



# Overcoming Barriers: Deploying High Efficiency Outdoor Lighting

Tuesday, 9:45-11:00  
AM



# Overcoming Barriers: Deploying High Efficiency Outdoor Lighting: Regional Streetlight Procurement Program (RSLPP)

*Liz Compitello*

*Senior Research Analyst*

*Delaware Valley Regional Planning Commission*

*May 10, 2016*



# DVRPC

An aerial photograph of Philadelphia, Pennsylvania, showing the city skyline with numerous skyscrapers, a large body of water (the Schuylkill River), and surrounding suburban and rural areas under a clear blue sky.

Metropolitan Planning Organization  
for Greater Philadelphia Region

Bi-state, nine counties surrounding  
and including Philadelphia.

5.6 million residents

Planning areas

Transportation Planning, Air Quality,  
Smart Growth Planning,  
Environmental Planning, Housing  
and Economic Development,  
Population and Employment  
forecasts, Long Range Planning,  
*Energy Planning*

# The Perfect Storm for a Retrofit

## Technological

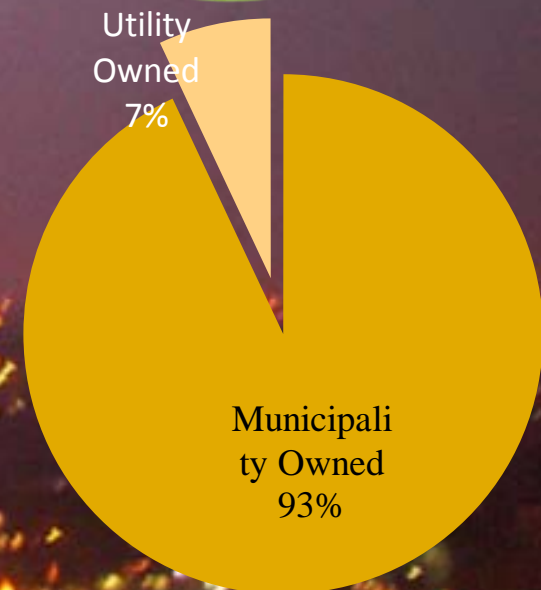
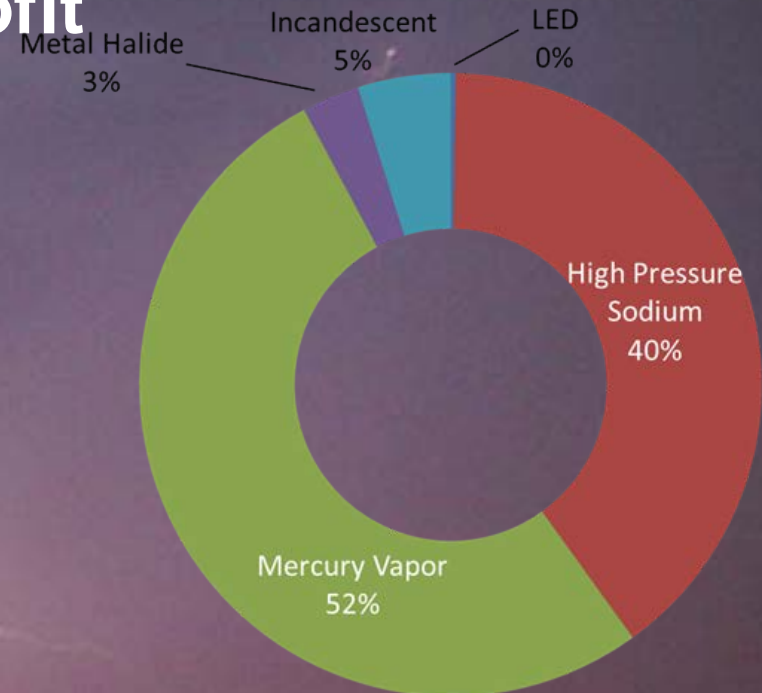
LED performance improvements  
Successful pilots in the region

## Regulatory

Municipal ownership of streetlights  
Utility recognition of LEDs

## Financial

LED costs dropping  
Pennsylvania Sustainable Energy  
Finance (PennSEF) Program





# Regional Streetlight Procurement Program

## Program Objective

Municipalities are able to access **energy performance contracting** to retrofit their entire street lighting systems to LED. The program will pool buying power to achieve economies of scale in purchasing and finance.

## Program Scope

Joint RFP

- i.d. a single ESCO for project design, procurement, and installation.
- Expert-vetted specification for streetlights through RFP process
- Transparent, competitive pricing

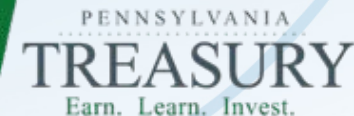
Common project timeline

Free basic audit and cost estimates

Guaranteed Savings Agreements

Pooled Procurement and Financing

## Project Partners



INGENUITY WELCOME

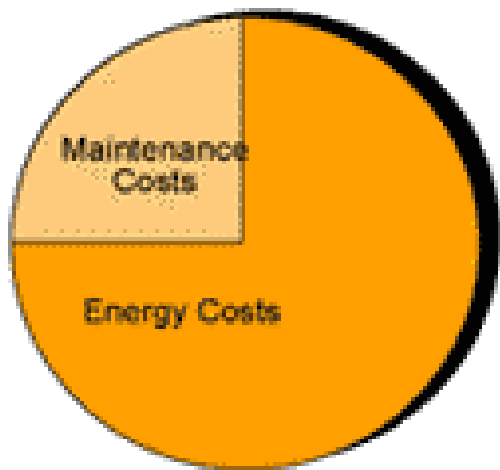


# Performance Contracting: A Simple Explanation

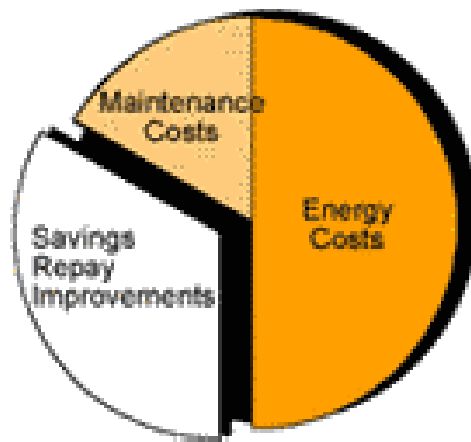
How do you re-invest in your municipal infrastructure with money you are already spending on utilities and external vendors.

The PA Guaranteed Energy Savings Act is a no-risk way to fund these improvements using future savings instead of capital reserves.

Before Improvements



After Improvements

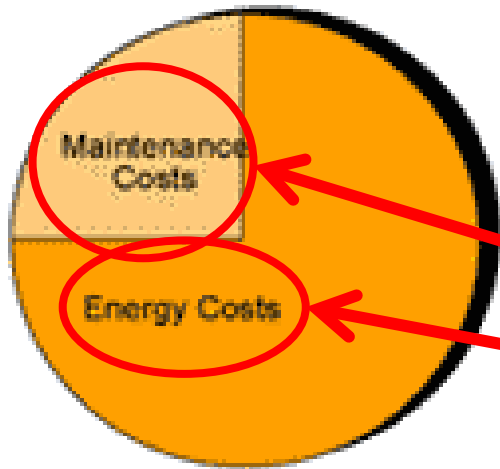


# Performance Contracting: A Simple Explanation

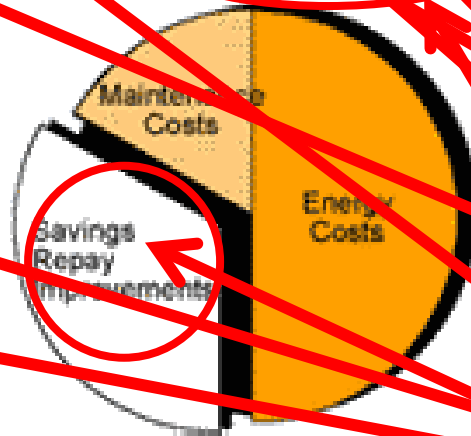
How do you re-invest in your municipal infrastructure with money you are already spending on utilities and external vendors.

The PA Guaranteed Energy Savings Act is a no-risk way to fund these improvements using future savings instead of capital reserves.

Before Improvements



After Improvements



# Municipal Street Lighting Projects



Energy Performance Contracting  
Design, procurement  
installation,  
Performance Guarantee, M&V



Unbiased technical support on street lighting best practices

Convener/facilitator  
Trusted municipal partner

Access to Financing

Unbiased Support on Energy Performance Contracting



PennSEF:





# Owners Agent – Program Technical Advisor

## Keystone Lighting Solutions

### Whole program services

- Assist with technical elements of RFP
- Developed common streetlight specification
  - Using MSSLC Model Specification-System Specification
- Review ESCO RFP proposals, comment and provide input on selection process
- Program design support
- Product design and pricing review

### One-on-one direct assistance to participants

- Scope defining, evaluating ESCO solutions and design



# Pennsylvania Sustainable Energy Finance Program

A collaborative partnership between the Pennsylvania Treasury and the Foundation for Renewable Energy and the Environment (FREE)

- In an effort to expand its investments in energy efficiency, PA Treasury secured a grant from the West Penn Power Sustainable Energy Fund in order to set up PennSEF with the goal of purchasing the bonds issued by the program
- FREE is a nationally recognized leader in sustainable energy and its team has already piloted the PennSEF model, financing over \$70 million in energy efficiency improvements in Delaware
- The FREE team includes Drinker Biddle & Reath as counsel and Becker Capital as financial advisor

# Key Program Features

- ✓ Prequalification of local and national energy service companies (ESCOs) through an RFQ process
- ✓ Standardized documentation that facilitates pooled financing – which lowers costs for ***all*** Participants
- ✓ Guaranteed Savings Agreement is a transparent construction contract with a strong guarantee and spells out a monitoring and verification (M&V) plan in detail
- ✓ Guarantee is based on energy and water savings alone – operational savings, deferred maintenance are a bonus
- ✓ FREE's legal, financial and technical team assists throughout negotiations



# Overcoming Barriers

## Barriers

## Solutions

No Upfront  
Capital / High  
Upfront Cost

- RFP ensured competitive, vetted pricing
- ESCO will procure all equipment and labor in bulk – municipalities achieve lower cost than what they can get on their own.
- **Energy savings guarantee.** No upfront cost required – all projects can be fully financed and paid back through energy and maintenance cost savings.

Access to  
Finance

- All project sizes have access to financing (\$20K-1.5M)
- Financing “subject to appropriation” – does not eat into debt limit
- Pooled Financing lowers cost of borrowing

Choosing LED  
Technology

- Common expert vetted specification in RFP
- Workshops, webinars
- Pilot phase, tours of existing projects in the region

# Overcoming Barriers

## Barriers

## Solutions

### Trusting an ESCO

- RFP allowed us to compare ESCOs apples to apples on pricing, quality
- PennSEF's Trusted Advisors work to ensure the 'guarantee' in the Guaranteed Savings Agreement
- ESCO oversight of design, communications, procurement by RSLPP team (DVRPC, KLS, PennSEF)

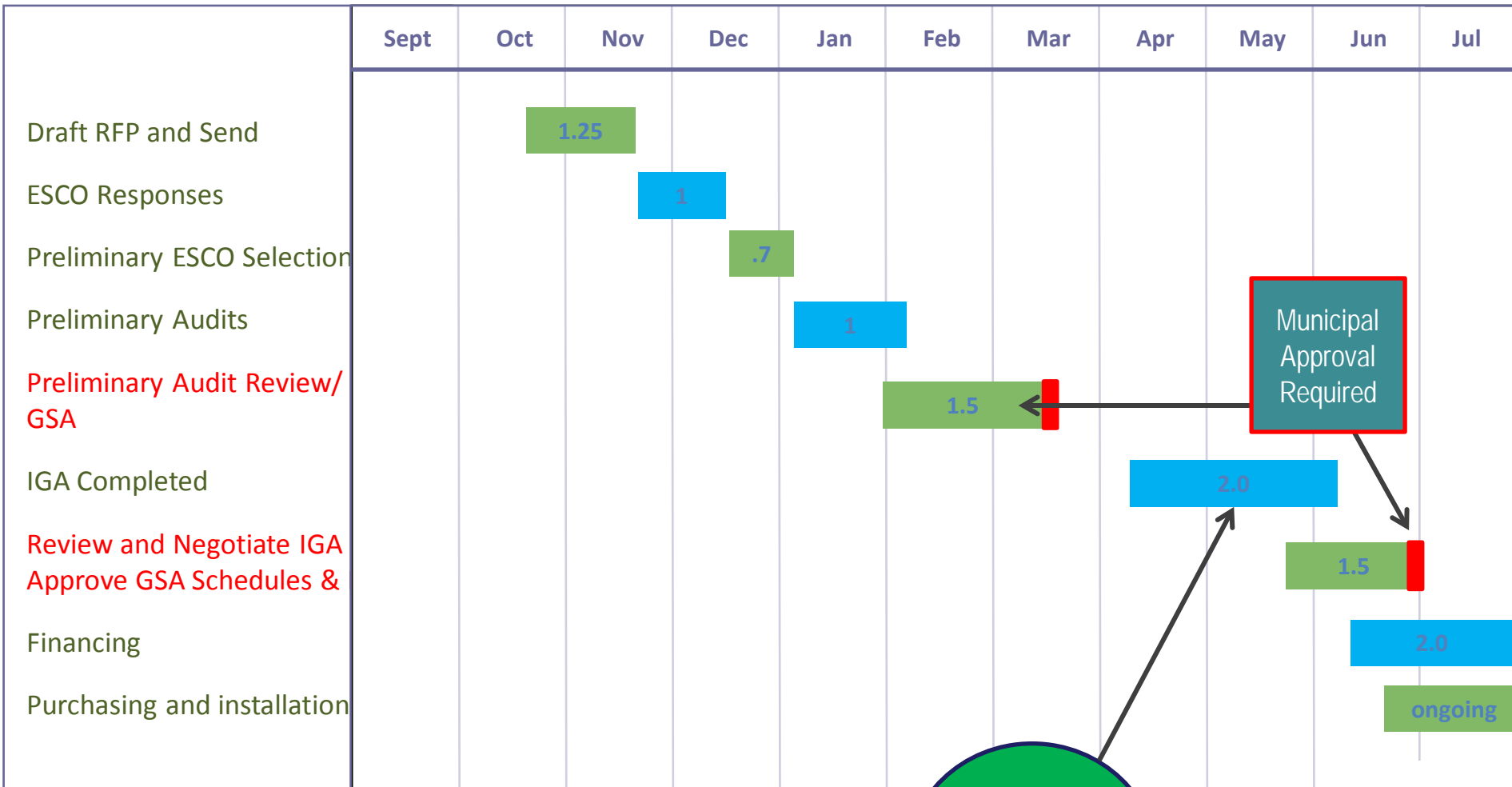
### Municipal Decision Making

- Common forum to share lessons learned, disseminate information
- Peer pressure
- Tight, common time frame
- Standard documents
- Program advisors "on call"

### Working with the Utility

- Clear communication from the start
- Working with their existing template
- Updates will occur in bulk

# RSLPP Program Timeline



We are here



# Preliminary Results

**~40 out of 45 municipalities proceed with an investment grade audit**

- 23,500 Streetlights (cobrahead and decorative).
- Traffic signals, exterior lighting, Simple to Complex Control Systems

**\$12-\$15 million dollar project**

- Average project size ~\$312K (range: \$22K - \$1.4M)

**Annual energy savings total ~\$950,000**

- Average 7 year payback for cobraheads
- Average ~20 year payback for decoratives
- Average 8.2 year payback for base project

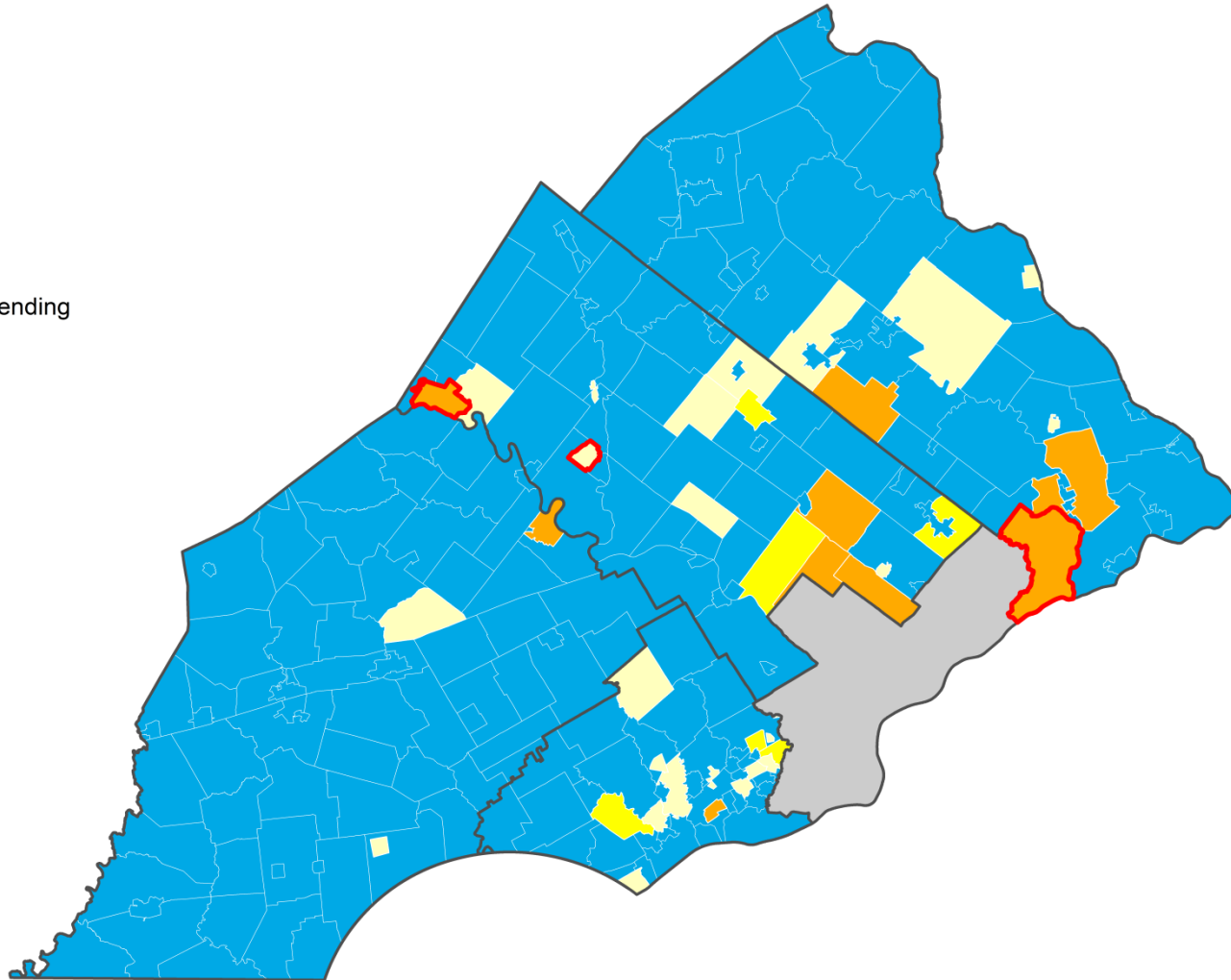
**Financing**

- 5-20 year terms will be used
- A few are planning to self-fund

# Regional Streetlight Procurement Program

## Street Lights

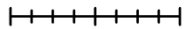
- 0 - 500
- 501 - 1000
- >1000
- IGA Approval Pending



N



0 2.5 5 10 Miles



dvrpc

# Individual fixture and pole information




Street Light Audit Portal

Township Name

Back

Search

The screenshot displays a Google Maps interface with a street light audit overlay. A popup window provides detailed information for a selected fixture:

- Pole Type & ID:** Wood - Unique ID:10660835 - (At381)
- Photos:** Pole:  Fixture:  ID: 
- Fixture:** Cobrahead- Lamp: MH - Watts:70W
- Pole Condition:** Good
- Fixtures per pole:** 1
- Arm length:** 6ft
- Address:** 305-1237 Richard Rd, Aston, PA 19014, USA
- [Google Map Link](#)

A callout box on the right side of the map contains the text: "Text Search for searching by street or city".



# Beyond cost savings, we achieved something else too...

- Building trust in Energy Performance Contracting
- Municipal comfort with financing
- Municipalities taking control over their SL infrastructure
- Accelerating the adoption of a high-value technology
- More exposure to LEDs in the region (what's that? I want one too)
- Partnership building – and regional cooperation
- Creating a replicable program concept for other types of municipal and public facilities



## For More Information

Liz Compitello

Delaware Valley Regional Planning Commission

[ecompitello@dvrpc.org](mailto:ecompitello@dvrpc.org)

215.238.2897

Name:   
 Account Number:

Lighting Information

Size	No. of Luminaires	Wattage per Luminaire
20000M	9	429
12000M	13	275
09500S	3	131
04000M	446	115
000LED	30	50
	501	

All streetlights are unmetered  
 $kWh = \text{Billing Watts} * 4100 \text{ Burn Hours} / 1000$

Street Lighting Customer Owned Service - Current Period Detail

Service 06/04/2012 to 07/03/2012 - 29 days

Service Location Distribution Charge	501	Locations	X	\$7.33000	3,672.33
Generation Charges	20,672	kWh	X	0.05920	1,223.78
Alt. Energy Portfolio Standard	20,672	kWh	X	0.00110	22.74
Transmission Charges	20,672	kWh	X	0.00130	26.87
Distribution Charges	20,672	kWh	X	0.00500	103.36
State Tax Adjustment					-1.89

Fixed \$7.33 per service connection/month  
 AKA the "Tap fee"

**Total Current Charges**

**\$5,047.19**

G32		Baseline Solutions						
A	B	C	D	E	F	G	H	I
1	<b>RSLPP</b> Product & Pricing Matrix	<b>Baseline Solutions</b>						
2		<b>Cobrahead Fixture Style</b>						
3		70W HPS	100W HPS	150W HPS	250W HPS	400W HPS	Total	
4		100W MH	100W MH	175W MH	250W MH	400W MH		
5		100W MV	100W MV	175W MV	250W MV	400W MV		
6	<b>ESCO Information</b>							
7	ESCO Name							
8	<b>LED Replacement Fixture Product Submittals</b>							
9	<b>General Information</b>							
10	Manufacturer							
11	Model #							
12	IES File (hyperlink to source)							
13	Housing Finish Color							
14	Tenon Nominal Pipe Size							
15	Nominal Luminaire Weight							
16	Nominal Luminaire EPA							
17	DLC Listed (Y/N)							
18	Make/model of LED light source(s)							
19	<b>Electrical Specifications</b>							
20	System Watts							
21	Nominal Luminaire Input Voltage							
22	System Drive Current (mA)							
23	Driver Type							
24	Driver Life (90% survival)							
25	<b>Photometric Performance</b>							
26	Initial Delivered Lumens							
27	IES Distribution Type							
28	BUG Rating - B (backlight)							
29	BUG Rating - U (uplight)							
30	BUG Rating - G (glare)							
31	CRI							
32	CPD							
33	CPD							
34	CPD							
35	CPD							
36	CPD							
37	CPD							
38	CPD							
39	CPD							
40	CPD							
41	CPD							
42	CPD							
43	CPD							
44	CPD							
45	CPD							
46	CPD							
47	CPD							
48	<b>Distributor Fixture Unit Cost (assumes prevailing market prices)</b>							
49	Quantity <100							
50	Quantity 100-500							
51	Quantity 500-1000							
52	Quantity 1000+ *							
53	Price Effective Period (days)							
54	<b>Fixture Unit Cost ADDERS (enter N/A if not available or enter 0 if included in base spec fixture price)</b>							
55	Miscellaneous materials/parts required for mounting*							
56	0-10V Driver (Base Specification)							
57	DALI Driver							
58	3-Pin ANSI (Deduct)							
59	5-Pin ANSI (Base Specification)							
60	7-Pin ANSI							
61	Photocell*							
62	Shorting cap							
63								
64	House Side Shield							
65	Field Adjustable Light Level Options <i>(N/A = Not Available)</i>							
66	ANSI C136.31 vibration level 2 <i>(Level 1 assumed base specification)</i>							
67	<b>Control System Unit Cost Adders</b>							
68	Control Manufacturer							
69	Control System Family Name							
70	Fixture Control Node							



# From this...

	A	B	C	D	F
1					
2					Account #XXXXX-XXXXX
3					
4	<b>Sequence</b>		<b>Component Type</b>		<b>Component Details</b>
5					
6	1		1000 Lumen Incandescent		ACHILLE RD E/O ROOSEVELT AV
7	2		1000 Lumen Incandescent		BALA LA N/O W HATHAWAY LA
8	3		1000 Lumen Incandescent		BELFIELD AVE S/O STEEL RD
9	4		1000 Lumen Incandescent		BRENTWOOD RD S/O HEATHERWOOD RD
10	5		1000 Lumen Incandescent		BRIERWOOD RD 2ND W/O EAGLE RD
11	6		1000 Lumen Incandescent		CEDAR BROOK & YORK RD
12	7		1000 Lumen Incandescent		CHESTNUT ST E/O BIDDLE AVE
13	8		1000 Lumen Incandescent		CIRCLE DR S 2ND W/O FAIRMONT RD
14	9		1000 Lumen Incandescent		COLFAX & WOODLEIGH RDS
15	10		1000 Lumen Incandescent		COLFAX RD S/O COOPERTOWN
16	11		1000 Lumen Incandescent		COVINGTON RD & ST ALBANS RD
17	12		1000 Lumen Incandescent		DAVID DR 2ND E/O ELLIS RD
18	13		1000 Lumen Incandescent		DAYTON RD 1ST POLE W/O PENN ST
19	14		1000 Lumen Incandescent		FAIRMONT RD & MT PLEASANT RD
20	15		1000 Lumen Incandescent		FRIENDSHIP RD S/O TREATY RD (AT BEND)
21	16		1000 Lumen Incandescent		FRIENDSHIP RD 1ST W/O PILGRIM LA
22	17		1000 Lumen Incandescent		GARFIELD AVE & ROOSEVELT AVE
23	18		1000 Lumen Incandescent		GARLOR DR OPP BARBARA
24	19		1000 Lumen Incandescent		GEORGES LA N/O HAVERFORD
25	20		1000 Lumen Incandescent		GOLF VIEW RD E/O DARBY RD
26	21		1000 Lumen Incandescent		GOLF VIEW RD 3RD N/O COOPERTOWN RD
27	22		1000 Lumen Incandescent		GOLFVIEW RD S/O MERWOOD LA
28	23		1000 Lumen Incandescent		GOLFVIEW RD 3RD POLE E/O ARDMORE AVE
29	24		1000 Lumen Incandescent		HARRINGTON RD E/O ROOSEVELT AVE
30	25		1000 Lumen Incandescent		HARVEST LA BET GOLF HOUSE RD & TAYLOR LA
31	26		1000 Lumen Incandescent		HATHAWAY LA W & HUNTINGDON LA



# Relight Washington

Better Buildings Summit  
2016



# The Problem Statement

- Small cities left behind.
- Initial capital cost prevents adoption.
- Lack of a statewide strategy to include small cities.
- Strong savings needs faster action.
- Grant processes impair rate of adoption.
- Service providers doubted the savings.



# Street lights consume 60% of city direct gas tax



- \$90,000/year direct gas tax
- \$55,000/year to street lights
- 245 PSE Cobras
- City-owned lighting, no replacement parts

Buckley, WA Population 4,500



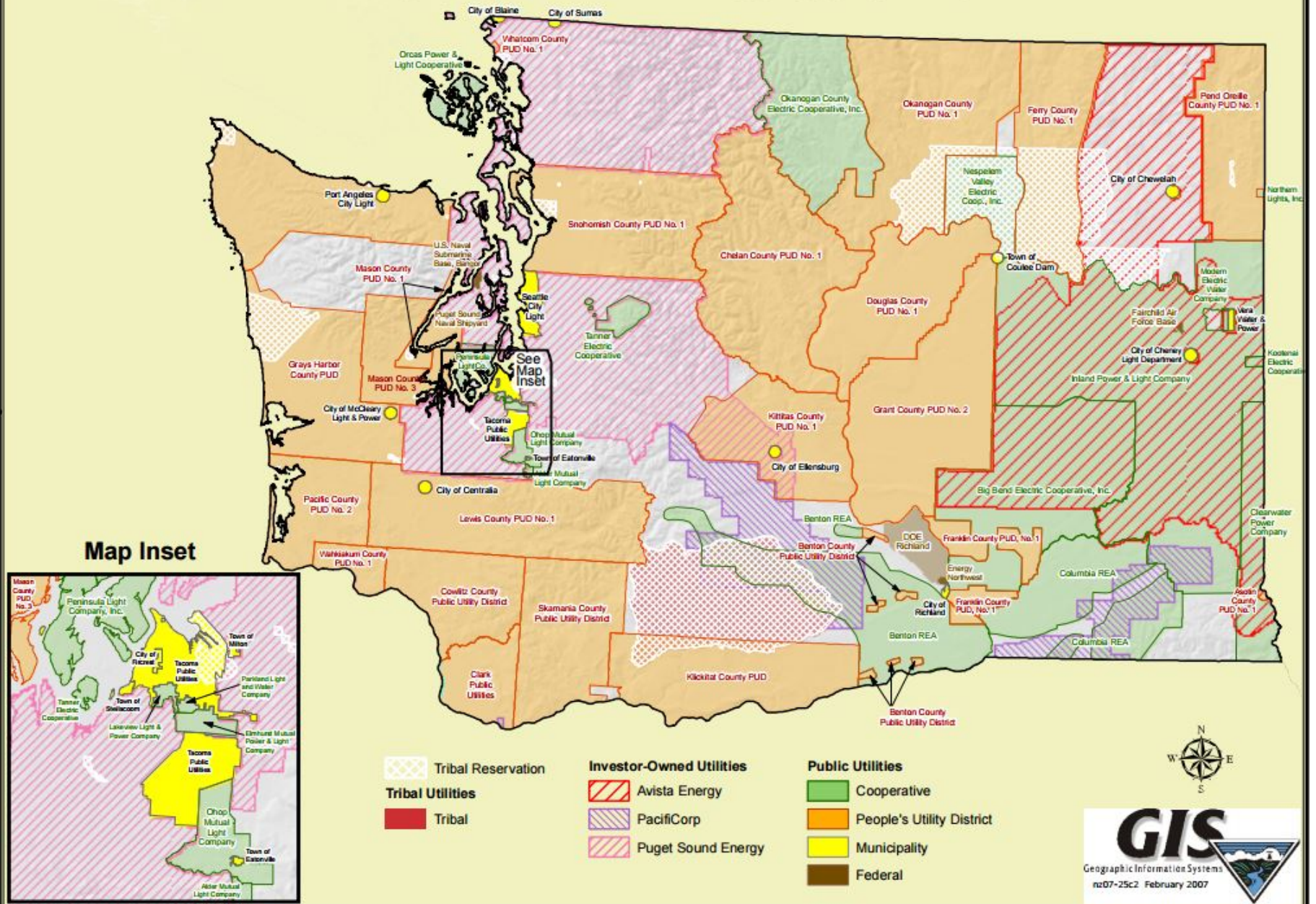
# What are we getting into?

- Is the existing infrastructure too fragile?  
(You break it, you buy it.)
- Is the potential savings truly significant?
- Can we even get the savings to the end user?
- Will conversion ROI?
- Can we fund it?
- Answer the questions before starting a program!

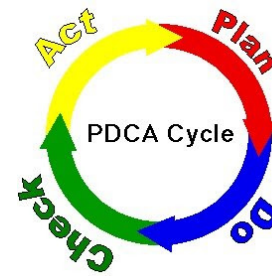
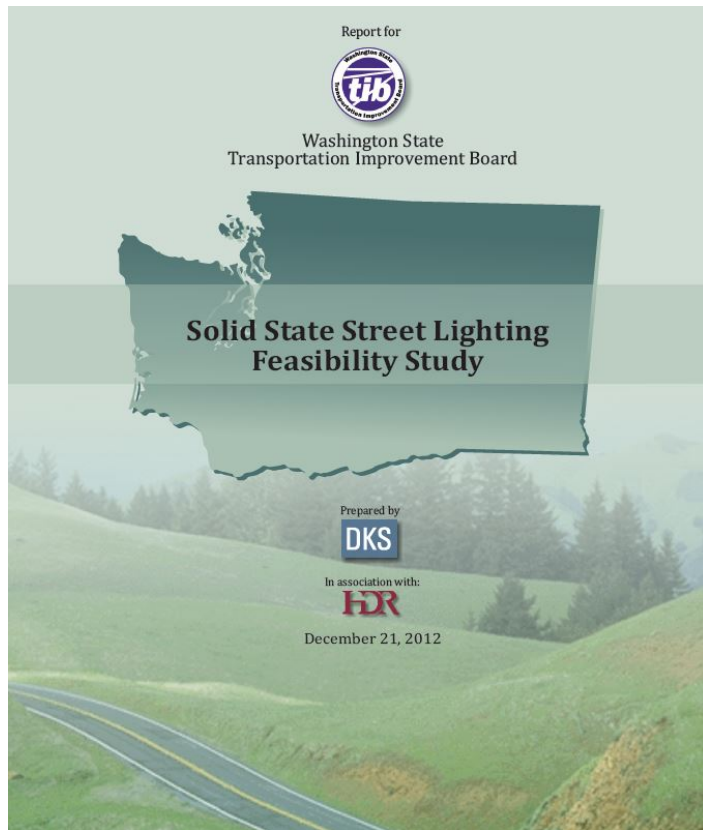
# Understanding the Barriers

- Smalls don't own the lights, but need the savings
- Lighting design? Do we need to add poles?
- Low customer awareness
- Electric providers
  - Technology/maintenance acceptance
  - Not believing the savings
  - Willingness to impact profit center
  - Uniform response across providers
  - Institutional complexity!

# WASHINGTON STATE BPA PUBLIC, TRIBAL AND IOU CUSTOMERS



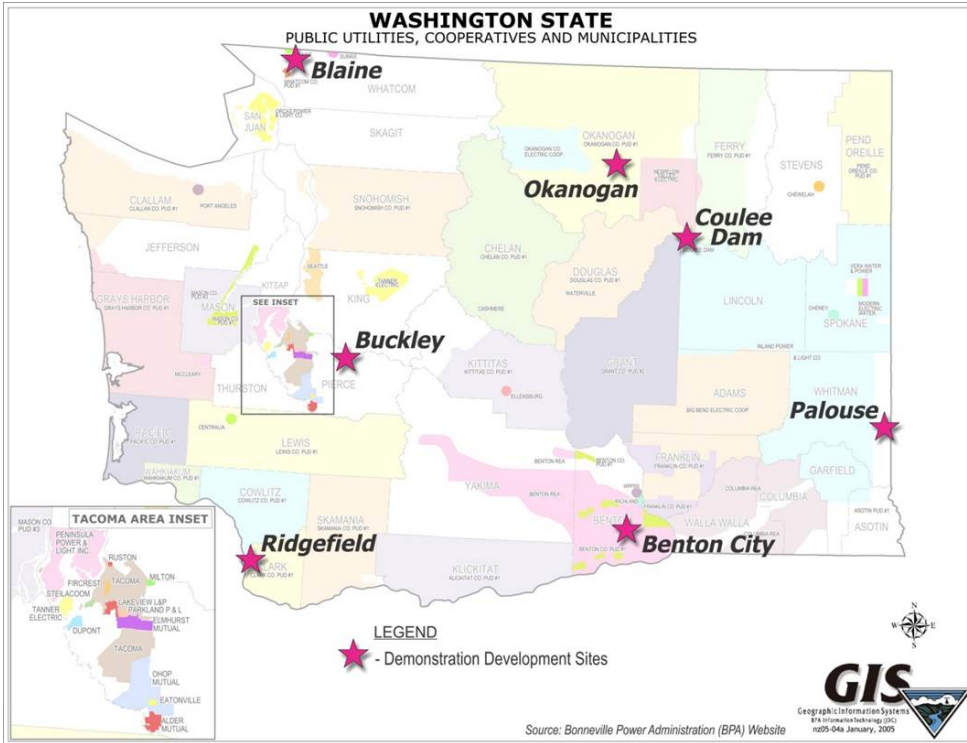
# Applying Lean Processes



- Establish Clarity of Purpose
- Determine Feasibility
- Test to Confirm
- Complete SROI Study



# Proof of Concept

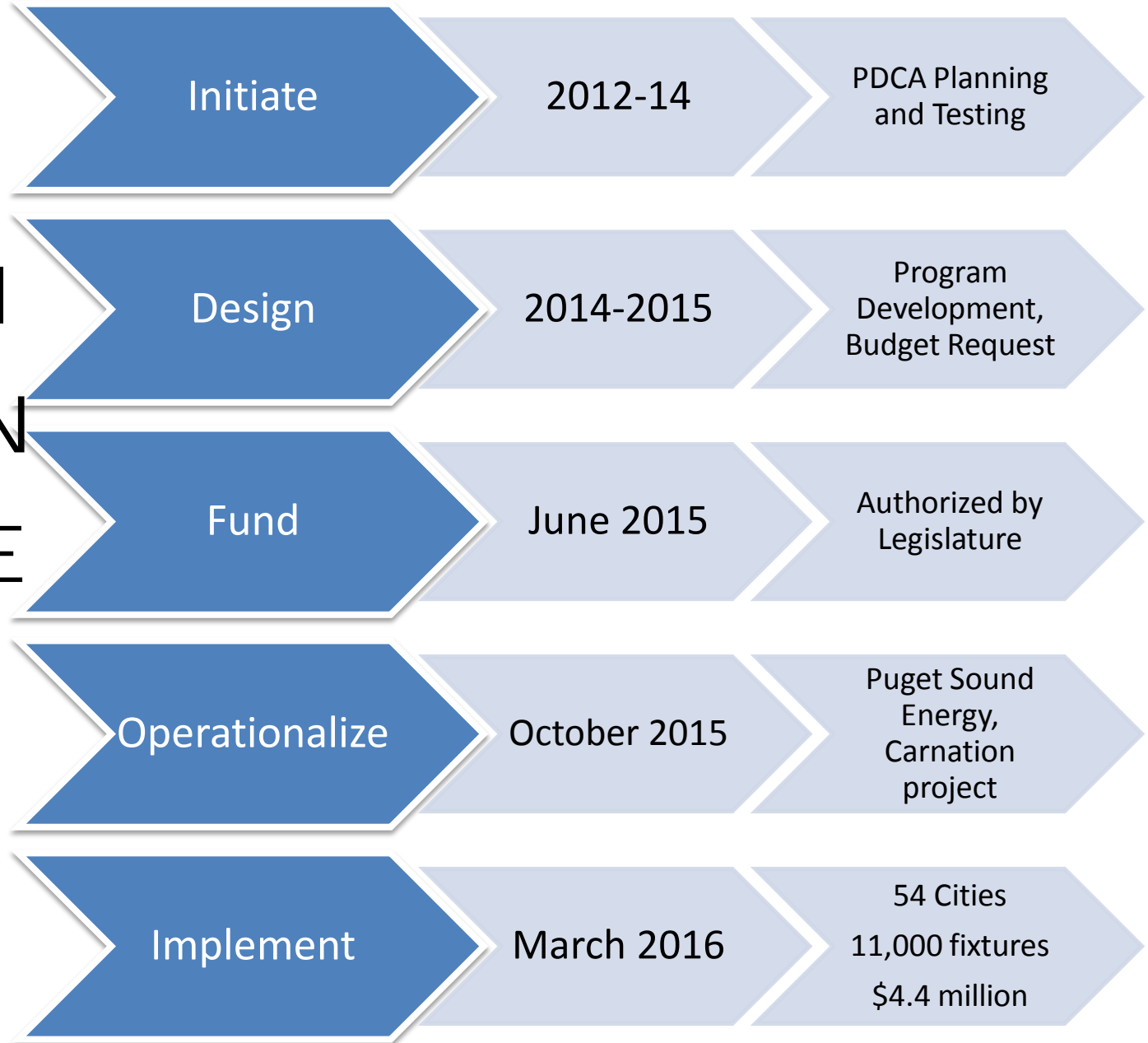


- Feasibility Study 2012
- Installed 2,000 fixtures in 2013
- Performance measured 2013-2015
- Studied SROI in 2014
- Funded by Legislature in 2015
- Operational in October 2015

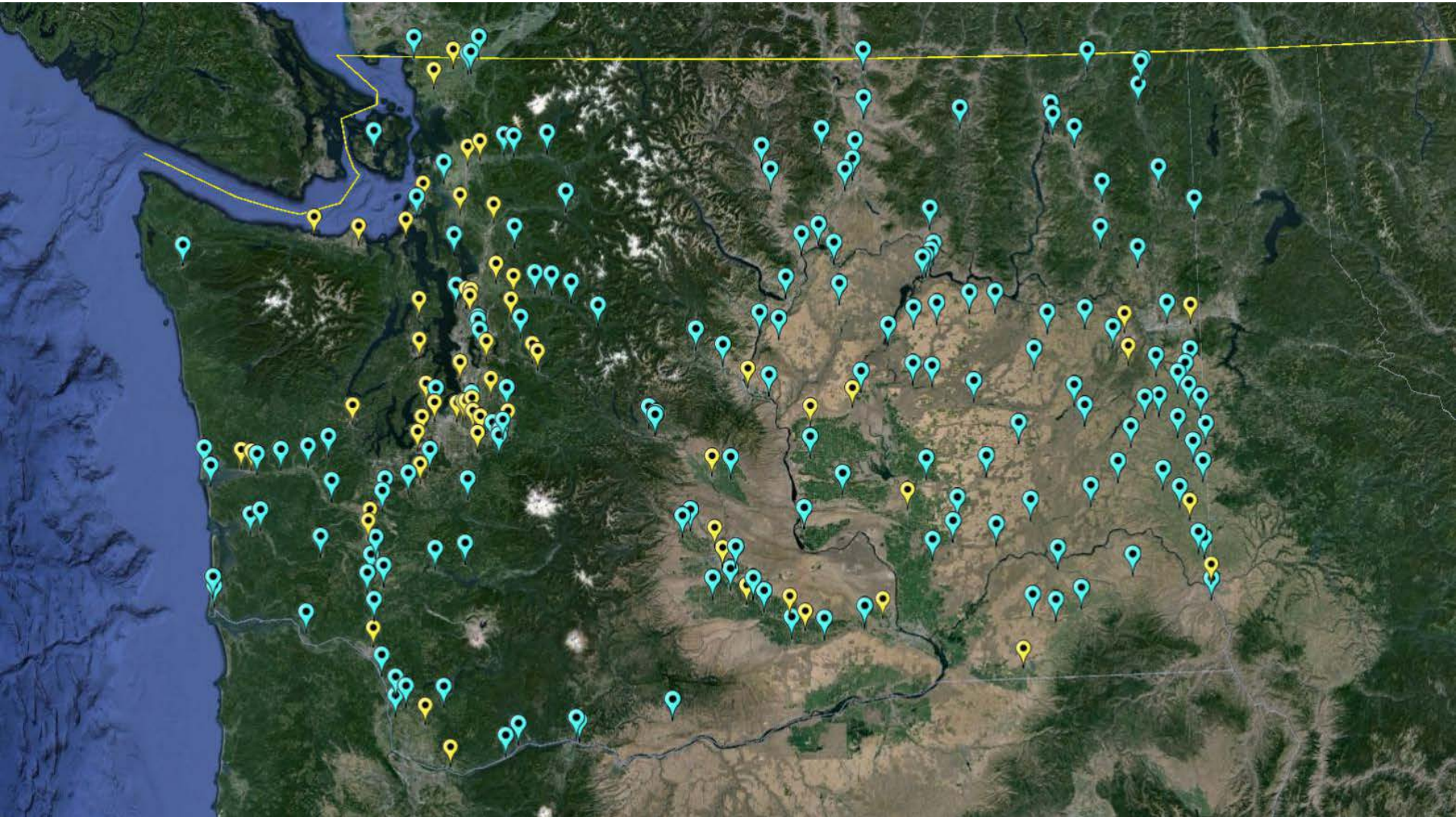
4.6 years ROI

\$2.34 value  
over 15 years

T  
I  
M  
E  
L  
I  
N  
E



# Customers: 220 of 289 Cities



# The Numbers Game

based on commitments through March 2016

Fixtures to date	11,000
Expenditures to date	\$4,400,000
Cost per fixture (installed avg.)	\$400
Savings to date (est. from sample \$1,000-2,000/mo)	\$80,000/mo \$970,000/yr
Return on Investment	4.5 years
Buildout Cost (est.)	\$24,000,000
Buildout Savings (projected) -accumulated savings/city increases over time because smaller cities are frontloaded	\$330,000/mo \$4,000,000/yr



“If you’re saving 5%, take your time.  
If you’re saving 55%, do it now.”

# Transportation Improvement Board

## Contact



**Steve Gorcester**

Executive Director

(360) 586-1139

[steveg@tib.wa.gov](mailto:steveg@tib.wa.gov)

[www.tib.wa.gov](http://www.tib.wa.gov)

[www.tib.wa.gov/tibdashboard](http://www.tib.wa.gov/tibdashboard)



*Lighting Energy Savings Performance Contracting  
at North Carolina Dept. of Transportation*

*Better Buildings Summit May 10, 2016*



# Scope



*Department of Environmental Quality*





- Replace existing roadway lights with LED lights
  - 10,500 roadway fixtures (excluding facilities)
  - 172 roadway sites
- Controls
  - What is it you control?
- Lighting upgrades in Maintenance Buildings, Visitor Centers and Weigh Stations
  - 156 sites
  - 1638 buildings
  - Over 4 million sq. ft.



# *Project Goals & Scope of Work*



High Mast LED Fixtures



High Mast Lowering Device



Cree Cobra LED Fixture



I-40 Eastbound Tunnel #1



# *Project Goals & Scope of Work*



Dual Cobra Head Fixtures



Mast-Mounted Fixtures





- Number of highway lighting fixture models that will be used in the Highway Lighting Project = 24
- Replace 1,877 roadway signs and remove lights at overhead signs
- Highway lighting work will be performed at night except for the high mast-mounted fixtures which will be upgraded during the day because will not require any traffic management



- **Traffic control:**
  - Traffic control will account for about 40% - 50% of the total costs for the work not counting the material.



# *Project Costs – Option 1*

- **Cost (without signs)**

- Total project cost - \$45,252,000
- Annual savings - \$3,297,000
- Total savings over 20 years - \$65,945,000

# Project Costs – Option 2

- **Cost (with signs)**

- Total project cost - \$74,739,000
- Annual savings - \$5,272,954
- Total savings over 20 years - \$105,459,000



# Challenges

- Locating and identifying the fixtures
- Who owns the light / Who pays the bill?
- What is the rate?
- How much detail to include in the survey?
- What is the condition of the fixture / pole / wiring?
- Determining operational / maintenance savings



# Challenges

- How much to budget for repairs?
- Cost of Traffic Control
- Multiple sources of information
- Surge protection needs
- LED requires new lighting standards



## Contacts:

### Eric Frazier

NC Dept. of Transportation

919-707-4554

[erfrazier@ncdot.gov](mailto:erfrazier@ncdot.gov)

### Renee Hutcheson, FAIA

NC Dept. of Environmental Quality / Utility Savings Initiative

919-707-9252

[renee.hutcheson@ncdenr.gov](mailto:renee.hutcheson@ncdenr.gov)

