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Long-Term Northwest Residential Lighting Tracking and Monitoring Study

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Executive Summary

E.1 Program History

The Northwest Energy Efficiency Alliance (NEEA) began its consumer lighting market initiatives in 1997 to advance consumer awareness and use of compact fluorescent lamps (CFLs) and fluorescent light fixtures throughout the region. In 2000, NEEA began targeting retailers (by providing salesperson training as well as advertising and marketing support) and shifted its focus to manufacturers in 2005, coordinating a regional manufacturer buydown promotion. The promotion provided broad geographic sales coverage (including rural markets) through distribution channels including grocery, drug, hardware, mass merchandise, do-it-yourself, and wholesale chains.

NEEA coordinated similar promotions in 2006 and 2007, emphasizing smaller CFL distribution channels (such as drug and grocery stores) and CFL sales in non-metropolitan areas. In 2007 alone, participating retail chains sold approximately 1.8 million ENERGY STAR CFLs through NEEA's promotions and total regional sales of ENERGY STAR CFLs exceeded 18 million lamps. NEEA concluded that additional support of the Northwest lighting market was no longer necessary and ceased its active interventions in the market in early 2008.

E.2 Conclusions and Recommendations

Conclusions from the study include the following:

- **In general, there were minor changes over the last year in availability, affordability and diversity of CFLs in Northwest retail stores.** There was an increase in the fraction of stores that carry specialty CFLs (from 82 to 91% of stores), but a slight decrease in the average number of specialty CFL models stocked (from 17.6 to 16.8 models). The average estimated CFL retail price increased 10 percent (from $3.76 to $4.06)– mostly due to price increases in non-metro areas and among big box stores. Retailers are stocking twice as many LED models in 2010 (approximately 7 per store) compared to 2009.
- **In non-metropolitan areas in particular, however, there have been greater declines in CFL affordability, availability, and diversity than stores in metropolitan areas.** CFL prices increased more dramatically in non-metro areas than metro areas (by 41 cents and 24 cents, respectively) while share of shelf space dedicated to CFLs declined in non-metro areas (from 29% to 21% of total shelf space) and stayed the same in metro areas. The average number of general purpose CFL models increased in both metro and non-metro stores, but by only 2.7 models per store in non-metro stores compared to 4.1 in metro stores. Specialty lamp diversity remained fairly constant in metro stores (increasing by 0.2 models per store) but declined by 2.7 models per store in non-metro stores.
- **CFL promotions offered by energy-efficiency program sponsors throughout the Northwest are providing support to the market for both standard and specialty CFLs.** These ongoing promotions likely helped to maintain fairly consistent CFL market prices, availability and diversity over the past several years, but as evidenced by the drop in market

share among non big box stores since 2008 (from 30% in 2007 to roughly 14% in subsequent years), NEEA's more widespread past promotions may have helped provide the additional support that smaller retail channels may need.

- **Northwest CFL sales rebounded by about 5 percent between 2009 and 2010 after a major drop of 26 percent between 2008 and 2009.** There were approximately 19 million CFLs sold in 2010, but sales are still far from the 2008 peak of nearly 25 million CFLs. Northwest CFL market share also experienced a small uptick between 2009 and 2010 (from 30% to 31%) after dropping from nearly 40 percent in 2008.
- **We expect CFL sales levels to plateau as most consumers do not plan to install more CFLs until their existing CFLs burn out** – instead they will buy them when they are on sale or when one of their installed lamps burns out. Most consumers use CFLs in a handful of sockets – and they avoid using them in certain applications and rooms, depending on their aesthetic and use preferences. A small fraction of consumers use CFLs throughout their homes and think the environmental/economic savings outweigh any aesthetic or application issues.
- **As EISA phases in, there is a risk that the majority of CFL users who are not completely committed to the technology may revert back to incandescent technology**, at least for some of their applications, if suppliers promote these products as energy saving/EISA compliant. Persistent concerns around mercury could also hurt sales of CFLs if consumers who have those concerns think they have a new "energy-efficient" incandescent lamp option that does not contain mercury. CFL program sponsors have not convinced the majority that the energy savings associated with CFLs outweighs mercury concerns.
- **There remains potential for additional general purpose and specialty CFL installations.** However, consumers lack awareness of specialty CFLs (only 32% of CFL purchasers are aware of specialty lamps), specialty CFLs are more expensive and less available, and dimmable CFLs in particular do not perform well. There are major market barriers to significantly increasing specialty CFL sales and to address the barriers will require a multi-pronged approach due to the wide variety of products and issues.
- **There remains a small fraction of consumers who are either unaware or have never tried CFLs** (approximately 8% of Northwest consumers were unaware of CFLs in 2010, and 17 percent were aware but had never purchased CFLs)**.** California utilities have had success reaching previously under-served populations by promoting CFLs in ethnic supermarkets and discount stores. These efforts have been funded by large-scale resource-acquisition programs and they take advantage of the density of under-served populations and the prevalence of ethnic and discount stores that serve them.
- **Utility program managers see a role for a regional representative such as NEEA in supporting national efforts on consumer education** around mercury, CFL disposal, use of specialty CFLs, integrated messaging around the various technology options available as EISA takes effect.
- **Utility program managers also see a role for a regional representative such as NEEA in supporting national efforts regarding quality testing and labeling** for LED products.

Based on these conclusions, we recommend the following:

1. As recommended in prior tracking study reports, we recommend that NEEA consider engaging with the regional lighting suppliers. From the 2010 study[1]:

   > "**NEEA should continue to strengthen its relationship with CFL suppliers** (manufacturers and retailers) in the absence of a formal CFL incentive program. Ongoing dialogue with these stakeholders may help NEEA and its sponsors influence the mix of products these suppliers will produce and market in response to impending EISA requirements."

   The 2010 study also suggests the value of maintaining supplier relationships because they may be difficult to reestablish should NEEA decide to pursue future lighting market interventions – such as educational efforts or incentive programs – that would require (or benefit from) supplier support. These recommendations are particularly relevant now, given that EISA requirements will begin to phase in soon (January, 2012).

2. **NEEA should consider further discussion with regional stakeholders regarding whether the Northwest would benefit from having a regional representative in national efforts to promote energy-efficient lighting products**. Findings from the utility program manager interviews in particular suggest a desire for a regional entity to coordinate utility input to help develop consistent messaging regarding energy-efficient lighting products at the national level (including messages regarding mercury and CFL disposal). From the utility program managers' perspectives, messaging priorities include decreasing consumer confusion regarding new lighting technology options and increasing consumer understanding of lumens to aid comparison shopping. Program managers also expressed the desire for a voice in supporting the U. S. Department of Energy's efforts to further assess effective useful life and lumen degradation of LEDs and efforts lead by the Consortium for Energy Efficiency and U.S. Environmental Protection Agency to support LED product labeling standards. Engaging in these activities could facilitate staying abreast of current market trends and innovations. NEEA may be able to fill such a role, and further dialogue with utility program managers and other regional stakeholders may help NEEA decide whether to pursue this arrangement.
3. **NEEA should consider further discussion with regional stakeholders regarding whether some form of market support is necessary for CFLs in non-metropolitan areas.** As mentioned above, lighting retailers in non-metro areas have experienced greater declines in CFL affordability, availability, and diversity than metro stores. It may benefit the non-metro regions for NEEA to have dialogue with stakeholders to determine whether additional support is necessary and the best form of support that could be provided.

[1] KEMA, 2010. 2009-10 Residential Lighting Market Research Study. Prepared for NEEA. Supported by ECONorthwest. May 18, 2010. Page 50.

4. **NEEA should consider efforts to educate consumers regarding the full range of installation potential for energy-efficient lamps in their homes.** The 2010 study includes a similar recommendation for CFLs, and current study results suggest a broader need across energy-efficient lamp types. Whether these efforts are conducted under the umbrella of the national efforts suggested above or through a distinct effort, study findings suggest a lack of awareness among consumers regarding the impending phase-out of traditional incandescent lamps (as suggested by the consumer surveys), lingering confusion regarding CFL applicability for different purposes (as suggested by the consumer surveys and focus groups), and a desire among the region's utilities for educational efforts regarding new lighting technology options.
5. **NEEA should consider developing materials and information to help Northwest utilities determine if and when they should start promoting new lighting products including LEDs**. Study results suggest this information is of particular interest to lighting program managers at some of the region's smaller utilities.
6. **NEEA should continue to regularly monitor the Northwest residential lighting market to provide timely data on the Northwest** to help shape local utility, regional and national lighting promotions and efforts to maintain the gains in CFL market acceptance achieved over the last two decades.

1. Introduction

This report represents KEMA's seventh assessment of the Northwest residential lighting market for the Northwest Energy Efficiency Alliance (NEEA). KEMA has conducted evaluations and market research studies roughly on an annual basis since 2005, beginning with the 2005 Market Progress Evaluation Report (MPER1) for NEEA's ENERGY STAR® Consumer Products Project and most recently the 2009-10 Residential Lighting Market Research Study published in May, 2010.[2]

1.1 Project Overview

NEEA launched its first residential lighting market initiatives in 1997 to advance awareness and use of energy-efficient compact fluorescent lamps (CFLs) and fluorescent light fixtures among Northwest residential customers. The project was designed to address market barriers including high first cost; lack of product availability; lack of consumer awareness; incompatibility of CFLs with existing fixtures, dimmers, timers and photocells; performance problems; poor aesthetics of energy-efficient lighting products; and consumer dislike of fluorescent technologies. The project provided financial incentives to manufacturers; retailer education; marketing and mass advertising; and branding.

During the late 1990s, the number of products that qualified for inclusion in NEEA's initiatives expanded. As a result, the project strategy evolved from targeting manufacturers to retailers in 2000. The project provided retailers with salesperson training as well as advertising and marketing support to encourage ENERGY STAR product promotion and marketplace acceptance. NEEA leveraged local utility activities and regional and national initiatives to encourage improvements in ENERGY STAR product quality.

In response to market data suggesting consumer dissatisfaction with product performance, the project shifted its focus in 2004 toward achieving improvements in CFL quality and consumer acceptance. The project provided cooperative marketing opportunities and field services to retailers to promote ENERGY STAR products and coordinated financial incentive offerings for these products. The project also coordinated with national efforts such as ENERGY STAR's Change a Light, Change the World campaign and the lighting quality research conducted by the Program for Evaluation and Analysis of Residential Lighting (PEARL). Finally, the project supported advancement of new lighting technologies (e.g., dimmable/reflector CFLs) and efforts to encourage proper disposal of broken or burned-out CFLs.

In 2005, the project coordinated a regional manufacturer buydown promotion to reduce the market price of CFLs in the region and to establish promotional distribution channels for moving high-quality, low-priced products into the market. The promotion provided broad geographic sales coverage (including rural markets) through distribution channels including grocery, drug, hardware, mass merchandise, do-it-yourself, and wholesale chains.

[2] KEMA, 2005, 2006, 2007, 2008, 2009, and 2010. Please refer to the Bibliography (Appendix A) for complete citations.

NEEA expanded upon the success of the project in 2005 by coordinating similar promotions in 2006 and 2007 with a focus on consumers who had had limited access to high-quality, low-priced CFLs as well as those who had never purchased CFLs. The 2006 and 2007 promotions emphasized non-traditional CFL distribution channels (such as drug and grocery stores) and rural areas, and excluded large do-it-yourself chains and wholesale clubs from participating.

In 2007 alone, participating retail chains sold approximately 1.8 million ENERGY STAR CFLs through NEEA's promotions and total regional sales of ENERGY STAR CFLs exceeded 18 million lamps.[3] NEEA concluded that additional support of the Northwest lighting market was longer necessary and ceased its active interventions in the market in early 2008. Several other energy-efficiency program sponsors have continued to offer CFL incentives in the region since then.

1.2 Evaluation Overview

The goal of this study is to assess the current status of the CFL market and key objectives are to:

1. Track and monitor current availability, affordability and diversity of CFLs in Northwest retail stores;
2. Analyze residential ENERGY STAR CFL sales and market share of total residential medium screw-base lamp sales in the Northwest;
3. Through a consumer telephone survey, investigate current awareness of CFLs; purchase, installation, and storage rates; perceptions of CFLs; and motivations for recent CFL purchases (or lack thereof);
4. Review and comment on NEEA's cost effectiveness model and baseline assumptions; and
5. Report on retailer/manufacturer attitudes and expectations regarding future sales trends (particularly with regard to the potential impacts of the 2007 Energy Independence and Security Act [EISA]).

NEEA's market tracking reports present results for the region as a whole as well by geographic location where possible. Geographic results are typically divided into metropolitan statistical areas (MSA) east and west of the Cascades mountain range versus nonmetropolitan areas in the region based on classifications defined by the United States Office of Management and Budget as published by the United States Census Bureau. For consistency with previous reports, geographic results are presented within the metro east, metro west, and non-metro categories within this report.

In 2011, NEEA shifted its focus toward a different set of classifications of metropolitan versus nonmetropolitan areas utilized by the United States Department of Agriculture Economic Research Service (ERS). The ERS utilizes Rural Urban Continuum Codes (RUCC) that further classifies counties based on population sizes and functional adjacency to one or more metropolitan areas. While the MSA/Non-MSA classifications described above include many suburban areas in the "non-

[3] Fluid Market Strategies, 2009.

metropolitan" category, the RUCC deem many suburban areas to be in the "urban" category (provided that they meet minimum population thresholds). Because of this re-categorization of suburban areas, the RUCC "rural" designation comprises a smaller proportion of the total Northwest population than the MSA "non-metropolitan" designation. For a summary of key results from this study by RUCC, please refer to Appendix G.

Table 1 provides more detail on the major data collection activities conducted in support of this study. The table provides information about the sample design, sample size, and data collection dates (see Appendix 0 for the data collection instruments). The study also included a review of inputs to NEEA's ACE model (which can be found in Appendix H) and analyses of regional ENERGY STAR CFL sales and market share of total regional medium screw-base (MSB) lamp sales. Appendix F provides the consumer focus group results.

Table 1: Data Collection Activities, 2010-11
Long-Term Northwest Residential CFL Tracking Study

Data Collection Activity	Sample Frame Source	Sample Design Overview	Number of Completes	Data Collection Dates
Consumer Focus Groups	Random digit dialing of consumers in the selected geographic areas	Conduct two focus groups each in Portland, Seattle and Spokane	6 focus groups with 47 Northwest consumers	December 2010
Retail Store Shelf Surveys (in-store surveys)	List of stores provided by Portland Energy Conservation Institute	Complete retail store shelf surveys stratified across 3 geographic regions (metro east, metro west, non-metro), 3 store categories (national chain, regional chain, independent), and 5 store types (do-it-yourself, drug/grocery, mass merchandise, small hardware, warehouse)	58 retail stores	December 2010
Consumer Surveys (computer-aided telephone surveys)	List of Northwest zip codes from US Census Bureau	Complete surveys with Northwest consumers stratified across 3 regions	1,000 consumers	January—February 2011
Market Actor Interviews (in-depth telephone interviews)	List of manufacturers and retailers provided by Fluid Market Strategies	Complete interviews with representatives of CFL retailers and manufacturers that participated in past NEEA promotions	5 retailer representatives; 4 manufacturer representatives	February 2011
Utility Program Staff Interviews (in-depth telephone interviews)	List of utility program staff provided by NEEA	Complete interviews with all of the investor-owned and large utilities and a random sample of the remaining utilities	16 utility program managers	January—March 2011

2. CFL Sales and Market Share Assessment

This chapter provides an overview of ENERGY STAR CFL sales and an assessment of residential ENERGY STAR CFL market share of total residential medium screw-base lamp sales in the Northwest and nationwide. While data are not available by metro/non-metro designation, this section does include a discussion of sales by state.

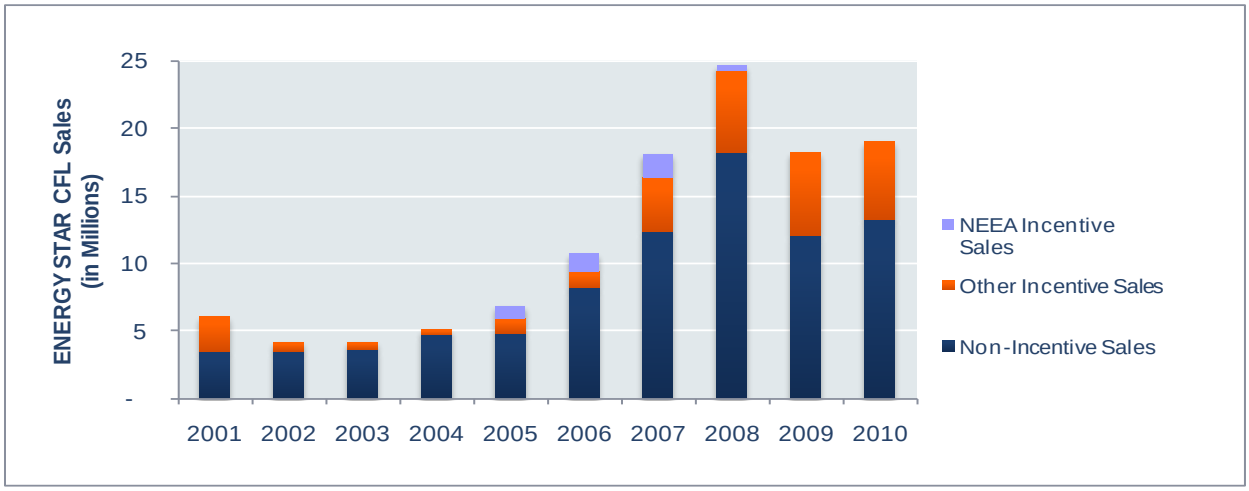
2.1 ENERGY STAR CFL Sales

As described in prior ENERGY STAR Consumer Products residential lighting studies, NEEA's implementation contractors have tracked CFL sales throughout the region for several years. The current method relies upon reports of actual CFL sales through several major retail channels in the Northwest, reports from local utilities and other energy-efficiency program sponsors, and extrapolation of these data to retailers representing the Northwest region.[4] In 2010, NEEA's contractor, Fluid Market Strategies, increased the proportion of tracked sales versus extrapolated sales in their sales database and also began tracking specialty CFL sales as a fraction of total CFL sales in the region.

Figure 1 shows ENERGY STAR CFL sales for the region broken down by utility incentive versus non-incentive sales. Total ENERGY STAR CFL sales increased by approximately 5 percent between 2009 and 2010, reaching more than 19 million CFLs sold in 2010. This is noteworthy given the 26 percent decline in ENERGY STAR CFL sales between 2008 and 2009. The number of CFLs sold with utility incentives decreased by 5 percent between 2009 and 2010, and the number sold without incentives increased by 10 percent. CFLs sold with utility incentives comprised a slightly smaller proportion of overall regional sales in 2010 as they did in 2009 (31% and 34%, respectively).

[4] Note that because tracking methods have improved over time, it is likely that annual estimates from earlier years tracked a smaller proportion of the overall Northwest CFL sales than estimates for later years. Also note that Fluid Market Strategies is in the process of revising and improving the current extrapolation methods.

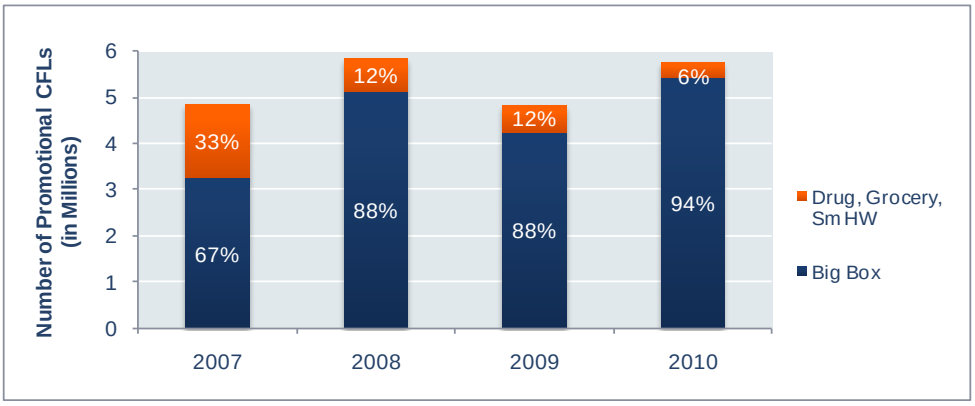
Figure 1: Estimated ENERGY STAR CFL Sales in the Northwest, 2001-2010



Sources: PECI, 2001–2006 (from 2006 report); Fluid Market Strategies, 2011, 2010, 2009, 2008a, 2008b, and 2007b.

While the proportion of total regional sales for which utility incentive sales accounted stayed about the same between 2009 and 2010, the proportion of overall tracked incentive CFL sales by channel shifted toward big box stores (do-it-yourself [DIY], mass merchants, and wholesale clubs) between 2009 and 2010 (Figure 2).[5] Big box stores represented 88 percent of total tracked promotional sales in 2009 but represented 94 percent of total tracked promotional sales in 2010. Non big box (drug, grocery, and small hardware) stores dropped from 12 percent of total tracked promotional sales in 2009 to only 6 percent in 2010.

Figure 2: Tracked Promotional CFL Sales by Store Category and Year, 2007-2010

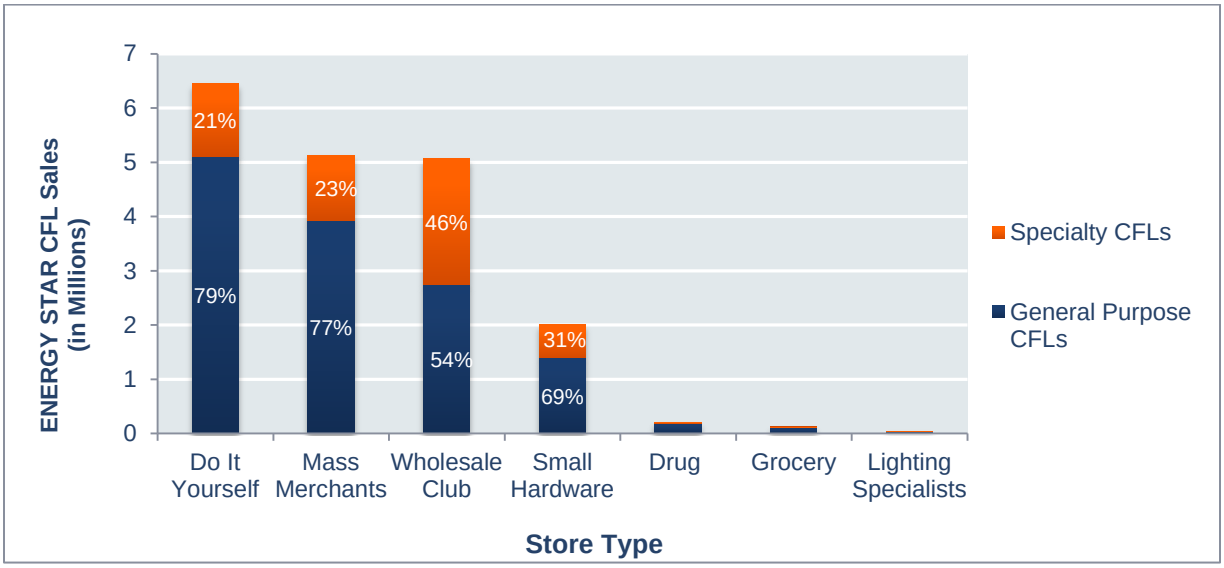


Source: Fluid Market Strategies, 2011, 2010 and 2009.
Number of Northwest promotional CFLs tracked with details on retail channel: 2010 n= 5,766,284; 2009 n=4,827,010; 2008 n=5,811,229; 2007 n=4,868,350. For consistency with data from prior years, the 2010 data excludes 38,207 CFLs sold in lighting specialty stores and the 2009 data excludes 519 promotional CFLs sold through this channel.

[5] Less than one percent of promotional sales were not tracked by channel.

NEEA's data collection contractor also tracked ENERGY STAR CFL by general purpose and specialty designation, with the "general purpose CFLs" category including all twisters and a-lamps and the "specialty CFLs" category including all other lamp types. At the store category level, there is little difference in the proportion of lamps sold by store type in these two categories (29% specialty in big box, 28% specialty in non big box), but the differences are more pronounced at the store type level. Figure 3 shows total 2010 Northwest residential ENERGY STAR CFL sales by store type broken into general purpose versus specialty CFLs. As shown, wholesale clubs sold the highest proportion of specialty CFLs (46%) with the next highest at 23 percent (mass merchandise) and 21 percent (do it yourself). Among the non big box stores, small hardware stores had the highest sales volume and also the greatest proportion of specialty lamps sold (31%), compared to 11 percent in drug stores, 9 percent in grocery stores, and only 2 percent specialty lamps in lighting showrooms.

Figure 3: ENERGY STAR CFL Sales by Store Type, Lamp Type and Year, 2010

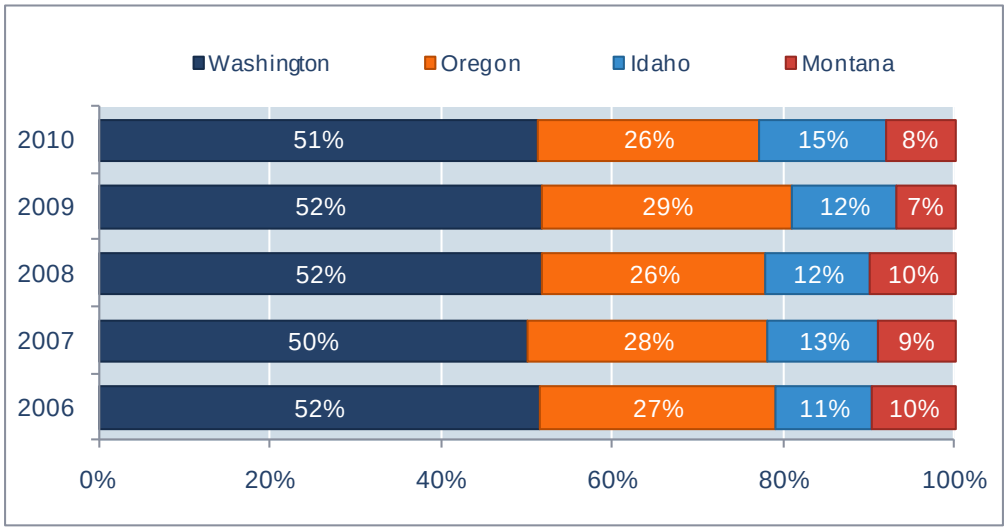


Source: Fluid Market Strategies, 2011.
Do It Yourself n=6,448,303; Mass Merchants n=5,128,418; Wholesale Club n=5,065,408; Small Hardware n=2,011,230; Drug n=210,270; Grocery n=123,230; Lighting Specialists n=39,029.

Figure 4 shows the proportion of ENERGY STAR CFL sales by state in the Northwest for 2006 through 2010. For the past five years, sales in Washington have comprised approximately half of the region's total ENERGY STAR CFL sales. Total ENERGY STAR CFL sales in 2010 were approximately 9.8 million in Washington, nearly 4.9 million in Oregon, more than 2.8 million in Idaho, and more than 1.5 million in Montana.

The proportion of total regional CFL sales comprised by sales in Oregon declined between 2009 and 2010 to 2008 levels, while Idaho increased from 12 to 15 percent of regional sales. Washington and Idaho remained constant between 2008 and 2009. The allocation of 2010 CFL sales by state closely mimics the distribution of the region's 2010 population.

Figure 4: Estimated Residential ENERGY STAR CFL Sales in the Northwest by State, 2006-2010



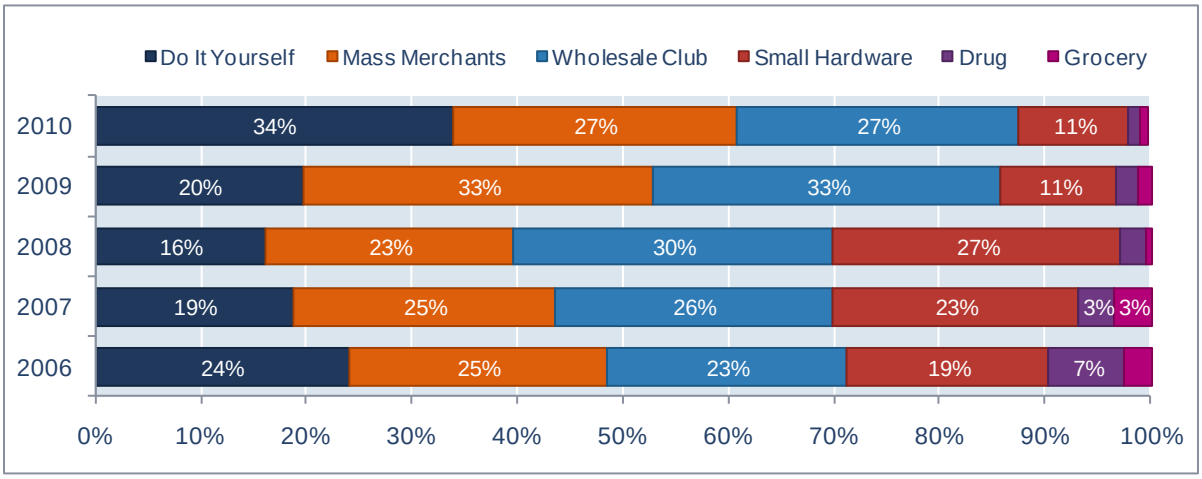
Sources: Fluid Market Strategies, 2011, 2010, 2009, 2008b and 2007b.
2010 n=19,025,888; 2009 n=16,898,484; 2008 n=24,710,098; 2007 n = 18,157,300; 2006 n = 10,751,907.

Figure 5 shows the proportion of Northwest CFL sales across store types for 2006 through 2010. The proportion of regional CFL sales through big box stores versus non big box stores remained fairly constant between 2006 and 2008 (roughly 70% big box, 30% non big box), the proportion of sales through big box stores increased from 70 percent in 2008 to 86 percent in 2009. These proportions held constant between 2009 and 2010 (87% big box, 13% non big box), but the distribution of sales within the big box channel shifted substantially:

- Market share of total ENERGY STAR CFL sales for do-it-yourself stores increased by approximately 70 percent between 2010 and 2010 (from 20% to 34%).
- Sales through mass merchandise and wholesale clubs both declined from 33 percent of the total market to 27 percent (a 22% decline).

Market share of total Northwest ENERGY STAR residential CFL sales for non big box stores remained relatively unchanged between 2009 and 2010.

Figure 5: Estimated ENERGY STAR CFL Sales in the Northwest by Store Type, 2006-2010*†



Sources: Fluid Market Strategies, 2011, 2010, 2009, 2008b, and 2007b.
2010 n= 19,025,888; 2009 n=16,898,484; 2008 n= 23,988,695; 2007 n = 18,157,300; 2006 n = 10,751,907.
* Sales in 2010, 2009, and 2006 include CFLs sold through lighting specialty stores which represent less 1% of total sales in each year. Sales through lighting specialty stores were not tracked in 2007 or 2008.
† Note that 2010, 2009, and 2008 data exclude promotional sales from utilities including Snohomish PUD, Energy Trust of Oregon, and Northwestern Energy that were not tracked by retail channel.

2.2 ENERGY STAR CFL Market Share

2.2.1 Approach[6]

D&R International provides annual estimates of CFL market share for the United States through 2009 in its annual CFL Market Profile reports.[7] To estimate Northwest ENERGY STAR CFL market share, we began with the estimates of lamp shipments for CFLs and incandescent lamps by year used by D&R International to estimate CFL market share at the national level through 2010.[8] We then assumed (based on discussions with D&R International staff) that annual lamp sales in the U.S. equal approximately 85 percent of total lamp shipments into the U.S. on an annual basis. We multiplied total U.S. shipments on an annual basis by 85 percent to estimate annual lamp sales for the U.S.

To estimate the share of national-level lamp sales comprised by Northwest lamp sales, we used population data from the U.S. Census to estimate the percentage of the U.S. population residing in

6 Note that the approach described herein is greatly simplified from those used in previous lighting tracking studies for NEEA and is based on updated data. Thus, annual market share estimates in this report may differ slightly from those reported in previous NEEA lighting studies. For details on methods used in previous studies, see KEMA, 2009.

7 D&R International, 2010.

8 KEMA obtained the 2010 data through personal communication with D&R International staff (D&R International, 2011).

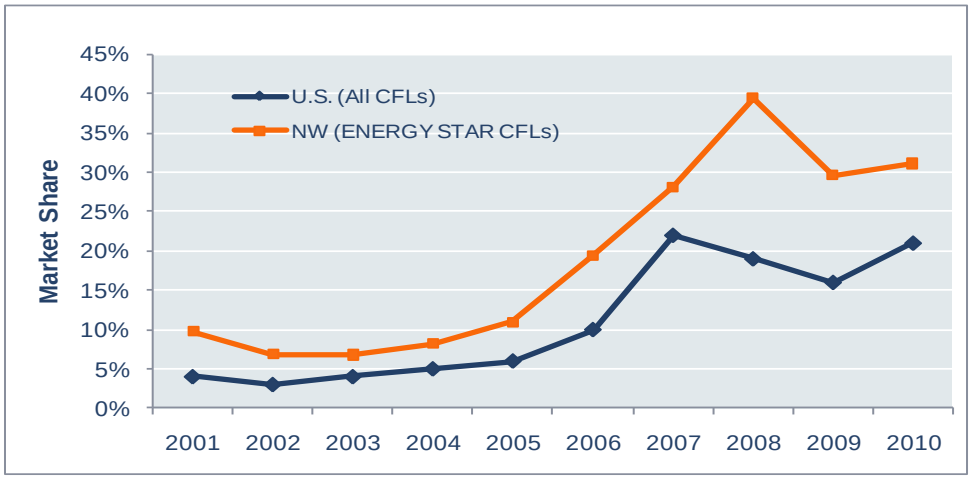
the Northwest by year.[9] We then applied these percentages to the annual estimates of total U.S. lamp sales to arrive at an estimate of total Northwest lamp sales per year.

To estimate Northwest ENERGY STAR CFL market share of total Northwest lamp sales, we calculated the percentage of total Northwest lamp sales comprised by annual ENERGY STAR CFL sales estimates provided by NEEA's data collection contractors.[10, 11]

2.2.2 Results

Based on the methods described above, we estimated Northwest residential ENERGY STAR CFL market share and national CFL market share for 2010. Results suggest that Northwest ENERGY STAR CFL market share increased to 31 percent in 2010 after declining from 39 percent in 2008 and to 30 percent in 2009 (Figure 6). At the national level, market share rebounded to approximately 21 percent after dropping from 19 percent in 2008 to 16 percent in 2009. Northwest market share also continues to exceed the national average.

Figure 6: Estimated CFL Market Share of Total Lamp Sales for the Northwest and U.S., 2001-2010



Sources: NW ENERGY STAR CFL sales: PECI, 2001–2006 (from 2006 report); Fluid Market Strategies, 2010, 2009, 2008b and 2007b.
U.S. CFL market share and lamp shipments: D&R International, 2010 and 2011.
U.S. and NW population estimates 2000-2010: U.S. Census, 2010.

[9] U.S. Census, 2010.

[10] PECI, 2001–2006; Fluid Market Strategies, 2011, 2010, 2009, 2008b and 2007b.

[11] It is important to note that the national-level lamp shipments/sales estimates provided by D&R International include *all* CFL sales, while the Northwest data includes only ENERGY STAR CFL sales. NEEA's data collection contractor (Fluid Market Strategies) did have some data on Northwest sales of non-ENERGY STAR CFLs for the 2008 and 2009 sale years, but did not actively seek this data from retailers until the 2010 sales year. Thus, the CFL market share comparison is between all CFL sales the national and ENERGY STAR CFL sales in the Northwest and is not a strictly "apples-to-apples" comparison.

3. Shelf Surveys

This section of the report focuses on the lighting retailer shelf surveys and includes a brief description of the methodology and presentation of key findings from survey data analysis. It provides results for the current (2010) surveys compared to results from 2006, 2008, and 2009. Appendix 0 provides the data collection instrument used for the 2010 shelf surveys, and Appendix F provides more detailed results including tables and comparisons with prior years broken down by region (metro versus non-metro) and store type.

Store classifications include "big box" which refers to warehouse, mass merchandise, and do-it-yourself (DIY) stores and "non big-box" which refers to grocery, drug, and small hardware stores. Appendix C contains results by all store types as well as results by store category.

3.1 Approach

Field staff visited a total of 58 lighting retailers in the Northwest region during December of 2010. Staff members recorded shelf space measurements and performed an inventory of all CFLs, incandescent lamps, and Light-Emitting Diode lamps (LEDs) found on shelves throughout each store.

With the exception of a couple closures, visits were made to stores that were recorded in past years. More details on approach, location, sample frame, and store type can be found in Appendix F. Researchers calculated sample expansion weights by strata and applied them to each sample retailer such that findings presented in this section represent the population of lighting retailers in the region that sell CFLs (as approximated by PECI's 2006 database). For affordability results across store types in the Northwest, we also applied sales weights based on regional CFL sales data gathered by Fluid Market Strategies.[12]

3.2 Affordability

Field staff collected pricing information for every CFL model observed on the shelf. As in prior evaluations, field staff recorded price (before and after utility program discounts or other discounts, when applicable) and number of CFLs per package. Results suggest that the average CFL price in the Northwest increased between 2009 and 2010:

- Overall increase of 30 cents per CFL, from $3.76 to $4.06.
  - Increase of 35 cents per CFL in big box retailers, from $3.56 to $3.91.
  - Decrease of two cents per CFL in non-big box stores, from $4.70 to $4.68.
  - Increase of 24 cents per CFL in metro areas, from $3.69 to $3.93.
  - Increase of 41 cents per CFL in non-metro areas, from $3.79 to $4.20.

[12] Fluid Market Strategies, 2010.

The highest increase between 2009 and 2010 occurred in non-metro areas, in which prices were only 10 cents more than in metro areas in 2009. At the end of 2010 a CFL in a non-metro area cost an additional 27 cents compared to one in a metro area. For further detail on the price trends over time, see the Affordability section in Appendix C (section C.3).

3.3 Availability

To assess the availability of lighting products, field researchers collected information on the total linear feet of shelf space and number of shelves for all lamp types, all CFLs, and ENERGY STAR labeled CFLs specifically. These data enabled calculation of total lighting shelf space in the region, average shelf space per store dedicated to CFLs, the percentage of stores carrying any CFLs, and the percentage of stores carrying CFLs of specific styles. We present results below for all CFLs by store category and geographic location. See Appendix C (section C.4) for additional detail on CFL availability over time.

3.3.1 Total Shelf Space

The quantity of linear space dedicated to lighting increased from 2009 to 2010, but the proportional allocation of this space to CFLs declined by 4.5 percent over the past year. While new shelf space allowed for the presentation of additional CFLs, it was also utilized to shelve non CFLs. The increase in ENERGY STAR CFLs was not proportional to the overall CFL growth (i.e., growth in ENERGY STAR CFLs was lower).

When looking at CFL shelf space as part of the total shelf space dedicated to lighting, the most significant drop occurred in non metro stores, where CFLs shelf space decreased by 28 percent (from 29% in late 2009 to 21% in late 2010).

3.3.2 Share of Shelf Space

The percentage of lighting shelf space allocated to CFLs in Northwest retail stores did not change dramatically over the last year:

- Decreased slightly from 24 to 23 percent of lighting shelf space is allocated to CFLs.
- No change from last year for metro areas (still 27 percent).
- Decrease from 29 to 21 percent in non-metro areas.
- Decrease from 30 to 25 percent in big box areas.
- Decrease from 25 to 22 percent in non big box areas.

These decreases are the first in the past four years across the board, which until now, have shown a steady rise from 16 percent in 2006. Metro and big box stores have generally had the largest ratio of CFLs to all lamps, and this currently remains true.

3.3.3 Percentage of Stores Carrying (Any) CFLs

For the first time in the past four years, all of the stores visited had CFLs in stock. The largest jump occurred in big box stores.

- Overall, 100 percent of stores carry CFLs (an increase of three percentage points over 2009).
  - Increase of four percentage points in metro stores to a total of 100 percent.
  - One hundred percent of non-metro stores carry CFLs, unchanged from last year.
  - Increase of eight percentage points in big box stores to a total of 100 percent.
  - Increase of one percentage point in non big box stores to a total of 100 percent.

3.3.4 Percentage of Stores Carrying CFLs by Style (Twister and Non-Twister)

As shown above, all Northwest lighting retailers carried CFLs in 2010. Examining CFLs further by style (twister versus non-twister) shows the following for twisters:

- Overall, approximately 96 percent of stores carry twisters (no change between 2009 and 2010).
- Ninety-six percent of metro stores carry twisters, an increase from 93 percent in 2009.
- Ninety-six percent of non-metro stores carry twisters, a decrease of four percentage points from 2009.
- Ninety-six 93 percent of big box stores carry twisters, a six percentage point increase from last 2009.
- Ninety-six 97 percent of non big box stores carry twisters, a two percentage point drop from 2009.

For twister CFLs, big box stores recovered the six percentage points in 2010 that they lost between 2008 and 2009 and returned to 2008 levels. While big box and metro stores both saw increases, non metro and non big box stores saw their first slight decrease in proportional shelf space for twisters since 2006.

Non-twister CFLs can also be found at the majority of stores and experienced significant gains this past year:

- After an increase of nine percentage points from 2009, 91 percent of stores currently carry non-twisters.
- After an 8 percentage point increase from 2009, 96 percent of in metro stores carry non-twisters.
- A six percentage point increase in non metro stores from 79 percent in 2009 to 82 percent in 2010.
- An eleven percentage point increase in big box stores from 83 percent in 2009 to 94 percent in 2010.
- A seven percentage point increase in non-big box stores from 83 percent in 2009 to 90 percent in 2010.

3.4 Diversity

Field researchers recorded data on lamp style (twister, three-way, reflector, etc.) and wattage as part of the shelf surveys to assess the diversity of CFLs available to Northwest consumers. Below we discuss diversity in terms of the average number of twister and non-twister CFL models available in each store. Appendix C (section C.5) provides additional information on CFL diversity.

3.4.1 Average Number of Models per Store

The average number of CFL models per store – a measure of CFL diversity – increased between 2009 and 2010. Examining the average number of CFL models per store by style (twister versus non-twister) shows the following results.

The overall average number of twisters increased by 3.5 models per store, from 19.9 to 23.4, including:

- Increase of 4.1 models per store at metro stores, from 20.5 to 24.6.
- Increase of 2.7 models per store at non-metro stores, from 18.8 to 21.5.
- Increase of 5.1 models per store at big box stores, from 27.8 to 32.9.
- Increase of 2.9 models per store at non big box stores, from 17.5 to 20.4.

The average number of non-twisters per store has decreased slightly, with an overall decrease of approximately 0.8 models per store (from 17.6 to 16.8 models). Other details include:

- Increase of 0.2 models per store at metro stores, from 16.3 to 16.5.
- Decrease of 2.7 models per store at non-metro stores, from 20.0 to 17.3.
- Decrease of 2 models per store at big box stores, from 27.3 to 25.3.
- Decrease of 0.6 models per store at non big box stores, from 14.3 to 13.7.

Once again, big box stores exhibited the largest increase in average number of models per store for twisters. Non-twister models decreased the most in non-metro stores, which was a turnaround from last year's increase in non-metro stores for this product type.

3.4.2 LEDs

LEDs are available at approximately 27 percent of stores in NEEA's territory, down two percentage points from last year. Of these, approximately 48 percent are in metro areas and 52 percent in non-metro areas which is a more even distribution than last year (in which metro areas had 60 percent of the share of LEDs). In late 2010, 60 percent of the stores that carried LEDs were small hardware, grocery, and drug stores, and 40 percent were big box. Stores that carried LEDs doubled between late 2009 and late 2010 and averaged approximately seven models per store.

Field researchers found LEDs primarily in spotlight and reflector (flood lamp) styles, with a few other styles available (including globes and a-lamps). The overall average price for LEDs was $27.59 per lamp, with spot lights averaging $34.75 per lamp, reflectors averaging $41.78 per lamp, and other styles averaging $16.39 per lamp. Spot light prices increased over $10 in the past year, other styles prices dropped by nearly 50 percentage points, and the overall average cost of LEDs increased less than a dollar.

4. Consumer Surveys

This section of the report presents key findings from 1,000 consumer telephone surveys conducted in early 2011. These consumer survey efforts build upon surveys that have been conducted in the region since 2001. The survey effort was further enhanced by consumer focus groups, which elicited detailed perspectives on consumer decision-making and enabled qualitative testing of telephone survey questions. Appendix F provides detailed consumer focus group results.

4.1 Approach

KEMA conducted the 2011 consumer survey with a stratified random sample of households in Idaho, Montana, Oregon and Washington. We oversampled non-metropolitan areas based on classification of counties as inside of outside of Metropolitan Statistical Areas (MSA), location east or west of the Cascades mountain range, and state. We also oversampled eastern metropolitan areas. Table 2 shows the sample frame and survey completes by strata. We conducted a total of 222 surveys in Idaho, 194 in Montana, 229 in Oregon, and 355 in Washington.

Table 2: Consumer Survey Sample Frame and Completed Surveys by Strata, 2011

Segment	Metro West	Metro East		Non-Metro	
		(a) Washington	(b) Idaho /Montana	(a) Washington /Oregon	(b) Idaho /Montana
Population[13]	7,254,556	933,082	922,279	2,151,646	1,568,977
% of Population	57%	7%	7%	17%	12%
Final Number of Completes	300	100	200	200	200
Final % of Survey Completes	30%	10%	20%	20%	20%

We created and applied sample expansion weights to the data such that the results are representative of the Northwest residential population. We analyzed the 2011 survey data using both time series[14] and cross-sectional comparisons to understand longitudinal changes in the market as well their underlying causes. We compared results by various categories of consumers, including based on their awareness and purchases of CFLs in the past. We also looked at the date of their first CFL purchase and most recent CFL purchase. We looked at respondents who are aware of CFLs by their intentions to replace burned-out incandescent lamps in their homes with CFLs. We also analyzed results by geographic region. We looked for meaningful and statistically significant time series or cross-sectional differences (at the 90% level of confidence).

[13] US Census, 2010.

[14] The 2011 survey included many of the same questions as those conducted in previous years back to 2004.

Appendix 0 provides the data collection instrument used for the 2010 consumer surveys, and Appendix D provides more detailed results. Appendix E provides cross-tabulations of each survey question in banner table format.

4.2 CFL Awareness and Purchase Rates

The telephone survey addressed CFL awareness and purchase rates, as well as CFL purchase rates by channel. Appendix D (section D.1) provides additional details on consumer awareness and purchase rates.

- Overall awareness of CFLs dropped from 95 percent in 2010 to 92 percent in 2011, a small but statistically significant change.[15] This decline seems driven by a small but statistically significant drop in awareness in Washington (from 96% in 2010 to 91% in 2011). Changes in awareness among consumers in other Northwest states were not significant.
- The proportion of Northwest consumers who have purchased CFLs has decreased by a small but statistically significant margin from 81 percent in early 2010 to 75 percent in early 2011. All states except Oregon demonstrated small declines in consumer purchase rates between 2010 and 2011, but none of the changes were statistically significant.
- Concurrently, the proportion of consumers who are unaware of CFLs and the proportion that is aware but has not purchased CFLs have both increased slightly since 2010. Aware non-purchasers currently represent 17 percent of the Northwest population and only 8 percent of the population is currently unaware of CFLs.
- Do-it-yourself (DIY) stores such as Home Depot and Lowe's continue to be the most common store category in which consumers purchase CFLs. Approximately 45 percent of metro consumers report that they purchase CFLs in DIY stores compared with 31 percent of non-metro consumers (a statistically significant difference).
- When purchase locations are examined by geography (metro versus non-metro), 2010 survey results show a much more even distribution of purchase locations between geographies than 2006 results.
- Approximately 32 percent of CFL purchasers in the Northwest report that they are aware of specialty CFLs.[16] Among CFL purchasers who are aware of specialty CFLs, a statistically equal distribution currently have them installed and currently do not have them installed (47% and 53%, respectively). There was no difference in awareness of specialty CFLs between metro and non-metro consumers.

[15] We report statistical significance at the 90 percent level of confidence throughout.

[16] The survey asked, "Other than CFLs that look like a twisty, spiral or curlicue shape, are you aware of any other types of CFLs?" If the respondent answered, "Yes," a follow-up question asked the respondent to describe the CFL shapes with which they were familiar. Respondents who were familiar with only spiral CFLs and/or a-lamps were characterized as "unaware" of specialty CFLs, and respondents who were familiar to other CFL shapes (in addition to spirals and/or a-lamps) were characterized as "aware" of specialty CFLs.

4.3 CFL Disposition

Table 3 presents results on CFL installation, removal, and storage for CFLs acquired by CFL purchasers in the Northwest over time. As of early 2011, Northwest consumers who have purchased CFLs have, on average, 11 CFLs installed at their home with 6 in storage. In 2006, the Consumer Products Market Progress Evaluation Report 3 (MPER3) cited a then-recent study which suggested significant potential for expansion of CFL usage in the Northwest.[17] Since 2010, however the proportion of CFLs installed in purchaser households has decreased significantly from 64 percent in 2010 to 53 percent in 2011 – suggesting that consumers have removed a relatively high proportion between the 2010 and 2011 survey, despite still having opportunities for additional CFL installations.

This does not necessarily mean that consumers in the Northwest have changed their installation habits and remove CFLs at a higher rate than in the past because all CFLs ever removed are included in this result. Over time, we expect the number of CFLs removed to increase relative to their time in use, rated life, and other factors. However, this may reflect the slight decline in CFL purchase rates as described in section 4.2 above.

Within the 2011 results, there were no significant differences by geographic region (see Appendix D, Table 14 for additional detail).

Table 3: Lamp Disposition in Purchaser Households by Survey Year, 2004–2011

Disposition of All CFLs Ever Acquired by Purchaser Household	2004 Survey (n=554)		2005 Survey (n=220)		2006 Survey (n=411)		2010 Survey (n=399)		2011 Survey (n=646)	
	Mean # of lamps	% of lamps	Mean # of lamps	% of lamps	Mean # of lamps	% of lamps	Mean # of lamps	% of lamps	Mean # of lamps	% of lamps
CFLs currently installed	5.2	71%	6.1	70%	6.3*	68%	10.9†	64%	11.0	53%†
CFLs ever removed	0.3	4%	0.3	4%	0.4	4%	1.4	8%†	3.8†	18%†
CFLs currently stored	1.8	25%	2.3	26%	2.6*	28%	4.8†	28%	6.0	29%
Total CFLs ever acquired	7.3	100%	8.7	100%	9.3*	100%	17.1†	100%	20.7	100%
Purchaser base	**32%†**		**58%†**		**67%†**		**81%†**		**75%†**	

* Difference from 2004 is statistically significant.
† Difference from prior study period is statistically significant.
Purchaser base: 2004 n=1,530; 2005 n=560; 2006 n=667; 2010 n=500; 2011 n=646.

4.4 Satisfaction with CFLs

The telephone survey included questions addressing CFL satisfaction, including general satisfaction as well as satisfaction with specific CFL attributes (such as color of light and how long they last). The telephone survey also asked about likelihood of replacing CFLs with CFLs as an indirect measure of

[17] Based on a study of single-family homes in the Northwest (RLW Analytics, 2007. Single Family Residential Existing Construction Stock Assessment).

consumer satisfaction. These results are summarized below with additional detail provided in Appendix D (section D.2).

- Consumer satisfaction with CFLs remains high and there were no statistically significant differences between early 2010 and early 2011 or between metro and non-metro purchasers. The mean satisfaction rating remained statistically unchanged from 2010 (7.6) to 2011 (7.4). This sustained level of consumer satisfaction is noteworthy given the waning satisfaction with specific CFL attributes such as color of light, light-up time, and how long CFLs last (all of which declined by statistically significant margins from 2010 to 2011). Survey results also suggest that recent purchasers are more satisfied with CFLs than consumers who have not purchased CFLs within the past year.
- CFL purchasers who have CFLs installed in their homes continue to cite a mixed-bag of reasons for not increasing their CFL installations, but approximately one-third report that they are waiting for incandescent lamps to burn out before installing more CFLs (consistent with 2006 and 2010 results). When results are further examined based on CFL saturation in purchaser households (Table 4), results suggest few significant differences among respondents grouped by the level of CFL saturation in their homes (that is, the percent of total sockets filled with CFLs). The only significant differences based on saturation are:
  - Respondents with 33 percent saturation or less cite issues with the brightness of light and the way CFLs fit in fixtures more often than those with saturation ranging from 34 to 100 percent of their household sockets (a statistically significant difference); and
  - Respondents who have more than two-thirds of their sockets currently filled with CFLs are significantly less likely to cite price as a barrier than those with saturation between zero and 67 percent of sockets.
- There were no statistically significant differences between 2010 and 2011 regarding CFL purchaser likelihood of replacing a CFL with another CFL upon burnout.

Table 4: Main Factors Preventing Additional CFL Installations Among CFL Purchasers Who Have CFLs Installed in Their Homes by Percent Saturation, 2011

	Percent Saturation			
Main Factor	0%	1-33%	34-67%	68%+
Waiting for incandescent bulbs to burn out	10%	19%	22%	23%
Storing incandescent bulbs	4%	4%	3%	3%
Operating hours (don't use the other bulbs enough)	2%	3%	0%	1%
CFL price (too expensive)	12%	11%	15%	5%
Need dimmable bulbs	0%	9%	6%	7%
Need 3-way bulbs	2%	3%	4%	4%
Don't like the way CFLs look in fixtures	9%	10%	2%	4%
Don't like the way CFLs fit in fixtures	2%	4%	10%	5%
CFLs aren't bright enough	15%	12%	7%	2%
Don't like the color of light from CFLs	13%	5%	4%	0%
CFLs take too long to light up	1%	1%	2%	2%
Other	24%	13%	11%	19%
Don't Know / Refused	7%	5%	14%	25%
n	70	239	157	257

4.5 2007 Energy Independence and Security Act (EISA)

The 2010 and 2011 consumer telephone surveys included several questions designed to gauge Northwest consumers' awareness of Energy Independence and Security Act (EISA) of 2007.

- Approximately 26 percent of 2011 survey respondents report that they are aware of legislation that will affect lamp availability (up from 16% in 2010; a statistically significant change).
- One-third (33%) of 2011 survey respondents report that they are aware of legislation that will ban most traditional incandescents by 2014, up more than 40 percent from 2010 (23%; a statistically significant change).
  - A slightly higher proportion of metro west respondents report awareness of the legislation than metro east respondents (74% versus 68% percent, respectively; a statistically significant difference).
- Less than 20 percent of 2011 respondents are aware that traditional 100-watt incandescents will no longer be available by 2012 (18%), up from only 11 percent in 2010 (a statistically significant change).

The survey also included a follow-up question to gauge behavior in response to the new legislation: "When traditional 100-Watt light bulbs are eliminated, which one of the following things are you most likely to do: switch to a new type of light bulb, keep using traditional light bulbs but switch to a lower wattage, or something else?" Just less than half of Northwest consumers said they are most likely to switch to a new type of lamp to replace their 100 Watt incandescent lamps once the latter are phased out, and this proportion declined from 55 percent in 2010 to 46 percent in 2011 (a statistically significant change).[18] Of these, more than four out of five reported that they are most likely going to switch to CFLs. In both 2010 and 2011, nearly a quarter of consumers said they are most likely going to replace their 100 Watt incandescent lamps with incandescent lamps of a lower wattage. Only around 1 percent of the population said they are most likely to stock up on low-efficacy 100 Watt incandescent lamps before they are phased out.

4.6 Compact Fluorescent Fixtures

Appendix D (section D.4) provides details regarding compact fluorescent (CF) fixture awareness and purchase rates, reasons for choosing CF fixtures over standard fixtures, and consumer satisfaction with CF fixtures.

[18] Note that if this survey question allowed more than one response, it is possible that a higher proportion of respondents (for example) may have stated that they would stockpile low-efficacy incandescent lamps in advance of the phase-out.

5. Market Actor Interviews

In the beginning of 2011, researchers conducted ten interviews with lighting market actors. Four of these interviews were with representatives from CFL and LED manufacturers and the remaining five were with representatives from retail chains that sell CFLs in the Northwest. Appendix 0 provides the guides used for these interviews.

Below we divide findings between the national and Northwest CFL markets and then further into topics including:

- Sales (overall, promotional vs. non-promotional, and forward looking sales expectations);
- CFL price;
- Perceived current and future effects of the Energy Independence and Security Act of 2007 (EISA); and
- Future of LEDs.

Where possible, we also compared this year's findings to that of the past two years. We give particular attention to challenges faced in the Northwest within the past year.

5.1 National Market

Below we review CFL manufacturer and retailer representatives' perspectives on general market movements as well as changes in CFL sales and prices between 2009 and 2010. Where possible, we compare results to prior years.

5.1.1 General Market Changes

Interviewers discussed general CFL market changes with manufacturer and retailer representatives during the market actor interviews conducted in early 2011 and have tracked responses on this issue for two prior years. After two years of little consensus among the representatives regarding market changes, there now seems to be a common observation of decreasing sales of CFLs (although it is important to note that one interviewee noticed an increase in sales). The estimated decrease in sales ranged from one to fifteen percent among respondents, a shift from interviews in the two prior years in which respondents predicted continuing increases in CFL sales.

While the trends this year were more widely agreed upon, there was less of a consensus on the reasons for the decline. Explanations included the status of the economy, the need for further education, the possibility that people may have already stocked up on CFLs, and the lack of utility incentives.

In prior years' findings, views on the economy were both pessimistic and optimistic, but this year the economy was a much less prominent part of the discussion. Two representatives mentioned the economy as the main influence on the decrease in CFL sales in the past year. Others used the economy as a predictor for the future direction of CFL sales and diversity. The overall consensus was

that the economy isn't recovering very quickly and until it improves, CFL sales have reached a plateau.

Despite varied explanations for sales trends, a common theme emerged from the interviews regarding the need for education of consumers on the benefits of all types of CFLs. While many noted an increase in popularity of specialty lamps, they noted a continuing lack of knowledge about the benefits and savings that can encourage consumers to purchase these more expensive CFL styles.

5.1.2 Sales

Below we review the supplier representatives' perspectives on overall CFL sales at the national level as well as promotional (i.e., utility incentive) sales versus non-promotional sales during 2010. Where possible, we compare perspectives from the 2011 interviews with those from previous years.

5.1.2.1 Nationwide

Interviewers asked retailer and manufacturer representatives to describe how their overall sales of CFLs in 2010 compared to sales in 2009. Interviewers also asked this question of representatives regarding overall sales trends between 2007, 2008 and 2009 as part of previous evaluations. Regarding sales in 2008, representatives were inconsistent in their comments with sales trends ranging from an 18 percent increase over 2007 sales to a 20 percent decrease. Similarly, representatives reported inconsistent trends between 2008 and 2009, ranging from a 10 percent increase over 2008 sales to a 25 percent decrease. This year's results offer the first near consensus with only two manufacturers' representatives noting an increase in sales with the remaining respondents listing a decrease in the range of one to 15 percent. These differences may be the result of varied levels of involvement with promotional programs throughout the country, lamp types sold, regional consumer behavior patterns coupled with variations in regional supply distributions, and (for manufacturers) the types of retail chains through which they sold CFLs.

During the 2011 interviews, in addition to the economy's effects on sales volume, representatives acknowledged a variety of other trends related to the economy in terms of lighting sales, including:

- Lack of education for customers;
- Fewer incentives on twister CFLs;
- Raising popularity of specialty CFLs;
- Rising popularity of halogen lamps; and
- Declining CFL sales in areas without incentive programs.

5.1.2.2 Sales Expectations

Of the seven representatives that provided commentary on sales expectations at the national level (including the Northwest), and as a contrast to last year's positive expectations, this years' interviews produced split results for sales beyond 2011. Three respondents predicted a flattening of sales and another four respondents still hold the same optimistic outlook from prior years.

Those that predicted a flattening of sales cited the following reasons:

- Status of the economy;
- EISA legislation filling in incentive gaps by pushing consumers towards CFL purchases; and
- Consumer replacement of old incandescents.

Those that predicted a raise in sales credited:

- Adoption of more specialty CFLs as they gain popularity; and
- Improvements in lighting quality and ability to dim lamps.

Many of the representatives steered the conversation toward LEDs and believe these products to be both much more recognizable to consumers while acknowledging that they still have a long way to go in both price and in technological advances before mainstream customers will be ready to purchase them.

5.1.3 CFL Prices

Interviewers asked supplier representatives to compare Northwest CFL prices over the past year with pricing throughout the United States during the interviews conducted in 2011, 2010 and 2009. The overwhelming response from both manufacturer and retailer representatives in past years was that their regular prices for CFLs are consistent nationwide. This year's group did not comment on differences between national and local prices. While the prices for promotional CFLs tend to differ depending on the location, the representatives attribute this to varying levels of promotional assistance among the local or regional entities that provide incentives.

5.2 Northwest Market

Similar to the above review of general market movements and changes in CFL sales and prices for the national market, we conduct a similar review below for the Northwest market. We include comparisons between prior years as possible.

5.2.1 General Market Changes

Respondents believed the Northwest market differed from the national market in two ways:

- Higher CFL sales rates; and
- CFL specialty lamps sales were more resilient than they were on the national level.

Both respondents who claimed that the Northwest had higher sales rates than at the national level represented manufacturers and stated that generally, CFL sales in the region were five to ten percent

higher than the rest of the country. One of these manufacturer's representatives credited regional promotions and the other credited utility-sponsored energy-efficiency programs.

Retail representatives were less able to compare their regional sales levels to national statistics as two of the retailers only have stores in the Northwest region. The two retailer representatives who were able to comment on the market both shared that there are less Northwest rebates and promotions for CFLs than there have been in prior years. One visible change, noted by two respondents, was a decrease in promotional offers.

5.2.2 Sales

Below we review the supplier representatives' perspectives on CFL sales in the Northwest as well as promotional (i.e., utility incentive) sales versus non-promotional sales during 2010. Where possible, we compare their perspectives regarding prior years.

5.2.2.1 Overall

In early 2011, we asked supplier representatives to describe any differences in sales between 2009 and 2010 in the Northwest. There were few responses and little consensus. Two manufacturer's representatives reported increases of up to ten percent when comparing to national sales (crediting utility assistance and promotions) but the retail respondents felt that promotional assistance was lower than it had been in past years and that sales were flattening out or lowering. The two local independent retailers estimated CFL sales declines of ten and 25 percent. Additional retailer representatives claimed that sales were initially higher in past years and have since decreased in popularity similarly to what they perceived at the national level.

During the interviews conducted in early 2010 (regarding 2009 activity), the manufacturer representatives offered similar opinions: two reported an increase in Northwest CFL sales during 2009. One of these manufacturer representatives claimed that sales were up by ten percent, while the other could not quantify the increase but attributed it to participation in regional promotional programs. The retailer representative stated that his firm showed strong growth in 2009, but that the growth was not quite as strong as in 2008. Another past retailer representative claimed that the Northwest was one of their highest performing regions in the nation, but this representative was unable to compare sales with previous years to estimate growth.

Two retailer representatives commented that specialty CFLs have been more resilient than twister CFLs in sales. One representative supported this with the observation that specialty CFLs are becoming more of the focus of utility rebates and that consumers are more aware of their applications.

5.2.2.2 Promotional vs. Non-Promotional

Multiple retailer representatives provided information regarding regional promotions in the four Northwest states. When asked directly about the loss of NEEA incentives and subsequent effects, retail representatives mentioned that sales have suffered, end-cap promotions have disappeared, and that NEEA's promotions were helpful in educating customers, a role that one retailer is attempting to fill on its own. While there was a general consensus that sales dwindled after 2007, there was a split

opinion on whether or not the variety of lamps has increased or decreased. Manufacturer representative perspectives offered consensus on the need for promotions to support sales and provide regional uniformity that is so desired by retailers.

5.2.3 CFL Prices

Supplier representatives estimated prices for promotional and non-promotional twister-style CFLs in the Northwest for 2010.[19] Representatives report higher price ranges for both promotional and non-promotional twister-style CFLs during 2010 than they did during 2009. A comparison of price estimates in years past can be found in Table 5. Comparing results across all 2011 interviewees yields an average non-promotional price of $1.70 for twister-style CFLs in 2010 and an average non-promotional price of $2.81. These results suggest an average discount of approximately $1.11 for twister-style CFLs with promotional pricing in 2011.

Table 5: Range of Reported Northwest Prices for Twister-Style CFLs by Promotion Availability, 2008—2010

Description	Range of Reported Prices		
	2008	2009	2010
Promotional twister CFL	$0.66 – $2.00	$0.46 – $1.50	$0.99 - $3.25
Non-promotional twister CFL	$1.25 – $4.99	$1.30 – $3.44	$2.15 - $3.74

5.2.4 Supplying the Northwest Market

Interviewers asked retailer and manufacturer representatives if they had experienced any difficulties supplying the Northwest CFL market during 2010 or meeting market demand. As in the previous year's interviews, the majority of CFL suppliers claimed that they had no difficulty supplying the market. The only issue mentioned had to do with electrical component supplies and hasn't been a problem since this particular manufacturer's representative found a new component supplier in 2009.

5.3 Effects of the Energy Independence and Security Act of 2007 (EISA)

Interviewers asked supplier representatives to comment on the effects of the Energy Independence and Security Act (EISA) on their stocking or manufacturing practices and the stocking and manufacturing practices of lighting suppliers in general. Recall that the EISA sets an energy-efficiency standard for general service incandescent lamps and governs the phase-out of many of the low-efficacy incandescent lamps that are currently on the market, beginning in 2012.

[19] Given the broad range of non-twister styles, the interviews did not include questions regarding non-twister CFL prices.

Similar to past results, none of the retailers or manufacturers claimed that they would sell certain inefficient lamps in the United States if the law does not permit. However, expectations of stocking effects varied; while one retailer representative predicted that there are incentives to stock up on incandescent lamps pre-2012, they also noted that these products have a high warehousing cost. Another retail representative predicted that it would be a big adaptation while another predicted that the legislation will not affect them much. One thing they all seem to agree upon is that halogens will be in demand, as three of the four responding retailer representatives have begun stocking high-efficiency halogen lamps on their shelves. None of the five retail representatives noted any noteworthy increase in sales of these higher efficiency incandescent lamps since they were introduced.

The manufacturers' perspectives were just as fragmented. Two out of the three commenting manufacturer representatives predicted that other lamps (such as CFLs and LEDs) will fill the void created when traditional incandescent lamps are no longer available, and one of these representatives believed that there will need to be new education on the shelves to inform consumers of the changes. (Only one of the five retailers mentioned making significant changes to how they advertise lamps before the 2012 change.) The low response rate from manufacturers can be attributed to the fact that only two out of the four interviewed produce incandescent lamps and only one out of the four is producing the higher efficiency halogen.

5.4 LEDs

Interviews this year contained additional questions regarding LEDs. There is much excitement among those in the industry about the fast advance of this technology, although all agreed that the technology is not at a price-point that will push customers to purchase these lamps for general purpose use. All four of the manufacturers are making LEDs but currently only two out of the five retailers stock them (citing successful sales to early adopters), with two waiting for a lower price-point and better technology.

While recognition of LEDs is not cited as a barrier, problems still exist with the technology and with the price-point. One manufacturer representative noted issues with electrical components and another pointed out that they are having difficulty findings suppliers that make a quality chip. When asked about key barriers, every single interview subject named price. Despite the discussed barriers, three retail and two manufacturing representatives expected short-term sales to increase for LEDs with residential applications first in decorative, outdoor, and specialty applications.

6. Utility Program Manager Interviews

6.1 Approach

Between January and March 2011, senior evaluation staff conducted in-depth interviews with lighting program managers at 16 utilities in the Northwest. The interviews had four distinct objectives:

- **Identify and discuss effectiveness of recent utility activities to promote energy-efficient lighting**. The interview guide included questions about the utilities' current lighting promotions and the utilities' reasons for offering those programs.
- **Understand market progress since NEEA's withdrawal**. We asked all the utilities how the market lighting market had changes since the end of 2007.
- **Obtain utility staff perspectives on expected changes in the residential lighting market and potential market barriers**. We asked the utilities about the existing market barriers in their service areas and the trends they have observed.
- **Understand whether utility staff desire NEEA's assistance to overcome existing or expected market barriers**. Our interview guide asked the utilities to offer their views on NEEA's role in the regional lighting market.

NEEA provided a list that identified the utilities as an investor-owned (IOU), or a large, medium, or small publicly owned utility (see Table 6). Evaluators included all of the IOUs and the large publicly owned utilities (a total of ten) in the sample. To select the remaining six utilities, evaluators assigned a random number and selected the six utilities with the highest random numbers. The final sample and completed calls are shown in Table 7. The sample included a mix of utility ownership and sizes as well as both metro and non-metro service areas.

Table 6: Sample Frame of Utilities by State, Size, and Ownership, 2011

State	Publicly Owned[20]			Investor Owned	Total
	Small	**Medium**	**Large**		
Oregon	20	14	0	3	37
Washington	32	16	4	1	53
Montana	18	3	0	1	22
Idaho	18	5	0	1	24
Total	**88**	**38**	**4**	**6**	**136**

[20] Sizes based on program staff and implementation contractor assessment of utility residential customer base.

Table 7: Utilities Interviewed by State, Size, and Ownership, 2011

State	Publicly Owned Utiilities[20]			Investor-Owned Utilities	Total
	Small	Medium	Large		
Oregon	1	1	0	3	5
Washington	1	2	4	1	8
Montana	1	0	0	1	2
Idaho	0	0	0	1	1
Total	**3**	**3**	**4**	**6**	**16**

6.2 Northwest Lighting Programs

6.2.1 Current Lighting Programs

The utilities included in the program staff interviews offer a variety of lighting programs, including point-of-sale (POS) incentives, coupons for discounted CFLs, CFL giveaways at community events, rebates for efficient fixtures, and direct-installation of CFLs implemented during energy audits or weatherization. Only one utility included in the interviews is currently offering no residential lighting programs.

The most common lighting program type offered by the interviewed utilities was POS incentives, and ten of the sixteen interviewees explicitly mentioned working with the Bonneville Power Administration (BPA) “Simple Steps, Smart Savings” POS program. The utilities in more isolated areas reported that the BPA’s program was their only POS program. Utilities in the Puget Sound area offer their own independent programs, some coordinating with BPA to minimize leakage across service areas or to ensure the entire area is covered.

Three utilities offer no POS programs for residential lighting. All three are publicly-owned and relatively isolated. These staff indicated the impression that market transformation had occurred in their service territories and that their customers’ homes have many CFLs in them. Also, the cost of CFLs had declined enough so that the rebates mattered less. Another utility representative explained that they have very little retail in their service area and most household purchase consumer goods outside the area and a POS program made little sense for that service territory.

The second most common program type among the interviewed utilities is give-away programs. Nine representatives noted that their organizations give away CFLs at events. Only one of these representatives mentioned that the utility’s giveaways were specific to low-income customers. The others reported giving away lamps at community events, often as part of an educational program (discussed in more detail below). A handful of utility representatives mentioned that they offer rebates for compact fluorescent fixtures.

6.2.2 Change Since 2007

Almost all the utility representatives reported that their programs have changed very little since NEEA withdrew from the CFL market. One large metro utility representative reported that they established

their own program in place of NEEA's program, but the majority of the utilities shifted from the NEEA program to the BPA program. Utility representatives perceive that the two programs are very similar; for example, one utility representative reported that only change made by the utility since the end of 2007 was that they had added light fixtures to their rebate program. That utility had actually shifted its whole POS program from NEEA to BPA—but from this representative's perspective, the POS program continued to operate and no change had really occurred.

All of the utility representatives interviewed for this task stated that the CFL promotions have had a positive impact on the CFL market. They mentioned that the promotions have been able to achieve:

- Reduction in CFL price;
- Increased market share;
- Increased customer adoption;
- Increased socket penetration; and/or
- Increased customer satisfaction.

Utility representatives outside the Puget Sound or Portland regions noted that specialty CFLs are more difficult to obtain, asserting that smaller hardware stores lack the shelf space and volume to stock a wide variety of lamps.

6.2.3 Education for Specialty CFLs

Just over half of the interviewed utility representatives reported that their organizations offer education or training materials for specialty CFLs. Educational activities for specialty CFLs include point-of-purchase materials, information on the utility website, bill inserts, and information at community events.

The utilities that offer education for specialty lamps plan to continue those educational programs in some way. The materials will continue to be available on the website and for in-store displays. The number of community events may change in the next year—with some utilities decreasing activity and others increasing. The utility staff who provide information at community events noted that customers learn about CFLs during the events. The use of display CFLs and information about appropriate uses generate positive reaction from customers during the face-to-face interaction. The interviewees who had been in the position to directly inform the public reported that further education is needed as there is quite a bit of confusion of appropriate application of specialty lamps (and the inappropriate use of basic CFLs).

Generally, the non-metro utilities do not offer educational materials for specialty lamps and do not plan to offer any. For some, it is matter of the lack of staff time. Two interviewees stated that their respective organizations planned to let the market "take care of itself" and would not seek to direct it.

6.3 Northwest CFL Market Since 2007

The interviewees noted a few key trends in the CFL market in the last few years:

- **Increased availability.** Interviewees assert that CFLs are available at more stores on a regular basis across the four-state region. They report that big-box retailers all carry CFLs and many smaller retailers, such as small hardware stores in non-metro areas, now carry CFLs.
- **Increased diversity.** Interviewees also have the impression that a wider variety of lamps are now available in metro and non-metro areas. Some interviewees cautioned that although the variety of lamp types has expanded, consumer understanding of appropriate use of different lamp types has not kept pace.
- **Decreased prices.** Almost all the interviewees noted that prices for CFLs have declined over time. One utility representative (whose organization has exceptionally low electricity rates) explained that the utility has difficulty providing incentives for energy-efficiency programs because the payback period is too long. But even for that utility, CFL prices had declined enough to be attractive to their customers.
- **Increased customer awareness and acceptance.** Interviewees noted that across the region, consumers have grown to accept CFLs and consider them a "standard" good to use in their homes. The interviewees indicated that basic CFLs have become accepted but that specialty lamps are not accepted to the same degree; however, they noted that consumers are slowly learning about the appropriate applications for specialty CFLs.

Interviewees had varying opinions regarding the importance of the POS programs, some stating that they are "a little important." Two utility representatives had unique experiences that suggest the POS programs are quite important: one reported that the utility had to remove incentives from one store and the CFL sales experienced a dip at that store but not at others. Another utility with service inside and outside the BPA region—where there is no POS program—found that CFLs have a dramatically larger market share in the BPA region than its territory outside the BPA region.

A few of the interviewees stated that NEEA's work did impact the CFL market, but at this time it is the BPA program that is moving sales forward. The interviewee at one metro utility stated that NEEA's relationship with manufacturers remains important because individual utilities lack the clout to influence them. Interviewees generally acknowledge that NEEA "laid the groundwork" for consumer acceptance of CFLs.

Utility representatives report that other factors have affected the Northwest CFLs market. For example, some interviewees mentioned that more households make an effort to be environmentally responsible now than in the past, and they feel that this has positively affected sales. A few interviewees reported that the economic downturn has caused some households to take long-term savings into account and that these customers may expect more value from consumer goods. Finally, some interviewees asserted that the quality of CFLs has improved. They feel that CFLs switch on faster and the colors are more appealing, and that these changes have increased consumer satisfaction, making the product more appealing to a broader range of households.

6.4 CFL Market Barriers

Most of the barriers identified by utility representatives pertained to the CFLs themselves, and the following were mentioned in roughly equal proportion:

- High first cost, slow start ups (interviewees report that these barriers are present but declining);
- Wrong color, “greenish hue” (because consumers are not educated about color temperature);
- Shorter than expected actual life (because CFLs may be placed in applications that are frequently switched on and off);
- Inadequate light (because consumers can’t distinguish between lumens and watts);
- Poor quality of dimmers;
- Incompatibility with timers, photo-sensors; and/or
- Lingering disappointment with initial purchases and aforementioned problems.

Overall, several interviewees noted that it is “too easy” to install CFLs in the wrong application and/or use the wrong color temperature. In addition, interviewees feel that many buyers understand that CFLs should be recycled but find this a hassle to do, and many non-metro customers will not purchase CFLs since they are “promoted by the government.”

To overcome these barriers, some larger utilities have increased customer education regarding lumens and recent improvements in CFL quality, and one small utility representative reports that his organization gave away cool white CFLs to try to increase color acceptance. In general, however, most of the utility representatives recommended increased national education on:

- Improving CFL quality and new uses for specialty CFLs;
- Lumens and color temperatures;
- How to compare lighting types as EISA regulations take effect; and/or
- General information regarding EISA (so misinformation is not disseminated in non-metro areas).

Almost all of the interviewees stated that customers have an inadequate understanding of specialty CFLs and the full range of CFL applications, although most interviewees feel that customer knowledge is slowly improving. Interviewees feel that there is still not enough CFL information in the market, and that it has been difficult to overcome the simplicity and habit of installing incandescent lamps. Several interviewees claimed that changing consumers to a totally new product and terminology requires a concerted, national campaign.

According fifteen of the sixteen interviewees, mercury concerns remain a persistent barrier to consumers. These interviewees assert that these concerns had a slight-to-moderate negative impact on sales while at the same time increasing interest in LED products. To address this issue, many utilities have distributed bill inserts and other materials comparing CFL mercury content to other common household items (cosmetics, jewelry), or similar literature from third parties like the Sierra Club, the United States Environmental Protection Agency (EPA), or state Departments of Environmental Quality.

6.5 Future Outlook for CFLs

A few interviewees expect CFL sales to continue increasing because consumers appreciate their long life and cost-effectiveness, and because socket penetration is still lagging behind store stocking. In addition, interviewees feel that there is a high growth opportunity in non-metro areas if more context-sensitive education can be delivered and that there is also a large untapped market for dimmable CFLs if this technology can be improved.

Most of the interviewees, however, expect growing competition from other technologies with uncertain impacts on CFLs. Some interviewees expect LEDs to capture CFL market share, particularly if LED heat dissipation can be improved. Other interviewees believe that new halogen lamps and CFL-halogen combinations are best positioned to capture CFL market share. In the broader picture, many interviewees believe that the EISA requirements will only increase market uncertainty as CFLs increasingly compete with LEDs, halogen incandescents, and lower wattage standard incandescents, which will exacerbate buyer confusion. In this environment, there is a high risk that CFLs could lose market share if market barriers persist. Similarly, CFLs could lose market share if California's Super Lamp initiative or subsidized research and development efforts promote other technologies.[21]

For CFLs to gain significant market share, utility representatives expressed that a broad range of CFL quality issues and market barriers still need to be addressed. The issues they mentioned include:

- Frequent failures of 3-way lamps;
- High cost of specialty lamps;
- Slow starts for globes and a-lamps ;
- Lamp size still too large;
- Cannot be used in enclosed fixtures;
- Flickering when cold; and/or
- Dimmers flicker/hum at lower illumination.

Regarding the prospects of manufacturers addressing these issues, one interviewee expects strong, continued technological progress based on the significant color and start-up improvements that have occurred since 2007. Most of the other interviewees, however, perceived that lighting manufacturers are shifting their focus to efficient incandescents and LEDs, and that CFL technology will not make significant strides. While ballasts could still be improved to go on faster, the prevailing sentiment is that fluorescents bulbs are now close to their optimum performance and a wide range of colors is

[21] The Super Lamp initiative is a technology development initiative including several California utilities, the Natural Resources Defense Council and the California Lighting Technology Center (CLTC). The initiative promotes the introduction and dissemination of high-quality screw-base light sources that address issues consumers have raised about technologies such as CFLs. The goal of the initiative is to make high-efficacy technologies (the CFL, LED, or others) the mainstream choice for screw-base sockets in California. The initiative promotes the market introduction of products that are technically feasible but not yet available. For more information about the Super Lamp technical specifications, see: http://cltc.ucdavis.edu/content/view/652/342/.

available and CFLs will never perform as tested because they are turned on/off much more in real applications.

6.6 LED Market

Interviewees at the large utilities reported that a growing number of retail chains in larger metropolitan areas are offering LEDs for the residential and general markets. Some large home improvement stores, for instance, now offer 40-watt directional down lights for $20 to $30, and most stores carry LED nightlights and a limited selection of LED desk lamps. Most large-utility staff noted that residential LED lighting remains a slowly growing niche product. One interviewee at a medium-sized utility reported that local retailers were only stocking LEDs for commercial refrigeration and not residential uses. Interviewees at small utilities serving non-metro customers had noticed no growth in general LED stocking, although LEDs are available for outdoor solar kits and Christmas lighting.

The interviewees were consistent in naming current barriers to LED sales and utilization: LEDs are poor for general/diffused illumination, are only available at low lumen levels (insufficient for most reading lamps), and only work with some dimmers (requiring new screw-in kits that cost $50). From an aesthetics perspective, LEDs incorporate a lot of metal to facilitate cooling, which can deter some buyers, and better heat dissipation is still needed. In addition, LED color temperatures and consistency require improvement. Overall, however, the main barrier to LED adoption is high retail costs, especially in light of their performance limitations. On a positive note, representatives feel that LEDs appear to have long useful lives (though exactly how long is unclear), provide decent light quality, and are good for focused lighting and providing visibility.

Utility representatives expect LED sales to increase slowly over the next 2 to 5 years unless retail costs decline significantly. Interview participants characterized current LED buyers as “high-end,” “early adopters” and/or “technology fans” that seem to be aware of the technology limitations and are probably satisfied with their initial purchases. Interviewees expect LED lighting to remain a niche product for the foreseeable future because of its highly directional nature.

6.7 NEEA’s Role

When asked to assess the impact of NEEA’s withdrawal from the CFL market, nine interviewees gave an overall rating of “neutral,” although their reasons varied. Larger utilities perceived that NEEA had effectively “primed the pump” or begun to transform their market and that most utilities are capable of promoting CFLs after NEEA’s departure. In addition, some noted that the BPA’s regional program has adequately filled the gap left by NEEA.

A small number of interviewees perceived that NEEA’s withdrawal had led to generally negative impacts. Some stated that market transformation was only achieved among wholesalers in cities, and feel that NEEA did not focus enough on transforming non-metro areas. Some interviewees perceived that NEEA had done a lot to help smaller utilities that could not run their own programs, but withdrew 1 to 2 years too early and did not do enough to promote specialty lamps.

Most interviewees did not perceive a need for NEEA to re-enter the market with a region-wide CFL promotion, claiming that the BPA's CFL incentive program is sufficient and two regional players may create confusion. Most of the interviewees believed that NEEA could play an important role in the areas of testing as well as regional advocacy and education. Specifically, NEEA could:

- Assist federal DOE testing efforts by sponsoring installations and metering. In particular, contribute to studies that further assess useful effective life and LED lumen degradation over time.
- Work with the Consortium for Energy Efficiency and the EPA to develop LED product labeling standards. Some interviewees were concerned that Internet promotions and product labeling are over-stating the potential energy savings because they are not based on lumen equivalents.
- Coordinate input from the Northwest utilities to help develop *consistent, national* messaging to reduce customer product confusion and maximize energy savings in light of EISA regulations (standard incandescent lamp phase-outs) and increasing technology options (LEDs, halogen incandescents). Importantly, utility representatives feel that consumer education about all lighting options needs to be integrated.
- Provide more consumer education about lumens in general (to facilitate comparison shopping).
- Distribute LED product information (which may be most helpful to smaller utilities).
- Provide some LEDs for utilities to distribute on a limited scale, but only conduct broad promotions if the BPA does not.

7. Synthesis of Findings

Below we summarize key study findings by research task.

- CFL Sales and Market Share Analysis
  - Northwest CFL sales increased 5 percent since last year – even though utility incented sales declined 5 percent. The increase follows a 26 percent decline in sales from 2008 to 2009.
  - The big box retail channel accounted for a larger fraction of promotional sales than in prior years (from 88% in 2009 to 94% in 2010). Big box's share of overall CFL sales was unchanged from 2009, but DIY stores increased their share with a commensurate decrease in mass merchandise sales.
  - Northwest CFL market share increased from 30 to 31 percent from 2009 to 2010 after a decline in market share from 39 percent in 2008. National CFL market share also increased from 16 to 21 percent between 2009 and 2010.
- Shelf Surveys
  - The estimate of average retail CFL price paid by consumers increased 10 percent over the last year, to about $4 per lamp. Prices increased more in non-metro areas and in big box retailers.
  - There was little change in the amount of shelf space that retailers dedicate to lighting, CFLs and ENERGY STAR CFLs.
  - More Northwest retailers carry specialty CFLs (from 82 to 91%) – with 96 percent of metro, 82 percent of non-metro, 94 percent of big box and 83 percent of non-big box retailers carrying specialty CFLs in 2010.
  - Retailers increased the unique models of twister-style CFLs from 2009 to 2010, while there was a slight decrease in the number of specialty CFL models stocked. This was due to a decline among non-metro stores in specialty CFL stocking. Big box stores increased their CFL diversity more than non-big box.
  - Northwest retailers are stocking twice as many LED models compared to a year ago – with an average of seven models per store. The average retail price for LEDs is $28, similar to 2009.
- Consumer Surveys
  - The rate of CFL purchase and awareness may have peaked in 2009 with a small but statistically significant decline in both the purchase and awareness rate (to 75% and 91%, respectively) in 2010. While it may be counter-intuitive for the share of the population who has reportedly bought or heard of CFLs to decline, these results may reflect declining use of the term "CFL" in the retail setting, more lighting technologies available to consumers and less significance placed on CFLs being a stand-alone technology.
  - About one-third of Northwest households are aware of specialty CFLs – and half of those currently have them installed in their homes. There was no difference in awareness of specialty CFLs between metro and non-metro consumers.
  - Since 2010, the proportion of CFLs installed in purchaser households of all CFLs ever acquired has decreased significantly from 64 percent among 2010 survey respondents to 53 percent of CFLs ever acquired by 2011 survey respondents. These results suggest that consumers have removed a relatively high proportion between the 2010 and 2011 survey (whether due to lamp failure, dissatisfaction, or other reasons); however, we'd expect to see this proportion increase over time (as it represents the proportion of all lamps *ever acquired*).

These results may also reflect the slight decline in CFL purchase rates between 2009 and 2010.

- Overall satisfaction with CFLs is unchanged from 2009, but there was a decrease in satisfaction with the color of light, light-up time and how long CFLs last. (Average satisfaction ratings are similar between metro and non-metro CFL purchasers.) These barriers may be the reason that some households have only two or three CFLs installed, whereas households that have more CFLs installed than average are typically waiting for CFLs to burn out to install more.
- More Northwest households are aware of federal lighting legislation in 2010 (from 23% to 33%), with a slightly higher proportion of metro west respondents reporting awareness than metro east respondents (74% versus 68% percent, respectively; a statistically significant difference). Around half of survey respondents say they will switch to CFLs once traditional 100-watt incandescent lamps are no longer available, unchanged from last year.
- CF fixture awareness and purchase rates in 2011 remained statistically unchanged since 2010. CF fixture awareness and purchase rates are similar among metro and non-metro consumers. CF fixture awareness and purchase is positively correlated with CFL awareness and purchases, and satisfaction with fixtures among fixture purchasers remains high. Respondents in the 2011 survey were significantly more likely to cite electric bill reductions as motivations for purchasing CF fixtures than respondents to the 2010 surveys who purchased CF fixtures.

- Market Actor Interviews
  - National suppliers expect to see a continued plateau in CFL sales nationwide due to stocking of CFLs, less utility incentives, increased halogen lamp sales, bad economy and the need to educate consumers on how to appropriately use CFLs (to expand CFL saturation beyond the handful of sockets in which most households use them.) The economy cited less frequently as compared to last year, and suppliers were more enthusiastic about the potential for LED sales this year. Some said that the Northwest had higher rates of CFL sales due to the ongoing utility promotions.
  - Suppliers felt that having consistent promotions was important, and NEEA's past promotions increased consistency across the region and increased in-store education through end caps and other educational displays.
  - Suppliers expect to sell more halogen lamps once EISA phases in (particularly since they can be marketed as mercury-free), and LED sales may also increase over the long run once prices go down and the technology improves for general purpose lamps. There is a need for consumer education on what types of lamps to use once certain categories of incandescent lamps are phased out.
- Utility Program Manager Interviews
  - Many utilities continue to offer point-of-sale CFL programs either in conjunction with BPA or on their own.
  - Most utilities feel that NEEA's prior promotions impacted the market by increasing sales through lowering the price, and that BPA and utility promotions have stepped in to fill the gap to continue CFL market progress. Some mentioned that better CFL quality has also helped to drive Northwest CFL sales in addition to concerns about the environment and cost savings.

- Existing market barriers cited include higher upfront cost, lack of CFL diversity in rural areas, few CFLs in grocery stores (which typically do not want to deal with the hassle of point-of-sale programs), CFL consumer acceptance issues (color, delayed start-up, shorter than expected life, inadequate light levels, poor quality of dimmable CFLs, incompatibility with controls)
- Many program managers mentioned that consumers are confused about how and where to use specialty CFL lamps. About half (typically larger and serving metro populations) provide some form of consumer education, but many said they would like to see a consistent nationwide response to improving CFL quality and expanding their applicability, clarifying lumens and color temperatures and educating consumers on how to appropriately select and use CFLs.
- CFL disposal issues were mentioned as a barrier, with concerns about mercury and lack of sufficient safe disposal sites. Utilities provide their own literature to assuage mercury concerns and/or refer their customers to third party claims (e.g., Sierra Club or EPA) about the relative safety of CFLs.
- A few utility program managers expect to see continued increases in CFL sales since there is still so much potential for them. However most felt that CFLs will be competing against incandescent (including halogen) lamps that meet EISA and LEDs. These other products may be more popular than CFLs with consumers since they are not associated with quality, performance and mercury issues.
- Utility program managers believe that stakeholders must address the quality, performance and applicability issues to maintain CFL market shares. Some feel that manufacturers had made some progress towards addressing these issues but have since turned their R&D efforts to incandescent lamps that will meet EISA and LEDs.
- Utilities will begin to provide incentives for LEDs once the price comes down, the technology improves and specifications and standards are put in place for residential uses. Most have learned their lesson from the early promotions of CFLs and are cautiously approaching LEDs for general purpose applications.
- Some utilities feel that NEEA could help rural areas increase CFL sales, but generally the existing BPA/utility promotions are adequately addressing the CFL market. Some felt that NEEA could provide consumer education on specialty CFLs and address concerns about mercury. Most felt NEEA could play a role in the emerging LED market by working with national organizations to developing testing and labeling standards, develop a consistent national message for consumers on what lamps to choose as EISA phases in (e.g., integrate the messaging around the various technology options) and help utilities develop and launch LED promotions in the future.

- Consumer Focus Groups
  - Focus group participants were generally aware of CFLs including non-twister styles. Many voiced opinions and concerns that reflected a consensus that CFLs are an inferior technology versus incandescent lamps. They are too dim, they take awhile to reach full brightness, they contain mercury, they are not appropriate for certain tasks that require focused light, the light color/quality is inferior and they do not last as long as they claim. However it seems consumers have gotten used to the issues with CFL performance and they use them at least to some extent since they feel the savings outweighs the issues. But the performance barriers do prevent the majority from using them more widespread in their homes.

- About half the participants say they buy CFLs when they see them on sale – whether they need them or not. The other half tended to buy them when they needed them. Most try to keep at least one CFL on hand in case one burns out.
- A few participants said they have installed CFLs in all possible sockets to save money and/or energy.
- The majority said they had several CFLs (but not all their sockets) – they were mixed in how they use CFLs:
  - High-use fixtures – to yield more energy savings;
  - Difficult-to-reach fixtures – to take advantage of the longer lifetime; and/or
  - Avoiding using CFLs where aesthetics and application are suitable for CFLs – e.g., some do not like to use them in bathrooms, others do not like to see the CFL in the fixture, some do not put them in enclosed fixtures due to performance concerns, some avoid putting them in fixtures used for reading or other close tasks, most do not like using them where they use controls such as dimmer switches.
- Most participants were aware that CFLs contain mercury but that had not prevented them from buying and using CFLs. There was not a uniform understanding of the issues or how to handle disposal – though a few knew there were some retailers and events where CFLs can be disposed.
- Most participants prefer to wait for an incandescent lamp to burn out first before replacing it with a CFL – they feel it is wasteful to remove a working lamp.
- Some participants were aware that CFLs are sold in varying color temperatures.
- A negligible number of focus group participants use dimmable CFLs – most state that CFLs cannot be used in dimmable fixtures.

8. Conclusions and Recommendations

8.1 Conclusions

Conclusions from this study include the following:

- **In general, there were minor changes over the last year in availability, affordability and diversity of CFLs in Northwest retail stores.** There was an increase in the fraction of stores that carry specialty CFLs (from 82 to 91% of stores), but a slight decrease in the average number of specialty CFL models stocked (from 17.6 to 16.8 models). The average estimated CFL retail price increased 10 percent (from $3.76 to $4.06)– mostly due to price increases in non-metro areas and among big box stores. Retailers are stocking twice as many LED models in 2010 (approximately 7 per store) compared to 2009.
- **In non-metropolitan areas in particular, however, there have been greater declines in CFL affordability, availability, and diversity than stores in metropolitan areas.** CFL prices increased more dramatically in non-metro areas than metro areas (by 41 cents and 24 cents, respectively) while share of shelf space dedicated to CFLs declined in non-metro areas (from 29% to 21% of total shelf space) and stayed the same in metro areas. The average number of general purpose CFL models increased in both metro and non-metro stores, but by only 2.7 models per store in non-metro stores compared to 4.1 in metro stores. Specialty lamp diversity remained fairly constant in metro stores (increasing by 0.2 models per store) but declined by 2.7 models per store in non-metro stores.
- **CFL promotions offered by energy-efficiency program sponsors throughout the Northwest are providing support to the market for both standard and specialty CFLs.** These ongoing promotions likely helped to maintain fairly consistent CFL market prices, availability and diversity over the past several years, but as evidenced by the drop in market share among non big box stores since 2008 (from 30% in 2007 to roughly 14% in subsequent years), NEEA's more widespread past promotions may have helped provide the additional support that smaller retail channels may need.
- **Northwest CFL sales rebounded by about 5 percent between 2009 and 2010 after a major drop of 26 percent between 2008 and 2009.** There were approximately 19 million CFLs sold in 2010, but sales are still far from the 2008 peak of nearly 25 million CFLs. Northwest CFL market share also experienced a small uptick between 2009 and 2010 (from 30% to 31%) after dropping from nearly 40 percent in 2008.
- **We expect CFL sales levels to plateau as most consumers do not plan to install more CFLs until their existing CFLs burn out** – instead they will buy them when they are on sale or when one of their installed lamps burns out. Most consumers use CFLs in a handful of sockets – and they avoid using them in certain applications and rooms, depending on their aesthetic and use preferences. A small fraction of consumers use CFLs throughout their homes and think the environmental/economic savings outweigh any aesthetic or application issues.
- **As EISA phases in, there is a risk that the majority of CFL users who are not completely committed to the technology** may revert back to incandescent technology, at least for some of their applications, if suppliers promote these products as energy saving/EISA compliant. Persistent concerns around mercury could also hurt sales of CFLs if consumers who have those

concerns think they have a new "energy-efficient" incandescent lamp option that does not contain mercury. CFL program sponsors have not convinced the majority that the energy savings associated with CFLs outweighs mercury concerns.

- **There remains potential for additional general purpose and specialty CFL installations.** However, consumers lack awareness of specialty CFLs (only 32% of CFL purchasers are aware of specialty lamps), specialty CFLs are more expensive and less available, and dimmable CFLs in particular do not perform well. There are major market barriers to significantly increasing specialty CFL sales and to address the barriers will require a multi-pronged approach due to the wide variety of products and issues.
- **There remains a small fraction of consumers who are either unaware or have never tried CFLs** (approximately 8% of Northwest consumers were unaware of CFLs in 2010, and 17 percent were aware but had never purchased CFLs)**.** California utilities have had success reaching previously under-served populations by promoting CFLs in ethnic supermarkets and discount stores. These efforts have been funded by large-scale resource-acquisition programs and they take advantage of the density of under-served populations and the prevalence of ethnic and discount stores that serve them.
- **Utility program managers see a role for a regional representative such as NEEA in supporting national efforts on consumer education** around mercury, CFL disposal, use of specialty CFLs, integrated messaging around the various technology options available as EISA takes effect.
- **Utility program managers also see a role for a regional representative such as NEEA in supporting national efforts regarding quality testing and labeling for LED products.**

8.2 Recommendations

Based on the conclusions described above, we recommend:

1. As recommended in prior tracking study reports, we recommend that NEEA consider engaging with the regional lighting suppliers. From the 2010 study[22]:

   > "**NEEA should continue to strengthen its relationship with CFL suppliers** (manufacturers and retailers) in the absence of a formal CFL incentive program. Ongoing dialogue with these stakeholders may help NEEA and its sponsors influence the mix of products these suppliers will produce and market in response to impending EISA requirements."

   The 2010 study also suggests the value of maintaining supplier relationships because they may be difficult to reestablish should NEEA decide to pursue future lighting market interventions – such as educational efforts or incentive programs – that would require (or benefit from) supplier support. These recommendations are particularly relevant now, given that EISA requirements will begin to phase in soon (January, 2012).

[22] KEMA, 2010. 2009-10 Residential Lighting Market Research Study. Prepared for NEEA. Supported by ECONorthwest. May 18, 2010. Page 50.

2. **NEEA should consider further discussion with regional stakeholders regarding whether the Northwest would benefit from having a regional representative in national efforts to promote energy-efficient lighting products.** Findings from the utility program manager interviews in particular suggest a desire for a regional entity to coordinate utility input to help develop consistent messaging regarding energy-efficient lighting products at the national level (including messages regarding mercury and CFL disposal). From the utility program managers' perspectives, messaging priorities include decreasing consumer confusion regarding new lighting technology options and increasing consumer understanding of lumens to aid comparison shopping. Program managers also expressed the desire for a voice in supporting the U. S. Department of Energy's efforts to further assess effective useful life and lumen degradation of LEDs and efforts lead by the Consortium for Energy Efficiency and U.S. Environmental Protection Agency to support LED product labeling standards. Engaging in these activities could facilitate staying abreast of current market trends and innovations. NEEA may be able to fill such a role, and further dialogue with utility program managers and other regional stakeholders may help NEEA decide whether to pursue this arrangement.
3. **NEEA should consider further discussion with regional stakeholders regarding whether some form of market support is necessary for CFLs in non-metropolitan areas.** As mentioned above, lighting retailers in non-metro areas have experienced greater declines in CFL affordability, availability, and diversity than metro stores. It may benefit the non-metro regions for NEEA to have dialogue with stakeholders to determine whether additional support is necessary and the best form of support that could be provided.
4. **NEEA should consider efforts to educate consumers regarding the full range of installation potential for energy-efficient lamps** in their homes. The 2010 study includes a similar recommendation for CFLs, and current study results suggest a broader need across energy-efficient lamp types. Whether these efforts are conducted under the umbrella of the national efforts suggested above or through a distinct effort, study findings suggest a lack of awareness among consumers regarding the impending phase-out of traditional incandescent lamps (as suggested by the consumer surveys), lingering confusion regarding CFL applicability for different purposes (as suggested by the consumer surveys and focus groups), and a desire among the region's utilities for educational efforts regarding new lighting technology options.
5. **NEEA should consider developing materials and information to help Northwest utilities determine if and when they should start promoting new lighting products including LEDs.** Study results suggest this information is of particular interest to lighting program managers at some of the region's smaller utilities.
6. **NEEA should continue to regularly monitor the Northwest residential lighting market** to provide timely data on the Northwest to help shape local utility, regional and national lighting promotions and efforts to maintain the gains in CFL market acceptance achieved over the last two decades.

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B. Data Collection Instruments

C. Additional Shelf Survey Findings

Below are the detailed results for the Lighting Retailer Surveys conducted in late 2010 and analyzed in early 2011.

C.1 Sample Frame

The sample frame for the lighting retailers was taken directly from the third Market Progress Evaluation Report (MPER3) of NEEA's ENERGY STAR Consumer Products – Lighting project[23], the original source of which was the prior project implementation contractor's 2006 lighting retailer database.[24] To make direct comparisons between current results and those from 2006 and 2008, and 2009, our 2010 effort focused on stores that were surveyed during the previous evaluation effort. Consistent with the approach used for the last three shelf surveys, we stratified the sample by Metro West, Metro East and Non Metro; store type; and within store type, by store ownership type (national, regional or franchise chain versus independent store).[25] Table 8 shows the distribution of retailers in the sample frame by strata.

Table 8: Retailer Shelf Survey Sample Frame, 2011

Store Type	Store Ownership Category (Number of Chains)	Geographic Location							
		Number of Stores				Percent of Stores			
		Metro West	Metro East	Non-Metro	Total	MSA West	MSA East	Non-Metro	Total
Club/ Warehouse	National chain (1)	21	3	9	33	1%	0%	0%	1%
DIY	National chains (3)	83	26	46	155	3%	1%	2%	6%
Drug and Grocery	National chains (4)	528	125	184	837	21%	5%	7%	33%
	Regional chains (6)	126	15	55	196	5%	1%	2%	8%
Mass Merchandise	National chains (4)	181	61	121	363	7%	2%	5%	14%
	Regional chains (7)	6	12	28	46	0%	0%	1%	2%
	Independents	15	1	28	44	1%	0%	1%	2%
Small Hardware	Franchises (3)	147	55	308	510	6%	2%	12%	20%
	Regional chains (20)	46	13	26	85	2%	1%	1%	3%
	Independents	89	38	154	281	3%	1%	6%	11%
Total		1,242	349	959	2,550	49%	14%	38%	100%

Table 9 shows the completed retailer shelf surveys by strata. During 2010/2011 we conducted a total of 58 surveys including 19 in Idaho, 7 in Montana, 20 in Oregon, and 12 in Washington.

[23] KEMA, 2007.

[24] PECI, 2006.

[25] See MPER3 (KEMA, 2007) for more details on these categories.

Table 9: Retailer Shelf Survey Completes by Strata, 2011

Store Type	Store Ownership Category (Number of Chains)	Geographic Location							
		Number of Stores				Percent of Stores			
		Metro West	Metro East	Non-Metro	Total	MSA West	MSA East	Non-Metro	Total
Club/ Warehouse	National chain (1)	1	1	1	3	1%	2%	2%	5%
DIY	National chains (4)	3	3	2	8	2%	5%	3%	14%
Drug and Grocery	National chains (3)	3	3	3	9	2%	5%	5%	16%
	Regional chains (4)	3	2	2	7	2%	3%	3%	12%
Mass Merchandise	National chains (5)	2	2	3	7	1%	3%	5%	12%
	Regional chains (2)	1	1	1	3	1%	2%	2%	5%
	Independents	1	0	2	3	1%	0%	3%	5%
Small Hardware	Franchises (3)	2	1	2	5	1%	2%	3%	9%
	Regional chains (5)	2	1	2	5	1%	2%	3%	9%
	Independents	2	2	4	8	1%	3%	7%	14%
Total		**20**	**16**	**22**	**58**	**13%**	**28%**	**38%**	**100%**

Researchers calculated sample expansion weights by strata and applied them to each sample retailer such that the findings presented in this section represent the population of lighting retailers in the region that sell CFLs (as approximated by PECI's 2006 database). For affordability results across store types in the Northwest, we also applied sales weights based on regional CFL sales data gathered by Fluid Market Strategies.[26]

C.2 Sample Sizes, 2006-2010

Researchers conducted shelf surveys at 58 retail establishments in the Northwest during December 2010. Most of these locations were visited during the 2006, 2008 and 2009 survey periods, during which 58, 88 and 78 sites were surveyed, respectively. The breakdown of stores surveyed by region, store type, and by each combination of geography and store type is presented below in Tables 11 through 12.

[26] Fluid Market Strategies, 2009.

Table 10: Shelf Survey Store Visits by Store Type and Year, 2006–2010

Store Type	Year			
	2006	2008	2009	2010
Big Box	36	24	31	24
Drug, Grocery, Small Hardware	52	34	47	34
Total Visits	**88**	**58**	**78**	**58**

Table 11: Shelf Survey Store Visits by Region and Year, 2006–2010

Region	Year			
	2006	2008	2009	2010
Metro	52	36	47	36
Non-Metro	36	22	31	22
Total Visits	**88**	**58**	**78**	**58**

Table 12: Shelf Survey Store Visits by Store Type, Region and Year, 2006–2010

Store Type	Region	Year			
		2006	2008	2009	2010
Big Box	Metro	22	15	19	15
	Non-Metro	14	9	12	9
Drug, Grocery, Small Hardware	Metro	30	21	28	21
	Non-Metro	22	33	19	13
Total Visits		**88**	**58**	**78**	**58**

C.3 Affordability

Field staff collected pricing information for every CFL model observed on the shelf. As in prior evaluations, field staff recorded price (before and after utility program discounts or other discounts, when applicable) and number of CFLs per package.

C.3.1 Average Price

The average CFL price in the Northwest increased by an average of $0.30 between 2010 and 2011 to reach the price of $4.06 Average price of CFLs rose in both metro and non-metro areas by 24 and 41 cents respectively within the past year (Figure 9).

As shown below in Figure 8, the price increase was primarily in big box stores where prices increased by 10 percentage points and reached their four-year high. While big box CFL prices are higher than they have been in the past four years, they still offer lamps at a price below drug, grocery, and small hardware stores where prices this year decreased by a very small percentage.

When broken down by geography and store type, it is apparent that prices have stayed very similar in non-big box stores (Figure 8) while rising in both rural and non-rural stores (Figure 7). The difference in cost between the stores is growing smaller as big box prices rise.

Figure 7: Average Price Paid for CFLs by Geography and Year, 2006–2010

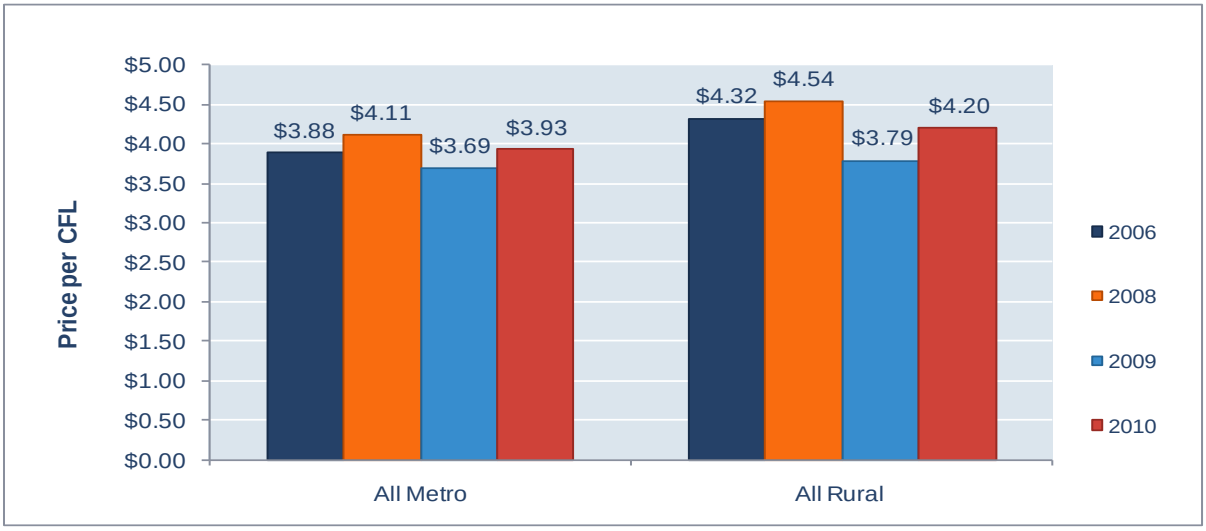


Figure 8: Average Price Paid for CFLs by Store Category and Year, 2006–2010

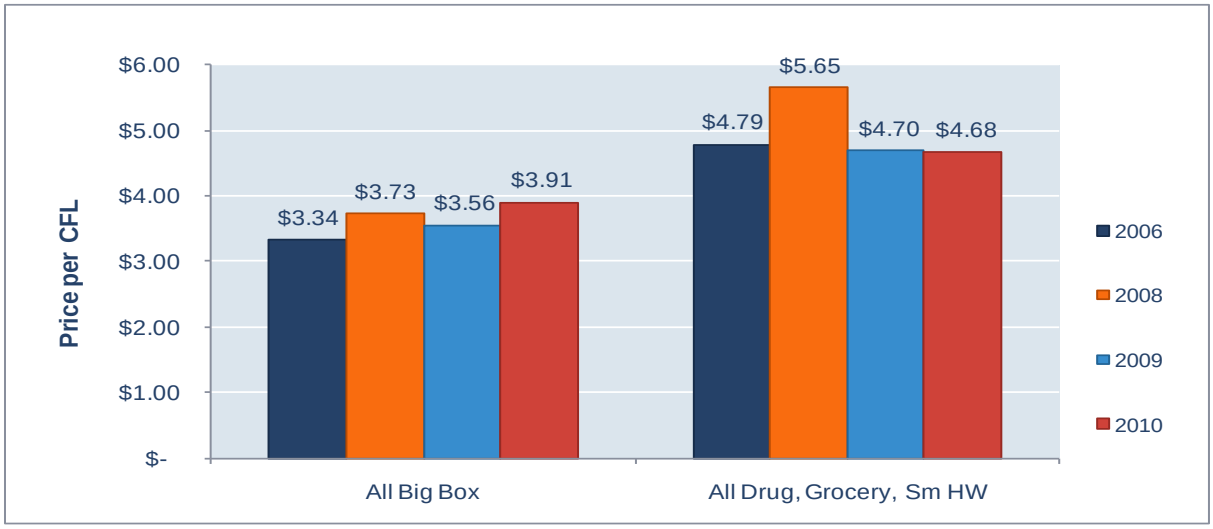
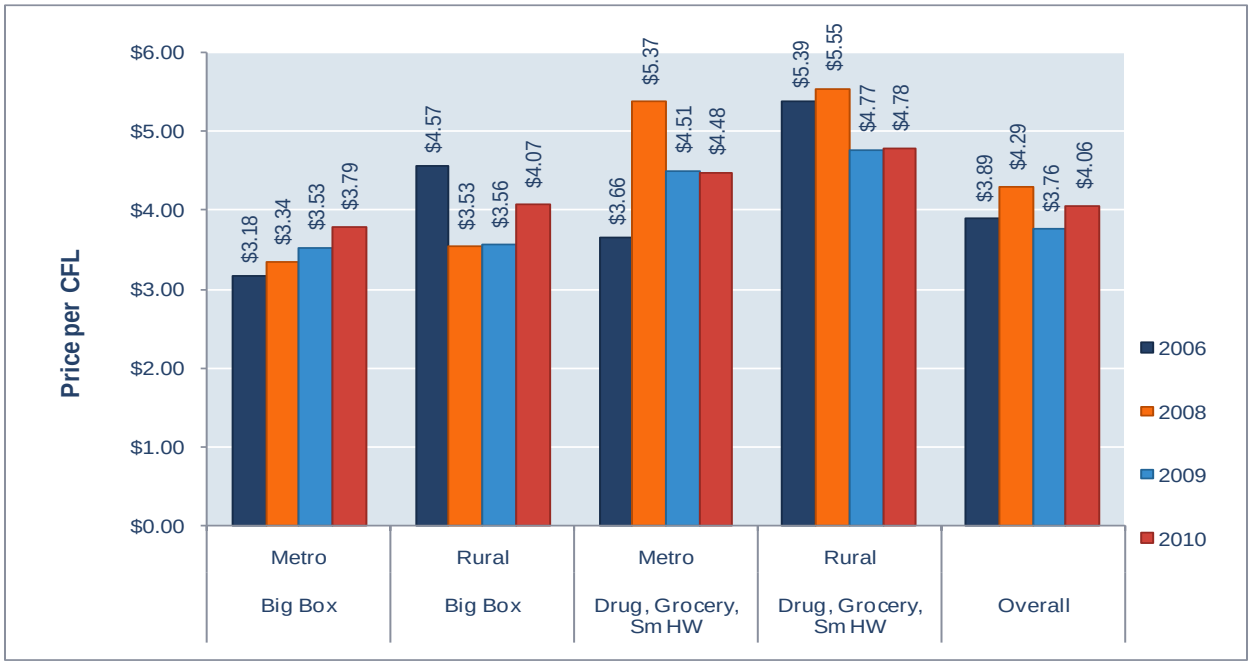


Figure 9: Average Price Paid for CFLs by Geography, Store Category, and Year, 2006–2010



C.3.2 Range of Prices

In this section, we present the range of CFL prices by category of bulb: twisters less than 18 watts, twisters 18-30 watts, twisters greater than 30 watts and non-twisters.

Figure 10 below shows the average range in prices (after any discounts) of twister-style CFLs that are less than 18 watts that were displayed on store shelves during the four study periods.[27] For each store type, the first data point or range is for spring 2005, the second for fall 2005, the third for fall 2006, the fourth for winter 2008, the fifth for winter 2009, and the sixth and final range of data is for 2010. The bars at the top and bottom of the range are the average maximum and minimum, and the diamond is the midpoint of the range. Over the last year, the price range of twisters less than 18 watts stocked by Northwest lighting retailers barely changed for warehouse, dropped for DIY and increased for drug and grocery stores, mass merchandise stores, and small hardware stores.

[27] Note that the Savings With a Twist (SWAT) promotion explicitly excluded this wattage range.

Figure 10: Average Range of CFL Prices Over Time – Twisters Less than 18 watts, 2005–2010

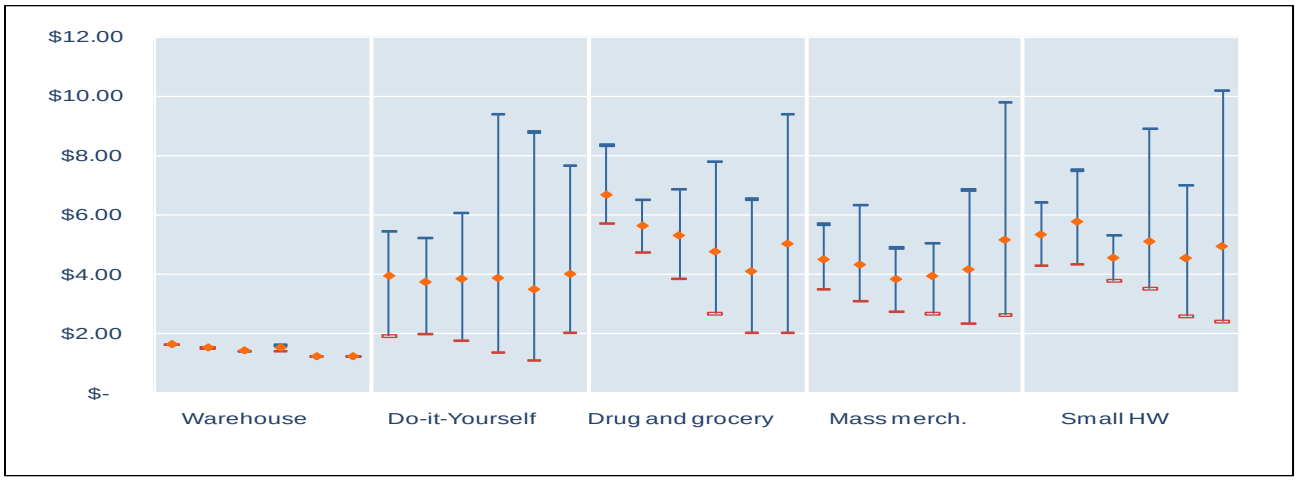
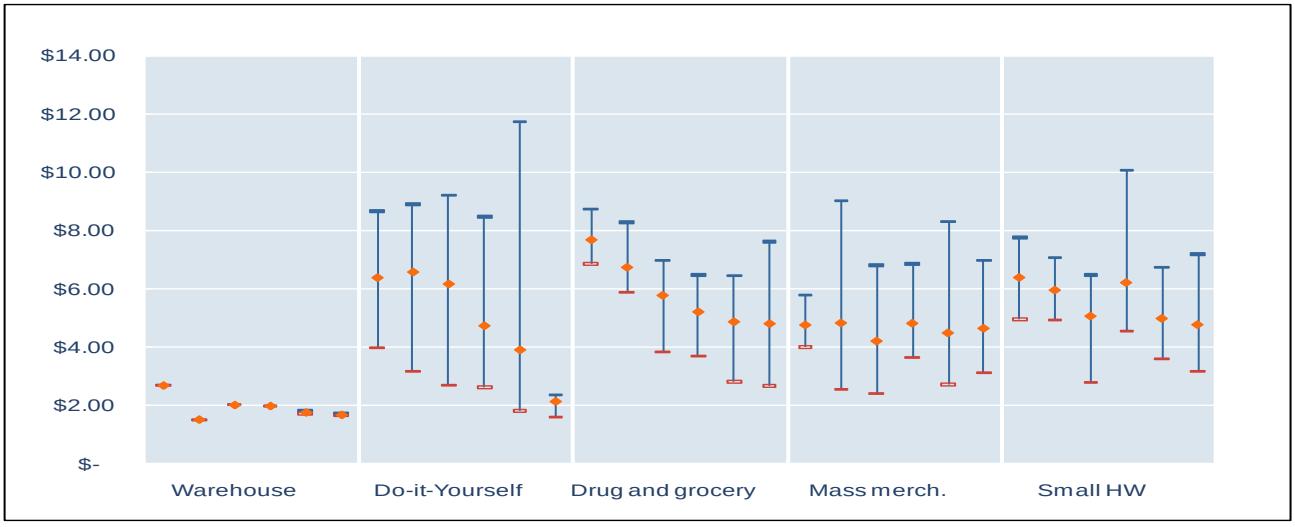


Figure 11 shows the average range of prices of twister-style CFLs between 18 and 30 watts.[28] Over the last year, the range of prices for this category of twisters widened on both ends for drug and grocery and small hardware stores, and shrank for DIY and mass merchandise. For the second year in a row, the range stayed about the same for warehouse stores similar to twisters with less than 18 watts.

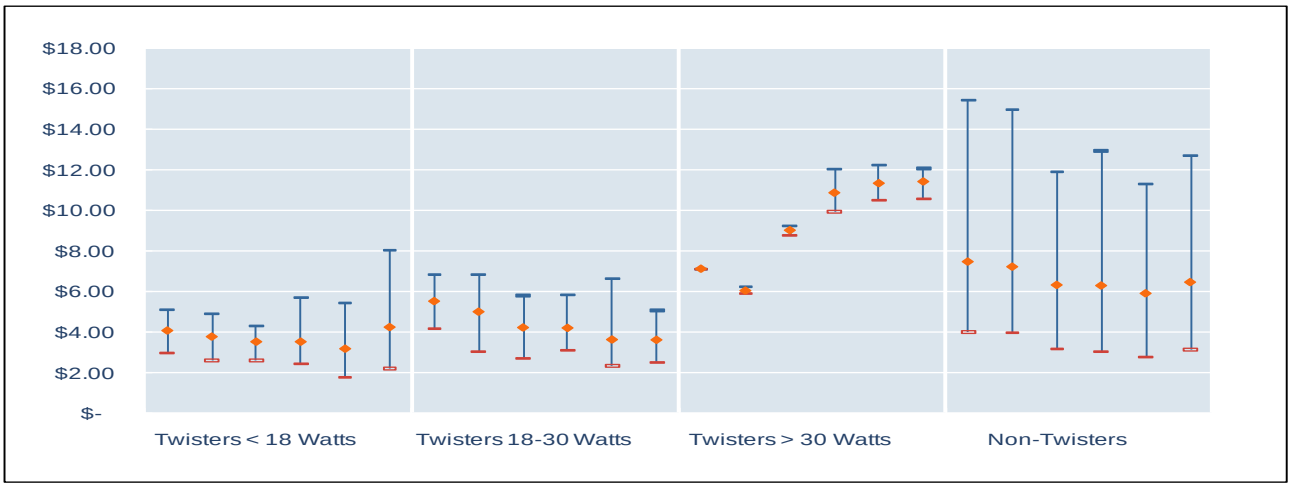
Figure 11: Average Range of CFL Prices Over Time – Twisters 18-30 watts, 2005–2010



[28] This wattage category was the target of the SWAT promotion, which was active in some Northwest stores in the fall of 2005 and 2006. Note that in 2006, SWAT explicitly excluded warehouse and Do-it-Yourself stores and included only CFLs less than 23 watts

The average price for twisters greater than 30 watts ranged from $6 to $14 during prior evaluations. During the 2009 survey, the range increased to $9 to $14 and stayed roughly the same this past year. While the range of prices for 18-30 watt twisters decreased slightly, twisters with less than 18 watts saw the largest increase in price range, going from a high under $6 in 2009 to a recorded high of $8 this year (Figure 12).

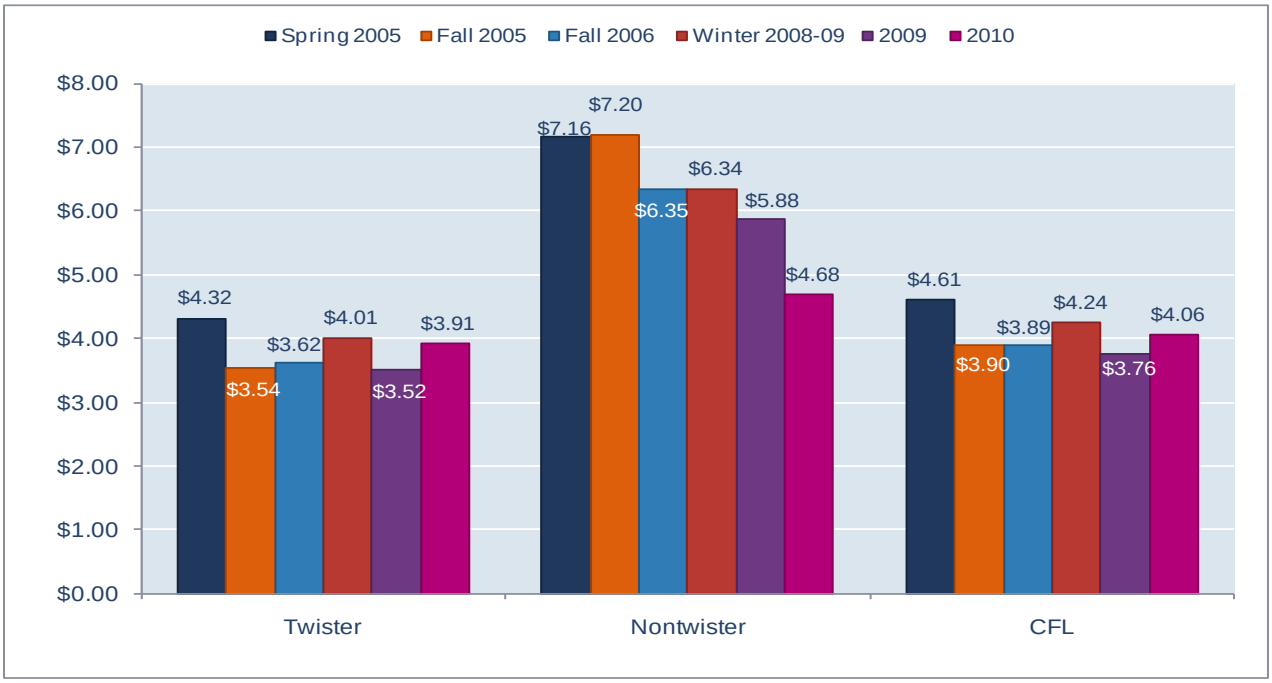
Figure 12: Average Range of CFL Prices Over Time – Sales Weighted, 2005–2010



C.3.3 Average Price Paid by Consumers

Figure 13 below shows estimates of the average price paid by customers for twisters, non-twisters, and CFLs in general for the five data collection periods. CFL prices (as estimated using the shelf survey combined with sales weights) have moved back up by eight percentage points after dropping by 11 percentage points in the previous year. This overall adjustment represents both an increase in the cost of a twister, and a rather large decrease in the price of specialty CFLs.

Figure 13: Average Price Paid by Customers for Twisters, Non-Twisters and CFLs, 2005–2010



C.4 Availability

To assess the availability of lighting products, field researchers collected information on the total linear feet and number of shelves for all light bulbs, all CFLs, and ENERGY STAR labeled CFLs specifically. These data enabled calculation of total lighting shelf space in the region, average shelf space per store dedicated to CFLs, the percentage of stores carrying any CFLs, and the percentage of stores carrying CFLs of specific styles. We present results below for all CFLs by store category and geographic location.

C.4.1 Total Shelf Space

Total shelf space dedicated to CFLs increased by ten percentage points over the last year down to just under 100,000 linear feet, or 23 percent of total lighting. The total shelf space dedicated to ENERGY STAR CFLs increased by three percentage points last year to over 79,000 linear feet, or 19 percent of total lighting. The total shelf space dedicated to lighting in general increased by 12 percentage points during the same period. Each increase was a turnaround from decreases the prior year.

Figure 14 below shows the allocation of total shelf space by store type during each study period. In 2010, drug and grocery stores in aggregate account for the largest fraction of total CFL and ENERGY STAR CFL shelf space just as they did in 2009. Small hardware stores still account for the largest fraction of total bulb space. This year, mass merchandise has replaced drug and grocery store as the type of store with the second most shelf space allocated to all bulbs as shown in Figure 14. Despite

this shift, drug and grocery stores still take second place in regards to shelf space allocated to CFLs, and are first in regards to total shelf space allocated to ENERGY STAR CFLs.

Figure 14: Allocation of Total Lighting Shelf Space by Store Type, 2005–2010

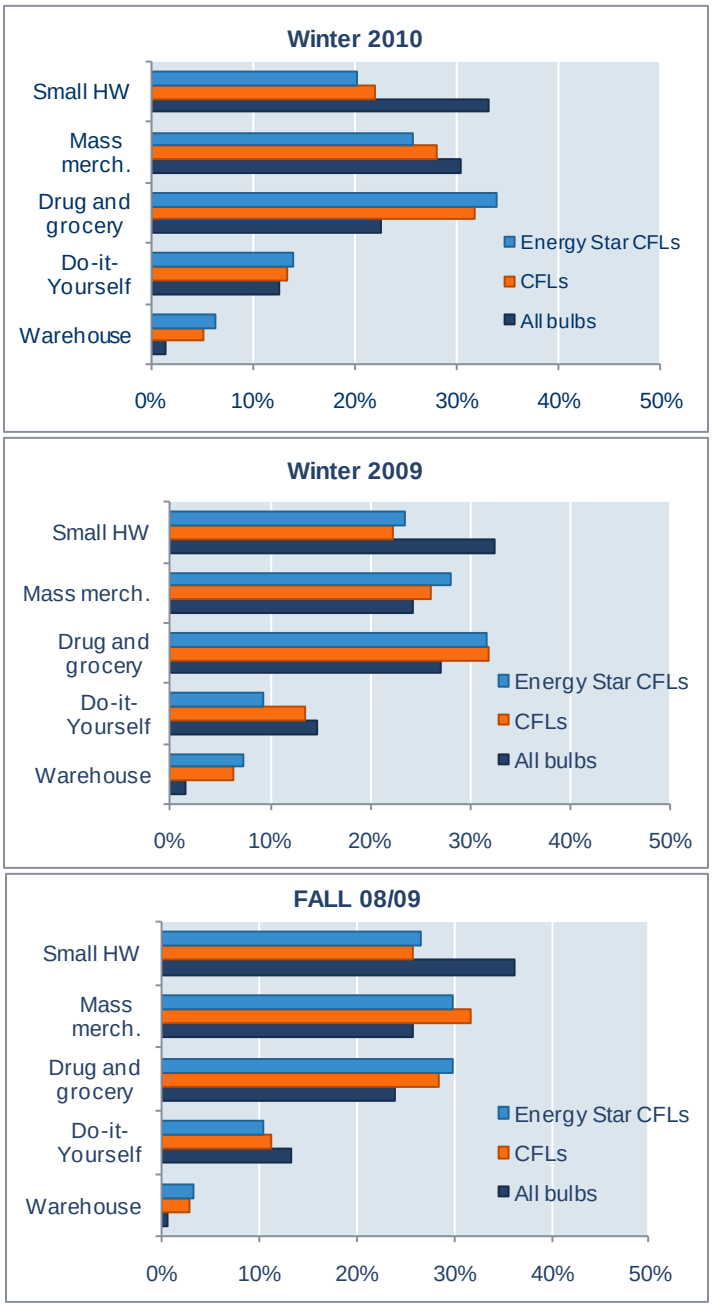
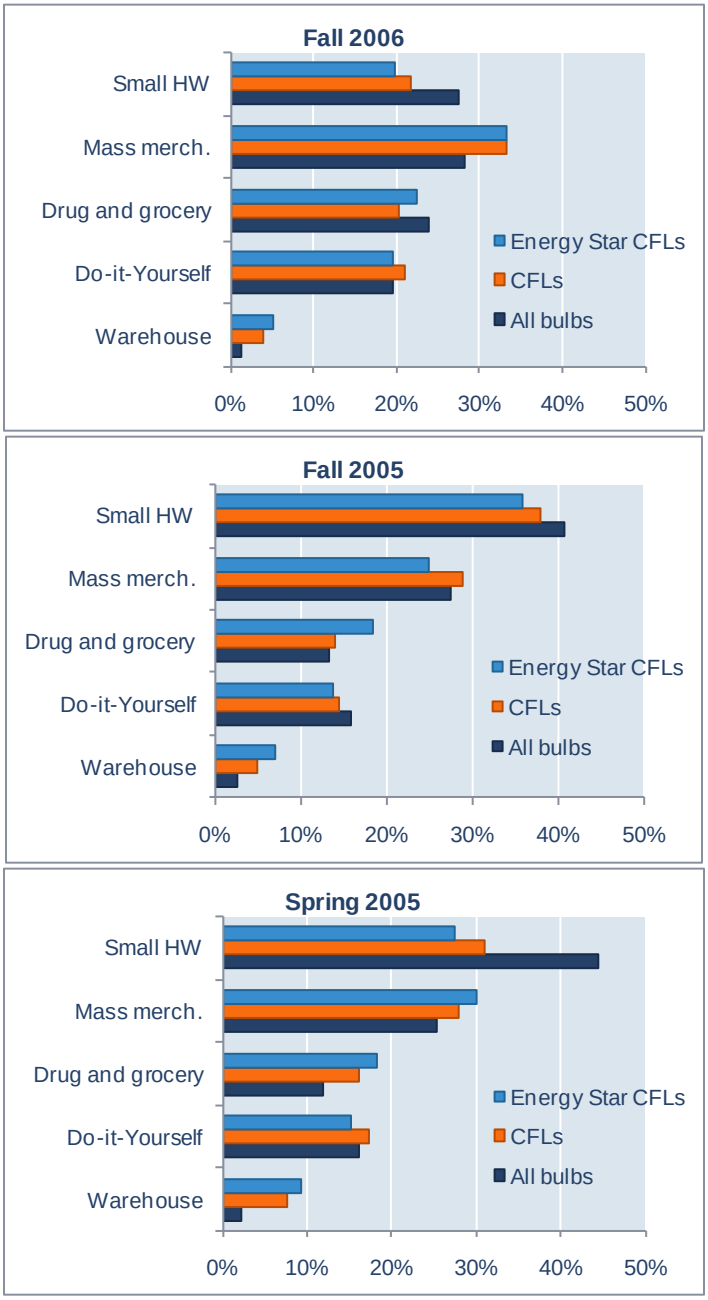


Figure 14 (continued): Allocation of Total Lighting Shelf Space by Store Type



C.4.2 Average Shelf Space

Figure 15 shows the average shelf space allocation by store type during each study period in linear feet. Warehouse stores have continuously stocked only ENERGY STAR CFLs, with the other channels devoting shelf space to other types of lighting products. Mass merchandise saw a decrease in the amount of CFLs that were ENERGY STAR while seeing an overall increase in total lighting shelf space.

The percentage of lighting shelf space allocated to CFLs in Northwest retail stores decreased slightly over the last year, from 24 to 23 percent (Figure 18), but still hasn't returned to 2008 levels. When looking at alterations in CFL shelf space allocation declines occurred in every geographic region and every store type except drug and grocery stores in metro areas as seen in Figure 18.

Most of this decline occurred in metro stores (which had a drop of nine percentage points over the past year) and in big box stores (which had a drop of five percentage points over the past year) as can been seen in Figure 16 and Figure 17. also shows that by the end of 2010, the prior gap in the proportion of shelf space dedicated to CFLs between metro and non-metro stores has returned, with metro stores at 27 percent of shelf space and non-metro stores at 21 percent of shelf space dedicated to CFLs. Big box stores dedicate an additional three percentage points of lighting shelf space to CFLs than non big box stores which represents a shrinking of the gap between big box and non box stores.

Figure 15: Average Shelf Space Allocation by Store Type in Linear Feet, 2005–2010

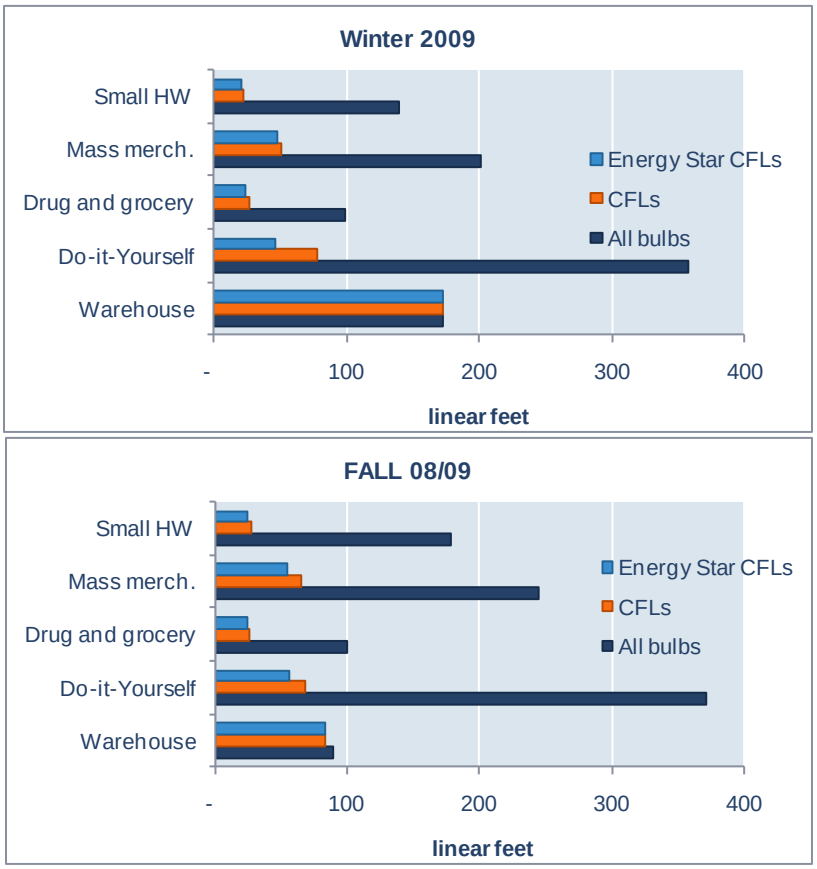


Figure 15 (continued): Average Shelf Space Allocation by Store Type in Linear Feet, 2005–2010

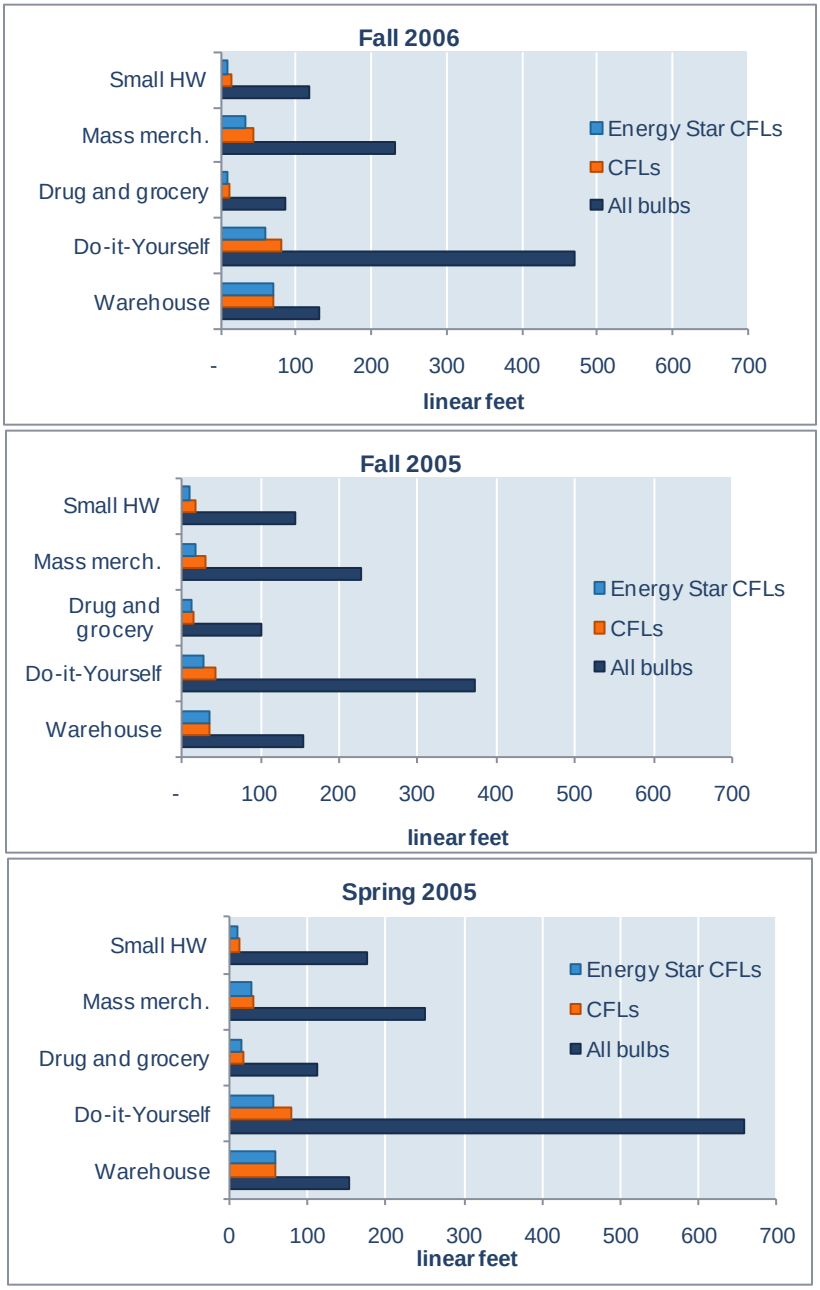


Figure 16: Percentage of Shelf Space Dedicated to CFLs by Geography and Year, 2005–2010

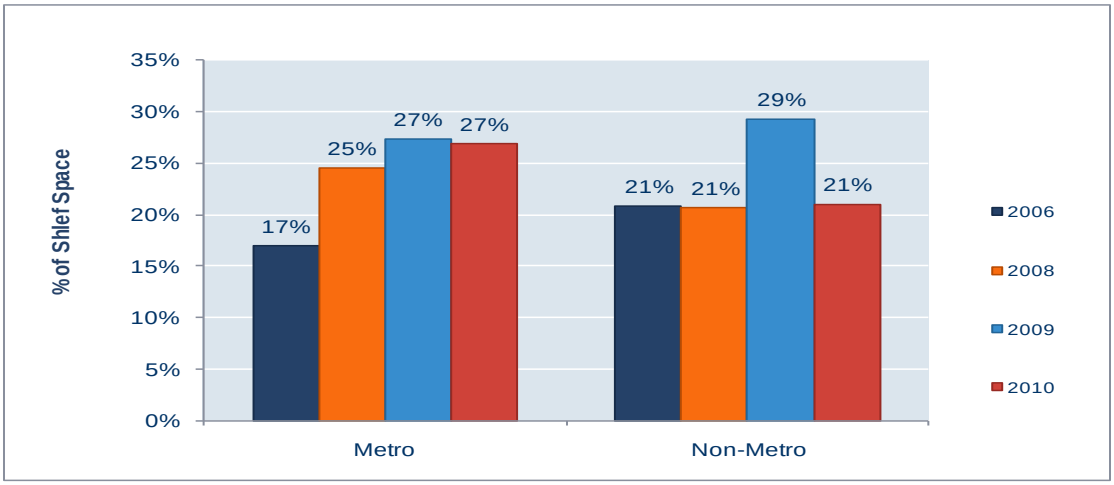


Figure 17: Percentage of Shelf Space Dedicated to CFLs by Store Category and Year, 2005–2010

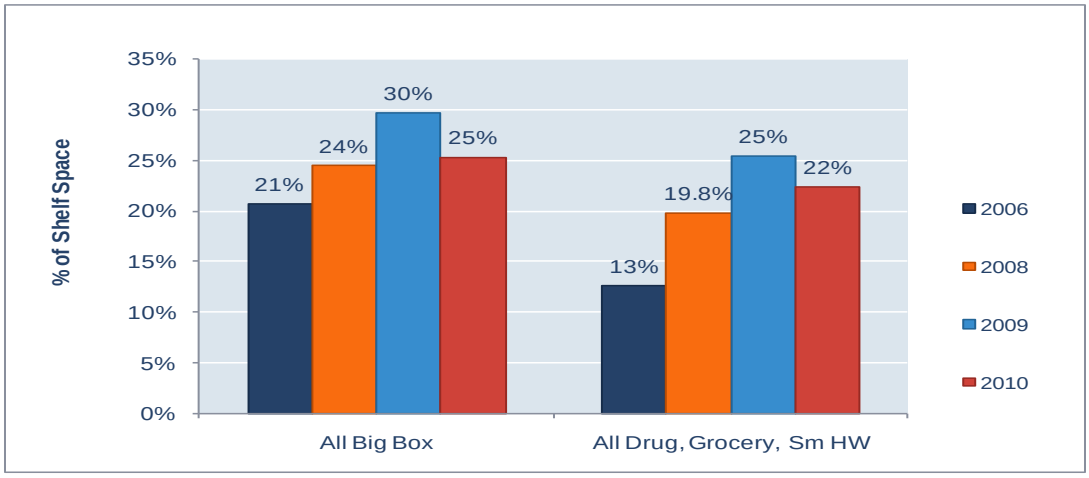
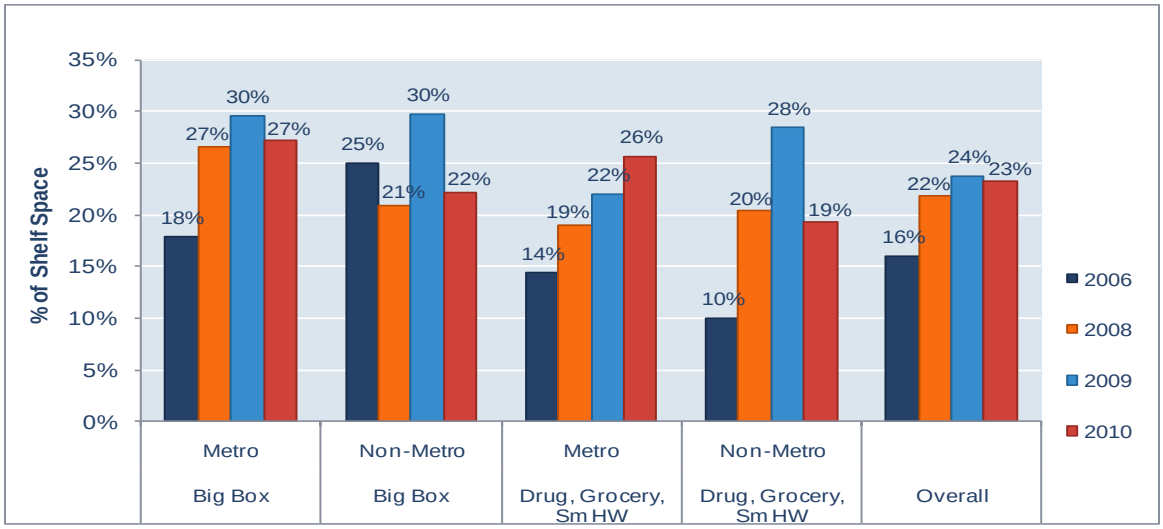


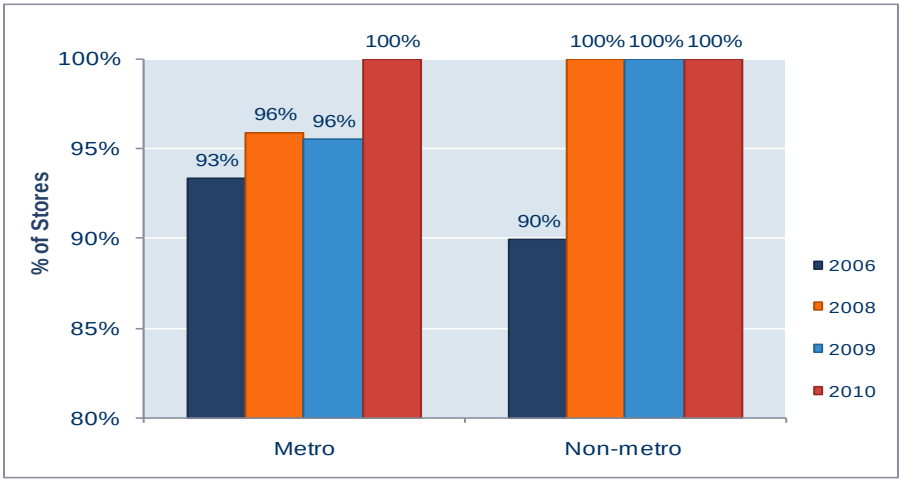
Figure 18: Percentage of Shelf Space Dedicated to CFLs by Geography, Store Category, and Year, 2005–2010



C.4.3 Percentage of Stores Carrying (Any) CFLs

Up three percentage points from last year, the Northwest market now has CFLs available in each of the 58 stores sampled (Figure 21). This jump seems to be driven by metro big box stores where there was a jump of eight additional percentage points in stores now carrying CFLs when compared to last year. Figure 19 shows the percentage of stores carrying CFLs by geography and year, and Figure 20 shows the percentage of stores carrying CFLs by store category and year.

Figure 19: Percentage of Stores Carrying CFLs by Geography and Year, 2006–2010



* Difference from prior study period is statistically significant.

Figure 20: Percentage of Stores Carrying CFLs by Store Category and Year, 2006–2010

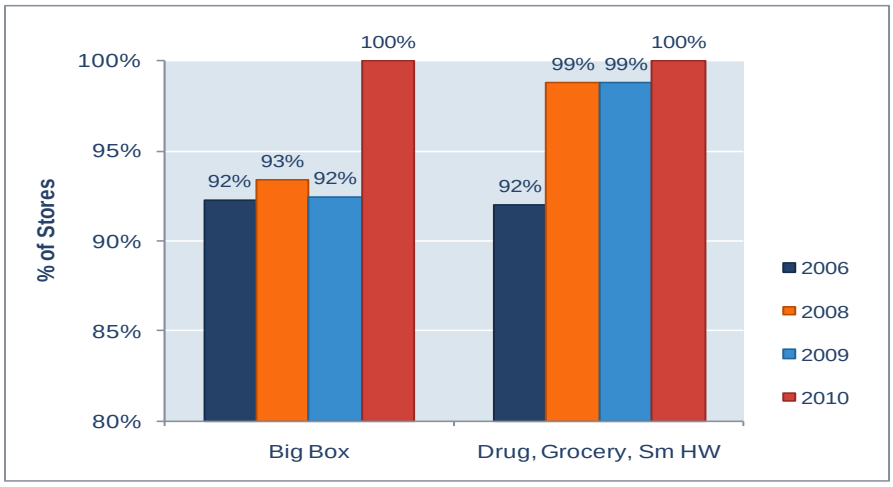
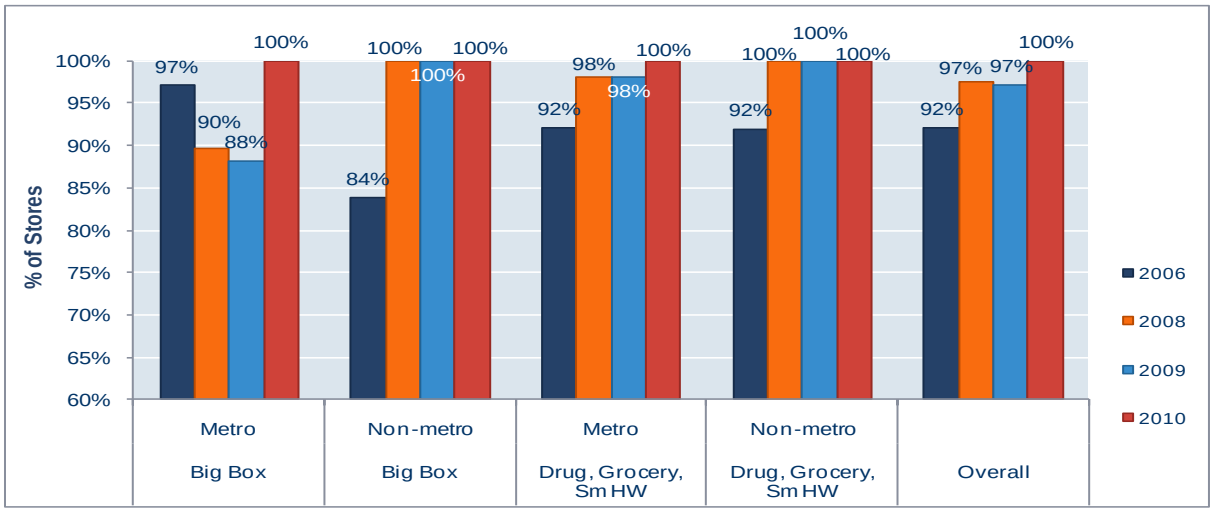


Figure 21: Percent of Stores Carrying CFLs by Geography Store Category, and Year, 2006–2010



C.4.4 Percentage of Stores Carrying CFLs by Style (Twister and Non-Twister)

When CFLs are further examined by style (twister versus non-twister), the proportion of stores carrying twisters declined slightly in non-metro areas while raising in metro areas and big box stores. As shown above, all Northwest lighting retailers carried CFLs in 2010. When CFLs are further examined by style (twister versus non-twister), the proportion of stores carrying twisters increased slightly in metro areas (Figure 22) and big box stores (Figure 23) while continuing to decline in non-metro stores and drug, grocery, and small hardware stores. When the geographic and store category characteristics are examined all together (Figure 24), it is apparent that these trends are driven by the

increase of eleven percentage points of metro big box stores that carry twisters and by the decrease in percentage of rural drug, grocery, and small hardware stores that carry twisters.

Non-twister CFLs can also be found at the majority of stores but are still less prevalent when compared to twisters (carried at 96% of stores versus 91% for non-twisters). Unlike twisters, non-twisters saw increases in all geographies and in all store types. For non-twisters, this year showed a significant jump from last year's 83 percent of stores. This was largely driven by big box stores, which had an additional 11 percentage points of stores with non-twister CFLs. For both twisters and non-twisters, the largest increase in CFLs occurred in big box stores.

Figure 22: Percentage of Stores That Carry Twister and Non-Twister CFLs by Geography and Year, 2006–2010

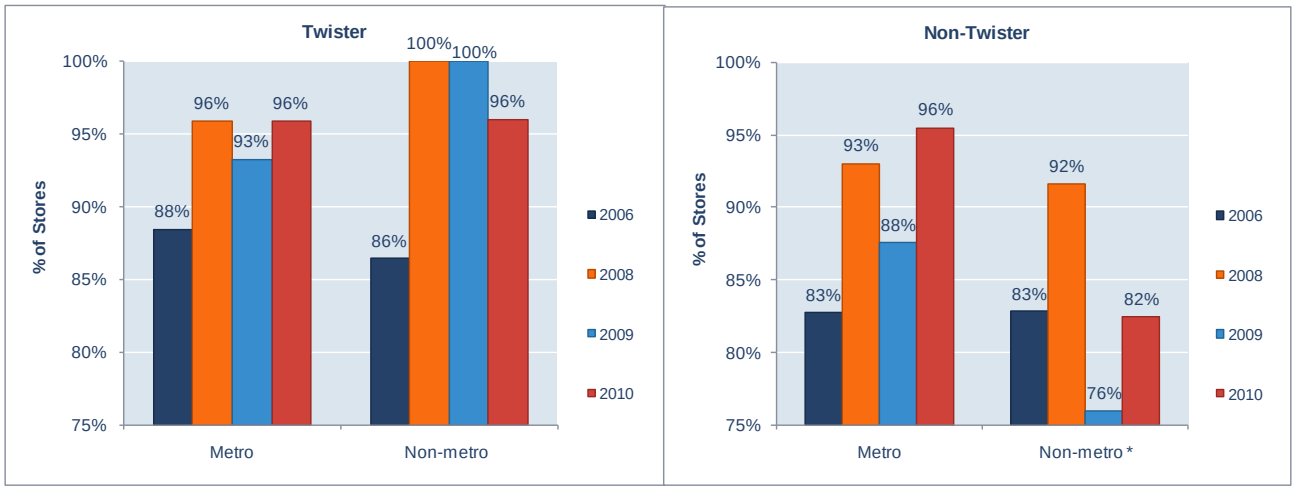


Figure 23: Percentage of Stores That Carry Twister and Non-Twister CFLs by Store Category and Year, 2006–2010

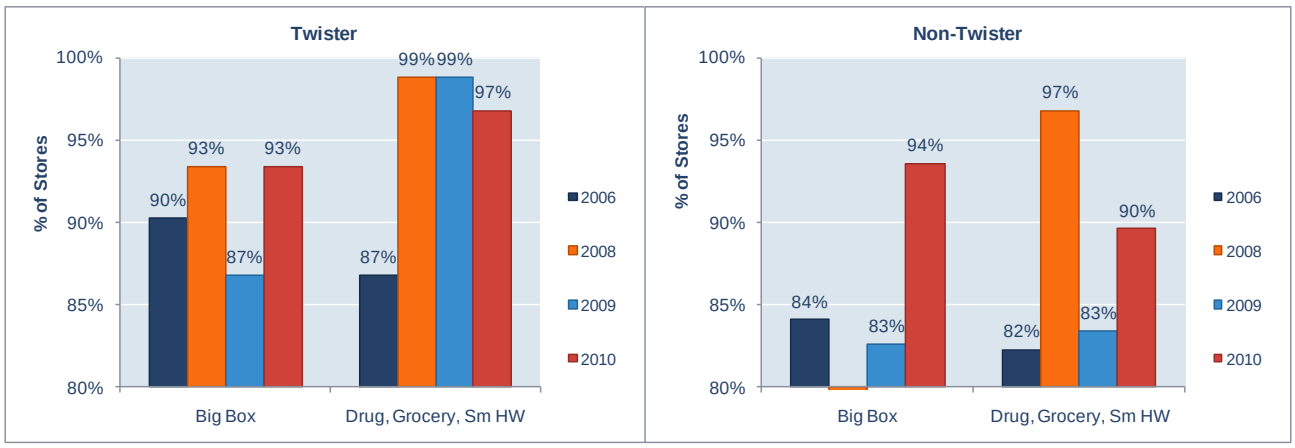
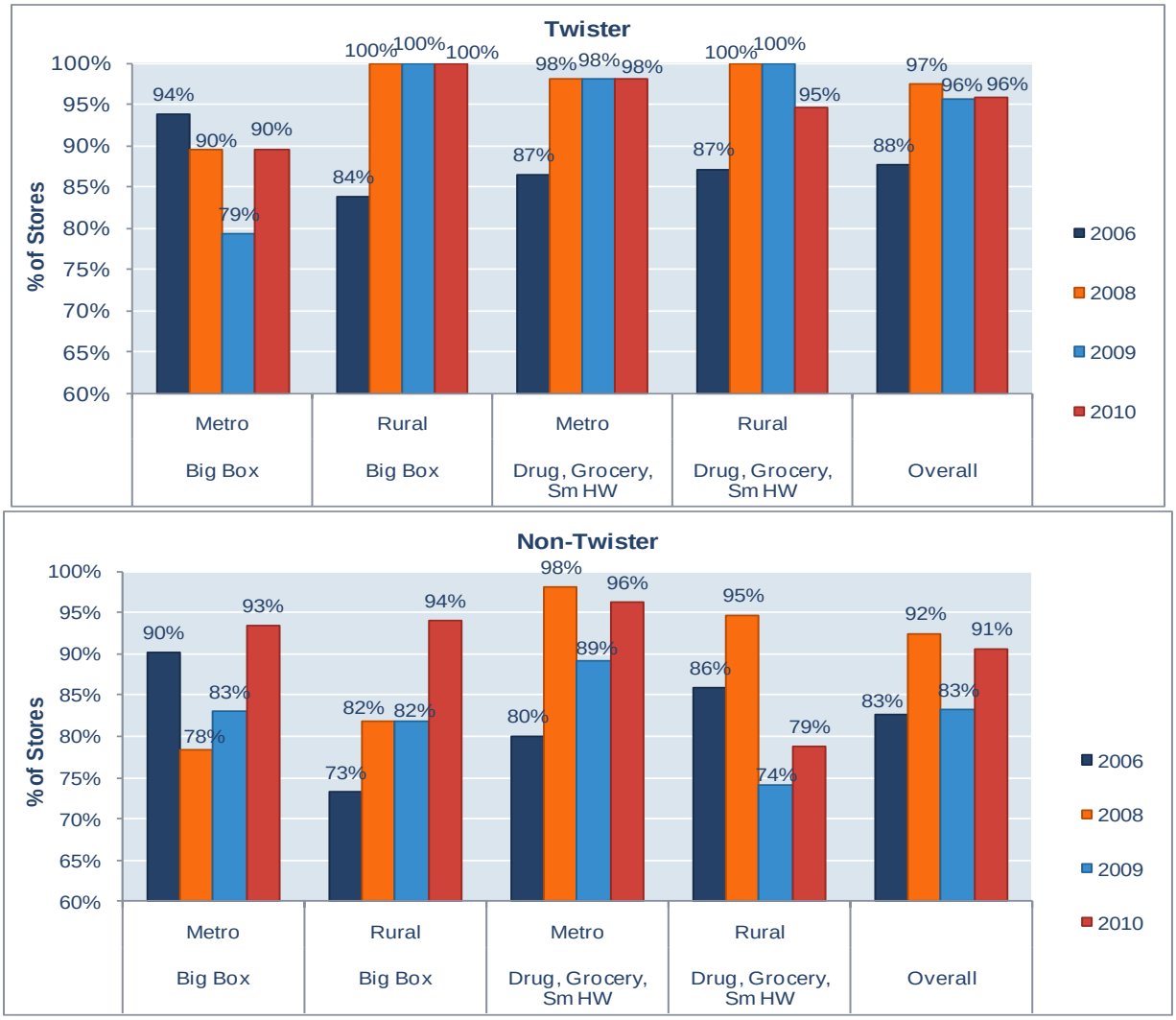


Figure 24: Percentage of Stores That Carry Twister and Non-Twister CFLs by Geography, Store Category, and Year, 2006–2010



C.5 Diversity

Field researchers recorded data on lamp style (twister, three-way, reflector, etc.) and wattage as part of the shelf survey to assess the diversity of CFLs available to Northwest consumers. Below we discuss diversity in terms of the average number of twister and non-twister CFL models available in each store.

C.5.1 Average Number of Models per Store

The average numbers of CFL models per store – a measure of CFL diversity – increased between 2009 and 2010 for twisters, and had a slight decrease for non-twisters. The average number of twister

models carried by each store increased by approximately three models (from 19.9 per store in 2009 to 23.4 in 2010) and decreased slightly for non-twisters (from 17.6 in 2009 to 16.8 in 2010; see "Overall" columns in Figure 27).

Twisters have shown a continued increase in diversity each year that this study has been done, across all store types and geographies. One reason for this may be an increase in lighting technology, allowing people to purchase CFLs that give off light in a manner that matches more with their preferences. For the past two years, big box stores have increased their twister models more than any other store type. This is not surprising given the way in which big box stores had the highest increase in availability of twisters within the last year.

The non-twister market, while experiencing an increase in allocated shelf space, experienced a slight decline in diversity. The slight decrease occurred in non metro areas and across all store types (Figure 25, Figure 26). The largest decline occurred in non metro big box stores, which, on average, had five fewer non-twister models than they did at the end of 2009. This drop returned non metro big box diversity to a level that still remains higher than that of 2008.

Figure 25: Average Number of Twister and Non-Twister CFL Models per Store by Geography and Year, 2006–2010

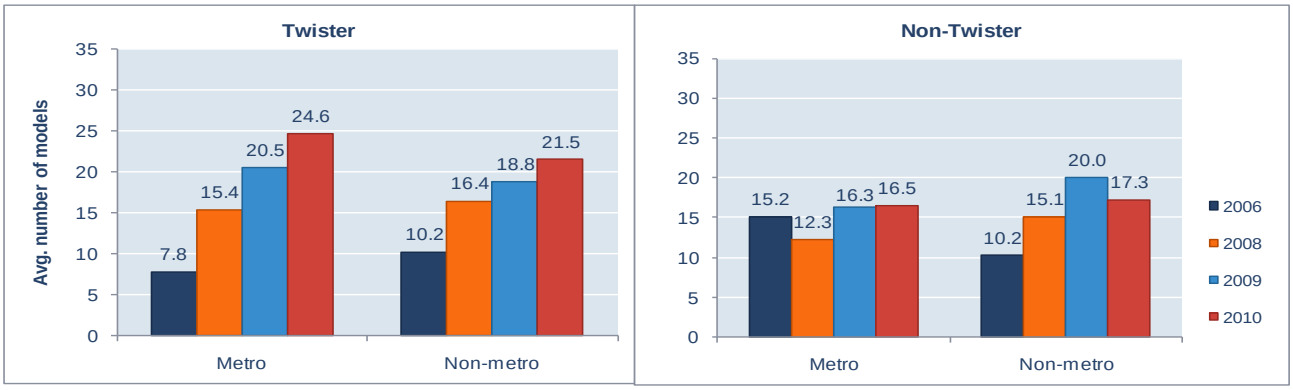


Figure 26: Average Number of Twister and Non-Twister CFL Models per Store by Store Category and Year, 2006–2010

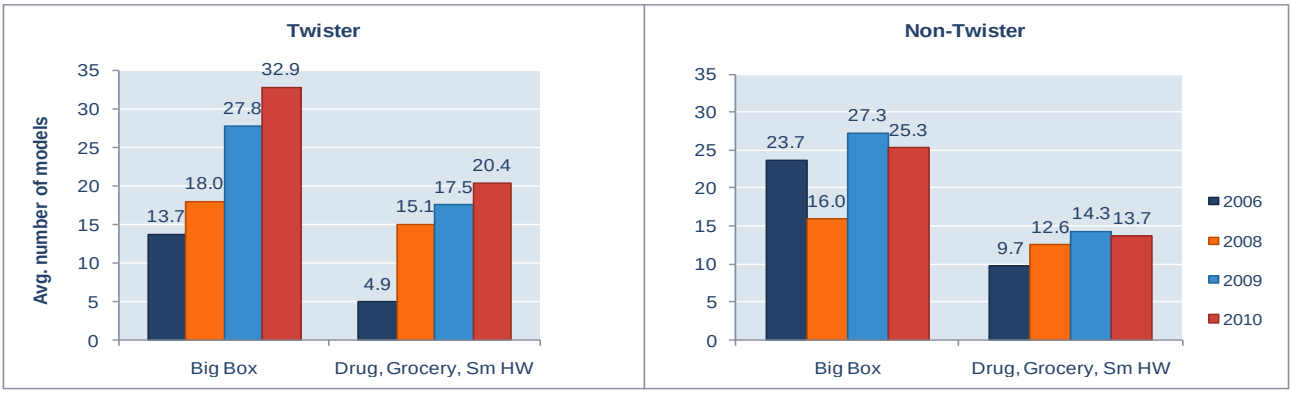
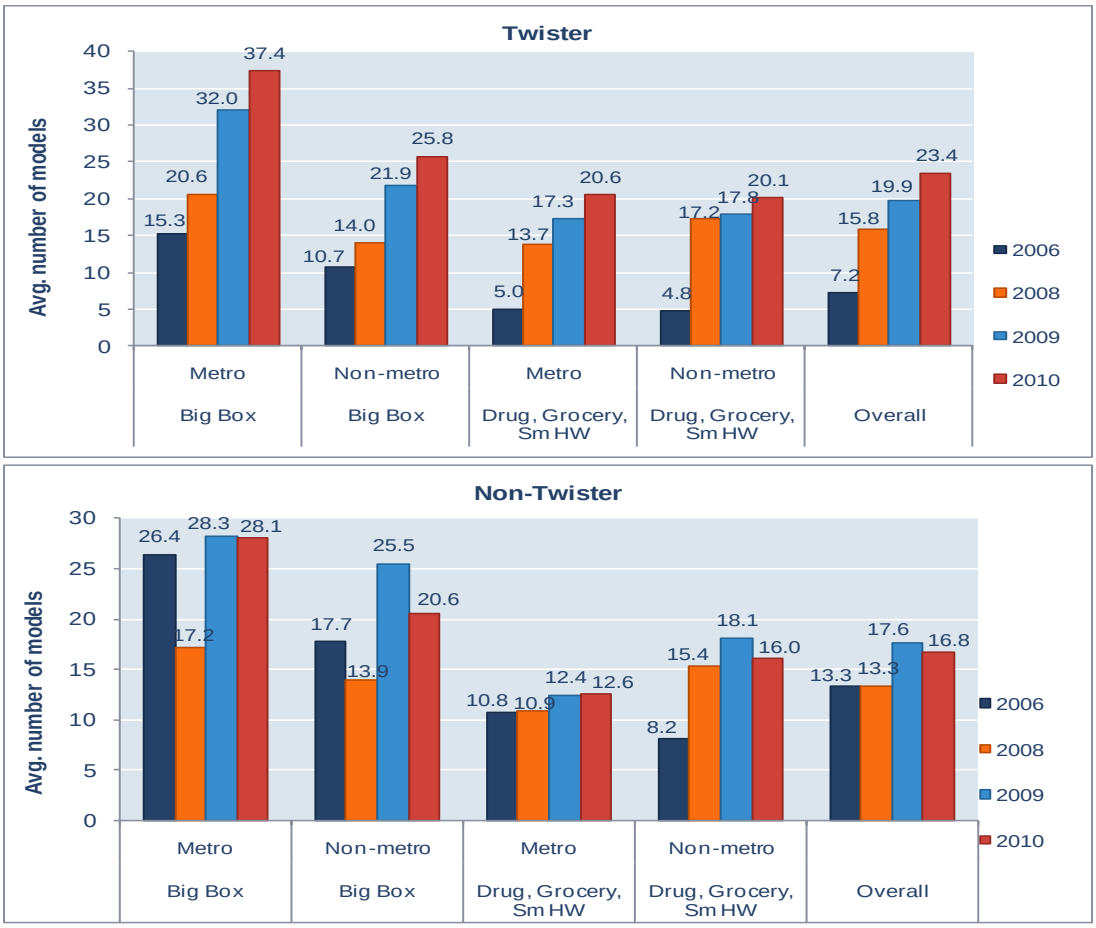


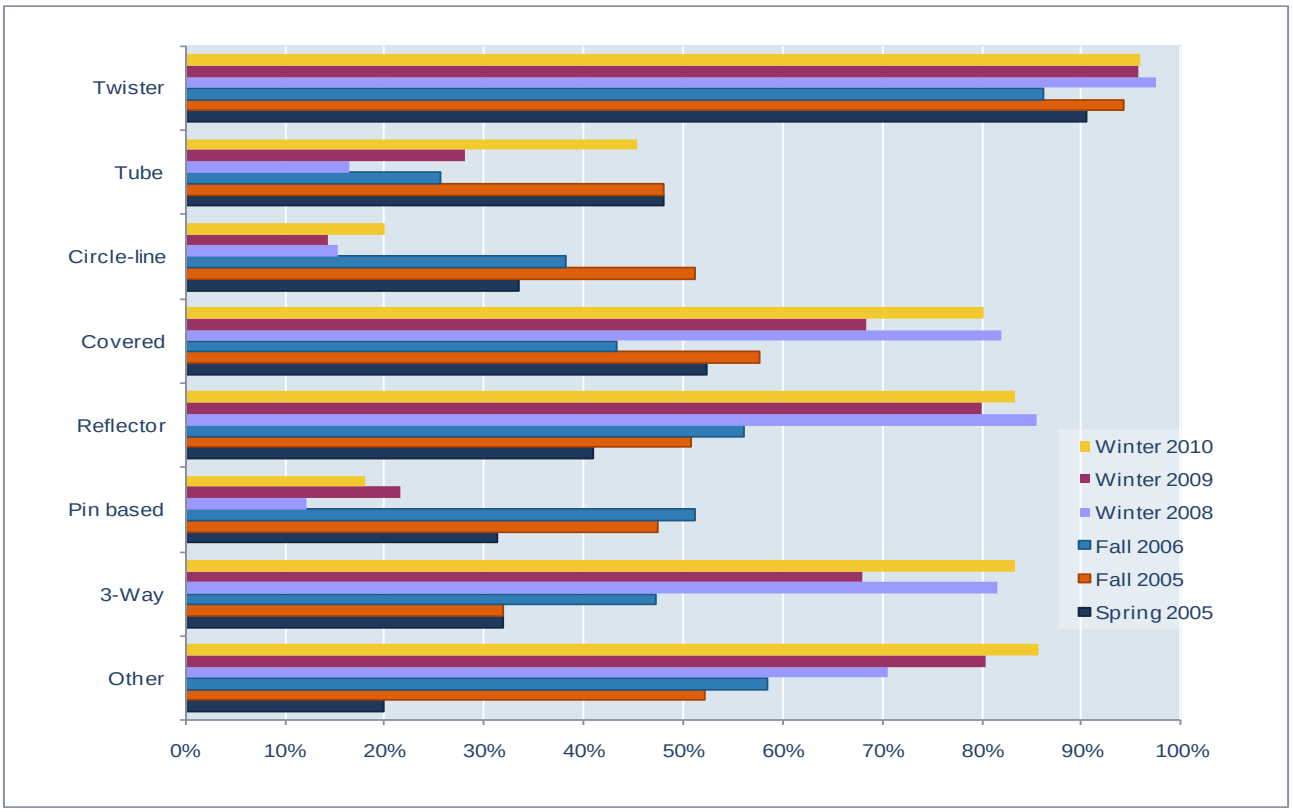
Figure 27: Average Number of Twister and Non-Twister Models per Store by Geography, Store Category, and Year, 2006–2010



C.5.2 CFL Style

The lighting shelf survey also studied CFL diversity by lamp style (twister, 3-way, reflector, etc.) and wattage category. Figure 28 shows the percentage of stores in the Northwest that carry each different style of CFL. As reported in the main shelf survey section (Section 3), almost every Northwest lighting retailer in our sample carries twister-style CFLs. About 20 percent carry circle-line and pin-based CFLs. There were both large and small shifts in non-twister style diversity over the last year, with slightly more stores carrying tube, circle-line, covered, reflector, 3-way, and other styles and slightly fewer stores carrying pin-based styles.

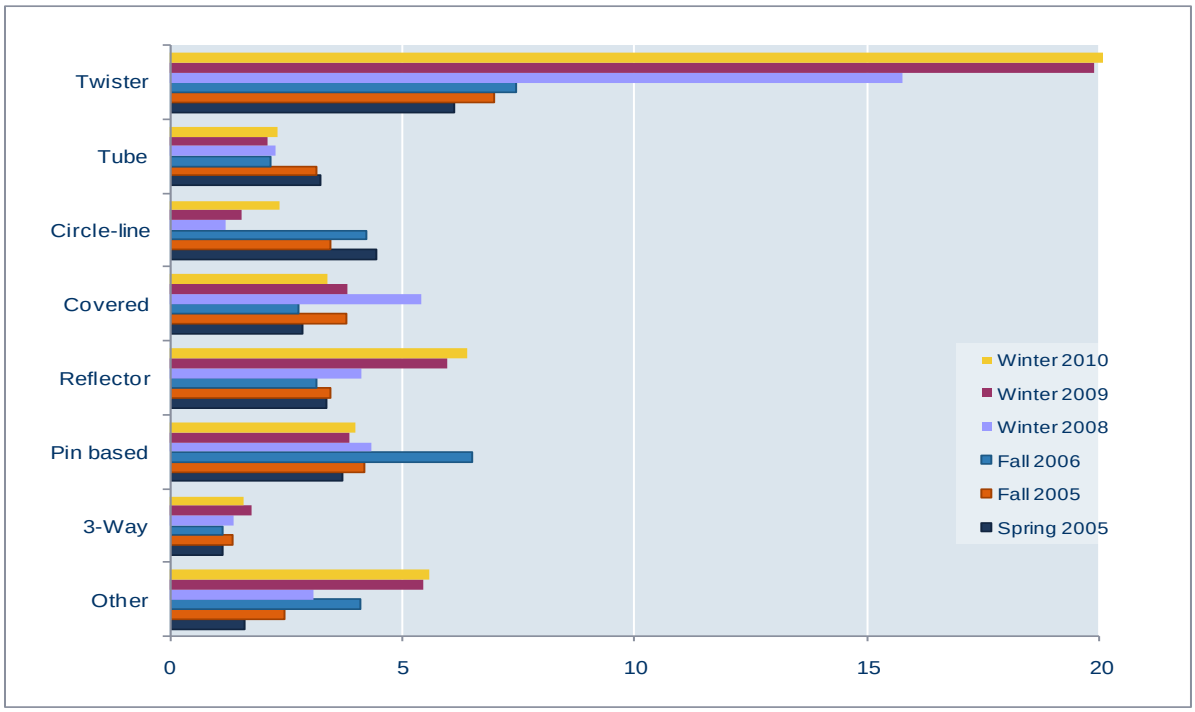
Figure 28: Percentage of Stores that Carry CFLs by Style, 2005--2010



There were more increases in types of CFLs carried this year than there were in prior years which contrasts the above observation that there were slightly less models per store. This can be explained by the following graph (Figure 29) which shows that brand variety is much more prevalent in twisters and is considered less important to have a variety of brands for each type of non-twister.

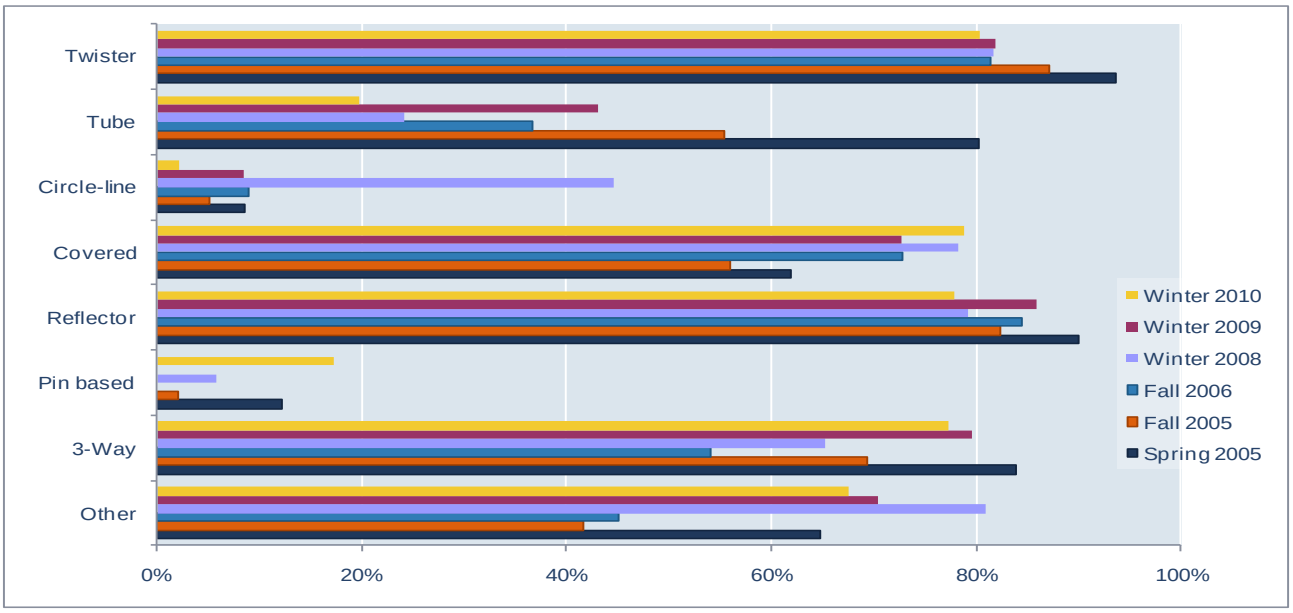
Figure 29 shows the average number of CFL models stocked in lighting retailers across the Northwest, by style. As shown, there was a slight increase in twister style diversity over the last year. This represents a large slow down given the large jumps in previous years. There were only slight changes in diversity for the non-twister styles, with stores stocking on average between one and six models.

Figure 29: Average Number of CFL Models Stocked by Style, 2005–2010



The percentage of models with ENERGY STAR labels encountered in Northwest lighting retailers is presented by style in Figure 30. About 80 percent of twister models have ENERGY STAR labels, unchanged from last year. A significant decrease in ENERGY STAR labeled tubes occurred which declined to a level more than half that of last year, as did Circle-line ENERGY STAR labels. The opposite effect was seen in pin-based bulbs, which went from not having any ENERGY STAR labeled bulbs to having nearly 20 percent. Covered bulbs were the only other type to see an increase in percentage of models with ENERGY STAR labels, although it was rather slight. A decrease of no more than five percentage points occurred for reflectors, 3-ways, and miscellaneous bulbs.

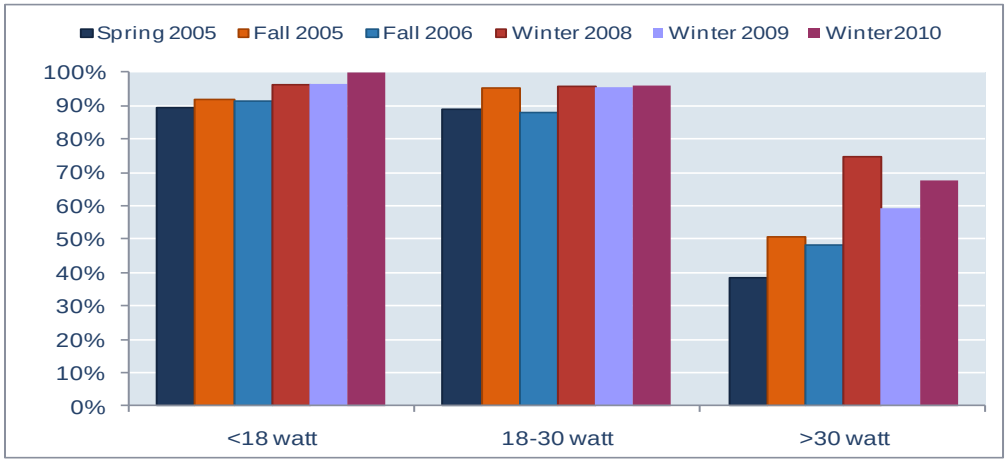
Figure 30: Percentage of Models with ENER GY STAR Label by Style, 2005–2010



C.5.3 CFL Wattage Category

The percentage of stores carrying CFLs, by wattage category, is presented in Figure 31. As shown, more than 95 percent of Northwest lighting retailers carry CFLs of 30 watts or less – unchanged from last year. A smaller fraction carries CFLs greater than 30 watts – about 70 percent, up from about 60 percent in 2009.

Figure 31: Percentage of Stores that Carry CFLs by Wattage Category, 2005–2010



The percentage of CFL models stocked at lighting retailers in the Northwest is presented in Figure 32, by wattage category. About 60 percent of all models stocked in our sample were less than 18 watts, a decrease from just over 75 percent of models last year. Stocking levels for less than 18 watt bulbs and bulbs in the 18 to 30 watt range returned to their 2008 levels after increases in 2009. The percentage of over 30 watt bulbs stocked has remained the same over the past three years.

Figure 32: Percentage of CFL Models Stocked by Wattage Category, 2005–2010

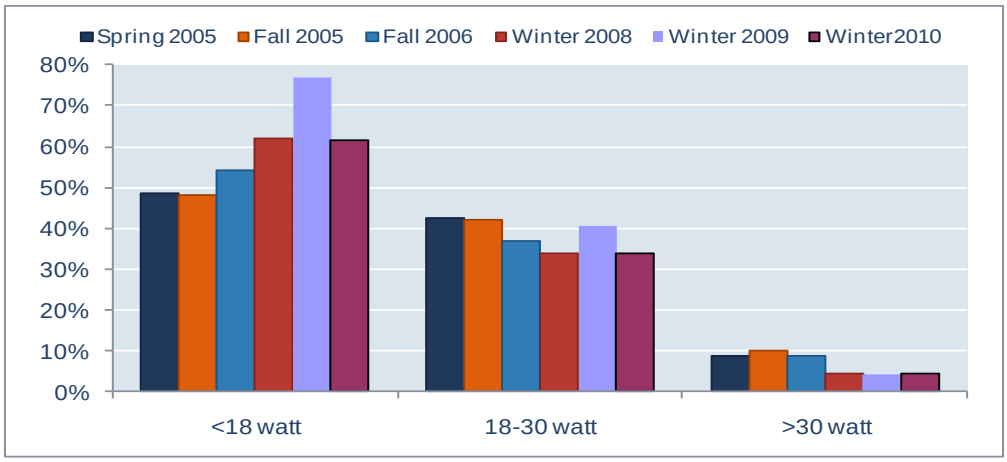
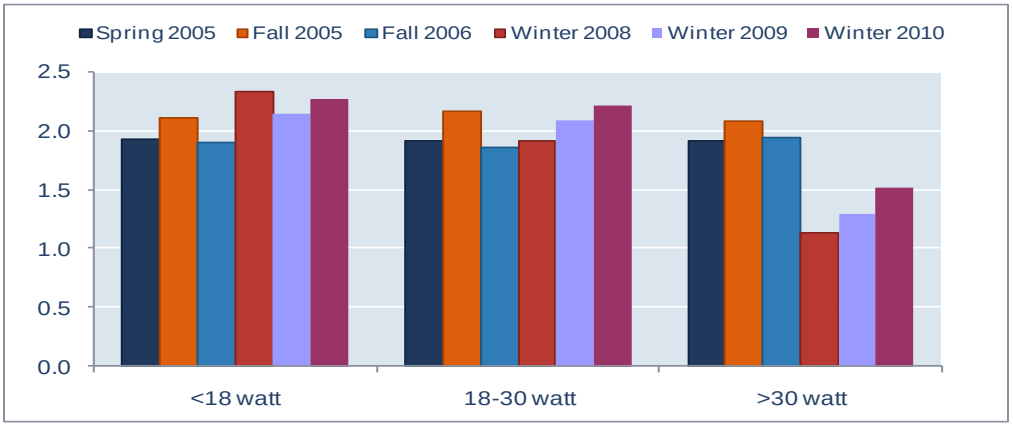


Figure 33 shows the average number of CFL brands at lighting retailers in the Northwest, by wattage category. While the number of models is skewed towards less than 18 watt CFLs, the various wattage categories are equally represented by brand, with a little over two brands each for CFLs less than 18 watts and 18-30 watts and just over one and a half brands for greater than 30 watts, with just a slight increase over last year, across the board.

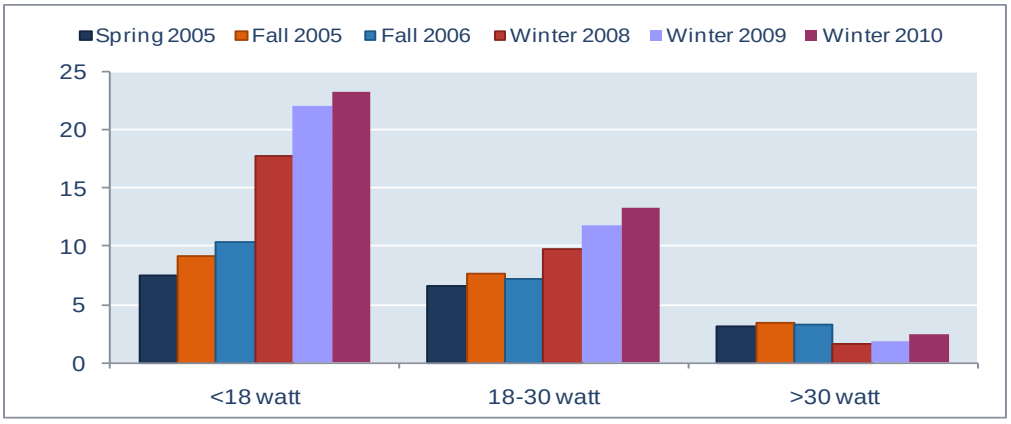
Figure 33: Average Number of CFL Brands Stocked by Wattage Category, 2005–2010



The average number of CFL models stocked by wattage category is presented in Figure 34 below. There are over 22 models of CFLs less than 18 watts stocked by the average Northwest lighting retailer, just over 13 models 18-30 watts and about two models greater than 30 watts. These results mirror those presented in

Figure 33 above, with an increase in the stocking of models of all wattage rates.

Figure 34: Average Number of CFL Models Stocked by Wattage Category, 2005–2010



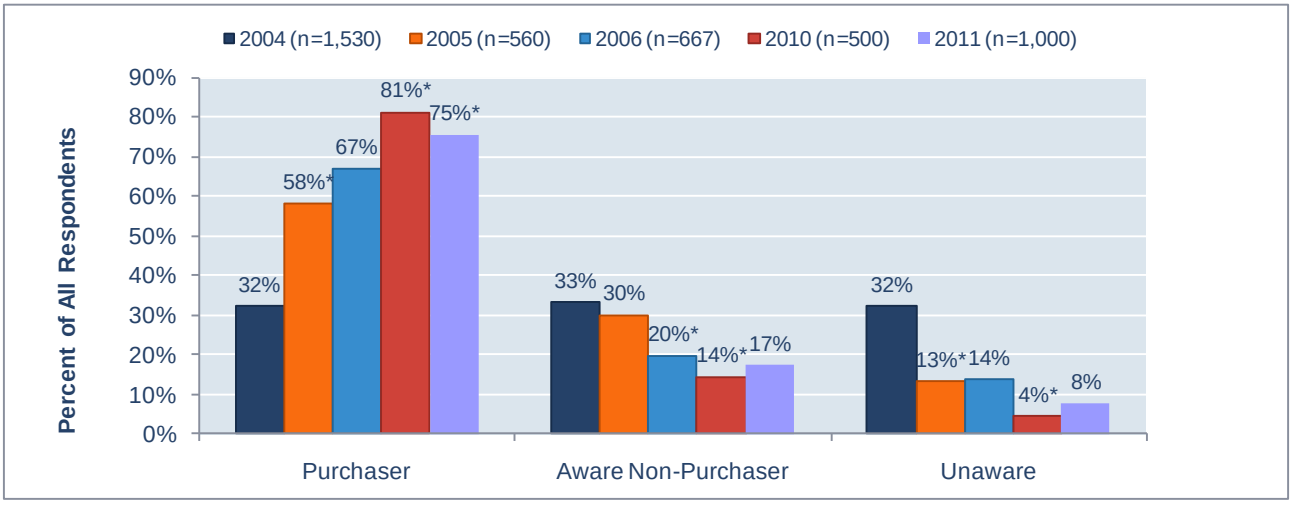
D. Additional Consumer Survey Results

D.1 CFL Awareness and Purchases

D.1.1 CFL Awareness and Purchases – Overall

Figure 35 shows changes in awareness and purchaser categories over time for consumers in the Northwest. Purchasers are consumers who have bought one or more CFLs at any time. Aware non-purchasers are consumers who are aware of CFLs, but have never purchased them. Unaware consumers are those who have never heard of CFLs even when prompted with a description.[29] As shown, overall awareness of CFLs has dropped from 95 percent in 2010 to 92 percent in 2011, a small but statistically significant change.[30]

Figure 35: Consumer CFL Awareness and Purchaser Categories, 2004–2011



* Difference from previous study period (within awareness/purchaser category) is statistically significant.

Approximately 68 percent of CFL purchasers in the Northwest are unaware of specialty CFLs.[31] Among CFL purchasers who are aware of specialty CFLs, a statistically equal distribution currently

[29] The CFL description reads, “Compact fluorescent bulbs, or CFLs, are small fluorescent bulbs that fit in regular light bulb sockets. CFL look different from standard bulbs. They are often made out of thin tubes of glass bent into loops.”

[30] Statistical significance is reported at the 90 percent level of confidence throughout.

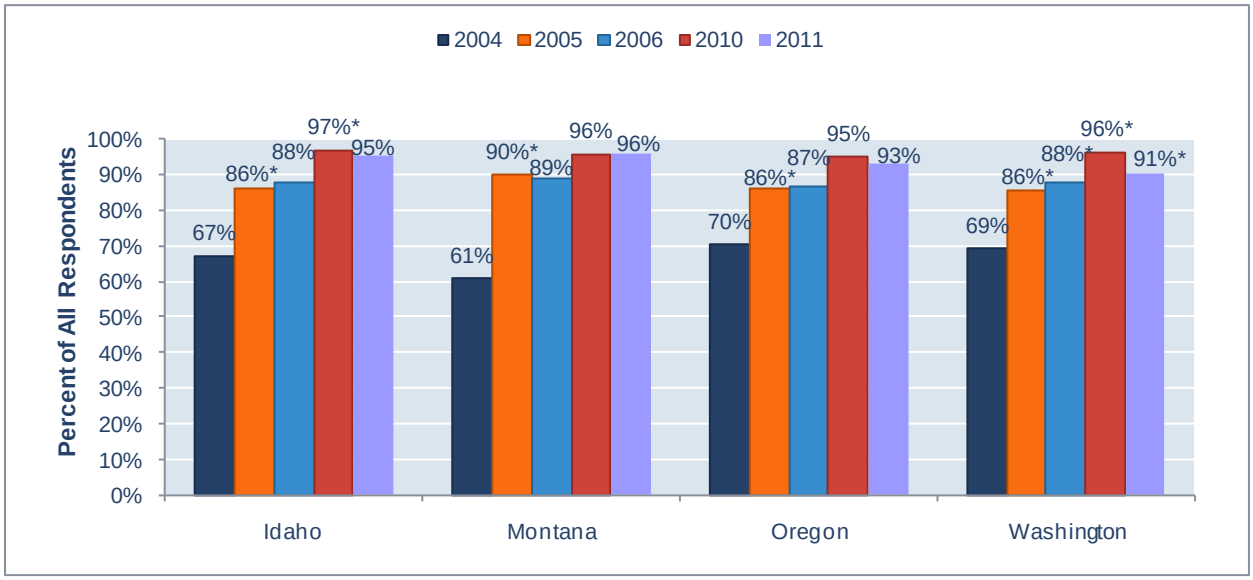
[31] The survey asked, “Other than CFLs that look like a twisty, spiral or curlicue shape, are you aware of any other types of CFLs?” If the respondent answered, “Yes,” a follow-up question asked the respondent to describe the CFL shapes with which they were familiar. Respondents who were familiar with only spiral CFLs and/or a-lamps were characterized as “unaware” of specialty CFLs, and respondents who were familiar to other CFL shapes (in addition to spirals and/or a-lamps) were characterized as “aware” of specialty CFLs.

have them installed and currently do not have them installed (47% and 53%, respectively). There were no statistically significant differences among states in the Northwest.

D.1.2 Awareness and Purchase Rates by State

As shown in Figure 36, consumer awareness of CFLs has not increased over 2010 levels among any of the four Northwest states. There was no significant change in awareness among residents of Idaho, Montana or Oregon. Awareness dropped from 96 to 91 percent in Washington (a statistically significant change).

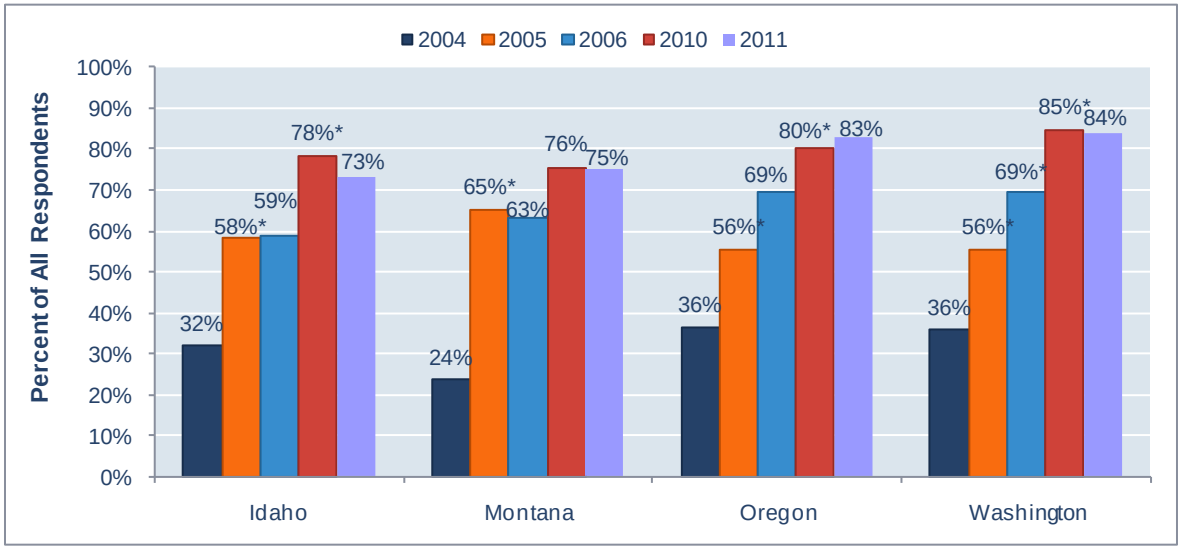
Figure 36: Consumer Awareness of CFLs by State, 2004–2011



* Difference from previous study period (within state) is statistically significant.
2004 n: ID n=197; MT n=189; OR n=426; WA n=786. 2005 n: ID n=63; MT n=60; OR n=162; WA n=275; 2006 n: ID n=273; MT n=94; OR n=110; WA n=190. 2010 n: ID n=54; MT n=43; OR n=175; WA n=228. 2011 n: ID n=108; MT n=101; OR n=313; WA n=478

As shown in Figure 37, there was no significant change in CFL purchase rates from 2010 to 2011 among any of the four Northwest states.

Figure 37: Consumer CFL Purchase Rates by State, 2004–2011



* Difference from previous study period (within state) is statistically significant.
2004 n: ID n=133; MT n=119; OR n=305; WA n=554; 2005 n: ID n= 54; MT n= 55; OR n=141; WA n=240; 2006 n: ID n=238; MT n= 84; OR n= 95; WA n=164; 2010 n: ID n= 52; MT n= 41; OR n=166; WA n=219. 2011 n: ID n=103; MT n=96; OR n=292; WA n=433

D.1.3 Where CFLs Have Been Purchased

The consumer survey asked all CFL purchasers where they purchased CFLs most recently. As shown in Figure 38, do-it-yourself (DIY) stores such as Home Depot and Lowe's continue to be the most common store category in which CFLs are purchased. There has been a small but statistically significant increase in the proportion of consumers in the Northwest who report purchasing CFLs at pharmacies or drug stores (from 1% in 2010 to 3% in 2011). There were no other statistically significant changes between 2010 and 2011.

Figure 38: Where CFLs Are Purchased Among CFL Purchasers, 2004–2011

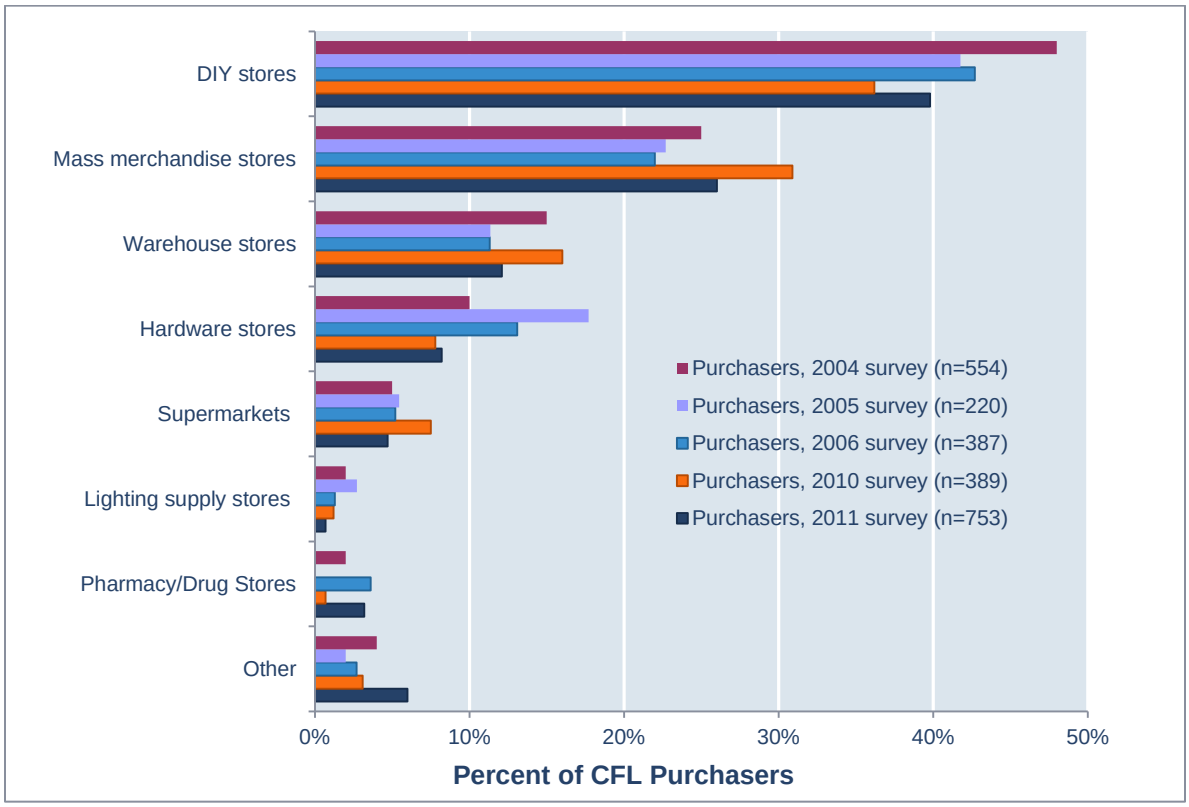


Table 13 shows the distribution of CFL purchase locations for metro versus non-metro purchasers in 2010 and 2011. As shown, 45 percent of metro consumers in 2011 report purchasing CFLs at DIY stores, compared to 31 percent of non-metro consumers. The difference is accounted for in mass merchandise stores, where 39 percent of non-metro consumers purchased CFLs, compared to less than one-quarter of metro consumers (23%).

Compared to 2010, a significantly higher proportion of Metro consumers in 2011 report purchasing CFLs at drug or grocery stores (10% in 2011; less than 1% in 2010).

Table 13: Where CFLs Are Purchased Among CFL Purchasers by Metro/Non-Metro, 2010 and 2011*

Store Type	2011 Survey		2010 Survey	
	Metro (n=527)	Non-Metro (n=195)	Metro (n=284)	Non-Metro (n=106)
Do-it-Yourself stores	45%††	31%	38%	32%
Mass merchandise stores	23%††	39%	29%	36%
Hardware stores	8%	10%	7%	11%
Warehouse stores	13%	12%	17%	15%
Drug/grocery stores	10%†	5%	<1%	2%
Lighting supply stores	<1%	<1%	1%	1%
Other	6%	7%	11%	9%

* Question allowed multiple responses; totals may exceed 100%.
† Difference from 2010 Metro results is statistically significant.
†† Difference from 2011 Non-Metro results is statistically significant.

D.1.4 Lamp Disposition in Purchaser Households by Geographic Region

Table 14 shows CFL distribution by geographic region within the Northwest from the 2011 survey. There are no statistically significant differences among the geographic regions.

Table 14: Bulb Disposition in Purchaser Households by Geographic Region, 2011

Disposition of All Bulbs Ever Acquired	Metro East (n=108)		Metro West (n=441)		Non-Metro (n=204)	
	Mean # of lamps	% of lamps	Mean # of lamps	% of lamps	Mean # of lamps	% of lamps
CFLs currently installed	12.1	57%	10.5	51%	11.4	56%
CFLs ever removed	3.5	16%	4.0	19%	3.2	16%
CFLs currently stored	5.6	26%	6.3	30%	5.6	28%
Total number of CFLs ever acquired	21.1	100%	20.8	100%	20.2	100%
Purchaser base	80%		85%		75%	

D.2 Satisfaction with CFLs

D.2.1 General Satisfaction

CFL purchasers rated their general satisfaction with CFLs on a ten-point scale, with 1 being “not at all satisfied” and 10 being “very satisfied.” Results presented in Figure 39 show that consumer satisfaction remains high, and there was no statistically significant difference in consumer satisfaction with CFLs between 2010 and 2011. The mean satisfaction rating remained statistically unchanged from 2010 (7.6) to 2011 (7.4), although the change since 2006 (8.0) is statistically significant.

Figure 39: General Satisfaction with CFLs Over Time Among CFL Purchasers, 2001–2011
(Where 1=Not at all Satisfied, 10=Very Satisfied)

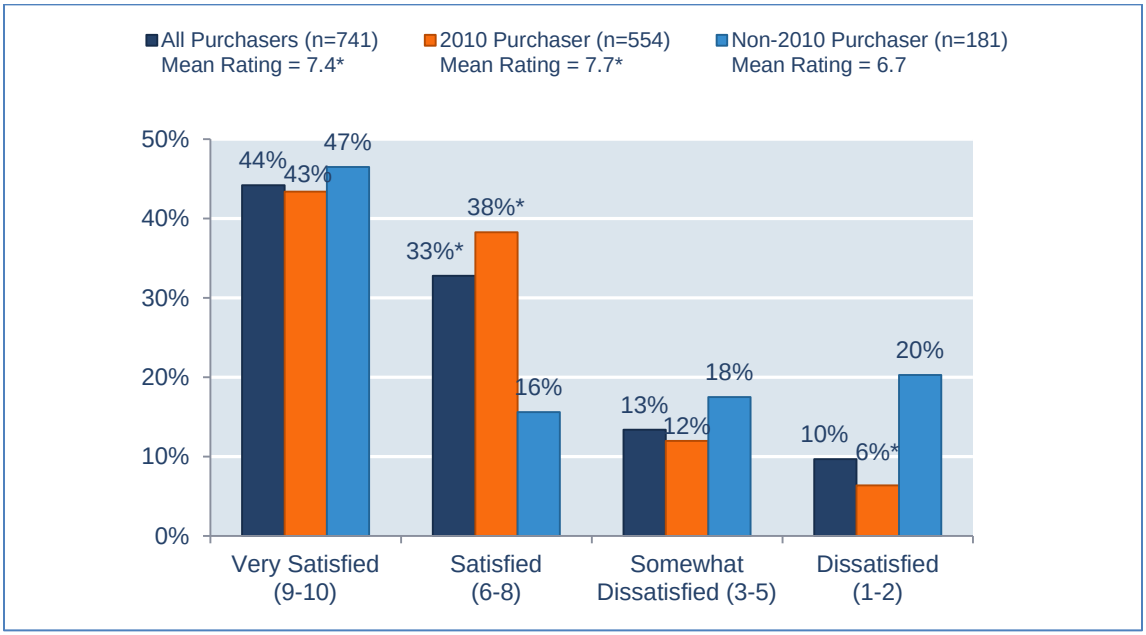
* Difference from previous study period is statistically significant.

D.2.2 CFL Satisfaction by Purchaser Group

Figure 40 shows overall satisfaction with CFLs for CFL purchasers in general, as well as for purchasers who bought CFLs in 2010 and purchasers who did not buy any in 2010 (but purchased CFLs in prior years). CFL purchasers who did not purchase CFLs in 2010 reported a significantly lower mean satisfaction rating than 2010 purchasers and purchasers in general.

Figure 40: General Satisfaction with CFLs Among CFL Purchasers, 2011

(Where 1=Not at all Satisfied, 10=Very Satisfied)



* Difference from non-2010 purchasers is statistically significant

D.2.3 Satisfaction with CFL Attributes

The consumer survey addressed consumer satisfaction with specific CFL attributes in two ways:

(1) by asking CFL purchasers to rate their level of satisfaction with various CFL attributes (such as color of the light and appearance in light fixtures) on a 5-point scale where 1 means, “not at all satisfied” and 5 means, “very satisfied; ” and

(2) by asking CFL purchasers to indicate their level of agreement or disagreement with a series of statements regarding CFLs on a 5-point scale where 1 means, “not at all likely” and 5 means, “very likely.”

We utilized the first approach in each round of consumer surveys from 2004 through 2011, and utilized the second approach starting in 2011.

Results from the first approach (in which interviewers asked CFL purchasers to rate their satisfaction with specific CFL attributes) suggested a statistically significant decline in average satisfaction with the color of light, light up time, and how long CFLs last between 2009 and 2010 (Table 15).

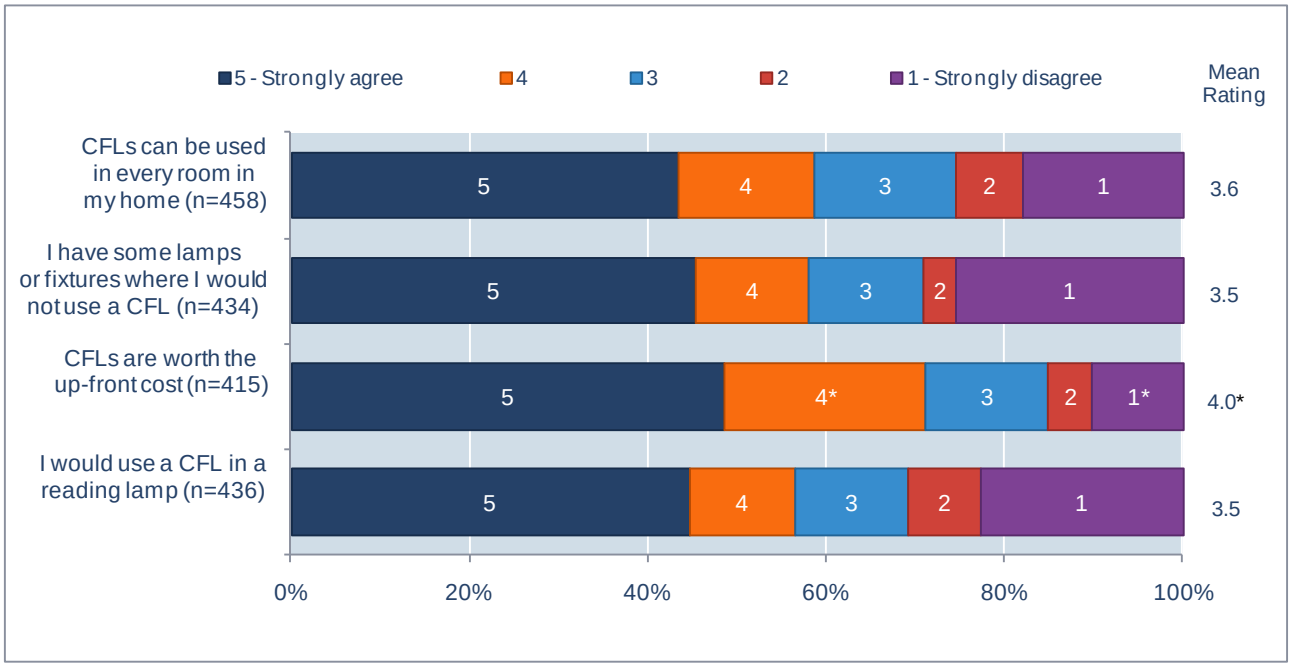
Table 15: Mean Satisfaction with CFL Attributes Among CFL Purchasers, 2004–2011
(Where 1=Not at all Satisfied, 10=Very Satisfied)

Lamp Attribute	Mean Rating Among All Purchasers				
	2004 (n=554)	2005 (n=220)	2006 (n=217)	2010 (n=230)	2011 (n=349)
Ability to work with a dimmer and 3-way applications	3.5	3.2	*	*	*
Appearance in fixture	3.8	3.8	3.9	3.8	3.7
Brightness of light	3.9	4.0	4.0	4.0	3.9
Color of light	4.0	4.0	4.0	4.2	3.9†
Light up time	4.0	3.8	4.2†	4.0	3.6†
Light fixture fit	4.0	4.2	4.5	4.4	4.3
How long they last	4.3	4.4	4.5	4.8	4.3†

* Data not collected in 2006, 2010, or 2011.
† Difference from previous study period is statistically significant.

Results from the second approach (in which we asked CFL purchasers to indicate their agreement or disagreement with various statements regarding CFLs) suggest that consumers tend to agree with the statement, "CFLs are worth the up-front cost" significantly more than the other statements (Figure 41). The mean agreement rating for the other three statements – which include, "CFLs can be used in every room in my home," "I have some lamps or fixtures where I would not use a CFL," and "I would use a CFL in a reading lamp" – were lower by statistically significant margins.

Figure 41: Level of Agreement with Statements Regarding CFLs, 2011
(Where 1=Strongly Disagree, 5=Strongly Agree)



* Difference from other statements is statistically significant.

As expected, respondents' levels of agreement with the statements mentioned above tend to vary according to the saturation of CFLs in their homes (that is, the percentage of total household sockets currently filled with CFLs). As shown in Table 16, the mean level of agreement with the statements "I would use a CFL in a reading lamp," "CFLs are worth the up-front cost," and "CFLs can be used in every room in my home" are significantly lower among respondents with no CFLs than among all other groups (i.e., among everyone with 1 or more CFL installed). Additionally, respondents with 68 percent or higher saturation rate their level of agreement with the statements "I would use a CFL in a reading lamp" and "CFLs can be used in every room in my home" significantly higher than all other groups. These highly saturated CFL users also rate their level of agreement with the statement, "I have some lamps or fixtures where I would not use a CFL" significantly lower than all other groups.

Table 16: Mean Level of Agreement with Statements Regarding CFLs, by Percent Saturation, 2011

(Where 1=Strongly Disagree, 5=Strongly Agree)

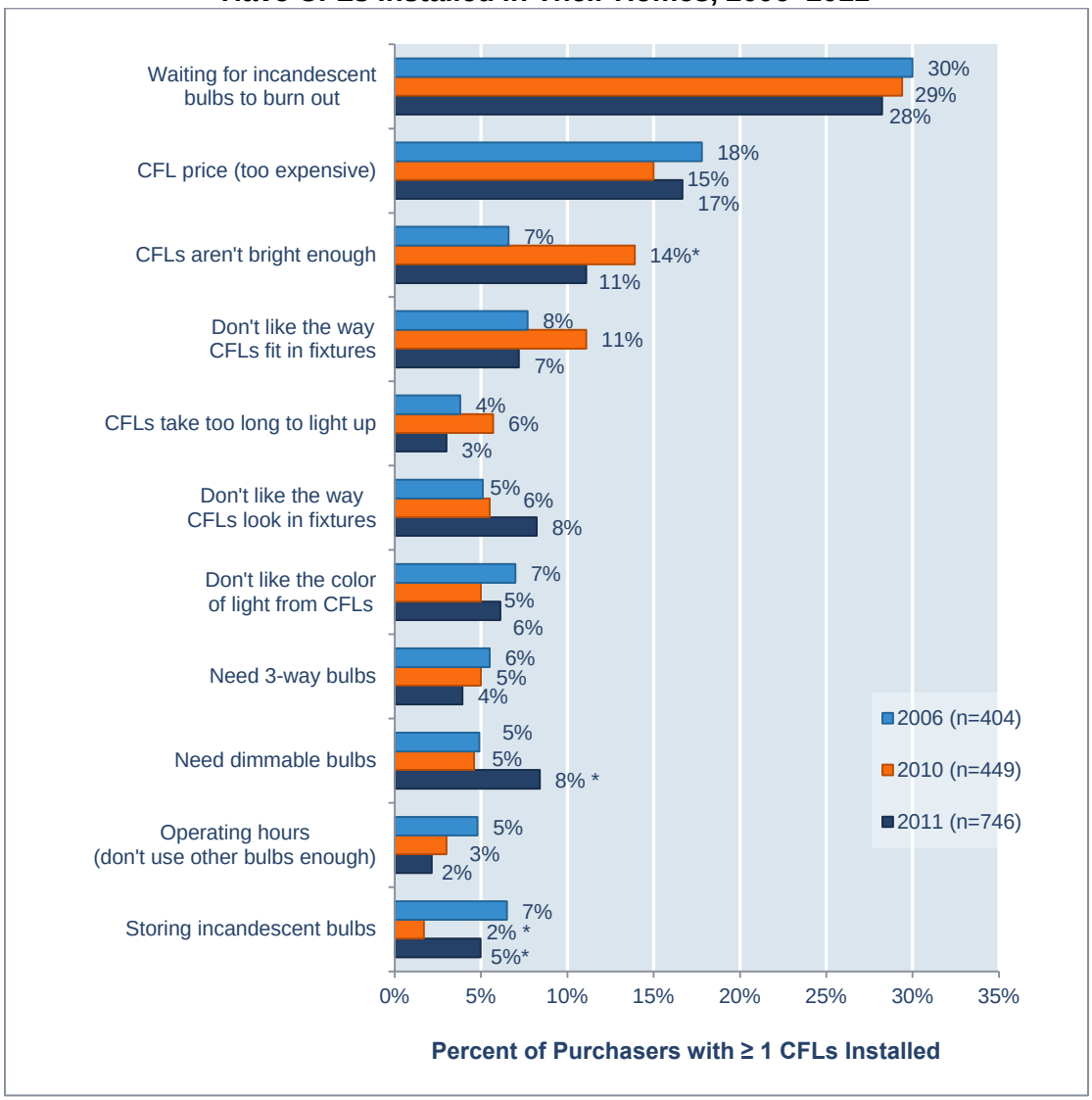
	Percent Saturation			
Mean Rating	0%	1-33%	34-67%	68% +
I would use a CFL in a reading lamp	2.0*	3.2	3.5	4.2*
CFLs are worth the up-front cost.	2.1*	3.6**	4.1	4.4
I have some lamps or fixtures where I would not use a CFL.	4.0	3.9	3.8	2.9*
CFLs can be used in every room in my home	2.2*	3.2	3.5	4.4*

* Difference from all other saturation groups is statistically significant.
** Difference from 68%+ saturation group is statistically significant.

D.2.4 Factors Preventing Additional CFL Installations

Furthermore, we asked CFL purchasers what were the main factors preventing them from installing more CFLs in their homes. As shown in Figure 42, the main factor continues to be that consumers are waiting for incandescent lamps to burn out (30%), followed by the perception that CFLs are too expensive (18%). A slightly higher proportion of CFL users in 2011 (8%) are reporting a need for dimmable CFLs as the main factor preventing installing more CFLs (compared to 5% in 2010 and 2006; a statistically significant change). Slightly fewer 2011 CFL users cited low operating hours (2%) compared to 2006 (5%), and more than twice the proportion report that their incandescent storage is preventing them from installing CFLs in 2011 compared to 2010 (from 2 percent in 2010 to 5 percent in 2011). There were no other statistically significant differences in 2011.

Figure 42: Main Factors Preventing Additional CFL Installations Among CFL Purchasers Who Have CFLs Installed in Their Homes, 2006–2011



* Difference from prior year is statistically significant

D.2.5 Influences on CFLs Installation Patterns

The 2011 survey included questions to address specific influences on CFL usage within the home based on focus group results which suggested that consumers may make choices about where to install CFLs in their homes based on how they use a particular fixture, the type of fixture in which the lamp will be installed, or other factors. This section presents results from those survey questions.

D.2.5.1 How a Fixture is Used

Interviewers asked CFL purchasers the following question: “Does the way you use a particular light fixture – say, for reading versus general lighting – affect whether you’d use a CFL in that fixture?” Forty-three percent of CFL purchasers responded in the affirmative. Of these, more than half of the respondents suggested that they prefer not to use CFLs in lamps used for reading (most often because respondents believe CFLs are not bright enough for this purpose).

Not surprisingly, a significantly higher proportion of CFL users with at least two-thirds of their household sockets filled with CFLs report that the way they use a fixture has no impact on whether or not they would use a CFL in that fixture (71%, compared to less than 49% for households with lower levels of penetration).

D.2.5.2 Fixture Type

Interviewers also asked CFL purchasers whether the type of lamp or fixture affects whether they would use a CFL in that lamp or fixture. While these results are somewhat difficult to interpret (because fixture type often dictates how one uses a fixture), approximately 31 percent of respondents said that the type of lamp or fixture does affect whether or not they’d use a CFL in that fixture (a significantly smaller proportion of purchasers than those who report that the way they use a fixture influences whether they’d use a CFL in a particular fixture). Of these, table lamps and ceiling lamps were the most-cited lamp type in which purchasers prefer not to install CFLs (each mentioned by approximately one-third of purchasers who indicated that fixture type has an influence on whether they’d install a CFL).

Not surprisingly, households with higher levels of CFL penetration in their homes appear to discriminate less among fixture types when installing CFLs.

D.2.5.3 Other Factors

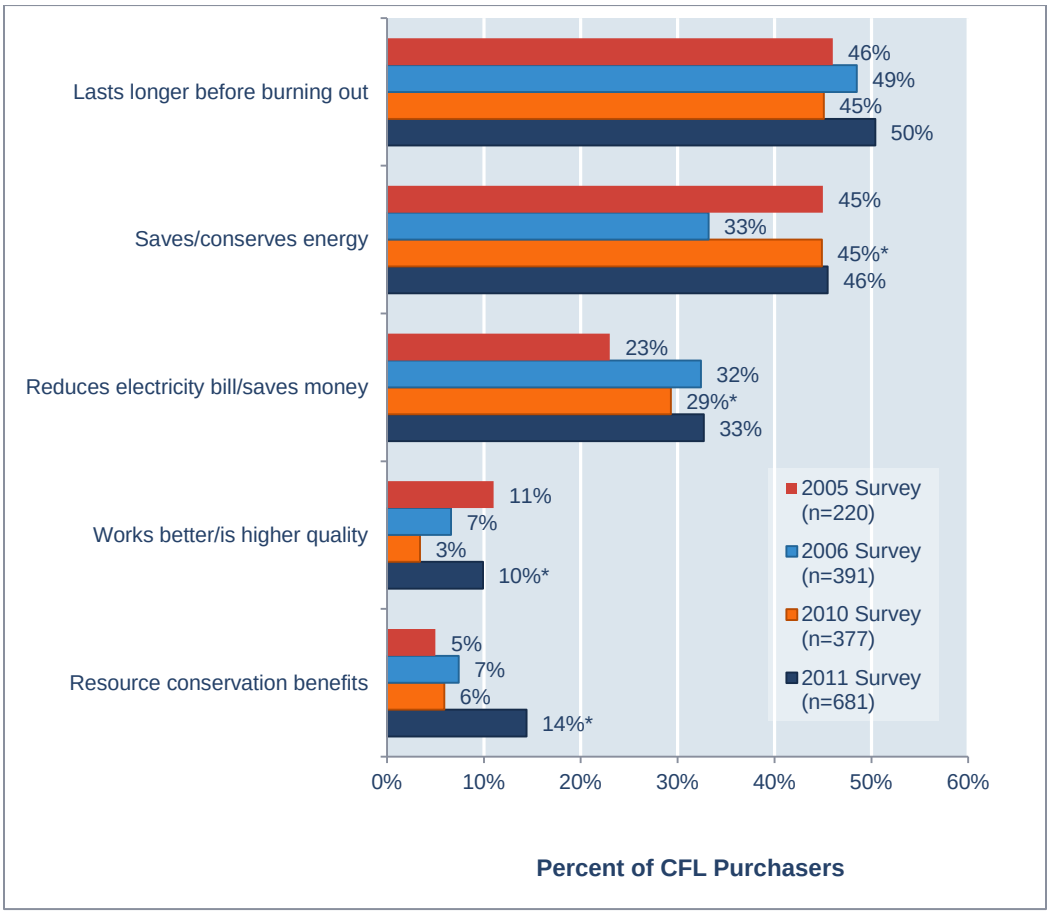
Interviewers also asked CFL purchasers, “is there anything else that affects whether you’d use a CFL in a particular fixture?” The vast majority (80 percent) reported that there were no other factors that affect whether they would use a CFL in a particular fixture.

D.2.6 Best Features of CFLs

Figure 43 shows purchasers’ impressions of the best features of CFLs. The two features most consistently cited as best in each year from 2005 through 2011 are that CFLs last longer and that CFLs save energy. In 2011, half of respondents mentioned the relatively longer lifespan of CFLs as the best feature, and 46 percent mentioned their energy savings. While these proportions are statistically unchanged since 2010, statistically higher proportions reported that CFLs are higher quality and their resource conservation benefits in 2010 (10% and 14%, respectively), compared to 2010 (3% and 6%, respectively).

Interviewers also asked purchasers about their impressions of the worst features of CFLs. Respondents cited two features most: that CFLs are not bright enough and that they take too long to light up (each mentioned by more than 20 percent of respondents).

Figure 43: CFL Purchaser Impressions of Best CFL Features Over Time, 2005–2011†‡

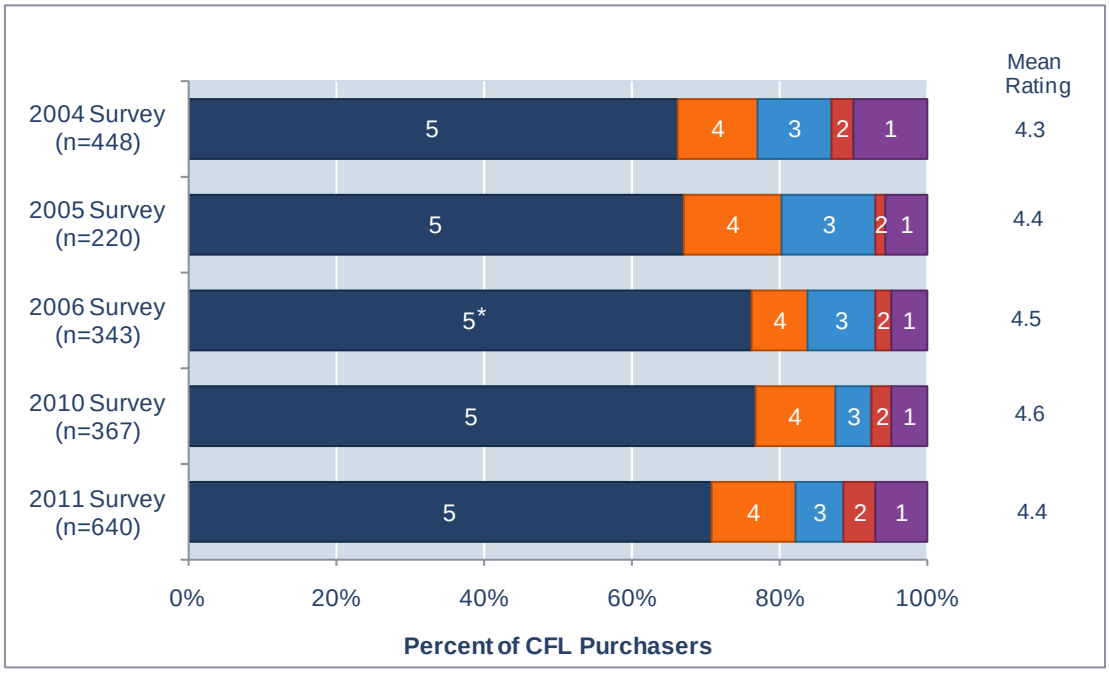


† Question allowed multiple responses; results may not total 100 percent.
‡ Question Wording: "In general, what are the best features of CFLs?"
* Difference from prior study period is statistically significant.

D.2.7 CFL to CFL Replacement Intentions

We asked respondents to rate how likely they would be to replace a burned out CFL with another CFL using a 5-point scale where 1 means, "not at all likely" and 5 means, "very likely." As shown in Figure 44, there are no statistically significant changes in results between 2010 and 2011. Roughly three-quarters of CFL purchasers report that they are very likely to replace CFLs with CFLs (a "5" rating).

Figure 44: CFL Purchaser Likelihood of Replacing a CFL with a CFL Upon Burnout, 2004–2011
(Where 1=Not at all Likely, 10=Very Likely)



* Difference from prior study period is statistically significant.

In past years, likelihood ratings were significantly higher among respondents who made their most recent purchases within the past year than among those whose most recent purchase was more than one year prior. However, as shown in Table 17, the likelihood rating among recent purchasers and those who purchased CFL over a year ago are statistically similar.

Table 17: Mean Likelihood of Replacing a CFL with a CFL Upon Burnout by Date of Most Recent Purchase, 2005–2011
(Where 1=Not at all Likely, 10=Very Likely)

Date of Most Recent Purchase	Purchasers				Number of Respondents			
	2011 Survey	2010 Survey	2006 Survey	2005 Survey	2011 Survey	2010 Survey	2006 Survey	2005 Survey
Within the Past Year	4.4	4.6	4.6	4.5	499	293	258	55
1 or More Years Ago	4.2	4.2*	4.3*	4.1*	135	67	73	125

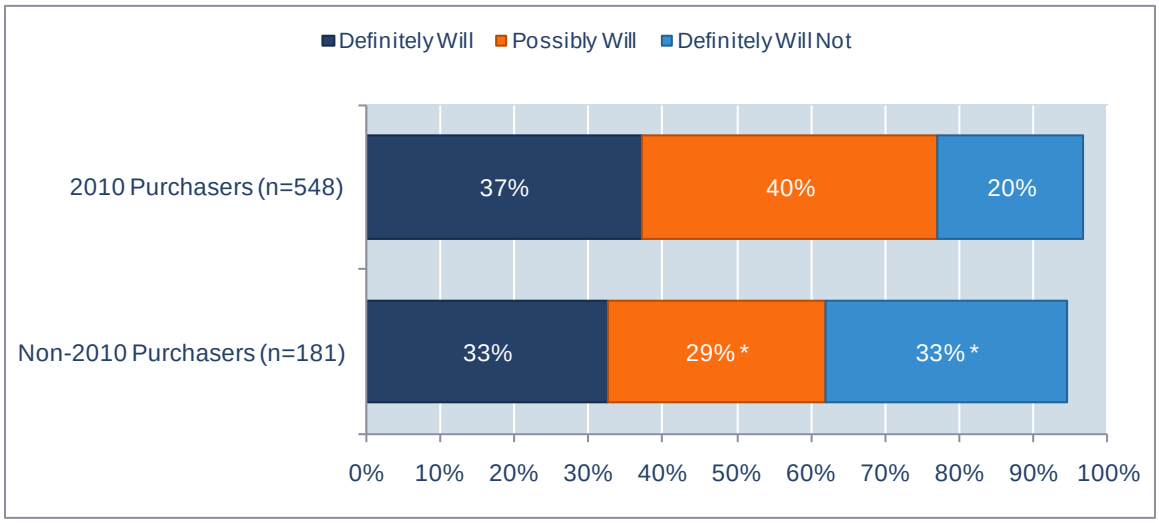
* Difference within survey year among purchasers who bought CFLs within the past year is statistically significant.

D.2.8 Incandescent to CFL Replacement Intentions

We asked all respondents who were aware of CFLs whether they would definitely, would possibly, or would definitely *not* replace a burned-out incandescent lamp with a CFL. As shown in Figure 45, more than two in three 2010 purchasers are at least somewhat likely to replace a burned-out incandescent

lamp with a CFL (37% “definitely will” and 40% “possibly will”), compared to 62 percent of non-2010 purchasers, a statistically significant difference.

Figure 45: Likelihood of Replacing an Incandescent Lamp with a CFL Upon Burnout, 2011‡



‡ Question allowed multiple responses; results may not total 100%.
* Difference from 2010 Purchasers is statistically significant.

D.3 CFL Purchase Intentions

D.3.1 Likelihood of CFL Purchases within a Year

We asked respondents to rate the likelihood that they would purchase a CFL in the next year using a scale of 1 to 5 in which 1 means, “not at all likely” and 5 means, “very likely.” Respondents who were unaware of CFLs prior to the survey were first read a description of CFLs[32] before they were asked this question; these respondents are referred to as “Informed Unaware”.[33]

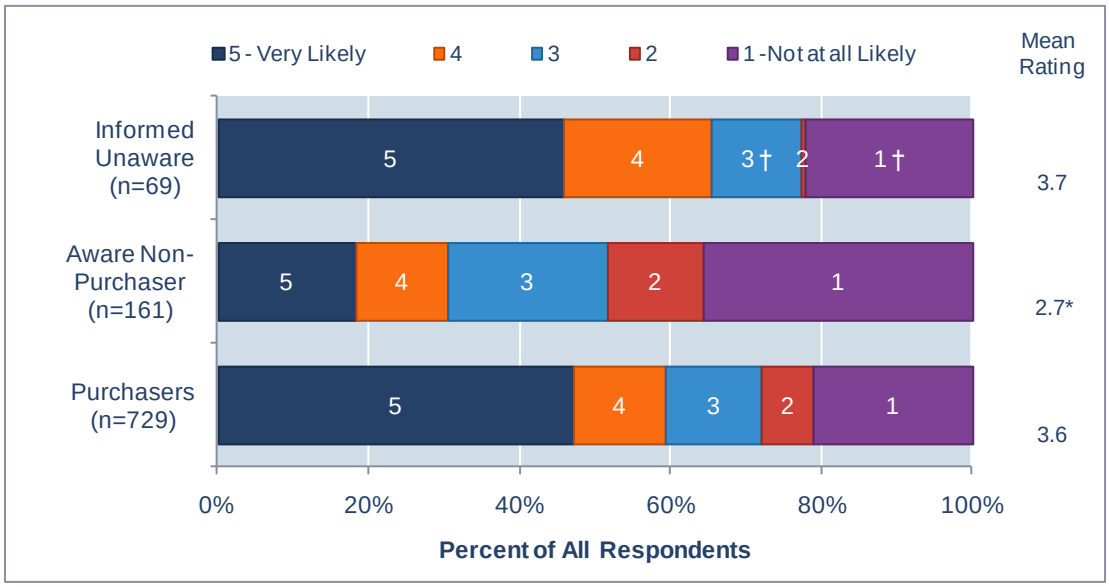
As shown in Figure 46, responses differ across purchase categories, with Aware Non-Purchasers the least likely to purchase CFLs in 2011. Informed Unaware respondents and Purchasers were statistically equally likely to purchase a CFL in 2011, with mean ratings of 3.7 out of 5 and 3.6 out of 5, respectively. This same trend across purchase categories was reported in 2005, 2006, and 2010,

[32] The CFL description read, “CFLs use two-thirds less energy than a standard bulb, and last up to 10 times as long. Some styles of CFLs are available for $2 or less – and they are about the same size and color as a standard bulb and can be installed in almost any fixture where you would put a standard bulb. They can be purchased at the same places you purchase standard bulbs, including some drug and grocery stores. CFLs save about $30 in electricity costs over the life of the bulb. By using less energy, CFLs also help the environment.”

[33] At this point in the survey, Purchasers and Aware Non-Purchasers have not been read the same CFL description as Unaware respondents and may thus actually be somewhat less informed about current CFL pricing, availability, and so on than Unaware respondents.

further suggesting there may be CFL purchase potential within the Informed Unaware population.

Figure 46: Likelihood of CFL Purchase within the Next Year Among All Respondents, 2011



* Difference from other categories is statistically significant.
† Difference from Aware Non-Purchasers is statistically significant.

D.4 Fixture Usage

D.4.1 Awareness and Purchase

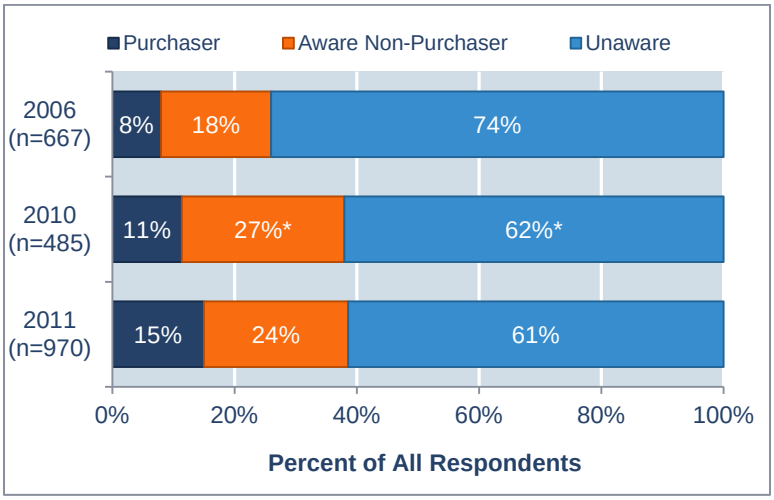
The 2006, 2010, and 2011 surveys included questions regarding compact fluorescent (CF) fixtures. The questions address awareness and purchase of CF fixtures, also known as ENERGY STAR light fixtures. Unlike standard incandescent light fixtures that use screw-based lamps, CF fixtures use special pin-based CFLs that plug into the fixtures. In 2011:

- Forty-three percent of CFL purchasers are aware of compact fluorescent (CF fixtures), compared with only 32 percent of respondents who are aware of CFLs but have not purchased them (aware non-purchasers) and 13 percent of respondents who are unaware of CFLs.
- Seventeen percent of CFL purchasers have also purchased CF fixtures. Among non-purchasers of CFLs, 9 percent of aware non-purchasers and 5 percent of unaware respondents have purchase CF fixtures.
- CF fixture awareness and purchase rates are similar among metro and non-metro consumers.

Figure 47 compares the distribution of respondents by awareness and purchases of CF fixtures from 2006 to 2011. Awareness and purchase rates in 2011 remained statistically unchanged since 2010.

Similar to both the 2006 and 2010 study, CF fixture awareness and purchase is positively correlated with CFL awareness and purchases.

Figure 47: Compact Fluorescent (CF) Fixture Awareness and Purchase Rates, 2006-2011



* Difference from other categories is statistically significant.

We asked CF fixture purchasers why they purchased a CF fixture as opposed to a "regular" fixture that use screw-based lamps. Table 18 shows that CF fixture purchasers decided to purchase a CF fixture for reductions in their electric bills significantly more in 2011 (18%) than in 2010 (7%). Interestingly, the proportion of CF fixture respondents who cited this reason in 2011 is statistically the same as the proportion citing reductions in their electric bills in 2006 (23%). In 2011 the most frequently mentioned reason for purchasing CF fixtures as opposed to incandescent fixtures is to save or conserve energy (19%).

Table 18: Reasons for Choosing CF Fixture Over Standard Screw-Based Fixture, 2006-2011*

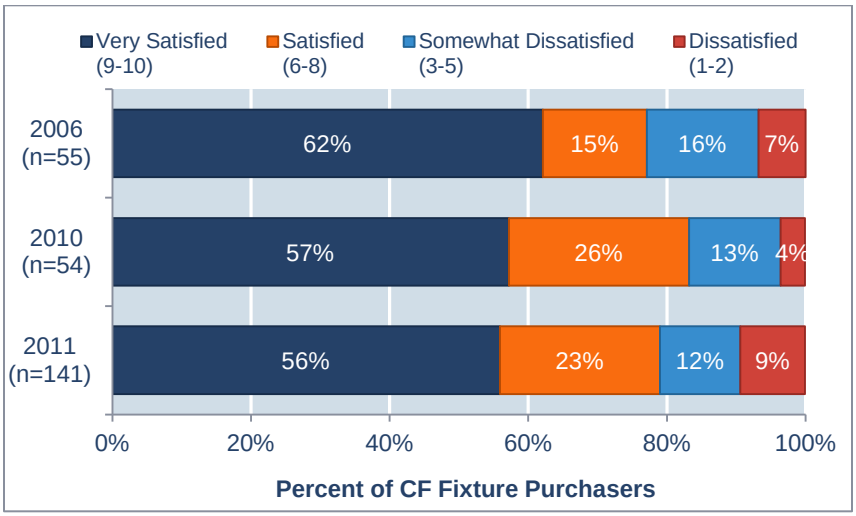
Reason	% of CF Fixture Purchasers		
	2006 (n=55)	2010 (n=54)	2011 (n=141)
Higher quality product	27%	11%	3%
Reduce electric bill	23%	7%†	18%†
Save/conserve energy	13%	13%	19%
Remodeling	8%	15%	13%
Energy cost savings worth the extra upfront cost	7%	0%	2%†
Energy savings worth the extra upfront cost	5%	4%	4%
Extra cost was minimal	3%	1%	1%
Had a coupon	2%	2%	0%
Like to have new, high-tech products	2%	11%	4%
Other	8%	48%†	43%
Don't Know	15%	5%	12%

* Question allowed multiple responses; results may not total 100%.
† Difference from prior study period is statistically significant.

D.4.2 Satisfaction

The consumer phone surveys asked CF fixture purchasers to rate their satisfaction with the fixtures on a scale of 1 to 10 with 1 being "not at all satisfied" and 10 being "very satisfied." The average rating among CF fixture purchasers in 2011 was 7.9, slightly lower than in 2010 (8.4), although not statistically significant. As shown in Figure 48, more than half of respondents in 2011 (56%), 2010 (57%), and 2006 (62%) are very satisfied with CF fixtures. While there is some variation in the reported proportions in the figure, there are no statistically significant differences among respondents across study periods. This indicates a sustained high level of satisfaction among CF fixture purchasers.

Figure 48: Compact Fluorescent (CF) Fixture Awareness and Purchase Rates, 2006-2011



D.5 2007 Energy Independence and Security Act

D.5.1 Awareness

The 2010 and 2011 consumer telephone surveys included the following three questions to gauge Northwest consumers' awareness of various elements of the Energy Independence and Security Act of 2007 (EISA):

- Are you aware of any legislation in the United States that may affect the availability of certain types of light bulbs?
- In 2007 Congress passed legislation that will ban most traditional incandescent light bulbs by 2014. Before today, were you aware of this legislation?
- As part of the legislation, traditional 100-Watt light bulbs will no longer be sold by 2012. Before today, were you aware that 100-Watt light bulbs will no longer be available by 2012?

Each of these questions allowed responses of "yes," "no," or "don't know." Table 19 shows the percent who replied "yes" – that they are aware – for each of these questions. In 2010, less than one quarter of consumers in the Northwest was aware of any of the EISA elements mentioned in the survey. In 2011, statistically higher proportions of consumers in the Northwest are aware of each element queried by the survey.

Table 19: Awareness of EISA and Its Implications, 2010–2011

Aware…	Percent Aware	
	2010 (n=500)	2011 (n=1,000)
…of legislation that will affect lamp availability?	16%	26%*
…of legislation that will ban most traditional incandescents by 2014?	23%	33%*
…that traditional 100-watt incandescents will no longer be available by 2012?	11%	18%*

* Difference from prior study period is statistically significant.

D.5.2 Planned Activities Once EISA is in Effect

Following the questions described above, the 2010 and 2011 survey asked the following two additional questions (each allowing only one response):

- When traditional 100-watt light bulbs are eliminated, which one of the following things are you most likely to do: switch to a new type of light bulb, keep using traditional light bulbs but switch to a lower wattage, or something else?
  (Among respondents who answered "switch to a new type of light bulb") Which type of light bulb are you most likely to switch to - would you say LED, halogen, or CFL?

As shown in Table 20, significantly fewer Northwest consumers in 2011 said they are most likely to switch to a new type of lamp to replace their 100-watt incandescent lamps once the latter are phased out, compared to 2010.[34] In both 2010 and 2011, more than four out of five of these consumers reported that they are most likely going to switch to CFLs. In both 2010 and 2011, approximately one quarter of consumers said they are most likely going to replace their 100-watt incandescent lamps with incandescent lamps of a lower wattage. Only around 1 percent of the population in both years said they are most likely to stock up on low-efficacy 100-watt incandescent lamps before they are phased out.

[34] Note that if this survey question allowed more than one response, it is possible that a higher proportion of respondents (for example) may have stated that they would stockpile low-efficacy incandescent lamps in advance of the phase-out.

Table 20: Plans for Phase-Out of Low-Efficacy 100 Watt Incandescent Lamps, 2010–2011

Planned Action	Percent Aware	
	2010 (n=500)	2011 (n=1000)
Switch to a new type of light bulb	55%	46%*
Keep using traditional light bulbs but switch to a lower wattage	24%	27%
Stock up on 100-Watt lamps before the phase-out	1%	1%
Other	3%	6%
Don't know / Refused	17%	21%

* Difference from prior study period is statistically significant.

E. Consumer Survey Banner Tables

F. Consumer Focus Group Findings

F.1 Overview

In December 2010, KEMA's project manager conducted six focus groups with consumers in Portland, OR; Seattle, WA; and Spokane, WA. Each group consisted of 7 to 8 participants as shown in Table 21 below. The purpose of the focus groups was to closely examine consumer choices with regard to CFL purchase, installation, and usage patterns and to probe consumers regarding the on the barriers to replacing incandescent lamps with CFLs.[35]

Table 21: Number of Focus Group Participants by Group Location and Time, 2010

Location	Group Time		Total Participants
	5:30-7:00pm	7:30-9:00pm	
Portland	8	8	**16**
Seattle	8	8	**16**
Spokane	7	8	**15**
Total Participants	**23**	**24**	**47**

The groups began with a brief discussion of how participants would describe CFLs to others who were unfamiliar with them. The moderator then led participants in discussions regarding their light bulb shopping, installation, and usage behaviors; and impressions of various CFL attributes. Each session closed with a discussion of barriers to increasing CFL installations in participants' homes.

F.2 CFL Description

The moderator started each focus group discussion with a conversation about how one might describe CFLs to others who are not familiar with them. In more than half of the groups, the first response related to the general shape of the lamps: participants referred to them as "pigtail-shaped," "squiggly," "swirly," "twisty," and so on. At least one participant in each group mentioned CFLs in shapes other than the standard twister shape (including a-lamp, u-tube, globe, and others). A handful of participants also mentioned base types other than the standard screw-base lamp (such as pin-based).

After mentioning the shape of CFLs, however, the discussion quickly moved to CFL attributes with which participants were especially disappointed (or, in a few cases, pleased). Many focus group

[35] The focus groups also assisted with scoping for the consumer telephone surveys by helping to understand how consumers frame issues regarding CFL selection and use, which provided useful insights into appropriate wording for telephone survey questions.

participants voiced impressions that CFLs are not bright enough when describing them, and a slightly smaller proportion mentioned that CFLs take longer to reach full brightness:

- "The swirly ones don't light up very much – you know the dark rooms in my house? Those are the ones with swirly bulbs in them."
- "They're dimmer than the regular ones."
- "You'll be waiting a little longer for them to warm up."
- "[My son] refused to use it because when he first turns it on, it's too dull."
- "They don't get bright as quickly as other lights."

Because of issues with brightness, some participants also mentioned the impression that CFLs are not good for reading or other "close work" (such as sewing or needlepoint).

A handful mentioned that CFLs have a "different kind of light" or a "different color of light" as compared to traditional incandescent lamps, and a small number mentioned that CFLs can't be used in enclosed fixtures and/or that they're difficult to dispose of because they contain hazardous materials (i.e., mercury).

Not surprisingly, the initial discussion regarding how to describe CFLs also revealed some disagreement within the group about certain CFL characteristics – for example, some participants mentioned that CFLs last a long time, while others asserted that they don't last as long as they should. Some participants also had differing perspectives over whether CFLs can or cannot be used outdoors.

F.3 CFL Purchase, Installation, and Disposal Behaviors

Focus group participants reported purchasing CFLs in a variety of store types (primarily large home improvement and mass merchandise stores), and a small number of participants reported that they received some CFLs free of charge from their energy utility (e.g., Seattle City Light, Inland Power) or other organizations such as Energy Trust of Oregon.

When shopping for CFLs, focus group participants were split fairly evenly between those who purchase CFLs when they're on sale (whether they need them or not) and those who purchase them as needed. Many participants mentioned that they have at least one CFL on hand (in storage) in case another CFL burns out. Some also mentioned the impression that retail store salespeople are not knowledgeable about CFLs.

The vast majority of focus group participants had several CFLs installed in their homes, and a handful had all (or nearly all) of their sockets filled with CFLs. Installation behaviors differed among respondents. For example, a small proportion of participants reported that they made a conscious decision or effort to transition all or most of their light bulbs to CFLs (either gradually or all at once), and most of these individuals were motivated by potential money and energy savings. Most participants reported other CFL installation strategies, however, including focusing their CFLs installations in:

- **Fixtures with high hours of operation (for energy savings)** – e.g., "For awhile we didn't put them in the bathroom because we're only in there [for] a few minutes at a time, but [we put them] in the kitchen where you might be for an hour or so."
- **Difficult-to-reach fixtures (based on the long life expectancy of CFLs)** – in other words, to reduce the need to access these fixtures to replace burned-out lamps. For example, one participant noted, "I use them in the entryway because it's high and I don't want to pull out the ladder all the time."
- **Specific rooms, fixture types, control types, or applications** (see below).

Of the strategies described above, the majority of focus group participants mentioned that they prefer not to use CFLs in certain rooms or fixture types or for specific applications. However, there was no consensus on these issues:

- **Room type**. Several focus group participants mentioned that they prefer not to use CFLs in bathroom vanity fixtures in particular (typically because they dislike the color or quality of the light). Interestingly, a smaller number of participants mention that they especially like to use CFLs in their bathrooms.
- **Fixture type.** Several participants mentioned that they do not like to use CFLs in fixtures where the lamps are visible, while others mentioned that they dislike using CFLs in fixtures that are totally enclosed. The former group explained their reasoning based on aesthetics while the latter mentioned fit and performance issues.
- **Application.** Many focus group participants mentioned a preference for non-CFL light sources for "close work" such as reading or sewing, but a handful of others mentioned that CFLs are fine for these applications.
- **Control types.** Some focus group participants mentioned dissatisfaction with CFLs used in sockets controlled by dimmer switches, explaining that the lamps flickered, hummed, or buzzed when in use. All of the focus group participants who mentioned using CFLs with dimmer switches reported some trouble in these circumstances.

In five of the six focus groups, participants mentioned that CFLs contain mercury and/or that they need to be disposed of differently than "regular" (incandescent) lamps. None of the participants seemed to be particularly frightened by these facts, but a small number were concerned. None of the participants reported that they had stopped using CFLs (or planned to stop) as a result of these issues. Not surprisingly, some of the participants who weighed in on the mercury issue were ill-informed – for example:

- "I've heard that if one breaks in your home you're supposed to evacuate your house for 24 hours."
- "You put them in a couple of plastic bags and seal them up and [then] they go in the trash."

In all of the groups where CFL disposal was mentioned, one or more participants mentioned various disposal or collection sites for CFLs. These included specific retail chains, waste transfer stations, and/or local household hazardous waste collection events.

F.4 Impressions of CFL Attributes

During the focus groups, the moderator provided a worksheet to each participant. The worksheet included 7 statements regarding CFLs, and next to each statement the moderator asked participants to write the letter "D" if they mostly disagreed with it, "A" if they mostly agreed, or both letters if they were neither agreed nor disagreed (i.e., if they were unsure of how to respond).[36] Table 22 below shows the statements included on the worksheets as well as the participants' responses to each of the seven statements.

Table 22: Participant Agreement/Disagreement with Statements Regarding CFL Attributes

Statements	Participant Response			Total Responses
	Agree	Disagree	Unsure	
CFLs come in a variety of shapes and sizes	36	8	3	**47**
When installing CFLs, it makes sense to wait until the bulbs I have installed burn out first	31	13	3	**47**
CFLs take a long time to reach full brightness	30	12	5	**47**
CFLs provide good light quality	31	11	5	**47**
CFLs fit well in my light fixtures	24	14	9	**47**
CFLs can be used in every room in my home	20	25	2	**47**
CFLs take a long time to turn on when I flip the light switch	14	27	6	**47**

Below we summarize the discussions that occurred with regard to each statement on the worksheet:

- **CFLs come in a variety of shapes and sizes.** As mentioned above (in section F.2), the majority of participants were familiar with CFL shapes in addition to the standard spiral.
- **When installing CFLs, it makes sense to wait until the bulbs I have installed burn out first.** Most focus group participants agreed with this statement. Many participants stated that they prefer not to remove or discard working lamps – in other words, they will retain their working incandescent lamps if they replace them with CFLs, or they will wait until the incandescents lamps burn out to replace them with CFLs. A small number of participants expressed no difficulty with removing or discarding working incandescent lamps, but most reported that they feel "guilty" or "wasteful" when they remove or discard working incandescent lamps regardless of the potential to save energy or money from CFLs.
- **CFLs take a long time to reach full brightness.** More than half of focus group participants mentioned that CFLs don't reach their full brightness right away:
  - "It takes [CFLs] a minute to get to full brightness."
  - "I don't have the patience to wait for [CFLs] to get bright. I want it on right away so I can see what I'm doing."
  - "I've noticed that it takes a little longer for [CFLs] to get brighter."

[36] Worksheets included the same set of seven statements arranged in a different order for each focus group. Evaluators determined the order of phrases at random for each focus group worksheet.

- **CFLs provide good light quality.** About two-thirds of focus group participants agreed with this statement. There was some discussion regarding the "different" quality of the light emitted by CFLs, and a handful of participants mentioned having seen CFLs of different color temperatures using terms like "full-spectrum," "daylight color," "yellower," "warm," "greenish," and other terms to describe some CFLs. Others related light quality to brightness.
- **CFLs fit well in my light fixtures.** Roughly half of the focus group participants agreed with the statement that CFLs fit well in their light fixtures. Many mentioned that the lamps "stick out" of their fixtures in a way that "looked tacky" or "isn't fashionable." Others mentioned that some CFLs are simply too bulky to fit inside their enclosed fixtures.
- **CFLs can be used in every room in my home.** Less than half of the focus group participants agreed that CFLs can be used in every room in their homes. In all of the groups, participants discussed the distinction between the idea that CFLs "can" be used (technical suitability) versus where they would prefer to use CFLs. They explained that while CFLs could technically be used in any room, they have preferences that guide their installation patterns by room type:
  - "I wouldn't put them in my bedroom. I read in bed a lot."
  - "I won't put them in my living room or bedroom; I don't like the way the light looks in there."
  - "I don't like a bright light in my bathroom so I won't use them [in the bathroom]."

  As evidenced by some of the participants' quotes above, these preferences may be related to perceptions of light quality, brightness and/or how participants use the fixtures in which the CFLs are installed.

- **CFLs take a long time to turn on when I flip the light switch.** About one-quarter of participants agreed that CFLs take a long time to start up when they are first switched on. There was some discussion about the meaning of the phrase "a long time," and most participants agreed that they might not consider it a "long" time but that the delay is noticeable and/or is longer than they would associate with incandescent lamps.

F.5 Barriers to Increasing CFL Installations

When the focus group moderator turned the discussion toward barriers to increasing the number of CFLs installed in participant's homes, focus group participants mentioned many of the same issues described above in terms of preferences to use or not use CFLs in certain room types or fixture types, for specific applications, or with dimmer controls. When participants moved into deeper discussions regarding barriers to increasing CFL installations in their homes, participants began talking about their satisfaction with specific CFL attributes

From the perspective of barriers to increasing CFL installations, these include:

- **Brightness.** Several participants reported dissatisfaction with CFL brightness, reporting that CFLs are not bright enough. In many cases, this affected participants' choices regarding the rooms or applications for which they prefer non-CFL light sources. Many mentioned that some CFLs can take awhile to reach full brightness. The perception that CFLs are not bright enough appears to be more of a barrier to increased CFL installations than the slow start-up times, as most participants

who mentioned the latter also mentioned that they've adjusted to this issue or aren't really bothered by it.

- **Light color or light quality.** A small number of participants expressed dissatisfaction with the color or quality of the light from CFLs – and again, this affected some participants' choices regarding the rooms or applications for which they'd prefer to use or not use CFLs.
- **Length of life.** A small number of participants mentioned dissatisfaction with how long their CFLs last, explaining that some CFLs burned out long before the life expectancy stated on the lamp packaging.
- **Incompatibility with dimmer switches.** All of the focus group participants who mentioned using CFLs with dimmer switches reported some trouble in these circumstances. Interestingly, few explicitly expressed dissatisfied with CFLs as a result of this trouble, however – many simply stated matter-of-factly that CFLs cannot be used in applications where dimming was required.

G. Rural Urban Continuum Codes (RUCC) Memo

memo

To: Anu Teja and Rob Russell, NEEA Date: July 21, 2011

From: Jenna Canseco, KEMA Inc.
Tami Rasmussen, Evergreen Economics

Subject: 2010-11 Long-Term Northwest Residential Lighting Tracking Study Results by Rural-Urban Continuum Code Classifications

Background

In its market tracking reports, the Northwest Energy Efficiency Alliance (NEEA) typically presents results for the region as a whole as well by geographic location where possible. For the past several years, NEEA has presented geographic results at the state level and by metropolitan areas east and west of the Cascades mountain range versus nonmetropolitan areas in the region. These designations were based upon Metropolitan Statistical Area (MSA) classifications defined by the United States Office of Management and Budget (OMB) as published by the United States Census Bureau. For residential lighting market tracking efforts, NEEA reported results by MSA and Non-MSA designation, further subdividing “Metro” into “metro east” (metropolitan areas east of the Cascades mountain range) and “metro west” (metropolitan areas west of the Cascades), and presenting “Non-Metro” (nonmetropolitan areas throughout the region) to enable comparisons among population centers and less populated areas within the region.

In 2011, NEEA shifted its focus toward a different set of classifications of metropolitan versus nonmetropolitan areas utilized by the United States Department of Agriculture Economic Research Service (ERS). The ERS utilizes Rural Urban Continuum Codes (RUCC) that further classifies counties based on population sizes and functional adjacency to one or more metropolitan areas. These RUCC are comprised of nine categories based on population size, with category 1 indicating the greatest degree of urbanity (i.e., largest population centers) and category 9 indicating the greatest degree of ruralness (i.e., smallest populations). Based on these definitions, NEEA has grouped categories 1 through 5 as “urban” and categories 6 through 9 as “rural.”

While the MSA/Non-MSA classifications described above include many suburban areas in the “nonmetropolitan” category, the RUCC deem many suburban areas to be in the “urban” category (provided that they meet minimum population thresholds). Because of this re-categorization of suburban areas, the RUCC “rural” designation comprises a smaller proportion of the total Northwest population than the MSA “nonmetropolitan” designation.

Objective

Because NEEA has shifted its focus toward the RUCC classifications versus MSA/Non-MSA classifications, NEEA has asked the residential lighting research team (comprised of KEMA, Inc. and Evergreen Economics) to revisit results from the 2010-11 Long-Term Northwest Residential Lighting Tracking Study to examine the extent to which the data can be presented in the "urban" versus "rural" categories based on the RUCC. There were three data collection and analysis efforts in the study that included data at the zip code level and are thus potentially feasible candidates for this reexamination: the 2010 retail lighting store shelf survey data, the 2011 consumer telephone survey data, and the 2010 compact fluorescent lamp (CFL) sales data. Thus, the purpose of this memorandum is to review the extent to which these data can be presented in terms of "urban" versus "rural" designation and present results where feasible.

Datasets

Below we present the available data for characterizing the urban versus rural results for the shelf survey, consumer survey, and CFL sales data.

Shelf Survey

Overview

During late 2010, experienced field researchers conducted 58 shelf surveys in Northwest retail stores that carry residential lighting products. Researchers followed the same sampling protocol as used in previous years. Table 1 shows that of the 58 sites visited, 36 were categorized as "metro" based on the MSA classifications and 22 were categorized as "non-metro." When the zip code data for these sites are reexamined based on the RUCC classifications (Table 2), 53 of the sites are categorized as "urban" while only 5 are categorized as "rural."

Table 1: Disposition of Shelf Surveys by State and MSA Classification

State	MSA Classification		Total
	Metro	Non-Metro	
Idaho	12	7	19
Montana	2	5	7
Oregon	12	8	20
Washington	10	2	12
Total	**36**	**22**	**58**
Percent of Total	**62%**	**38%**	**100%**

Table 2: Disposition of Shelf Surveys by RUCC Classification

State	RUCC Classification		Total
	Urban	Rural	
Idaho	16	3	19
Montana	7	0	7
Oregon	18	2	20
Washington	12	0	12
Total	**53**	**5**	**58**
Percent of Total	**91%**	**9%**	**100%**

Based on these results, this memo does not present additional analyses of the shelf survey data (given the small sample size associated with rural stores). However, a brief review of results based on the rural/urban classifications suggests some substantial differences in results between stores in these locations. To determine whether these differences truly exist between rural and urban areas (i.e., are statistically significant[37]), analyses based on larger sample size would be necessary.

Consumer Survey

Overview

KEMA hired an experienced survey research firm to conduct 1,000 surveys with residents of Idaho, Montana, Oregon and Washington in early 2011. The sampling approach was the same as in previous rounds of consumer surveys, oversampling residents in non-metropolitan areas. Results were weighted to reflect the population. As shown in Table 3, 71 percent of the respondents were in metropolitan areas and 29 percent in nonmetropolitan areas. When the results were reclassified

[37] Statistical significance is reported at the 90 percent level of confidence throughout this memorandum.

based on RUCC, 88 percent of the respondents were in urban areas and 12 percent of respondents were in rural areas.

Table 3: Disposition of Consumer Surveys by State and MSA Classification

State	MSA Classification		Total
	Metro	Non-Metro	
Idaho	46	62	108
Montana	28	73	101
Oregon	228	86	314
Washington	408	69	477
Total	**710**	**290**	**1,000**
Percent of Total	**71%**	**29%**	**100%**

Table 4: Disposition of Consumer Surveys by RUCC Classification

State	RUCC Classification		Total
	Urban	Rural	
Idaho	75	33	108
Montana	65	35	100
Oregon	285	29	314
Washington	458	20	478
Total	**883**	**117**	**1,000**
Percent of Total	**88%**	**12%**	**100%**

Although the number of respondents for rural areas is fairly small (n=117), the sample size is still robust enough to reveal statistically significant differences between some results for urban versus rural respondents.

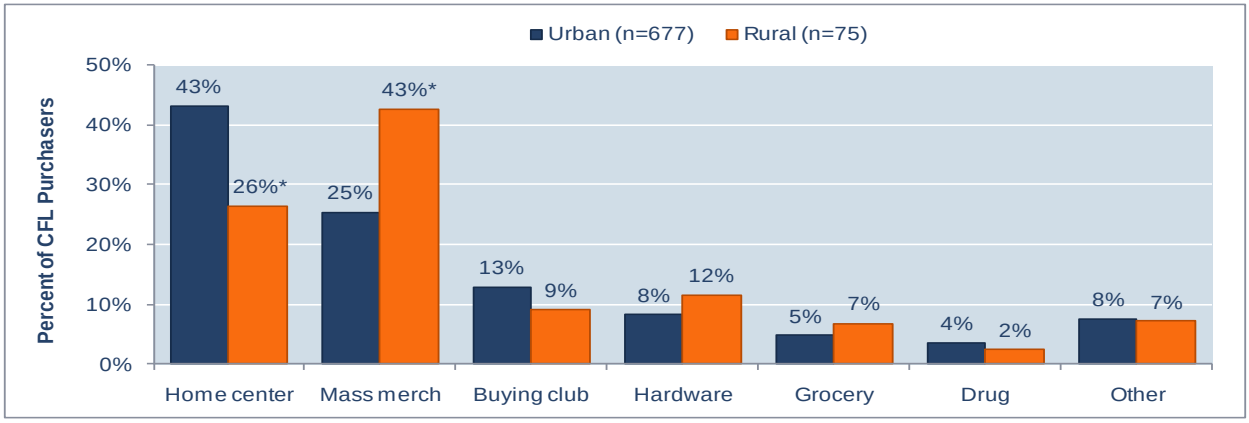
Key Findings from Consumer Surveys

Key findings for urban versus rural consumer telephone survey respondents include the following:

- There is no statistically significant difference in CFL awareness between urban and rural consumers in the Northwest. Of consumers who are aware of CFLs, a significantly higher proportion of urban consumers report having purchased CFLs as compared to rural consumers (84% versus 70 percent, respectively) but purchasers in both areas report having purchased similar quantities of CFLs within the past year (approximately 11 lamps).
    - There is no difference in awareness of specialty lamps among CFL purchasers in urban versus rural areas, with 39 percent of urban CFL purchasers aware of specialty lamps and 38 percent of rural purchasers.

- Among CFL purchasers, there is no statistically significant difference in the proportion of respondents who have CFLs installed in their homes among urban versus rural respondents (91% and 89% of purchasers, respectively). The average number of lamps installed per household is also fairly consistent between urban and rural areas (roughly 11 to 12 lamps, on average).
- Among CFL purchasers, the proportion of respondents storing CFLs does not differ between urban and rural areas (75% of urban respondents have CFLs in storage versus 73% of rural respondents). The average number of CFLs stored per household is also fairly consistent between urban and rural areas (roughly 5 to 6 lamps, on average); however, urban respondents store more incandescent lamps on average than rural respondents (roughly 7 versus 4 lamps, respectively).
    - Urban purchasers reported that, on average, they have purchased CFLs on approximately 9.1 occasions, while rural purchasers report having purchased CFLs on an average of approximately 5.7 occasions. These results may help explain the higher storage rates for urban versus rural purchasers
- Results suggest that urban CFL purchasers typically buy CFLs in home centers (such as Lowes and The Home Depot) while rural purchasers tend to buy CFLs in mass merchandise stores (such as Wal-Mart and KMart; see Figure 1).
    - Forty-three percent of urban CFL purchasers report that their most recent CFL purchase occurred in a home center compared to only 26 percent of rural purchasers.
    - The opposite is true for mass merchandise stores: 43 percent of rural CFL purchasers report that their most recent CFL purchase occurred in a mass merchandise store compared to only 25 percent of urban purchasers.
    - There were no other statistically significant differences in CFL purchase locations between urban and rural purchasers.

Figure 1: Most Recent CFL Purchase Location by Store Type and RUCC, 2011

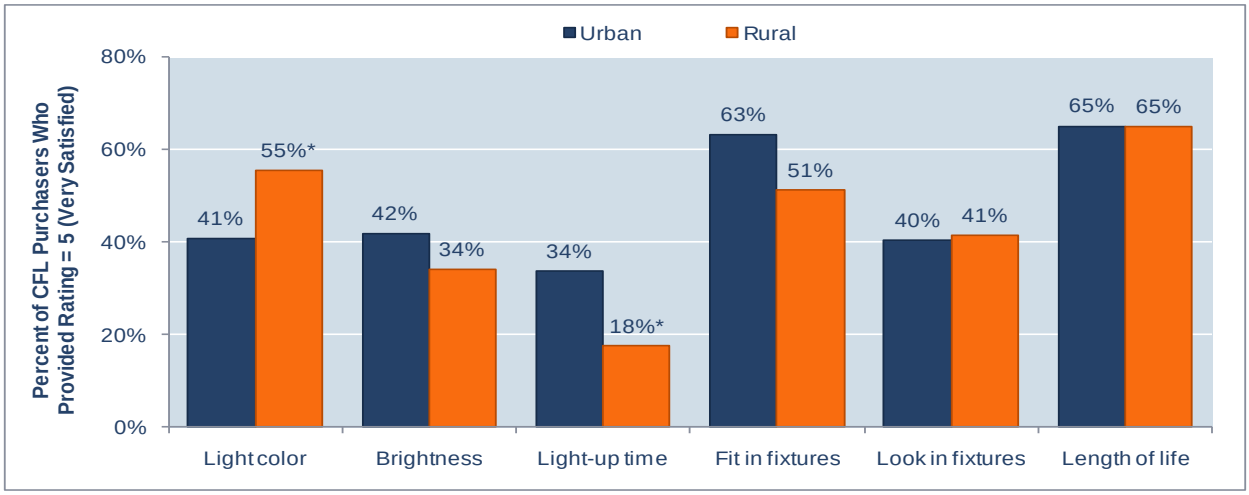


* Difference between Urban and Rural is statistically significant.

- Among CFL purchasers, average satisfaction ratings with the most recently-purchased CFLs are fairly high among both urban and rural consumers. When asked to rate their level of satisfaction with CFLs on a 10-point scale where 1 means "not at all satisfied" and 10 means "very satisfied," the average satisfaction rating for urban CFL purchasers was 7.4 compared to 7.8 for rural purchasers.
- When asked about satisfaction with specific CFL attributes, there are some noteworthy differences in responses between urban and rural CFL purchasers on a scale of 1 to 5 where 1 means "not at all satisfied" and 10 means "very satisfied" (Figure 2).
    - In terms of the color of the light CFLs provide, the average overall rating was similar between urban and rural purchasers, but a significantly greater proportion of rural consumers provided the highest satisfaction rating (55% of rural purchasers, 41% of urban).
    - The opposite pattern is apparent with regard to satisfaction with the amount of time it takes for CFLs to light up, with 34 percent of urban purchasers providing the highest satisfaction rating (5) compared to only 18 percent of rural purchasers.

  There were no noteworthy differences among urban versus rural purchaser satisfaction with CFL brightness, the way they fit into light fixtures, the way they look in light fixtures, or how long they last.

Figure 2: Percent of Respondents Who Provided Highest Satisfaction Rating (5) by CFL Attribute and RUCC, 2011
Satisfaction Scale: 1 = Not at all satisfied; 5 = Very satisfied



* Difference between Urban and Rural is statistically significant.

- The surveys included other questions to gauge satisfaction with CFLs, including questions that asked consumers to rate their level of agreement or disagreement with a series of statements. Respondents were asked to use ratings on a 5-point scale where 1 means "strongly disagree" and 5 means "strongly agree."
    - There were no significant differences between urban and rural respondents for the statements, "I would use a CFL in a reading lamp," "CFLs are worth the up-front cost," and "I have some lamps or fixtures where I would not use a CFL."
    - For the statement, "CFLs can be used in every room in my home," the overall average rating was similar between urban and rural CFL purchasers, but a larger proportion of rural purchasers provided the highest level of agreement (5) with this statement than urban purchasers (55% and 42%, respectively).
- Urban and rural CFL purchasers provided similar ratings for likelihood of replacing a CFL with another CFL upon burnout and for likelihood of replacing an incandescent lamp with a CFL upon burnout. There were no significant geographic differences in the reasons that consumers don't have more CFLs installed in their homes.
- Awareness and purchase rates for compact fluorescent fixtures are similar between consumers in urban and rural areas, as are satisfaction levels with fixtures among fixture purchasers.
- Urban and rural survey respondents had similar levels of awareness of the 2007 Energy Independence and Security Act. A statistically higher proportion of rural respondents, however, reported that they were aware before the survey that "traditional 100-watt light bulbs will no longer be sold by 2012" (24% of rural respondents versus 18% of urban).

When taken together, these results suggest that there are few differences between urban and rural consumers in the Northwest with regard to CFL and compact fluorescent fixture awareness, purchase, and installation rates and behaviors. Of note, however, is the higher purchase rate among urban versus rural purchasers, the fact that rural and urban shoppers tend to purchase CFLs in different store types, that urban purchasers have purchased CFLs on more occasions and are storing more CFLs in general than rural purchasers, and some differences in satisfaction with specific CFL attributes between rural and urban purchasers (although there is no discernible pattern in these results).

CFL Sales Data

Overview

Fluid Market Strategies has collected CFL sales data throughout the region on behalf of NEEA for several years. The current method relies upon reports of actual CFL sales through several major retail channels in the Northwest, reports from local utilities and other energy-efficiency program sponsors, and extrapolation of these data to retailers representing the Northwest region. Fluid Market Strategies collects data on sales through seven retail channels: do-it-yourself, mass merchants, wholesale clubs, small hardware, drug, grocery and lighting specialty stores.

In early July 2011, KEMA staff requested CFL sales by zip code from Fluid Market Strategies to examine the possibility of analyzing sales data by RUCC for NEEA. KEMA received an Excel workbook from Fluid Market Strategies that included partial data for a subset of the retail channels (because data is not available for all channels by zip code). The data file included sales in the do-it-yourself, mass merchandise, wholesale club, and small hardware channels.

As shown in Table 5, the CFL sales with zip code data for do-it-yourself stores represent 99 percent of total tracked CFL sales in the region. Closer examination of these data reveals that these sales are distributed among both urban and rural stores. This cursory review suggests that the data for which zip code information is available (and thus for which RUCC classification is possible) are relatively representative of sales through do-it-yourself channels in the Northwest.

For mass merchandise stores, sales for which RUCC classification is possible represent approximately two-thirds of total sales through these stores in the region. However, further examination of these data suggests that the zip code data represents only urban stores. This suggests that the data for which zip code information is available are not representative of total regional sales for the region through mass merchandise stores.

For the other two store types for which zip code level data is available—wholesale club and small hardware stores—the percent of total sales represented by the zip level data are much smaller. These data cannot be said to be representative of sales through wholesale club and small hardware stores in the Northwest.

These analyses suggest that at this time, the only sales data from 2010 for which zip code information is available (and thus for which RUCC classification is possible) with a high degree of representativeness of total regional sales would be sales through the do-it-yourself channel, which accounts for approximately one-third of 2010 total Northwest CFL sales (34%).

Table 5: Total 2010 Northwest Residential ENERGY STAR CFL Sales and Sales for Which RUCC Classification is Possible

Store Type	2010 Total CFL Sales	2010 CFL Sales with Zip Code Data	Percent of 2010 CFL Sales with Zip Code Data	Analyze sales by RUCC?
Do It Yourself	6,448,303	6,380,479	99%	Yes
Mass Merchants	5,128,418	3,437,438	67%	No; sample includes urban only
Wholesale Club	5,065,408	1,596,364	32%	No; sample too small
Small Hardware	2,011,230	52,630	3%	No; sample too small
Drug	210,270	0	0%	No; no zip codes
Grocery	123,230	0	0%	No; no zip codes
Lighting Specialty	39,029	0	0%	No; no zip codes
Total / Overall	**19,025,888**	**11,466,911**	**60%**	**34%**

Key Findings from CFL Sales Data

Key findings for do-it-yourself (DIY) stores in the Northwest are as follows:

- Approximately 99 percent of all CFLs sold through DIY channels in the Northwest are sold in urban stores (see Table 6).

Table 6: Northwest Residential ENERGY STAR CFL Sales in DIY Stores by RUCC, 2011*

RUCC	2010 DIY CFL Sales	Percent of Sales
Urban	69,174	1%
Rural	6,311,305	99%
Total / Overall	6,380,479	100%

* Note that 2010 sales for which RUCC classification is possible for the DIY channel represent 99% of total 2010 sales for DIY stores (6,380,479 of 6,448,303 total CFLs sold).

- Four out of five CFLs sold through DIY stores in the Northwest are general purpose CFLs, while approximately 21 percent are specialty CFLs (Table 7).
    - Urban and rural DIY stores in the Northwest sell similar proportions of specialty CFLs – 21 percent of CFLs sold in urban stores are specialty lamps compared to 18 percent in rural stores.

Table 7: Northwest Residential CFL Sales in DIY Stores by CFL Type and RUCC, 2011*

	2010 DIY CFL Sales			Percent of 2010 DIY CFL Sales		
RUCC	Urban	Rural	Total	Urban	Rural	Total
General Purpose	4,991,082	56,687	5,047,769	79%	82%	79%
Specialty	1,320,223	12,487	1,332,710	21%	18%	21%
Total / Overall	6,311,305	69,174	6,380,479	100%	100%	100%

* Note that 2010 sales for which RUCC classification is possible for the DIY channel represent 99% of total 2010 sales for DIY stores (6,380,479 of 6,448,303 total CFLs sold).

- Seventeen percent of CFLs sold in the region are sold with energy efficiency program incentives (Table 8).
    - A higher proportion of CFLs sold in rural DIY stores are sold with incentives (26%) than in urban DIY stores (17%).

Table 8: Northwest Residential CFL Sales in DIY Stores by Incentive/Non-Incentive and RUCC, 2011*

	2010 DIY CFL Sales			Percent of 2010 DIY CFL Sales		
RUCC	Urban	Rural	Total	Urban	Rural	Total
Incentive Sales	1,069,007	17,834	1,086,841	17%	26%	17%
Non-Incentive Sales	5,242,298	51,340	5,293,638	83%	74%	83%
Total / Overall	6,311,305	69,174	6,380,479	100%	100%	100%

* Note that 2010 sales for which RUCC classification is possible for the DIY channel represent 99% of total 2010 sales for DIY stores (6,380,479 of 6,448,303 total CFLs sold).

H. Review of NEEA's ACE Model Inputs

memo

To: Anu Teja, Northwest Energy Efficiency Alliance Date: April 22, 2011

From: Jenna Canseco, KEMA Inc.
Tami Rasmussen, Evergreen Economics

Subject: Review of ACE Model Key Assumptions – final results

This memorandum provides independent estimates of key NEEA lighting ACE model assumptions[38] based on the primary and secondary research that is underway for the Long-Term Northwest Residential Lighting Market Tracking Study. This memorandum completes an earlier preliminary version.

1. Total Market Size – Northwest CFL and Incandescent Sales

1.1 Sales and Market Share data analysis

Fluid generates estimates of total and ENERGY STAR CFL sales in the Northwest. For 2010, the estimate of total CFL sales was 20,195,963 – 19,025,888 of those were ENERGY STAR CFLs.

2. Total Market Size – Northwest Specialty CFLs

We do not have a primary or secondary data source that provides an estimate of Northwest specialty CFLs. However, we use the consumer survey and supplier interviews to provide an estimate of the share of total Northwest CFL sales that are specialty lamps. Fluid also broke out their CFL sales estimate for specialty CFLs. We will apply an estimate of the fraction of specialty CFL sales to the total Northwest CFL sales to provide an estimate of Northwest specialty CFL sales.

2.1 Share of Total CFLs that are Specialty CFLs

Consumer Surveys

The 2010 consumer lighting survey included the following questions regarding recent CFL purchases:

- M1. When was your most recent CFL purchase? Would you say it was either during 2010 or 11, or sometime before 2010?

[38] For standard CFLs, *Assumptions Table 10.25.2010.xls*, provided by NEEA in October 2010 and for specialty CFLs, *Assumptions_Table_20101227.xls*, provided by NEEA in January 2011.

- M2. Thinking about your most recent CFL purchase, how many did you buy? If a package contained more than one bulb, please count each one separately.
- M2a. How many of the CFLs you bought during your most recent purchase were the spiral, twisty, or curlicue shape?
- M2b. How many of the CFLs you bought during your most recent purchase were shaped like regular light bulbs?

To estimate the fraction of CFLs purchased within the last year that were specialty lamps versus standard CFLs (twisters and a-lamps), we first and excluded all respondents who did not purchase CFLs in 2010 or 2011 (based on responses to question M1). Using data from these respondents only, we calculated the fraction of specialty CFLs purchased in two ways:

(1) Method 1 (weighted average): We calculated the total number of CFLs purchased in the past year for each survey respondent individually (question M2). We then compared these results to the total number of twisters and a-lamps purchased by each respondent (questions M2a and M2b) and excluded all inaccurate responses (e.g., cases in which respondents said they said they purchased more twisters in the past year than the total number of CFLs purchased in the last year). We then calculated the percentage of standard versus specialty CFLs purchased by each respondent and took the weighted average of these percentages to estimate standard versus specialty CFL purchases in the past year.

(2) Method 2 (un-weighted average): We calculated the total number of CFLs purchased in the past year across *all* survey respondents (sum of all responses to M2). We then totaled the number of standard spiral and a-lamp CFLs purchased across all respondents and added these two numbers together to represent total standard CFLs purchased in the past year (sum of M2a and M2b), eliminating the same cases as described in Method 1 above. We then divided the latter estimate by the former to yield the percentage of CFLs purchased that were standard CFLs, and subtracted this estimate from 1 to yield the percentage of specialty CFLs purchased over the past year.

As shown in Table 1 below, these two methods yielded similar results, suggesting that approximately 8 to 10 percent of CFLs purchased by consumers in 2010 were specialty lamps.

Table 1: Percentage of Lamps Purchased in 2010 for Standard and Specialty CFLs by Method

CFL Type	Method	
	Method 1	Method 2
Standard (Twister and A-lamp)	92%	90%
Specialty	8%	10%
All CFL Types	**100%**	**100%**

Source: Preliminary results from the 2010 Consumer Lighting Survey. Results will be included in the 2010-11 Long Term Northwest Residential CFL Tracking Study report (2011).

Supplier Interviews

In January of 2011 we reached out to nine people involved in the process of supplying retail stores, both from within the store and as outside manufacturers. Our survey included the following questions:

- Q1a. Did the extent of theses (national CFL sales from 2009 to 2010) changes differ by lamp type, retailer type, geography, or anything else?
- Q1b. What do you think caused the changes in sales?
- Q1c. Have you seen changes in the proportion of sales that are standard CFLs versus specialty CFLs? (IF NECESSARY: standard CFLs are spirals, twisters, and a-lamps)
- Q6. Have you seen changes in the proportion of sales that are standard CFLs versus specialty CFLs in the Northwest between 2009 and 2010? (IF NECESSARY: standard CFLs are spirals, twisters, and a-lamps)
- Q6a (If Q6=yes) What do you think caused that shift?

While it was difficult to get hard sales figures, those interviewed commended on directional trends, mentioning that the past year has brought a decline in CFL twister (spiral) sales and an increase in the sale of floods and decorative CFLs. Many of those interviewed lacked sales figures but maintained a general consensus that specialty lamps are lagging behind twisters in sales, but are becoming more popular as awareness grows.

Only one manufacturer was able to give sales figures related to the portion of CFL sales that are specialty versus standard, and they said that on a nationwide level, 25% of their CFL sales are specialty.

Fluid Sales Estimate

Fluid estimated specialty CFL sales based on SKU data and extrapolation. They estimate that 30.4 percent of Northwest CFL sales in 2010 were specialty CFLs – or 6,133,258.

2.2 Northwest Specialty CFL Sales

We combined the average of consumer survey estimates and Fluid specialty CFL sales estimate to yield an estimate of the fraction of Northwest CFL sales in 2010 that were specialty CFLs. We use a weighted average, with the Fluid estimate weight equal to 2/3 since it is considered more reliable (mostly based on actual SKU data, but with some extrapolation) and the consumer survey estimate weight equal to 1/3.

> **2/3 [weight on Fluid estimate] * 30.4% [Fluid estimate] + 1/3 [weight on consumer survey estimate] * 9% [consumer survey estimate] = 23%**

We combines the 23 percent estimate to Fluid's overall estimate of Northwest CFL sales for 2010 to yield an independent estimate of 2010 Northwest specialty CFL sales:

23% * 20,195,963 [Fluid estimate of 2010 Northwest CFL sales] = 4,694,718 CFLs

3. Total Market Size – Technical Market Potential for CFLs

3.1 Literature Review

As part of the 2006-2008 Upstream Lighting Evaluation[39] conducted for the California Public Utilities Commission (CPUC), the KEMA CFL hours of use study included a detailed inventory of lighting sockets in California homes. Field inspectors recorded information on every type of lighting in the home – regardless of base type or lamp type – except for lamps in electric garage door openers, lamps built into appliances, plug-in nightlights, and fixtures with incandescent lamps of fewer than 20 watts. These data will provide a basis for estimating the fraction of sockets that may be filled with CFLs and specialty CFLs.

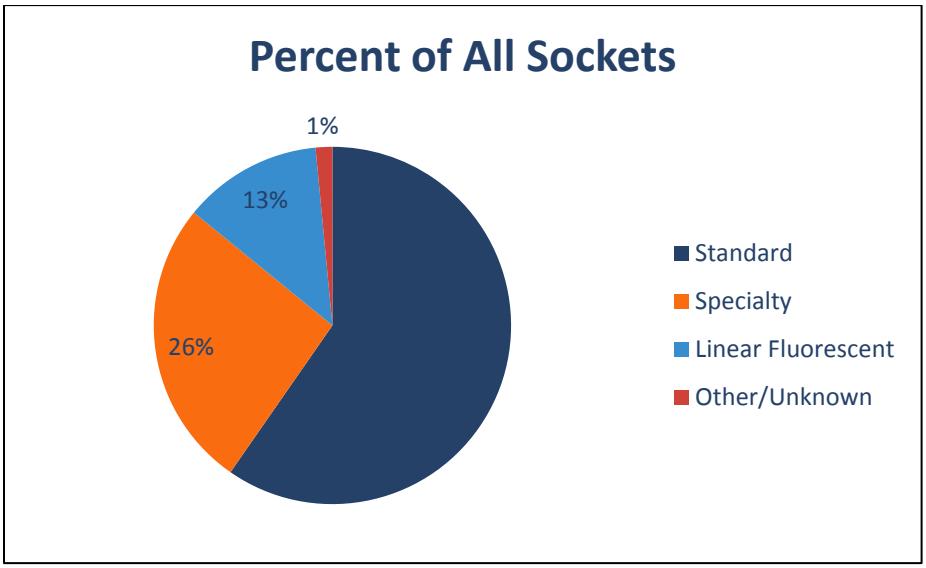
As shown in Figure 1, approximately 60 percent of household sockets in California are suitable for standard[40] lamps. Approximately 26 percent of sockets are specialty sockets[41], 13 percent are linear fluorescents, and 1 percent is other or unknown.

[39] KEMA, Inc., 2010. Final Evaluation Report: Upstream Lighting Program - Volume 1. Supported by The Cadmus Group, Inc.; Itron, Inc.; PA Consulting Group; and Jai J. Mitchell Analytics. Prepared for the California Public Utilities Commission, Energy Division. February 8, 2010.

[40] "Standard" consists of all sockets which are medium screw-based, non-dimmable, and non-three-way sockets.

[41] "Specialty" consists of all sockets which are either small screw-based, pin-based, dimmable, or three-way sockets (or any combination).

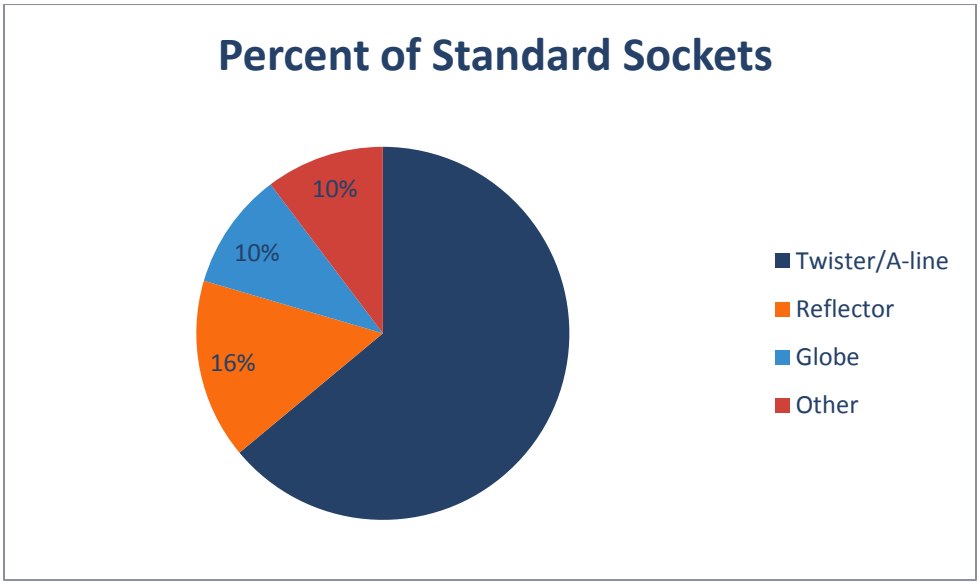
Figure 1: Percentage of Sockets by Socket Type



As shown in Figure 2, approximately 64 percent of Standard sockets in California were found to contain twister or A-line lamps. Sixteen percent contained reflectors, 10 percent contained globes, and 10 percent contained other lamp styles.[42]

[42] These "other" bulb styles include empty sockets, U-shaped, decorative, bullet/post, and circline bulbs.

Figure 2: Percentage of Standard Sockets by Lamp Type



4. Baseline Market Share

4.1 Overall CFLs

The baseline estimate is the theoretical level of CFL sales that would have occurred in absence of regional market interventions. The baseline is theoretical and difficult to estimate because there is no way to really know what would have happened in the absence of NEEA, utility and other regional promotions.

Last year, we provided NEEA with an estimate of 2009 CFL baseline sales that extrapolated 2008 CFL baseline estimates from various regional sources based on assumptions that the change in baseline was roughly equivalent to the change in overall CFL sales. [43]

Similar to the past two years, we will apply a rate of change equal to that of the CFL market over the past year to yield an estimate of 2010 CFL baseline sales. 2010 national CFL sales data will come from ENERGY STAR's contractor, D&R International, that compiles sales and market share data.

Sales and Market Share data analysis

The rate of change in CFL sales for the nation from 2009 to 2010 was 39 percent, per estimates provided by D&R International on April 18, 2011.[44] The estimate of Northwest CFL baseline sales for

[43] ECONorthwest memorandum on 2009 CFL ACE model assumptions from Tami Rasmussen to NEEA on May 3, 2010.

[44] Personal correspondence from Toby Swope to Jennifer Canseco and Tami Rasmussen.

2009 was 9.58 million CFLs, or 1.868 CFLs per household.[45] The 2010 Northwest baseline CFL estimate is equal to:

1.039 * 1.868 CFLs per household * 5,170,832 NW households[46] = 13,417,525 CFLs

Literature Review

A review of recent reports and papers on the federal lighting legislation (EISA) indicates that the legislation will lead to slower market transformation than previously thought, with less aggressive energy savings than anticipated.[47] For example, in 2012, the least efficient lamp will be only about 30 percent more efficient than the today's least efficient lamp. Moorefield predicts that the actual increased efficiency will be closer to 22 percent because the same standard is applied across multiple lighting output levels.[48] The literature does not provide quantitative data. However, the emerging industry consensus on EISA impacts may argue for NEEA to increase the timeframe during which the maximum achievable potential is met. NEEA may also adjust the shape of its curve such that the near-term naturally occurring baseline market share (e.g., through 2015) ramps up much slower than the later years (e.g., 2016-2020) to reflect the fact that the near-term EISA impacts are quite modest and the substantial impacts are expected in later years as the legislation is phased into effect.

4.2 Specialty CFLs

We will work with NEEA under separate contract to develop a scope of work for assessing the assumption for the baseline market share of specialty CFLs.

5. Savings Rate

5.1 Literature Review

California's *Final Upstream Lighting Report,Volume 1* includes estimates of the average daily hours of use for residential CFLs. Evaluators derived these estimates from analyses of lighting logger data

[45] ECONorthwest May 3, 2010.

[46] From US Census 2010 population estimates by state and US Census 2000 number of people per household by state.

[47] First Tracks Consulting Service, Inc., Applied Proactive Technologies, and Opinion Dynamics Corporation. EISA Lighting AESP Brown Bag Presentations. Association of Energy Service Professionals. January, 2011.

[48] Moorefield, L., 2010. Residential Lighting at a Crossroads: Why Next-Generation Technologies Are More Important than Ever. Presented at the ACEEE Summer Study on Energy Efficiency in Buildings. August, 2010.

collected through the Residential Lighting Metering Study.[49] The Metering Study included approximately 8,400 lighting loggers installed in 1,232 homes throughout California from July 2008 through June 2009. The Residential Lighting Metering Study utilized a sample stratified by investor-owned utility (IOU) service territory and geographic region. Researchers selected sample through a simple random sampling process within each region giving each residential account in the IOU records an equal probability of selection into the sample. The sample included single-family, multi-family, and manufactured homes.

Table 2 below shows the average daily hours of use reported in the *Final Upstream Lighting Report*. As shown, the average daily hours of use for standard (twister and a-lamp style) CFLs is approximately 2.0 hours per day, and the average across all CFL types is approximately 1.9 hours per day. The analyses also included hours of use estimates for CFLs discounted through IOU programs and found slightly lower hours of use for standard CFLs (1.9 hours) and all CFL styles (1.8 hours) as compared to all CFLs purchased and installed by Metering Study participants.

The estimates from California are very close to those used in the current ACE model (1.8) and we recommend that NEEA continue to use their estimates.

[49] KEMA, Inc., 2010. Final Evaluation Report: Upstream Lighting Program - Volume 1. Supported by The Cadmus Group, Inc.; Itron, Inc.; PA Consulting Group; and Jai J. Mitchell Analytics. Prepared for the California Public Utilities Commission, Energy Division. February 8, 2010.

Table 2: Average Daily Hours of Use for California CFLs by Style for All CFLs and IOU-Discounted CFLs

CFL Style	Average Daily Hours of Use - California	
	All CFLs	IOU-Discounted CFLs
Twister and A-lamp	2.0	1.9
Globe	1.5	1.6
Reflector	1.9	1.8
All CFL Styles	**1.9**	**1.8**

Source: "Table 38: Average Statewide Residential Daily Hours-of-Use (HOU) – By CFL Type" (KEMA, 2010).

6. Incremental Cost

6.1 Shelf Survey

In December of 2010, we conducted a fourth round of shelf surveys in the Northwest. Field staff conducted 58 surveys including 19 in Idaho, 7 in Montana, 20 in Oregon and 12 in Washington. During these surveys, field staff recorded the price per package for all CFLs they found in each store.

Based on these data, the cost in the past year appears to have increased by an average of 30 cents per lamp. Average price of CFLs rose in both metro and non-metro areas by 24 and 41 cents respectively within the past year. The average price for standard CFLs (including a-lamps) is estimated at $3.79 and specialty CFLs (excluding a-lamps) is $6.63.