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Embracing the lighting transition

VEIC's approach to the next generation of efficiency programs.



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Summary

Efficient lighting, once a very high-performing measure for utility efficiency programs, has now entered a transition, as the market successes of these programs have begun to take hold. This is good news for consumers, the economy, and the environment, but it poses a “What’s next?” challenge for efficiency programs.

Nationwide, the U.S. Department of Energy (DOE) conservatively [forecasts that efficient solid-state lighting \(LEDs\) will account for 84 percent of general illumination by 2030](#), with savings of \$30 billion and 300 terawatt-hours of electricity. In another indicator, New England utilities with efficiency programs have historically spent just over half their budgets on lighting and achieved almost 70 percent of their savings from that investment in lighting. If mainstream products are now using much less energy to meet the need for that energy, the baseline—the threshold level for efficiency programs to claim savings to their regulators—goes up. It means efficiency programs have an important opportunity to plan for the next generation of strategies that assume reduced savings at an increased cost. The value that lighting has brought to consumers, energy program portfolios, and the economy can be repeated with other measures—and indeed, with lighting in non-residential markets. That is, with other technologies, measures, and products that can become the new mainstays of efficiency programs.

This paper offers insights, observations, and recommendations for efficiency programs as the market moves beyond its traditional reliance on residential lighting.

The Baseline Challenge

If backstop provisions established in federal lighting [standards](#) take effect in 2020, new [screw-based bulbs](#) must meet efficacy levels currently not achievable by halogen or incandescent bulbs. This advancement in the baseline efficiency of many lighting products will immediately diminish energy savings from programs incentivizing screw-based lighting.

Even if changes to federal (or [state](#)) lighting standards do not take effect, LEDs have a foothold in many markets, effectively displacing all other types of bulbs. LEDs are also becoming increasingly competitive with less efficient halogen products.

Thus, we expect a negative effect on residential lighting program savings and increasing pressure to deliver cost-effective energy efficiency programs generally. In fact, an independent analysis performed for VEIC by [Synapse Energy Economics](#) shows that energy efficiency costs will double by 2030. Both factors are creating a profound challenge for program implementers.

The Opportunity: What’s Happening with Lighting

Most regulated efficiency programs face a future where they will be unable to rely on substantial energy savings from residential efficient lighting products.

From a market perspective, this is good news. Aggressive, impending federal lighting standards and state codes that shift efficiency program cost-effectiveness baselines, and a responsive marketplace of affordable, long-lived efficient lighting products, are good for the planet, budgets, and electrical loads.

For more than a decade, these factors and utility programs' respective lighting incentives have driven market demand for CFLs and now, LEDs. This work has contributed to the drive toward market transformation in several regions, at least in residential lighting. Although there is still potential in the commercial lighting market, no emerging technology is expected to replace LEDs, in either the residential or the commercial market, for durability, flexibility, and energy savings.

Now that the lighting transition has begun to shift from residential to non-residential and to other technologies, efficiency programs need higher levels of customer engagement and information sharing with their stakeholders to stimulate the market toward more complex efficiency measures. This requires increased investment in outreach and technical assistance to promote such measures and the systems they support.

As market transformation causes the low-cost residential lighting measures to diminish in a portfolio, the yield rate for those measures increases, in terms of dollars spent per first-year MWh saved. In other words, this is the unit cost of saved energy, and it's going to increase.

The VEIC Approach

Instead of waiting for definitive changes in state and federal lighting standards, VEIC is pushing itself to develop and adopt new strategies. VEIC recognizes that solid-state lighting and CFLs bring long-term value to consumers and program portfolios alike. With greater diversification—by promoting advanced lighting measures to commercial markets and by recognizing the market transformation potential with other technologies—these new services can keep savings sufficiently strong to ensure program health. In this way, they can continue to ensure good value to consumers.

VEIC has considered (1) trends in accounting for benefits from energy efficiency (including health and other non-energy benefits), (2) emerging technologies, and (3) possible future initiatives for utility efficiency programs. It has also considered methods for guiding its clients in maximizing remaining lighting potential, while considering methods for shifting toward an anticipated new generation of energy efficiency offerings.

These considerations have resulted in five guidelines for efficiency programs that are concerned about the coming decline in savings from the transformed lighting market.

Guidelines for the Next Five Years

1. Be smart about goals: Set and communicate clear goals in program design and determine metrics for performance.

Program designs should be tied to investment and incentive levels that align well with savings objectives.

Assumptions

- The lighting market is likely to experience rapid and unpredictable changes and, in some cases, has already transformed.
- There are unique barriers and opportunities in each utility location.
- There are increasing opportunities for non-lighting programs and technologies that can and should be considered.

Recommendations

- A. Program administrators should write strong action plans for ratepayer investments and identify clear measures of success, with data-informed, achievable metrics for that success.
 - a. A strong plan will provide programs with a valid basis for a significant role in the market and visibility for industry investment.
 - b. A strong plan will also insulate programs against outside influences beyond the organization's control.

Sample actions

- The plan should include a list of next-in-line strategies that can be mobilized once screw-based bulb socket saturation (for example) reaches X percent.
 - To optimize the capture of the remaining lighting potential, once stocking practices within a service territory reach a targeted amount of inventory, staff should shift resources to fulfilling next-in-line strategies, and possibly retiring the program.
 - The plan must contain a price point at which the consumer / retail cost of inefficient products to the incentivized efficient product is comparable.
- B. Program administrators should design new programs in such a way that relevant staff can regularly reassess the market to determine the need to change course.

2. Offer high value for customers: Continue to prioritize an equitable return on ratepayer dollars.

Lighting has consistently been a cost-effective, socially equitable efficiency opportunity. Utility lighting programs have helped balance savings and ratepayer dollars across residential and commercial programs, and their flexible designs have contained cost-effective strategies that serve low- and moderate-income customers.¹

Assumptions

- Lighting disproportionately serves residential customers.
- Lighting (or any other readily available and affordable technology) that helps to support cost-effectiveness and energy savings in broader programs puts those programs at risk if the lighting / other technology is no longer part of the program design.

Recommendation

- A. Programs must take the lead in supporting new technologies and program strategies that provide ongoing, equitable use of program funding.

Sample actions

- As lighting incentives shift from screw-based lighting to commercial and specialty bulbs, efficiency programs should find ways to continue to meaningfully serve the residential market:
 - Accelerate the transition to residential LEDs by targeting replacements of incandescent bulbs.
 - Target above-code LED incentives in smaller independent, grocery, and discount stores.
 - Advocate for changes in performance metrics among regulator and client attitudes, early on, to ensure services to low-income customers and to support energy justice in all communities.

3. Keep making lighting purchases easy and enticing: Maximize customers' good experience with high-efficiency lighting / efficiency technology.

Efficiency programs that reduce their investments in efficient lighting / technology jeopardize market penetration of good-quality, high-performance lighting. Notably, direct-installation multifamily and single-family weatherization programs have leaned heavily on lighting to support those programs' cost-effectiveness and energy savings. And as has been stated, the potential for penetrating the non-residential lighting market in new ways is high.

¹ An example of this is the early distribution of CFLs at food banks (by [the DC Sustainable Energy Utility](#), beginning in 2012), as a way to introduce low- and moderate-income customers to energy efficiency concepts and technologies.

Assumptions

- Consumers will likely be less inclined to recognize and choose accredited products and will settle for lower-cost (“value”) LED products, while still expecting high-performance results in terms of lighting quality and product durability.
- The lack of confidence in the performance of new, qualified technology will result in fewer sales and installations of efficient technologies.

Recommendation

- Program administrators should identify market opportunities to reduce incremental costs of the highest-performing efficient products—whether in the residential marketplace or the commercial marketplace. This approach is likely to increase customer acceptance and adoption of the technology. In the example of lighting, that would involve ENERGY STAR LEDs.

Sample actions

- Programs can offer incentives and technical guidance to customers to support purchasing and sales of the highest-quality, most efficient products.
- Program administrators should coordinate an advocacy effort for adopting federal standards and state building energy codes whose specifications align with the highest-quality products. This process should adhere to the action and monitoring steps shown in Figure 1.



Source: VEIC, DC Sustainable Energy Utility, 2018.

Figure 1. Sample action and monitoring steps that can support industry advocacy of the highest-performing technologies for utility efficiency portfolios—in an era of declining performance from existing technologies.

4. When in doubt, diversify: Diversifying efficiency program revenue and partnerships to maximize lighting / other technology savings, while allowing investments in new programs and technologies.

Ratepayer-funded efficiency programs are experiencing pressure to reduce budgets, or in other ways are limited in their abilities to invest meaningfully in new technologies or program strategies. Under the current “business as usual” scenario, they need supplemental funding to achieve these objectives.

Assumptions

- Program administrators can accelerate gains from lighting, while advancing a more comprehensive energy strategy for a wide variety of buildings.
- This strategy involves a higher emphasis on more efficiency, electric transportation, renewables, and storage.
- Program administrators will be curtailed in their ability to scale, unless they can obtain revenue and investments from new sources and build new partnerships to deliver co-benefits.

Recommendation

- A. Bring additional funding to existing programs by partnering with others to deliver co-benefits (for example, water, weatherization, or health).

Sample actions

- Efficiency programs can and should advocate to regulators that they account for the co-benefits of energy efficiency.²
- Program managers can prioritize and measure program success from leveraged financing and other external investments.
- Programs can seek external funding to support efficiency, transportation, and renewable energy projects in underserved sectors.
- Program administrators should seek out effective partnerships with healthcare institutions, municipal governments, community-based organizations, and other mission-aligned entities.

² The list of co-benefits and other “non-energy benefits” grows each year. Synapse Energy Economics made a [presentation](#) at an ACEEE Symposium on Market Transformation (2014), outlining the various forms of non-energy benefits and their respective roles in cost-effectiveness screening. Other analyses are well known to some VEIC staff—notably, “[Evaluating and Quantifying the Non-Energy Impacts of Energy Efficiency](#),” Electricity Markets & Policy Group (Lawrence Berkeley National Laboratory; 2016) and ICF’s “[Don’t Sell Yourself Short on Non-Energy Benefits](#)” (2017).

5. Work with regulators to shift criteria for performance awards: Prioritizing the achievement of state (or client) goals (for example, environmental and energy system outcomes), rather than electricity or natural-gas savings only.

Assumption

- Shifting away from energy savings only will allow for strategic, long-term investments in residential and low-income programs, and create a deeper understanding of the layered value of efficiency and energy services.

Recommendation

- A. Program administrators should continue to strongly advocate to regulators that they adjust program performance metrics to acknowledge (if not prioritize) achieved positive outcomes. This is preferable to confining themselves to being rewarded primarily for achieving energy savings.

Sample actions

- Launch pilot programs to test new models and explore ways to improve (or completely revise) cost-effectiveness screening.
- Target programs to align with a community's goals—such as those for economic development.
- Shift program metrics to a combined energy metric or to greenhouse gas emissions.
- Promote stricter codes and standards and encourage their adequate enforcement.
- Align energy efficiency program goals with state policy goals. In progressive states, that means expanding energy efficiency programs to explicitly allow for demand response, electrification, storage, and renewable energy.
- Advocate for savings credits from controlled smart bulbs and whole-house systems.
- Advocate for savings credits from programs that optimize equipment operation, using a Pay for Performance model.
- Receive credit for helping commercial customers implement measurable CEI / SEM / ISO50001 practices to decrease energy use.
- Advocate for the ability to dedicate resources to obtain energy savings through [Attribution for Codes Compliance and Adoption](#).

Conclusion

The lighting transition is under way now and it is part of a success story that can be repeated. In fact, the history of market transformation in the residential lighting marketplace now offers a road map for other measures in an efficiency program's portfolio.

The historical level of importance obtained from residential lighting savings, the projected decline in future lighting savings efficiency programs can claim, and projected higher unit costs all occur across efficiency portfolios that have had strong lighting programs. Creating a more diversified portfolio that maintains some level of lighting in it—and even advances lighting in ready commercial markets, is a best practice that allows for future cost-effective energy efficiency potential.

Having next-in-line strategies ready to go is good for the consumer, just as it can help a jurisdiction meet its energy goals and keep negative environmental impacts low. These strategies should be informed by program staff who keep an eye on how lighting evolves technologically, and who monitor other, possibly new markets for lighting, especially in the commercial sector.

Efficiency programs and rising energy performance standards on lighting products have helped transform the residential lighting market from one dominated by incandescent bulbs just a decade ago to one where CFLs and LEDs are the norm. This transformation is an opportunity, if not an invitation, for energy efficiency programs to seek market transformation in other parts of their portfolios. Diversifying portfolios is valuable, but so is staying engaged with stakeholders, to ensure that their needs are being met with high-quality, cost-effective strategies and initiatives.

Even with declining claimed lighting savings in the residential market, it is important not to forget that the savings created from lighting initiatives are now embedded in baselines. Therefore, lighting continues to support jurisdictional energy, economic, and environmental policy goals.

Ultimately, embracing the lighting transition is about generating next-in-line strategies for a new, diversified portfolio that continues to learn from the history of the measure that started it all.