## The Value of Ongoing Market Tracking, Monitoring and Evaluation: A Case Study from the Pacific Northwest

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## ABSTRACT

The Northwest Energy Efficiency Alliance (NEEA) is a regional non-profit organization that works in Idaho, Montana, Oregon, and Washington to transform markets for energy-efficient products and services. NEEA began a consumer lighting market transformation initiative in 1997 and conducted market tracking, monitoring and evaluation studies on approximately an annual basis soon after the project's inception. Data collected during NEEA's 2007 market progress evaluation period suggested that NEEA achieved its project's goals ahead of schedule and as such, NEEA withdrew its CFL incentives from the market in early 2008. Since then, NEEA has continued to monitor the Northwest residential lighting market to assess its continued progress toward market transformation and to examine whether withdrawing its CFL incentives has had any negative impacts on the market.

This paper presents the results of NEEA's most recent residential lighting market evaluation as one example of an ongoing market tracking and monitoring effort. Highlighting some key examples from NEEA's research, the paper describes the value of ongoing market tracking, monitoring and evaluation. In particular, the paper summarizes some of the key benefits of these efforts, including that they enable early detection of and adaptation to shifting market conditions; they provide opportunities for rapid feedback from stakeholders; and they may offer financial efficiencies to energy-efficiency program administrators.

## Introduction

The Northwest Energy Efficiency Alliance (NEEA) is a regional non-profit organization that works in Idaho, Montana, Oregon, and Washington to transform markets for energy-efficient products and services. Funded by the region's electric utilities, the Bonneville Power Administration, and the Energy Trust of Oregon, NEEA began its consumer lighting market transformation initiatives in 1997. The purpose of NEEAs initial engagement in the residential lighting market was to advance consumer awareness and use of ENERGY STAR® compact fluorescent lamps (CFLs) and fixtures throughout the region. In 2008, after more than 10 years of active market support, NEEA withdrew its CFL incentives from the market. Since then, NEEA has continued to monitor the Northwest residential lighting market to assess its continued progress toward market transformation and to examine whether withdrawing its CFL incentives has had any negative impacts on the market.

This paper presents the results of NEEA's most recent residential lighting market evaluation as one example of an ongoing market tracking and monitoring effort. Using this example, the paper describes the value of ongoing market tracking, monitoring and evaluation.

## **Lighting Project Background**

As mentioned above, NEEA works to transform markets for energy-efficient products in the Northwest. This process is not limited to working within existing markets but may also involve supporting efforts to develop viable energy-efficient product alternatives. NEEA also works to ensure that the energy-efficient options are affordable, widely available, and of high quality. NEEA's initiatives target the market barriers associated with specific products and offer numerous forms of market support to overcome those barriers. The process also involves development and monitoring of various market progress indicators and clearly-defined exit strategies for discontinuing market support when the market has advanced to the point at which active support is no longer necessary.

NEEA's residential lighting market initiatives are a good example of its ongoing market transformation efforts. NEEA launched its first residential lighting market project in 1997. At that time, the purpose of the project was to advance awareness and use of energy-efficient compact fluorescent lamps (CFLs) and fluorescent light fixtures among residential customers in the Northwest. 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 and controls (such as dimmers, timers and photocells); performance problems; aesthetics of energy-efficient lighting products; and general dislike of fluorescent technologies among consumers. The project provided financial incentives to manufacturers; retailer education; marketing and mass advertising; and branding support.

During the late 1990s, the number of products that qualified for inclusion in NEEA's initiatives expanded considerably and both retailers and consumers were faced with a greater variety of products as well as new product types and features. As a result, the project's strategy evolved from targeting manufacturers to working more closely with retailers. Starting in 2000, the project provided retailers with salesperson training as well as advertising and marketing support to promote ENERGY STAR CFLs and fixtures and to encourage consumer acceptance of these products in the marketplace. NEEA leveraged local utility activities and participated in regional and national initiatives to encourage improvements in ENERGY STAR CFL 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.<sup>1</sup> The project provided cooperative marketing opportunities and field services to retailers to promote ENERGY STAR CFLs. The project also coordinated utility incentive offerings for these products. Additionally, NEEA continued its participation in broader market initiatives beyond the Northwest and coordinated with national efforts such as ENERGY STAR's Change a Light, Change the World campaign. Additionally, the project supported lighting quality research efforts 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.

To address consumer concerns regarding the relatively high cost for CFLs versus less efficient lighting products, the project coordinated a regional manufacturer buy-down promotion in 2005 to reduce the market price of CFLs in the region. Through these efforts, the project also worked with manufacturers to establish promotional distribution channels for moving high-quality, low-priced CFLs into the market. The promotion provided broad geographic sales coverage (including rural markets) through numerous distribution channels including grocery, drug, small hardware, mass merchandise, do-it-yourself, and wholesale chains.

Results from NEEA's 2004 market progress evaluation study suggested that the proportion of consumers reporting very high satisfaction with CFLs (ratings of 9 or 10 on a 10-point scale where 1 means "not at all satisfied" and 10 means "very satisfied") fell from 46 percent in 2001 to 29 percent in 2003 (ECONorthwest 2004). The study also reports that CFL purchasers highlighted product quality issues (such as light quality and length of product life) as factors contributing to their overall satisfaction with CFLs. Per the report, these findings "[underscore] the critical importance of [NEEA's] continued support" for product quality assurance initiatives (ibid., viii).

NEEA expanded upon the success of the project in 2005 by coordinating similar promotions in 2006 and 2007 with a specific 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 smaller and/or non-traditional CFL distribution channels (such as drug, grocery and small hardware 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. As with previous studies, NEEA's 2008 market progress evaluation report compared the status of the Northwest residential CFL market against NEEA's long-term goals for the project (including increased CFL awareness, availability and market penetration; reduced price; and increased sales) and concluded that NEEA achieved these goals ahead of schedule at the end of 2007 (KEMA 2008). As such, NEEA concluded that it was no longer necessary for NEEA to provide CFL incentives 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.

## **Ongoing Market Tracking, Monitoring and Evaluation**

#### Overview

As mentioned above, NEEA has undertaken residential lighting market tracking and monitoring activities on an approximately annual basis for more than a decade. The purpose of NEEA's research is multifold. In addition to assessing market effects of the lighting project while it was active, the ongoing research sought to estimate market effects that occurred after NEEA withdrew its residential lighting incentives (because market effects may continue after a project's funding period ceases). During both timeframes the research provides market intelligence to funders and stakeholders and provides an opportunity for NEEA to verify (and if necessary, adjust) key assumptions in its cost-effectiveness models. Additionally, NEEA's market progress assessments offers ongoing coordination opportunities within the region with regard to residential lighting market transformation efforts.

NEEA's market tracking, monitoring and evaluation efforts have included a broad range of activities; Table 1 below provides an overview of the types of research activities undertaken as part of these efforts. These have included in-depth telephone interviews with NEEA staff and other project staff, computer-aided telephone surveys of Northwest consumers, onsite shelf surveys in retail stores that carry residential lighting products, in-person and telephone interviews with lighting retail store managers, interviews with high-level representatives of lighting manufacturers and retail chains, and interviews with Northwest utility program managers. These research efforts have provided a multifaceted picture of the residential lighting market in the region over time and have enabled NEEA not only to stay abreast of current status of the lighting market but also to place these in the broader context of market trends.

As demonstrated in the table, NEEA's lighting market research activities shifted over time and included varying sets of research activities. The changes in the research activities included in each study are primarily a result of the program's shifting focus over time in response to market changes, but also partially a result of limited evaluation funding—a reminder that energy-efficiency program sponsors typically cannot afford to track all facets of a market all the time, and that prioritization is necessary. Table 2 provides more details on the research activities included in the most recent lighting market evaluation study.

**Table 1.** ENERGY STAR Consumer Products Lighting Project Evaluation Studies and ResearchActivities, 2004—2011 (KEMA 2005—2011)

|                                       | Study Date     |                |                |                |                |                |                |
|---------------------------------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|
| <b>Research Activity</b>              | 2005           | 2007           | 2007           | 2008           | 2009           | 2010           | 2011           |
| Project staff interviews              | ✓              | ✓              | ✓              | ✓              |                |                | $\checkmark$   |
| Consumer telephone surveys            | ~              | ✓              |                |                |                | ✓              | ✓              |
| Lighting retail store shelf surveys   | ~              | ~              | ~              |                | ~              | ~              | ✓              |
| Lighting retail store manager surveys | ~              |                | ✓              |                |                |                |                |
| Market actor interviews               | ✓              |                | ✓              |                | ✓              | ✓              | $\checkmark$   |
| Utility program manager interviews    | ~              |                | ~              | ~              |                |                | ✓              |
| Source                                | (KEMA<br>2005) | (KEMA<br>2006) | (KEMA<br>2007) | (KEMA<br>2008) | (KEMA<br>2009) | (KEMA<br>2010) | (KEMA<br>2011) |

# **Table 2.** Data Collection Activities, 2010-2011 Long-Term Northwest Residential CFL Tracking Study(KEMA 2011)

| Research Activity   | Sample Frame Source  | Number of<br>Completes  | Data<br>Collection<br>Dates  |
|---|--|---|------------------------------|
| Retail Store Shelf Surveys<br>(in-store surveys)                    | List of stores provided by<br>NEEA's former sales data<br>collection contractor (Portland<br>Energy Conservation Inc.)     | 58 retail stores  | December<br>2010             |
| Consumer Surveys<br>(computer-aided telephone surveys)              | Random Digit Dial within<br>Northwest zip codes (zip code<br>list from U.S. Census Bureau)                                 | 1,000<br>consumers  | January—<br>February<br>2011 |
| Market Actor Interviews<br>(in-depth telephone interviews)          | List of manufacturers and<br>retailers provided by NEEA's<br>sales data collection contractor<br>(Fluid Market Strategies) | 5 retailer<br>representatives;<br>4 manufacturer<br>representatives | February<br>2011             |
| Utility Program Staff Interviews<br>(in-depth telephone interviews) | List of utility program staff<br>provided by NEEA and Fluid<br>Market Strategies   | 16 utility<br>program<br>managers                                   | January—<br>March<br>2011    |
| Consumer Focus Groups   | Random digit dialing of<br>consumers in the selected<br>geographic areas   | 6 focus groups<br>with 47<br>consumers                              | December<br>2010             |

#### **Example Results**

As described above, NEEA began tracking market progress in the Northwest shortly after its residential lighting project's inception, and shifted the project's focus throughout its course in response to evaluation results that revealed changes in the market over time. NEEA's earliest lighting market initiatives included numerous objectives, three of which were increasing CFL sales, improving CFL quality, and improving CFL affordability (Gilmore Research Group 1998). As NEEA's residential lighting project evolved, NEEA also began shifting its CFL incentives toward smaller retail channels and those in which CFLs were not traditionally stocked—such as drug, grocery and small hardware stores—as well as toward rural areas. The intention of this focus was to ensure the presence of affordable ENERGY STAR CFLs in these store types and regions.

As an example of how long-term market tracking and monitoring can be utilized by energyefficiency program sponsors, this paper focuses on a subset of the market characteristics tracked by NEEA over time—specifically, CFL sales, consumer satisfaction with CFLs, and CFL price. The paper will highlight important results with regard to these metrics in rural areas and in non big box retail channels (including drug, grocery and small hardware stores) given NEEA's particular interest in supporting CFL sales throughout the entire Northwest region.

**CFL Sales.** As part of its ongoing market tracking and monitoring efforts, NEEA works with contractors who collect data on ENERGY STAR CFL sales through retail channels that typically serve residential customers. NEEA's evaluation contractors then analyze these data to produce estimates of residential ENERGY STAR CFL sales in the region by retail channel and geographic region.<sup>2</sup>

Figure 1 presents data on CFL sales in the Northwest from 2001 through 2010 broken down by incentive sales (i.e., CFLs sold with discounts provided by the region's energy-efficiency program sponsors) versus non-incentive sales (i.e., CFLs sold without these discounts). The figure further separates incentive sales into those provided by NEEA versus other energy-efficiency program sponsors, evincing the absence of CFLs sold with NEEA incentives after early 2008. The figure also demonstrates a slight increase in CFL sales between 2009 and 2010 after dramatic 26-percent drop between 2008 and 2009.

Had NEEA not continued to monitor and track CFL sales after discontinuing its lighting project in early 2008, there may be little evidence of the spike in sales during 2008 or of the subsequent maintenance of steady sales at 2007 levels (at least for 2009 and 2010). Although fairly simplistic, this example demonstrates the value of long-term market tracking and monitoring efforts such as NEEA's, particularly when these efforts continue after a program sponsor discontinues its program.

Figure 1 also shows changes over time in the proportion of total CFLs sold with utility incentives. In 2007, while NEEA's residential lighting incentives were still available, incentive sales comprised 32 percent of total regional ENERGY STAR CFL sales. This proportion dropped to 27 percent in 2008, the year NEEA withdrew its CFL incentives, and rebounded to 34 percent in 2009. These data may suggest the importance of continued residential lighting product support offered by other program sponsors in the region.

<sup>&</sup>lt;sup>2</sup> For greater detail on sales data tracking methods, refer to NEEA's most recent residential lighting market tracking study (KEMA 2011).



**Figure 1.** Estimated ENERGY STAR CFL Sales in the Northwest, 2001-2010 (Portland Energy Conservation Inc. 2006; Fluid Market Strategies 2007—2011)

**CFL Sales by Store Type.** Figure 2 shows the proportion of Northwest residential ENERGY STAR CFL sales across store types for 2006 through 2010. This data is valuable given NEEA's interest in supporting CFL sales through non big box stores (drug, grocery, and small hardware), particularly in the later years of its residential lighting project efforts. As shown, the proportion of regional CFL sales through big box stores versus non big box stores remained fairly constant between 2006 and when NEEA's lighting project ceased its activities in 2008 (roughly 70% big box, 30% non big box). Between 2008 and 2009, sales through big box stores increased from 70 to 86 percent of total Northwest residential ENERGY STAR CFL sales, and these proportions held fairly constant between 2009 and 2010 (87% big box, 13% non big box).

Although there is no data to suggest that the shift in product sales is exclusively attributable to NEEA's withdrawal of incentives in 2008, the data in Figure 2 suggest that additional support may be necessary for sales through these channels to rebound to pre-2009 levels. Should program sponsors choose not to target these channels specifically, however, ongoing tracking efforts will enable sponsors to continue monitoring market share in these channels and support decision-making regarding possible market interventions in the future.



**Figure 2.** Estimated ENERGY STAR CFL Sales in the Northwest by Store Type, 2006-2010<sup>3</sup> (Fluid Market Strategies 2007—2011)

<sup>&</sup>lt;sup>3</sup> A small fraction of annual ENERGY STAR CFL sales in the region were not tracked by retail channel in 2008, 2009 or 2010.

**Consumer Satisfaction with CFLs.** As described above, NEEA's residential lighting project efforts included a focus on ENERGY STAR CFL quality, and NEEA engaged in various efforts to support production and distribution of high-quality ENERGY STAR CFLs. As one measure of lighting product quality, NEEA measured general satisfaction with CFLs among CFL purchasers over time through random-digit-dial computer-aided telephone surveys. To provide further insights into the underlying reasons for satisfaction at this more general level, the surveys also collected data on CFL purchaser satisfaction with various CFL attributes.

During the telephone surveys, interviewers asked consumers the following question: "Thinking about all of the CFLs you recently purchased, how satisfied are you with them?" Interviewers then instructed survey respondents to rate their satisfaction with CFLs using a scale of 1 to 10 (where 1 means "not at all satisfied" and 10 means "very satisfied"). Figure 3 below depicts the results and shows the mean satisfaction rating in the figure legend. As shown, general satisfaction with CFLs increased dramatically between 2003 and 2004 and has remained relatively high since then.

However, the results in Figure 3 also suggest a slight yet noteworthy increase in the proportion of CFL purchasers providing the lowest satisfaction ratings (1 or 2) during the past few study periods as well as a decline in mean satisfaction ratings between 2006 (when the mean rating was 8.0) and 2011 (when the mean rating was 7.4). To provide further insights into consumer satisfaction or dissatisfaction with CFLs, Table 3 shows results over time to more detailed survey questions regarding satisfaction ratings with specific CFL attributes (this time on a scale of 1 to 5 where 1 means "not at all satisfied" and 5 means "very satisfied"). As shown in the table, the average satisfaction ratings for 3 specific attributes – the color of light from CFLs, the time it takes CFLs to light up, and how long CFLs last – declined by statistically significant margins between 2010 and 2011. While satisfaction with these three CFL attributes (and the other attributes examined by the surveys) are still moderately high overall, these results could provide helpful insights in the future should the proportion of highly dissatisfied purchasers continue to increase over time.



\* Difference from previous study period is statistically significant at the 90 percent level of confidence.

**Figure 3**. General Satisfaction with CFLs Over Time Among CFL Purchasers, 2003–2011 (1 = Not at all Satisfied, 10 = Very Satisfied; KEMA 2011)

|                       | Mean Satisfaction Rating<br>(1 = Not at all satisfied; 5 = Very satisfied) |         |         |         |         |  |  |  |
|-----------------------|--|---------|---------|---------|---------|--|--|--|
|                       | 2004   | 2005    | 2006    | 2010    | 2011    |  |  |  |
| CFL Attribute         | (n=554)  | (n=220) | (n=217) | (n=230) | (n=349) |  |  |  |
| 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*    |  |  |  |
| Fit in light fixtures | 4.0  | 4.2     | 4.5     | 4.4     | 4.3     |  |  |  |
| How long they last    | 4.3  | 4.4     | 4.5     | 4.8     | 4.3*    |  |  |  |

 Table 3. Mean Satisfaction with CFL Attributes Among CFL Purchasers, 2004–2011 (KEMA 2011)

\* Difference from previous study period is statistically significant at the 90 percent level of confidence.

**CFL Price.** To track prices for CFLs available throughout the region over time, NEEA conducts periodic shelf surveys in retail stores that sell ENERGY STAR CFLs. During these surveys, researchers collected detailed information on lamps for sale in each store, including manufacturer, model number, number of lamps per package, price per package, and so on. NEEA's most recent evaluation study (KEMA 2011) included a fourth round of shelf surveys in 58 stores throughout the Northwest during December 2010. NEEA tracks CFL prices in both metropolitan and non-metropolitan areas across six store types (drug, grocery, and small hardware stores as well as big box stores including large do-it-yourself stores, mass merchandise stores, and wholesale clubs).

Based on these data, the average cost per CFL<sup>4</sup> appears to have increased by approximately 30 cents per lamp between 2009 and 2010 after a 53-cent drop between 2008 and 2009. (Figure 4). When further examined by geography, results suggest that prices increased in metropolitan areas by 24 cents between 2009 and 2010 and by 41 cents in non-metropolitan areas (Figure 5). As shown in Figure 6, while the average CFL price increased by 35 cents in big box stores between 2009 and 2010, average prices in non big box stores (drug, grocery, and small hardware) remained steady.

When both geography and store type are examined together, these more detailed data suggest that the overall increase in average regional CFL price between 2009 and 2010 was primarily driven by a 51-cent increase in the average CFL price at non-metropolitan big box stores (along with a 26-cent increase in metropolitan big box stores).

These results demonstrate not only the possible volatility in market data for a particular product (in this case, CFL price) but also the value of collecting detailed data on an annual basis to monitor ongoing developments. The data also suggest the difficulty in determining market trends based on only a few years' worth of data.

Eliminating any year's worth of data in the three figures below would demonstrate a somewhat different picture of the market. Without the 2008 data, for example, the figures would suggest an overall price fluctuation of approximately 20 cents between 2006 and 2010 for the Northwest region as a whole. The absence of data from 2008 would also obscure the sharp increase of nearly 90 cents per CFL in drug, grocery and small hardware channels between 2007 and 2008. And without the 2009 or 2010 data, for example, there would be little evidence of the decline and subsequent uptick in average CFL price.

<sup>&</sup>lt;sup>4</sup> These data include both incentive and non-incentive CFL prices.



Figure 4. Mean Northwest CFL Price, 2006–2010 (KEMA 2011)



Figure 5. Mean Northwest CFL Price by Geography, 2006–2010 (KEMA 2011)



Figure 6. Mean Northwest CFL Price by Store Type, 2006–2010 (KEMA 2011)

## Value of Ongoing Market Tracking, Monitoring and Evaluation

The examples provided in this paper illustrate some of the key benefits of ongoing market tracking, monitoring and evaluation efforts, all of which are closely related to one another:

#### 1. Early detection of and adaptation to shifting market conditions.

NEEA's residential lighting project shifted its focus over time in response to the results of its ongoing market tracking, monitoring and evaluation efforts. After initially targeting manufacturers, NEEA then shifted its residential lighting project to provide more support to lighting product retailers as the number and diversity of ENERGY STAR CFLs increased in the late 1990s. A few years later, in response to market data suggesting consumer dissatisfaction with product performance, the project shifted its focus toward achieving improvements in CFL quality and consumer acceptance in the mid-2000s. NEEA utilized its ongoing market evaluation efforts to help target the residential lighting project's resources to maximize its benefits in the Northwest market.

In California, the California Public Utilities Commission (CPUC) and investor-owned utilities (IOU) have been engaged in ongoing monitoring and evaluation of energy-efficiency programs for more than two decades. In response to market evaluation data suggesting "rapid progress toward lighting market transformation," the CPUC directed the IOUs in 2010 to allocate less of its ratepayer-funded energy-efficiency program efforts toward incentives for basic CFLs (CPUC 2010, 7). The CPUC directed the IOUs to reduce and reallocate funding for basic CFL programs to instead support "advanced lighting programs and other lighting market transformation activities" (ibid., 7).

### 2. Rapid feedback from stakeholders.

As demonstrated with the CFL satisfaction example above, ongoing market tracking and monitoring efforts provided NEEA with rapid feedback from stakeholders. And as shown in Table 1 above, NEEA's ongoing residential lighting market tracking, monitoring and evaluation efforts also included periodic interviews with lighting program managers at the region's electric utilities as well as with representatives of lighting manufacturers and retailers to obtain feedback on NEEA's ongoing lighting market activities. These interviews also provided these market actors to provide their perspectives on the types of lighting market support that might be most valuable in the market.

The Vermont Department of Public Service identifies "quick and ongoing feedback on program implementation" as a critical need met by ten years' worth of ongoing program monitoring and evaluation activities (Lloyd, R. 2005). Such feedback enables program planners to adjust their programming to address stakeholder needs and concerns. As part of an ongoing evaluation process, these frequent assessments may also allow program sponsors to target specific problems and follow up with stakeholders in a subsequent evaluation period to ensure that their concerns were addressed.

#### 3. Financial efficiencies.

As mentioned above, NEEA's ongoing market progress evaluation reports suggested that NEEA met its Northwest ENERGY STAR residential lighting project's goals several years ahead of schedule. Based on these results, NEEA withdrew its incentives from the lighting market in early 2008. Without these frequent market monitoring efforts, NEEA would not have had the necessary data to determine the success of its program ahead of schedule, which may have resulted in unnecessary residential lighting project expenditures.

The example from California cited above—regarding the reduction in program efforts related to basic CFLs—is arguably another example of how ongoing market tracking, monitoring and evaluation efforts can lead to cost efficiencies (i.e., evaluation results suggested that basic CFL program resources may be better spent elsewhere). Other studies suggest similar results in other program areas; for example, a 2008 study for the U. S. Department of Energy Office (DOE) of Energy Efficiency and Renewable Energy revealed significant cost savings associated with ongoing annual peer reviews of research and development programs between 2003 and 2007 (Agyeman, Y. O. and J. Dowd 2008). The Hydrogen Program invested approximately \$1.8 million in a peer review process during this timeframe, and the DOE estimates that the Program avoided spending approximately \$29 million on relatively ineffective projects. The peer review process suggested these funds could be better spent on other Program initiatives. As such, the study concluded that "for research & development (R&D) programs with long-term research goals, peer reviews not only improve overall management efficiency and effectiveness, but they can also greatly improve financial efficiency" (ibid., ii).

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