City of San Diego
Broad Spectrum Lighting Program

Brought to you by:

CPUC-funded Local Government Partnerships

EECBG, CEC and QECB

Tom Cartier and Linda Giannelli Pratt

ENVIRONMENTAL SERVICES DEPARTMENT

THE CITY OF SAN DIEGO

2002: Conversion to HPS

HPS **LPS**

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Dark Sky Society

Maintain 30 mile LPS radii around Mt. Palomar and Mt. Laguna

San Diego's Road to Recovery

Unexpected results from a routine Library Interior Lighting Retrofit–

We *KNEW* that the White Light (Broad Spectrum) Saves Energy.

We *DISCOVERED* that it also provides <u>better</u> visual performance.

Why?

TRUE COLORS

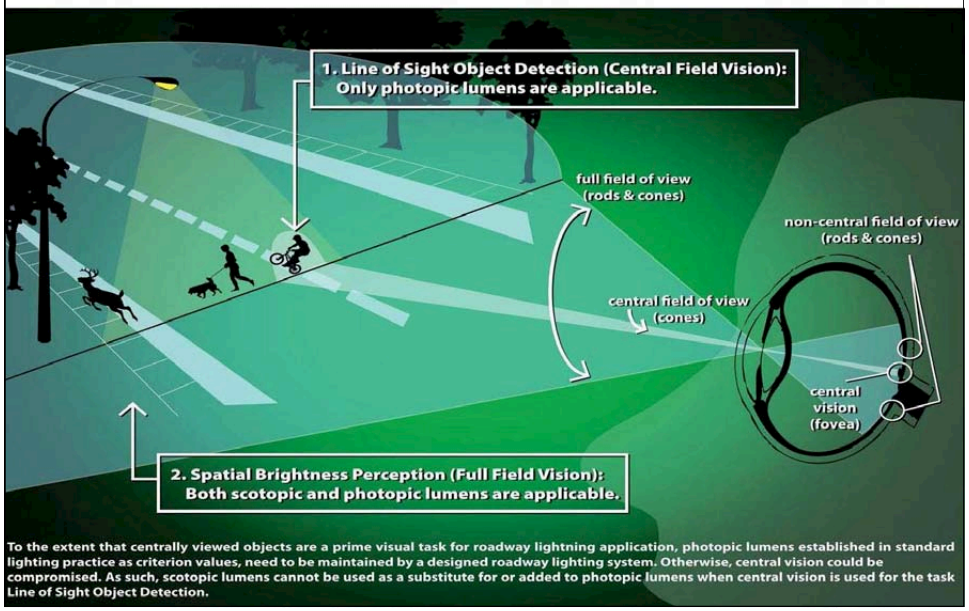
Monochromatic prohibits color rendition.

Boring… and a concern for public safety.

5

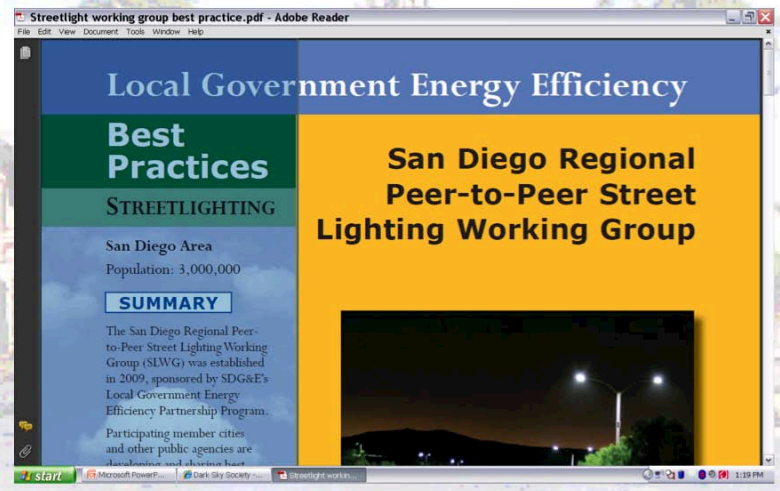
Scotopic versus Photopic Light and Vision

White Paper by Dr. Jack Josefowicz and Ms. Debbie Ha, LED Roadway Lighting Ltd.



To the extent that centrally viewed objects are a prime visual task for roadway lightning application, photopic lumens established in standard lighting practice as criterion values, need to be maintained by a designed roadway lighting system. Otherwise, central vision could be compromised. As such, scotopic lumens cannot be used as a substitute for or added to photopic lumens when central vision is used for the task Line of Sight Object Detection.

Streetlight Working Group



"We have taken a technology-agnostic approach, since there is no one-size-fits-all solution."

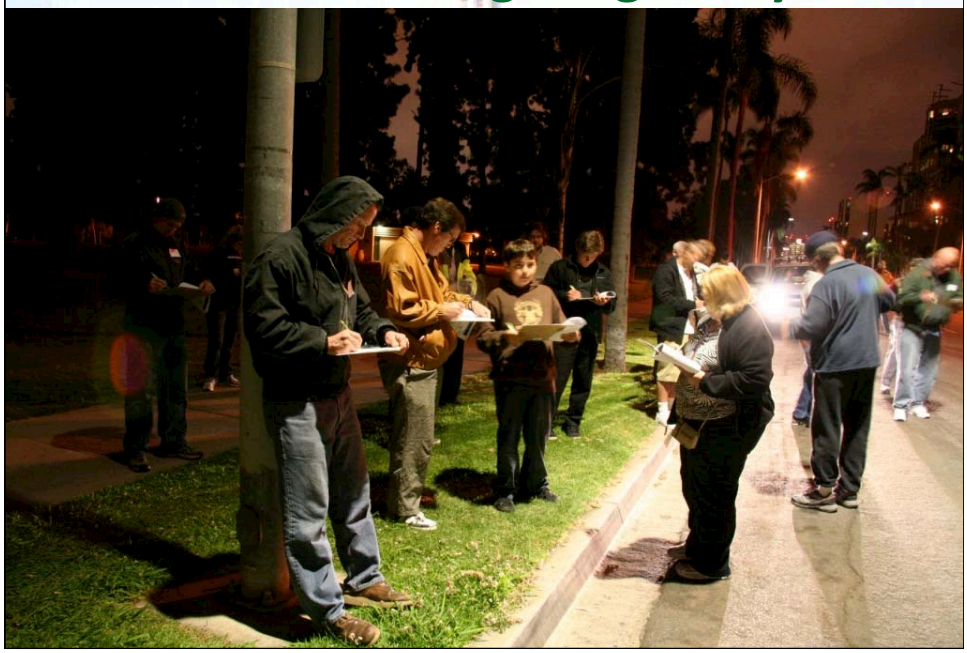
CleanTECH San Diego is a nonprofit membership organization formed to accelerate San Diego as a world leader in the clean technology economy, and co-leads the SLWG.

www.cleantechsandiego.org/streetlight-working-group.html

City of San Diego's Street Lighting Needs

- Nearly 38,000 streetlights to retrofit
- Comply with Dark Sky guidelines
- Decide on technologies
- Identify specific requirements/ criteria
- Develop an RFP
- Provide Public Outreach

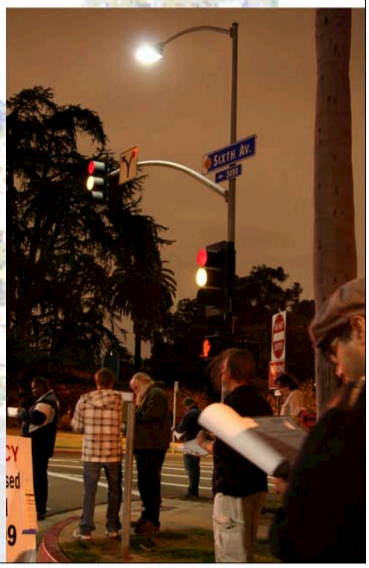
6th Avenue Lighting Study



SDG&E-Sponsored Study Parameters

- Luminance (Ft Candles)
- Reaction Time (Test Vehicle)
- Subjective Public Evaluation

Street Light Working Group was a tremendous success- CleanTech, SDGE and many municipalities



Preliminary Results

- **No** significant difference between the existing 250 Watt High Pressure Sodium (HPS) and the 170 Watt Broad Spectrum Lights
- How do we choose between LED and Induction?

Decision: Broad Spectrum Lighting

- Equal or Better Visual Performance
- Energy Saving 40% to 60%
- Maintenance Savings - Especially in right-of-way

Life Cycle Cost Analysis

Consider all the costs during a twenty year product life, including:

- Inflation as a variable
- Maintenance Costs
- Energy Costs converted to Simple Payback (Years) for Financing

Street Lighting 20 Year Economic Life Cycle Analysis

Line #	Data	250 Watt HPS	165 Watt Induction	198 Watt LED
2	Lamp & Fixture Costs (Material Only)	$ 175.00	$ 515.00	$ 1,071.00
5	**Monthly Energy Rate**	**$ 13.16**	**$ 6.59**	**$ 7.91**
	Calculations			
9	Annual Energy Costs	**$ 158**	**$ 79**	**$ 95**
10	Years to Replace Lamp	5.77	24.04	12.02
11	No. of Lamp Replacements in 20 years	3.5	0.83	1.66
13	**Life Cycle Costs**			
14	Initial Cost of Fixture (Matl & Labor)	$ 214	$ 554	$ 1,110
15	20 Year Energy Costs (No Inflation)	$ 3,158	$ 1,582	$ 1,898
16	20 Year Energy Costs (with Inflation)	$ 4,135	$ 2,071	$ 2,485
17	20 Year Lamp Maintenance Costs	$ 209	$ 202	$ 2,264
18	**20 Year Life Cycle Costs**	**$ 4,558**	**$ 2,827**	**$ 5,860**
19	**Annual LC Costs**	**$ 228**	**$ 141**	**$ 293**
	Inflation Factor 2.5%	**250 Watt HPS**	**165 Watt Induction**	**198 Watt LED**

9/1/2009

Payback Compared with 250 Watt HPS (Years)

Induction

LCA Payback	Simple Payback
165 Watt	165 Watt
6.4	7.0

LED

LCA Payback	Simple Payback
198 Watt	198 Watt
(17.1)	17.6

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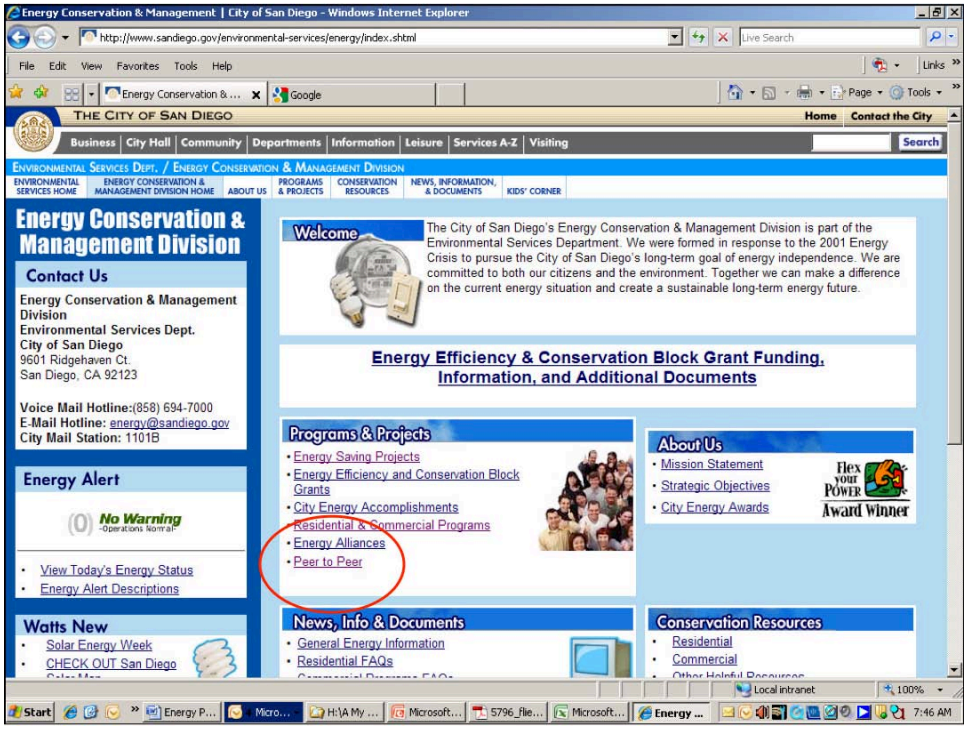
Example of Cobra-Head Lighting

Projections for Energy Savings from Streetlights conversion:

16,000,000 kWh = 16,000 MWh

Which is approximately equal to:

- 2,266 cars removed
- 1,450,000 gallons of gas saved
- 4,426 homes off the grid



Questions?

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