



Lighting Portfolio Planning for Efficiency Programs: Advanced Session

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Key Topics



- How will new federal laws affect the residential lighting market?
- Will consumers understand which lamps to buy?
- How will the mix of lighting technologies change?
- How should utilities shift their focus to achieve the greatest net energy savings cost-effectively?

EISA's General Service Incandescent Lamp Standards



EISA Effective Dates	Power (watts)		Light Output (lumens)		Efficiency (lumens/watt)	
	Std. Incan.	EISA Maximum	Std. Incan.	EISA Ranges	Std. Incan.	EISA Minimum
1/1/2012	100	72	1690	1118 - 2600	16.9	15.5 – 36
1/1/2013	75	53	1170	788 - 1489	15.6	14.9 – 28
1/1/2014	60	43	840	563 - 1049	14.0	13.1 – 24
1/1/2014	40	29	490	232 - 749	12.3	8.0 – 26

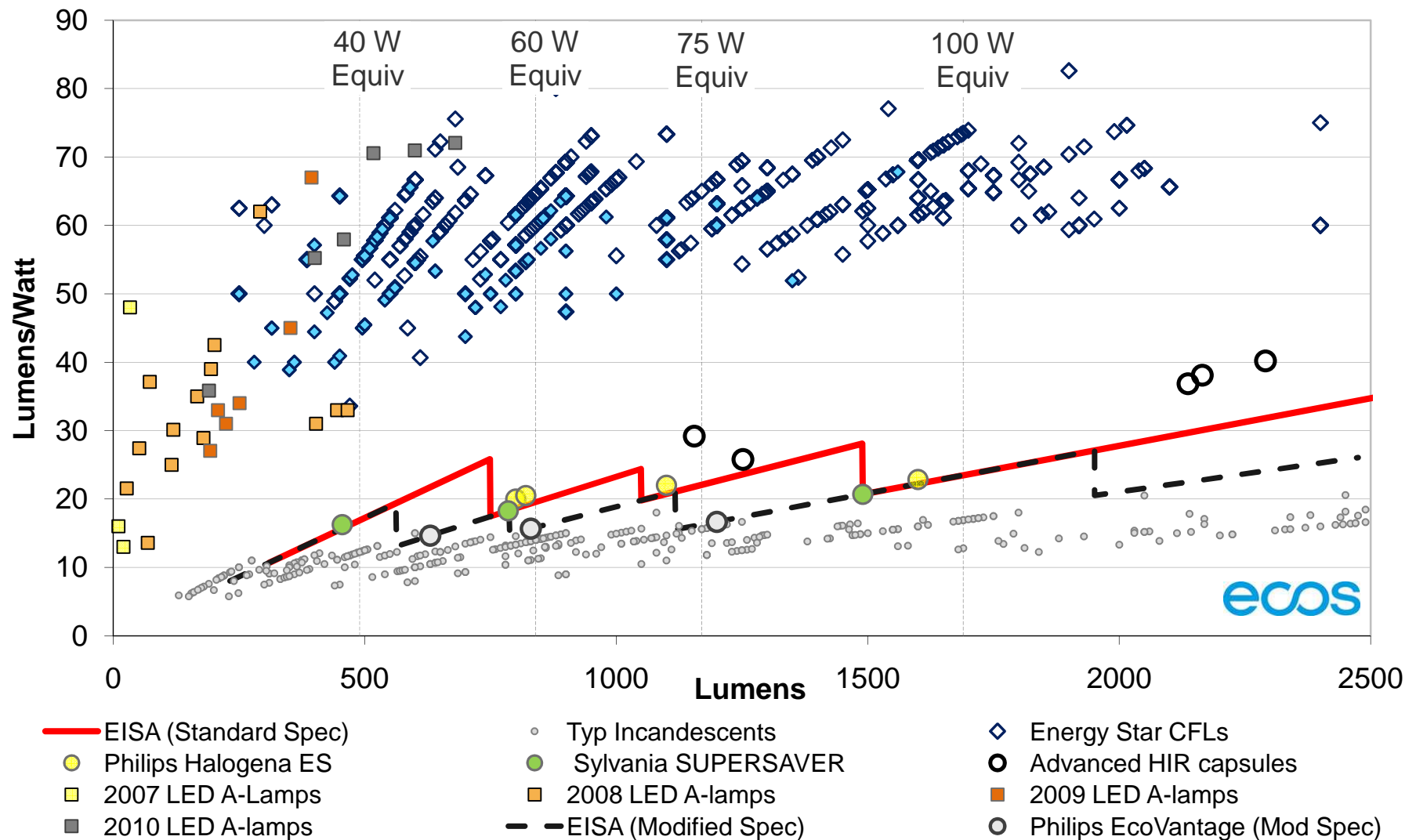
The way the EISA law is drafted requires manufacturers to reduce wattage, but allows them to greatly reduce *light output* as well, particularly with modified spectrum bulbs.

As a result, many of the incandescent bulbs sold after EISA takes effect will be far dimmer and similar in efficiency to the standard soft white incandescent bulbs sold today.

ENERGY STAR and the utilities can help pull the market toward better choices than these minimally compliant bulbs.



Emerging Technologies Offer More Energy-Efficient General Service Lighting Options



New FTC Labels Address Lumen Output & Energy Costs, but Not Wattage Equivalency



New Front Package Label

Brightness	Estimated Energy Cost
820 lumens	\$7.23 per year

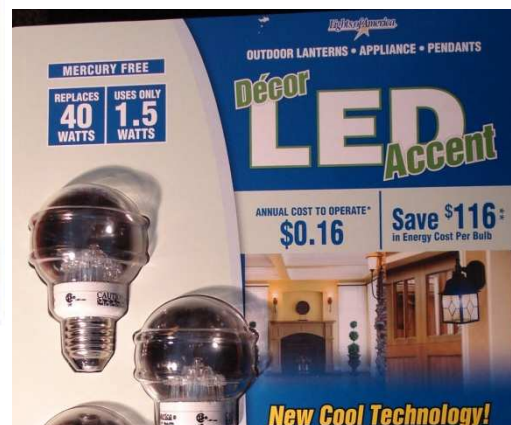
New Back Package Label

Lighting Facts Per Bulb		Light Appearance
		Warm Cool
Brightness	870 lumens	2700 K
Estimated Yearly Energy Cost	\$1.57	
Based on 3 hrs/day, 11¢/kWh Cost depends on rates and use		Contains Mercury For more on clean up and safe disposal, visit epa.gov/cfl .
Life Based on 3 hrs/day	5.5 years	
Energy Used	13 watts	

Existing FTC Label



New Lamp Wattages and Wattage Equivalence Claims Are Proliferating



Manufacturers Should Follow ENERGY STAR's Guidelines when Claiming Wattage Equivalence



*AT LEAST 25% ENERGY SAVINGS**
"See back panel for details"



Back panel says: *"When compared to an incandescent lamp rated at 1200 lumens."*
But 1200 lumens is more typical for 75 W lamps, so the savings (75 W – 72 W) are closer to 4%, not 25%.

ENERGY STAR's Guidelines

Nominal wattage of lamp to be replaced (watts)	Minimum initial light output of LED lamp (lumens)
25	200
35	325
40	450
60	800
75	1,100
100	1,600
125	2,000
150	2,600

Education Will Be Needed to Help Consumers Choose Bulbs Based on Lumens, not Watts



Consumer is trying to replace:

Watts	Lumens	Technology
60	800	Incandescent

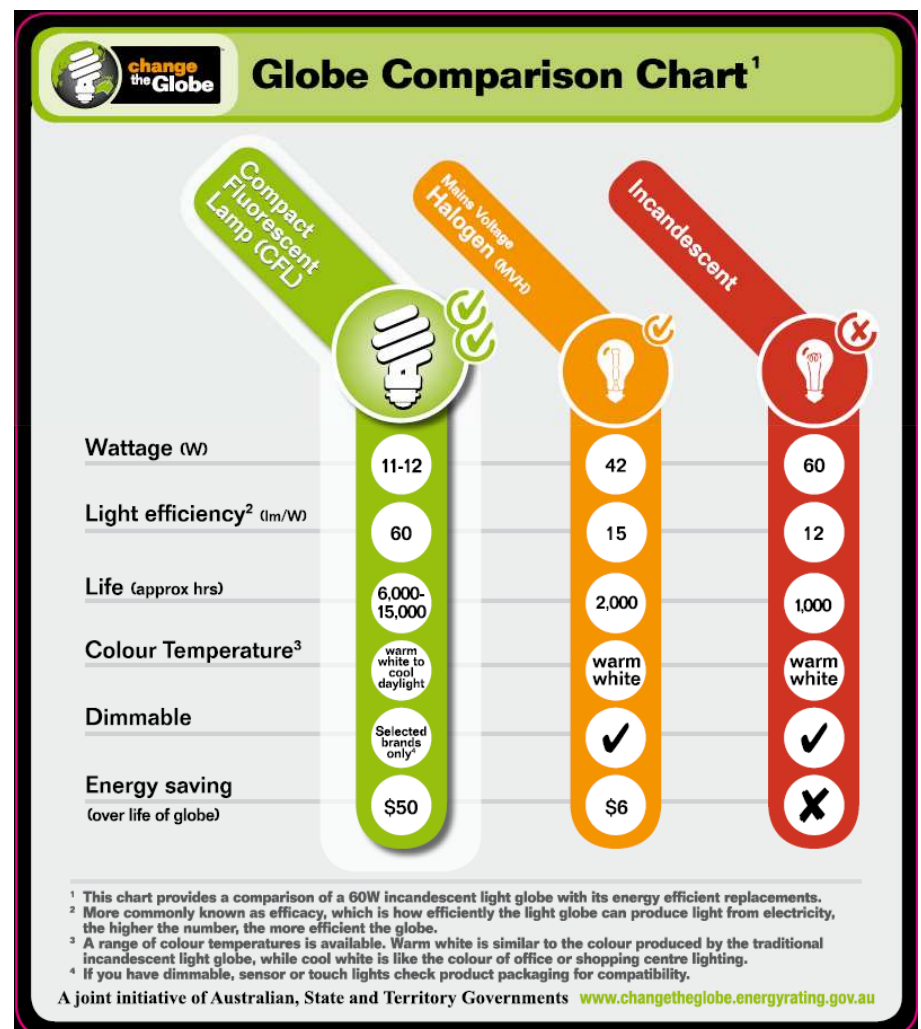
Options in store (2014):

Watts	Lumens	Technology	Savings	Result
8	800	LED	52 W	Maximum achievable savings
13	800	CFL	47 W	Much more savings than required by EISA, same amount of light.
43	800	IR Halogen	17 W	This is what EISA intended. Same light output, lower wattage.
53	1100	Halogen	7 W	Less savings than intended, more light than is needed.
53 ↓ 72	600 ↓ 800	Modified Spectrum Halogen	7 ↓ -12 W	Less savings than intended, not enough light. Customer may upgrade to brighter bulb, using more energy

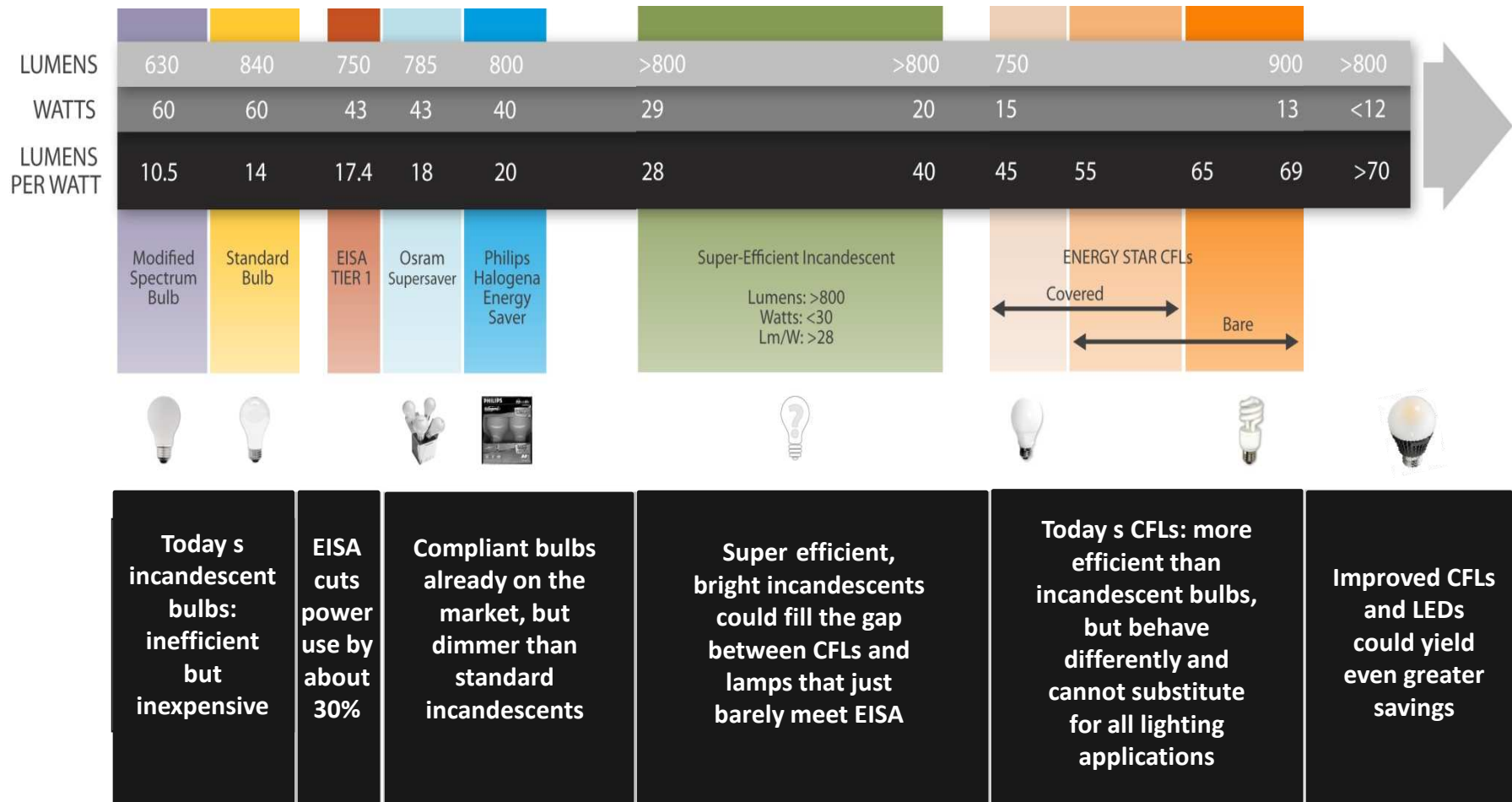
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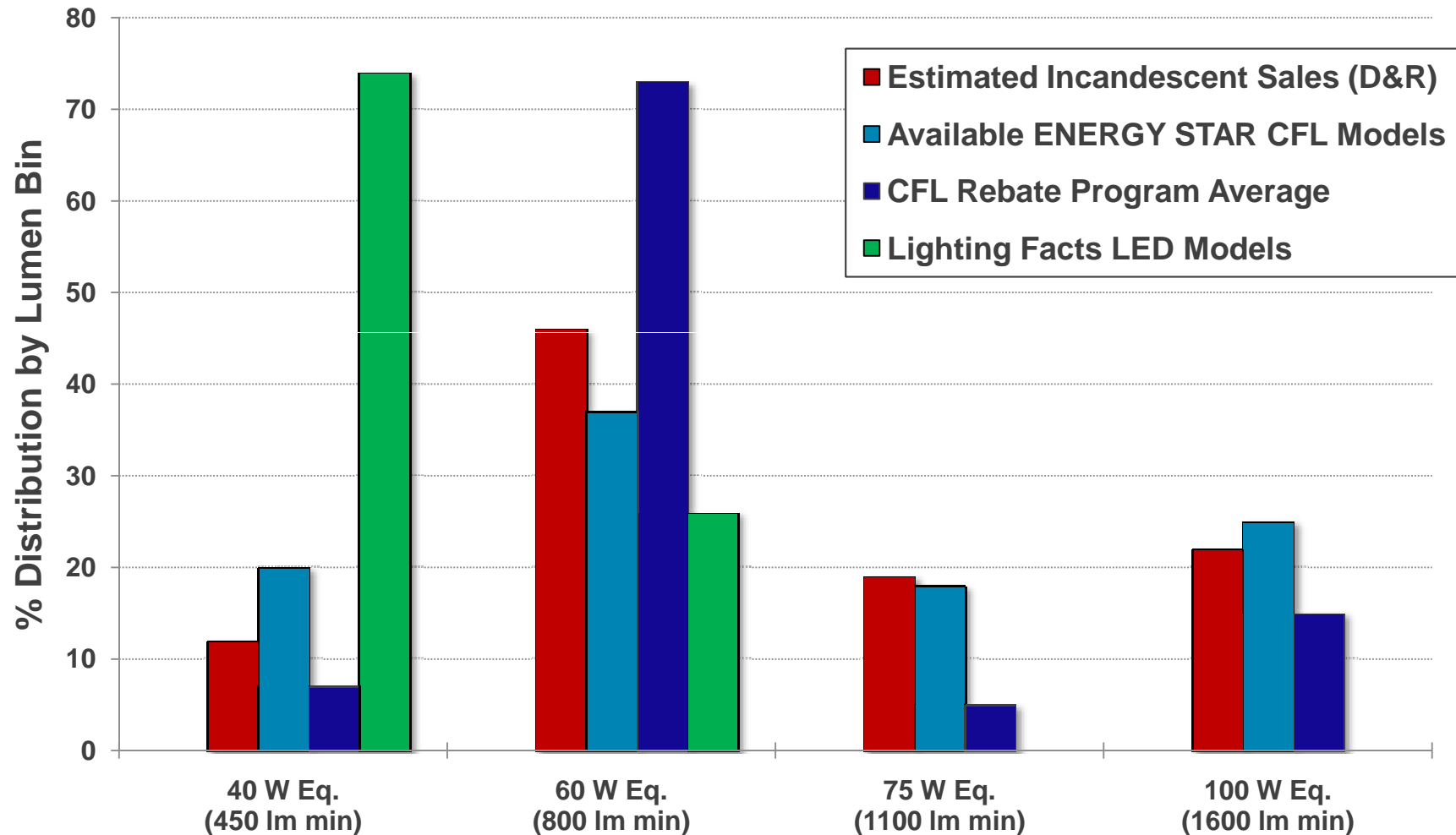
Australia's New Consumer Education Approach



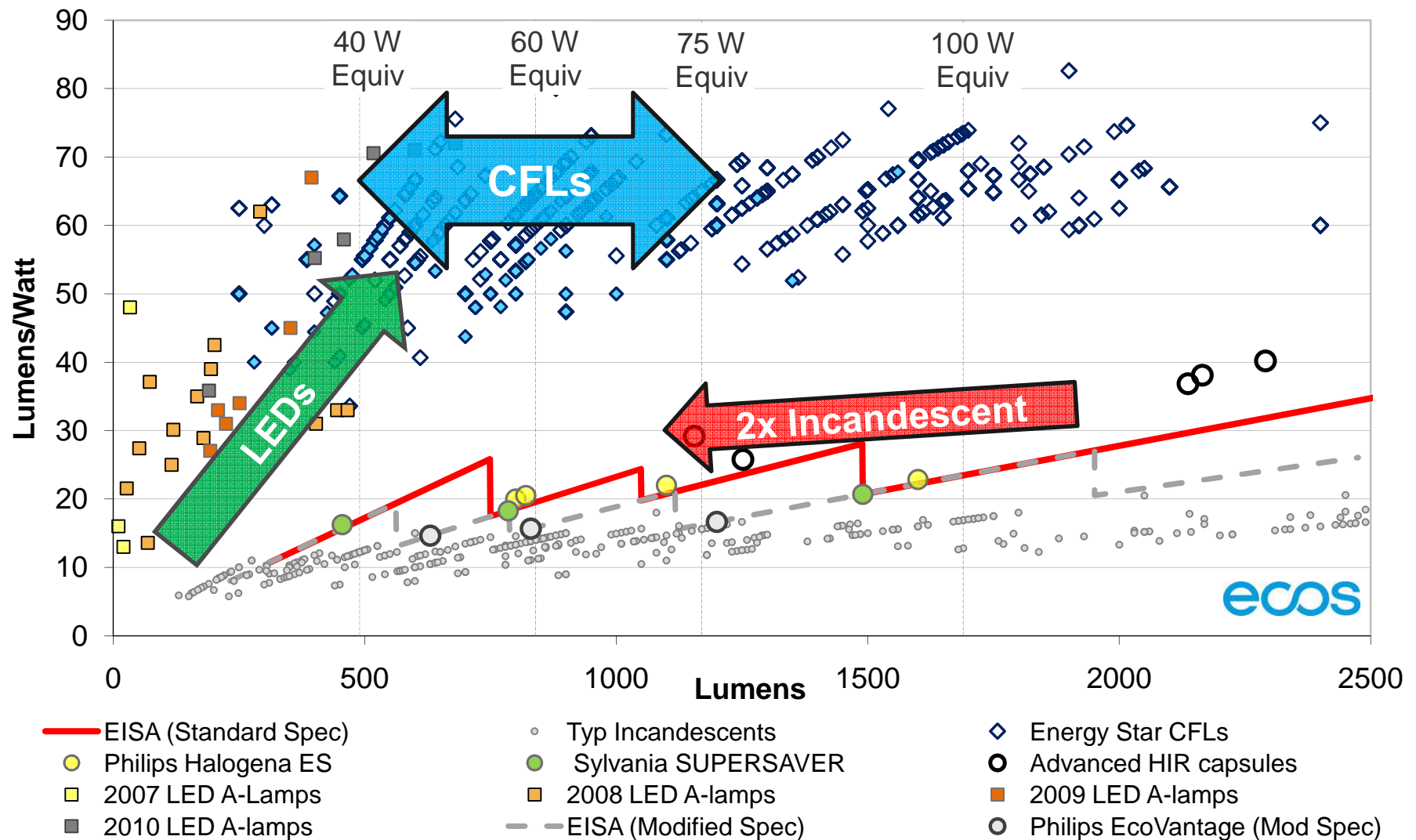
Program Options for Replacing Today's 60 W Incandescent Bulbs – The Portfolio Approach



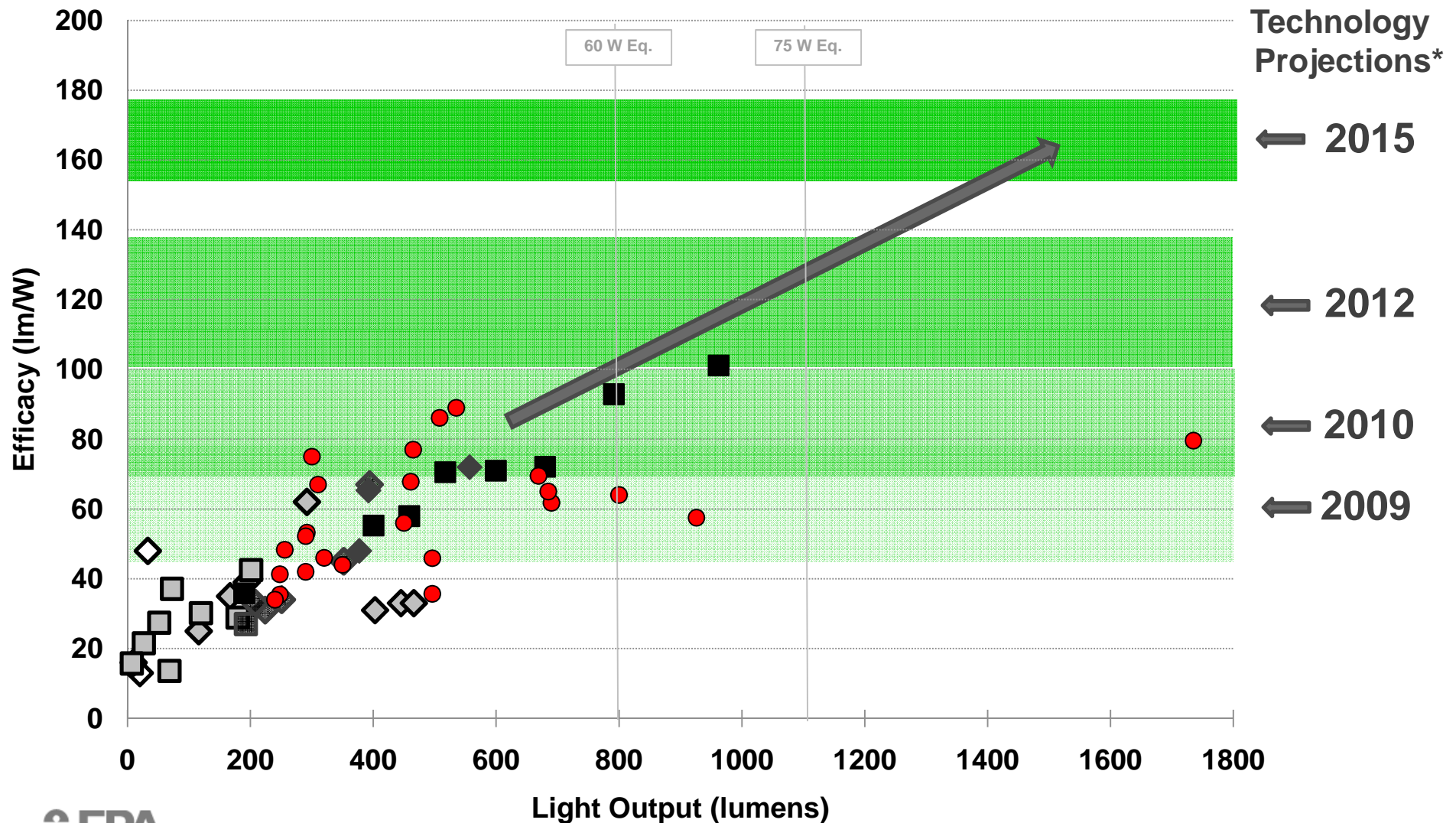
Distribution of Lamp Types by Light Output



Emerging Technologies Offer More Energy-Efficient GSL Replacement Options

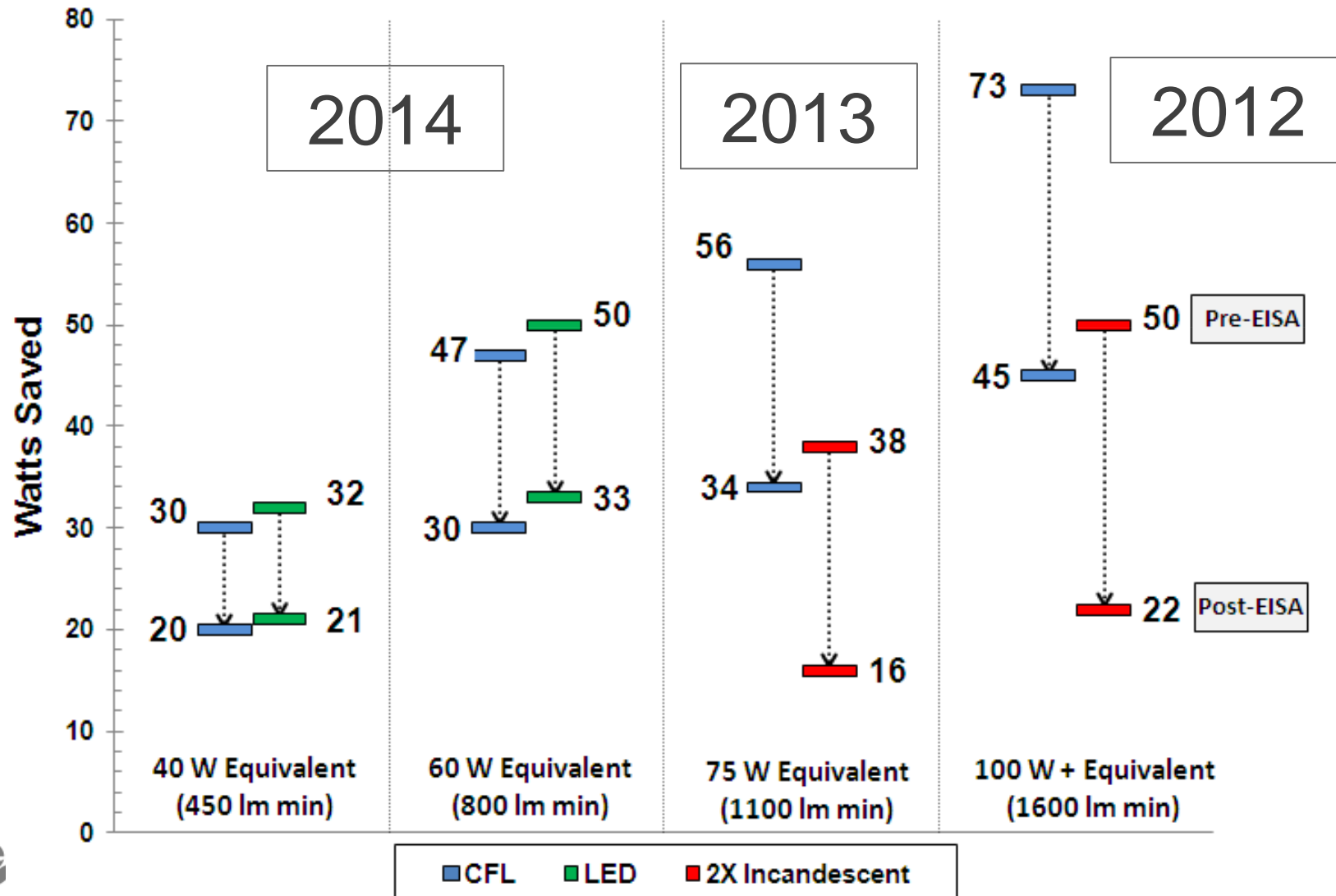


General Service LEDs are Getting Brighter and Meeting DOE's Efficiency Targets



* Based on DOE SSL R&D Multi-Year Roadmap (Cool White/Warm White ranges)

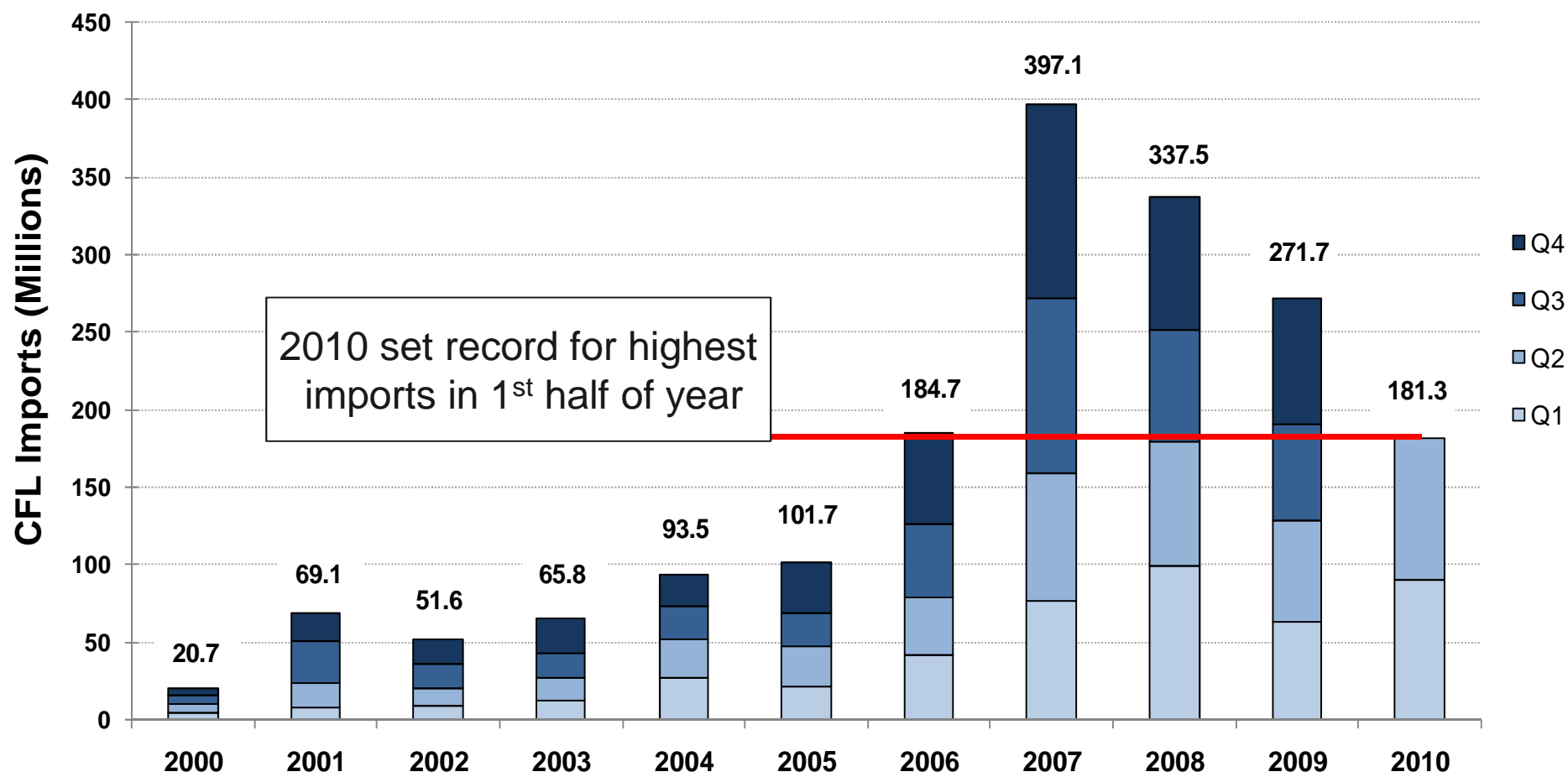
Watts Saved by Various Replacement Technologies Before and After EISA



CFL Imports Have Rebounded after Sharp Declines during the Economic Downturn in 2008 and 2009



U.S. Screw-Based CFL Imports



Source: Ecos Analysis of USA Trade Online Data

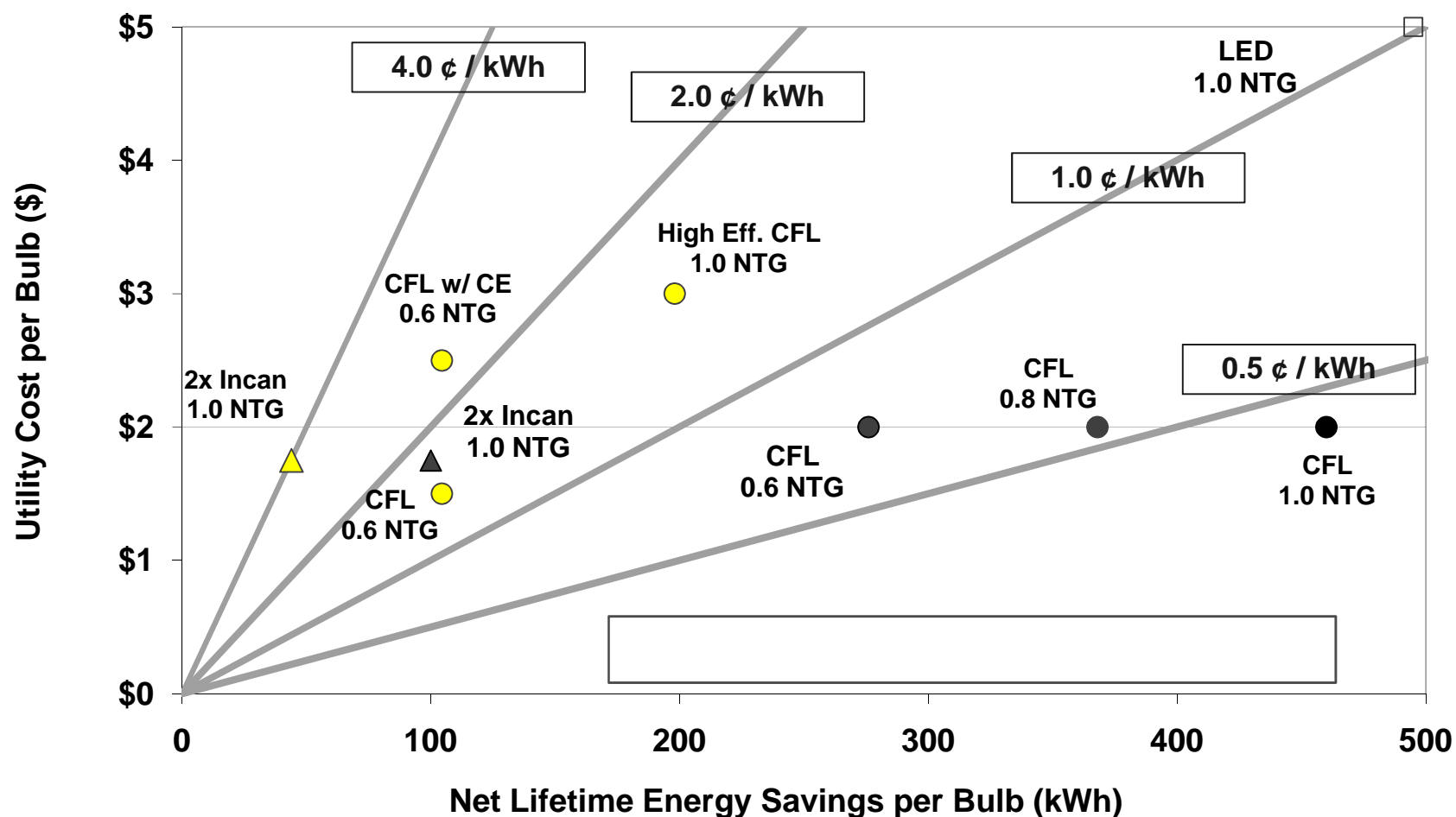
Utilities Use a Wide Range of Assumptions to Calculate CFL Program Cost Effectiveness



	Costs Per CFL	Benefits Per CFL				
	Incremental Cost	Hours/day	Watts Saved	Measure Life (Years)	Net to Gross Ratio	Lifetime Savings (kWh)
National Range	<\$1.00 - \$7.50	1.9 – 3	38 – 57	1.3 – 10	0.19 – 9.17	<100 – 500+
Michigan	\$3.00	2.3	52	9.0	?	397
Ohio	\$3.31	2.85	42	9.0	N/A	294

Cost effectiveness can be calculated before or after a program is run. Assumptions also vary widely on discount rates, electricity price escalation, the value of peak savings, market leakage and spillover effects, installation rates, and heating/cooling energy offsets.

Modeled Program Costs for Lifetime kWh Savings



Note: Utility costs/kWh are total program costs divided by lifetime savings; they are not levelized costs.



Putting Efficiency Program Costs in Context

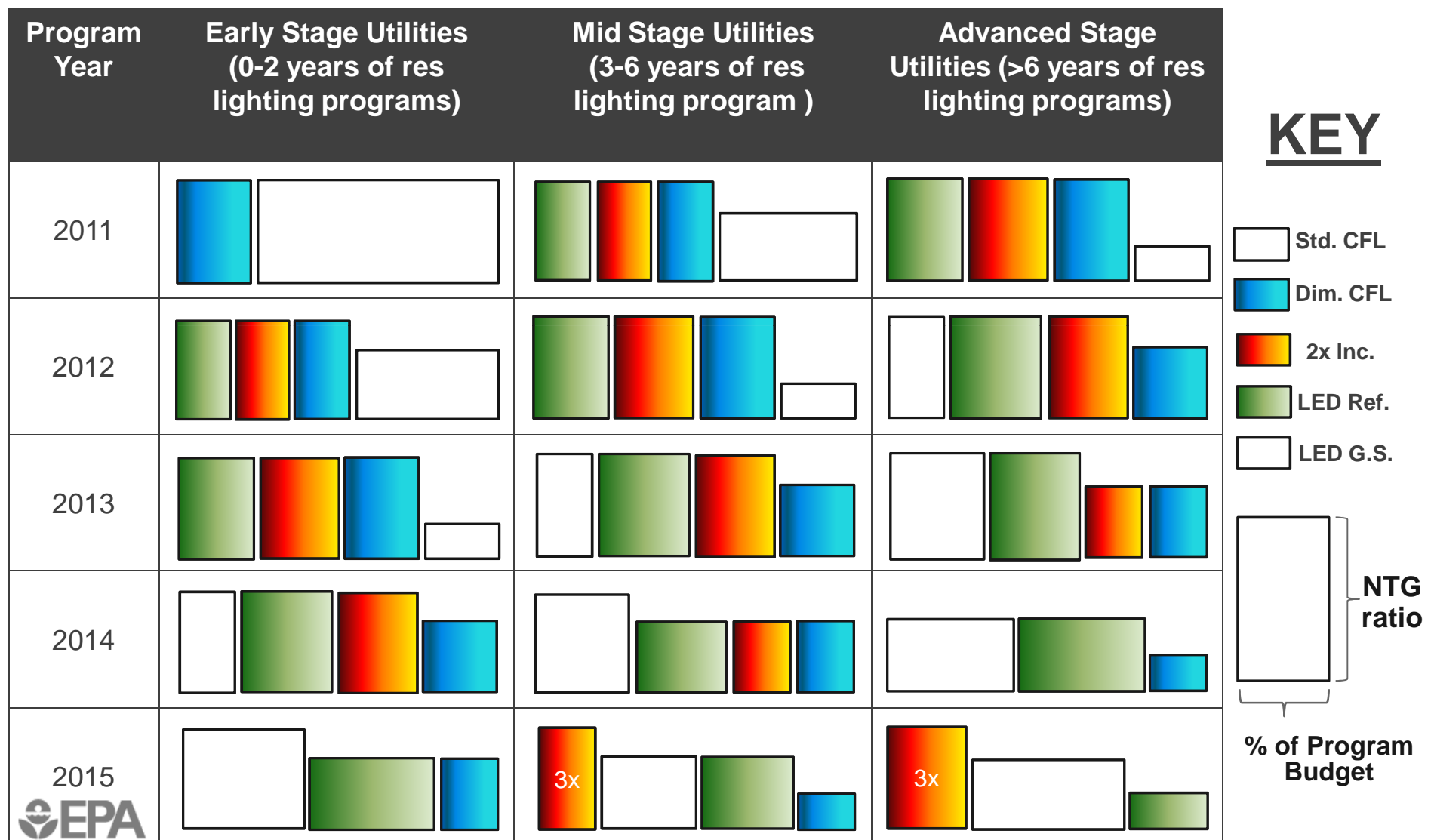


CFL or other residential lighting efficiency programs after EISA may cost more than they do today, but are still likely to cost less than other utility-run efficiency programs and power plants.

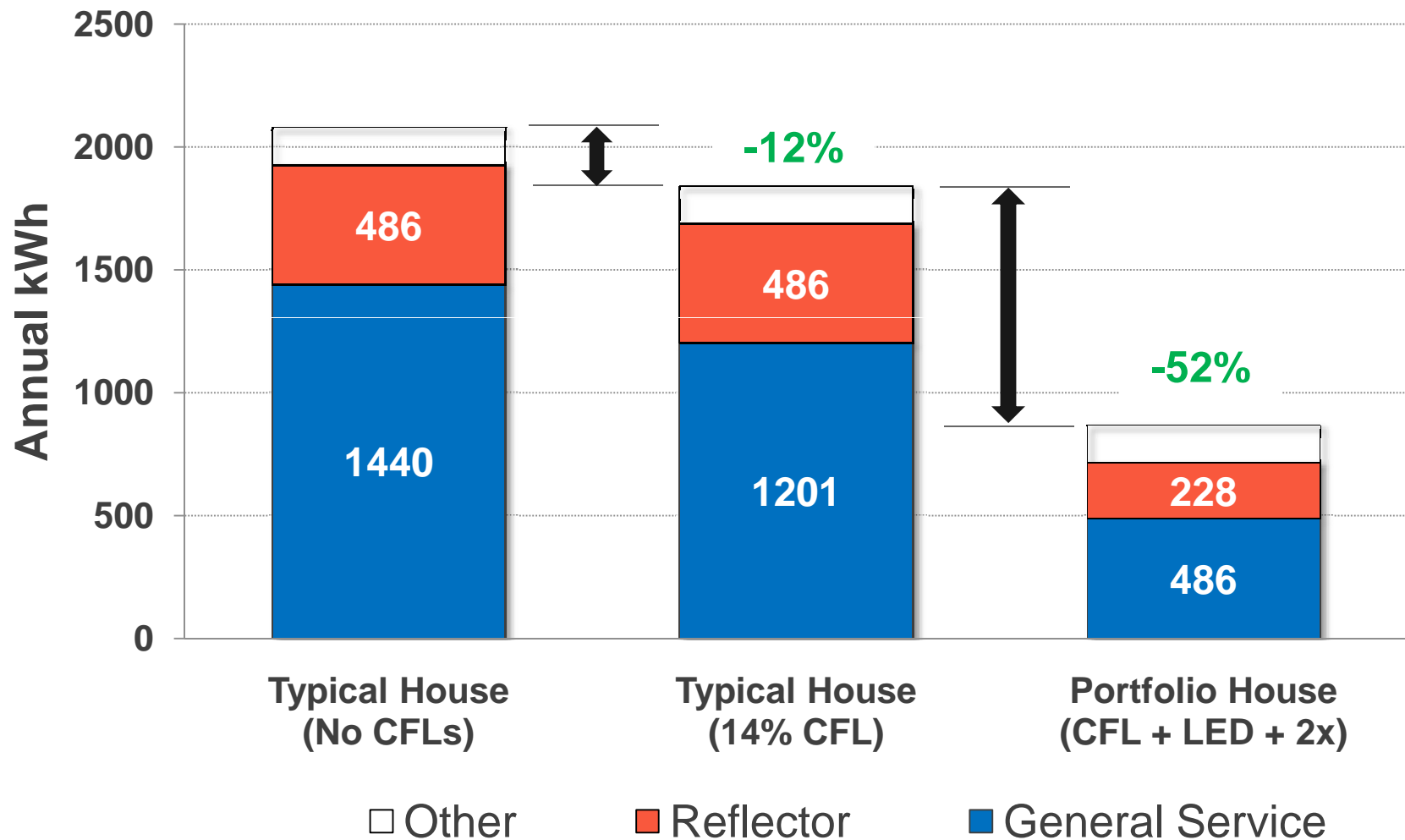
Program Type	Approximate Costs
Today's CFL Programs	0.5-1.0 ¢ / lifetime kWh saved
Future CFL or LED Programs (estimated)	1.5-2.5 ¢ / lifetime kWh saved
National Average for All Residential Efficiency Programs	3 ¢ / lifetime kWh saved
Typical Operating Costs for Existing Power Plants	3 - 5 ¢ / kWh generated
New Natural Gas Power Plants (no CO ₂ capture)	5 - 7 ¢ / kWh generated

How Might Different Types of Utilities Shift Their Lighting Portfolios Over Time?

Some Illustrative Examples...



How Much Lighting Energy Can Be Saved in a Typical House?



Conclusions



- The cost effective energy savings from CFLs have been enormous over the last 20 years.
- Going forward, CFLs will still play an important role in utility energy savings, but will be steadily joined by a set of complementary technologies, each suited to particular applications and situations, to form a *portfolio* of solutions.
- New federal standards will reduce the net energy savings from rebating a CFL, but incremental costs (and average rebate amounts) will also drop as the base case incandescents become more expensive.
- Consumer confusion about the new laws and lighting technologies will be high – consider boosting your consumer education budgets.
- It will still be less expensive to save energy in residential lighting programs than generate it in existing power plants or build new ones.
- New technologies and program approaches can cut residential lighting energy use in half over the next decade – saving more energy than CFLs have saved over the last 20 years.

Thank You



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