Use of Streetlight Infrastructure to Deploy Smart City Applications

League of California Cities
2019 Public Works Officers Institute
April 3 – 5, 2019

Introductions

- Patrick Thomas, Session Moderator
  - City of Temecula, Director of Public Works/City Engineer
- Jim Benson, Panelist
  - Current/Powered by GE, Head of Global Strategic Alliances and Marketing
- Jean Bonander, Panelist
  - California Street Light Association (CALSLA), Executive Director
- Tyler Masters, Panelist
  - Western Riverside Council of Governments (WRCOG), Program Manager
City of Temecula purchase of SCE Streetlights

- SCE announced streetlight acquisition program in March 2012
- WRCOG forms Regional Streetlight Program in December 2014
- SCE currently owns 7,453 streetlights in Temecula
- Purchase price based on valuation prepared by SCE ($5,391,409)
- Streetlights currently City’s largest utility cost approx. $1,175,000/year
- Convert from SCE owned (LS1) to City owned (LS2) savings approx. $700,000/year

Cost Comparison per pole/per month
LED Retrofit

- LED Retrofit Cost
  - Labor and Materials
    - $210.24/pole
  - Total cost
    - $1,546,138

- Annual O&M Cost
  - LED
    - $0.65/pole/month
  - LPS/HPS
    - $1.55/pole/month

HPS vs LED lighting
Positive Community Impact

- Reduced crime due to improved lighting
- Safer roadways due to increased visibility of hazards
- Reduced power consumption, GHG reduction
- Improved community view of City services as result of fewer outages and proactive repairs

Network Control System
Network Control System

- Features:
  - One-piece control – no special electronics necessary in the fixture. Node simply connects to ANSI standard socket, so it can be added easily at any time.
  - GPS chip embedded into node – determines exact location of controllers and fixtures for GIS mapping.
  - Node automatically connects to network and acquires location which helps with commissioning.
  - Operates with programmed schedules in case of network outage.
  - Accurate, utility-grade energy metering per pole.

Business Case for Networked LEDs
(Silver Springs Networks “White Paper”)

- Benefits
  - Energy Savings
    - Low wattage
    - Dimming
    - Reduced burn time
  - Operational Savings
    - Long lifetime (LED lamps last 3 – 4 times longer than legacy lamps)
    - Remote monitoring and management
    - Automatic outage detection
    - Proactive maintenance (software can predict when outages will occur)
Business Case for Networked LEDs

• Costs
  • Hardware
    • Network-integrated control system (control nodes, etc.)
  • Software
    • Street light control and network management (web based)
  • Deployment services
    • Planning and deployment of hardware and/or software
  • Operations
    • Street light and network operations and management

• 20-year analysis of networked LEDs
  • Benefits (per light)
    • Operational savings: $339
    • Avoided energy: $436
    • Total Benefits: $778
  • Costs (per light)
    • Networked LED fixture: $399
    • Deployment, services: $49
    • Software, services: $123
    • Total Costs: $572
  • Benefit/Cost Ratio: 1.36
  • Payback: 6 years
  • Payback (LED replacement alone): 8 years
LED Lighting

LEDs deliver 50-70% energy savings and are a gateway to city-changing technology.

Payback drivers:
- Energy savings
- Maintenance savings
- Greenhouse gas emissions reduction

Smart Lighting

Remotely control lighting costs by letting cities control metering, maintenance & output.

Payback drivers:
- Energy Savings
- Maintenance savings
- Operating costs
- Greenhouse gas reduction

Some: POE port for adding sensors

Avoid temptation to “Smart Wash” limited low bandwidth use cases

Smart City

Transform existing infrastructure into ubiquitous data capturing network, making cities better places to live, work & play.

Payback drivers:
- Cost avoidance
- Parking optimization
- Traffic congestion reduction
- Improved citizen safety
- Data Monetization
- Jobs and Economic growth
Data is the new bacon”, said Cody Hoover, Chief Sustainability Officer, City of San Diego

FUNDAMENTAL BUILDING BLOCK OF SMART CITIES:

DATA:

- Historical & Real-Time
- Ubiquitous
- Open & Actionable
- City-Owned
- Cross-Departmental

Open, Interoperable and Extensible is the Key

FUNDAMENTAL BUILDING BLOCK OF SMART CITIES:

INFRASTRUCTURE:

- Extensible
- Open / Interoperable
- Aesthetically Pleasing
- Secure
- Efficient / Cost Avoidance
IT TAKES
A Village to Raise a Smart City.

UNLEASHING THE APP ECONOMY

Built an Extensible Smart City
With Endless Use Cases

<table>
<thead>
<tr>
<th>Data</th>
<th>Use Cases</th>
<th>Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Car parked/not parked</td>
<td>On street parking space guidance</td>
<td>Reduced congestion by 30%, new service for citizens</td>
</tr>
<tr>
<td>Car counting</td>
<td>Build digital twin of city to enhance planning through dynamic scenario analysis</td>
<td>More efficient road/lane design, reducing congestion and increasing mobility</td>
</tr>
<tr>
<td>Pedestrian volume by location</td>
<td>Identify location of high risk intersections</td>
<td>Deliver on Vision Zero goals through intersection specific safety design</td>
</tr>
<tr>
<td>Traffic speed by location</td>
<td>Dynamic change of street lights</td>
<td>Increase throughput to reduce congestion;</td>
</tr>
<tr>
<td>Vehicle Type by location with timestamp</td>
<td>Enhance digital twin of city through understanding impact of congestion based on vehicle type</td>
<td>Optimize bus routes/truck routes, time street cleaning to reduce congestion</td>
</tr>
<tr>
<td>Bicycle counting in location with timestamp</td>
<td>Enhance bicycle route planning and increase number of bike safe corridors</td>
<td>Increased use of bicycles, decreasing traffic congestion, accelerate GHG goals, increasing citizen wellness</td>
</tr>
<tr>
<td>Shopping cart count by location with timestamp</td>
<td>Identify homeless population locations</td>
<td>Increase number of homeless served with medical/financial aid</td>
</tr>
<tr>
<td>Wheelchair count by location with timestamp</td>
<td>Remove obstacles during urban planning and enhance public transportation route/schedule</td>
<td>Improve accessibility for impaired community</td>
</tr>
</tbody>
</table>
Street Light/Vertical Infrastructure Rates and Tariffs

Jean A Bonander, Executive Director
California Street Light Association (CALSLA)
jean@calsla.org
April 3, 2019

Categories/Elements of Rate and Tariffs in CA

- Focus on SCE, SDG&E and PG&E
- Municipal Utility Districts, Rural Electric Cooperatives, Irrigation Districts, City Owned Utilities
- CPUC may not require LED retrofit rates/tariffs if the utility controls fewer than 100,000 street lights
LS-1 (Utility Owned)

Service for the lighting of streets, highways, and publicly-owned and publicly-operated automobile parking lots that are open to the general public where the utility owns and maintains the street lighting equipment and associated facilities.

LS-1, Option E
(from SCE, effective January 1, 2016)

Energy Efficiency - Light Emitting Diode (LED) Fixture Replacement

This option became available to customers that elect to have SCE replace its existing street lighting fixtures serving customer load under this Schedule with LED street lighting fixtures to achieve energy efficiency benefits for the customer, subject to Special Condition 14.

Special Condition 14

Customers electing to have SCE replace its existing street lighting fixtures with LED street lighting fixtures to achieve energy efficiency benefits for the customer may elect this Option instead of the Base LED lamp charge, which applies to customers that elect an upfront lump sum payment for LED fixture replacement costs.

Customers with decorative street lighting fixtures may also elect to be served under this Option; however an up-front one-time payment of the differential cost between the decorative light fixture and a non-decorative light fixture is required.
Unmetered service for the lighting of streets, highways, other public thoroughfares, and publicly-owned and publicly-operated automobile parking lots which are open to the general public, where the customer owns the street lighting equipment including, but not limited to, the pole, mast arm, luminaire and lamp, and all connecting cable in a street light system.

Applicable for street lighting service in conjunction with an SDG&E approved street light control module and open to governmental agencies and lighting districts for the lighting of streets, highways and other thoroughfares, and to other corporate agencies for the lighting of non-dedicated streets which are accessible to the public, where the customer owns the entire installation, including underground lines from a central point of connection with utility facilities.

*Note: Will be coming to an SCE and a PG&E rate schedule near you in the next three years!!*
LS-3 Customer Owned Metered/Incidental Load Street Lights (SCE)

Metered service for the outdoor lighting (including attached holiday lighting) of streets, highways, directional highway signs served in conjunction with street and highway lighting, other public thoroughfares, and publicly-owned and publicly-operated automobile parking lots which are open to the general public, where the customer owns the street lighting equipment.

**LS-3, Option A**

Option A is closed to new customers taking service under Schedule LS-3. Option A was available to existing customers with usage incurred exclusively within the period from dusk to dawn. No daytime usage was permitted under Option A.

**LS-3, Option B**

Customers taking service under Option B of this Schedule may have Incidental Load. Service under Option B is subject to meter availability, e.g., a meter capable of recording interval usage data in 15-minute intervals is required for receiving service under Option B of this Schedule.

Option B customers must have incidental load usage consistent with the limits specified in Special Condition 2, or are ineligible for service under this Schedule. Special Condition 2 states that Incidental Load is usage for non-lighting purposes incurred any time of day provided that it shall not either exceed 20 kW within any three months during a 12-month period, or comprise 15 percent or more of the customer’s maximum 12-month lighting demand within any three months during a 12-month period.

<table>
<thead>
<tr>
<th>LS-1A</th>
<th>Mast arm and luminaire attached to a shared distribution pole</th>
<th>PG&amp;E</th>
</tr>
</thead>
<tbody>
<tr>
<td>LS-1B</td>
<td>Street light only pole or post top lamp (closed since 1978)</td>
<td>$6.514</td>
</tr>
<tr>
<td>LS-1C</td>
<td>Customer owned pole; PG&amp;E owned luminaire</td>
<td>$6.782</td>
</tr>
<tr>
<td>LS-1D</td>
<td>Street light only pole, post top lamp</td>
<td>$9.723</td>
</tr>
<tr>
<td>LS-1E</td>
<td>Street light only steel pole, mast arm and luminaire</td>
<td>$10.478</td>
</tr>
<tr>
<td>LS-1F</td>
<td>Street light only wood pole, mast arm and luminaire</td>
<td>$7.867</td>
</tr>
<tr>
<td>LS-2A</td>
<td>Customer owned</td>
<td>$0.207</td>
</tr>
<tr>
<td>LS-2C</td>
<td>Customer owned; PG&amp;E provides maintenance</td>
<td>$3.994</td>
</tr>
<tr>
<td>Electric Rate</td>
<td></td>
<td>$0.1645</td>
</tr>
<tr>
<td>TC-1</td>
<td>Traffic Control</td>
<td>$10.00</td>
</tr>
<tr>
<td>Electric Rate</td>
<td></td>
<td>$0.19092</td>
</tr>
</tbody>
</table>

PG&E rates are subject to change.
### SCE

<table>
<thead>
<tr>
<th>LS-1</th>
<th>Extensive rate sheet with multiple types of lamps</th>
<th>$8.51 to $9.29 for HPSV lamps</th>
</tr>
</thead>
<tbody>
<tr>
<td>LS-2</td>
<td>Customer owned</td>
<td>$0.76</td>
</tr>
<tr>
<td>Electric Rate</td>
<td></td>
<td>$0.07806</td>
</tr>
<tr>
<td>TC-1</td>
<td>Traffic Control</td>
<td>$15.20</td>
</tr>
<tr>
<td>Electric Rate</td>
<td></td>
<td>$0.13868</td>
</tr>
</tbody>
</table>

### SDG&E

<table>
<thead>
<tr>
<th>LS-1A</th>
<th>Wood poles with overhead power lines; Extensive rate sheet with multiple types of lamps</th>
<th>$9.95 to $21.10 for HPSV lamps</th>
</tr>
</thead>
<tbody>
<tr>
<td>LS-1B</td>
<td>Concrete pole; customer pays the cost difference between a concrete and wood pole at installation; Extensive rate sheet with multiple types of lamps</td>
<td>$10.09 to $21.03 for HPSV lamps</td>
</tr>
<tr>
<td>LS-1C</td>
<td>Concrete pole paid by SDG&amp;E (closed to new customers); Extensive rate sheet with multiple types of lamps</td>
<td>$14.78 to $28.08 for HPSV lamps</td>
</tr>
<tr>
<td>LS-2</td>
<td>Customer owned; Extensive rate sheet with multiple types of lamps</td>
<td>$1.24 to $13.40 for HPSV lamps</td>
</tr>
<tr>
<td>Electric Rate</td>
<td>Generation portion of the electric rate; the distribution electric rate is included in the facilities charges listed above</td>
<td>$0.07176</td>
</tr>
<tr>
<td>A-TC</td>
<td>Traffic Control</td>
<td>$10.00 (5KW max) $16.00</td>
</tr>
<tr>
<td>Electric Rate</td>
<td>Generation and distribution</td>
<td>$0.1643</td>
</tr>
</tbody>
</table>
Challenges for Local Governments and Utilities

- Technology is moving faster than legislation and regulations
- Utilities and Local Governments are struggling to adapt, plan for and implement rate/tariff changes that will affect:
  - Metered street lighting
  - Vertical infrastructure control devices that allow multiple attachments
  - Balancing the public benefit and for-profit private sector interests
  - Custodial care of the public right of way for all the services the communities need
  - Time of Use (TOU) rates affecting street lighting
  - Administrative issues (permitting, environmental, zoning and design review, billing, accounting and record keeping) are roadblocks to change

Managing the Public Right of Way – Right!
So, what is under the public right of way that local governments control?

It’s Still About the Basics

- Are there rates and tariffs for attachment devices in your region, based on wattage draw, evaluation of the infrastructure stability?
- What is the condition of existing vertical infrastructure – can it support attachments w/rates, tariffs, wiring, wattage, pole strength, stability, adverse weather conditions?
- Have you identified the multiple relationships – local government, investor owned and public utilities, transportation entities, contractors, maintenance, operations?
- Is your application format in place, with design guidelines, process flow, a cost analysis to justify fees, and are you considering shifting the burden for compliance, completeness, monitoring, testing to the applicant?
- What do citizens/customers/businesses think about the use of the right of way and how to pay for the services the right of way encompasses? Are you prepared for the comment?
Small Wireless Facilities in Cities Right-of-Way

Tyler Masters, Program Manager
Western Riverside Council of Governments (WRCOG)

Presentation Overview

- WRCOG Regional Streetlight Program
- Small Wireless Facilities – Small Cell
  - What’s the common vehicle for Wireless facility contracts?
  - Small wireless facility - Legislation
  - What about aesthetics and design?
WRCOG Regional Streetlight Program

- Subregional cost for streetlights: $10 M+ annually
- 11 jurisdictions decided to acquire and convert to LED. Nearly $70M in savings over 20 years (includes financing, O&M, LED procurement)
- Program tasks included:
  - LED demonstration area and lighting analysis
  - Financing
  - Retrofit, Operation & Maintenance Service Provider
  - LED Fixture selection
- Allows for additional smart city and revenue generating opportunities

Small wireless facilities – small cells

- Revenue generating potential!
- Low powered nodes that provide cellular service
  - Power: < 1 watt of power
  - Range: < two kilometers
  - Femto, pico, micro - cells are all considered small cells
- Telecommunication companies see small cells as the tool to support the next generation (5G) of telecommunication services, speed, and transfer of data

As of December 2017, a total of 12 million small cells have been deployed worldwide, with forecasts as high as 70 million by the year 2025
What’s the common vehicle for Wireless facility contracts?

• 2005 – 2015:
  - Agreements: Right-of-way Use Agreements (RUA) and TLNEA
  - Revenue: $500-$1000 with 3%-5% revenue share
  - Term: 5-10 year terms

• 2016 – 2018:
  - Common Agreements: Master Lease Agreement (MLA), Service License Agreement (SLA), and Streetlight Agreement
  - Revenue: $1,000 - $4,000 with CPI or 2%-4% annual rate escalator
  - Term: 5-10 year terms

• 2019 – now:
  - Revenue: $270 fee cap

Small wireless facilities in legislation

• California Legislation (SB 649) – vetoed in 2017
• Federal Legislation (S.3157) – 2018
• Federal Communication Commission (FCC) ruling – September 2018
  - Some portions went into effect January 2019

• Common themes of each:
  - Limit local control of small cell deployments
  - Set administrative cost recovery limits
  - Small cell size
FCC ruling and order on small cell deployment

- FCC Ruling and Order full title: FCC Facilitates Deployment Of Wireless Infrastructure For 5G Connectivity
- Companies will expect:
  - Applications be processed within the 60-day and 90-day shot clocks
  - If application deemed incomplete, expectation to be informed within 10 days
  - Associated permit action completed within shot clock, unless otherwise stated by applicant.
  - Fee caps

What if I have a pre-existing agreement?

- The FCC does not require change in existing agreement fees to $270/year.
- Any change will need to be handled on a case-by-case basis.
What about aesthetics and design?

- Aesthetics portion of the FCC order does not go into effect until April 15.

<table>
<thead>
<tr>
<th></th>
<th>City example #1</th>
<th>City example #2</th>
<th>City example #3</th>
<th>SB 649 (vetoed)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Size</td>
<td>NTE 2 cubic feet (excluding cable and conduit)</td>
<td>Charges additional fees for anything above 10 cubic feet</td>
<td>NTE 4 cubic feet (excluding cable and conduit)</td>
<td>Cumulative total NTE 21 cubic feet</td>
</tr>
<tr>
<td>Appearance</td>
<td>Match pole color</td>
<td>Match pole color</td>
<td>Match pole color</td>
<td>No requirement</td>
</tr>
<tr>
<td>Design</td>
<td>Meet City standards</td>
<td>Meet City standards</td>
<td>Meet PW design standards</td>
<td>No specifics</td>
</tr>
<tr>
<td>Location</td>
<td>720 ft. apart, only permitted in collector or larger.</td>
<td>75 ft. away from residential structure. Industrial, Commercial, office, mixed use residential</td>
<td>Additional review if within 300 ft. of residential. Co-location preferred if within 1000 ft. of another small cell.</td>
<td>No restrictions</td>
</tr>
</tbody>
</table>
H.R 530

• 2019 attempt to Nullify/Repeal FCC ruling
  - Actions by the Federal Communications Commission in “Accelerating Wireless and Wireline Broadband Deployment by Removing Barriers to Infrastructure Investment” (83 Fed. Reg. 51867) and the Federal Communications Commission’s Declaratory Ruling in “Third Report and Order and Declaratory Ruling” (FCC 18-111) shall have no force or effect.

• 1/14/19: Introduced into House, referred to Committee on Energy and Commerce

• WRCOG supports H.R 530
  - Oppose legislation that seeks to take away local control
  - Oppose legislation that seeks to limit local control or reduce funding opportunities to local jurisdictions

• Worth taking action on!!!

Questions???