




Welcome to AESP's Brown Bag
The CFL Market: Past, Present and Future

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Compact Fluorescent Lamps Market Saturated? Not Really...

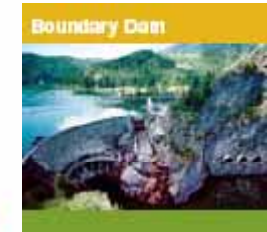
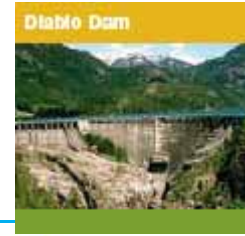
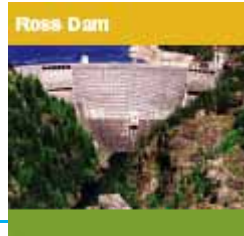
www.seattle.gov/light/consERVE

September, 2009

Robert Balzar
Seattle City Light



SEATTLE CITY LIGHT

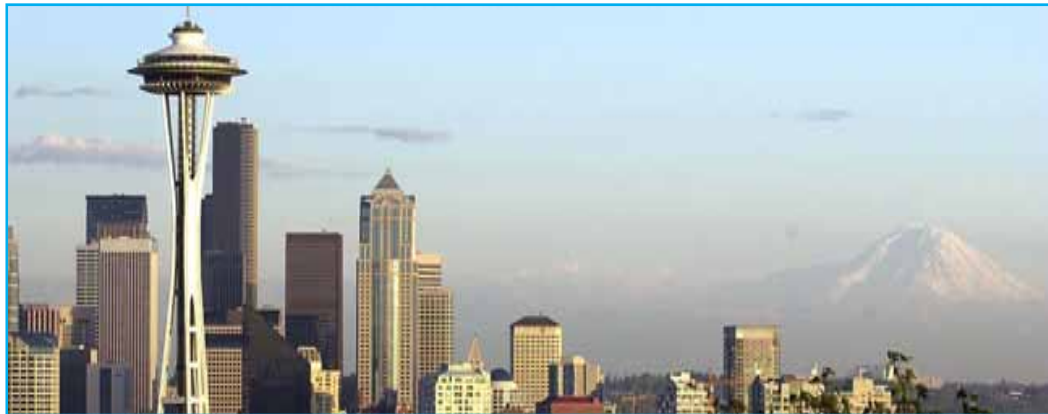


SEATTLE CITY LIGHT

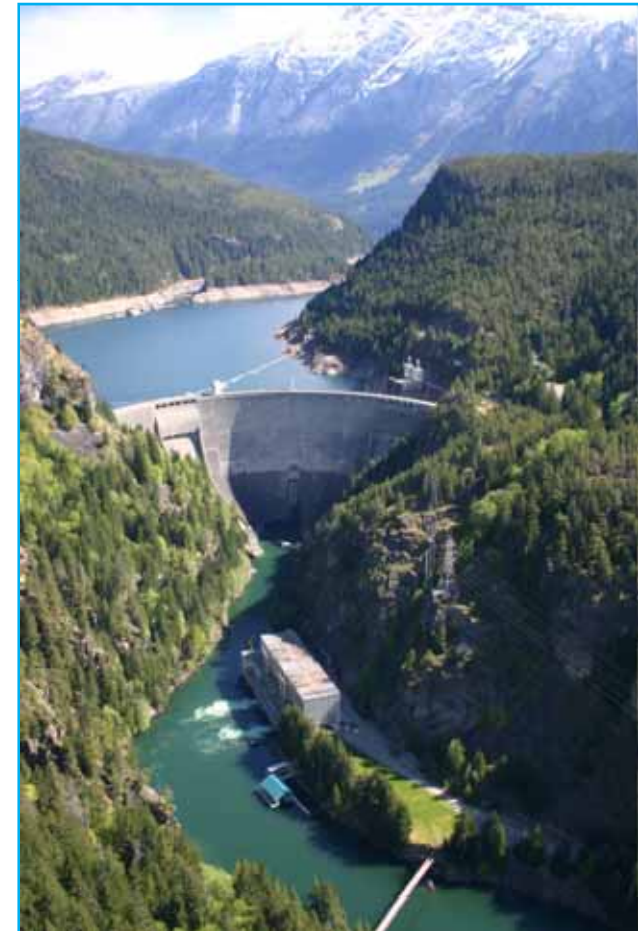
Serves Seattle and several surrounding communities.

2008 load and revenues:

- 741,600 service area population
- 131 square mile service area
- 9,748,460 MWh = 1,108 aMW
- \$877.4M in 2008 Operating Revenues



Ross Dam



CFL PROGRAMS IN SEATTLE AND THE NORTHWEST



Pacific Northwest

- Change-a-Light Program – BPA
- Other utility programs

Seattle City Light

- Twist & Save.
- Event handouts
- Neighborhood Service Centers
- Multifamily Distribution
- Neighborhood Power Program Porch Light Brigade
- Direct Install*

MARKET PENETRATION VS. SATURATION



- Saturation is the percentage of sockets in a home filled with CFL.
- Penetration is the percentage of homes that have at least one CFL installed.
- Sales data alone is insufficient to establish penetration or saturation.
- Customer surveys inherently inaccurate. (compared to in-home audit findings)¹.

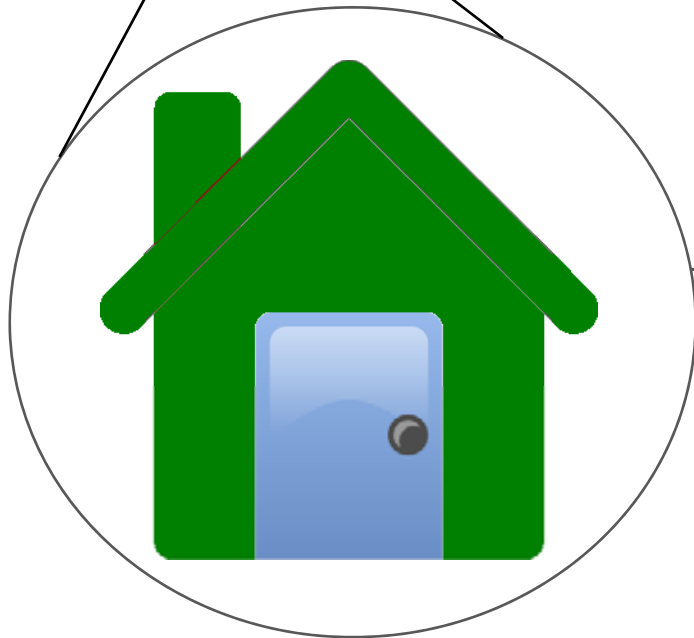
1. Rasmussen, Tami; Kathleen Gaffey and Rob Rubin. "Illuminating Current CFL Usage Patterns: Results from a CFL Metering Study." In *Reducing Uncertainty Through Evaluation: Proceedings of the 2005 International Energy Program Evaluation Conference*, (New York, August 2005).

SEATTLE MARKET PENETRATION VS. SATURATION

Penetration \approx 7 in 8 Homes



Saturation \approx 7 in 33 sockets per home



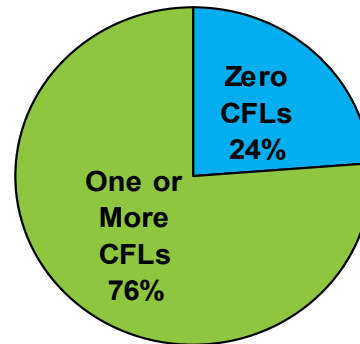
Saturation = Percentage of sockets in a home with CFLs

PENETRATION OF CFLs

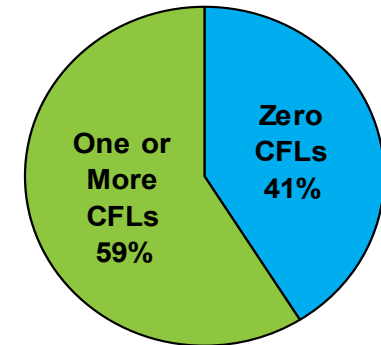
Penetration is clearly improving but this does not indicate level of saturation.

2007

Owners

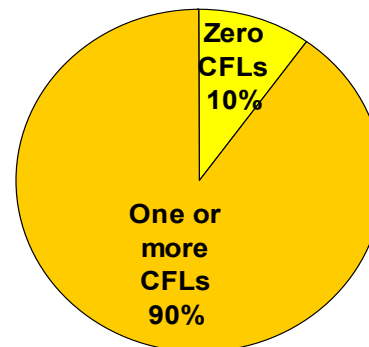


Renters

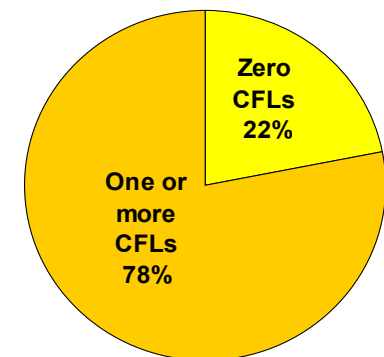


2009

Owners



Renters



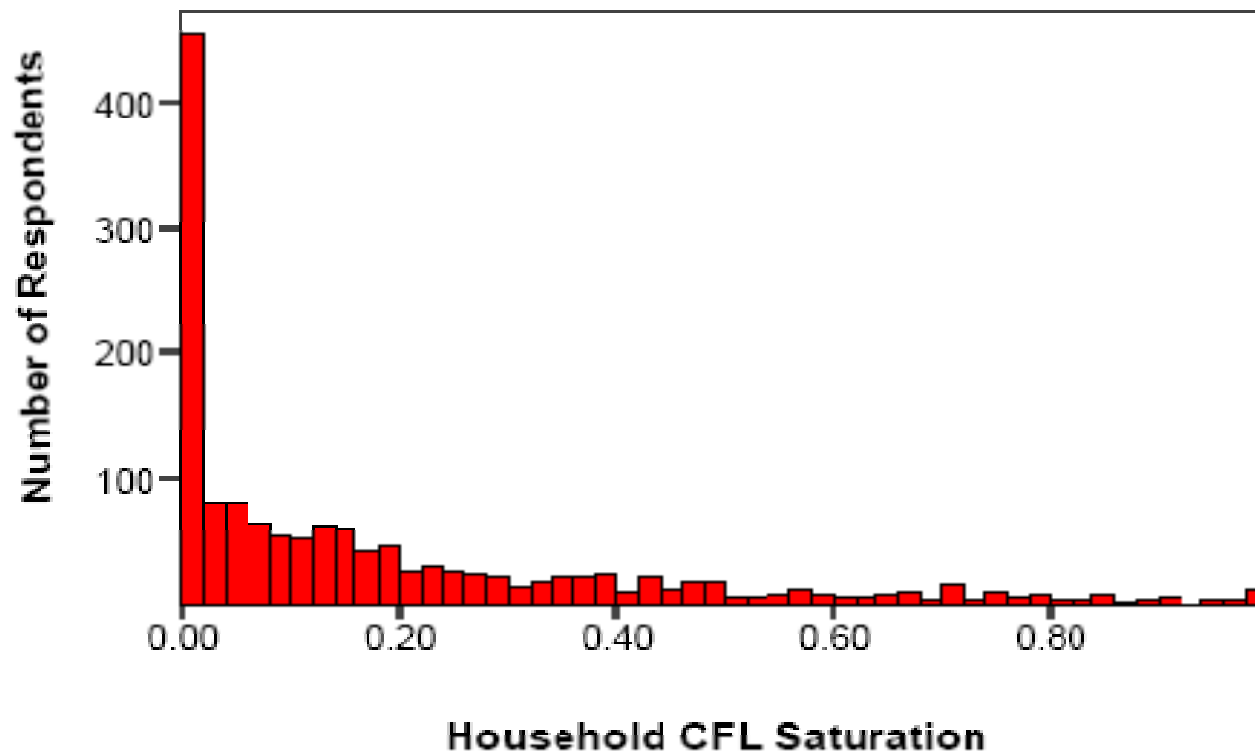
PUGET SOUND 2007 SATURATION RATES

Distribution of CFL Saturation in Households: Puget Sound Sample

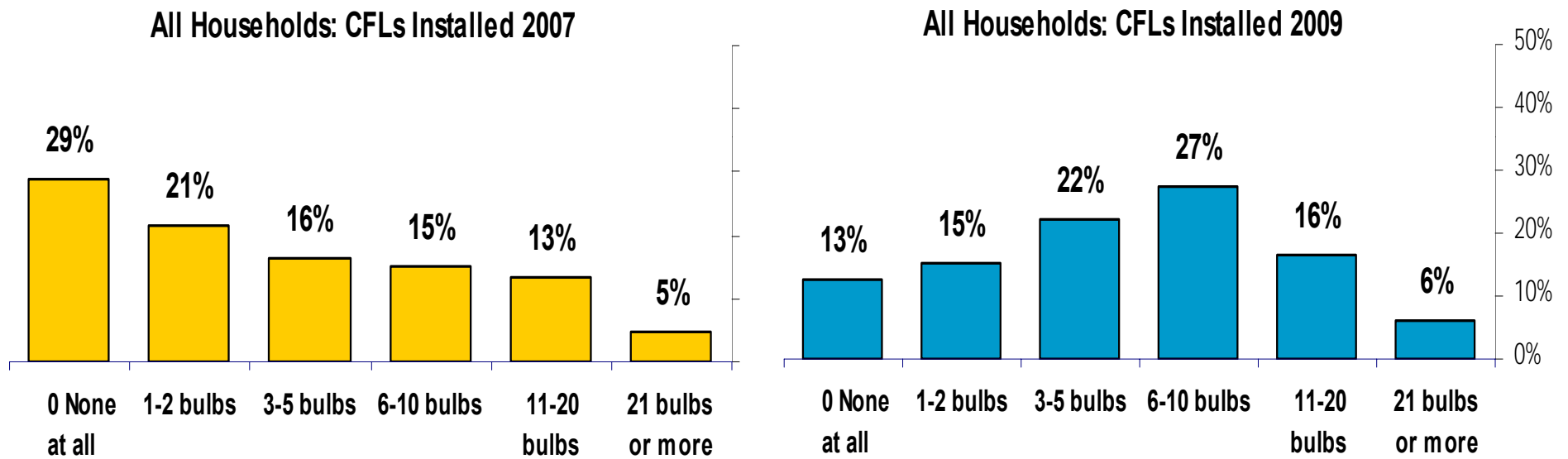
Number of respondents = 1,488

Respondents with zero CFLs = ~460

Respondents with at least one CFL = ~1,000



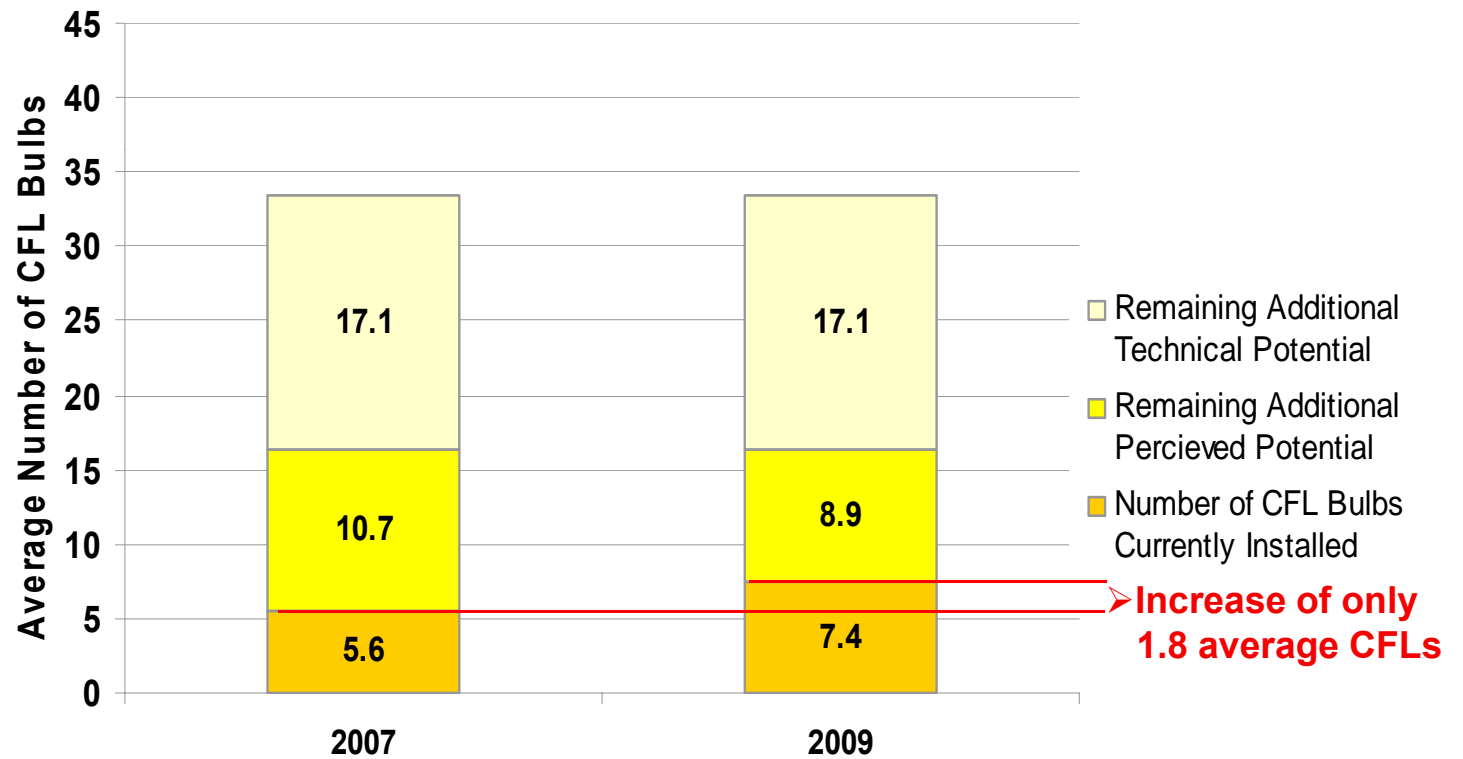
IMPROVED PENETRATION AND SATURATION



Still less than 25% **overall** saturation in Seattle City Light territory.

REMAINING SATURATION POTENTIAL

On average, 26 more sockets per home could take a CFL.
Still a long way to go.



CONTINUING BARRIERS TO PURCHASE

- Perceived as harmful and difficult to dispose of
- Purchase cost
- Believe quality of light is worse
- Lack of awareness of specialty bulbs
- Don't need new bulbs
- Lack of concern about energy efficiency
- Less valued by renters

Source: EMI. *Puget Sound Residential Compact Fluorescent Lighting Market Saturation Study*, November 2007 and KEMA, Inc. *ENERGY STAR Consumer Products Program: Market Progress Evaluation Report (MPER 2)* (Northwest Energy Efficiency Alliance, Portland, Oregon 2006).



SPECIALTY BULBS

Dimmable CFLs:

- Dining rooms have a greater average number of sockets controlled by dimmer switches than any other room (27%).
- Over half of all dining room sockets are controlled by dimmers.

Specialty CFLs:

- Customers are not aware of availability of specialty CFLs such as globes, A-lamps and candelabra styles.

2007 FEDERAL ENERGY ACT (EISA)

“But wait! Aren’t new bulb efficiency standards going to require consumers to use CFLs by 2012?”

- Certain specialty bulbs not covered.
- Full impact of first phase may not be felt until 2015.
 - Phased-in standards over 3-4 years.
 - Standards apply to bulb *shipments* not sales.

A smooth transition requires continued aggressive promotion of CFLs.

CONCLUSIONS

- **Much more CFL saturation potential remaining (>70%).**
- **Potential includes fixtures needing specialty bulbs.**
- **Renters a sub-group to be targeted.**
- **Federal law will take time to become standard and not cover certain specialty bulbs.**

RECOMMENDATIONS

- **Address barriers for consumers who have not purchased CFLs.**
- **Continue to use utility CFL rebate programs to increase saturation.**
- **Focus on ways to get CFLs to multifamily renters for first time.**
- **Promote CFLs in high lighting use areas.**
- **Provide information and rebates for specialty bulbs.**

THANK YOU!

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Socket Penetration Model



The MSB Socket Model in Concept

1. Model matches industry lamp shipments to available sockets
2. MSB Sockets estimated as a function of application profiles in 4 sectors:
 - Residential
 - Hospitality
 - Other commercial
 - Industrial
3. Lamp shipments projected as a function of
 - Available MSB sockets
 - Lamp life
 - Lamp usage (hours/day)
 - Consumer behavior
 - Regulatory environment

The MSB Socket Model in Concept

Analytical rigor is achieved through satisfaction of four requirements:

1. *Every industry shipment must have a destination (socket or inventory)*
2. *Every socket must be filled from shipments or inventory*

		INC MSB		HAL MSB		CFLI		LED		TOTAL	
		2008	2016	2008	2016	2008	2016	2008	2016	2008	2016
Residential	Sockets	79.6%	13.0%	2.3%	4.2%	18.1%	75.8%	0.0%	7.0%	100.0%	100.0%
	Shipments	76.4%	40.1%	7.2%	18.7%	16.3%	41.2%	0.0%	0.0%	100.0%	100.0%
Hospitality	Sockets	15.1%	0.1%	33.4%	6.6%	51.5%	90.0%	0.0%	3.3%	100.0%	100.0%
	Shipments	14.9%	2.3%	33.5%	34.4%	51.7%	63.3%	0.0%	0.0%	100.0%	100.0%
Commercial	Sockets	80.6%	2.3%	8.6%	9.5%	10.8%	84.9%	0.0%	3.3%	100.0%	100.0%
	Shipments	79.9%	2.9%	14.5%	43.4%	5.6%	53.7%	0.0%	0.0%	100.0%	100.0%
Industrial	Sockets	54.8%	4.5%	26.5%	23.2%	18.7%	69.3%	0.0%	3.0%	100.0%	100.0%
	Shipments	79.4%	31.1%	10.3%	57.2%	10.3%	11.7%	0.0%	0.0%	100.0%	100.0%

3. *Changes in both shipments and socket penetration must be reasonable for each technology in each year in each sector*
4. *Model is calibrated using 5 years of shipment history*

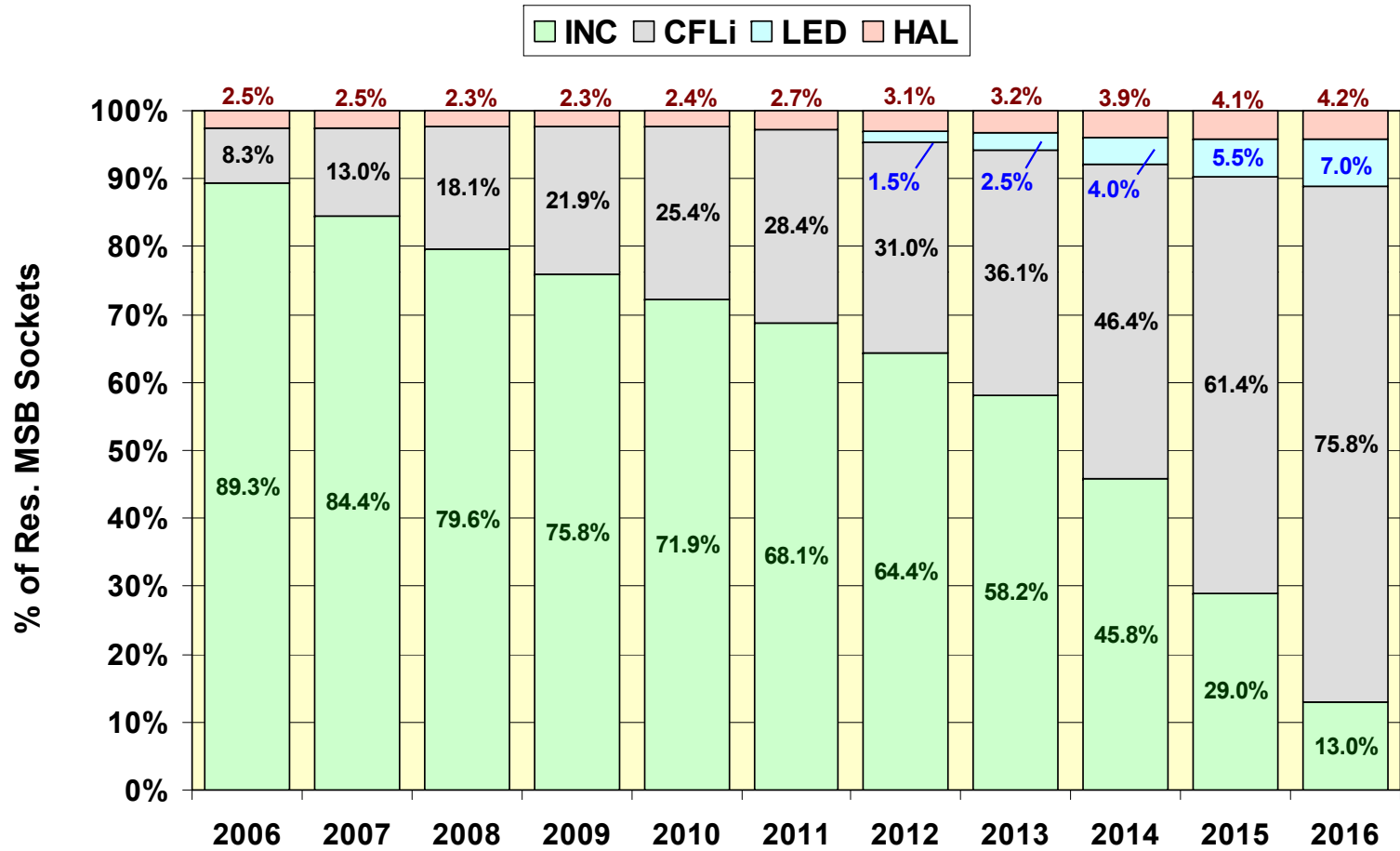
Variables and Assumptions in the Model

Available Data	Industry Knowledge	Estimates and Assumptions
Current households	% MSB by technology	Household growth trend
MSB sockets per household	Trend in % MSB	Trend in MSB sockets/h-hold
Current hospitality guest rooms	Avg. non-res sq. ft./socket	Hospitality guest room growth
Base commercial/indust. sq. ft.	Lamp life by technology	MSB sockets/guest room
Non-Res sq. ft. lit by technology	Burn rates by technology	MSB sockets/facility/guestroom
Shipment history by technology	Burn rates by sector	Future non-res. sq. ft. by sector
	% retail distribution	Future non-res % lit by tech.
	Retail inventory turns	Future non-res sq. ft. per socket
	% of technology by sector	INC hoarding effect *
	Household pantry effect	Organic CFLi household penetration ceiling before legislation*
		LED MSB penetration curve*

* Key assumptions with little or no empirical data reference

Model Results: Residential Socket Penetration

Residential MSB Socket Penetration: OSI Socket Model



Note: Assumes incandescent hoarding effect of 10% in 2011-2012, 15% in 2013-2014





*The CFL Market:
Far to Go,
Little Time to Get There*

Presented by:

Stephen Bickel

D&R International, Ltd.

Overview



- What CFLs have delivered
- Regulatory actions and justifications
- Market status
 - Socket saturation and storage
 - Shipments and sales
 - LED replacement bulbs
- Why not to wait for EISA*
- Need for good data and direct measurement

*The Energy Independence and Security Act of 2007

CFLs Have Delivered for Energy Efficiency Program Sponsors



Program Sponsor	Share of total DSM savings from CFL Programs
NYSERDA	84%
Wisconsin Focus on Energy	64%
Pacific Gas and Electric	62%

Source: D&R International, based on contact with ENERGY STAR Partners.

Some Regulators Reducing Support for General Service CFLs



- Connecticut has decided to suspend CFL programs in 2010
- Other areas of the country are facing similar issues:
 - CA – CPUC draft plan recommends 10% reduction, no support after 2012
 - NW – Northwest Power and Planning Council reduced claimable savings
 - MA – Net-to-gross values are declining
 - TX – CPS Energy in San Antonio is discussing whether to continue CFL incentives
 - AR – Attorney General's office testified to PUC that market is transformed

Reasons for Proposed Reductions



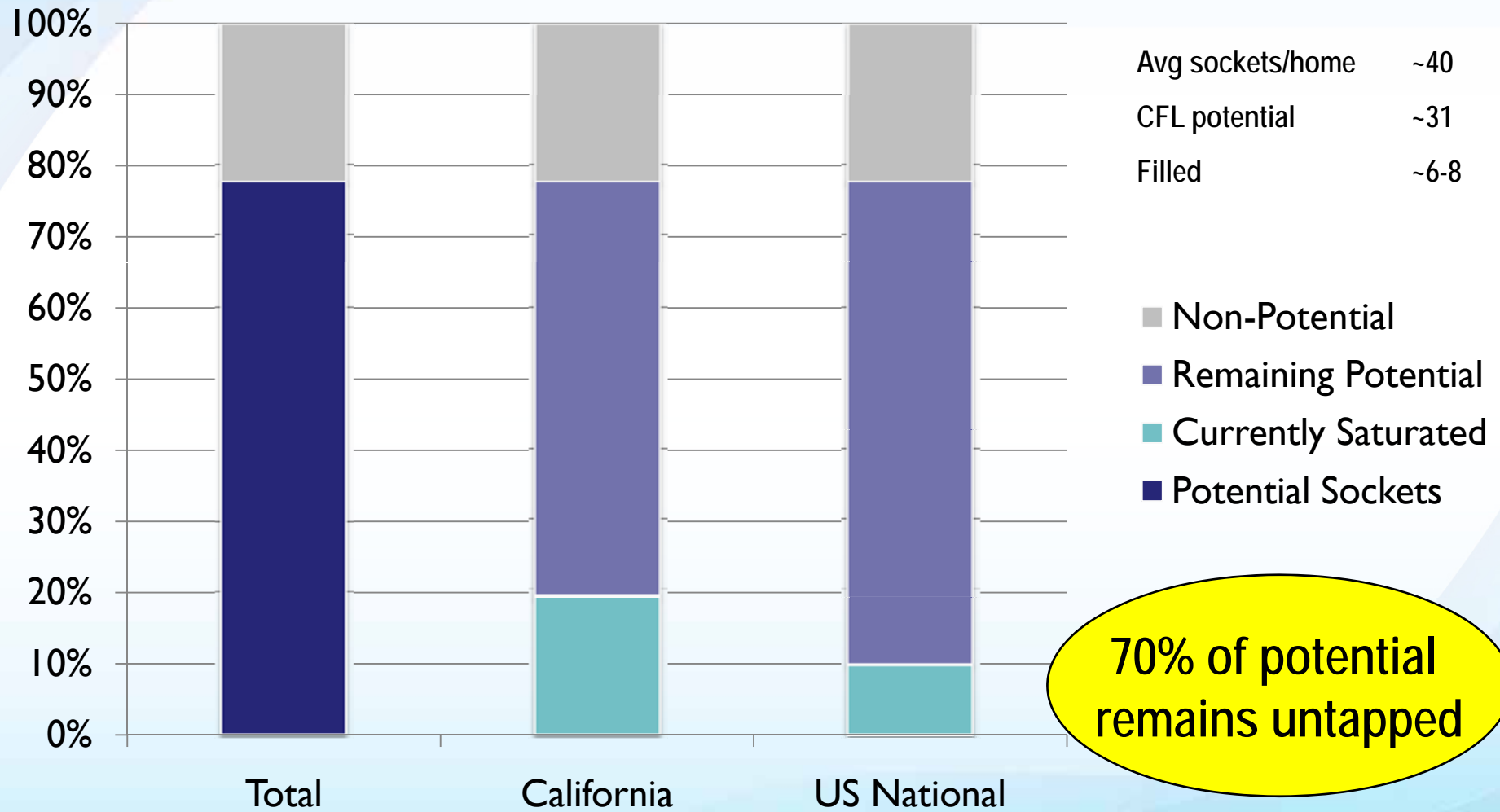
- Captured most of the general service CFL savings already, remaining sockets require specialty bulbs
- It is a better investment to bring down cost of LEDs, specialty bulbs, and "super CFL"
- General service CFL market no longer needs support, as market is transformed
- EISA will complete remaining market transformation
- Need utilities to begin building capacity to deliver big savings from other sources and not delay while relying on CFLs

Misconception



We have captured most of the general service CFL savings already.

We have captured only a fraction of CFLs' savings potential



Avg sockets/home ~40
 CFL potential ~31
 Filled ~6-8

- Non-Potential
- Remaining Potential
- Currently Saturated
- Potential Sockets

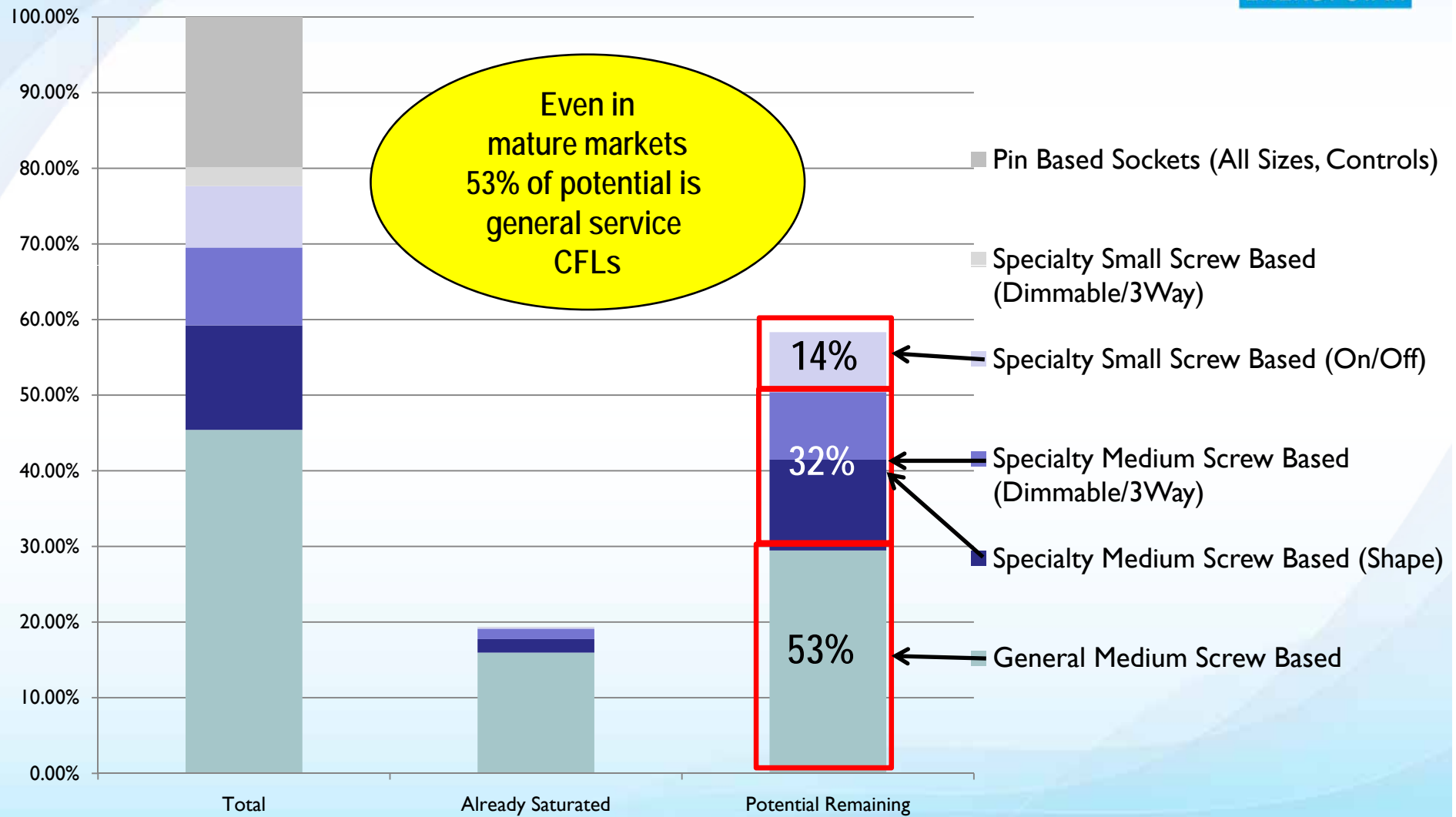
Sources: California - "Residential Lighting Metering Study – Preliminary Results," KEMA, February 2009
 National – D&R International.

Misconception



Most of the remaining savings will come from specialty bulbs.

More than half of remaining potential is for general service CFLs



Sources: "Residential Lighting Metering Study – Preliminary Results," KEMA, February 2009 [California]



Fewer sockets require specialty bulbs than most people think

- California 2009 Inventory Data

Control Type	Percent of Sockets
On/Off	85%
Dimmer	12%
3-Way	3%

Base Type	Percent of Sockets
Medium Screw	69%
Pin	19%
Small Screw	10%
Other	2%

Misconception



Stored CFLs will capture much of the remaining savings.



Most stored CFLs are unlikely to replace incandescents in high-use sockets

Number of CFLs Installed	Socket Saturation %	CFLs Stored	Incandescent Lamps Stored
0	0	0.17	6.61
1-10	2.5 - 25	1.97	6.69
More than 10	>25	6.75	7.15

- Failed bulbs in low saturation homes more likely to be replaced with incandescents
- CFL “adopters” have not abandoned incandescents

Households are storing about 1/4 of purchased CFLs*

Sources: “Residential Lighting Metering Study – Preliminary Results,” KEMA, February 2009 [California]

* 27% - Northwest Energy Efficiency Alliance, “Consumer Product Market Progress Evaluation Report 3,” 2007

Misconception



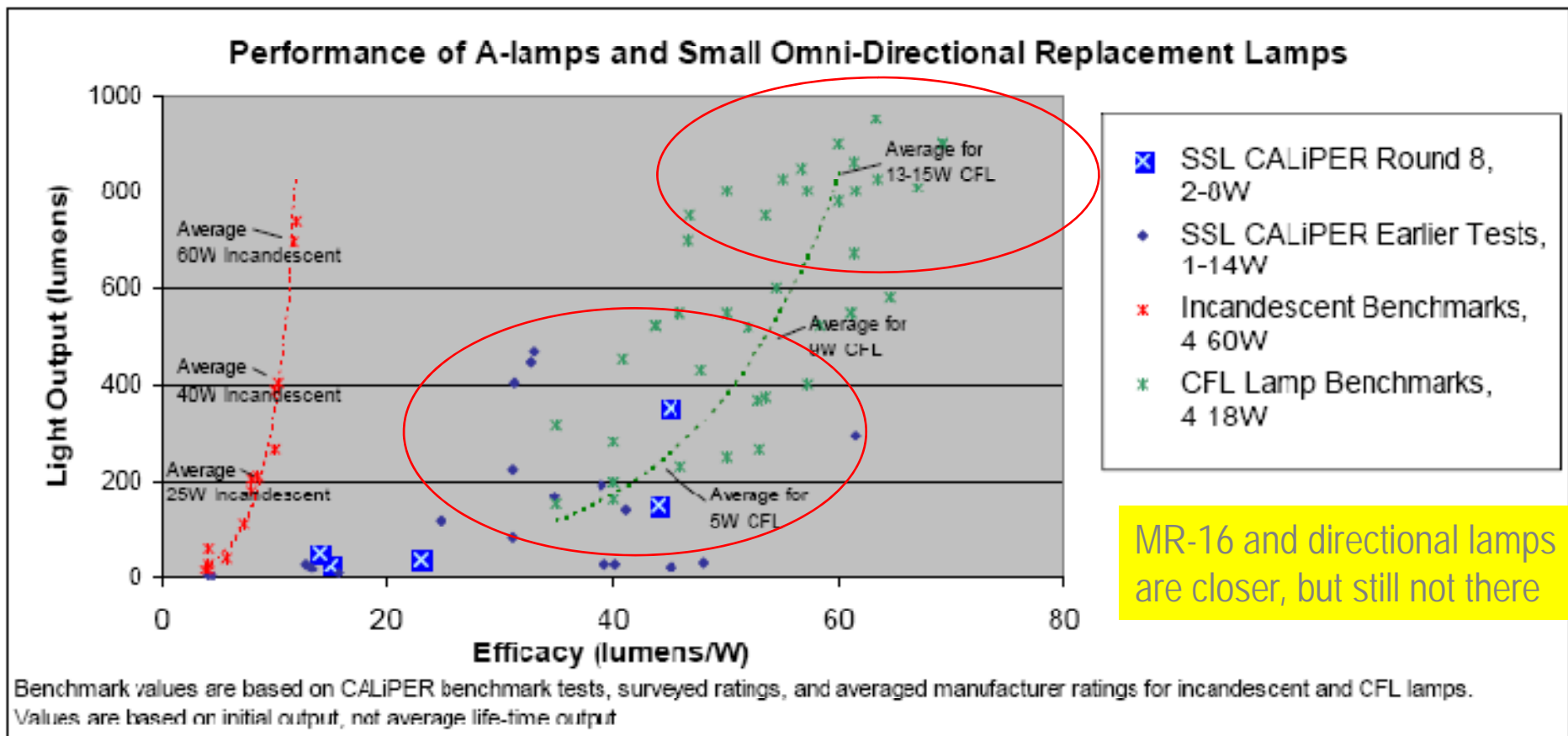
LEDs will soon deliver more energy savings and are a better investment than CFLs.

High volume sales of replacement LED lamps are still some years off



- ENERGY STAR LED Replacement Criteria
 - Final Criteria - October 2009
 - Earliest Possible Effective Date - July 2010
- Expect few products at first with momentum building in 2011 as the technology matures, as was the case for SSL Luminaire program
- First cost will be big barrier – price points on some products are \$50/unit
- Current non-ENERGY STAR products could damage market

Current LED replacement lamps perform poorly compared to CFLs



MR-16 and directional lamps are closer, but still not there

Figure 4. Comparison of A-lamp SSL Products Versus Benchmarked Traditional Lamps

As measured by the DOE CALiPER Program Cycle 8

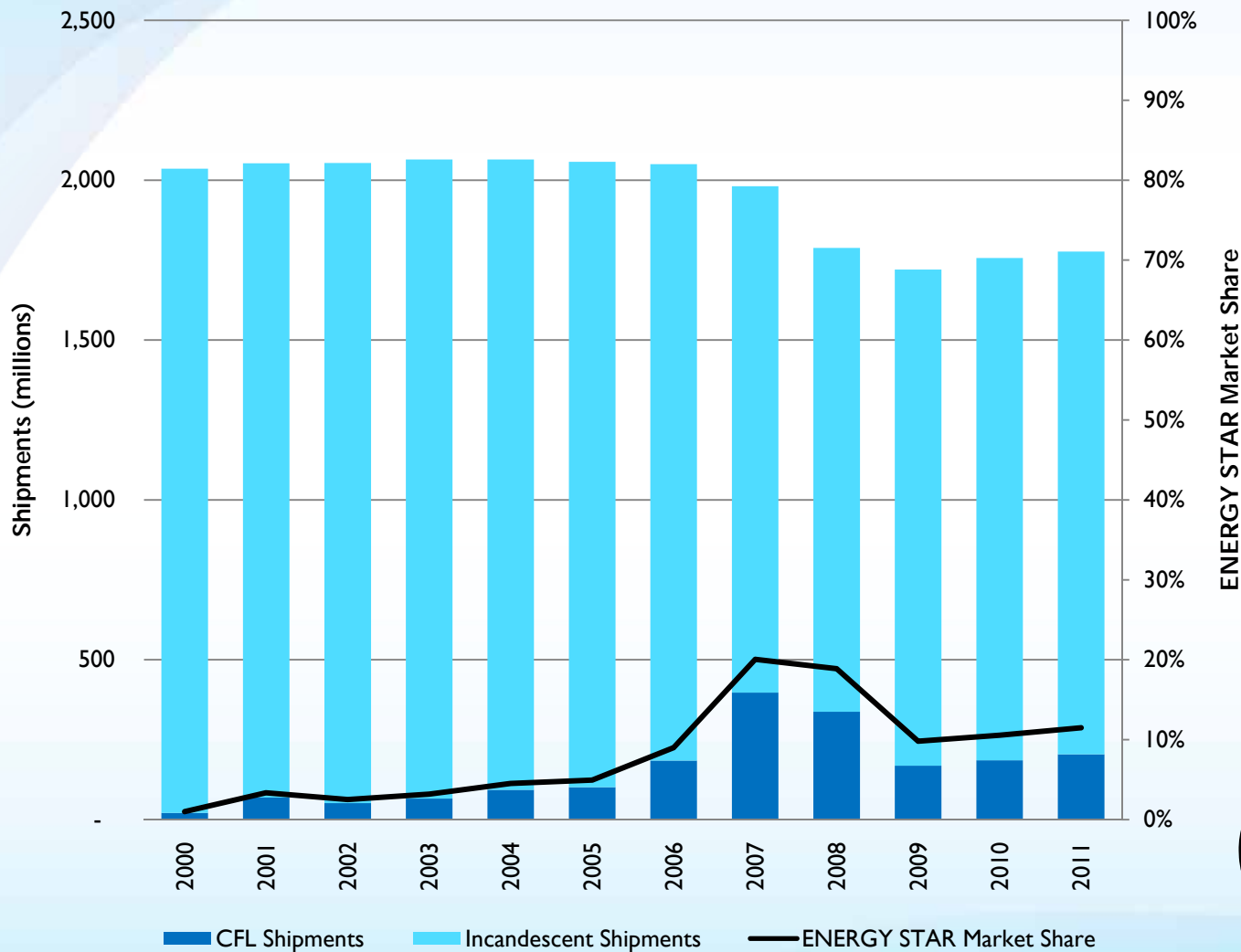
http://apps1.eere.energy.gov/buildings/publications/pdfs/ssl/caliper_round_8_summary_final.pdf

Misconception



The market for general service medium screw based lamps is transformed.

CFL shipments and sales have fallen far from their peak



- Shipments down 49% from 2007 peak
- **Sales down 25% [NEMA]**
- Retail sales down only 10% for all products.
- CFL market share ~25% [NEMA; (shipment data says 11%)]

3 of 4 bulbs purchased today are incandescent

Sources:

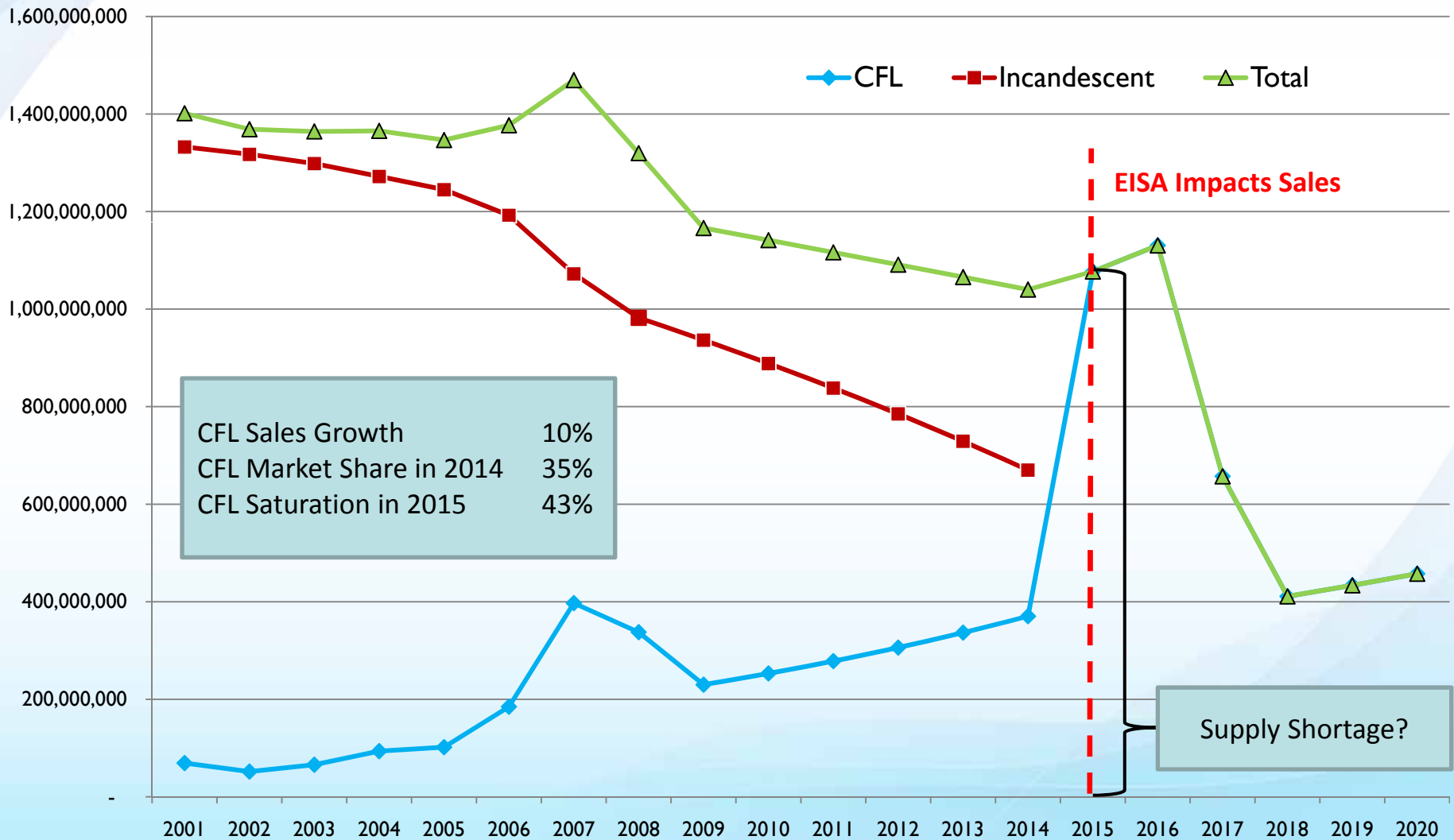
Department of Commerce; "U.S. Lighting Market Characterization, Volume 1: National Lighting Inventory and Energy Consumption Estimate," 2002, Navigant Consulting; U.S. Census Bureau; NEMA

Misconception

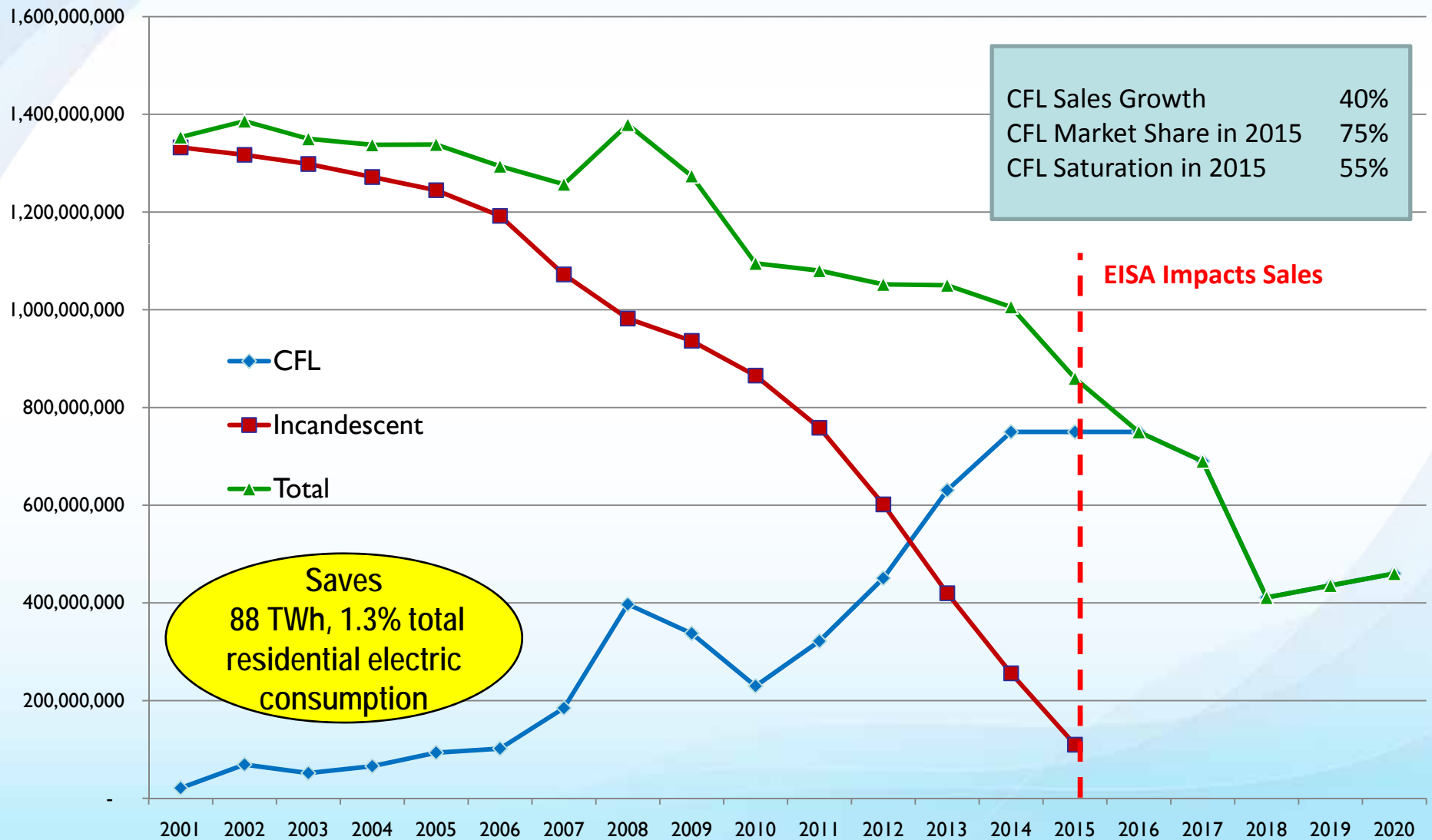


EISA will complete the market transformation and deliver the energy savings potential.

Relying on EISA creates enormous lost energy savings and possible supply shortages



Accelerating sales and saturation delivers big savings and avoids problems



CFL Sales Growth 40%
 CFL Market Share in 2015 75%
 CFL Saturation in 2015 55%

Saves 88 TWh, 1.3% total residential electric consumption

EISA Impacts Sales

Benefits of accelerated sales and saturation



By 2015:

- **\$10 billion energy bill savings for consumers**
 - Nearly \$160 in total savings per home
- **88 million MWh energy saved**
 - 7.9% savings in household lighting consumption
 - 1.3% savings in total household electricity consumption
- **13 million MMT cumulative reduction in carbon emissions**
- **Minimal bulb shortages, no backlash, no repeal or delay in EISA implementation**



To accelerate sales and saturation

- Sustain proven program models
- Experiment with new program models
 - Promote early retirement of incandescents and full replacement with CFLs
 - “You’re losing \$100 every year you keep those incandescents”
- Track sales **AND** saturation
 - Use in-home inventories to directly measure inventories, saturation, and storage
 - Insist on CFL and incandescent retail sales data



Use on-site inventories because self-reported data is not reliable

- Comparing appliances from 2002 to 2005 using:

ENERGY STAR Market Share	Refrigerators	Clothes Washers
Residential Energy Consumption Survey 2005	57%	59%
Shipment and Market Share Data	28%	26%

Self-Reported Survey Data

Maximum possible saturation levels

- Even for big ticket, single unit/household items, self-reports are highly unreliable.
- Is self-reported data for CFL purchases and saturation likely to be better?



Consider directly calculating energy savings and cost effectiveness

- Energy savings calculation

$$\text{Savings} = \sum (\sum [\# \text{ of new CFLs} * \text{ wattage savings} * \text{ usage}]_{\text{room}})_{\text{home}(n)}$$

- Cost-effectiveness calculation

$$\text{Cost per kWh}_{\text{Saved}} = \frac{\text{Total Expenditures}}{\text{Energy Savings}}$$



Recap

- CFLs still offer tremendous energy and carbon savings.
- 70% of CFL savings potential is unrealized, even in mature market, and specialty sockets are less than 50% of remaining potential. LED replacement lamps are not yet competitive substitutes.
- The market is not transformed. 3 of 4 bulbs sold are incandescent and CFL sales have fallen much more than retail sales.
- Promotion of both general service and specialty CFLs needs to be increased rather than reduced.
- Rapid growth in sales and saturation will yield enormous energy and carbon savings and avoid potential shortages, backlash, and other bad outcomes during the EISA phase-in.
- To accurately assess progress, we need good on-site saturation and sales data. Direct calculations using on-site and hours of use data might yield more accurate measurement of savings and cost-effectiveness.

Contact Information



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Nuances of EISA [Background]



- EISA will probably not fully affect CFL sales until 2015
 - Standards affect 60 watt in 2014
 - Standards apply to manufacturing and imports, not sales
- Implemented in two stages
 - Stage 1, phases in from 2012-2014, does not ban incandescents, just requires they be slightly more efficient
 - Stage 2, effective in 2020, will likely eliminate all incandescents

Major Wattage Type Affected	EISA Rated Lumen Ranges	Effective Date
100w and 150w	1490-2600 (~90w – 150w)	1/1/2012
75w	1050-1489 (~75w – 90w)	1/1/2013
60w	750-1049 (~60w – 75w)	1/1/2014
40w	310-749 (~30w – 60w)	1/1/2014

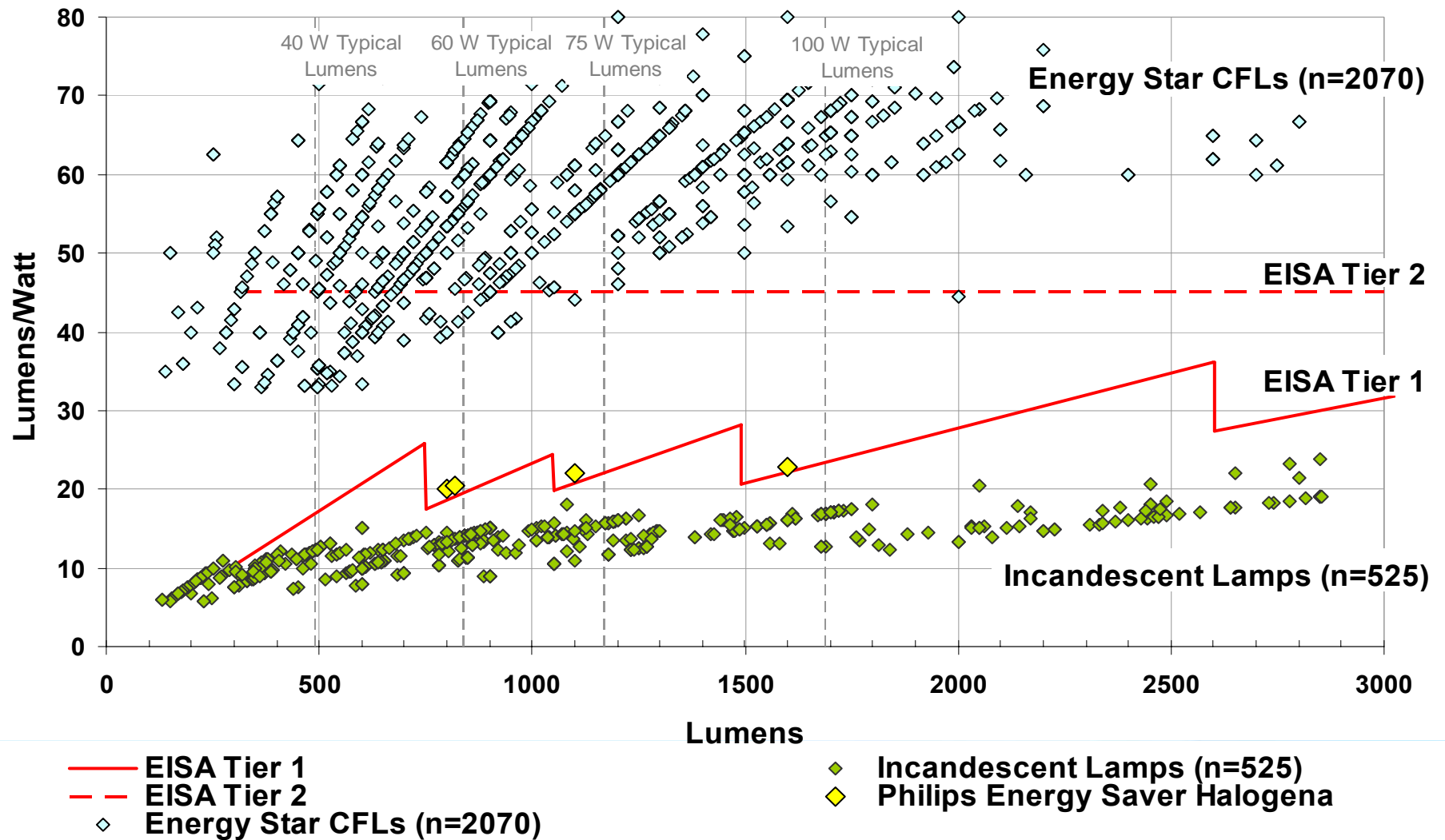
Nuances of EISA [Background]



- Lamps not covered by EISA
 - 3-Way --Reflector --Globes > 5" --Decorative
 - Candelabra
 - Plus numerous small volume specialty bulbs (e.g. oven lamps, bug lights)
- Legislation allows DOE to institute standards for excluded lamps should their sales increase significantly.



Nuances of EISA [Background]



Sources: "EISA and Future Residential Lighting Programs," Ecos Consulting, March 2009



The CFL Market: What Must Be Done

Richard P. Karney, P.E.
ENERGY STAR Program Manager
U.S. Department of Energy

Overview



- Where We Stand
- Where We Need to Go
- Savings Potential
- What It Will Take
- How DOE Will Help

Where We Stand



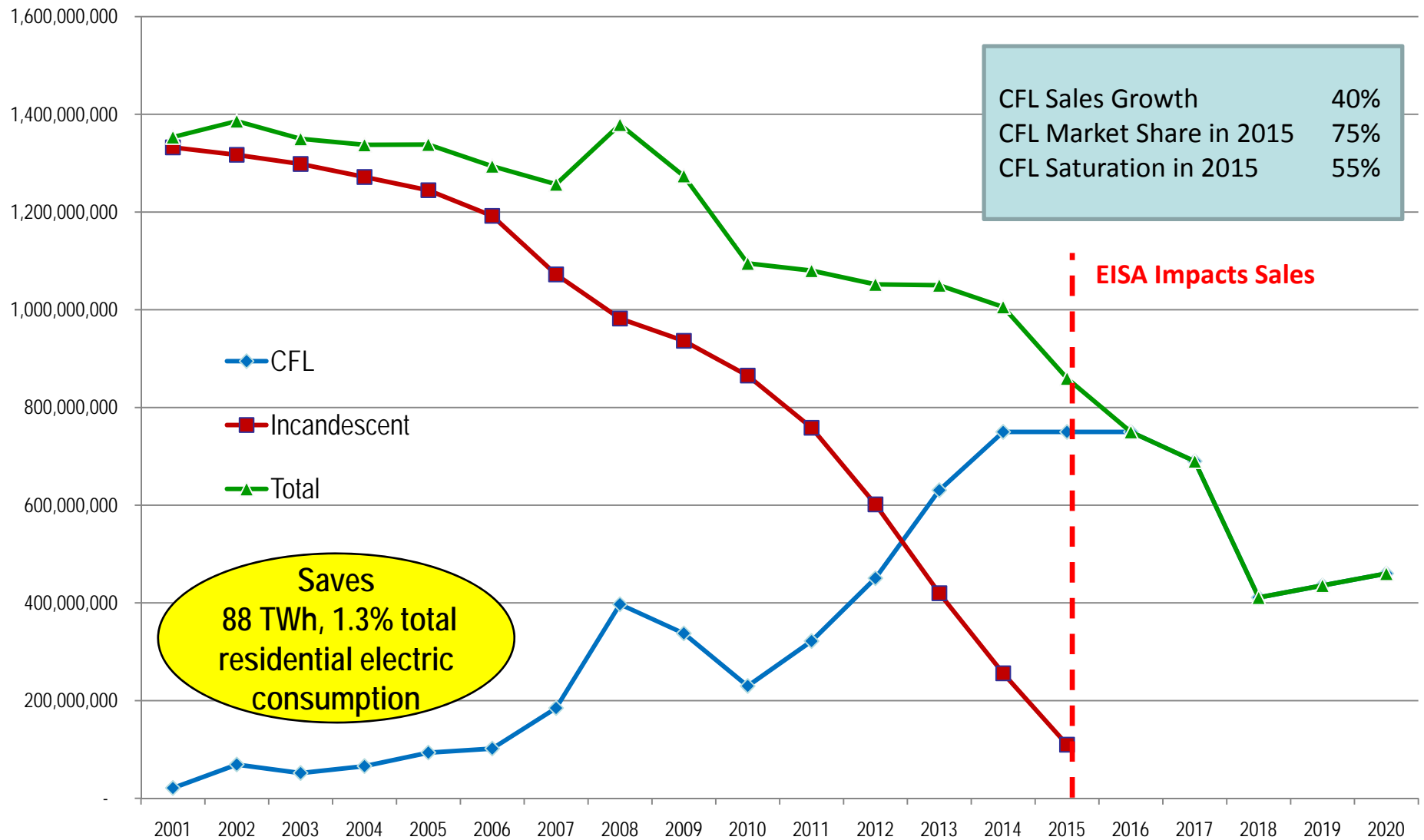
- Saturation is low and skewed, even in mature markets
- 70% of potential remains unrealized
- Three of four bulbs sold are incandescent
- Sales are falling rather than rising
- Bulb failure is driving saturation
- Current trajectory could lead to bad outcomes (shortages, backlash, delays in EISA implementation)
- Decision makers, unaware of recent developments, are proposing to cut funding for general service CFLs, the bulbs needed for more than half of remaining sockets.

Where We Need to Go



- Increase saturation from 20% in 2008 to 55% by 2015
- Increase sales by 40% per year through 2014

High Energy Savings Scenario



CFL Sales Growth	40%
CFL Market Share in 2015	75%
CFL Saturation in 2015	55%

Saves
88 TWh, 1.3% total
residential electric
consumption

Savings Potential by 2015



By 2015:

- \$10 billion energy bill savings for consumers
 - Nearly \$160 in total savings per home
- 88 million MWh energy saved
 - 7.9% savings in household lighting consumption
 - 1.3% savings in total household electricity consumption
- 13 million MMT cumulative reduction in carbon emissions
- Minimal bulb shortages, no backlash, no repeal or delay in EISA implementation

What It Will Take



- Direct measurement of saturation using on-site inventories to assess baseline and progress
- Sales data on CFL and incandescents
- May require sponsors to develop new program models, e.g.
 - Early Retirement and Full Replacement
 - “Those old light bulbs are costing you \$100/year”
 - Models that encourage sales growth over baseline, rather than unit sales

How DOE Will Help



- Foster dialogue between partners on this issue
- Gather robust, accurate data on market and successful methods
- Disseminate this data to partners
- Inform decision makers and outside parties about the state of the market



Resources

- ENERGY STAR CFL Market Profile (March 2009)
 - www.energystar.gov/ia/products/downloads/CFL_Market_Profile.pdf
 - New edition March 2010
- ENERGY STAR Lighting Partner Meeting (March 2010)
- Monthly CFL Market Forum Call (Schedule TBD)
- ENERGY STAR Lighting Pages
 - CFLs – www.energystar.gov/cfls
 - LEDs – www.energy.gov/led
- Marketing and communication materials leveraging the ENERGY STAR platform

Contact Information



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QUESTIONS???

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