and \$75,000 in annual operation and maintenance costs. The Florida Department of Transportation has partnered with Santa Rosa County to install approximately 800 LED roadway luminaires on U.S. Highway 98. Read more about the WSDOT and FDOT programs below in "LED Street Lighting in the News."

Also, in April 2012, CALTRANS began its program of converting 67,000 fixtures to LED roadway luminaires over a two-year period with estimated energy savings of 50 percent.

The earliest of state highway installations was the I-35W Bridge in Minneapolis, Minnesota that featured LED roadway lighting on the main span of this interstate. Phase 1 of this project went online in 2008 and provided the first glimpse of how effective this technology could be in that highly challenging environment. Phase 2, involving long-term monitoring of the LED lighting is expected to yield valuable information on lumen depreciation, physical effects, and performance impacts over time. Look for updates on this installation later this year.

Together, these projects illustrate how the slow initial adoption at the state level is starting to rapidly resemble what's happening on the municipal level. As technology improves, fixture cost continues to decrease and state governments continue to identify efficiencies, perhaps other states will follow the lead of California, Washington, Florida, Colorado, Minnesota and Alaska and state-level installations will gain the momentum experienced on the municipal level.

Case Study: Iowa Association of Municipal Utilities Energy Savings Estimate



More information

www.ssl.energy.gov/consortium.html

Bruce Kinzey, Director | Office: (503) 417-7564

MSSLC@pnnl.gov

Municipal Solid-State
STREET LIGHTING
CONSORTIUM

Join Us
for those buying, using,
or considering LED
street and area lighting

Participate
for those manufacturing
or distributing LED street
and area lighting products

[Main Consortium Page](#)

[Join the Consortium](#) 

[Outdoor Lighting Resources](#)

[Consortium Charter](#) 

[Consortium Fact Sheet](#) 

[Guidelines for Manufacturers and Distributors](#)

[Consortium Participant List](#) 

U.S. Department of Energy | Energy Efficiency & Renewable Energy

EEER Home | Programs & Offices | Consumer Information

Solid-State Lighting

Search: **SEARCH**

Home | About the Program | R&D Projects | Market-Based Programs | SSL Basics | Information Resources | Financial Opportunities

EEER • Building Technologies Office • Solid-State Lighting • Market-Based Programs • Municipal Consortium

LED Lighting Facts
CALPER Program
Standards Development
Technical Information Network
Gateway Demonstrations
Municipal Consortium
About the Consortium
FAQs
Members
News & Events
Financing Guidance
Resources
Design Competitions

Financing Guidance for LED Street Lighting Programs

Financing an LED street lighting replacement program can present a hurdle for many system owners, even if the planned transition offers very favorable economics. Replacing the existing system requires a significant budget, particularly as the scope of the program increases. Cities such as Los Angeles and Seattle have invested many millions of dollars into their (very successful) LED street lighting replacement programs.

At the same time, LED street lighting is increasingly becoming recognized as a relatively low-risk investment that can pay big dividends in the form of energy and maintenance savings when correctly implemented. The recent emergence of myriad financial instruments, as well as financing companies offering to supply the associated funding, is testament to the favorable perspective taken on these investments.

The purpose of this section of the website is to offer a brief introduction to the various financing models and tools that are becoming available, to present case studies of municipalities that have used those tools, and to provide links to resources that offer additional information. These materials are not intended to be a complete tutorial on the various financing methods, nor to steer users in any particular direction, but, rather, to raise awareness of some of the different options available and identify sources for obtaining more information.

- [Financial Analysis](#)
- [Financing Options](#)


A number of available financing methods make LED streetlights a viable option for many municipalities today. Photo Credit: Los Angeles Bureau of Streetlighting

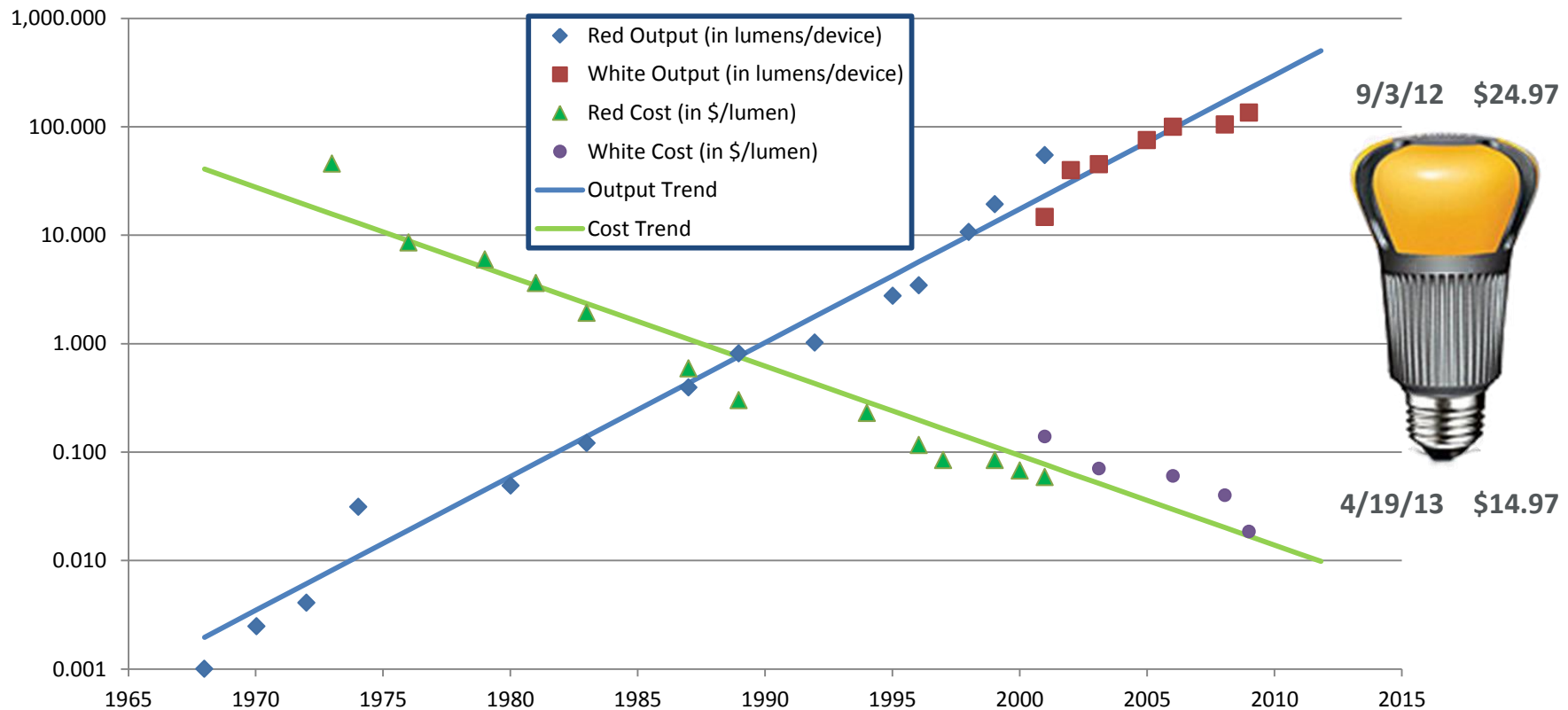
Contacts | Web Site Policies | U.S. Department of Energy | USA.gov
Content Last Updated: 10/17/2015

Backup Slides

Advancement Continues

LEDs continue to follow Haitz's Law

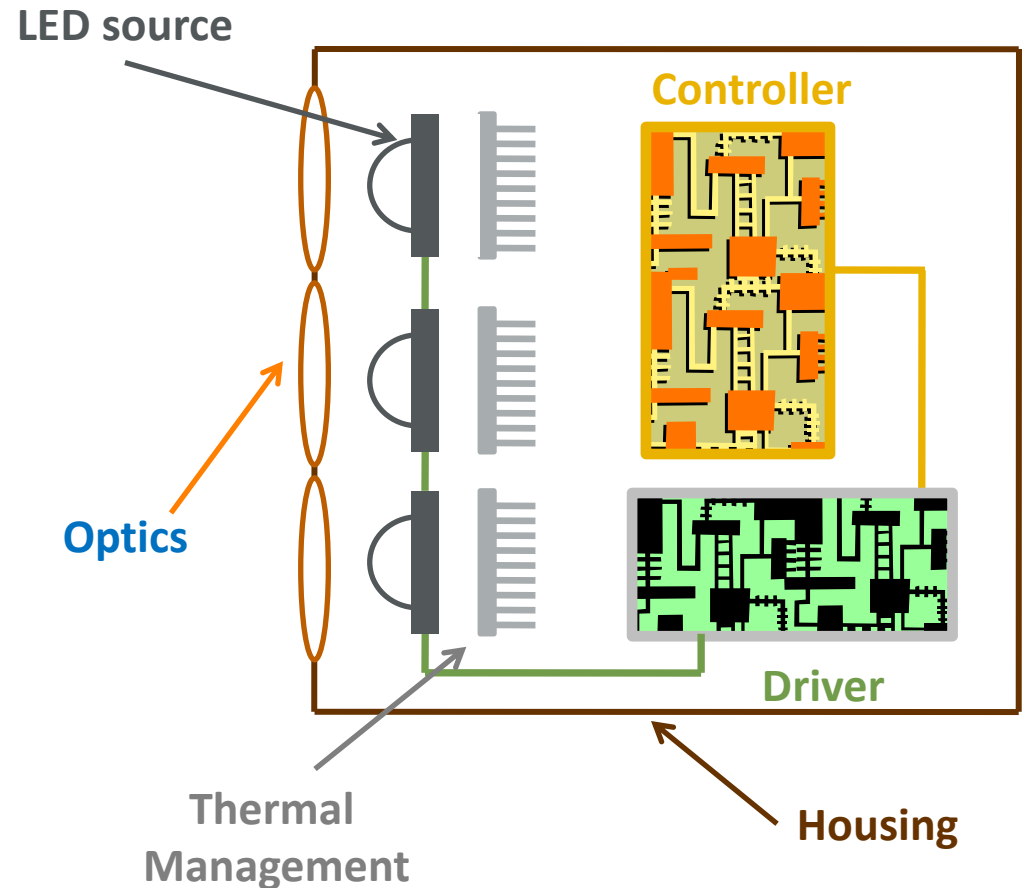
Haitz's Law



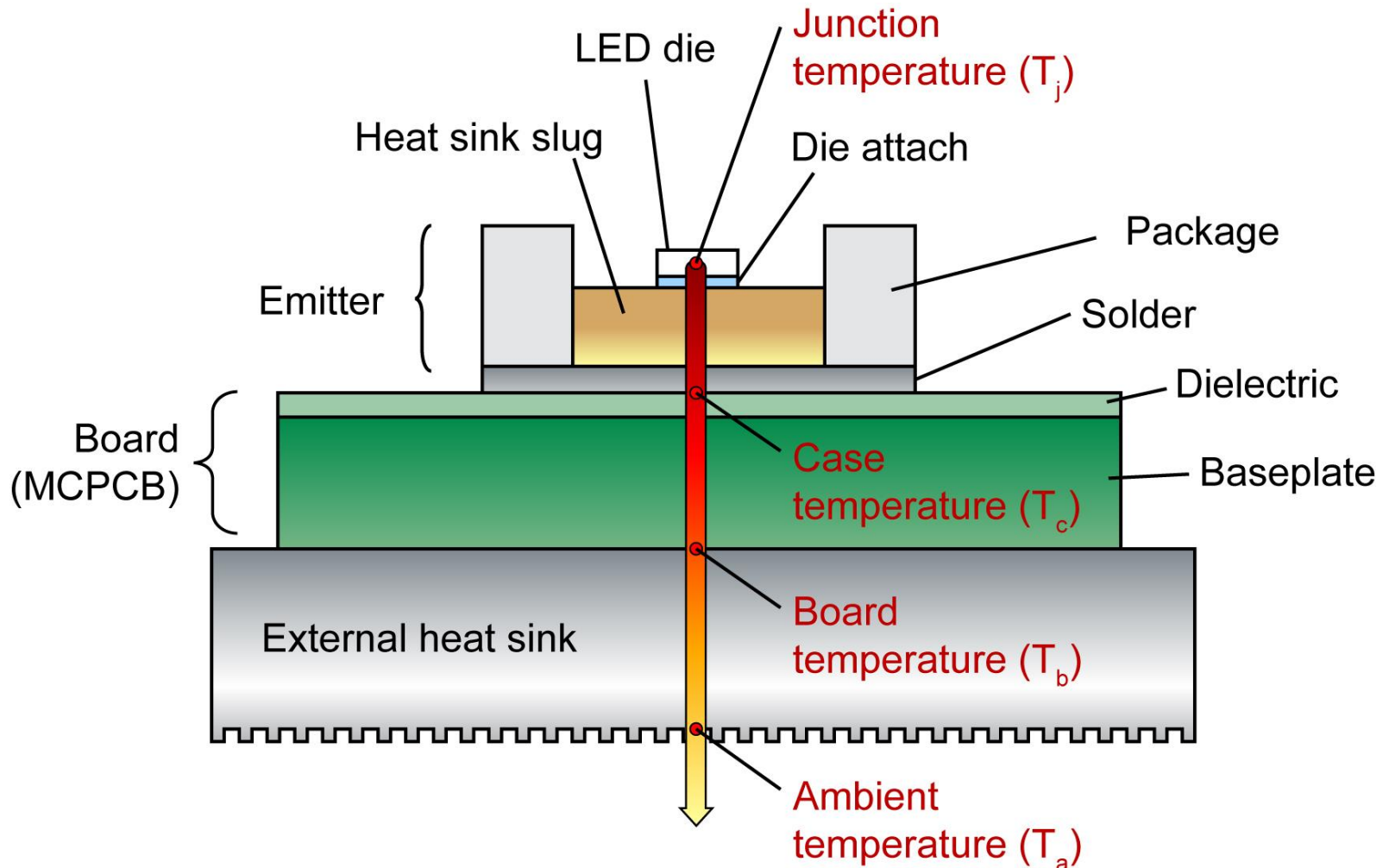
Source: Roland Haitz & Lumileds

Reliability - A Luminaire is a System

The failure of any one component can cause the entire system to stop functioning

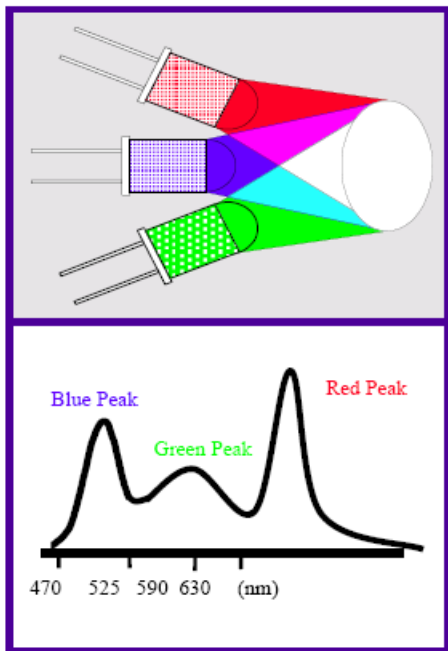


Components of an LED



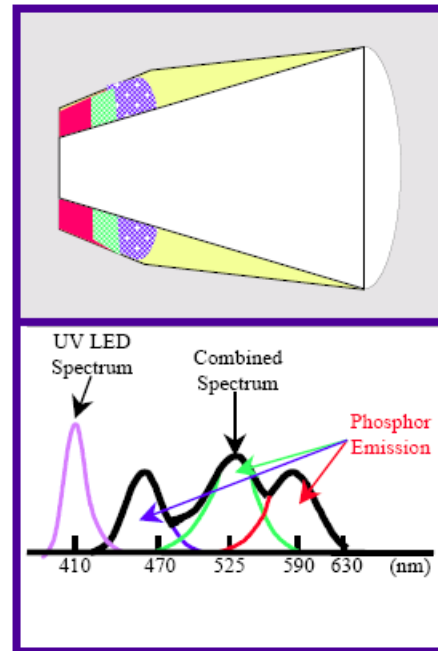
How do we make white light?

Red + Green + Blue LEDs



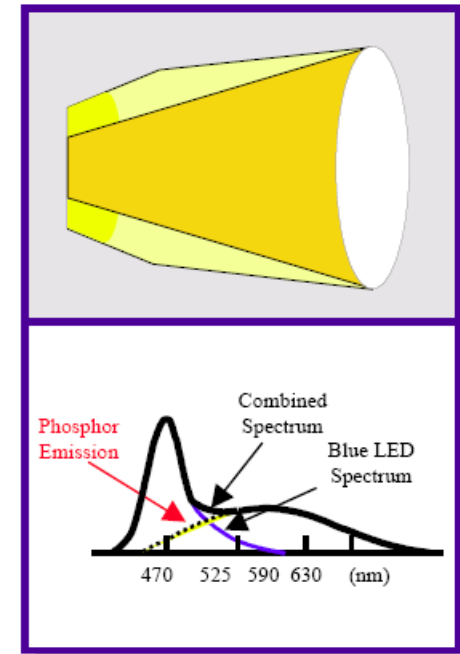
- Dynamic color tuning
- Excellent color rendering
- Large color gamut

UV LED + RGB Phosphor



- White point tunable by phosphors
- Excellent color rendering
- Simple to create white

Blue LED + Yellow Phosphor



- Simple to create white
- Good color rendering

Courtesy: Lumileds



LED Streetlights for a Sustainable Cleveland

Better Buildings Summit

May 8, 2014

Matthew Gray



SUSTAINABLE CLEVELAND
TOGETHER, WE'RE BUILDING A THRIVING
GREEN CITY ON A BLUE LAKE

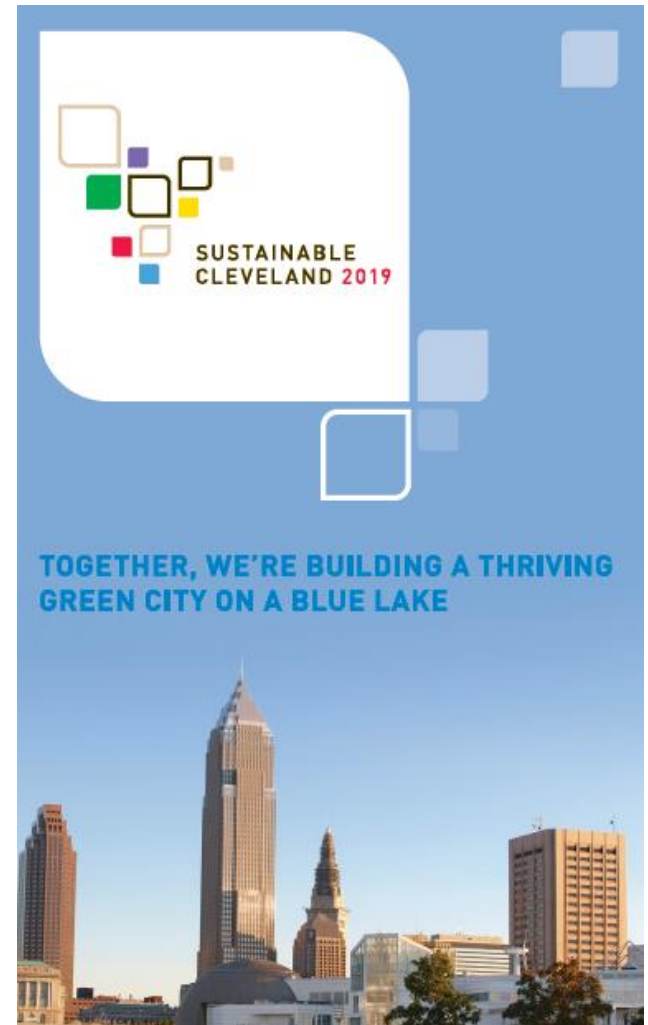


CITY OF CLEVELAND
Mayor Frank G. Jackson

Agenda



- Sustainable Cleveland 2019
- Municipal Action Plan
- Tracking Use, Cost, and Progress
- LED Streetlight Pilot
- Q&A





Mayor Jackson's Vision

- Together, we're Building a Thriving Green City on a Blue Lake
- Integrate sustainability into the City of Cleveland's municipal operations, our residents' lives and the priorities of our corporate and institutional partners



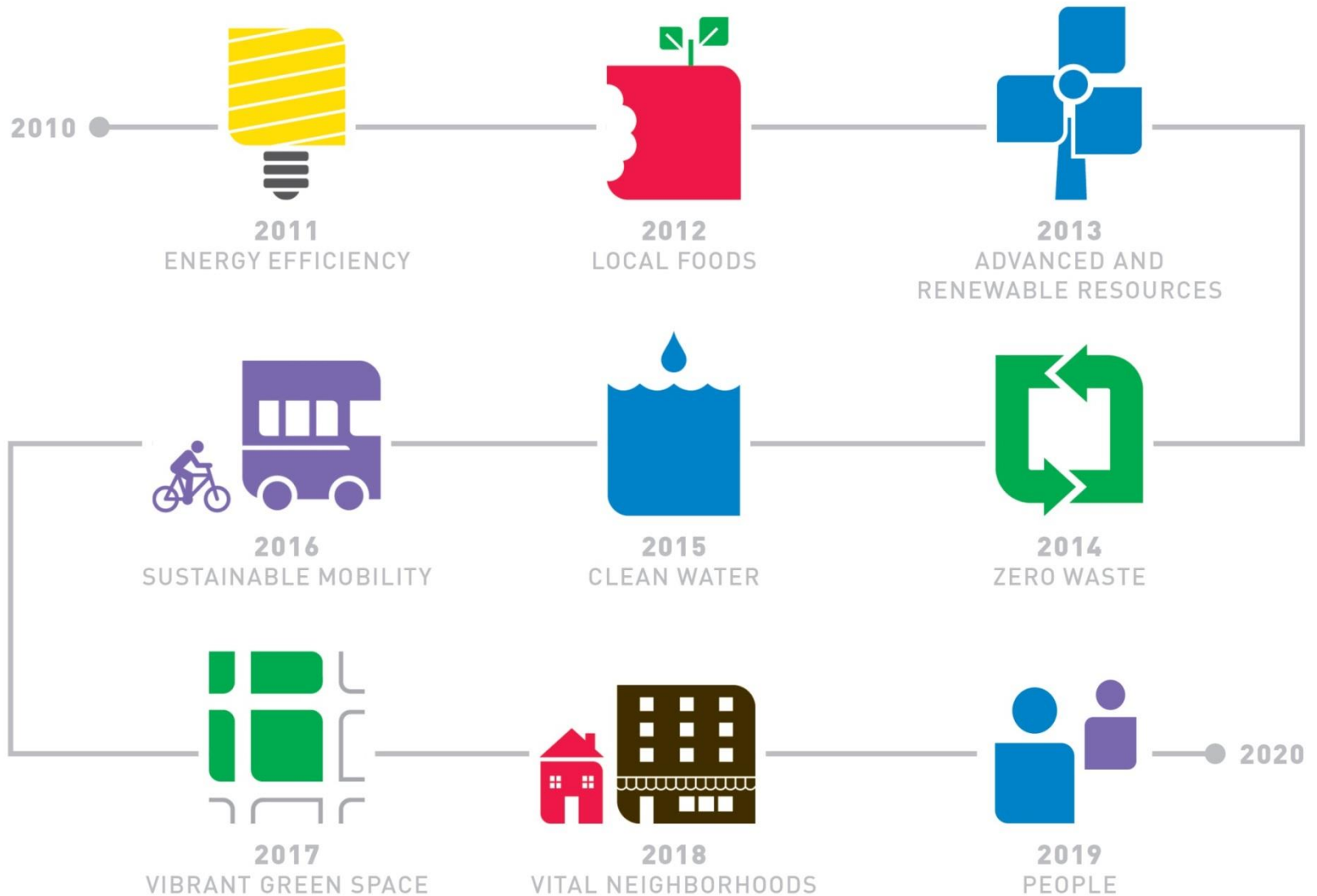
1969



2019: Surprise and Amaze with our Transformation



Celebration Years







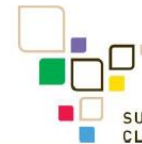
SUSTAINABLE CLEVELAND MUNICIPAL ACTION PLAN

EXECUTIVE SUMMARY

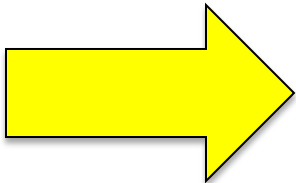
October 2013



CITY OF CLEVELAND
Mayor Frank G. Jackson



SUSTAINABLE
CLEVELAND 2019



Purpose of the SC-MAP

Work with all City departments to create goals, actions, and policies that are both bold and achievable:

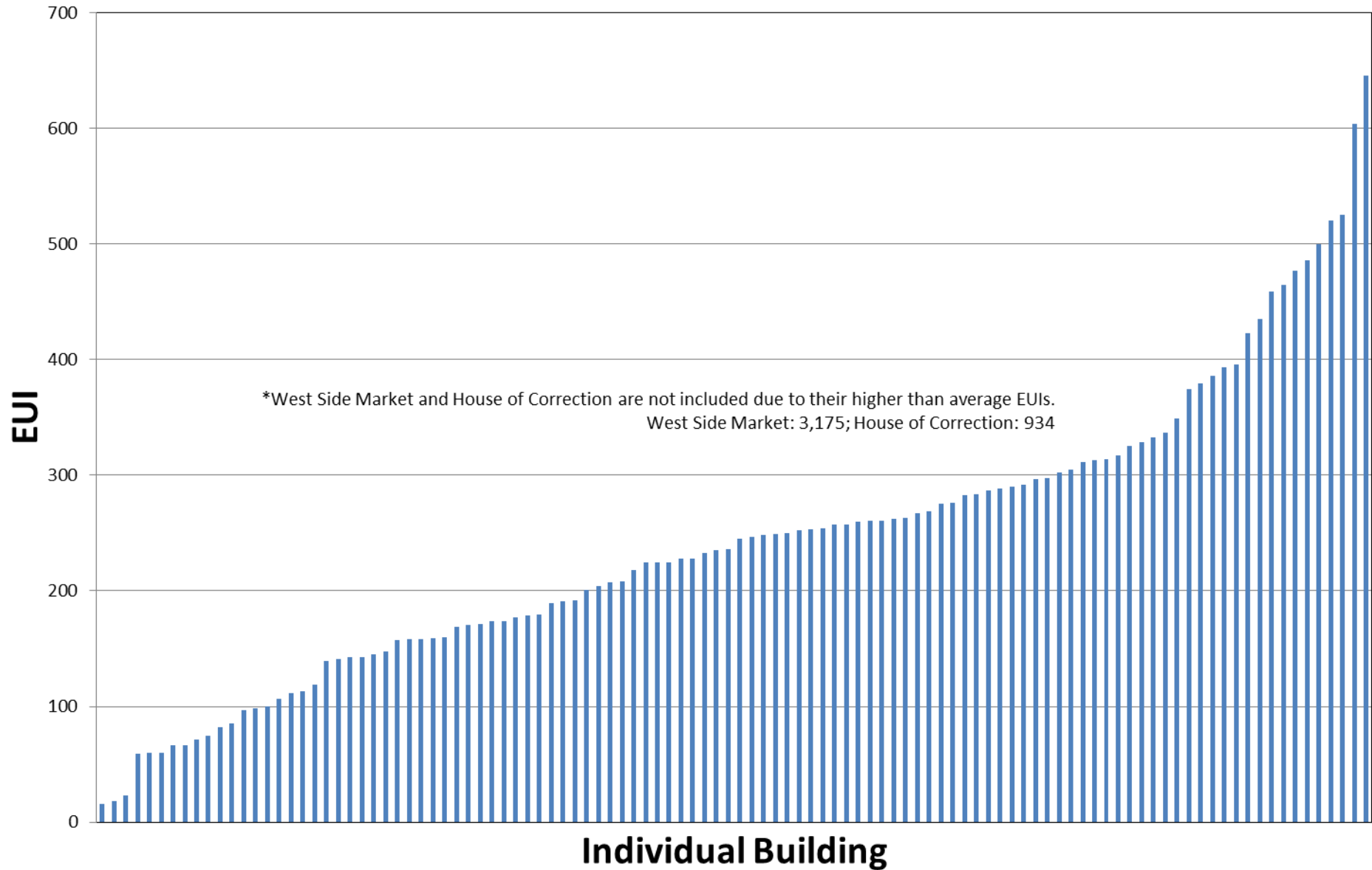
- Lower City energy costs for heating, cooling, and lighting
- Reduce fleet motor vehicle fuel costs and emissions
- Reduce waste generation and increase landfill diversion rates
- Lower water costs and consumption while improving water quality
- Increase employee satisfaction, productivity, and health
- Unite the City's many sustainability initiatives under one cohesive plan of action to create efficiencies/synergies
- Engage employees in the City's sustainability efforts
- Lead by example for the community and other cities

Sustainable Cleveland Municipal Action Plan (SC-MAP)

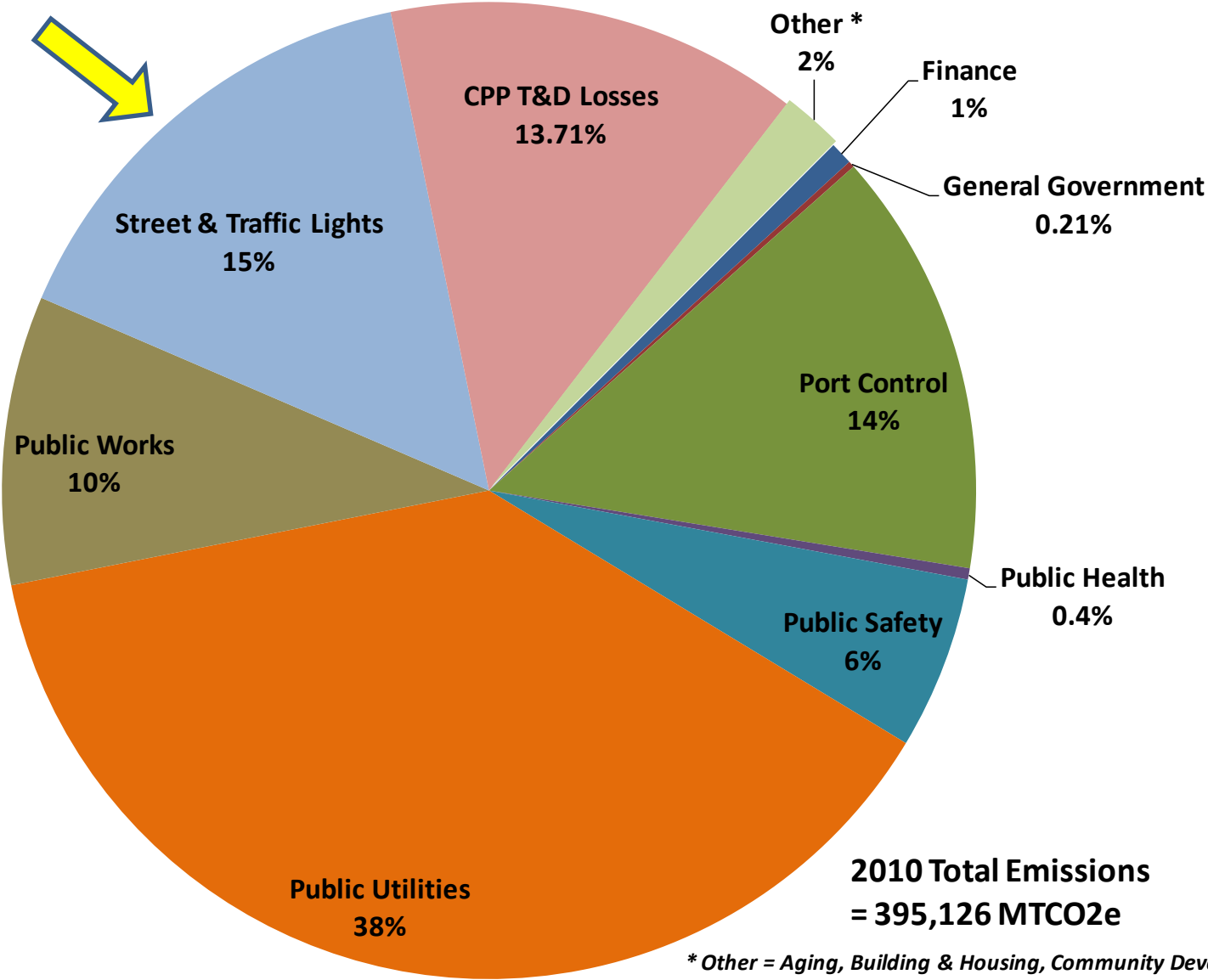
- 5 Focus Areas, 25 Actions
 - Design, Construction, Maint.
 - **Energy**
 - Transportation
 - Water
 - Materials Mgmt & Purchasing
- GHG emissions reduction below 2010 baseline:
 - 2016: 10%
 - 2020: 20%
 - 2030: 45%



Current EUIs (kBtu/sq ft) of City of Cleveland Buildings Included in BBC*

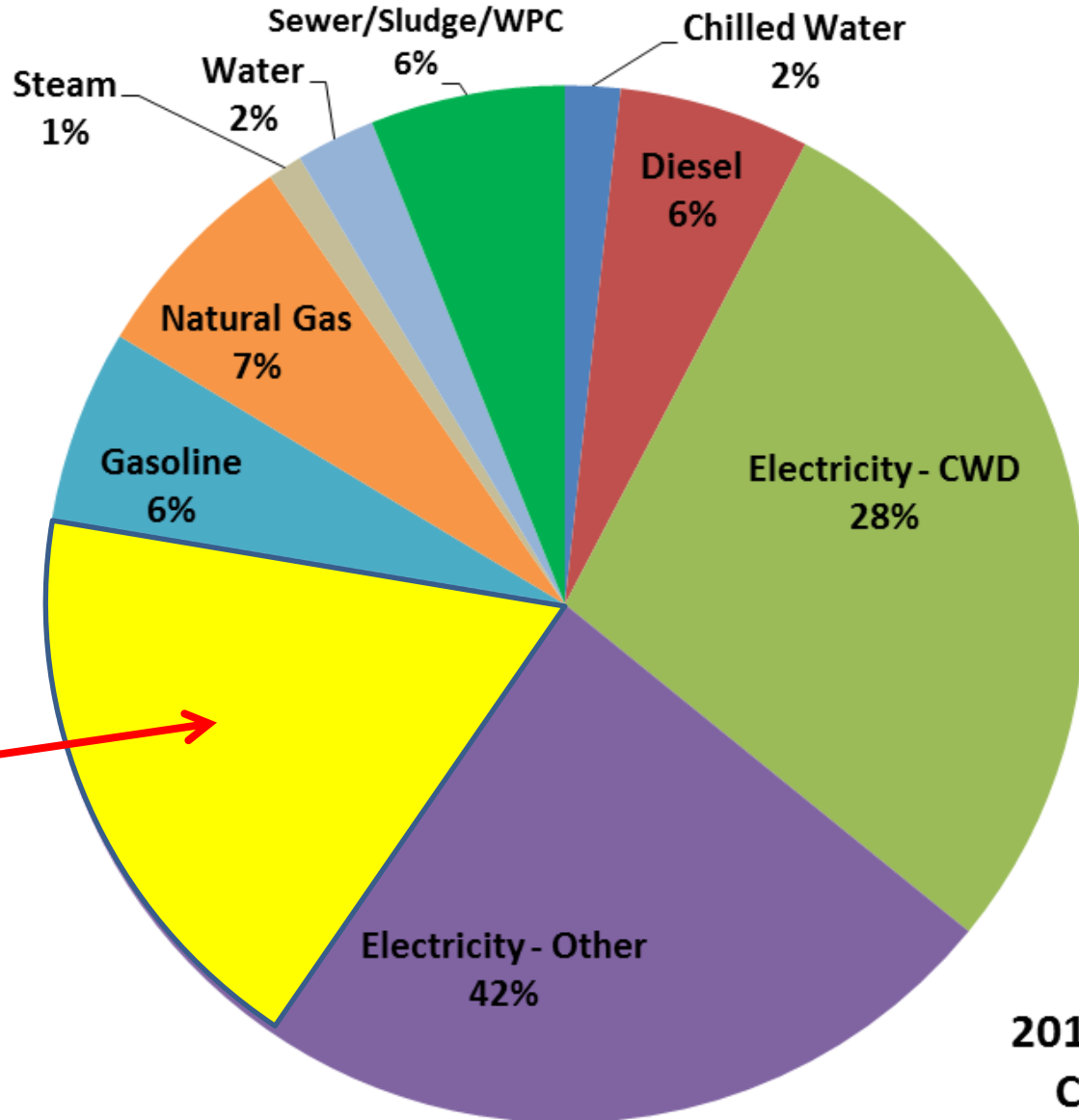


Annual Municipal GHG Emissions



** Other = Aging, Building & Housing, Community Development, Economic Development, Law, and Office of Capital Projects Departments + Municipally Financed Travel, Commuting, and Solid Waste*

City Utility Costs



**67,000
Streetlights
=
\$13.5
million
=
21% of
spend**

**2010 Total
Cost =
\$64,172,754**

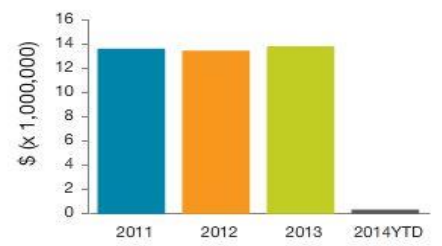
- Buildings
 - City of Cleveland
 - Aging (Department)
 - Building & Housing (Department)
 - Community Development (Department)
 - Finance (Department)
 - General Government (Department)
 - Law (Department)
 - Office of Capital Projects
 - Outliers
 - Port Control (Department)
 - Public Health
 - Public Safety
 - Public Utilities
 - Public Works (Department)
 - Streetlights & Traffic Lights
 - Streetlights
 - CPP Streetlights
 - Lakeside Ave Streetlights
 - Shaker Square Streetlighting
 - W. 140th Streetlights
 - Traffic Lights
 - Courts
 - State of Ohio
 - Unknown

Summary Commodity Monthly Greenhouse Gas

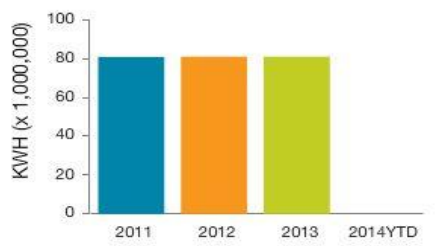
Fiscal Year Summary (FY ends in Dec of year shown) Last updated: 04/22/2014 1:33:49 AM

Electric

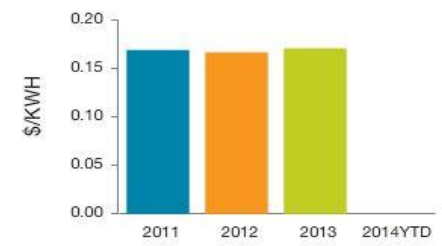
Total Cost Summary



Total Use Summary



Unit Cost Summary



Daily Average Cost

Percentage Change from Previous Year To Current Year

Current Year: Mar 2013 - Feb 2014
\$32,192.48

Previous Year: Mar 2012 - Feb 2013
\$36,944.47

12.8 %

Daily Average Usage

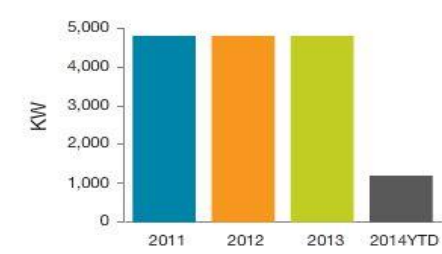
Percentage Change from Previous Year To Current Year

Current Year: Mar 2013 - Feb 2014
184,677.97 KWH

Previous Year: Mar 2012 - Feb 2013
221,489.33 KWH

16.6 %

Total Demand Summary



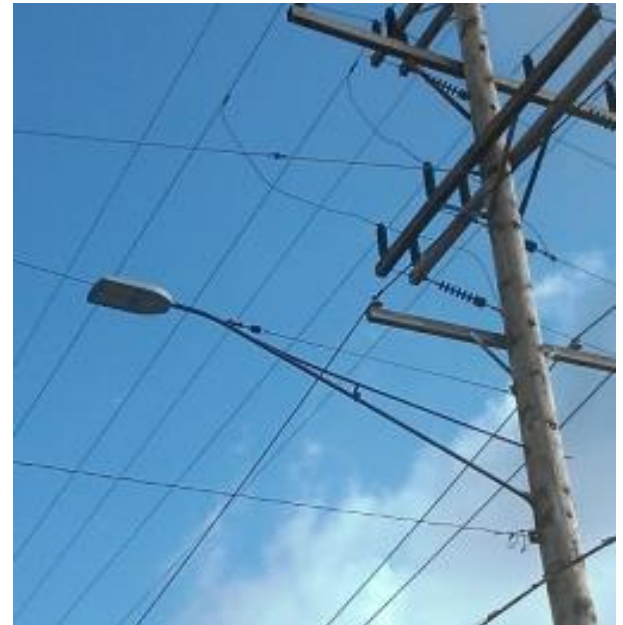
LED Streetlight Pilot with Cleveland Public Power



- Approx. 800 streetlights replaced
 - 360 LED Streetlights from DOE's EECBG program
 - 320 LED Streetlights funded by CPP
 - Approx. 150 installed downtown (donated)
- In-house installation completed in April 2013
- Metered savings for M&V in progress
- Replaces 150, 250, 400 W HPS Streetlights

LED Pilot with Cleveland Public Power (cont.)

- CPP is currently testing 15 different streetlight vendors
- All product types are roadway, no post top units tested
- All vendors required to meet or exceed minimum specs, e.g. 40% savings, 4500CCT (± 500 CCT), ≥ 75 CRI and 5yrs warranty
- The pilot is a two year program and ends May of 2015



LED Streetlights – Next Steps

1. Measure energy use/savings and evaluate effectiveness of pilot project.
2. Based on pilot, develop standard Cleveland streetlight specification.
3. Seek creative financing options.
4. Seek new city legislation/ordinance for debt service.
5. Continue rolling out LED streetlights city-wide.



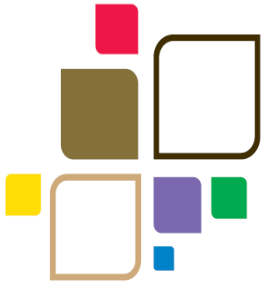
*When we reduce energy consumption,
We are Sustainable, Cleveland.*

CLE has replaced over a thousand traditional light fixtures with LED fixtures in its terminal, concourses, stairwells, garages, parking lots, roadways, and airfield.

**CLEVELAND[®]
AIRPORT SYSTEM**

**SUSTAINABLE
CLEVELAND 2019**

Together, we're building a thriving green city on a blue lake.
LEARN MORE, DO MORE AT SUSTAINABLECLEVELAND.ORG



Thank You

Matt Gray

Director, Mayor's Office of Sustainability

City of Cleveland

mgray@city.cleveland.oh.us

Join us at:

www.SustainableCleveland.org

Smart **LIGHTS** for Smart **CITIES**



High Efficiency Lighting Project **Kansas City Region** **DOE EECBG grant recipient**

Better Buildings Summit

May 8, 2014

Presentation Outline

- Background – strategy employed.
- Project results.
- Challenges.
- Main take-aways.
- Lessons learned.
- Next steps.



Smart Lights for Smart Cities

- **25 participating communities** with three utility companies using HPS and MH lights.
- **Initial deployment** of high-efficiency streetlight technologies (LED).

From this...

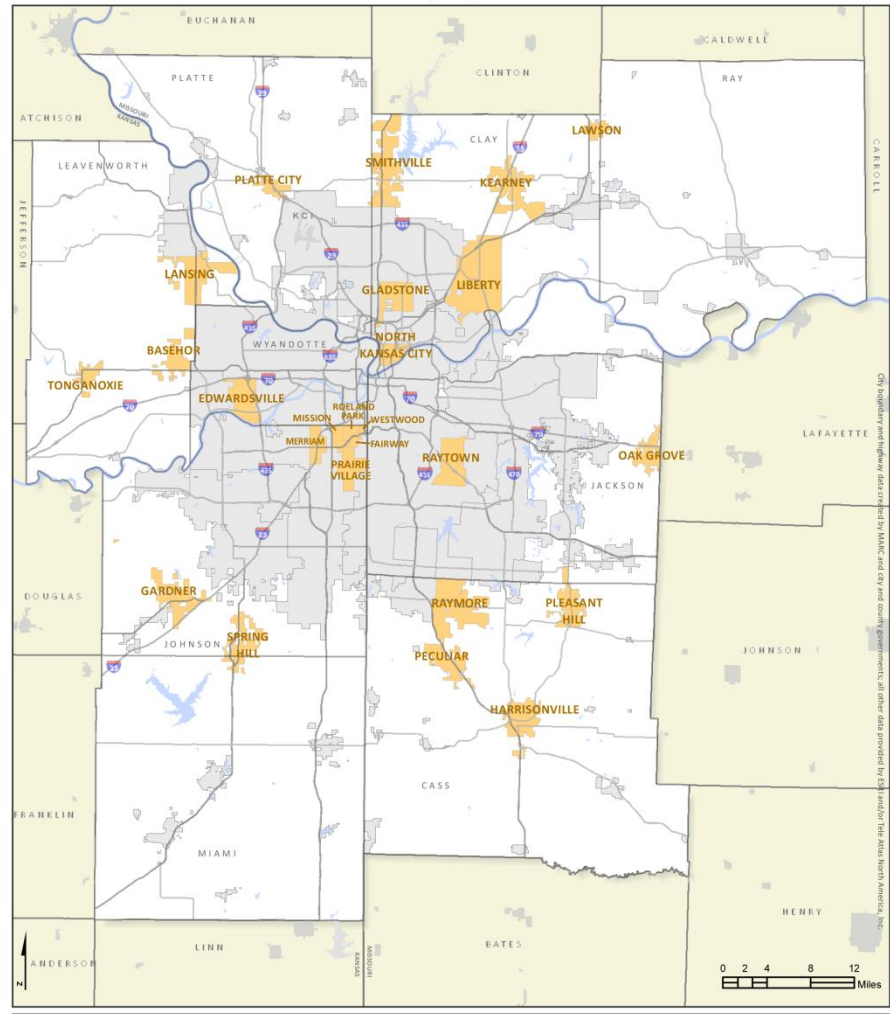


To this...

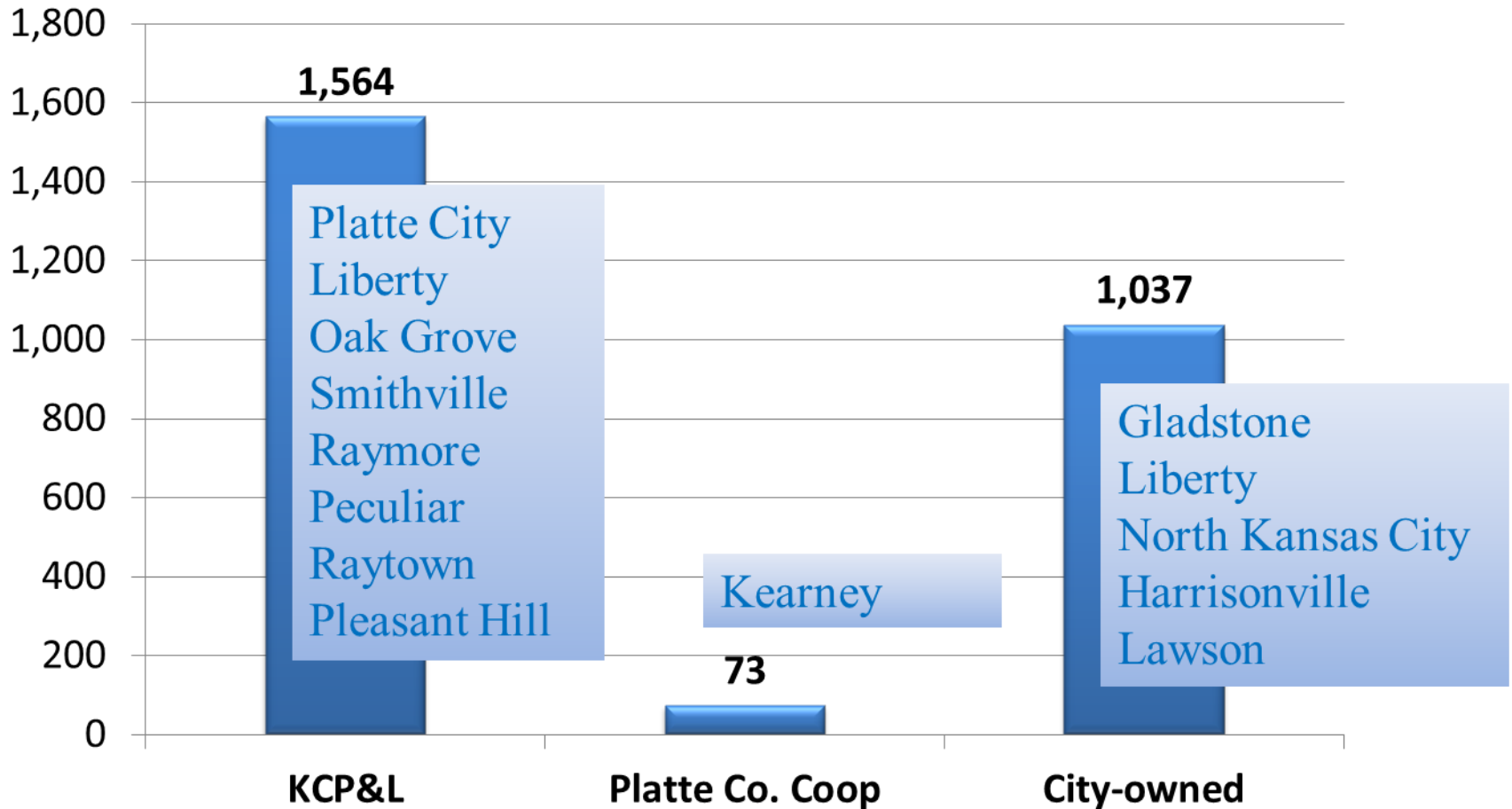


KC Metro Installation Areas

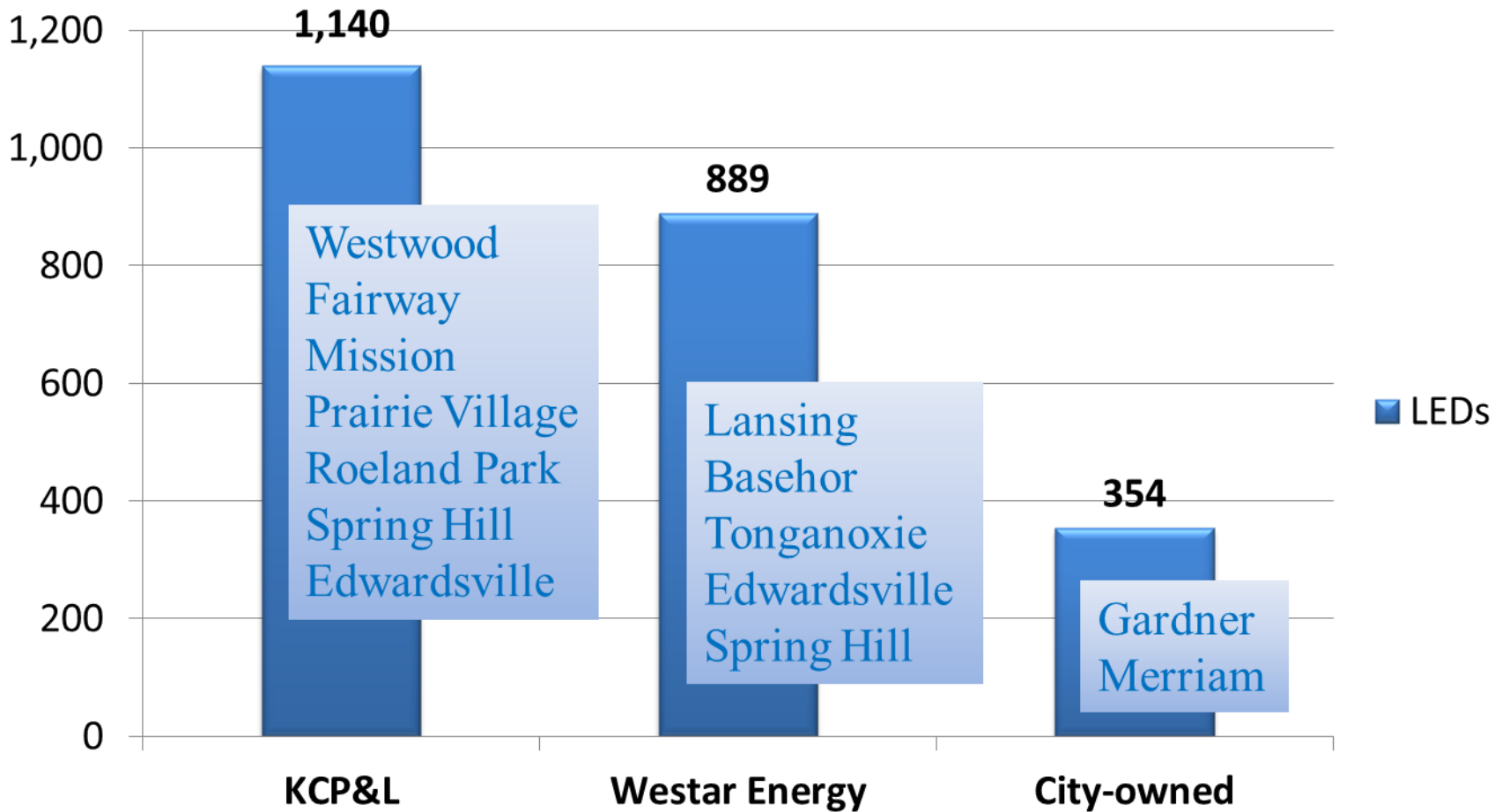
- Streetlights installed in main streets, commercial and residential areas.
- Cities and utilities maintain, monitor and share data.



Missouri LED Installations by Utility Provider and Community



Kansas LED Installations by Utility Provider and Community



Strategy Employed

- Convened partners – developed specifications.
- Issued RFP - 15 proposals.
- Nine installed for review.
- Five vendors selected.
- Cities selected vendor(s) of choice.
- Lights installed 2011-2012.
- Monitored result.



Strategy (continued)

- Three electric utility partners.
- Presented to Kansas and Missouri Public Service Commissions.
- Received LED pilot tariff (slightly lower cost).
- Utilities committed to seek permanent tariff.



Project Results

- 5,753 high efficiency streetlights purchased/ installed.
- 55-61 percent energy savings documented.
- Pilot LED tariff approved in two states.
- Stakeholder and community outreach – feedback from five focus groups, online discussion.
- Received low number of complaints, high percentage of feedback was positive.
- Cities' staff well satisfied with results.

Challenges

- Majority of participating cities did not own streetlights – Leased through utility companies.
- PSC slow in approving pilot tariff applications.
- Pilot tariff did not include significant cost saving potential.
- PSC and utility companies have conservative adoption strategies.

Main take-aways

- Technology has further improved over time.
- Prices have continued to decrease.
- Energy savings documented.
- PSC need to adopt progressive tariffs for LED streetlights.



Lessons Learned

- LED technology is more accepted – cost of maintenance is still an issue.
- Cities need to purchase streetlights from utilities to fully benefit for LED project.
- Tariffs need to be renegotiated in favor of cities receiving cost savings.



What has happen since close of grant

- Three cities have finalized the purchase of their streetlights with a three-year payback.
- Three cities have plans to purchase lights in 2015.
- Three large cities have started the process of converting to LED lights.



Thank You

Georgia Nesselrode

Director of Local Governmental Services

816-701-8207

gnessel@marc.org





Questions or Comments



High Performing Street and Area Lighting Upgrades



Penni Redford

Sustainability Manager

City of West Palm Beach, Florida



Target and Commitment



*Sustainability Action
Plan*



▼ 19%

GHG

City Operations
by 2018

over 2008 baseline

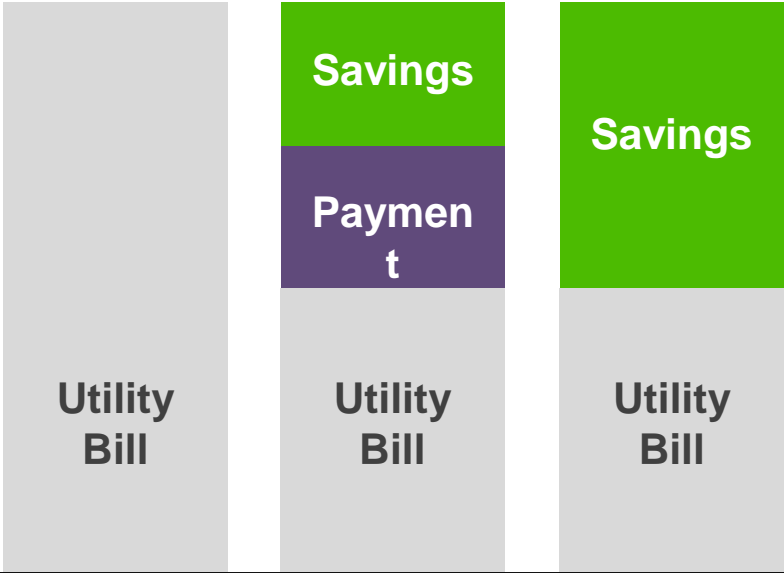
▼ 20%

EUI

by 2020

over 2010 baseline

Performance Contract



Current

Finance
Period

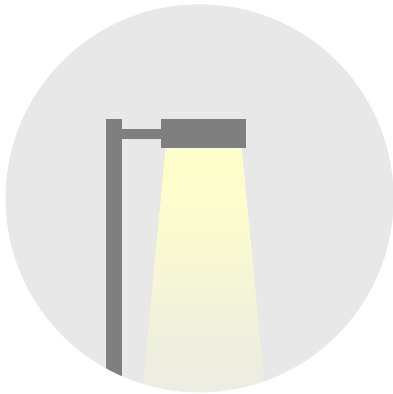
After
Payoff

Collaboration with FPL

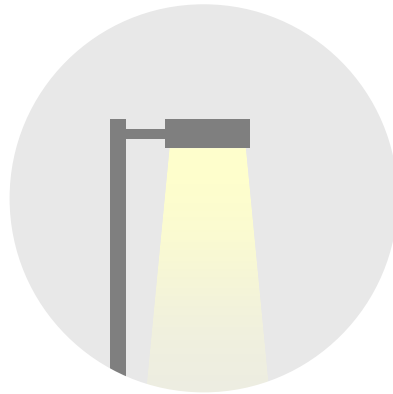


- First ever LED retrofit project for Florida Power and Light (FPL)
- FPL reduced tariffs using the decorative lighting agreement
- FPL evaluated LED technology and performed engineering study

Control Over Streetlights



City



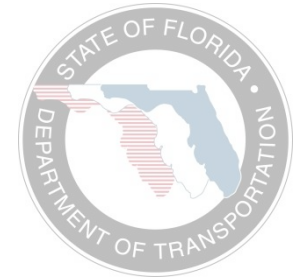
Utility



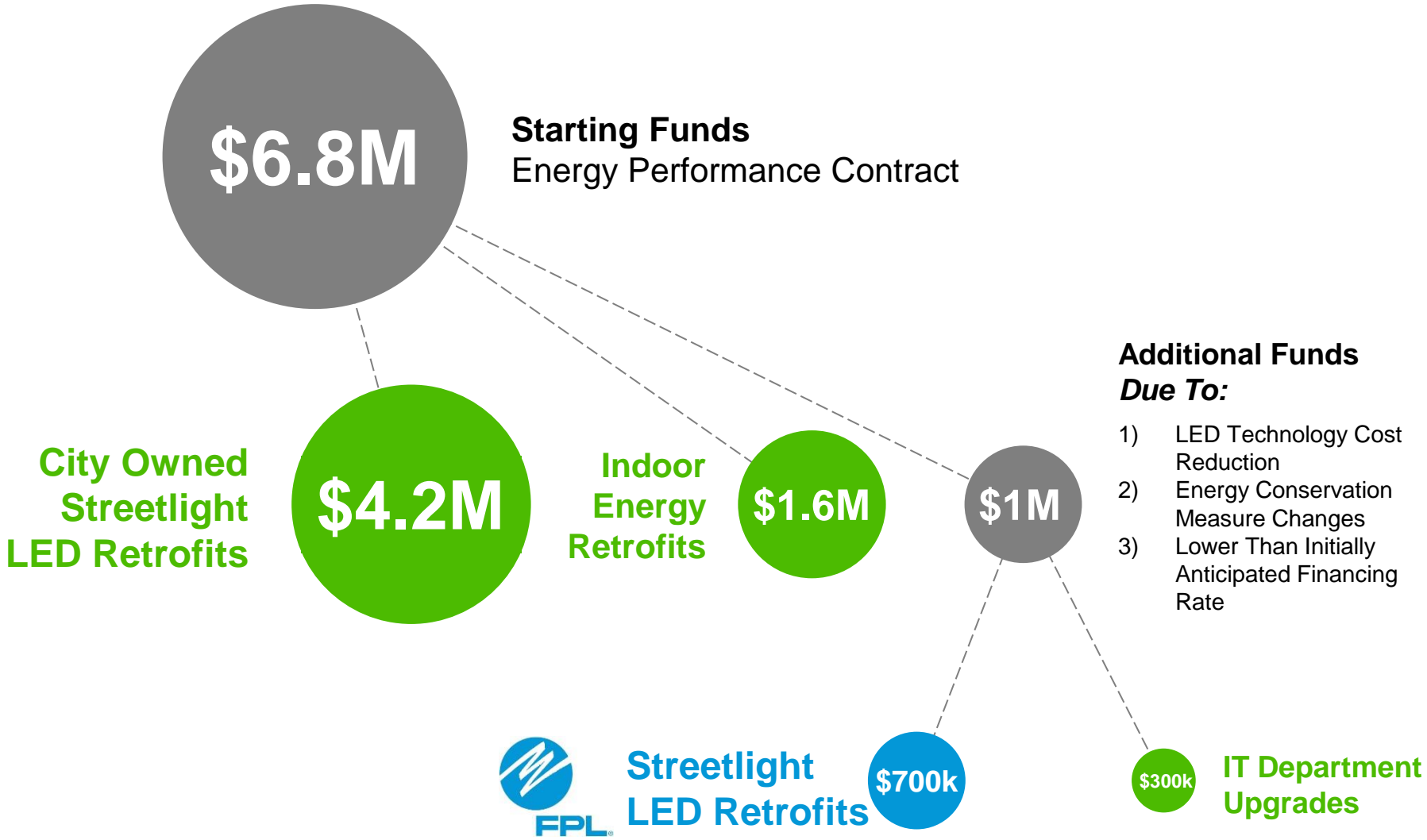
County



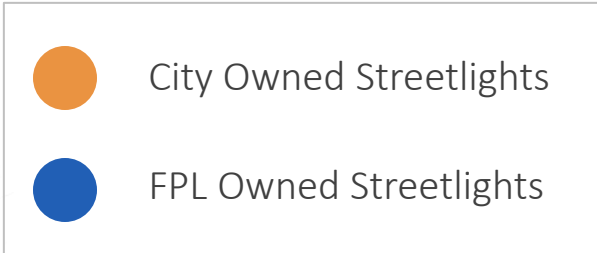
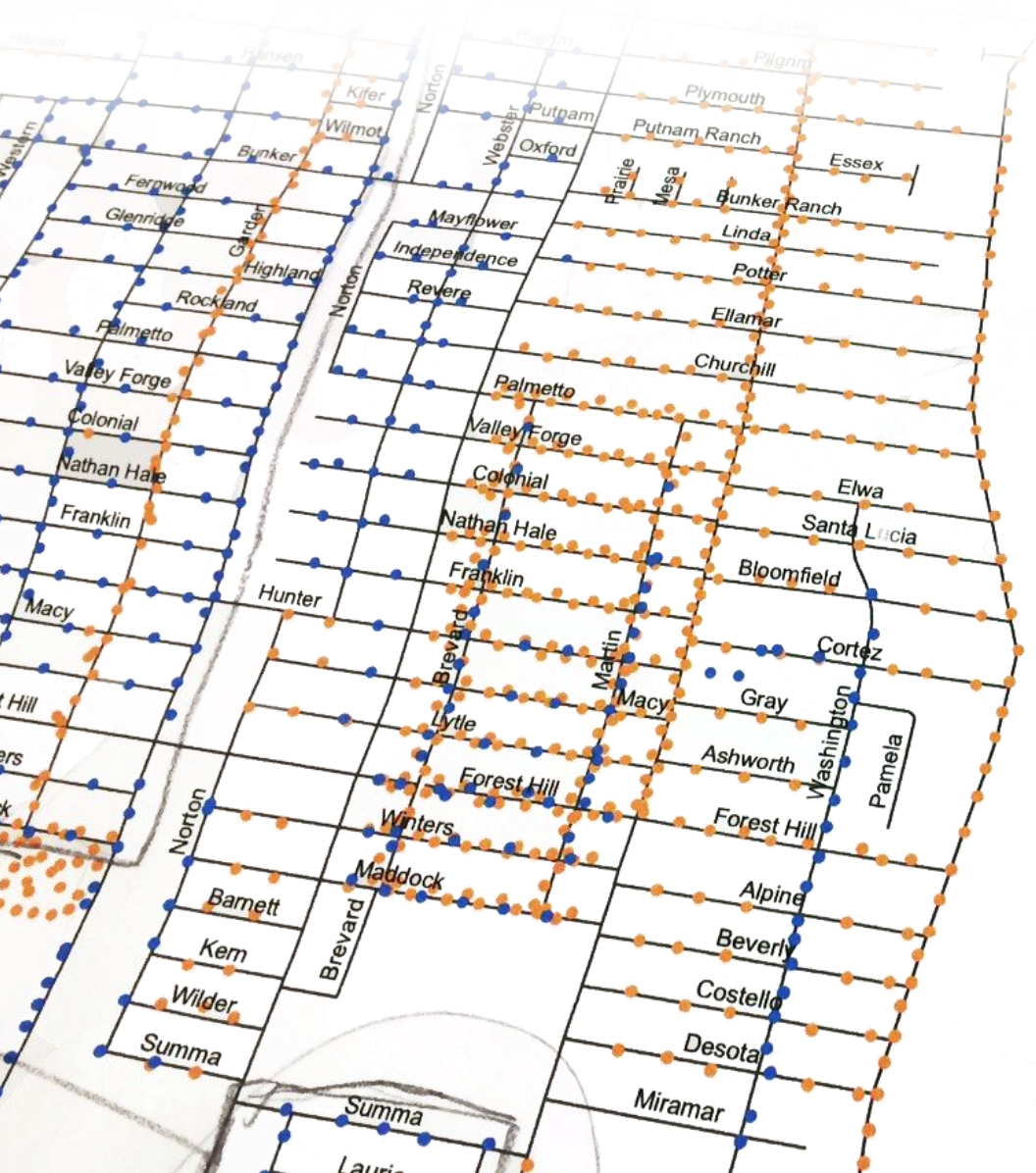
FDOT



Project Financing



FPL Phase Selection



FPL Phases



- Started with Phase 1 (Coleman Park) in November 2013
- All 7 Phases Completed in September 2014

FPL Agreement



Decorative Streetlighting Non-Refundable Deposit Invoice

August 26, 2013

0

Penni Redford
Sustainability Manager
401 Clematis St
West Palm Beach, FL 33401

Re: DSL Invoice ----->

Project Information
Replace HPSV to LED street lights
City of West Palm Beach
0
0

Total Project Cost	
Lump Sum:	\$364,678
Total Monthly Cost (Facility + Maintenance + Energy)	*Franchise fees and taxes not included
*Lump Sum (M+E):	\$18,735
Product Information	
Fixture Information (# and type):	1,000 Cree 41w LED XSP1-D 3,701 Lumens
Pole Information (# and type):	1,000 Existing FPL Pole
Construction Information	
Will Cust. Install conduit?	No
Linear Trench Footage:	0
Linear Bore Footage:	0
Will Cust. Bore?	No

This preliminary cost estimate for approximately **\$364,678.14** includes basic project information, and does not account for all aspects of construction (e.g., restoration). In order to proceed with a more detailed cost estimate, a non-refundable deposit for a detailed estimate in the amount of **\$7,294.00** will be required. Upon completion of the project, this deposit amount will be credited to your decorative streetlight account. This invoice becomes null and void after 180 days from invoice date.

Please remit your payment to:

Florida Power & Light Company
810 Charlotte Ave
West Palm Beach, FL 33401
Bill Thomas

If you have any questions about this estimate, or need additional information on FPL's Decorative Street Lighting Program, please contact me at 561-616-1628

Sincerely,

Bill Thomas
SR Technical Specialist

FPL Agreement



CITY'S ORIGINAL

FPL Account Number: 97521-21110
FPL Work Order Number: 5258404

STREET LIGHTING AGREEMENT

In accordance with the following terms and conditions, City of West Palm Beach (hereinafter called the Customer), requests on this 24 day of September, 2013, from FLORIDA POWER & LIGHT COMPANY (hereinafter called FPL), a corporation organized and existing under the laws of the State of Florida, the following installation or modification of street lighting facilities at (general boundaries) Coleman Park located in West Palm Beach, Florida.
(city/county)

(a) Installation and/or removal of FPL-owned facilities described as follows:

Fixture Rating (in Lumens)	<u>Lights Removed</u> Fixture Type	# Removed
9500	Cobra Head	166

(b) Modification to existing facilities other than described above (explain fully): _____

That, for and in consideration of the covenants set forth herein, the parties hereto covenant and agree as follows:

FPL AGREES:

- To install or modify the street lighting facilities described and identified above (hereinafter called the Street Lighting System), furnish to the Customer the electric energy necessary for the operation of the Street Lighting System, and furnish such other services as are specified in this Agreement, all in accordance with the terms of FPL's currently effective street lighting rate schedule approved by the Florida Public Service Commission (FPSC) or any successive street lighting rate schedule approved by the FPSC.

THE CUSTOMER AGREES:

- To pay a contribution in the amount of ~~\$11,620.00~~ prior to FPL's initiating the requested installation or modification.
- To purchase from FPL all of the electric energy used for the operation of the Street Lighting System.
- To be responsible for paying, when due, all bills rendered by FPL pursuant to FPL's currently effective street lighting rate schedule on file at the FPSC or any successive street lighting rate schedule approved by the FPSC, for facilities and service provided in accordance with this agreement.
- To provide access, final grading and, when requested, good and sufficient easements, suitable construction drawings showing the location of existing and proposed structures, identification of all non-FPL underground facilities within or near pole or trench locations, and appropriate plats necessary for planning the design and completing the construction of FPL facilities associated with the Street Lighting System.
- To perform any clearing, compacting, removal of stumps or other obstructions that conflict with construction, and drainage of rights-of-way or easements required by FPL to accommodate the street lighting facilities.

Total work order cost is: \$ 11,620.00

In accordance with the following terms and conditions, City of West Palm Beach (hereinafter called the Customer), requests on this 24 day of September, 2013, from FLORIDA POWER & LIGHT COMPANY (hereinafter called FPL), a corporation organized and existing under the laws of the State of Florida, the following installation or modification of street lighting facilities at (general boundaries) Coleman Park located in West Palm Beach, Florida.
(city/county)

(customer), requests

ized and existing
man Park,

FPL Agreement



Matter 03017.007

CITY'S ORIGINAL

FPL Account Number: N/A
 FPL Work Order Number: 5254854

PREMIUM LIGHTING AGREEMENT

In accordance with the following terms and conditions, City of West Palm Beach (hereinafter called the Customer), requests on this 25TH day of September, 2013, from FLORIDA POWER & LIGHT COMPANY (hereinafter called FPL), a corporation organized and existing under the laws of the State of Florida, the following installation or modification of premium lighting facilities at (general boundaries) Colman Park-Palm Bch Lakes Blvd - 25th St, located in West Palm Beach / Palm Beach, Florida.
(city/county)

(a) Installation and/or removal of FPL-owned facilities described as follows:

Lights Installed		
Fixture Rating (in Lumens)	Fixture Type	# Installed
4,806 Lumens	53watt Led	142
9,612 Lumens	101watt Led	24

removed

FPL AGREES:

- To install or modify the premium lighting facilities described and identified above (hereinafter called the Premium Lighting System), furnish to the Customer the electric energy necessary for the operation of the Premium Lighting System, and furnish such other services as are specified in this Agreement, all in accordance with the terms of FPL's currently effective Premium Lighting rate schedule on file at the Florida Public Service Commission (FPSC) or any successive Premium Lighting rate schedule approved by the FPSC.

THE CUSTOMER AGREES:

- To purchase from FPL all of the electric energy used for the operation of the Premium Lighting System.
- To be responsible for paying, when due, all bills rendered by FPL pursuant to FPL's currently effective Premium Lighting rate schedule approved by the FPSC, for facilities installed under this Agreement.
- To provide access, final grading and, when requested, good and sufficient easements, suitable for the installation and operation of the Premium Lighting System, including identification of all non-FPL underground facilities within or near the site necessary for planning the design and completing the construction of FPL facilities associated with the Premium Lighting System.
- To perform any clearing, compacting, removal of stumps or other obstructions that conflict with construction, and drainage of rights-of-way or easements required by FPL to accommodate the premium lighting facilities.

Total work order cost is \$ 62,548.00

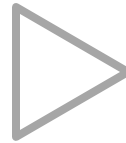
FPL Rate Adjustment Example



150
Watt
HPS

Reg. Eng.	\$1.50
Non Eng.	\$5.48
Fuel	\$1.62
Storm Chrg.	\$0.41
Fran.	\$0.56
Other Fees	\$0.39

\$9.96
*Per Light
Per Year*



53
Watt
LED

Reg. Eng.	\$0.47
Non Eng.	\$1.32
Fuel	\$0.51
Storm Chrg.	\$0.13
Fran.	\$0.15
Other Fees	\$0.13

\$2.71
*Per Light
Per Year*

Project Summary



Select Figures

1,451 Streetlights
Retrofitted with LEDs

\$711,276 Total Cost of LED
Streetlight Retrofits

7 Phases to Install LED
Lights

5 Months to Complete
Retrofits

Estimated Annual Savings

55% Reduction in kWh
and GHG Emissions

373,900 Electricity
Consumption (kWh)

407 Greenhouse Gas
Emissions (MT CO₂e)

34,700 Billing (\$)

Before and After Photos

Before

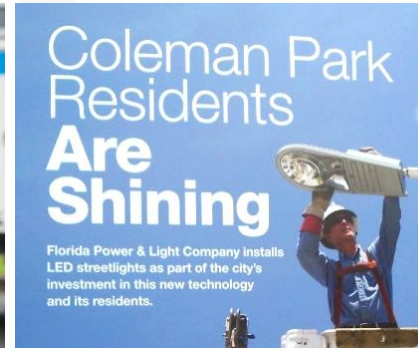


After



Coleman Park

December 2nd, 2013 Event



Coleman Park Event Video



FPL Video

<http://www.youtube.com/watch?v=EWA3zSe0KHk>



High Performing Street and Area Lighting Upgrades



Penni Redford

Sustainability Manager

City of West Palm Beach, Florida

