EISA: The End of Residential Lighting Programs?

A New Beginning …

Seth Craigo-Snell, Ph.D.

May 17th, 2011

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CFL MARKET: NOW & LATER

Where we are …

- Market Penetration of CFLs: **HIGH**
- CFL Market Share: **FLUCTUATING**
- Socket Saturation of CFLs: **LOW**

Where we are Headed …

- Regulations: EISA (2007) and DOE Rulemaking
- R&D: EC Halogen, IR Halogen, LED, and CFLs

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A LITTLE HISTORY

- Interest in Understanding Impact for EE Program Planning
- Public Meetings (DOE Summit, ACEEE, NEEP, etc…)
- Lots of Good Questions, Not Many Answers
- Met with Big Three U.S. Lamp Manufacturers
  - Confidential, review and sign-off on information
- Reviewed Literature
- Position Paper (see: www.appliedproactive.com)

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RESEARCH & DEVELOPMENT

Halogen

- EISA Compliant: 72watt; 53watt; 43watt; 28watt
- IR Halogen: twice as efficient as standard incandescent?

CFLs

- Mercury content/containment, dimming, instant-on, size/shape

LEDs

- Types, efficacy, ENERGY STAR, dimming, light quality, flicker, non-directional

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PRODUCTS

Halogen

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CFLs

LEDs

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BASELINE COMPARISON

Jumping Ahead …

	Std. Incand.	EC Halogen	CFL	Wattage Deltas (Percent Savings) Std. Incand. to CFL	Wattage Deltas (Percent Savings) EC Halogen to CFL
≈1600 lumens 100 watt equiv.	100	72	23	77 (77%)	49 (68%)

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CONSUMER PREFERENCES

- Light bulbs are a low interest category
- Inertia is fundamental to light bulb purchase decisions
- Sensitive to first cost
- Often economically irrational
- Slow adoption of CFLs – product features
- Mercury content is an issue – how big?
- Gravitate to closest alternative to what they've always purchased

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LESSONS LEARNED

Australia

- For one manufacturer, the year after the standards changed,

  Market Share …

  Increase for EC Halogen (from 1% to 17%)

  Decline for CFLs (from 42% to 31%)

  Increase for exempted incand. lamps (from36% to 42%)

European Union

- For switching customers …

  14% to CFLs

  53% to clear glass incandescent

  33% halogen

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MARKET DYNAMICS #1

- So what will they choose?
- Consider the customer replacing a 100 watt standard incandescent lamp in 2012 (after sell through).

72 watt EC Halogen	23 watt CFL	75 watt Incandescent
≈ $1.75	≈ $2.25	≈ $0.25
		

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MARKET DYNAMICS #2

- What about LED Products?
  - 2010-2015: Not a substantial role
  - Few Non-Directional General Purpose products
  - Not Bright Enough
  - Prohibitive First Cost
- EISA (2007) Standard (through EC Halogen) establishes new baseline

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BASELINE COMPARISON

	 Std. Incand.	 EC Halogen	 CFL	Wattage Deltas (Percent Savings) Std. Incand. to CFL	EC Halogen to CFL
≈1600 lumens 100 watt equiv.	100	72	23	77 (77%)	49 (68%)
≈1100 lumens 75 watt equiv.	75	53	18	57 (76%)	35 (66%)
≈800 lumens 60 watt equiv.	60	43	14	46 (77%)	29 (67%)
≈450 lumens 40 watt equiv.	40	29	9	31 (78%)	20 (69%)

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22nd National Conference & Expo

February 6-10, 2012
Hilton San Diego Bayfront

EISA: The End of CFL Programs? Evaluation Perspective

Scott Dimetrosky

May 17, 2011

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EISA: The End of Residential CFL Programs?

- It's a brave new world

EISA: The End of Residential CFL Programs?

- Evaluator's Job: Look Into the Crystal Ball
  - Efficacy and cost of EISA compliant bulbs
  - LEDs: Ready for prime time? Cost?

It's Only 2011: Are There Any Evaluation Issues Now?

Current Issues…

- Issue 1: Lifetime Energy Savings
- Issue 2: Incremental Cost Considerations
- Issue 3: Opportunity to Baseline LEDs

Future Issues…

- Timing, NTG Impacts, Behavioral

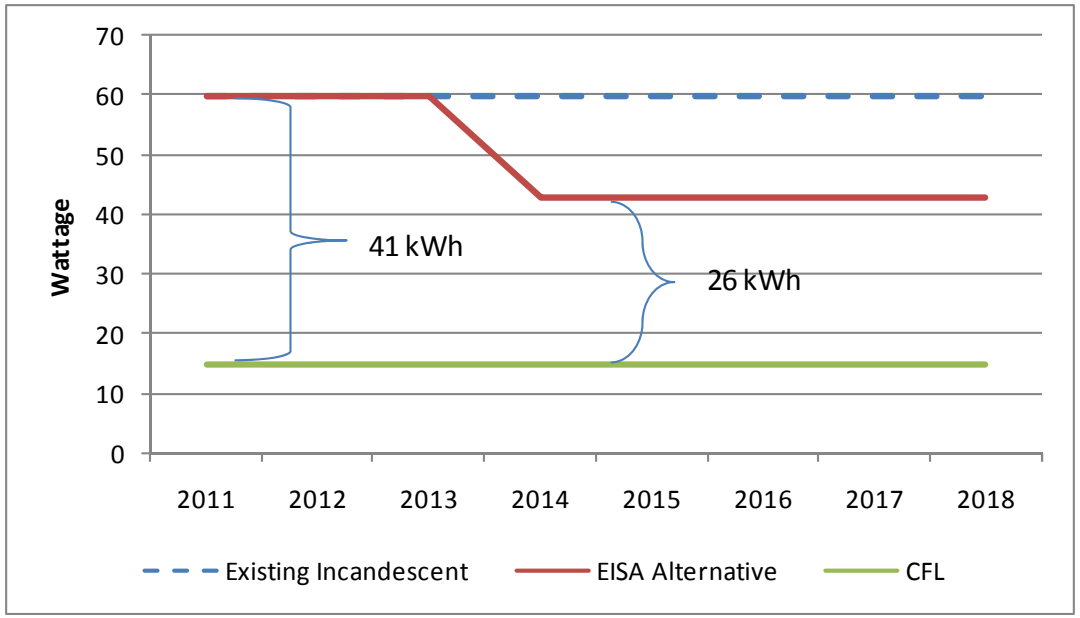
Issue 1: Lifetime Savings

First, the bad news…

- Savings are going down
- Current evaluations still assume delta watts ratios of about 4:1 (or 3:1 in some cases)
  - Savings needs to be a “step function” with decreasing savings in future years
  - Relevant even if people “downsize” incandescent wattage

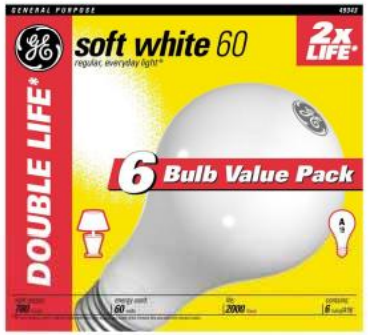
Issue 1: Lifetime Savings

- Example:
  - 60w baseline drops to 43w in 2014
  - 24% drop in gross lifetime energy savings
  - Important issue for CFLs that are in storage



Issue 2: Incremental Cost

- The good news (for implementers): incremental cost is going down



GE Soft White Double Life 60-Watt General Purpose A19 (6 Pack)

Model # 49343 Store SKU # 193383

★★★★★ Be the first to Write a Review

$3.47 /EA-Each

SYLVANIA 100-Watt A-Line Halogen Light Bulb

Item #: 302673 | Model #: 50006

★★★★★ Be the first to write a review!

$7.88

Issue 2: Incremental Cost

- Benefit/Cost Ratio Goes Up as Incremental Cost Goes Down
- Energy savings decreases, but so does the incremental cost
- ***CFLs might even be more cost-effective***

$$TRC = \frac{\sum Benefits}{\sum Costs} = \frac{\sum EnergySavings * AvoidedCosts}{\sum IncrementalCost + ProgramCosts}$$

Issue 2: Incremental Cost

- Example:
  - Assume incandescent cost of 50cents, EISA bulbs @ $2.00, and CFLs @ $3
  - Incremental cost over lifetime (not only first cost)
  - CFLs are less expensive!

Year	Incand.	EISA	CFL
2011	$0.50	$0.50	$3.00
2012	--	--	--
2013	$0.50	$2.00	--
2014	--	--	--
2015	$0.50	--	--
2016	--	$2.00	--
2017	$0.50	--	--
2018	--	--	--
Total NPV	**$1.83**	**$4.11**	**$3.00**

Issue 3: Baseline Data on LEDs

- LEDs Continue to Become More Viable
  - Use for directional lighting
  - Good options in lower wattage categories
- Great opportunity for evaluators to track sales, penetration, saturation, and cost

Issue 3: Baseline Data on LEDs

- Big challenge: LARGE incremental cost
  - Plus quality and directional concerns
- Incremental cost does decrease significantly with EISA
  - Plus longer lifetime (25,000 hours) than CFLs

Philips 12 watt (60W equivalent) A19 Ambient LED Soft White Light Bulb, Dimmable

Model # 409904 Internet # 202530170
Store SO SKU # 888865

★★★★★ 4.6/5 Reviews (25) Write a Review

$39.97 /EA-Each

Issue 3: Baseline Data on LEDs

- At what point do LEDs become cost-effective, assuming EISA baseline?
- Consumer's perspective:
  - 28 kWh/year @ 15 cents/kWh consumer saves $4/year
  - Last 3x as long: Cost-effective for consumer!
- Utility perspective:
  - Assuming avoided cost @ 5 cents/kWh
  - Price needs to be about +/- $20 per bulb

Other Issues to Consider: Timing of Savings

- Change doesn't happen instantly
  - Retailers can sell existing stock
  - Bulbs take time to burn out
  - Some people likely to stockpile

- "A pensioner has defied an EU ban by hoarding more than 1,000 traditional light bulbs - enough to see her 'into the grave'."

Other Issues: Future NTG

Increasing Free Ridership

- ***Prices of alternatives have gone up (no more 25 cent bulbs)***
- Satisfaction with EISA bulbs still TBD

Flat or Decreasing Free Ridership

- Remaining liabilities of CFLs (performance/ mercury, etc.)
- Any incremental first cost is a barrier to some people

Other Issues to Consider: Consumer Behavior

- For us it's an energy efficiency measure, to consumers it's a light bulb
- Consumers make economically irrational decisions
  - They don't do life cycle cost analysis

EISA: The End of Residential Lighting Programs?

It depends….

- Availability and high cost of EISA compliant bulbs will make programs cost-effective
- But price is less of a barrier – Need for alternative program design
  - More direct install
  - Education about options
- And the "wildcards"
  - LED prices
  - Consumer reactions?

Graphic from Efficiency Vermont (newbulbintown.com)

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