Results from the Efficient Lighting Initiative: Amazing Outcomes and Implications for Market Transformation

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ABSTRACT

The Efficient Lighting Initiative (ELI), a market transformation program that has been implemented by the International Finance Corporation (IFC), the private sector investment arm of the World Bank, with sponsorship by the Global Environment Facility (GEF), has operated in seven countries over the past five years using a variety of market intervention techniques all aimed at increasing the market adoption of high quality energy-efficient lighting products. This paper reports on the evaluation of the ELI program that has been performed by a team of experts in energy-efficiency program evaluation. The ELI program sought the accelerated adoption of high-quality energy-efficient lighting products that meet a set of stringent but achievable product specifications as identified through the program's product certification and quality mark process. The post-program evaluation, reported on in this paper, shows that by virtually all measures, the program succeeded in positively affecting the major metrics association with market transformation, and contributed significant near-term energy savings and GHG emissions.

Introduction

The Efficient Lighting Initiative (ELI) is a market transformation program that has operated in seven countries over the past five years, using a variety of market intervention techniques aimed at increasing the adoption of high-quality energy-efficient lighting products. Implemented by the International Finance Corporation (IFC), the private-sector investment arm of the World Bank, with sponsorship by the Global Environment Facility (GEF), the ELI program will conclude in 2005 when its final market transformation assessment has been completed.

This paper reports on the process evaluation, impact evaluation, and preliminary market transformation assessment. The ELI process evaluation examined five main issues before, during, and after ELI implementation: 1) Lighting market characteristics, 2) ELI program components and rationale, 3) Customer awareness, usage, and decision-making, 4) Trade ally awareness and stocking practices and 5) Regulatory, governmental, institutional, and financial roles.

These elements were researched through interviews with program implementation and management staff, reviews of program status reports and periodic tracking data, and surveys with

stakeholder groups (lighting manufacturers, distributors, and retailers). Interim results from the process evaluation, as well as impact methodology, can be found in Vine, et al. (2003).

The impact evaluation focused on measuring changes in lighting product prices, stocking patterns/supply, quality of products sold, and the resulting energy savings and greenhouse gas emissions that could be estimated from available data. Results of the impact evaluation are presented in Exhibit 1 below.

The market transformation research will continue into late 2004, with the results to be published in mid-2005. This work will focus on the extent to which observed and measured changes in the lighting markets in the ELI countries will have been sustained after the programs' completion and also refine the estimates of attribution of market changes to ELI activities in each country made for the impact evaluation.

ELI Impacts and Amazing Outcomes

Program impacts. Exhibit 1 presents the impacts that have been calculated as resulting from ELI program activity in each of the seven participating countries, as based on available data.

The Measurement and Evaluation (M&E) Team concluded that the market interventions conducted in each of the seven countries have resulted in approximately 3,000 GWH in gross energy savings and approximately 2.5 million tons of CO_2 greenhouse gas emissions reductions. These results are based on the available data and the judgments of the M&E team as to the degree of attribution of the observed changes in key indicators to the ELI Programs, over and above changes that would have occurred in the market without ELI. To adjust the gross impact estimates for the immediate post-program period, the ELI M&E team developed a series of factors that account for exogenous or non-program factors, such as the economic downturn that was experienced in Argentina, measured and anecdotal information as to the proportion of free-ridership, and other issues that serve as either decrements or increments. This country by country analysis resulted in the net savings figures shown above.

Amazing outcomes. We chose to title this paper using the words "amazing outcomes" for several reasons – foremost among them being that a program of this scope and breadth was attempted and ran for five years without any major calamities or country drop outs, and that it achieved virtually all of the goals it set out to achieve is amazing. More specifically amazing outcomes by country include, for example:

- In Argentina, ELI-Argentina's persistence reversed a strong downward trend in CFL sales that resulted from a mid-program economic crisis and currency devaluation that effectively tripled prices on imported products.
- In the Philippines, ELI was instrumental in reducing the cheap black market from several fronts - tariff enforcement, reduced sales and quality awareness.
- In South Africa, ELI increased demand and brought down prices of high quality CFLs, but concurrently reduced the adoption rate of lower efficiency incandescent lamps even in an environment of aggressive electrification and a rapidly growing market for residential appliances

Similar outcomes are the result of efforts in Czech Republic, Latvia, Hungary and Peru. Full findings of the evaluation will be published in late 2004 and posted on the program's website (see References).

Exhibit 1. Summary of Estimated Market Transformation / Impacts of the ELI Program

	Impact Evaluation Results (2000 - 2003)		**Market Transformation Results (1999-2003, unless otherwise noted)**	
Country	Estimated Energy Savings (net)[1]	Estimated GHG Reductions	Increase in **Sales** of High Quality CFLs pre-post program	Change in **Prices** of High Quality CFLs pre-post program
Units	*GWh*	*Tons of CO_2 emissions*	*%*	*$ USD*
Argentina	552	310,000	(no baseline)	From US$25 to US$3.25 (eightfold decrease)
Czech Republic	547	570,000	121%	From $5.00 to $4.50 10% decrease
Hungary	657	764,000	100% (1999-2002)	No clear trend in prices, decrease in low quality and increase in hi-quality
Latvia	105	24,000	499%	US$8.60 – US$7.00 17% decrease
Peru	515	406,000	1999 – 2003, +536% 2002 – 2003, +15%	from US$9 – 12 to US$3.50 - $4 (Threefold decrease)
Philippines	250	103,000	44% (1999-2002)	From US$5.40 to $4.93 (decrease 8.7%)
South Africa	372	327,000	123%	Reduced by US $6 (13%)
Total Program	App. 3,000 GWh	App. 2.5 million		

Trade Ally Survey Results

As part of the overall evaluation analysis, the M&E team conducted a survey of lighting manufacturers, distributors, and retailers in the seven ELI countries. The total sample consisted of the top lighting suppliers in each market, and as many other active entities as could be identified by the local implementing teams. The surveys were completed with 135 lighting supply firms (manufacturers, distributors, and retailers) across the seven ELI countries during mid-2002, and covered lighting market activities from 2001 through (projected) 2003. Data from the survey were used as a key source in the impact calculations and will be selectively updated as part of the market transformation work to be conducted in the fall of 2004.

Exhibits 2 - 4 present select findings from the survey. All show that the ELI program is perceived by market actors to have had a significant and direct impact on metrics such as product prices, market share, and reduction of barriers. Variability between countries is shown, and can be explained by the different types of market interventions attempted in each country.

Exhibit 2 shows that in five of seven countries, trade allies reported that prices of CFLs had dropped since the ELI program began. Lower prices are an important measure of accessibility that overcomes the problem of high first costs, identified as a barrier in virtually all

[1] Energy savings are determined as gross savings first, then adjusted for non-ELI effects, to arrive at net energy savings attributable to the ELI market intervention activities. Philippines based on preliminary market transformation regression analysis.

of the country appraisal reports. The question was worded to capture price changes regardless of whether they were directly or indirectly influenced by the ELI program, to ensure that overall pricing trends were captured. Other survey questions focused on attribution of changes to ELI.

Exhibit 2. Trade Ally Survey Results – ELI's Effect on CFL Prices

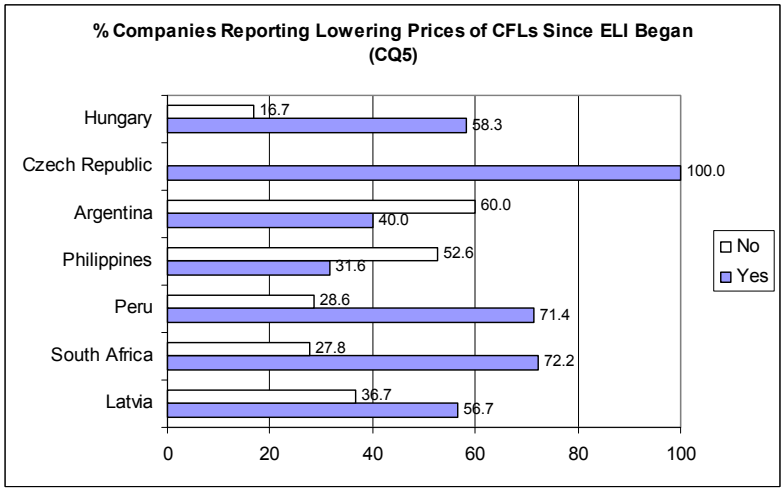
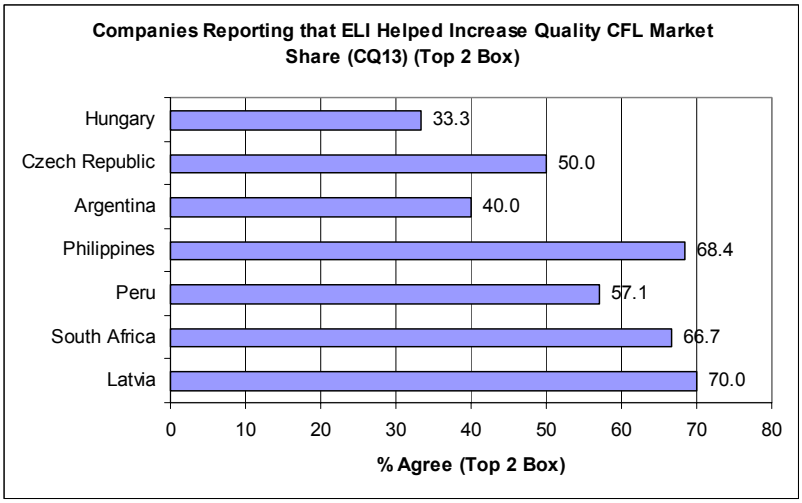


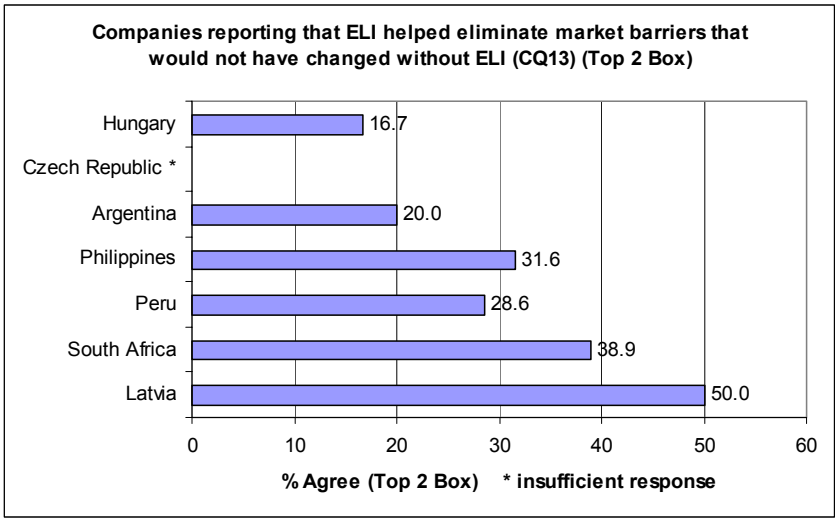
Exhibit 3 illustrates the extent to which lighting trade allies feel that ELI helped increase their market share of high-quality energy-efficient lighting sales. This is an important measure in assessing the impacts of ELI, in that a program goal was to decrease the influence of low-quality CFLs on the market and focus more attention on the benefits of high-quality CFL products. As shown, more than half of the respondents in five of the countries felt that an increase in market share of high-quality CFLs was achieved. (Top 2 Box refers to "Strongly Agree" or "Agree").

Exhibit 3. Trade Ally Survey Results - ELI's Effect on Companies' Market Share of Quality CFLs



Finally, Exhibit 4 addresses the broader issue of "market barriers" (however the respondent chooses to define them), the extent to which ELI helped in their elimination, and changes that would presumably not have happened without ELI. Here the results are also positive. In one case (Latvia), 50% of the respondents felt that the effect was achieved, and a significant number of respondents in five other countries report market barriers as having been eliminated.

Exhibit 4. Trade Ally Survey Results – ELI's Effect on Reducing Market Barriers



ELI Design, Administration, and Implementation

This section addresses the overall design and administration of ELI, the design and implementation of ELI market intervention strategies, and some "lessons learned," according to the program evaluation.

ELI Program Design and Implementation

Management. Flexibility was built into ELI program design, so that implementation could be adapted to each country's economic and political conditions, markets, prevailing lighting technologies, and capabilities. From the IFC point of view, ELI was basically an experiment to test different approaches in different countries, and in general the flexible management structure was deemed successful. There are difficulties inherent, though, in international management of programs being implemented by local country-specific teams, among them a perception of misunderstandings and delays caused by "micro-management" from far away. Lessons learned include:

- IFC should pay closer attention to the administrative efficiencies of the regional supervisory teams and local teams, to determine realistically if more or less supervision/management is needed. Unproductive "micro-management" should be avoided.

- IFC should spend more time at the beginning diagnosing the local situation and identifying potential challenges (e.g., legislative impediments to utilities' selling/leasing CFLs, utility companies' reluctance to switch from selling electricity to selling efficiency). A detailed early assessment would also help allocate resources to the areas in greatest need.

Partnerships and leveraging. ELI developed good partnerships with stakeholders (e.g., government, utilities, retailers, manufacturers, customers), which lent credibility to the entire ELI effort, and ELI could not have worked without those partnerships. Through these relationships, ELI was able to leverage existing resources to promote efficient lighting. For example, the Czech Republic worked with different training organizations, integrated energy-efficient lighting topics into curricula, and worked with manufacturers to develop their own ELI-related campaigns. Lessons learned include:

- Partnerships are essential for capacity-building purposes, as most ELI participants are initially unfamiliar with market transformation.
- More time and resources to create larger programs would have led to significantly greater impacts.

Design and Implementation of the Five ELI Market Interventions

Public awareness and education. Programs focusing on public awareness about efficiency and a greater acquaintance with high-quality lighting products were successful across all countries, resulting in increased sales of CFLs, the lowering of prices for efficient lighting products, and heightened competition among manufacturers. The ELI logo became accepted as a guarantee of quality, and media support in various countries helped influence stakeholders to participate through product qualification and co-marketing investments, helped leverage cooperation through the use of Memoranda of Agreement, and helped strengthen partnerships and reduce market barriers.

Lessons learned include the importance of implementation teams' being able to tailor public education and awareness campaigns to their own understanding of local customs, economies, and trends.

- In the Philippines, 40% of program budget was spent on shifting consumer demand and educating the public about the disadvantages of poor-quality products, with the result that 75% of Filipinos now know about CFLs and 66% -- including the poor – buy and use them.
- The Czech Republic had success with a clever ad campaign with animation.
- In South Africa, increasing awareness of CFLs helped reduce prices and establish a robust ESCO industry.
- In Argentina, well-implemented public education efforts resulted in a doubling of awareness from 2000 (47%) to 2003 (90%).

Transaction support. The IFC had expected greater use of transactional support – that is, using ESCOs or other partners with financial reserves or access to financing – but this happened in only three countries (Czech Republic, Philippines, and South Africa). In the Czech Republic, energy performance contracting and ESCOs were used in public and private buildings, and an

ESCO was established as a subsidiary of the largest Czech manufacturer of industrial and office lighting fittings. In the Philippines, ELI's creation of teams and joint ventures from qualified organizations led to the establishment of 14 independent ESCOs (in addition to the ESCOs spun off from utilities). In South Africa, the ESCOs worked in pilot programs in the private sector, and the number of ESCOs went from just a few to 70.

Lessons learned include the inescapable proposition that working with ESCOs and educating key stakeholders about energy performance contracting takes more time than was allowed under ELI. Significant progress was made, but much more work remained to be done.

Utility programs. As envisioned by the IFC during the design of the ELI, utility companies were to play an important, strategic role in the implementation of ELI. Utilities were active participants in the ELI program in a few countries: for example, utility leasing programs were implemented in Argentina, South Africa, and the Philippines, employee group purchasing and consumer financing of CFLs was offered by a utility in Peru. The success of these efforts underestimated the necessity of first achieving support from the regulatory community. For example, in the Philippines, the restructuring and privatization of the energy industry started before ELI began, and attention to regulatory issues limited progress on the energy-efficiency front, particularly relating to the dominant distribution utility. Once buy-in was achieved late in the program, utility involvement proved to be a useful part of the overall ELI portfolio of approaches.

Market aggregation. In general, market aggregation (i.e., in which an organization of buyers is created to facilitate bulk purchasing advantages) did not play an important role in the ELI program in most countries, but market aggregation is expected to be a cornerstone of the "next generation ELI" (see section on ELI Legacy). For example, in South Africa, market aggregation started and stalled. However, in the Philippines, market aggregation was very successful. A regional cooperative (Metro Manila, which has 22 smaller cooperatives under them) signed an MOA with manufacturers and negotiated a better price for CFLs – selling hundreds of thousands of CFLs. In Argentina, employees of one company were able to buy CFLs and have the costs deducted from their paycheck.

Financial incentives. Financial incentives (e.g., subsidies and price buy-downs) were only to be applied in limited cases, with the understanding that incentives do not lead to sustainable changes in the market. Financial incentives were a primary strategy in only one place, South Africa, where dealer discounts did help create a large demand (and hence supply) for CFLs. The extent to which this demand is sustained remains for the final market transformation assessment for a conclusion.

ELI Program Elements

ELI web site. In the early stages of ELI, the ELI web site was used a "reference point" and "structured learning facility" to inform people, for receiving inquiries from people, and for sharing information among countries. The web site had a public access site and a secure access site. The public access site contained a list of certified testing labs, contacts and contact information, a list of certified products, ELI product specifications, etc. This site was an important communication tool for industry/manufacturers and for marketing the ELI quality mark to new manufacturers. This program element was not successful, however, since most

participants preferred to use email, phone, and fax to exchange information. Because the operation and updating of this site required intensive inputs from regional and local ELI offices and these inputs were ranked in lower priority than other tasks, this part of the website became inactive and less useful to the program.

ELI Logo and quality mark. The ELI logo and quality mark (left) was useful for differentiating certified products over non-qualifying and often poor quality high efficiency products. It benefited small manufacturers who competed on price and wanted to differentiate their products with the ELI logo, and large lighting companies who were concerned that poor quality products would ruin the market. Thus, the logo was used as a vehicle to spur price competition. The ELI logo was also especially important for getting new technologies into the marketplace, as it provided a set of minimum criteria for evaluating applications for financial assistance (subsidies) from various manufacturers, retailers, etc. While important in all ELI countries, the logo was especially important in the Philippines (where low-quality products have been prevalent) and in South Africa. The logo became a symbol of higher quality, longer lasting, greater energy efficiency, and more energy savings, and these concepts and logo recognition were reinforced in the public awareness campaigns.

ELI certification and testing. The certification process was considered by all ELI participants to be very important to support the ELI claims regarding the quality of efficient lighting products. The certification process was perceived negatively in only a few cases in some countries, where it was noted that the process was very slow and inadequate, leading to claims of inconsistency in the approach adopted towards large manufacturers, as opposed to smaller manufacturers in the market. The existence of a testing facility in the Philippines (which randomly tested samples of certified ELI products in the market to determine if they were performing according to the certified specifications) was considered to be very helpful.

ELI Evaluation Lessons Learned

The ELI program was implemented with an M&E component implemented at the same time the programs were being implemented. This was regarded as advantageous to the IFC and to ELI participants. Because the evaluation of ELI is still underway and the M&E products (process, impact, and market transformation reports) are still in preparation, it is premature to draw definitive conclusions about the M&E process and the effectiveness of the M&E concept, as implemented for ELI. Nevertheless, several problems arose during the evaluation of the ELI program that could be averted in the future.

First, there is a need to clarify the distinctive roles and responsibilities in the evaluation process. The IFC and the M&E Team had different expectations as the ELI program was implemented. The absence of managerial processes for systematic monitoring of program progress was identified early on by the M&E Team as a critical issue and resulted in a lack of real-time information and feedback to the management team. During the implementation of the ELI program, the IFC saw an increased need for providing real-time M&E results to the IFC staff, ELI stakeholders, and GEF policymakers. However, the initial Terms of Reference (TOR), containing the scope of work for the M&E Team, did not contain provisions for real-time

evaluation[2]. The TOR focused on data collection and analysis activities for preparing reports on process evaluation, impact evaluation, and market transformation. The M&E Team allocated resources for preparing these reports, but had not allocated time and budget for providing real-time feedback based on their preliminary findings, although informal ongoing feedback was provided in many cases. In the future, if different M&E needs arise and are not reflected in the original TOR, then the TOR needs to be revised.

Second, there is a need to enhance communications between the IFC management and technical leads and the M&E Team. Related to the first point above, more frequent interaction between the IFC management and the M&E Team would probably have resolved some of the communication problems (and differences in expectations) that occurred later in the project. An interface (person) between the IFC management and the M&E Team (part of the IFC "organization") added a buffer between IFC and the M&E team and may have contributed to some of the communication problems. In addition, if this interface had not existed, the M&E Team would have gained more insight into ELI activities being conducted by both the IFC staff and technical leads and ELI implementers. Finally, more events facilitating communication are needed for sharing knowledge and experience, such as workshops, seminars, and conferences. After the initial ELI Workshop in 2000, there were no other global opportunities where the M&E Team was designed to be included, although some informal opportunities arose, in the form of conferences attended by some members of the IFC Management, Country Managers and M&E Team.

In recognition of the need for a lead evaluation person to interact more directly and frequently with M&E teams, the IFC is in the process of hiring an in-house M&E specialist for the first time. This person will help individual task managers to make sure M&E plans are methodologically sound and meet GEF requirements. This shows a long-term commitment to M&E that was not emphasized before.

Third, some of the country teams did not feel that they were getting any value from the M&E effort (again, no real-time feedback at the local level which they could use to modify their approach). The country teams provided information but were not aware of how it was used, or how their country's ELI program compared to other countries' ELI programs. They also felt that the information requested by M&E was too complicated and detailed. This could also be seen as another type of communication problem. Communication between the M&E Team and the countries was infrequent and periodic, largely due to budgetary constraints and the extended timeframe of the ELI operations without any corresponding expansion of the M&E study, which required that resources be conserved. Regular informal communication, as well as workshops, seminars, and conferences, would have been helpful.

Fourth, overall, the local M&E consultants were not an effective resource, and they added little value to the M&E effort, due to several factors: (1) some of them were inexperienced, (2) some of them did not fully understand their role or what was expected of them, (3) some of them were not familiar with the program, and (4) some of them experienced staff turnover. Many of these factors can be traced to the limited amount of resources (2 hours/month) available to them, which was too small to gain their commitment and willingness to follow this project over several years. These problems were identified and raised to IFC management when the project started, as it was clear that those most knowledgeable about energy efficiency and evaluation work were

[2] On several occasions, the M&E Team attempted to meet the needs of IFC management by providing interim information, but it was quickly determined that the M&E Team could devote only very limited resources to such activity given the growing scope of the country programs and the basic requirements of the evaluation TOR.

already serving on the LIE teams. One possible solution is to have the M&E Team work more closely with the local implementers (LIEs) and eliminate the local M&E consultants, except for specific survey or other periodic study tasks.

Finally, the M&E Team may have been too fragmented. The original strategy of the M&E team structure was to maintain technical teams – impact, process and market transformation – and apply these roles across all seven countries in a single consistent evaluation approach. Once the project began, however, it was immediately clear that there were seven different programs being developed and implemented and that applying a single approach across all seven countries would not be feasible. The strategy was quickly shifted to assigning evaluation teams of two people to each of the seven ELI country programs (with some teams covering more than one program). As a result the workloads of the M&E Team were divided into small parts spaced over time. The volume and variety of activity in each of the seven countries overwhelmed the original M&E design that had anticipated more consistency across all seven, and prevented the application of a standard research design and the realization of cost efficiencies. Instead of one program being applied in seven countries, the project ended up having to evaluate seven programs, then identifying what elements and findings were common among them. In the end, the project suffered from the difficulty of maintaining an overall (macro) perspective of how the entire program was developing over the entire course of the project, ideally by one person specifically dedicated to that purpose.

ELI Legacy

While the official ELI Program ends in 2004, there are several "legacy" components of the ELI Program that will continue for at least the near future.

1. ELI Legacy program elements include:
   - ELI's technical specifications and quality mark are now on over 200 products
   - The ELI logo will be maintained in several countries
   - The ELI web site will be maintained by an Argentine company
   - The ELI testing laboratory (an ISO-certified laboratory) will continue in the Philippines for random testing of qualified products
   - The ELI certification institute, located in Argentina, is expected to continue
   - Stakeholder organizations established in several countries (most notably two in the Philippines) will continue the work begun by ELI in maintaining standards and cooperation.
2. ELI promotional agents (partners) - One of the key characteristics of the ELI program was the number of organizations that partnered with the ELI program to promote efficient lighting, including governments, utilities, ESCOs and banks. Through these partnerships, the ELI program was able to leverage existing resources to promote efficient lighting. The results of these capacity-building efforts are expected to continue in the near future.
3. The price of CFLs decreased in all markets and the supply increased under ELI. To the extent that these changes are maintained and/or continue as trends, they will be an important market transformation legacy of ELI.
4. The awareness of quality CFLs, supported by standards, testing, labeling and logo recognition – Many purchasing and manufacturing entities have now become accustomed to addressing quality and efficiency specifications in bidding and procurement.

5. The "Next Generation" ELI – Finally, the IFC wanted to continue the momentum of the ELI and decided to set up a commercially viable successor service that would be established and sustained without GEF support (e.g., supported by certification fees and donor funds). Accordingly, the IFC issued a request for proposals (RFP) in 2003, reviewed several proposals, and selected the Center for Certification of Energy Conservation Products (CECP), based in China. The CECP will serve as an organizing agent for implementing ELI in other countries around the world. The CEPC-ELI business plan is based on a revenue-generation model with fees paid by manufacturers for receiving ELI qualification. It also seeks to harmonize certification procedures with other quality-oriented certification programs globally to create an efficient, low transaction cost means of getting high quality products certified globally.

Conclusions

The Efficient Lighting Initiative was a complex and multi-faceted program, ambitious in its scope and goals. According to this evaluation, the ELI program has succeeded in many of its market transformation objectives – by lowering prices of CFLs, increasing the quality of product offerings, establishing an effective testing and certification process that will likely continue beyond the end of the program, bringing stakeholders together, and increasing the awareness and adoption of high efficiency lighting among consumers in the countries where the program was implemented. The original objective of the ELI program was to execute a 2 – 3 year intervention in the marketplace to accelerate the availability, accessibility and adoption of quality high-efficiency lighting products in a sustainable manner.[3] Its aim was to push the trajectory of market acceptance higher along the traditional S-curve market development model. This first part of this objective appears to have been met – the interventions have, on balance, achieved the types of effects that suggest a new trajectory. The final market assessment phase will show the extent to which the markets in each ELI country continue to move along this new path.

The M&E effort attempted to work with a broad set of market conditions, diverse and highly cooperative program implementers in the seven countries, and a data record of varied quality and consistency. Based on the analysis conducted, the ELI program has had a significant effect on lighting markets in the participating countries, and is slated to maintain important elements of its legacy beyond the close of the formal program in late 2004. Our market transformation research will assess these effects. Future evaluation activities of the IFC and the global donor community are likely to benefit from the lessons learned in this first major attempt at measuring market transformation in a multi-country, multi-strategy program such as ELI.

References

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[3] "The ELI's Goal was to accelerate the growth of the high efficiency lighting market by 5 years over the 2 year program life," this taken from the ELI website. Since the program was extended to 2004 in some countries, it is too soon to comment on whether this goal was achieved. The M&E team has econometric estimates of pre-program growth rates and program impacts on sales of CFLs for all countries and for at least some countries T5/T8s that will be updated as part of the final Market Transformation Assessment.

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Background documents and program reports for the global program and individual country activities can be found at the official ELI website, www.efficientlighting.net.