

All Trade Allies are Not Created Equal: Identifying Leverage Points in the Commercial Lighting Market

Kevin Price, Evergreen Economics
Dulane Moran, Research Into Action
Stephen Bickel, D&R International
Caroline Chen, StatWizards LLC
Brian Smith, Pacific Gas & Electric Company

ABSTRACT

Regardless of the product or purchaser, most purchase decisions are driven by situational factors – a “choice architecture”. Recent primary and secondary research found that commercial lighting market actors have a strong influence on the lighting choices presented to commercial end-users. Identifying which trade allies a commercial lighting program should target in order to maximize market adoption of advanced technologies is critical in assisting in the design and implementation of effective and efficient energy efficiency programs. This paper presents evaluation findings that illuminate the choice architectures currently existing in the California commercial lighting market and the key influence points within the market.

First, a commercial lighting choice architecture and influence framework was informed by a critical synthetic review of available literature. Subsequent primary data collection – interviews with commercial lighting manufacturers, distributors, contractors and end-users – suggests that this framework indeed exists, and the actions of market actors within the commercial lighting market have a strong effect on purchase decisions. So which market actors hold the golden ticket? Do any?

The results suggest that while contractors are typically the only lighting market actor to directly “touch” the end-user, the knowledge, available choices, business arrangements, and decisions of market actors further up the supply chain have a direct impact on what lighting technologies contractors present and recommend to their customers. Manufacturers make a wide range of products, and are certainly the ultimate dictator of what exists in the market. However, could a key leverage point be the distributors? We believe so.

Introduction

Southern California Edison (SCE) and Pacific Gas and Electric Company (PG&E) contracted Evergreen Economics, Inc., along with Research Into Action and D&R International (jointly, the Evergreen Team) in November 2011 to conduct research related to SCE’s and PG&E’s residential and nonresidential energy efficient lighting rebate programs.

The Evergreen team designed the research to coordinate with and complement existing and ongoing California Public Utilities Commission (CPUC) directed research. Since there had been much less attention given to the nonresidential market for energy efficiency lighting, the Evergreen team, with direction from SCE and PG&E, prioritized the commercial sector and

focused on a needs assessment that would identify program strategies aimed at providing commercial customers with high efficiency lighting measures and systems.¹

California Program Context

The CPUC Energy Division (ED) adopted the California Energy Efficiency Strategic Plan (“Strategic Plan”) in 2008, outlining ambitious energy efficiency goals for the state of California (CPUC 2008). The California IOUs’ 2010-2012 energy efficiency program portfolios were the first to embrace the Strategic Plan as a guiding framework. These goals include transformation of both the residential and commercial lighting markets “through technological advancement and innovative utility initiatives” (CPUC 2008).

Following release of the Strategic Plan, the ED and stakeholders initiated the development of action plans, providing a project management framework for implementation of each of the Strategic Plan’s chapters. The Lighting Action Plan was completed in 2010, providing specific targets for residential and commercial lighting market transformation initiatives. The overall vision of the Lighting Action Plan, which is included as a section in the 2011 update to the Strategic Plan, is as follows: “By 2020, advanced products and best practices will transform the California lighting market. This transformation will achieve a 60-80 percent reduction in statewide electrical lighting energy consumption by delivering advanced lighting systems to all buildings” (CPUC 2011).

The purpose of the research presented in this paper is to support the IOUs in their efforts to help California in meeting these goals. We worked with program teams at SCE and PG&E² to understand their research needs, and conducted targeted research to answer their key questions. This effort was intended to inform a broader and more comprehensive effort that might be conducted in a subsequent research phase.

Approach

The Evergreen team’s primary goal was to conduct research to inform the following commercial lighting areas of inquiry:

- The supply-side structure of the commercial lighting market;
- The key drivers of the market;
- The motivations of market actors and end-users; and,
- How and why certain end-users go “above and beyond” the typical lighting retrofit.

The study included three research tasks:

- A residential and commercial critical synthetic analysis of literature (“literature review”), including a gap analysis³;
- A telephone survey with businesses that had recently retrofitted their lighting equipment with certain energy efficient lighting technologies or systems (discussed below); and

¹ The focus was further refined so that the research primarily investigated advanced lighting retrofits in the retail, restaurant, and office segments of the commercial lighting market.

² We refer to SCE and PG&E as “the IOUs” for the remainder of the paper.

³ The gap analysis identified gaps in the existing research that informed the subsequent study research tasks.

- In-depth interviews with market actors.

The literature review addressed both residential and commercial lighting sectors, but for this paper we only present the findings related to the commercial sector. The Evergreen team reviewed more than 100 published documents⁴ extracted relevant findings that were based on robust methodologies and datasets, and critically analyzed the findings with important market and/or program implications. The objectives related to the commercial lighting market were to identify the major factors influencing lighting purchases and to identify research gaps.

The primary objectives of the advanced lighting retrofit customer telephone survey were to identify who was involved in specifying lighting products (and to what degree they influenced the process), and to better understand reasons for selecting advanced lighting equipment.⁵ We conducted computer assisted telephone interview (CATI) surveys with a total of 263 SCE and PG&E commercial customers in the office, retail, and restaurant segments that had recently installed advanced LEDs⁶ or advanced lighting control systems⁷ (jointly referred to as “advanced lighting” hereafter).

For the market actor in-depth interviews, the majority of contacts came from SCE and PG&E program implementer databases, with additional lists of designers, manufacturer representatives, and distributors from a variety of sources. Once the sample frame was finalized, a random sample was chosen for each market actor group. Since the source of the sample was primarily utility databases, the results may not necessarily reflect the broader population of market actors. The team conducted the in-depth interviews between October 15 and December 15, 2012. The purpose of the interviews was to identify program opportunities to increase the adoption of advanced lighting in commercial lighting retrofit projects. This includes identifying the following:

- The role of market actors in the commercial retrofit market;
- Factors (who and what) that influence choice and selection of retrofit lighting;
- Stocking practices and influences; and,
- Barriers to the adoption of advanced lighting;

Below we discuss barriers to specifying, stocking, and promoting advanced lighting technologies among market actor and barriers to purchasing advanced lighting technologies among commercial customers. Then we present a framework for understanding how these barriers affect the market, and identify key leverage points that exist within the market structure. Finally, we identify strategies for rebate programs seeking to use these leverage points to affect the decisions of market actors and consumers.

⁴ The documents included energy efficiency program evaluation reports and market studies, as well as works from the fields of social psychology, behavioral economics, neuroeconomics, and neuropsychology.

⁵ Other goals of the survey included: collecting firmographic information for businesses that installed advanced lighting technologies; assessing commercial customer satisfaction with advanced lighting products (in three segments: retail, restaurant, and offices); and, determining awareness of and ability to meet Lighting Strategy Action Plan goals.

⁶ With help from the IOU EM&V and program staff, as well as the New Buildings Institute (www.algonline.org), the definition of advanced LEDs was determined to exclude LED signs, holiday lights, and case lighting.

⁷ With help from the IOU EM&V and program staff, as well as the New Buildings Institute (www.algonline.org), advanced lighting control systems were defined as: daylighting or an energy management system controlling lighting; and, occupancy sensors or photocells with T5 fluorescent lamps or induction lighting (or LEDs).

Barriers to Advanced Lighting Retrofits

Our research confirmed that current market barriers to advanced lighting retrofits are typical for many new products in general. We found the following barriers:

- **Higher first cost.** Manufacturers, distributors, and contractors frequently mentioned high initial cost (especially impactful in a poor economy) as a barrier to advanced lighting retrofits. According to market actors, this barrier is exacerbated by the availability of lower cost efficient lighting options with faster paybacks. The commercial customer research suggests that advanced lighting adopters tend to prioritize energy savings and/or operating costs over first cost.
- **Knowledge and product awareness gaps.** Distributors and especially contractors reportedly lack the awareness or knowledge to comfortably promote the benefits of advanced lighting over other “status quo” options. Any lack of knowledge or awareness affects the choices of end-users, as contractors may fail to present advanced lighting solutions to their customers.
- **Risk associated with product uncertainty and high initial cost.** This risk creates barriers for distributors, contractors, and end-users. Midstream market actors reported that end-users do not want to purchase expensive, unproven equipment. They also said that contractors want to sell retrofits comprised of lighting products with which they are familiar and comfortable in order to reduce risk. Distributors worry that unsold stock of expensive products will affect their profitability.

Our findings suggest that barriers to adoption of advanced lighting in the commercial retrofit market are related to product awareness and perceived risk, which is derived from high cost and product uncertainty (typical of new technologies).

Choice Architecture

The first central finding from the review of existing scientific research is that most decisions, especially for relatively smaller purchases such as lighting, are driven by situational factors. The collection of situational factors that drive a choice is called the “choice architecture,” and include:⁸

- The default condition (status quo bias)
- What we see other people doing (social norms/social proof)
- Urgency, often due to limited supply, limited time (scarcity effect)
- Whatever is readily at hand (availability)
- Reminders, prompts, and other attention-getters (marketing)
- Relative cost/comparative value
- The number of things we have to choose among (choice overload/option paralysis)
- Recommendations from experts
- Familiarity, confidence, and emotional associations

⁸ These factors are listed roughly in order of their importance and strength. The more factors present, the stronger the effect.

According to this frame of reference, all choices occur within such architecture that is profoundly affected by default options. These choice architectures, whether consciously constructed or naturally occurring, tend to generate a particular pattern of responses within a population (Thaler and Sunstein 2008).

Therefore, it follows that to affect most choices, especially less frequent ones like lighting retrofits, it may be most effective to influence the choice architecture (or context in which the choice is made). Efforts to try to influence the choice without influencing the architecture that surrounds that choice may be very difficult for the majority of the population, particularly for infrequent decisions. With an understanding of human decision-making and the situational factors that influence it, it is possible to affect choice architecture towards a desired outcome.

Situational Factors Affecting Choice

According to the choice architecture literature, situational factors presented to purchasers drive choice. These situational factors include:

- The default condition (status quo bias);
- What customers see other businesses doing (social norms/social proof);
- Urgency, often due to limited supply, limited time (scarcity effect);
- Whatever is readily at hand;
- Reminders, prompts, and other attention-getters;
- Relative cost/comparative value (contrast effect/anchoring and adjustment);
- The number of things we have to choose among (choice overload/option paralysis);
- Recommendations from experts; and,
- Familiarity, confidence, and emotional associations (Thaler and Sunstein 2008).

These factors are listed roughly in order of their importance and strength. According to the literature, the more factors present the stronger the effect (Thaler and Sunstein 2008). Lighting purchase decisions are shaped by existing choice architectures. Therefore, it follows that influencing choices in the commercial lighting market will require:

- Understanding the current choice architectures for commercial lighting market actors and end-users; and,
- Determining which tools will best enable you to affect the choice architecture to favor the desired choice.

The “Stream of Influencers”

The second main finding from the literature review is that market actors impart influence on the market actors below and above them in the market structure – there exists a “stream of influencers” in the lighting market (KEMA and Itron 2010; Xenergy et al. 2000). Determining where in the market to apply program influence is a key component of a successful midstream or upstream strategy. The theory behind the stream of influencers approach is simple: *Why hunt*

through the forest when you can wait by the waterhole? In this analogy, the forest represents individual commercial lighting end-users conducting retrofit projects, and the waterhole represents the market actors.

This theory implies that to increase the uptake of efficient lighting solutions, efficiency program managers must somehow reach those organizations that are planning to undertake new construction, major renovation, or small-scale lighting installation projects while they are in the process of designing, specifying, and procuring products.

For most organizations, such projects are infrequent and the period in which lighting decisions can be influenced is brief. Their interest and retention of information related to efficient lighting will be extremely low during the vast majority of the time, when they are not in the midst of planning the project. Thus, we posit that it is extremely difficult and resource intensive to reach these organizations through traditional marketing strategies. Revisiting the analogy, trying to reach the end-users in the commercial retrofit market is like hunting through a vast forest in search of scarce game.

Just as the hunter can improve their chances of catching dinner by staking out the water hole, energy efficiency program managers can improve their ability to encourage adoption of energy-efficient lighting solutions by working with the market actors responsible for conducting lighting retrofits, such as lighting designers or architects, distributors, installation contractors, and manufacturers. Indeed, for many energy efficiency program administrators (including in California) a substantial amount of effort has gone into building relationships and providing training to engage these market actors already.

According to the literature, these market actors strongly influence end-user choice of lighting products (KEMA and Itron 2010) and are centralized (compared to end-users), easily identified nodes through which multiple lighting decisions are funneled daily. Our primary research confirmed that market actors play a critical role in determining the specific lighting technologies installed among commercial end-users willing to adopt advanced lighting technologies. As part of our research with commercial customers, survey respondents were asked to provide an assessment of the importance of market actor input in their lighting equipment choice. On a ten-point scale, respondents reported a mean rating of 8.6 out of 10, with 90 percent reporting an importance rating of seven or greater.

Furthermore, the majority of respondents reported that their advanced lighting retrofit resulted from outreach from market actors (overall 76 percent). This suggests that market actor promotion of advanced lighting is an important factor in increasing the number of advanced lighting retrofits. This is not to disregard the critical importance of end-user awareness and acceptance of advanced products, but suggests that even willing end-users are more often sold on the retrofit than seek it out.

Therefore, it is of critical importance to understand the roles of the commercial lighting market actors, as well as their influence on the market and their motivations within the market structure.

“Stream of Influencers” in Lighting Retrofits

The combination of our primary and secondary research allowed us to identify the roles of the key market actors in the lighting retrofit market, which are presented below:

- **Manufacturer representatives** are sales representatives for lighting manufacturers. They promote and sell product packages to lighting distributors and the design community.
- **Lighting distributors** purchase packages of lighting products from manufacturer representatives. They typically sell lighting products to contractors (sometimes they sell directly to end-users, particularly for large chain accounts and municipalities).
- **Contractors** sell retrofits to end-users, and then procure the retrofit products from distributors and install them in end-user facilities.
- **Lighting designers** do not play a significant role in the lighting retrofit market. We found that most market reported that designers had no involvement in lighting retrofit projects, and all of the designers we contacted reported that they had no involvement in retrofit projects.

Among these market actors, contractors have the greatest direct influence on what specific lighting technologies a commercial end-user chooses to install, and are frequently the only lighting professional to interact directly with the end-user. However, contractor influence on end-user choice does not happen in a bubble. Rather, the knowledge, available choices, and decisions of other market actors in the supply chain affect what contractors recommend to end-users. Below, we discuss each market actor type's abilities to influence the choices presented to the end-user, and the motivations within the market structure that direct each market actor type's strategies related to promoting advanced lighting solutions. A summary of the factors motivating each market actor type is presented in

Table 1 (except for lighting designers).

Lighting Manufacturer Representatives

Manufacturer representatives are the most knowledgeable about advanced lighting options, and the most motivated to promote them in the market. Manufacturer representatives focus their efforts promoting new and innovative products to the design community (which is rarely involved with retrofit projects). High volume products and common lighting solutions are promoted to distributors, and education efforts often focus on getting distributors to promote new products to their customers. Nearly all lighting products are sold through the distributors.

Manufacturer representatives are motivated to increase sales in the product classes or categories supported by the manufacturer or manufacturers they represent. Negotiations are the manufacturer representatives' tool to encourage distributors to carry specific lighting packages – which sometimes include advanced lighting. The distributors pay interest on stocked products and are unable to return unsold goods. In order for the distributor to stock products seen as riskier to their bottom line, a manufacturer may offer lower prices or better financing terms in exchange for carrying newer products. They also offer incentives for sales of specific products within a limited time period. If the distributor is having trouble moving a product, the manufacturer representative may provide assistance (usually in the form of guidance or training).

Some manufacturer representatives work directly with large end-users, such as municipalities or large national chains. In these cases they can promote the advanced lighting solutions directly to the end-user, and likely work with them to find suitable applications for the products.

Lighting Distributors

The majority of lighting products flow through a distributor before reaching the end-user (KEMA and Itron 2010; Xenergy et al. 2000). Despite this, commercial customers do not perceive that distributors exhibit significant influence on the products installed in retrofit situations. Distributors are typically invisible to commercial customers – they engage directly with their contractor and purchase equipment branded by a manufacturer. As a trusted source for information, however, they are in a position to influence the contractor over time.

Distributors vary in their knowledge and attitudes toward advanced lighting, as do their motivation to promote advanced lighting products. Many stock based on what their customers – lighting contractors – are purchasing. They tend to view themselves as suppliers, not promoters, and are motivated to sell through their inventory by promoting what is on their shelves. Their engagement with end-users is limited.

Lighting Installation Contractors

Based on our interviews with market actors in general and lighting installation contractors specifically, we found that contractors have the highest level of engagement with end-users on retrofit projects, and in most cases are the ones who sell the projects. This puts them in the best position to influence the efficiency of the products selected by end-users.

More than half of the commercial end-users surveyed as part of this research reported that contractors had the greatest influence on their selection and acceptance of advanced lighting technologies. It is important to note that these findings are from the viewpoint of the end-user, and that the business may not be privy to the market actors upstream of the contractor with whom they directly engage.⁹

There was a wide range in knowledge and promotion of advanced lighting among the contractors interviewed for our research. Contractors reported being knowledgeable about energy efficiency but were not necessarily comfortable promoting the most advanced products on the market due to lack of knowledge about the products or skepticism about the product's quality or durability.

Furthermore, the literature indicates that the role of contractors can be significant because they typically have latitude to substitute products or lighting solutions (Xenergy 2000), and will often do so if a less expensive option is available or if the specified product cannot be procured easily. Lastly, contractors want to ensure that the products they install are reliable and meet customer needs. Contractors also expressed concern about cost. Even those that promote advanced lighting expressed concerns about product quality for some newer products (and may communicate that to customers), and are sensitive to customer price concerns. They do not want to bid themselves out of a project.

⁹ These findings corroborate the findings of the market actor interview research and the literature review: contractors are most often the market actor responsible for encouraging end-users to install specific lighting equipment. The finding is further supported by similar findings from market actor interviews conducted as part of KEMA's (2010) High Bay Lighting Study, which found that the majority of lighting distributor sales revenue came from sales to contractors (44 percent overall), and that "the contractor is the most common sales channel to the end-user and influencer in the specification process."

Lighting Designers

Designers are rarely involved in retrofit projects, and thus exhibit very limited direct influence on the lighting retrofit market. The retrofit projects they are involved with tend to be larger, more complex, or have specific aesthetic requirements (Xenergy et al. 2000). Reportedly, designers are too expensive for the majority of retrofit situations.

Table 1. Market actor motivations

Role in the Market	Motivations
Manufacturer Representatives	<ul style="list-style-type: none">• Increase sales• Negotiate favorable terms with distributors
Distributors	<ul style="list-style-type: none">• Meet, but do not exceed demand (from contractors)• Sell products rapidly• Negotiate favorable terms with manufacturer representatives
Contractors	<ul style="list-style-type: none">• Increase sales• High end-user satisfaction

Conclusions

Our research confirmed that contractors have a significant influence on the lighting choices of commercial end-users. Market actors and commercial end-users confirmed that contractors are frequently the only lighting professional to interact directly with the end-user in lighting retrofit situations. In many cases, the contractor approaches the end-user, providing them with information and lighting options, often based on what the contractor is familiar with and believes to be both applicable and amenable to the end-user. The motivations of contractors – as many sales as possible with few return visits – could work against rapid adoption of new technologies and installation considerations in line with advanced lighting guidelines and the California Strategic Plan’s ambitious lighting goals.

Contractor influence on end-user choice does not happen in a bubble. Rather, an important finding of the market actor research, corroborated by the critical synthetic literature review, is that the knowledge, available choices, and decisions of other market actors in the supply chain affect what contractors recommend to end-users.

Therefore, it is important to discuss the market actors upstream of the contractors in order to develop a better understanding of how to influence contractors, and thus their recommendations to commercial end-users. The theory behind the stream of influencers market framework that we identified as part of the synthesis of the literature is: *Why hunt through the forest when you can wait by the waterhole?* The theory implies that programs should identify the highest leverage points and concentrate efforts there. Evidence from our primary and secondary research supports this theory and suggests that distributors may offer a unique opportunity for commercial lighting programs in California. We believe that it is critical to encourage contractors to seek efficient products in all installations, but it is equally, if not more important, to encourage distributors to stock higher quantities of efficient products at reduced cost, thereby indirectly encouraging contractors to use efficient products.

Manufacturer representatives promote their advanced lighting products to distributors. They may negotiate with distributors to stock certain products as part of lighting packages. These packages come with specific financing terms, which are also part of the negotiation process. The outcome of these manufacturer representative-distributor negotiations has an effect on the options promoted to contractors and, as stated above, this affects the options presented to end-users (the choice architecture).

Distributors, like many lighting market actors, are risk averse. The risk that distributors face in the lighting market is the potential inability to rapidly turn over their stock of products, as they are unable to sell them back to the manufacturer and also pay interest on the products in their warehouses. This financing structure means that distributors are more comfortable stocking items they know are in high demand, and thus avoid products they believe to be costly or new and untested. Since the role of distributors is to sell products to contractors, their lack of familiarity or confidence may play a role in what they offer for sale. While stocking per se is not a barrier – any product can be ordered through a distributor regardless of whether it is stocked – what the distributor stocks can influence the product awareness and choices made by contractors (recall that distributors are motivated to sell what they have in stock). Furthermore the value-add services provided by distributors, such as training to contractors and providing product specification, may be influenced by the outcome of their negotiations with the manufacturer representatives or external influences (i.e., utility rebate programs).

In conclusion, while contractors influence end-user decisions, the influence they impart on end-users is affected by the relationships and motivations of market actors further upstream. The negotiations of the manufacturer representatives and distributors may be a particularly important factor influencing the choices provided to end-users by contractors.

The risk perceived by distributors in carrying and promoting advanced lighting technologies for commercial retrofit applications creates a fundamental barrier to creating a choice architecture likely to result in increased installations of advanced lighting solutions. Therefore, one important strategy for affecting the commercial lighting market is to reduce distributor risk related to actively stocking and promoting advanced lighting technologies, discussed in detail below.

Recommendations

Market actors reported that distributors seek to meet, but not exceed, demand as a way of minimizing their risk. This can potentially constrain the choices presented to end-users by reducing the likelihood that all options are equally presented. Investigating and testing the following strategies may help to reduce distributor risk:

- **Accelerating contractor awareness and knowledge** to increase demand of advanced lighting technologies. Lack of contractor awareness of and experience with advanced lighting products reduces the choices they provide to end-users. Contractor education and outreach is an important part of increasing the prevalence of advanced lighting installations – especially considering they play the role of the designer in advanced lighting retrofit projects. Contractors could also benefit from case studies of successful advanced lighting retrofits in each sector. Providing contractors the tools to learn about and market advanced lighting may both accelerate their knowledge and increase their ability to sell advanced lighting retrofits.

- **Testing midstream buy down strategies** to reduce the amount of capital a distributor must risk to stock advanced lighting products. A midstream buy down approach would essentially absorb some of the distributor risk associated with stocking advanced lighting products by making purchases of the higher cost, more efficient products easier to justify by contractors and end-users. The program administrators would assume part of the risk by lowering the cost and risk of stocking. A midstream buy down may significantly alter the information and choices provided to contractors, and increasing marketing and exposure of the product may lead to an increase in the demand for the products. This is integral in affecting contractor decisions, according to the stream of influence and choice architecture framework. Furthermore, it is a higher and more centralized leverage point within the market's stream of influencers. Midstream incentive programs were used successfully in California for commercial motors and central air conditioners (Itron and KEMA 2009). Following completion of the research for this study, a report was issued by DNV KEMA, Inc., that detailed the successes of a midstream approach to commercial LED lighting retrofits in Massachusetts. The findings may not transfer to the California commercial lighting market (particularly for controls, as it focused on LEDs exclusively), but the findings suggest that such an approach may be successful (KEMA 2013).
- **Leveraging relationships with manufacturers**, possibly in the form of upstream buy downs, to positively impact terms of sale agreements with their distributors. The IOUs have developed relationships with key manufacturers via other lighting rebate programs, such as the Upstream Lighting Program. We believe that the IOUs should consider investigating a similar approach for the heterogeneous nonresidential lighting manufacturers (some manufacture one product class, while others manufacture wide ranges of products). Establishing similar relationships to promote advanced lighting products could leverage utility expertise and encourage manufacturers to reduce the risk to distributors of stocking advanced lighting products. Our findings suggest that this does occur in the market, and that some manufacturers provide incentives so that distributors will carry advanced lighting products. The IOUs should investigate ways to increase the prevalence and efficacy of these efforts.

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