

The IFC/GEF Poland Efficient Lighting Project (PELP) Final Results

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ABSTRACT

Greenhouse gas emission reduction has become an important driver for international energy efficiency programs. In 1995 the International Finance Corporation (IFC) ¹, developed a Global Environment Facility (GEF) funded project known as the Poland Efficient Lighting Project (PELP) to reduce emissions of greenhouse gases emitted by Poland's energy sector. PELP was active in Poland from June 1995 through June 1998 and was among the first GEF projects designed to work directly through the private sector.

PELP reduced electricity consumption by promoting compact fluorescent lamps (CFLs) in the Polish consumer market. PELP was based on electric utility program models developed primarily in the United States. However, PELP was unable to attract substantial involvement by Polish utilities. Despite this handicap, PELP achieved large increases in sales of CFLs in Poland at a lower total cost per unit than many other similar efforts around the world (Martinot, Eric & Nils Borg, 1998) . By working with Polish manufacturers, government agencies, and NGOs and with international organizations, PELP was able to generate broad public interest and create a widely recognized symbol for efficiency and quality in the Polish lighting market.

In addition to this broad market transformation effort, PELP included a small DSM pilot demonstration program intended to provide quantitative support for the use of residential lighting efficiency improvements as a "distributed utility" peak load reduction strategy for Poland. PELP was able to cost-effectively achieve high penetrations of CFLs in targeted residential areas, and then monitor reductions in the peak demand experienced at the building and feeder levels.

Introduction

In 1993, a USAID study of demand-side management (DSM) potential in Poland identified significant energy consumption associated with lighting in the residential, commercial and industrial sectors. In the residential sector, lighting use accounted for 14,550

¹ IFC is the private sector arm of the World Bank Group and is the largest source of loan and equity financing for private sector projects in the developing world.

GWh, or 55% of total annual electricity consumption for the sector, from a total installed lighting end-use capacity of 13,250 MW. This was consistent with an almost exclusive reliance on incandescent lighting technology in Polish homes and a low incidence of other major electric appliances such as heating or air-conditioning equipment. Thus, in the Polish residential sector, improved lighting energy efficiency provided an opportunity to significantly reduce electricity consumption.

In late 1992, the Environment Division of IFC undertook a review of its investment portfolio with support from the International Institute for Energy Conservation (IIEC), an international NGO. The purpose of the review was to identify energy efficiency projects with clear environmental benefits that could be implemented with support from the pilot phase of the GEF.² With project design input from the Polish Foundation for Energy Efficiency (FEWE) and Battelle Pacific Northwest Laboratories in the US, IIEC proposed the development of a western utility-style DSM program using GEF pilot phase funds to stimulate the Polish domestic market for CFLs. PELP received approval from the GEF in December 1994 for the use of US\$ 5 million in pilot phase funds. IFC and its Environment Division were assigned responsibility by the World Bank and the GEF for managing project implementation. In 1995, the IFC selected Netherlands Energy Company B.V. (Netenco), to administer PELP and management of project activities was given to Netenco's daughter company, Netherlands Energy Efficient Lighting B.V. (NECEL). NECEL set up an office with Polish-speaking staff in Warsaw who worked with FEWE, Polish lighting manufacturers and other respected Polish organizations to realize the objectives of PELP.

Long-term sustainability of GHG reductions was one of the project's primary goals, therefore PELP was designed to be a *market transformation* project. PELP's goal was not to sell a certain number of CFLs, but rather to remove the barriers to widespread consumer adoption of CFLs in Poland. The PELP work plan and budget centered on the concept of a CFL promotion, but also tried to approach the Polish consumer lighting market in a comprehensive fashion by looking at luminaires, by specifically developing a strategy to

Table 1: Summary of PELP Costs	
Project Components	US\$
CFL Subsidy	2,613,682
Public Education	548,720
DSM Pilot	632,545
Luminaire Program	89,739
Cooperative Promotion	50,836
Project Monitoring and Evaluation	310,312
Project Administration	636,992
PELP Legacy Activities	317,443
Total*	\$5,200,269

*includes interest accumulated on the original US \$5 million Grant.

² The GEF and activities that aim to protect the global environment. The GEF Implementing agencies are the United Nations Development Program (UNDP), the United Nations Environment Program (UNEP) and the World Bank.

increase the Polish public's awareness of energy-efficient lighting and by attempting to build a constituency for future lighting efficiency efforts. Special attention was also given to ensuring that PELP's positive environmental benefits would be thoroughly evaluated using state of the art techniques. The final allocation of PELP resources is shown in Table 1.

PELP was originally designed to work closely with Polish electric utilities, following the model of similar US and western European programs. Unfortunately, the economic and political conditions in Poland at the time of PELP made this impossible. Due to economic restructuring, Poland had significant excess electricity generating capacity. Polish utilities were owned by the government and were supplied by the politically powerful coal miners. Promising negotiations with a large utility were cut off by an unofficial government policy forbidding utilities for engaging in any activities intended to decrease electricity sales. As a result, there was no utility involvement in the PELP CFL subsidy and minor utility involvement in the PELP DSM pilot program.

The Polish Residential Lighting Market Before PELP

An estimated 209.5 million incandescent general lighting service (GLS) lamps were in use in Poland in 1995. Annual sales of incandescent lamps were on the order of 200 million. The average Polish home had 15 standard "Edison base" electric lamp sockets. The Polish CFL market was established in 1992, when Philips Lighting Poland began selling CFLs domestically. Prior to this, Polish sales of imported CFLs had been negligible. In 1994, Polish awareness of CFLs was low and only a few models of CFLs, made by a small number of manufacturers, were available. CFLs could only be found in a limited number of shops and salespeople were not necessarily aware of their products' advantages. In 1995 prior to PELP, sales of CFLs in Poland did start to increase with the increasing penetrations in neighboring western European countries. However, CFLs still cost over thirty times as much as incandescent lamps. Even at this price difference, CFLs were a cost-effective investment for Polish consumers at prevailing electricity rates. However, this price difference posed a significant "first cost" barrier to consumers. Therefore, some type of intervention to help bring down retail prices was seen as the most effective way to stimulate the Polish lighting market.

The PELP CFL Subsidy Program

Design Concept

The manufacturer buydown approach developed at Southern California Edison was chosen by IFC and IIEC as the template for the PELP CFL Subsidy program because it promised the largest increase in CFL sales at the lowest cost. Through this program, PELP subsidies were available to reduce the retail prices of CFLs from any manufacturer that was able to meet minimum technical requirements.

Manufacturers participating in PELP competed with each other for the right to apply the subsidies. The right to use a larger share of subsidies was given to those manufacturers who were able to provide the greatest savings, in terms of projected avoided electricity use

resulting from increased CFL sales, at the lowest cost to the program. Manufacturers were given a great deal of freedom to decide which specific CFL product lines to subsidize and how much subsidy to apply. The intention was to use the manufacturers' knowledge of the marketplace to maximize CFL sales, and thereby maximize energy savings per dollar of available subsidy.

However, manufacturers also had a limited amount of time to demonstrate these increased sales. If a manufacturer was unable to sell its allotment of subsidized CFLs during the designated sales period, the subsidy allotment was reallocated to a more successful competitor. In this way, PELP preserved and strengthened competitive forces in the marketplace and used them to achieve project CFL sales goals.

The “Manufacturer Buydown”

Unlike CFL promotion programs that provide retail price subsidies to consumers through, for example, discount coupons, PELP decreased the prices for eligible CFLs at the factory. Participating manufacturers agreed to pass on the full value of the subsidies they were awarded to their distributors, and eventually to consumers, in the form of lower wholesale prices. Manufacturers were also encouraged to contribute their own additional wholesale price reductions and to cover advertising costs for special program-related promotions and product labeling. Under PELP manufacturers were a conduit for subsidies but did not benefit directly from the manufacturers buydown. Manufacturers benefited indirectly by being able to sell more products at lower prices. In fact, manufacturers financed the subsidies by first selling CFLs at reduced factory prices, and then applying to PELP for reimbursement. Subsidies were only paid following manufacturer submission of “proof of performance” documentation showing that the specified CFLs had been sold at the agreed-upon retail prices through appropriate channels. In addition, participating manufacturers were also required to assist in conducting program monitoring and in controlling product distribution to avoid cross-border leakage of subsidized products. Manufacturers also helped to limit attempts by distributors or retailers to keep retail prices high and capture the subsidy payments for themselves by printing suggested retail prices on CFL packaging.

The PELP CFL Subsidy program yielded larger reductions in retail prices for each dollar of subsidy allocated than would have been achieved by a discount coupon approach. Most distributors and retailers in Poland (and other countries) set wholesale and retail prices by multiplying manufacturers' factory prices by a set markup percentage. In addition, VAT (value added tax) in Poland that is paid by manufacturers, distributors and retailers is also based on a set percentage of the factory, wholesale and retail prices respectively.

A subsidy given to the consumer decreases the total price of the CFL after wholesale and retail markups and VAT have been added. When the subsidy is given to the manufacturer to reduce the factory price of a CFL, both the retail mark up and the VAT are then calculated as percentages of a lower wholesale price. For example, by the time a 15% wholesale markup, a 25% retail markup, and a 22% VAT are factored in (75% total increase over factory price), a US\$ 1.00 PELP subsidy on a CFL in Poland reduces the retail price by US\$ 1.75.

For PELP, the direct manufacturer subsidy approach also had administrative advantages over comparable retail-level program designs, including greater control over

product price and availability, and reduced program overhead costs. Because the manufacturer subsidy required relatively few transactions at the manufacturer level, administrative expenses were low. The total combined cost of subsidies and administration for the PELP CFL Subsidy was about US\$2.87 per CFL subsidized.³

PELP Program Experience

The PELP CFL Subsidy offered specially priced CFLs during the winter “lighting season,” roughly October through March, when sales of residential lighting products in northern hemisphere countries tend to be at their peak. During the winter of 1995-1996 four manufacturers of CFLs qualified for participation in a first pilot season of the PELP CFL Subsidy. The four manufacturers all signed agreements and sold subsidized products but only two were able to make full use of the available subsidies allocated to them. One manufacturer encountered product component availability problems and used only a small amount of subsidies and another encountered difficulties with meeting Polish government electrical safety regulations and was eventually not able to participate in PELP. The subsidy allocations initially made to the two non-performing manufacturers were reallocated to their more successful competitors. As a result, the PELP sales goals were met for the first season and 337,636 CFLs were sold.

During the winter of 1996-1997 the amount of subsidies available through PELP was substantially increased. Three manufacturers participated and the two who were successful during the first season were once again best able to take full advantage of the subsidies. The third manufacturer’s subsidy allocation was redistributed and PELP program goals were met with over 800,000 PELP CFLs sold. The average subsidy per CFL during the second season decreased by more than 25% relative to the first season because prices for both PELP and non-PELP CFLs on the Polish market had decreased, and because consumer demand had increased. The value of the subsidies and retail price reductions is presented in Table 2.

Table 2: PELP CFL Subsidy Program Leverage	Total PELP
CFLs Sold	1,218,888
Average PELP Subsidy per CFL	\$2.14
Total GEF Subsidies Used	\$2,614,247
Average Manufacturer Contribution per CFL	\$1.23
Retail and VAT multiplier	1.7538
Total leveraged contributions (include voluntary manufacturer contribution, avoided retailer mark-up and VAT)	\$4,590,148
PELP leverage (ratio of GEF funds contributed to funds contributed by manufacturers, distributors, retailers, and avoided VAT)	1 : 1.8
Average Retail Price Reduction per CFL	\$5.91

³ This assumes that all PELP public education costs, monitoring and evaluation costs, and 75% of PELP administration costs may be assigned to the CFL subsidy. This does not include associated IFC staff time and expenses, which were slightly less than one full time equivalent person during the course of the program.

The PELP Public Education Program

The Public Education component of PELP promoted the CFL subsidy program to the public by providing general consumer information on the benefits of energy-efficient lighting from a trusted, non-industry source. The PELP “Green Leaf” logo, developed by Polish advertising firm Studio P (see Figure 1), was promoted as a consumer brand connoting energy-efficiency and high quality. In the generic advertising developed by PELP, the PELP logo appeared alongside the names and logos of widely respected Polish organizations: the Polish Consumer Federation, the Polish Ecological Club and the Polish Energy Conservation Agency (KAPE) and FEWE.



Figure 0: The PELP "Green Leaf" Logo

The logo was used on posters, in PELP publications, and in the promotion of PELP in the Polish press including a short television spot and advertisements in many publications. Articles on PELP and energy-efficient lighting, written by PELP contractors and professional journalists who attended PELP’s two press events (January 1996 and May 1997), were also published in leading Polish newspapers and magazines. As a result CFLs, at least temporarily, achieved a relatively high profile in Poland. It is interesting to note that media coverage of CFLs changed over time, from a simple introduction of the product to more elaborate discussion of the best models for various home applications. This evolution in the way the press covered CFLs mirrors the evolution of Polish perception of CFLs from an unfamiliar product to a more familiar one.

The Public Education component of PELP also included an energy efficiency education program for Polish elementary schools. During 1996 PELP and the World Wide Fund for Nature (WWF) Germany jointly funded an education consultant to develop a competition for school teams, pupils and teachers on energy efficiency themes. Over 1,000 participants from 250 schools all over Poland took part in the competitions and the activities were endorsed by the Polish government’s Ministry of Education. Additional PELP education activities targeted professional lighting designers including an energy efficiency awareness program in the Krakow area developed by the Polish Ecological Club (PKE). As a result of the PELP lighting design seminars, a Polish university has decided to include energy efficiency in its lighting design curriculum.

The PELP Pilot DSM Program

Design Concept

Although Poland had excess generating capacity on the national level, some Polish utilities were also having difficulties serving load growth due to transmission constraints. Urban centers with underground electricity distribution were particularly expensive to upgrade and represented attractive opportunities for residential lighting peak load reduction strategies. FEWE estimated lighting to represent 50% of the residential peak electricity

demand in Poland. This implied a substantial opportunity to reduce residential peak load with CFLs. By working through FEWE in three smaller cities with interested municipal governments, PELP was able to implement a successful pilot demonstrating the value of residential lighting efficiency programs as a utility demand-management tool.

With the help of municipal officials, PELP was able to eventually obtain the cooperation of local electric utilities, and demonstrated quantifiable distribution system benefits to them. FEWE, students and faculty from the University of Mining and Metallurgy in Krakow, and staff from the local utilities performed the monitoring. The data was analyzed by FEWE under the direction of Battelle Pacific Northwest Laboratories. Battelle also performed a distributed utility analysis that compared the CFL installations against a conventional distribution upgrade to determine the relative cost-effectiveness to Polish utilities.

Program Experience

The three small cities targeted by the PELP DSM Pilot program all experienced electricity distribution system constraints in certain neighborhoods. Major activities took place in Chelmno, a city of about 22,000 in the northern part of Poland and Elk, a city of about 54,000 in the northeast region of the country. A smaller-scale effort also took place in the town of Zywiec. The electrical distribution system in each town was monitored at several different points, from several individual residences up to the subsystem level. Monitoring began before the targeted CFL promotion and continued afterwards to allow a determination of peak load reductions attributable to the CFLs installed.

In order to lower the peak electricity demand in the capacity-constrained neighborhoods, the DSM Pilot program needed to achieve very high concentrations of CFLs in a limited geographic area. This requirement meant that the approach used in the PELP CFL Subsidy program, was not appropriate. Pre-PELP retail sales of CFLs in the target cities had historically been very low and CFL retailing was not well established. Therefore, it was decided that the PELP DSM Pilot would try a series of consumer discount coupons coupled with high intensity marketing and augmented product distribution system. CFLs were purchased in bulk directly from the manufacturers through competitive tender. Consumer rebate coupons were distributed throughout the target cities, but the subsidies were scaled so that residents living in the capacity constrained areas received the highest rebates. Municipal officials and civic organizations also helped promote CFLs. Because the coupons were only valid for a limited time there was a sense of urgency about the campaign which created a level of excitement in the towns. In the capacity-constrained neighborhoods, an average of more than 5 CFLs were purchased and installed per household.

Results

After the introduction of CFLs to the target area in Chelmno, peak power levels at some 0.4 kV monitoring points declined by approximately 15%. Additionally, some monitored households in the target area exhibited up to a 40% reduction in peak power demand after CFL installation. The CFLs installed were primarily electronically ballasted models available in most European markets and did not have power quality correction

circuitry. A 10% increase in total harmonic distortion (THD) was observed at the 0.4 kV monitoring point. Neutral wire current increases were insignificant. Finally, Battelle performed a distributed utilities analysis on one of the targeted neighborhoods that showed a high probability, based on actual program costs and impacts, that it would have been more cost-effective for the local utility to have spent its own money on the PELP DSM pilot than to pay the costs of a distribution system upgrade (Battelle, July 1998).

The PELP Monitoring and Evaluation Program

Methods

PELP monitoring and evaluation efforts were designed to assess both the direct impacts of the purchases of GEF-subsidized CFLs, and the longer-term market transformation impacts of the broader program on greenhouse gas emissions in Poland. The US consulting firm Synergic Resources, Inc. (now Navigant) was competitively chosen as the contractor to develop and implement a comprehensive evaluation plan. The Polish firm EEI Market Research was contracted to perform much of the associated surveying and market research.

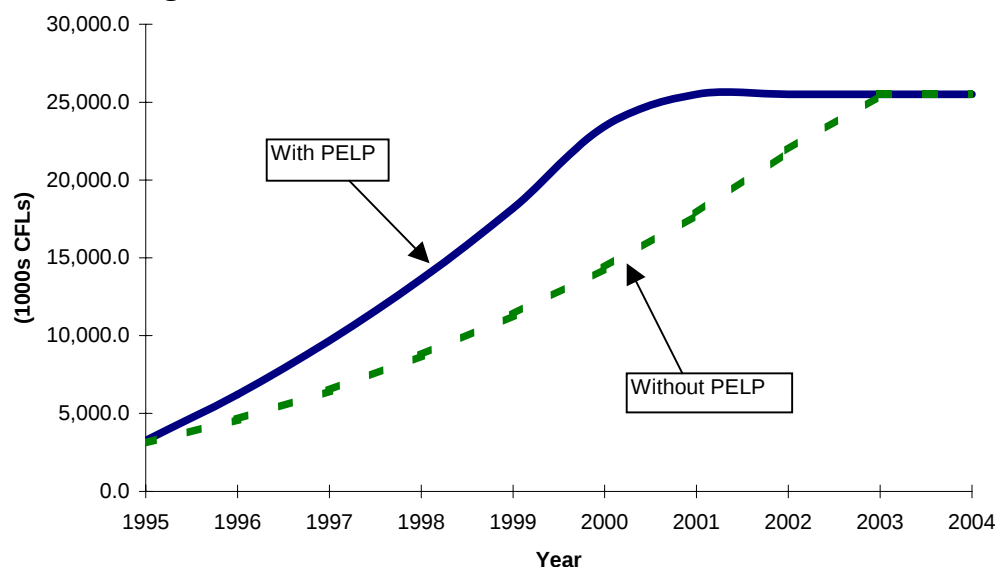
The impact of the program on the CFL market was estimated by analyzing survey data regarding consumers, PELP CFL purchasers, lighting retailers and distributors, and manufacturers. Data on the number of PELP CFLs installed in each room, their wattage and the wattage of the bulbs they replaced were derived from a database of more than 10,000 consumer response cards received from PELP CFL purchasers. Data on other key impact parameters were collected through surveys with general consumers and with PELP CFL purchasers.

Evaluation activities for PELP were also designed to allow continual fine-tuning of PELP's project activities, and to maintain the project's focus on its objectives. For example, results from EEI's marketing surveys were used to modify the operation of the CFL Subsidy marketing activities, the determination of subsidy levels, product distribution approaches, and manufacturers' eligibility status for continuing project participation. PELP conducted extensive research into the Polish residential lighting market including surveys of the incidence of CFL ownership; retail surveys of CFL availability and pricing trends in different parts of Poland; and surveys to evaluate the effectiveness of the PELP media campaigns in creating awareness of the PELP program and recognition of the PELP program logo.

Results

PELP significantly increased the penetration of CFLs in Polish households, as shown in Figure 2. The dashed line shows a forecast of what the penetration of CFLs in Poland might have been, if sales in Poland had followed the same pattern as the rest of Central and Eastern Europe. It is not known whether PELP had any effect on the final number of CFLs that may finally be installed in Poland when this market reaches saturation. To be conservative, the PELP evaluation assumed that PELP had no impact on final saturation levels. Therefore, the net benefit from PELP was interpreted as the area between the two

Figure 2: Acceleration of New Residential CFL Installations



curves above, which represent CFLs which are in use that would otherwise have not been sold and installed. Data indicate that PELP accelerated the maturation of the Polish CFL market towards saturation by approximately three years.

Table 3 below summarizes the electricity savings and greenhouse gas reductions attributed to PELP (Navigant Consulting, August 1999). The analysis of the program's *direct* impacts considers only the kWh and CO₂ emission reductions from CFLs sold with PELP subsidies during the two CFL subsidy periods (Fall lighting seasons of 1995-96 and 1996-97). The direct impacts were estimated using standard engineering estimation methods for residential lighting programs. PELP's energy impacts were quantified through impact parameters that represented key data, such as the number of CFLs installed in each type of room (kitchen, living room, bathroom, etc.), the average number of hours each room's CFL was on over the course of one year, and so on. Once the program's annual impact in terms of energy (kWh) savings was estimated for the life of the lamps, these values were then converted to the total amount of CO₂ reduction resulting from the program, using annual estimates of the emission rates of Polish coal-fired thermal plants generating marginal electricity supplies.

Table 3 : Summary of PELP's Environmental Benefits						
		GWh Savings	Thousand Reduced	Tonnes	CO₂	Cost/tonne Reduced
CFL Subsidy	Direct Impact	435.8	529.1			\$7.35
CFL Subsidy	Total Program Impact	2320.2	2,794.5			\$1.39

The evaluation of PELP's *total* program impacts also take into account the overall market transformation impacts of the program. Total impacts were calculated by using the estimate of kWh savings per CFL derived from the direct impact analysis, and projecting increased CFL sales in Poland resulting from PELP from the start of the program until several years in the future. This projection was then compared to a baseline estimate of what Polish CFL sales would have been had there been no PELP. The baseline was based on aggregate CFL sales data from Central and Eastern Europe (minus Polish CFL sales). The difference between the two projections represents the total increase in energy savings resulting from PELP, including installation of CFLs during and after the program that were not subsidized by PELP ("free drivers").

By the end of PELP in mid-1998, the retail price of CFLs in Poland had decreased by 34% in real terms relative to 1995. Polish CFL market experts and manufacturers agree that the PELP CFL subsidy and promotion campaign were largely responsible for this dramatic price decrease. The PELP subsidy campaigns helped increased sales volumes and manufacturer competition, and the PELP public education campaigns helped increase consumer CFL demand to the point where the price decrease was sustainable. So far, the price decreases appear to be durable.

The PELP evaluation tracked several residential CFL market indicators to gauge long-term changes in the Polish CFL market. Some signs of sustainable market transformation include:

- CFL penetration increased from one in ten Polish households owning at least one CFL prior to PELP, to one in three, a year after the program.
- After PELP CFLs were sold by a larger number of shops, and in a wider variety of shops (ranging from small shops to hypermarkets), than before the program, and shops carried a wider variety of models.
- 97% of CFL purchasers surveyed intend to replace their CFLs with another one upon burn out.
- Print media coverage of CFLs increased and shifted from describing CFLs to explaining where and how to best use them.
- Manufacturers provided extensive training to about CFLs to distributors and retailers throughout Poland specifically to allow them to take advantage of the business opportunity provided by PELP.

Furthermore, during the second season of PELP a global manufacturer of CFLs decided to enter the Polish market for the first time. The manufacturer credits PELP for at least part of the decision to make a commitment to the Polish market. As a result, the three largest international CFL manufacturers now market their products in Poland, which should increase availability and decrease prices in the long run.

Building on the PELP Experience

Within Poland – Cooperative CFL Promotion, Streetlighting ESCO, Housing Blocks

In late 1997, after most PELP program activities were completed, a decision was made to use a small amount of the remaining PELP budget to develop an additional

promotional CFL campaign using cooperative advertising, but with no subsidies. The PELP “Cooperative Promotion” initiative was designed to build upon the momentum created from the two previous PELP subsidy campaigns, and to assess the value of a CFL quality labeling campaign to manufacturers. PELP offered to fund a generic CFL advertising campaign featuring the PELP Green Leaf logo in return for manufacturer contributions to the cost of the advertising, and voluntary price reductions during a 3-week promotional period. The cooperative advertising ran over three and a half weeks starting in February of 1998 and manufacturers were allowed to display the PELP logo on their packages, from January through April 1998. The PELP logo appeared on roughly 400,000 CFL packages. Despite this apparent success, the contribution from the manufacturers ended up being far less than expected and cooperation between them was minimal. IFC concluded that subsidies were still required at some level to motivate manufacturers to participate. As PELP closed in 1998, some GEF funds remained unspent. IFC requested that FEWE submit a proposal for the use of these remaining funds, focusing on private sector-oriented market intervention. In response, FEWE prepared a business plan for Business Energy Ecology Sp z o.o. (BEE), a new lighting Energy Services Company (ESCO) in which FEWE would be a minority shareholder. This new company is current active in the street lighting market in Poland.

Beyond Poland—IFC/GEF Efficient Lighting Initiative (ELI)

During and after PELP many other countries approached IFC about hosting CFL promotion activities using GEF funding. In response, IFC submitted a proposal to the GEF for a US \$15 million multi-country Efficient Lighting Initiative (ELI). The GEF Council endorsed the ELI Project Concept Document in July 1998. ELI has begun implementation of a broad range of lighting energy efficiency programs using a combination of market-based tools, including the PELP model, to stimulate markets across residential, commercial, industrial and institutional markets in Argentina, Peru, South Africa, the Czech Republic, Hungary, Latvia and the Philippines. For more information please contact the authors.

Conclusion

PELP used a combination of consumer education and temporary product subsidies to leverage competitive market forces to lower prices of CFLs, to increase demand for CFLs, and to sustain substantially higher volumes of CFL sales in Poland. At the close of PELP, the market for CFLs in Poland had clearly been transformed. Consumer awareness of CFLs was high, and the price of CFLs had dropped by 34% (in real terms), to around \$10. CFLs from more manufacturers were available in more shops, and shop staff were better educated on the product’s merits. Annual sales grew from 500,000 in 1994 to 2.1 million in 1997, and the penetration of CFLs increased from one in ten to one out of every three homes.

PELP showed that a high-profile CFL promotion program could be operated at a reasonable cost using private sector delivery channels and approaches in a country with a restructuring economy. PELP also showed that CFLs could be part of a utility’s residential peak electricity load reduction program and may provide an additional reason for utilities to be interested in sponsoring, funding and implementing such programs.

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References

ARON, CLIFFORD AND RICHARD WOODWARD, Final Report on the IFC/GEF Poland Efficient Lighting Project (PELP), IFC, Washington, DC USA, 2000

BORG, NILS, AND MARTINOT, ERIC, *Energy-efficient Lighting Programs : Experience and Lessons from Eight Countries*. Energy Policy, Vol. 26, no. 14. 1998

GLOBAL ENVIRONMENT FACILITY (GEF) Republic of Poland, Poland Efficient Lighting Project, Project Document, IFC, Washington DC USA, September 1996.

GRANDA, CHRIS, *Case Study : The IFC/GEF Poland Efficient Lighting Project (PELP)*. Proceedings of the Right Light 4 Conference, November 1997, Copenhagen. Denmark. 1997

HAGLER BAILLY CONSULTING, INC. *DSM in Poland: Assessment and Pilot Program*. USAID. Washington, DC USA. 1993

INTERNATIONAL INSTITUTE FOR ENERGY CONSERVATION AND BATTELLE PACIFIC NORTHWEST LABORATORIES. Pre-Appraisal Report to the Global Environment Facility: IFC/GEF Poland Efficient Lighting Project. IFC, Washington, DC USA, 1994

LEDBETTER, MARC ET. AL., IFC/GEF Poland Efficient Lighting Project : Demand-side Management Pilot – Final Report, Battelle, Portland, OR USA, July 1998

NAVIGANT CONSULTING, Evaluation of the IFC/GEF Poland Efficient Lighting Project CFL Subsidy Program, Navigant, Philadelphia, PA USA, August 1999

YOUNGER, DANA, AND CHRIS GRANDA, *Lighting Initiative for Poor Countries*, Newsletter of the International Association for Energy-Efficient Lighting, No. 21, vol. 7 (2/98).