

Street Lights: LEDs and Other High-Performance Technologies



**Alicia Culver, Director
Responsible Responsible Network**

RPN

Nonprofit, ~200 members

- **States**
- **Local governments**
- **Federal agencies**
- **Colleges and universities**
- **School districts**
- **Businesses**
- **Non-profits**

RPN Mission

“Promote and practice responsible purchasing by identifying best practices, developing effective purchasing tools, educating the market, and using our collective purchasing power to maximize environmental stewardship, protect human health, and support local and global sustainability.”

RPN Resources



- *Responsible Purchasing Guides* for 15 product categories



- Webinars on “green” procurement issues
- Newsletter highlighting “green” purchasing activities and resources



- Sustainable purchasing policies and specifications



- *Model Responsible Purchasing Report*
- Calculators and other tools

Green Lighting Policy Goals

OPTIMIZE:

- **Energy efficiency**
- **Lamp life**
- **Toxicity reduction**
- **Recycling (convenient,
private sector-financed)**
- **Sustainable manufacturing**



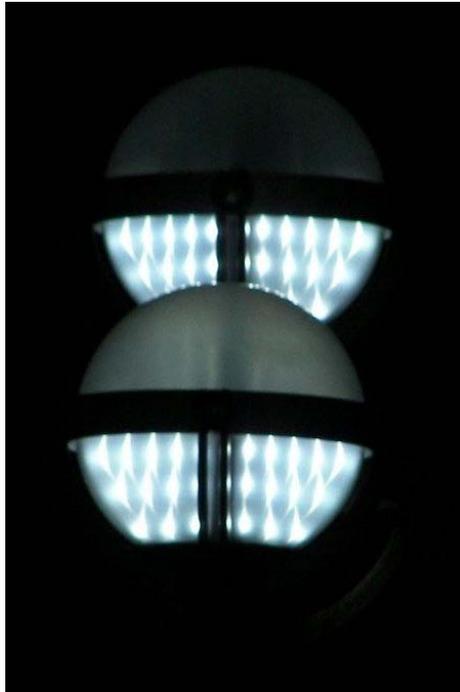
“Best Value” Procurement

Considers total (life-cycle) costs of ownership

- **Initial price**
- **Utility costs (energy, water)**
- **Maintenance costs (labor and replacement)**
- **End-of-life costs (disposal and recycling)**



LED Street Lights



LED Street Lighting Applications

- Streets and some highways
- Parking lots and garages
- Parks, beaches and pedestrian walkways
- Bus shelters and rest stops
- Street signs
- Security and other exterior lighting applications





LED Street Light Costs



- **LED street light conversions = luminaire replacement**
 - ~\$400-\$500/luminaire (pilot tests)
 - ~\$1000-\$1500/luminaire with remote monitoring
 - Costs dropping ~20% annually (DOE)
- **Cost savings on life-cycle basis compared to high-pressure sodium (HPS) and metal halide (MH)**
 - 35%-75% energy savings (more with dimming)
 - 2-4X longer life (lower replacement/labor costs)
 - No mercury disposal
 - Can power with solar/wind (no utility cuts)

LED Street Light Quality

- **LED Street Light Benefits**

- Improved night visibility (security)
- Instant-on with no re-strike delays
- Programmable (identify outages, bi-level lighting)
- No mercury or UV radiation
- Less light pollution (more directional)



- **Quality varies but is steadily improving**

- Early problems: glare, low/uneven light output, lumen depreciation (fading), over-heating
- Pilot tests, approved products, strong technical specifications, warranties important

Los Angeles LED Street Light Spec

Key requirements for LED luminaires to replace

138-watt HPS street lamps:

- $\leq 85\text{W}$ on, $\leq 0.5\text{W}$ off (excluding monitoring equipment)
- ≥ 3200 lumens; must maintain 70% @ 50,000 hours
- Efficacy = ≥ 40 lumens/watt
- Housing = rust-resistant metal, < 25 pounds
- Must have photocell receptor
- Color rendering index (CRI) ≥ 70 ; 4000-5000K
- UL-listed; Class A sound rating, FCC-compliant
- Fully shielded/IESNA “cutoff” (to prevent light pollution)
- Must be able to operate normally at -20C to 50C
- ≥ 5 year warranty



Full specification: www.LACity.org/BSL

San Diego Regional Peer-to-Peer Street Lighting Working Group

Local Government Energy Efficiency

Best Practices

STREETLIGHTING

San Diego Area
Population: 3,000,000

SUMMARY

The San Diego Regional Peer-to-Peer Street Lighting Working Group (SLWG) was established in 2009, sponsored by SDG&E's Local Government Energy Efficiency Partnership Program.

Participating member cities and other public agencies are developing and sharing best practices and tools to accelerate the retrofit of approximately 145,000 streetlights in SDG&E's service territory.

This regional initiative has the potential to reduce annual street lighting energy consumption by 60 million kWh, which equates to a reduction of 26,000 tons of CO₂ emissions and an annual savings to taxpayers of \$10 million in combined energy and maintenance costs.

In terms of economic development, full regional implementation has the potential to create \$58 million in combined product and installation revenues while generating 600 jobs.

The collaborative process, methodology, and unique "Dropbox" online best practice sharing toolkit establish a template that can now be replicated to address other key regional sustainability opportunities.

San Diego Regional Peer-to-Peer Street Lighting Working Group



PHOTO: Kasey Paez Sr.

PROGRAM HIGHLIGHTS

The Street Lighting Working Group meets every 2-3 weeks with the initial primary goal of providing specification and procurement tools and templates which are intended to streamline and accelerate the process for participating public agencies to move forward with street lighting retrofit procurements.

Participating cities and public agencies receive the following assistance:

- Regional Specification Guidelines for Induction and LED streetlights
- Data from local/regional field evaluations
- Guidance on observatory dark sky considerations
- Recommendations for recycling of lamps and fixtures
- Compliance requirements of EECBG and ARRA grant funded procurements
- SDG&E guidance on tariffs and available incentives
- Insight on emerging adaptive controls
- Sample RFP, RFB and Best Value Evaluation Templates

San Diego Green Street Lighting Collaboration

Local Government Energy Efficiency

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LED Street Light Standards

- **ENERGY STAR rating for LED roadway luminaires under development**



- Version 1.1 issued in December 2008
- Additional testing protocols, standards proposed

- **International Dark Sky Association (IDA) Fixture Seal of Approval**



- Independent, non-profit organization that certifies outdoor luminaires that “minimize glare, reduce light trespass, and don’t pollute the night sky”



LED Street Light Case Study

City of Raleigh, NC (First “LED City”)

- Worked with its local utility, Positive Energy (PE)
- Tested 9 decorative LED street lights near its new convention center
- 167-watt LED-lit fixtures replaced 200W & 250W HPS street lights (255W & 323W with ballasts)
- ~44% energy savings; => ~\$100,000 over 20 years
- “Installation was easy”; no operational problems to date
- LEDs improved visibility with fewer “foot-candles” of light
- Follows successful test of LED parking garage lights
- Currently testing solar-powered LED lights



LED Street Light Case Study

"The economic benefits for municipalities to invest in LEDs are clear as they save energy, reduce environmental impact and improve the quality of light. As leaders in one of America's fastest growing cities, it's our civic responsibility to invest in the future and ensure the highest possible quality of life and safety for our citizens in generations to come. We believe that the cost savings and benefits of LED lighting are real and achievable today."



Charles Meeker, Mayor, City of Raleigh, NC



www.ResponsiblePurchasing.org



Non-cycling HPS Street Lamps

- **Pros**

- Safer than conventional HPS because they do not “cycle” on and off
- 90% less mercury than standard HPS lamps
- 25% longer rated life (30,000 hours vs. 24,000 hours)
- Slightly higher efficiency than standard HPS



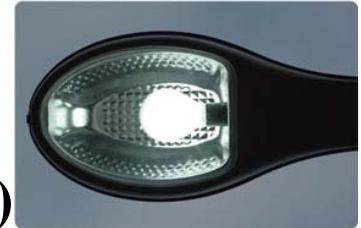
- **Cons**

- Far less efficient than LED or induction street lamps
- Much shorter lamp life than LED or induction street lamps (more frequent replacement, higher labor costs)
- Poor color rendering/visual acuity (yellow light)
- Contain mercury

Induction Fluorescent Street Lamps

- **Pros**

- Long life (100,000 hours)
- Improved visibility (High CRI “white” light)
- Lower wattage, less mercury than high-pressure sodium (HPS) and metal halide (MH) streetlamps
- Mature (well-demonstrated) technology



- **Cons**

- Long life (100,000 hours)



LED Street Lighting Resources

DOE Municipal Solid-State Street Lighting Consortium collects, analyzes and shares technical information and experiences related to municipal LED street lighting demonstrations

www1.eere.energy.gov/buildings/ssl/gatewaydemos_consortium.html



RPI's Lighting Research Center coordinates the Alliance for Solid State Illumination and Technology (ASSIST) offers a Parking Lot Lighting Calculator, technical reports, and other resources to help facilitate the use of LEDs www.lrc.rpi.edu/programs/solidstate/assist/index.asp

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