

ENLIGHTENED PROGRAM PLANNING: PREDICTING LED PRICES

Divita Bhandari, DNV GL, Burlington, MA
Jonathan Taffel, DNV GL, Oakland, CA
George Tagnipes, CPUC, San Francisco, CA

Retail LED lamp prices have dropped rapidly within the past four years. But a question remains as to how prices differ for LED lamps based on their unique attributes. For example, how do prices compare between discount, home improvement, wholesale club, and other stores? Within those stores, how do lamp shape, package size, wattage, and retail stock volume influence LED lamp cost? Moreover, how will these prices change over the next several years?

DNV GL team has created a hedonic pricing model for four LED lamp styles including A-lamp, reflector, globe, and torpedo. The hedonic pricing model forecasts the price of LED lamps based on a selection of lamp specific attributes. These attributes may include product discounts that are provided by the IOU or the retailer, volume of lamps stocked, characteristics of the retail establishment, or lamp-specific attributes. By predicting the price point of LED lamps of various attributes, our model can help utility upstream lighting programs identify the “sweet-spot” for any specific LED lamp discount.

The attributes modeled include:

- *Retail Channel.* Retail channels include discount, drug, grocery, hardware, home improvement, mass merchandise, and membership club. Hardware stores tend to price lamps higher than in the home improvement channel. Mass merchandise, discount and membership club stores tend to price lamps lower than in the home improvement channel.
- *Package Size.* Lamps may be sold individually or in packages of two or more. The model results show that the price per lamp typically decreases as the package quantity increases
- *Store Branded.* Lamps are either branded as a manufacturer brand or with a store name/ generic brand. The model shows that retailers typically price store-brand LED lamps lower than manufacture-branded lamps.
- *Wattage.* The results show that LED lamps with higher watts are more expensive.
- *LED Retail stock volume:* Retail stock volume represents the total number of LED lamps stocked for sale in retail stores. The total number of LED lamps in stock had a negative correlation with prices suggesting that
- stores with higher retail stock have lower prices in lamps.

The lamp pricing model is based on retail inventory data collected from one state between 2012 and 2016, and includes over 800 in-store inventories. The model allows the user to either view historical prices or forecast future prices. The lamp-specific models that estimate prices in 2012, 2013, 2014 and 2015 are specific to a given year, and use retail lamp stock inventory data for only that year. In contrast, the forecasting model uses all waves of stock inventory data collected between 2012 and 2015 to capture time-series trends.

While this poster pertains to the lighting market, we conclude that attribute-based price forecasting adds clarity to the cost-effectiveness of any utility energy savings program. Hedonic models deliver explicit insights into the market value of a product given its attribute profile. These results lead to a better understanding of a product’s market value, and can enhance program strategy, impact, and cost-effectiveness