

# Summary of Residential Lighting Proposal to CEC

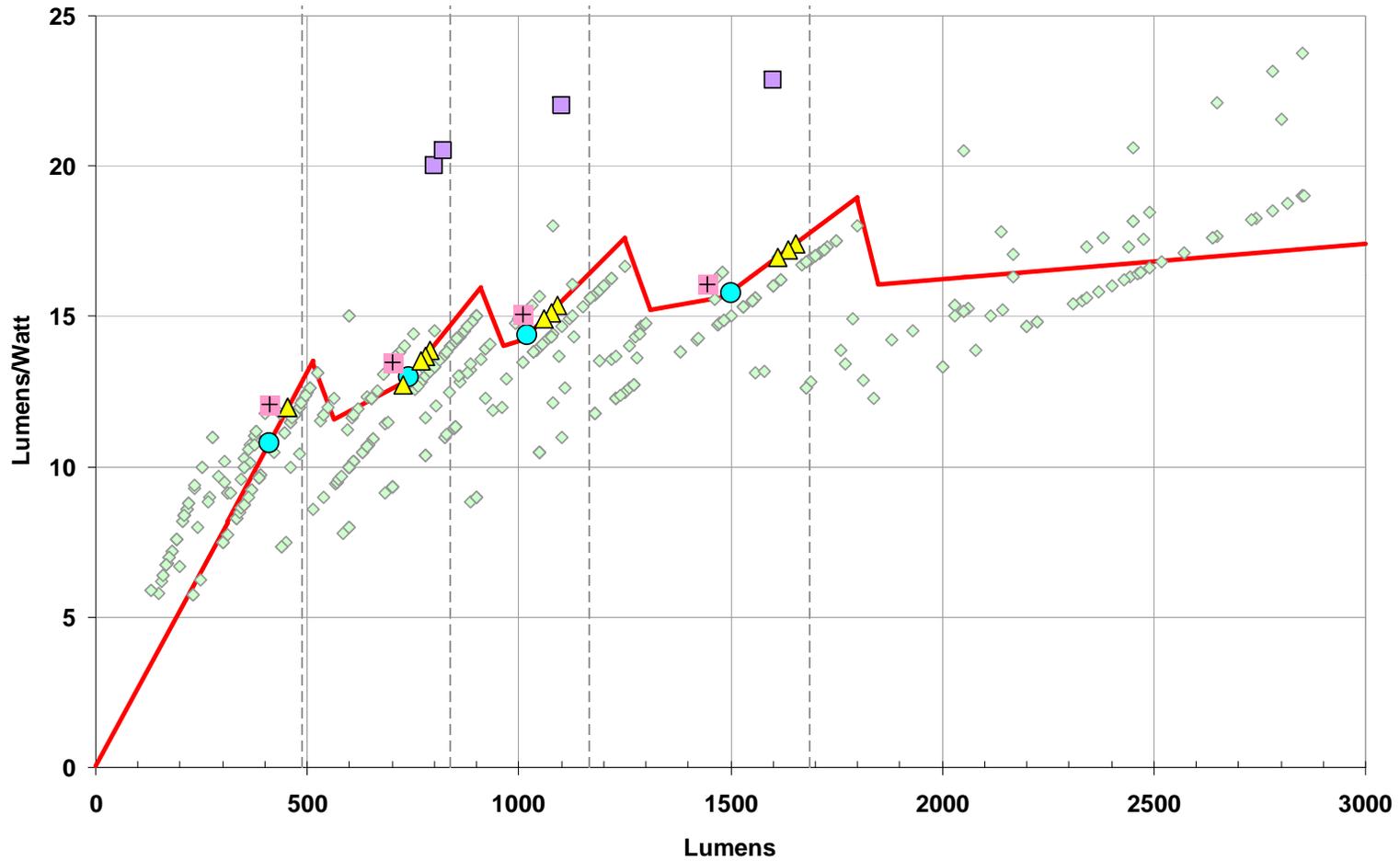
Presented on behalf of:  
Pacific Gas and Electric Company  
Pat Eilert  
Gary Fernstrom  
Ed Elliot



Presented by:  
Chris Calwell, **ecos**

Thursday, May 15, 2008  
CEC Efficiency Committee Workshop  
2008 Rulemaking on Appliance Efficiency Regulations  
Docket No. 07-AAER-3

# California Tier 2 Standards Update – Impact of 1/1/08 Standards So Far



- ◆ Standard Incandescent Lamps
- New Philips Halogena
- New Sylvania E-Logic
- CEC Tier 2 (2008)
- ▲ New GE Energy Saver
- ⊕ New Philips Econ-o-watt



CFLs now getting more prominent placement

New bulbs with 5% lower wattage now reaching retail shelves in California.

Most of the new bulbs reduce light output by 8 to 10%, and are less efficient than the old bulbs they replace.

Modified spectrum bulbs and G lamps at standard wattages offered for sale right next to the new bulbs at unfamiliar wattages

# Retailers Now Often Devote Their Highest Profile Shelf Space to the Least Efficient Light Bulbs



Pacific Gas and Electric Company®

ecos

Making a World of Difference

# Next Steps in California

- ▶ EISA adopted December 2007 - standards were imperfect, but will at least push manufacturers to reduce lamp wattage
- ▶ EISA gives manufacturers wide latitude to reduce light output, especially with modified spectrum products
- ▶ With better federal labeling and large amounts of consumer education, hopefully power savings will come mostly from efficiency gains, not dimmer lamps
- ▶ EISA offers California an opportunity to accelerate adoption of Tier 1 federal standards by 1 year in Tier 1 standards by 2 years
- ▶ Other presentations will discuss savings opportunities beyond general service lamps – this one is focused on the opportunity to accelerate EISA.



**Pacific Gas and  
Electric Company®**

ecos

Making a World of Difference

# More Strategies Needed to Meet AB 1109

- ▶ In its January 2008 testimony, PG&E recommended six specific strategies for dramatically increasing residential lighting efficiency in California.
- ▶ EISA 2007 acceleration is one useful strategy, but its impact will be modest compared to the combined impact of other recommended approaches:
  - better enforcement of existing standards
  - adopt a broad range of Title 20 and Title 24 measures not pre-empted by EISA
  - expand consumer education
  - employ financial incentives to discourage the sale of the least efficient products and encourage the sale of the most efficient ones.



Pacific Gas and  
Electric Company®

ecos

Making a World of Difference

# Recent History

- ▶ General purpose incandescent lamp sales likely peaked in the late 1990s, leveled out, and have begun a steady decline since.
- ▶ NEMA data submitted to DOE show U.S. sales of all incandescent A-line lamps at 1.57 billion units in 2001 and 1.41 billion units in 2005
- ▶ Sales declines have become more rapid for incandescents since 2005.
- ▶ Recent CFL sales have been phenomenally high – as much as 29% of all screw-based lamps sold in 2007
- ▶ High past sales of CFLs significantly reduce future lamp sales of all types due to longer average lifetimes
- ▶ Socket share will likely exceed sales share for CFLs soon – Ecos is continuing to refine its modeling to estimate this effect in future years



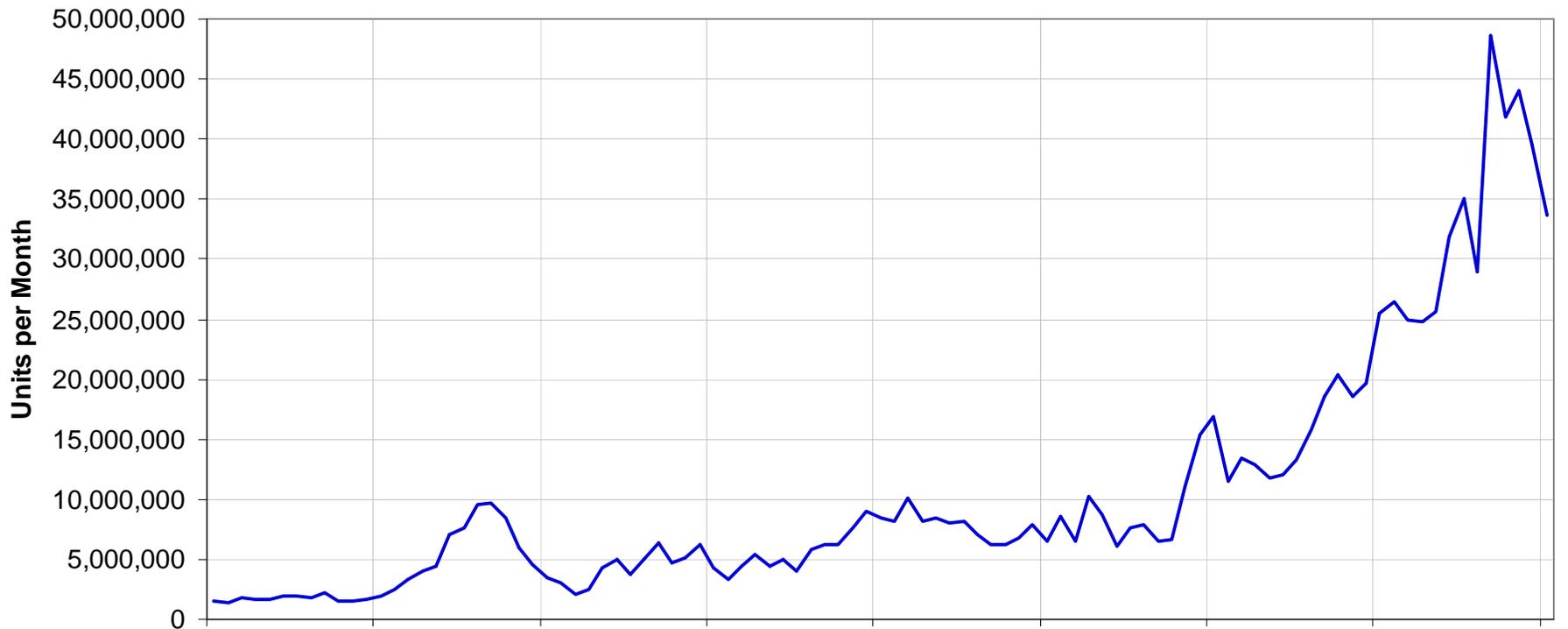
**Pacific Gas and  
Electric Company®**

ecos

Making a World of Difference

# Monthly CFL Imports Soared for 2 Years, Peaked in Fall 2007, then Dropped 30%

## Screwbase CFL Imports to the U.S.



Source: Ecos Consulting analysis of USA Trade Online import data. 3/08

2000	2001	2002	2003	2004	2005	2006	2007
21 million	69 million	52 million	66 million	93 million	102 million	185 million	397 million



Pacific Gas and Electric Company®

ecos

Making a World of Difference

# Long Term Projections

- ▶ We assume demographic and economic factors will increase the number of California sockets by about 30% between 2007 and 2018
- ▶ Even with that growth, at least 20% fewer screw-based lamps will be sold in 2018 than were sold in 2007, due to longer lamp lifetimes.
- ▶ Large unknowns regarding pace of technical advances in solid state lighting and declines in price. If pin-based LED and advanced fluorescent technologies take off, the number of sockets will decline far more.



Pacific Gas and  
Electric Company®

ecos

Making a World of Difference

# Summary of Total Energy Savings by End of 2018 (AB 1109 Deadline)

Scenario	Reduction in Peak Demand (MW)	Total Energy Savings (GWh)
Tier 1 implementation in 2011-2013	64	926
Tier 2 implementation in 2018	106	2,832
Accelerated implementation of both tiers	170	3,758



Pacific Gas and Electric Company®

ecos

Making a World of Difference

# Energy Use of EISA Tier 1 Compliant Lamps

## Standard Spectrum Lamps, 2011-2013

Lumen Range	Average Power Draw Per Unit (W)	Lifetime Operating Hours	Annual Unit Sales (in millions)	Lifetime Energy Use (GWh/yr)
310 to 749	29	2500	5.4	390
750 to 1049	43	2500	19.0	2042
1050 to 1489	53	2000	9.0	954
1490 to 2600	72	2000	7.9	1133
Total	n/a	n/a	41.3	4520

## Modified Spectrum Lamps, 2011-2013

Lumen Range	Average Power Draw Per Unit (W)	Lifetime Operating Hours	Annual Unit Sales (in millions)	Lifetime Energy Use (GWh/yr)
232-562	29	2500	1.8	130
563-787	43	2500	6.3	681
788-1117	53	2000	3.0	318
1118-1950	72	2000	2.6	378
Total	n/a	n/a	13.8	1507

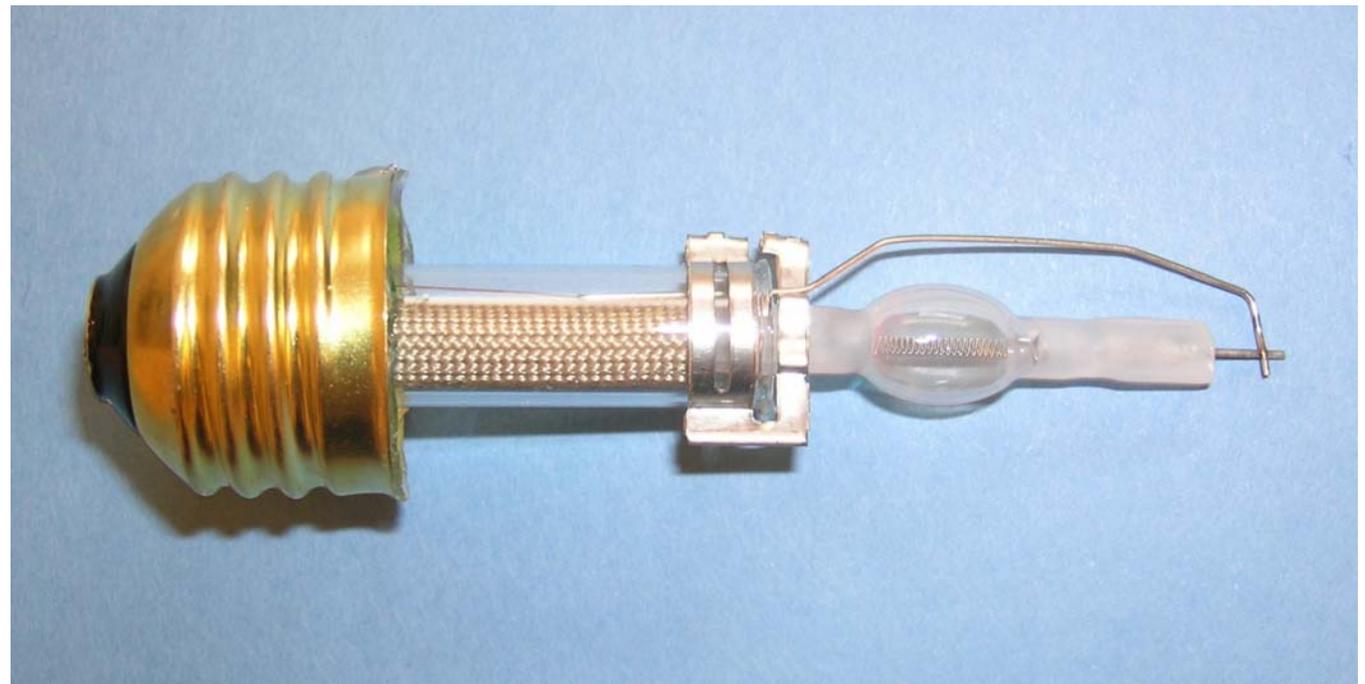
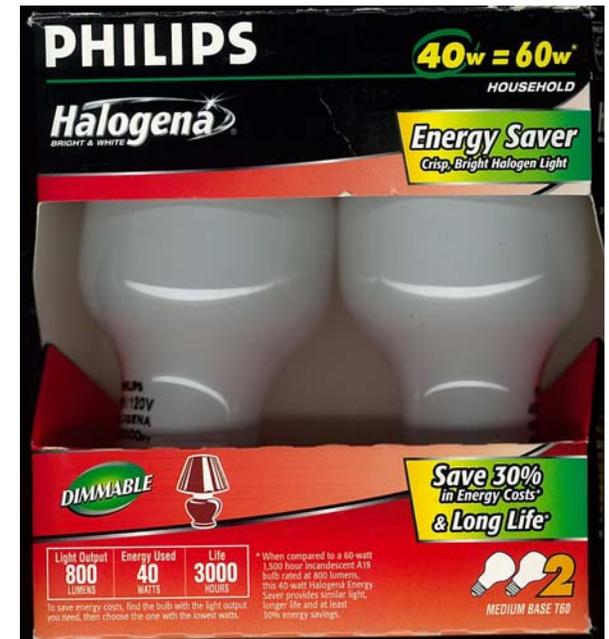


Pacific Gas and Electric Company®

ecos

Making a World of Difference

# One of the Likely Compliance Technologies: Halogen IR



# Savings from Adopting EISA Tier 1 One Year Early

## Standard Spectrum Lamps, 2011-2013

Lumen Range	Average Reduction in Power Draw Per Unit (W)	Attributable Operating Hours	Annual Unit Sales (in millions)	First Year Energy Savings (GWh/yr)	Recognizable Life Cycle Savings (GWh/yr)
310 to 749	9	1000	5.4	48	48
750 to 1049	14	1000	19.0	266	266
1050 to 1489	18	1000	9.0	164	164
1490 to 2600	23	1000	7.9	181	181
Total	n/a	n/a	41.3	660	660

## Modified Spectrum Lamps, 2011-2013

Lumen Range	Average Reduction in Power Draw Per Unit (W)	Attributable Operating Hours	Annual Unit Sales (in millions)	First Year Energy Savings (GWh/yr)	Recognizable Life Cycle Savings (GWh/yr)
232-562	11	1000	1.8	20	20
563-787	17	1000	6.3	108	108
788-1117	22	1000	3.0	66	66
1118-1950	28	1000	2.6	73	73
Total	n/a	n/a	13.8	267	267

Note: These tables account for a one-year acceleration of the EISA 2007 Tier 1 standard. Energy savings from this acceleration accrue over 1 lifetime of the base case lamp, which in this case is equal to one year, so that First year Savings and Recognizable Savings are equal.



Pacific Gas and Electric Company®

Making a World of Difference

# Energy Use of EISA Tier 2 Default Value Compliant Lamps in 2018

## Standard Lamps, California, 2018

Lumen Range	Average Power Draw Per Unit (W)	Lifetime Operating Hours	Annual Unit Sales (in millions)	Lifetime Energy Use (GWh/yr)
310 to 749	12	6000	7.4	523
750 to 1049	20	6000	26.1	3132
1050 to 1489	28	6000	12.4	2093
1490 to 2600	45	6000	10.8	2950
Total	n/a	n/a	56.7	8698

## Modified Spectrum Lamps, California 2018

Lumen Range	Average Power Draw Per Unit (W)	Lifetime Operating Hours	Annual Unit Sales (in millions)	Lifetime Energy Use (GWh/yr)
232-562	9	6000	0.8	44
563-787	15	6000	2.9	261
788-1117	21	6000	1.4	174
1118-1950	34	6000	1.2	246
Total	n/a	n/a	6.3	725



Pacific Gas and Electric Company®

ecos

Making a World of Difference

# Savings from Adopting EISA Tier 2 Two Years Early

## Standard Lamps in California, 2018

Lumen Range	Average Reduction in Power Draw Per Unit (W)	Attributable Operating Hours	Annual Unit Sales (in millions)	First Year Energy Savings (GWh/yr)
310 to 749	17	2000	7.4	127.6
750 to 1049	23	2000	26.1	600.9
1050 to 1489	25	2000	12.4	306.5
1490 to 2600	27	2000	10.8	287.3
Total	n/a	n/a	56.7	1322.3

## Modified Spectrum Lamps in California 2018

Lumen Range	Average Reduction in Power Draw Per Unit (W)	Attributable Operating Hours	Annual Unit Sales (in millions)	First Year Energy Savings (GWh/yr)
232-562	20	2000	0.8	16.6
563-787	28	2000	2.9	81.2
788-1117	32	2000	1.4	43.7
1118-1950	38	2000	1.2	45.6
Total	n/a	n/a	6.3	187.1



Pacific Gas and Electric Company®

ecos

Making a World of Difference

# Recommendations:

- ▶ Adopt EISA 2007 Tier 1 requirements in California with effectiveness dates from 1/1/2011 to 1/1/2013 (1 year earlier than corresponding EISA federal requirements).
- ▶ Adopt EISA 2007 Tier 2 requirements in California with an effectiveness date of 1/1/2018, securing up to 1 year's worth of early savings to assist with AB 1109's compliance deadline, and additional energy and greenhouse gas benefits after that deadline (from longer lamp lifetimes and a second year's worth of lamp sales).
- ▶ **Move on promptly to other lighting standards and voluntary measures to secure needed savings for compliance with AB 1109**



Pacific Gas and  
Electric Company®

ecos

Making a World of Difference