

Sales Floor Market Intelligence for CFLs: Methods and Trends Over the Past Four Years

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Abstract

Residential energy efficiency lighting programs have been offered throughout the Northeast U.S. for a number of years. Historically, these programs have sought to build partnerships with retailers, manufacturers, and customers using ENERGY STAR[®] to guide product identification and promotion. Information about product availability and pricing is essential to the development of program offerings that meet the needs of customers while remaining cost effective for the sponsors of the programs. This study presents key information about ENERGY STAR CFL availability and pricing in retailers throughout the Northeast region over the past four years. The results are presented based on key product characteristics (e.g. wattage, style, and dimmability), product package configuration (e.g. single vs. multi-packs), retailer type, and geography. The results are illustrated in time series to highlight the dynamic changes in availability and pricing.

The study finds strong growth in the availability of both bare spiral and specialty CFLs over the past four years leveling in the recent time period (Fall 2008). Growth of flood type specialty CFLs has consistently outpaced the steady growth of A-line and globe CFLs. Prices for both bare spiral and specialty CFLs declined sharply in the early part of the study period (Fall 2005) and have leveled or increased slightly in the recent periods. Prices for CFLs both by retailer type and geographic region have converged in recent years in the Northeast. This is a strong indication of the maturity of the program offerings and the CFL market in the Northeast U.S.

Introduction

Utilities and other organizations throughout the Northeast U.S. have offered energy efficiency lighting programs to residential customers over the past several years (Ledyard et al. 2007). The success of these ENERGY STAR lighting programs broadly depends on a wide array of program design elements, implementation effectiveness, and retail and manufacturer partner participation.

Critical program design elements such as product promotion and incentive levels directly depend on the types and prices of products available in the retail channel. This retail information often varies significantly across different retailer types. For example, large Do-It-Yourself (DIY) stores usually carry a wider variety of energy efficient products at a lower price than local independent hardware stores or specialty lighting retailers. As such, programs can target different retailers with different types of program participation and at different levels to achieve program goals if this market information is available and used to refine program planning.

In addition to the variability present across retailers, the availability and pricing of energy efficient products are moving targets through time. Some of these changes are directly attributable to energy efficiency program offerings while others are a result of market forces such as product maturation and consumer preferences.

This research presents information about the availability and pricing of medium based ENERGY STAR CFLs in the retail channel in markets throughout the Northeast U.S. The information is segmented based on key product characteristics, retailer types, and markets and is presented in a time series format to illustrate the dynamic changes over time.

Data and Methodology

The data used in this analysis were gathered from retail sales floors in four states throughout the Northeast U.S. (Maine¹, New Hampshire, Rhode Island, New York [Long Island]) from Spring 2005 through Fall 2008. There were five data collection periods: Spring 2005, Fall 2005, Fall 2006, Fall 2007, and Fall 2008. Retailers ranging from small, independent hardware stores to large, DIY and department stores were included (see Table 1).

In each retail location, a model level inventory of all ENERGY STAR CFLs was completed. The inventory includes: product specific information (e.g. manufacturer, model number, wattage, product type/style), retailer specific information (e.g. DIY, hardware-chain, independent hardware), and information specific to the models in each individual retail location (e.g. price, quantity stocked, shelf area devoted to product). In each round of data collection, every effort is made to capture data for the entire population of participating retail locations.

Table 1. Number of Retailers Inventoried

# of States	Date	Department Stores	DIYs	Hardware - Chains	Hardware - Independents	Lighting Specialties	Total Retailers
3	Spring 2005	40	38	120	24	22	244
4	Fall 2005	43	47	187	45	26	348
4	Fall 2006	41	72	168	46	29	356
3	Fall 2007	42	70	126	36	25	299
3	Fall 2008	39	63	122	30	31	285

The data are collected on hardcopy data collection instruments that have been in use for the past ten years with minor revisions through the years to accommodate new products and improve the overall consistency of the data collection. Since these data are collected as part of the implementation of the ENERGY STAR Residential Lighting Programs throughout the region, trained field representatives complete the actual field data collection. These individuals are responsible for retailer support, and therefore, are well versed in the types and ENERGY STAR status of the products available in each of the retailers included in the study. After collection, the data are entered into a customized Microsoft Access™ database, and are extensively checked for accuracy and internal consistency. When new products are encountered in the field, product characteristics are captured along with the retailer specific information to allow the tracking of these product characteristics for future encounters with the product. These product characteristics are verified across the incoming data stream and with outside information sources² to ensure that the details are accurate.

The primary methodological tool used in this analysis is the visual comparison of time series data. The data collected represent snapshots of the types, quantities, and prices of ENERGY STAR CFLs stocked by retailers at a given point in time. Metrics are compiled to control the variability attributed to inter-round differences in the retail composition. For example, the quantity of CFLs *per location* is compared rather than the overall quantity of CFLs to control for the variability introduced by larger or smaller numbers of retailers from round to round. Since a census of participating retailers is included in the analysis, there is no need to account for sampling error in this study. The values are directly measured from the population.

¹ Data were collected in Maine only during Fall 2005 and Fall 2006.

² Such as manufacturer product catalogues and information requests, ENERGY STAR qualified product lists, and on-line resources.

In the case of pricing information, quantity weighted average prices are calculated for comparison from round to round. This is done because of the extraordinary range in the amounts of CFLs stocked in the types of retailers included in this study. Simple averages grant too much statistical influence to CFLs that are stocked at very small quantities and those that remain unsold and on shelves for long periods of time. The weighting variable is: total quantity of CFLs stocked on the sales floor. The quantity weighted average prices are calculated according to Equation 1.

$$QTY \text{ Weighted Average Price} = \frac{\sum_{i=1}^N (\text{Quantity of CFLs}_i \times \text{Price}_i)}{\sum_{j=1}^N \text{Quantity of CFLs}_j}$$

(Eqn.1)

The amount of shelf area devoted to each CFL was also considered as the weighting variable for price, but the results were similar enough that quantity is used instead since it is more intuitive as a weighting variable.

Results

The results of this research are grouped into two areas: product availability and pricing for CFLs. In each case, results are presented for the region overall and are also segmented by retailer type and pertinent product characteristics.

Results: Product Availability

Product availability can be measured in many ways (e.g. total quantity of CFLs, number of unique models of CFLs, number of product occurrences). In this study, product availability is taken to be the total quantity of CFLs. Table 2 shows the growth in the total number of ENERGY STAR CFLs available in participating retailers in the study area from just under 31,000 CFLs in the Spring of 2005 to over 185,000 CFLs in the Fall of 2008 having reached an even higher level over 200,000 CFLs in the Fall of 2006³.

Table 2 also presents the availability of CFLs by product type (e.g. bare spiral, A-line, globe, flood, candelabra/capsule, and tube) and retailer type (e.g. department stores, DIY, hardware-chain, hardware-independent, and lighting specialty). The largely unrefined results of this table serve as a reference to help place the later research results into context. However, it is important to note that nearly all of the product and retailer type combinations have seen considerable growth over the past four years⁴.

Bare spiral, ENERGY STAR CFLs underwent strong growth in the Northeast region from Spring 2005 (≈100 CFLs/location) through Fall 2006 with continued growth into 2007 and leveling off through Fall 2008 at around 525 CFLs/location (see Figure 1). There was also consistent growth in the availability of specialty CFLs (A-line, globe, flood, and candelabra/capsule) from ≈30 CFLs/location to over 100 CFLs/location through that same period with a possible leveling off in the last period. Tube CFLs (twin, triple, and quad tubes and circline bulbs) were available in relatively low levels from the beginning of the study period (≈4 CFLs/location) and have consistently dropped to almost none in Fall 2008.

In Spring 2005, bare spiral CFLs accounted for nearly three quarters of all CFLs on the market in the Northeast (see Figure 2). This fraction expanded considerable between the Spring and Fall of 2005

³ Note that data were collected in Maine during the Fall 2005 and Fall 2006. These additional retail locations play something of a role in the higher total quantities during these time periods.

⁴ Notable exception being Tube CFLs (twin, triple, and quad tubes and circline bulbs).

(to 89% spiral; 10% specialty). However, the percentage of specialty bulbs has grown steadily in each time period since.

An interesting aspect of the growth of bare spiral CFLs during 2005 and 2006, is the availability of CFLs in six and twelve bulb packages (see Figure 3). These package arrangements emerged strongly during 2005 but have diminished considerably during 2007 and 2008 as two and four pack configurations begin to dominate the market.

Table 2. CFL Quantities (Bulbs)

# of States	Date	Style	Department Stores	DIYs	Hardware - Chains	Hardware - Independents	Lighting Specialties	Total CFLs
3	Spring 2005	A-Line	9	559	554	31	21	1,174
		Cand	8	298	66	19	5	396
		Flood	40	4,549	772	53	211	5,625
		Globe	0	304	207	14	16	541
		Spiral	684	16,384	4,213	377	500	22,158
		Tube	8	559	284	98	115	1,064
Spring 2005 - SUBTOTAL			749	22,653	6,096	592	868	30,958
4	Fall 2005	A-Line	219	753	777	54	39	1,842
		Cand	0	285	119	20	6	430
		Flood	194	6,103	901	63	113	7,374
		Globe	159	259	404	18	24	864
		Spiral	2,116	77,904	13,287	660	691	94,658
		Tube	0	43	586	126	32	787
Fall 2005 - SUBTOTAL			2,688	85,347	16,074	941	905	105,955
4	Fall 2006	A-Line	27	3,167	821	57	22	4,094
		Cand	80	0	185	33	13	311
		Flood	303	19,082	1,409	445	170	21,409
		Globe	189	1,454	362	46	25	2,076
		Spiral	2,781	164,093	8,861	2,197	1,003	178,935
		Tube	117	43	389	249	45	843
Fall 2006 - SUBTOTAL			3,497	187,839	12,027	3,027	1,278	207,668
3	Fall 2007	A-Line	58	7,515	636	90	21	8,320
		Cand	0	0	149	37	12	198
		Flood	25	16,379	1,346	359	159	18,268
		Globe	66	4,583	360	44	223	5,276
		Spiral	1,199	148,492	11,778	1,837	906	164,212
		Tube	0	0	204	64	5	273
Fall 2007 - SUBTOTAL			1,348	176,969	14,473	2,431	1,326	196,547
3	Fall 2008	A-Line	198	5,506	1,168	132	85	7,089
		Cand	0	0	390	47	14	451
		Flood	423	16,422	2,263	289	226	19,623
		Globe	162	4,002	439	74	55	4,732
		Spiral	3,433	129,059	17,516	1,471	1,389	152,868
		Tube	0	336	226	45	2	609
Fall 2008 - SUBTOTAL			4,216	155,325	22,002	2,058	1,771	185,372

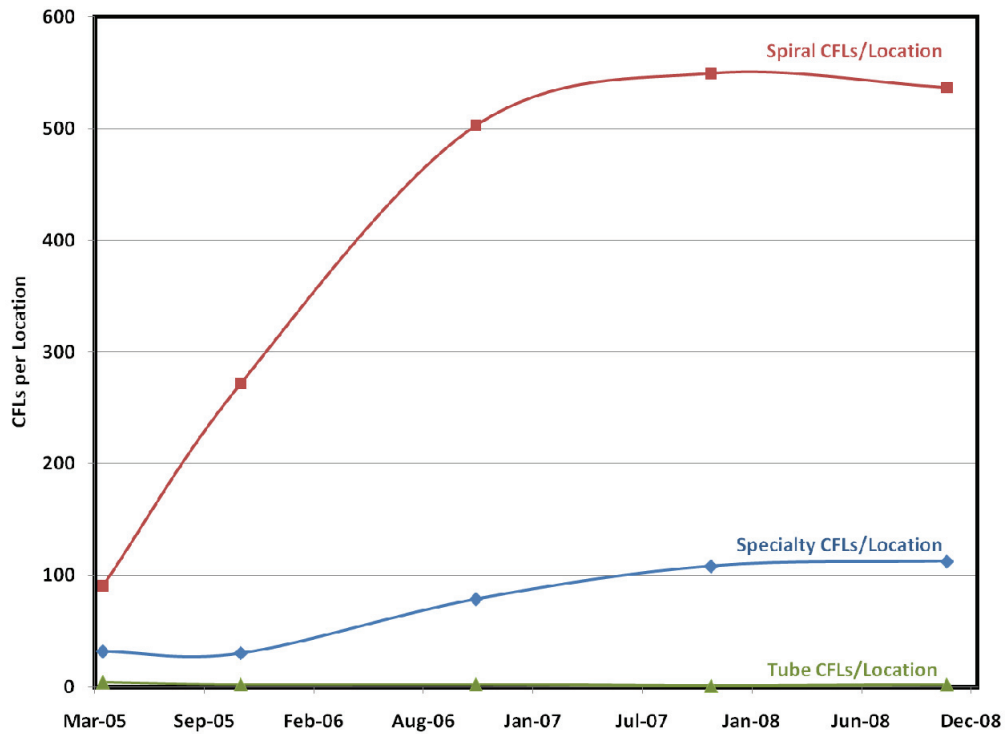


Figure 1. Average Number of CFLs per Location by Type

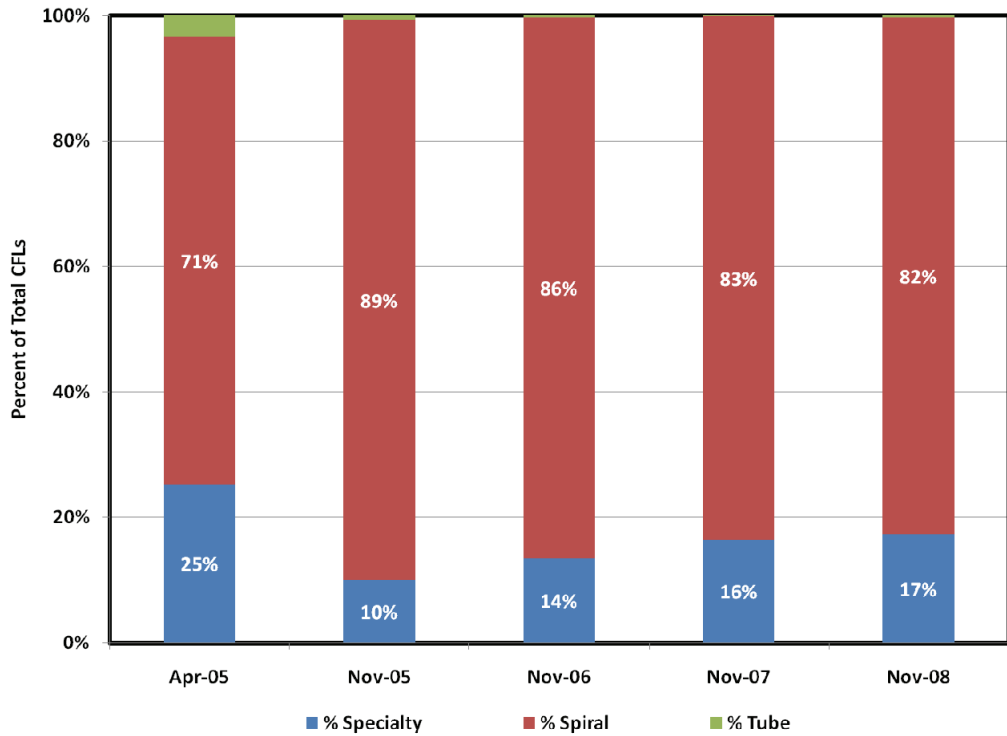


Figure 2. Percentage of Total CFLs by Type

In the Spring 2005, the CFLs in the Northeast market were nearly equally split between CFLs that were less than 18 watts and those between 18 and 25 watts (see Figure 4). This changed substantially in Fall 2005 when the fraction of lower wattage bulbs grew to over 75%. The market has remained relatively stable in the period since that shift to the greater availability of lower wattage bulbs.

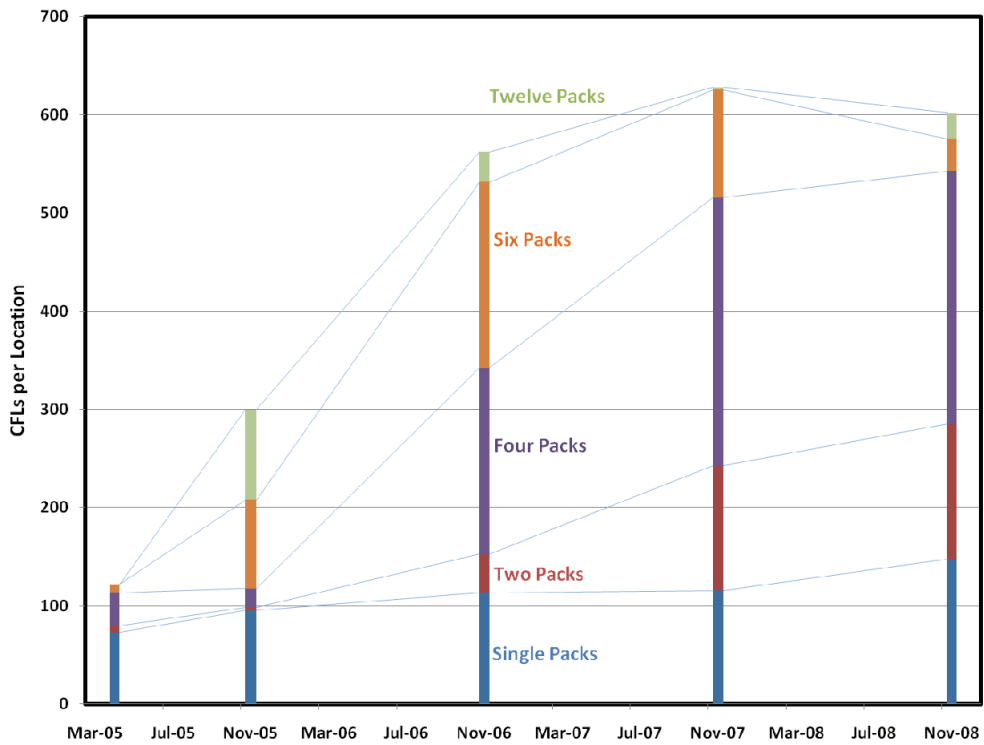


Figure 3. Average Number of CFLs per Location by Package Size

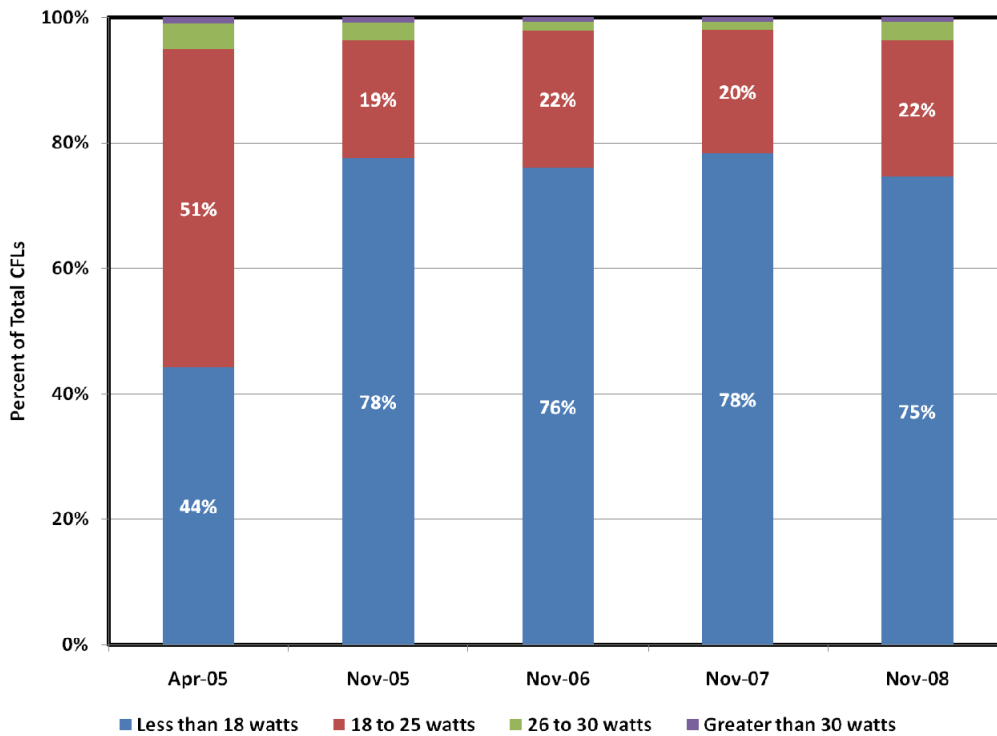


Figure 4. Percentage of Total CFLs by Wattage Category

The availability of flood type CFLs has grown substantially over the study period (see Figure 5). This is especially true between Fall 2005 and Fall 2006 after which time the growth has been less pronounced. A-line and globe specialty CFLs have also grown during the study period, but at a more

moderate rate. The availability of medium based candelabra or capsule CFLs has remained consistently low over the study period.

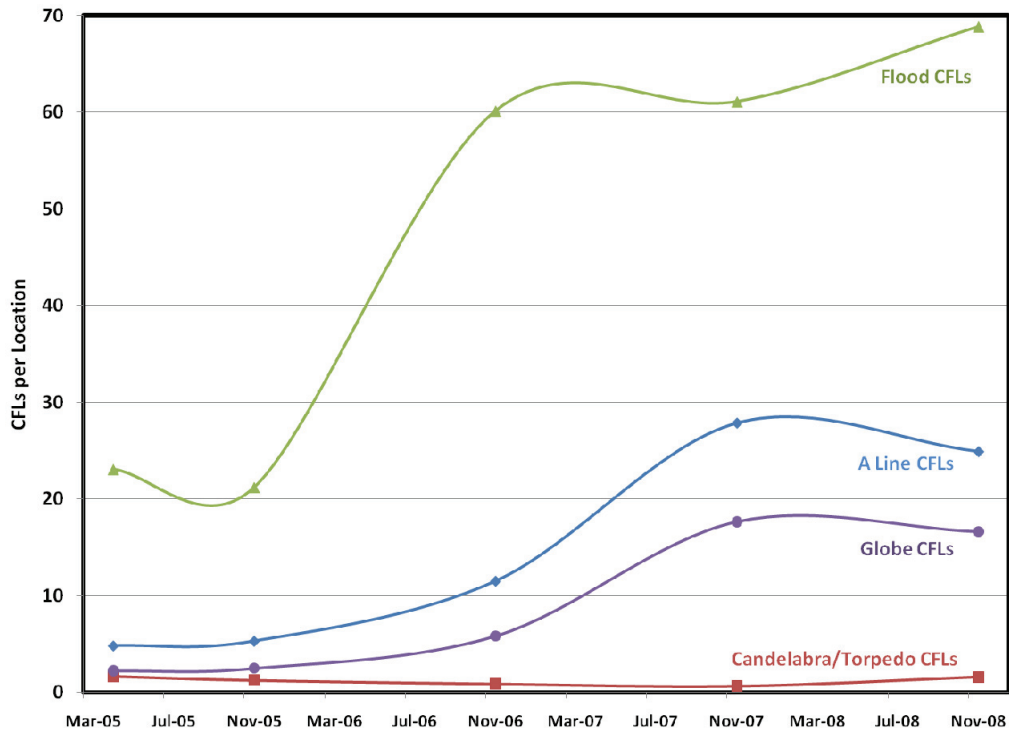


Figure 5. Average Number of CFLs per Location: Specialty Products

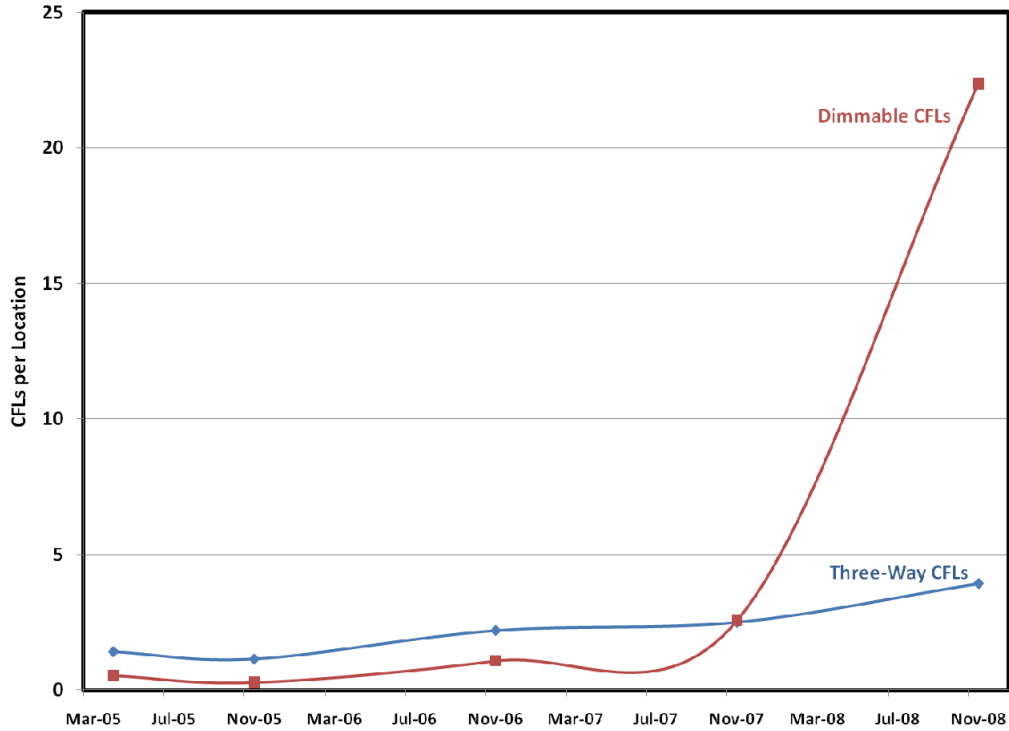


Figure 6. Average Number of CFLs per Location: Dimmable and 3-way

Although the growth in availability of three-way CFLs follows a nearly linear path from Fall 2005 through the present, dimmable CFLs have undergone exponential growth reaching a level of 22 CFLs per location, on average, in Fall 2008. These results illustrate the response on the part of retailers and manufacturers to the technical need and stated preference of customers in many market areas for dimmable and three-way CFLs (Mapp et al. 2005; Rasmussen et al. 2005; Webber et al. 2007). It may be useful to keep in mind at this point that these results do not suggest that there are, on average, 22 different dimmable CFL models per retail location in Fall 2008, but rather – 22 units, on average. It should be noted that nearly all of this growth in dimmable product is associated with a handful of models in DIY stores. Growth of dimmable product in other store types has been marginal throughout this time period.

Results: Pricing

The next several figures illustrate how prices for CFLs have varied over the past four years in the Northeast region. In each case, the price *per CFL* is presented, and the average values are weighted based on the total quantity of CFLs. In all cases, prices are non-incentivized, retail prices. Prices for both bare spiral and specialty CFLs have generally decreased over the four year study period although there is evidence of the leveling or slight increase in prices in the recent time periods (see Figure 7). The quantity weighted average prices are consistently lower than the simple average prices owing to the skewed distribution of quantities toward lower priced CFLs. Since the weighted average prices are more representative of the overall market, the remaining pricing figures show only weighted averages. Prices for bare spiral CFLs dropped drastically between Spring and Fall 2005 and have risen slightly since. Broadly speaking, prices for specialty CFLs have fallen consistently through the period before leveling off in Fall 2008.

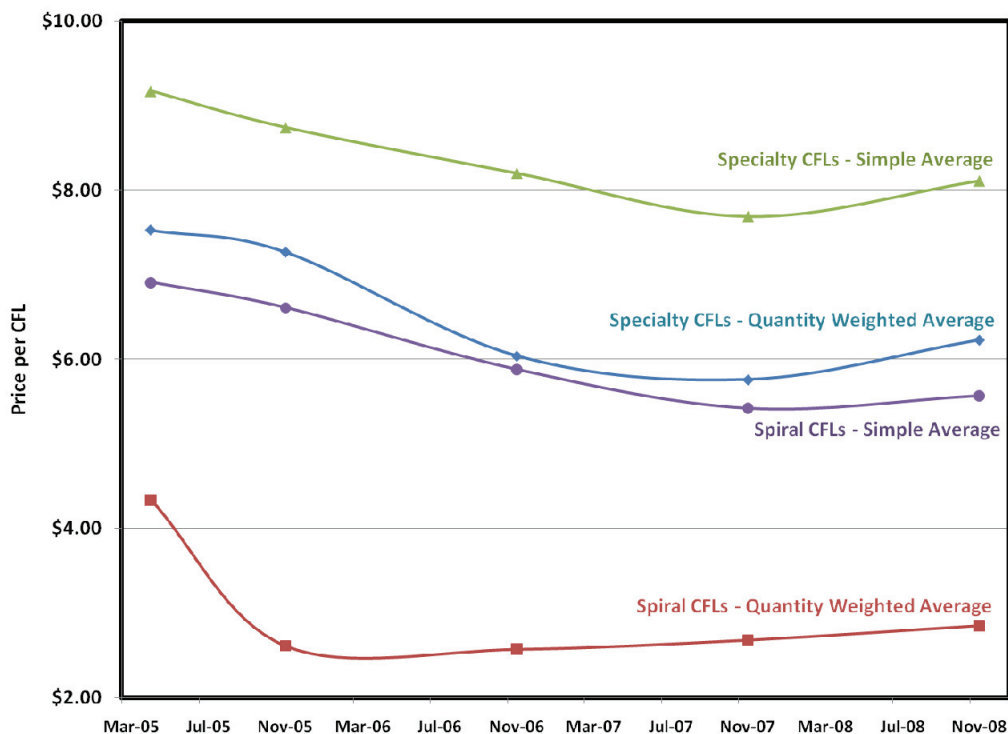


Figure 7. Pricing – Spiral and Specialty CFLs

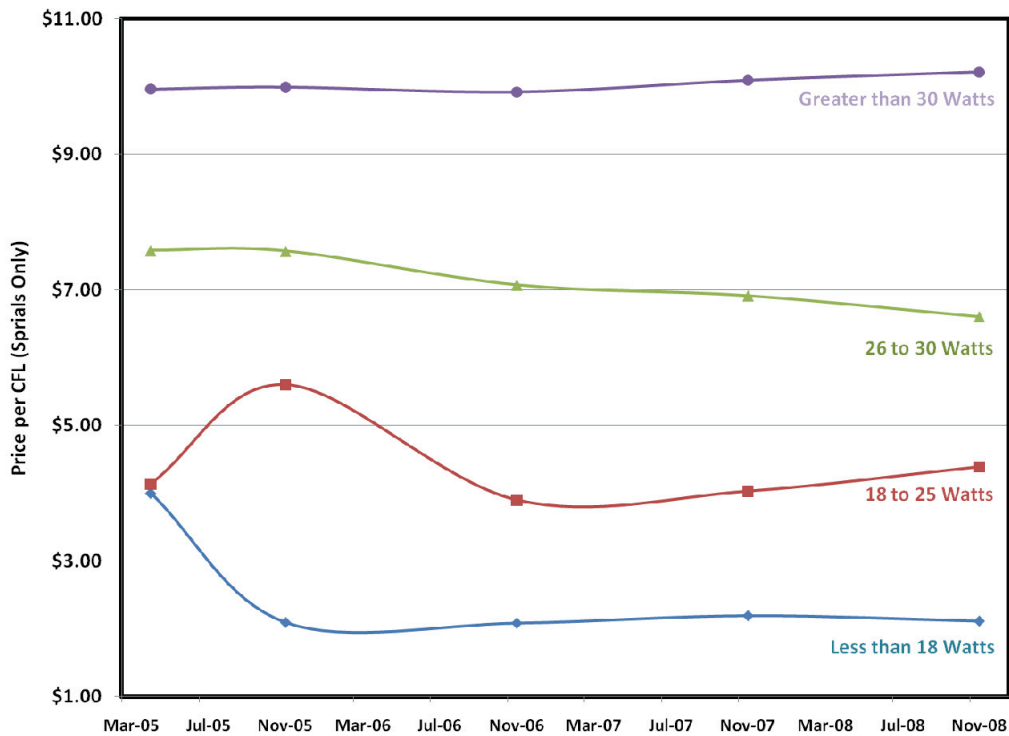


Figure 8. Pricing – Spiral CFLs by Wattage Category

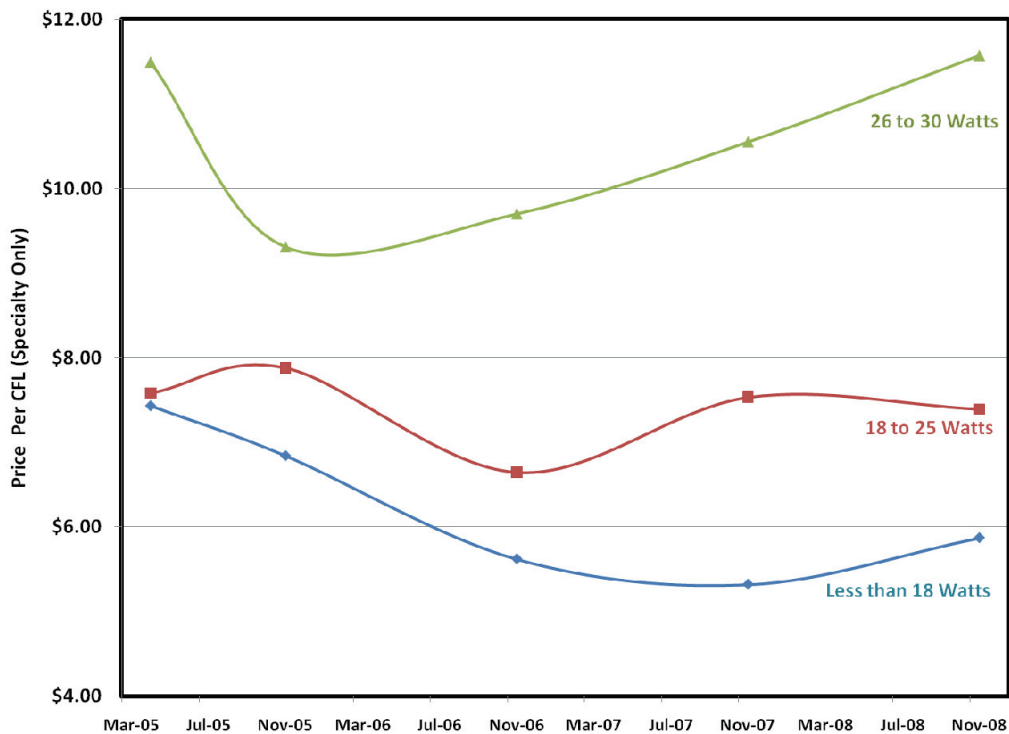


Figure 9. Pricing – Specialty CFLs by Wattage Category

Figures 8 and 9 show the pricing for bare spiral and specialty CFLs by wattage category. There is an obvious direct relationship between wattage and price for all types of CFLs in this market. Bare spiral CFLs less than 18 watts saw a sharp decrease in price in 2005, and a relatively consistent \approx \$2.00/bulb thereafter. Among specialty products, startling is the sharp decrease in the price of 26 to 30 watt

specialty bulbs in the early period and then the consistent recovery of those prices through Fall 2008. The inverse relationship between price and package size is evident for smaller package configurations (1-2 packs compared to 4-12 packs) in this market (see Figure 10). Interestingly, the notably higher early period prices of four pack CFLs have converged with larger package configurations through time.

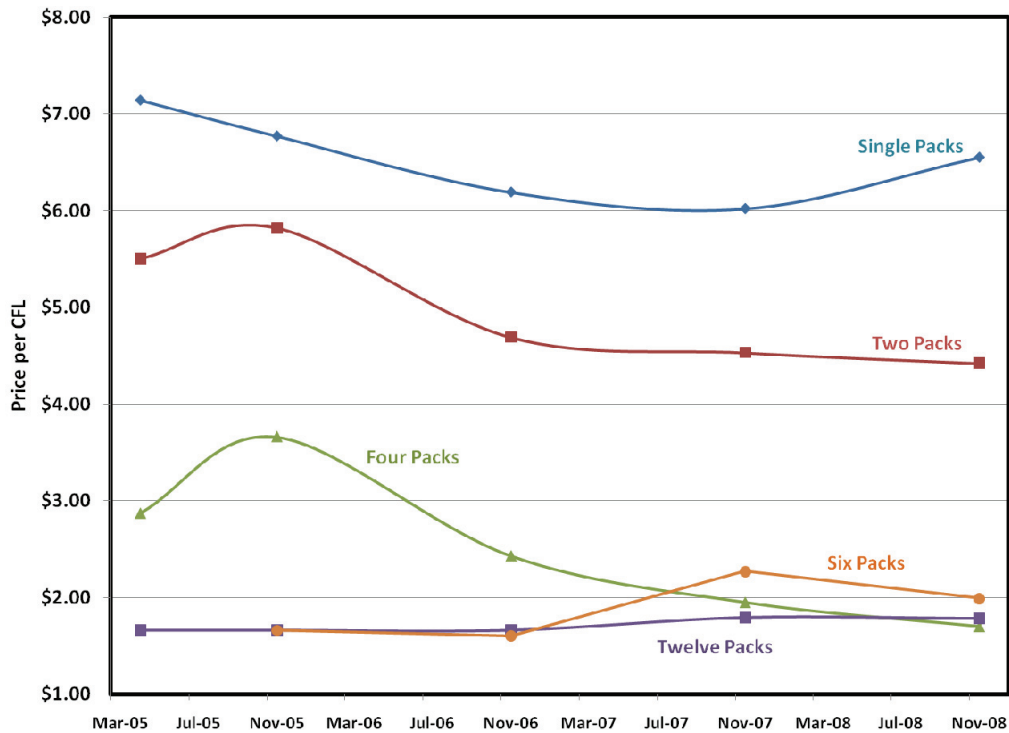


Figure 10. Pricing – Package Size

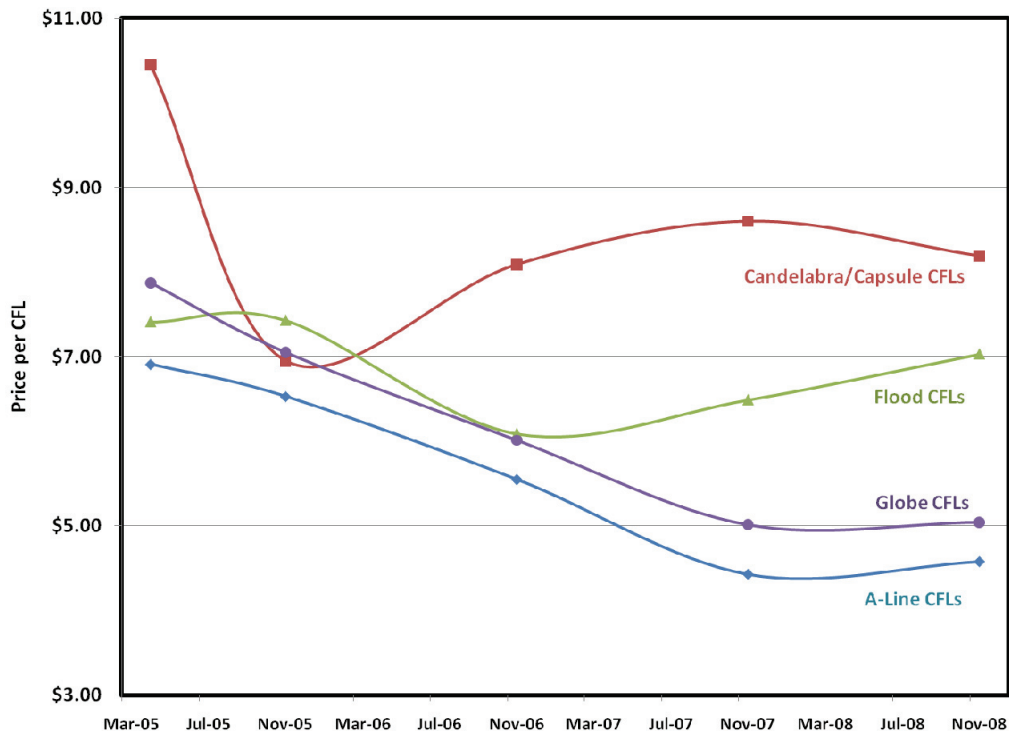


Figure 11. Pricing – Specialty CFLs

During the early periods of this study, while the availability of specialty product was somewhat limited, the prices of different specialty CFLs were more similar (especially A-lines, globes, and floods) than in later periods as availability has grown (see Figure 11). In Fall 2008, there was a nearly \$4 range in the average price of specialty products from A-lines (\$4.58) to medium based candelabra/capsules (\$8.19).

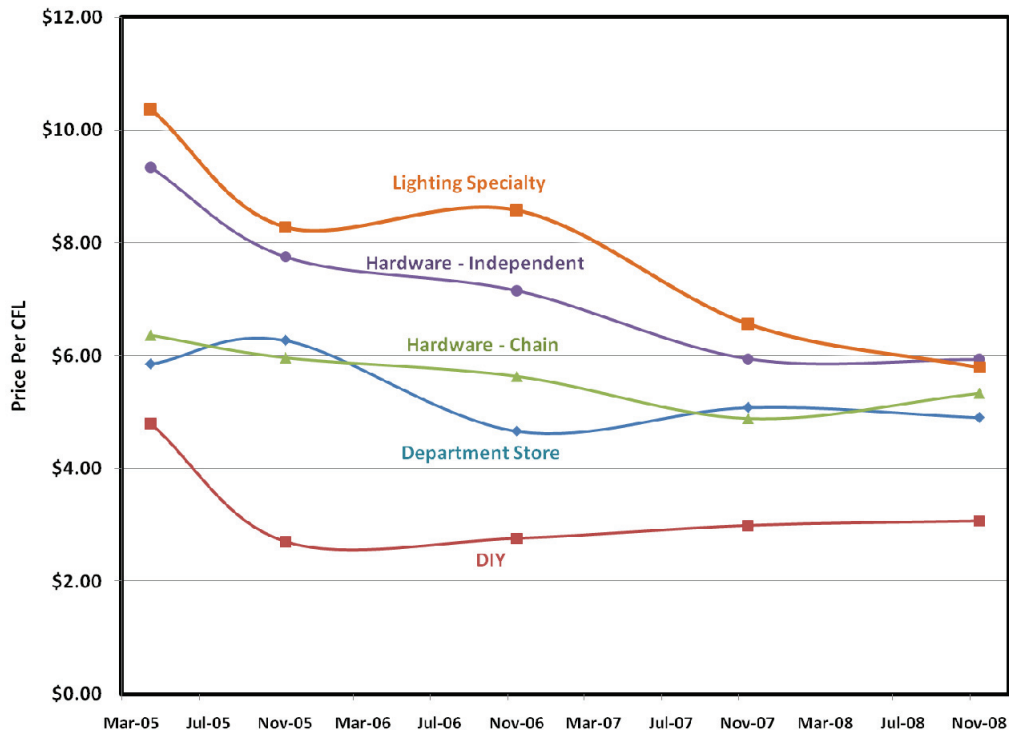


Figure 12: Pricing – Retailer Types

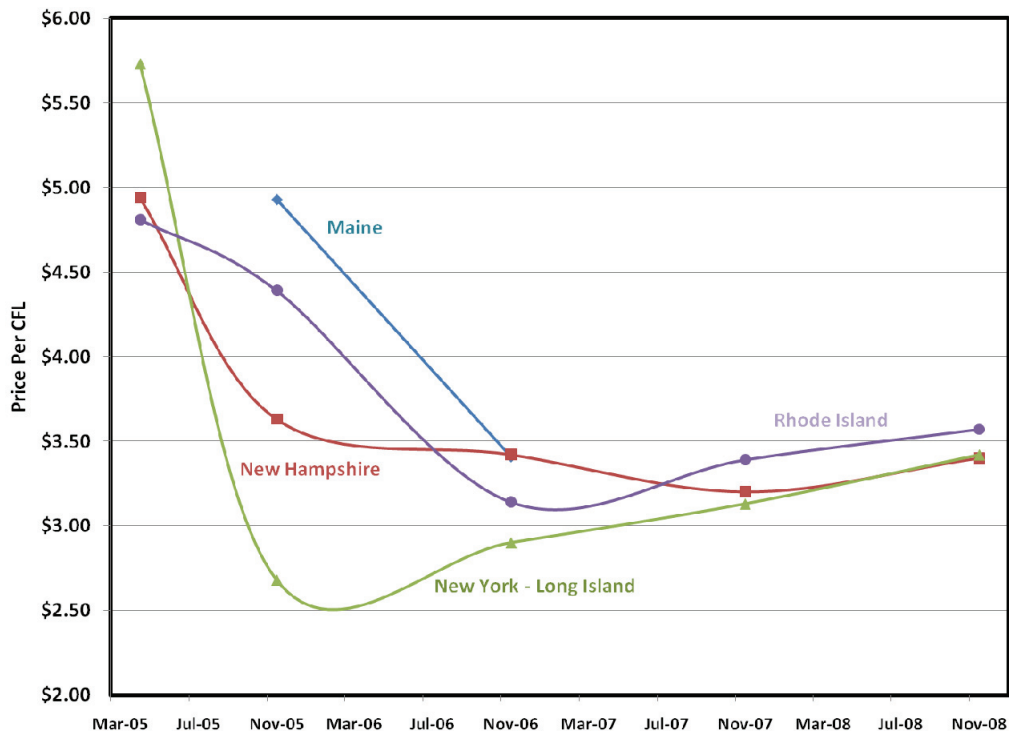


Figure 13: Pricing – States

Over the past four years, the range in CFL prices across the various retailer types (Figure 12) and the states in the Northeast (Figure 13) has lessened considerably. These are significant indications of a mature market in the Northeast U.S. As of Fall 2008, DIY stores have consistently offered the lowest cost CFLs (\approx \$3.00/CFL) while higher prices prevail in lighting specialty stores and independent hardware locations (\approx \$6.00/CFL). These average price differences are, in part, a result of differences in stocking practices since small independent hardware stores may still have older, more expensive CFL stock on their shelves. However, when comparing bare spirals less than 18 watts between DIY stores and independent hardware locations, the price differential in Fall 2008 is still considerable (\$2.16). Across all CFL types, prices fell sharply within each of the states in the study from Spring 2005 to Fall 2006 (Figure 13). Since that time, prices, on average, have either leveled or increased slightly in each of the states.

Conclusions

This research has utilized a valuable time series of measurements taken in a variety of retail locations in several markets in the Northeast U.S. to illustrate trends in CFL availability and pricing over the past four years. The region has seen strong growth in the availability of CFLs, in general, and several important subgroups of products (e.g. bare spirals, flood lamps, globes, dimmable product). CFL pricing in the region fell sharply for most products in the early part of the period (Spring 2005 to Fall 2005), and has either leveled or increased slightly since those earlier price declines. Price variability associated with two key aspects (across retailer types and geographic sub areas – states) has declined markedly in the four year period. This, combined with the increase in availability of product, is notable evidence of a mature CFL market in the region.

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