



Street Lights of San Francisco - Project Overview

DOE SSL R&D Workshop
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San Francisco, CA
February 3, 2009

CUSTOMER ENERGY EFFICIENCY
EMERGING TECHNOLOGIES





Presentation Overview

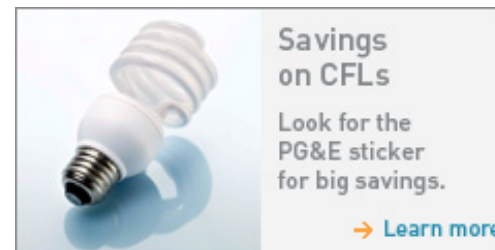
- Recent Results
 - San Francisco PG&E/GATEWAY Demonstration
- Issues
 - Maintenance, design practices, incentives, rate schedules





Energy Efficiency in California

- California has been aggressively pursuing Energy Efficiency for over 30 years
- Energy Efficiency is first in the “Loading order” to meet new demand
- Emerging Technologies programs - Identify and assess emerging technologies to **accelerate** market penetration

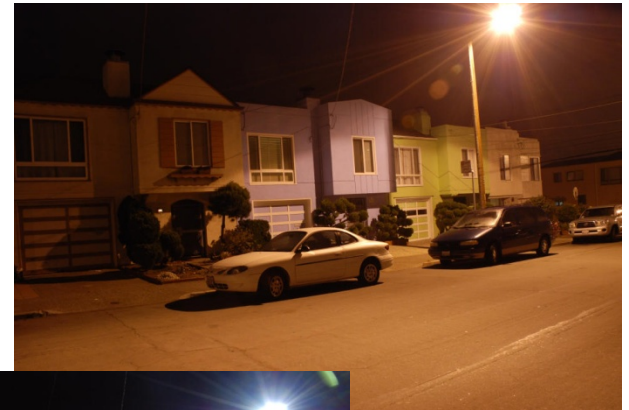


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LED Street Light Assessment - City of San Francisco

- Emerging Technologies Field Assessment
 - Collaboration with PG&E, DOE, City of San Francisco
 - Basecase: 100 W Cutoff HPS
 - Retrofit: Various manufacturers products
 - Beta LED, Cyclone, Leotek, Relume
- Report Available
 - www.etcc-ca.com
 - www.netl.doe.gov/ssl



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LED Street Light Assessment - City of San Francisco

- **Measured Power Consumption**

Luminaire	HPS	LED A	LED B	LED C	LED D
Power (W)	138.3	58.7	62.2	41.2	69.2
Savings (W)		79.6	76.1	97.1	69.1
Percent Reduction		58%	55%	70%	50%



LED Street Light Assessment - City of San Francisco

- **Lighting Performance - Field Data Trends**
 - Average photopic illuminance reduced
 - Minimum illumination generally maintained
 - Uniformity generally increased
 - Similar areas of measurable illumination possible, but not always achieved

- **“A Picture is worth a Thousand Words”**



LED Street Light Assessment - City of San Francisco

41st Avenue - LED A





LED Street Light Assessment - City of San Francisco

38th Avenue - LED B





PG&E's Emerging Technologies Program

LED Street Light Assessment - City of San Francisco

42nd Avenue - LED C



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LED Street Light Assessment - City of San Francisco

44th Avenue - LED D





LED Street Light Assessment - City of San Francisco

- **Economic Performance**

- Luminaire costs: \$300 - \$700
- New Construction
 - Simple Payback: 4 - 15 years
- Retrofit
 - Simple Payback: 7 - 20 years
- Products with better lighting performance were more economically attractive



LED Street Light Assessment - City of San Francisco

- **Lesson Learned**

- All products are not created equal - need to match performance to task
- Seeing is believing - install test luminaires
- Progress is being made - performance is improving and costs are declining



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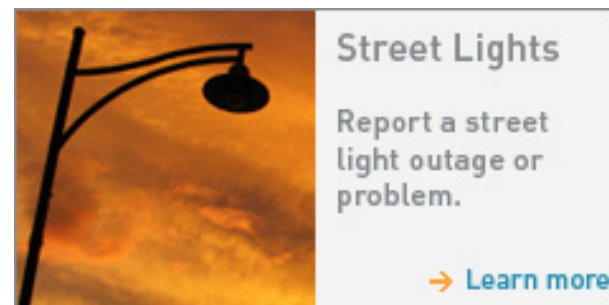
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Maintenance and Operation Cost Savings

- Longer life - really mean RELIABILITY
 - Reduced replacement part cost
 - Reduced field labor
 - Reduced hazardous waste disposal cost
 - Reduced administration cost
- Difficult to quantify
 - Range from \$12/year/fixture - over \$100/year/fixture





Outdoor Lighting Practices

- Current practices do not fully address the different attributes of various lighting sources
- Areas identified for research and development
 - Best practices
 - Adaptive standards
 - Development of visibility metrics
 - Additional demonstrations



Incentive Program Development Challenges

- Variable Product Quality
 - need to require product qualifying specifications (Energy Star)
- High Cost - Marginal Total Resource Cost (TRC)
- Rapid Technology Advancements
- Customer Education





Street Light Rate Schedules

- Issues
 - Street Lights are typically unmetered
 - Rate based on type of lamp, calculated energy use
 - With LEDs, no “standard” products
- Proposed Solutions
 - Develop “wattage categories”
 - Validate energy consumption based on IESNA LM-79 test

LED Luminaire Wattage	Rate \$/Lum/mo
50.0 - 54.9	\$????
55.0 - 59.9	\$????
60.0 - 64.9	\$????



Self Guided Tour

- PG&E Headquarters (Beale Street)
 - LED Street Lights and Network Controls

- Sunset District Avenues
 - PG&E/DOE GATEWAY report

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