ARLINGTON
VIRGINIA

Smart Streetlight System

MWCOG Energy Meeting

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Smart Streetlight System

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Overview

- Background
- Streetlight inventory and design requirements
- LED Pilot Project and current status
- Application of smart streetlighting system and savings
- Rate comparison
- Lesson learned

A City for Walking and Biking

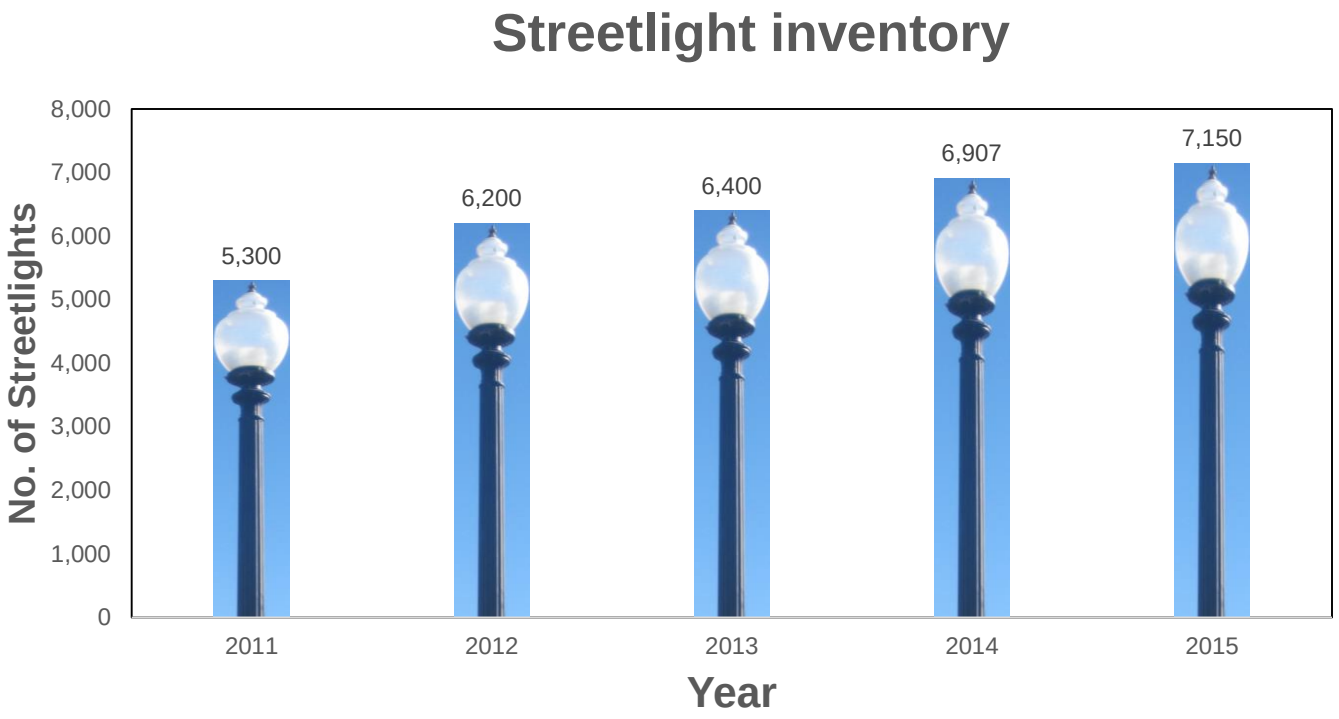
Transportation System Users

- Residents
  - Estimated 215,000 in 2014
  - Lowest resident drive alone commute rate in Virginia
  - 46% of residents use non single occupancy vehicle as primary commute mode
- Employees
  - Over 220,000 jobs in 2014
  - 200,000+ jobs clustered around transit in Arlington's high-density corridors.
  - 160,000+ workers commute into Arlington daily
- Visitors
  - 4 million plus visitors to Arlington National Cemetery
  - Over 11,000 hotel rooms used as a base for visitors from outside the region
  - Many daily visitors from adjacent jurisdictions
- Through travelers & commuters

Streetlight Inventory

- 11,800 DVP owned
- 7,150 County owned
- LED conversion started in 2010

Inventory: The Growth



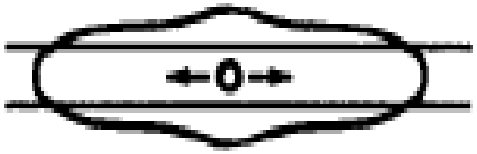
- 4 Million kWh of electricity per year=1500 homes
- 6 Million lbs of greenhouse gas
- 1.2 Million dollars in operation and management

AASHTO Requirement

Table 2: Illuminance Method - Recommended Values

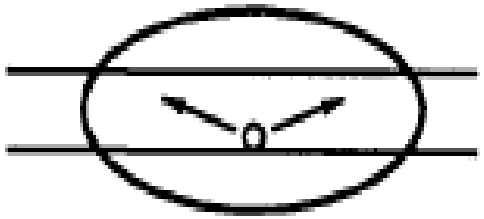
Road and Pedestrian Conflict Area		Pavement Classification (Minimum Manintained Average Values)			Uniformity Ratio	Veiling Luminance Ratio
Road	Pedestrian Conflict Area	R1 lux/fc	R2 & R3 lux/fc	R4 lux/fc	E_{avg}/E_{min}	L_{vmax}/L_{avg}
Freeway Class A		6.0/0.6	9.0/0.9	8.0/0.8	3.0	0.3
Freeway Class B		4.0/0.4	6.0/0.6	5.0/0.5	3.0	0.3
Expressway	High	10.0/1.0	14.0/1.4	13.0/1.3	3.0	0.3
	Medium	8.0/0.8	12.0/1.2	10.0/1.0	3.0	0.3
	Low	6.0/0.6	9.0/0.9	8.0/0.8	3.0	0.3
Major	High	12.0/1.2	17.0/1.7	15.0/1.5	3.0	0.3
	Medium	9.0/0.9	13.0/1.3	11.0/1.1	3.0	0.3
	Low	6.0/0.6	9.0/0.9	8.0/0.8	3.0	0.3
Collector	High	8.0/0.8	12.0/1.2	10.0/1.0	4.0	0.4
	Medium	6.0/0.6	9.0/0.9	8.0/0.8	4.0	0.4
	Low	4.0/0.4	6.0/0.6	5.0/0.5	4.0	0.4
Local	High	6.0/0.6	9.0/0.9	8.0/0.8	6.0	0.4
	Medium	5.0/0.5	7.0/0.7	6.0/0.6	6.0	0.4
	Low	3.0/0.3	4.0/0.4	4.0/0.4	6.0	0.4

Distribution Type??

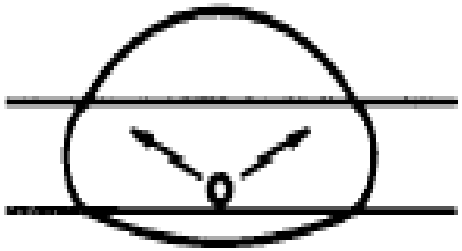


Type I

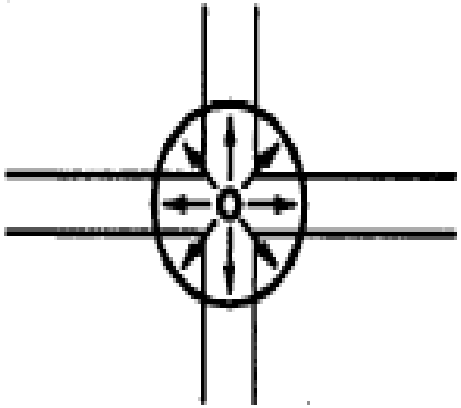
Type II



Type III

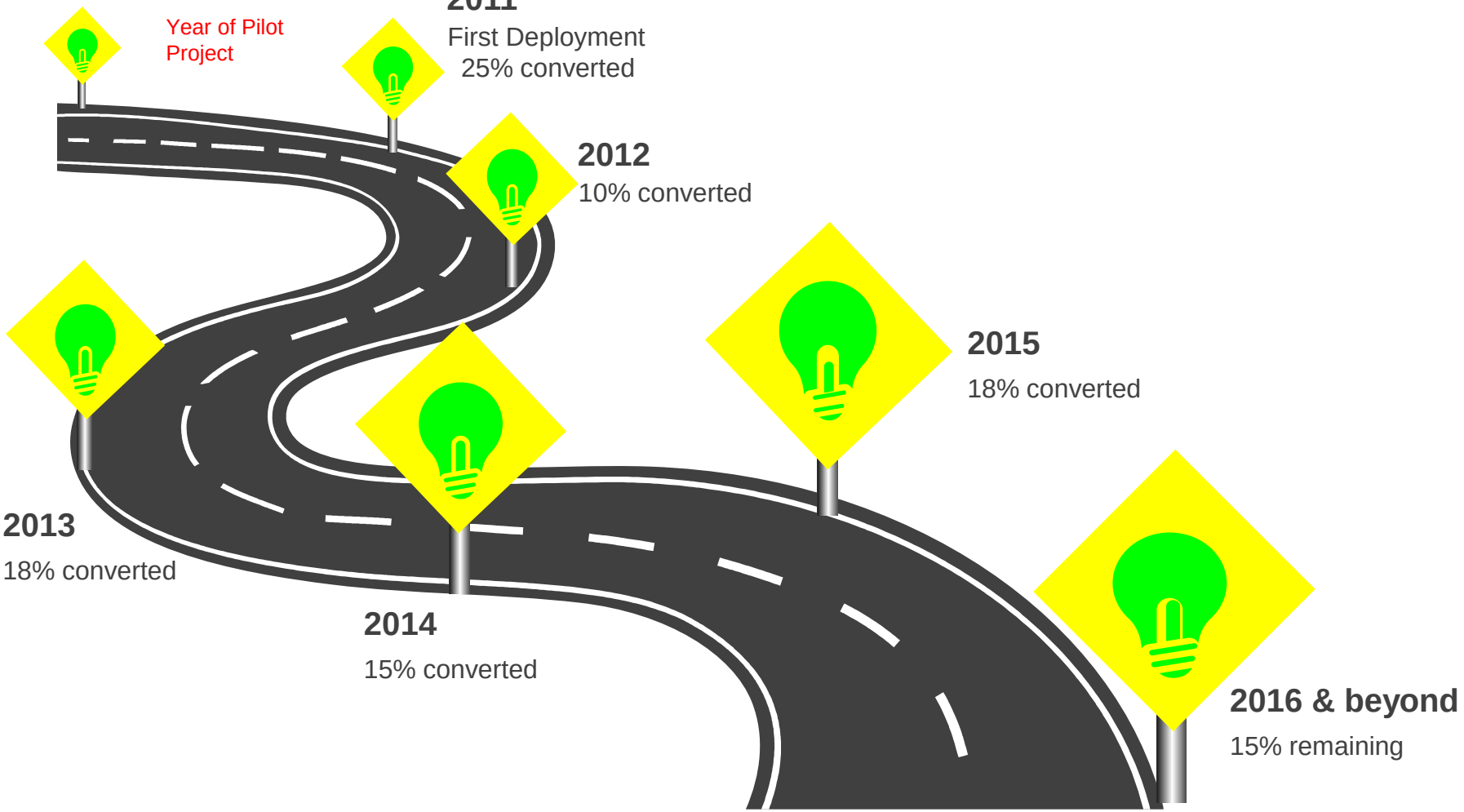


Type IV



Type V

Smart Streetlight System: A Timeline



Introduction of LED Program

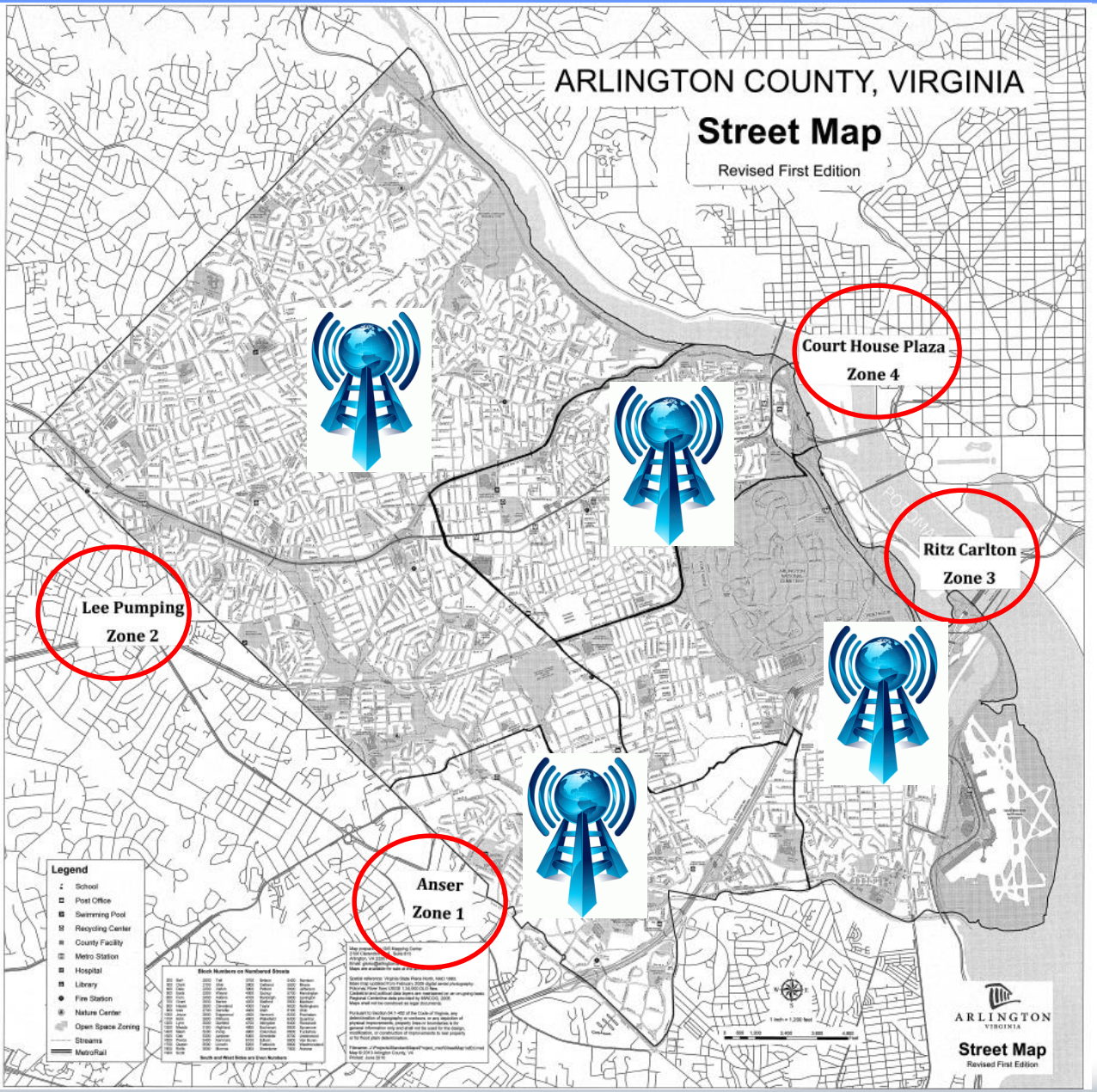
Groups involved in the decision making in 2010:

- Arlington County Civic Federation Environmental Committee
- Arlington County Neighborhood Conversation Advisory Committee
- Arlington County Civic Association presidents
- Arlington County Community Energy and Sustainability Task Force
- Arlington County Energy Advisory

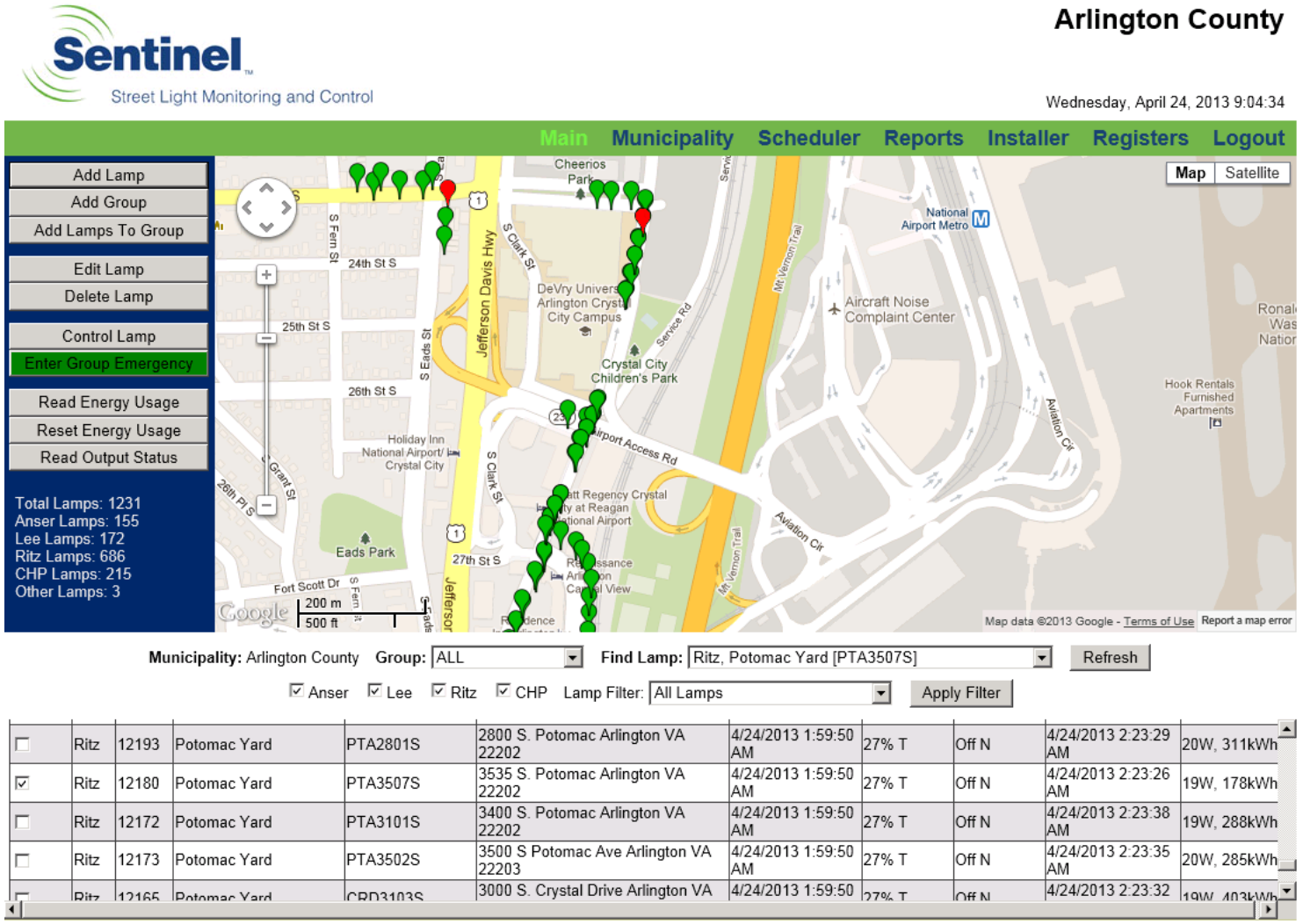
How we do it: Smart SL System

- Centrally controlled
- Improved roadway safety
- Reduced Power consumption and GHG by about 80%
- Helps incident and emergency managements
- Proactive maintenance system
- Uses 5500 Kelvin LED

Communication with each light



How we do it: Smart SL System



☐	Ritz	12193	Potomac Yard	PTA2801S	2800 S. Potomac Arlington VA 22202	4/24/2013 1:59:50 AM	27% T	Off N	4/24/2013 2:23:29 AM	20W, 311kWh
☑	Ritz	12180	Potomac Yard	PTA3507S	3535 S. Potomac Arlington VA 22202	4/24/2013 1:59:50 AM	27% T	Off N	4/24/2013 2:23:26 AM	19W, 178kWh
☐	Ritz	12172	Potomac Yard	PTA3101S	3400 S. Potomac Arlington VA 22202	4/24/2013 1:59:50 AM	27% T	Off N	4/24/2013 2:23:38 AM	19W, 288kWh
☐	Ritz	12173	Potomac Yard	PTA3502S	3500 S Potomac Ave Arlington VA 22203	4/24/2013 1:59:50 AM	27% T	Off N	4/24/2013 2:23:35 AM	20W, 285kWh
☐	Ritz	12165	Potomac Yard	CRD3103S	3000 S. Crystal Drive Arlington VA	4/24/2013 1:59:50	27% T	Off N	4/24/2013 2:23:32	19W, 403kWh

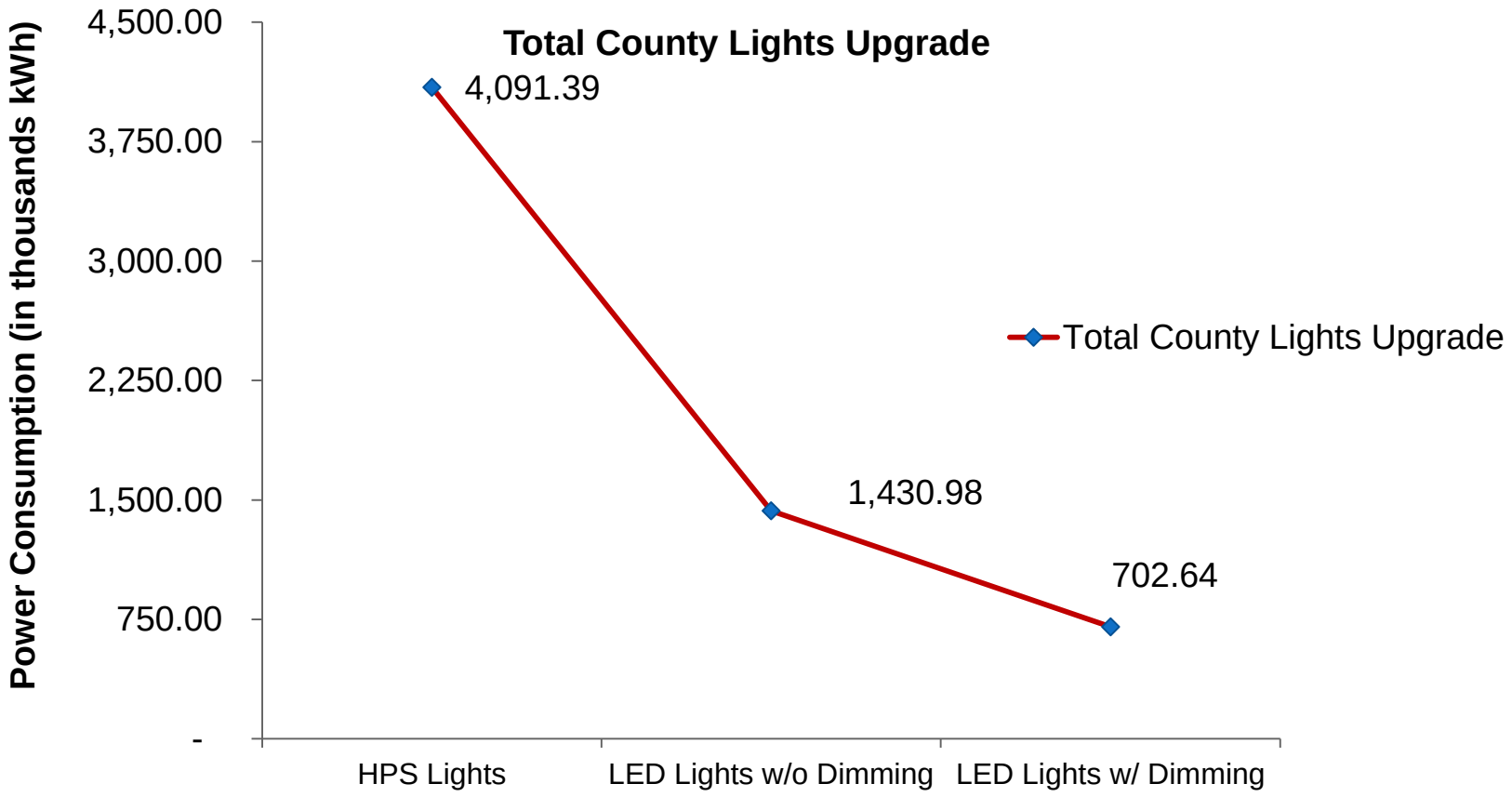

100%


50%


25%

Dimming Program

What does it mean?



End Result: LEDs with Dimming

Before

- 4 MkWh = 1,333 homes
- $1.2 million in Ops & Mgmnt
- 6 Million pounds of GHG

After

- 0.7 MkWh = 117 homes
- $900K in Ops &Mgmnt
- Reduction to 1 Million pounds of GHG

- Investment - $6M
- Payback – 5 years
- Benefit to cost ratio = 6

County Target: Emission per capita 13.2 Metric tons to 3.0 Metric tons by 2050

Design life – 30 years

Rate Comparison

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County LED

County LED light	58 W	
Annual Wattage	243600	(4200hrs/year @58W)
Usage / Year	243.6 kWh	kW (243600/1000)
Usage / Month	20.3 kWh	Tier 3=20-25kWh

	kWh	20.3
Distribution Service	$/ kWh	
Basic Customer Charges		$5.67
Distribution Charge	0.03	$0.54
Elec Sply Service (ESS)		
ESS Charge	0.01	$0.15
Rider R, S, T, B, W	0.01	$0.18
Fuel Factor	0.03	$0.69
Sales and Surchages	0	$0.01
	Total	**$7.24**

Elec Cost Per light	$1.57	($7.24-$5.67)
Basic Cust Charges	$0.28	$5.67 distributed to
		30lights/meter
Total	$1.85	$3.85 (w/Maint)

Dom HPS

Basic (Type1) Hig

	70W HPS
h:	30
):	0.082
h:	360
l):	$243.94
l):	$171.57
l):	$466.41
st:	$881.92
st:	$7.79
st	$58.00
e:	$7.03
e:	$337.44
t:	$544.48

Dom LED

6-06-2011

	Tier 3
	25
	0.075
	300
4	$243.94
7	$171.57
3	$639.71
4	$1,055.22
2	$1.10
0	$205.00
8	$14.17
4	$680.16
0	$375.06

Perfect World: Is Everyone Happy?

Light is too bright

Light is too white

Dangerous to human health

Dangerous to nocturnal lives

Our street is safe, we don't need light

Now I have to close my curtains

I cannot stargaze anymore

My house is too bright, cannot live there anymore

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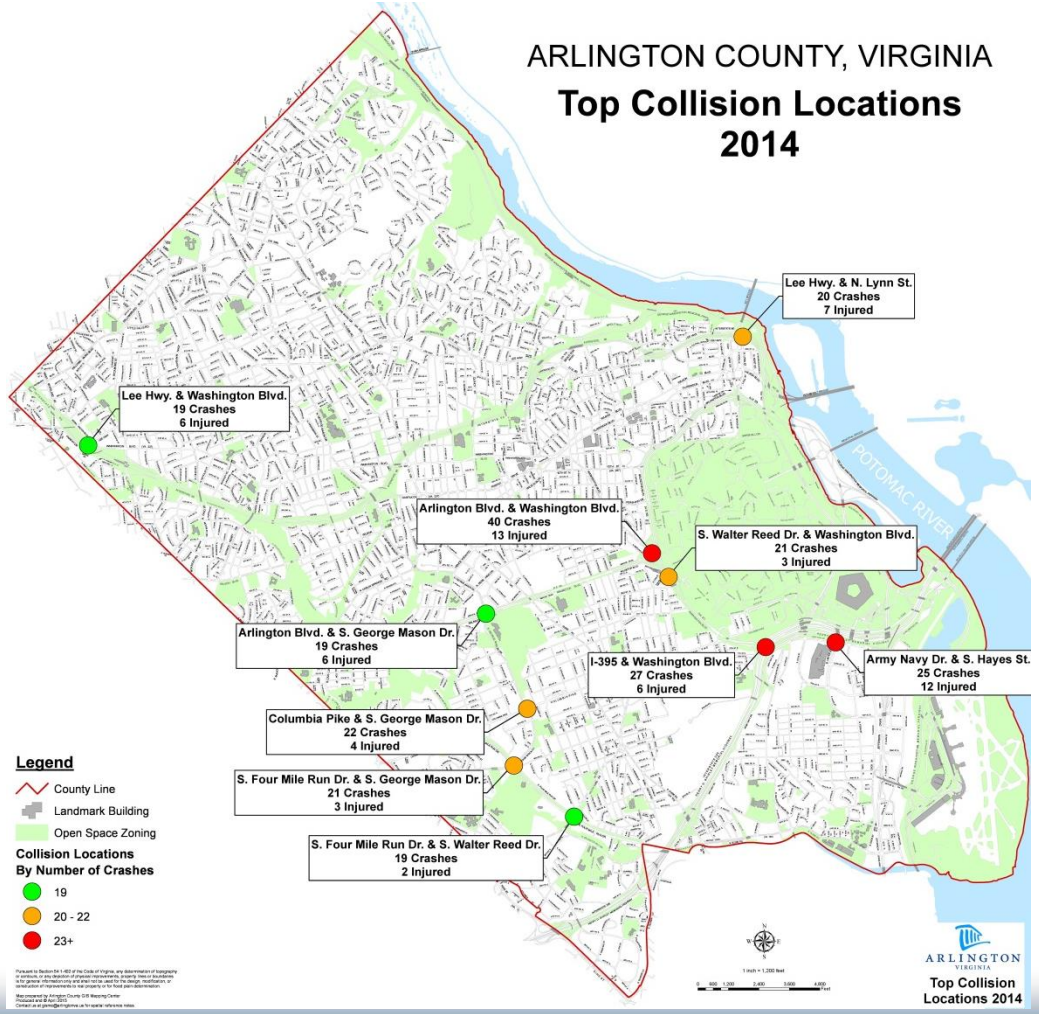
What do we actually see?

Lessons Learned

- Must communicate earlier in the process
- Conduct lighting demonstration prior to implementation
- Inform community of test period
- Explore new technologies

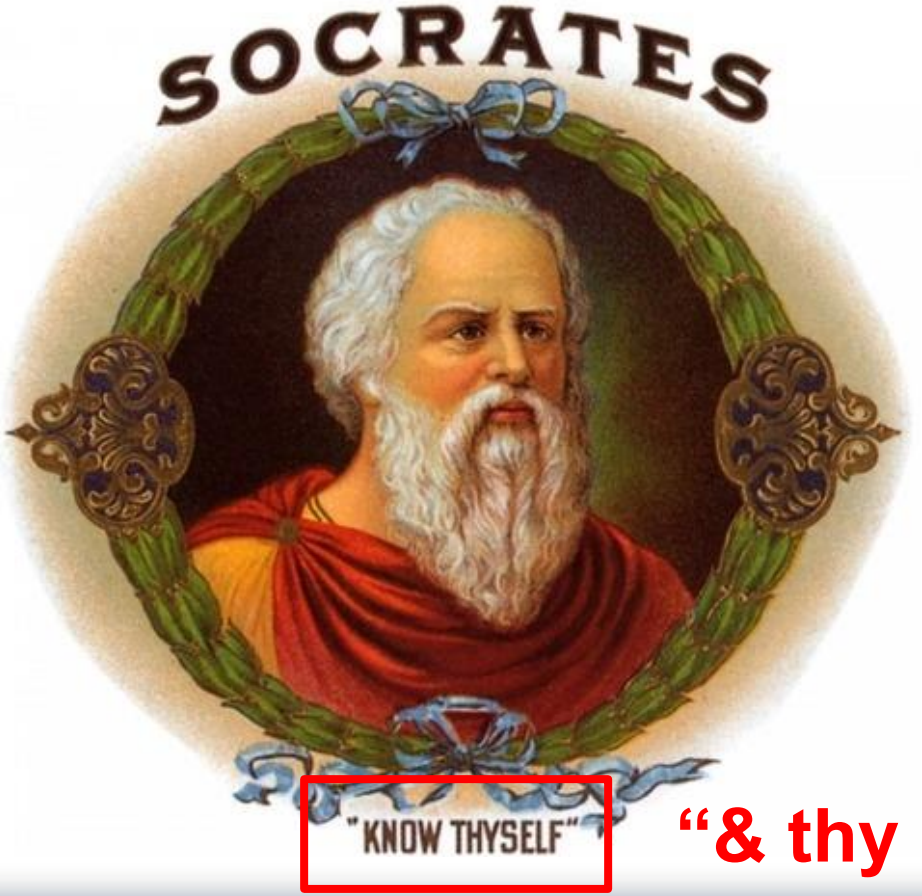
What Next?

- Only focus in high crash/high activity areas?
- Ensure dimming by redundancy



Take Away

- Invest in technology
- Be steward to environment
- Save money in the process



“& thy community”

Thank you!!!!

Questions?

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Mercury Concerns

Approx. 35million streetlights in the US

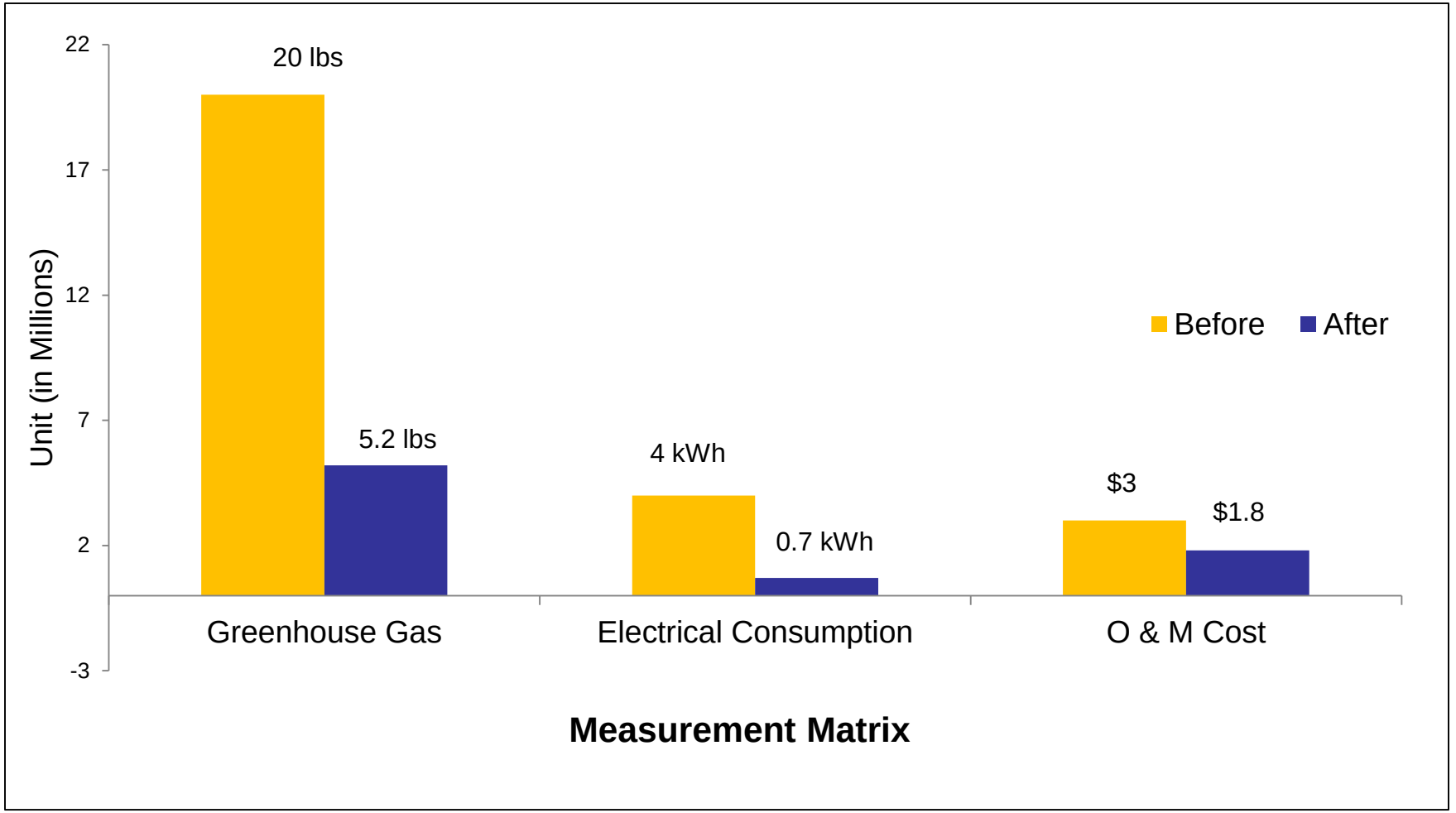
Each HPS or MV contains: 10 – 100 mg

In average, 2000kg of mercury on the US streets

2000kg not recycled, where does it go?

Mercury contents in LED: .....0 kg

LEDs w/ Dimming: End Result



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