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THE PHILIPPINE ENERGY EFFICIENCY PROJECT

Lighting Up the Philippines in an Efficient Way

A technician from the Department of Energy tests a compact fluorescent lamp.

- Amid a looming energy gap resulting from increasing demand for energy, power consumers in the Philippines are burdened with one of the most expensive electricity rates in Asia, if not the world.
- With assistance from the Asian Development Bank, the government implemented the Philippine Energy Efficiency Project as an interim measure to mitigate a projected energy supply deficiency and reduce power consumption in residential and public sectors.
- The project retrofitted 135 government office buildings and almost 4,000 public park and streetlights with energy-efficient lighting systems, distributed 8.6 million compact fluorescent lamps nationwide, and established a green labeling system for buildings.
- These actions yielded a cumulative energy savings totaling 321 gigawatt-hours per year and facilitated development of the Green Building Rating System, which has certified 32 government buildings for sustainability.

CONTEXT

In the Philippines, higher power demand is stretching generation capacity. Although energy consumption likely will double between 2009 and 2030, forecasts suggest that average demand for electricity will increase 4.79% per year, requiring 10,500 megawatts (MW) of generating capacity in 2013–2030.[1] In 2015, projected demand will reach 9,011 MW, exceeding actual demand in 2014 (i.e., 8,717 MW). Therefore, the country could have an almost 300 MW deficit in 2015, especially during peak usage months (March–May).[2]

The Philippines has one of the most expensive power rates in the world ($0.26 per kilowatt-hour in 2013). The steep cost of power results from reliance on imported fuel for power generation, scattered geography, inefficient transmission and distribution systems in some areas, a regulatory framework that contains a complex margin of protection mechanisms for supply and transmission companies, and debt and cost recovery issues for legacy infrastructure (footnote 1). Given the impending shortage of energy supply, the cost of electricity will likely increase.

The need to address the projected shortfall is urgent. However, delayed implementation of the Electric Power Industry Reform Act of 2001, which deregulated the power sector to attract private companies to invest heavily in power generation, means that no new major power generating plant will come online until 2016. Fourteen power plants that could provide at least 2,500 MW of additional capacity are in the pipeline, but they will become operational only after 2016. Therefore, the government and the private sector must work to manage electricity consumption and implement energy efficiency programs.

PROJECT SNAPSHOT

LOAN APPROVAL DATE:
January 2009

LOAN AMOUNT:
$31.1 million

BORROWER:
Republic of the Philippines

EXECUTING AGENCY:
Department of Energy

GEOGRAPHICAL LOCATION:
Metro Manila, Luzon, Visayas, and Mindanao

TYPE OF ENERGY PROJECT:
Energy efficiency

PROJECT COMPLETION DATE:
December 2013

SOLUTIONS

Implementing short-term strategies. One of the short-term strategies taken by the government was the promotion and implementation of energy efficiency initiatives. With assistance from the Asian Development Bank (ADB), the Philippines packaged such initiatives under the Philippine Energy Efficiency Project (PEEP). The PEEP planned to retrofit government office buildings, public parks, and traffic light systems with energy-efficient lighting systems (EELS),[3] distribute compact fluorescent lamps (CFLs) to residents nationwide, establish integrated building and industry efficiency rating standards, and set up an energy service company (ESCO).

1 Asian Development Bank. 2013. *Country Operations Business Plan: Philippines, 2014–2016.* October. Manila. http://www.adb.org/sites/default/files/linked-documents/cobp-phi-2014-2016-ssa-02.pdf

2 Department of Energy. 2014. Measures to Address 2015 Tight Supply Proposed. *Government of the Philippines Official Gazette.* 24 July. https://www.doe.gov.ph/news-events/news/press-releases/2438-measures-to-address-2015-tight-supply-proposed

3 EELS refers to a lighting system that utilizes both natural and electric sources of light and controls to provide the desired level of illumination and comfort to the occupants of the room.

Overcoming initial obstacles. Initially, the PEEP aimed to distribute 13.0 million CFLs for free nationwide to replace high energy consuming incandescent bulbs. The government also planned to claim Clean Development Mechanism (CDM) credits for the program. As CFLs had penetrated the lighting market in urban residential areas because of another national project (i.e., the Philippine Efficient Lighting Market Transformation Project), the PEEP reduced the number of CFLs for distribution from 13.0 million to 8.6 million. It no longer availed of CDM credits for the collection of the incandescent bulbs as well.

The government also planned to create an ESCO to develop and implement energy efficiency projects for public sector clients, and support the development of other ESCOs through financial and technical advisory support. However, the plan ended prematurely due to changing priorities at the Department of Energy (DOE).

These initial obstacles allowed for the reallocation of a significant portion of the $7.5 million budget earmarked for the ESCO creation to retrofitting of additional government buildings. The balance was allocated to retrofitting public lighting and traffic lighting systems.

Focus on retrofitting. Retrofitting government office buildings with EELS was the PEEP's most successful component. The program initially aimed to upgrade the lighting systems in 40 government office buildings in order to contribute a 7,000 megawatt-hours reduction in energy demand and cut the government agencies' electricity expense at least $1.7 million per year. Reduced energy demand was also expected to lower greenhouse gas (GHG) emissions by 5,000 tons per year.

Lighting loads in buildings and residences account for about 30%–40% of the Philippines' total electricity consumption. Office buildings built before 2000 were more likely to have fluorescent lamps with magnetic ballasts and, in most cases, incandescent bulbs with minimal use of natural lighting. Therefore, the DOE raised the target to 135 government buildings,[4] increasing energy savings and lowering emissions.

Retrofitting began in September 2012 and was completed in June 2013. Three key factors contributed to the successful implementation of the project: enabling government policies, an efficient project implementation plan, and availability of financial resources.

- *Enabling government policies.* Government policies fully supported retrofitting government office buildings with EELS. On 25 October 2004, years before program implementation began, former President Gloria Macapagal-Arroyo issued Administrative Order 110 (AO 110),[5] directing the institutionalization of a government energy management program. AO 110 mandated a 10% reduction in the cost of the government's monthly energy consumption for a minimum 3 years starting January 2005 and authorized the use of EELS. Due to budget constraints, most government agencies complied with AO 110 by using less air conditioning and turning lights off during lunch breaks and immediately after regular working hours. However, not all buildings were equipped with EELS.

[4] Government of the Republic of the Philippines, Department of Energy. 2012. Philippine Energy Efficiency Project: Expected Outcomes. May. http://www.phileep.org/index.php/expected-outcomes

[5] Government of the Republic of the Philippines. 2004. Administrative Order No. 110. October. https://www.gov.ph/2004/10/25/administrative-order-no-110-s-2004/

Issued on 9 July 2007, Administrative Order 183 (AO 183)[6] mandated all government agencies to use EELS. However, not all former government buildings have been retrofitted to comply with AO 183, mainly due to budgetary constraints.

- *Efficient project implementation.* In 2008, 140 government office buildings had not yet complied with AOs 110 and 183. Although available resources for the program covered only 40 buildings, the project implementation support consultant—the International Institute for Energy Conservation-Asia—developed a selection criteria to prioritize buildings for retrofitting. These buildings include government hospitals, schools and universities, and local government offices. A common set of selection criteria helped determine which buildings offered the greatest reduction in energy at the least cost, thereby accommodating more buildings in the program. After inspecting office buildings and recording their lighting loads and fixtures, the cost of replacing them with EELS was computed. Estimated energy consumption, potential savings, payback period, and the annual potential GHG emission reduction per building were calculated. A total of 135 government office buildings qualified for prioritization. The list also provided the DOE with a retrofitting budget requirement for each building, enabling identification of successive buildings when additional funds became available.

The Philippine Energy Efficiency Project distributed 8.6 million compact fluorescent lamps nationwide.

PEEP's most successful component focused on retrofitting of government buildings.

The DOE prepared a project implementation plan that was applied to all retrofitting projects. The plan included activities related to procurement, scheduling and installation, testing, and validation. An ADB-approved international competitive bidding process awarded the contract to supply, install, and commission EELS for government office buildings to a single entity. To ensure quality, all equipment and design was covered by a 2-year warranty.

[6] Government of the Republic of the Philippines. Administrative Order No. 183. http://www.gov.ph/2007/07/09/administrative-order-no-183-s-2007/

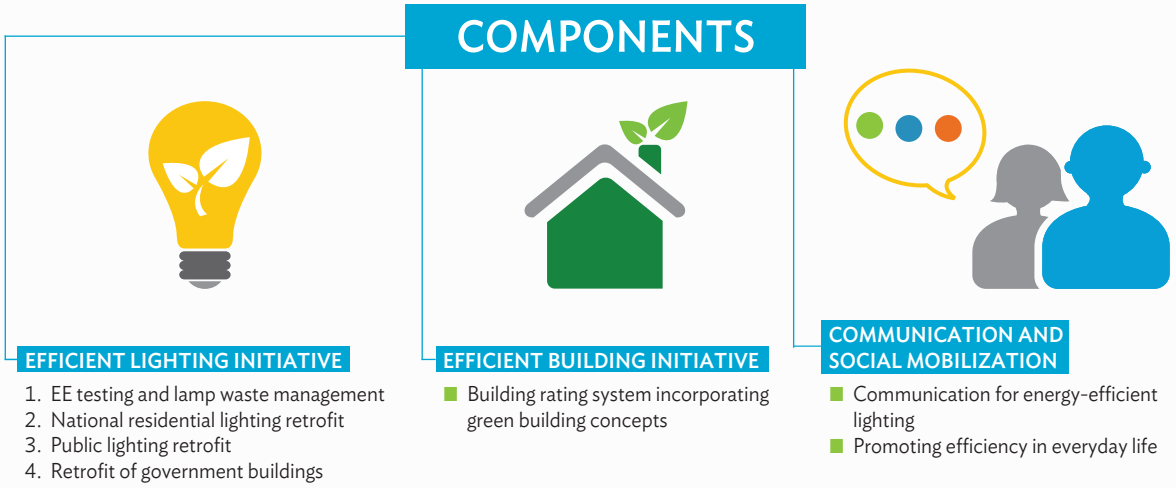
Close coordination between the contractor, the DOE, and other government counterparts and stakeholders was critical to efficient project implementation. Coordination also helped circumvent potentially negative impacts on building occupants, avoiding unwarranted delays.

Upon completion of EELS, the DOE and building representatives jointly inspected and validated all 135 buildings to ensure compliance with the lighting specifications for each building, check the electrical integrity of the new installations, and measure the resulting luminance. The project prepared inspection reports and validated documents such as delivery receipts, invoices, and official receipts before issuing a certificate of acceptance to the contractor.

Retrofitting began on 13 September 2012, a month behind schedule due to a delay in securing the necessary government permits. The retrofitting program was completed within 10 months. Some delays were attributed to customization, ongoing renovations, and schedule constraints.

PEEP also helped local government units replace old streetlights and traffic lights with more efficient lighting systems, establishing a model for standardizing public lighting and large-scale implementation. Local government units distributed 8.6 million CFLs to households. Figure 4.3.1 shows the main components of the project.

Figure 4.3.1: Components of the Philippine Energy Efficiency Project



EE = energy efficiency.

Source: E. Reyes. 2012. Philippine Energy Efficiency Project. Presentation at the PEEP-EBI Inception Workshop. 23 October. F1 Best Western Premier Hotel, Bonifacio Global City, Taguig City.

RESULTS

Between January 2009 and December 2013, the project retrofitted 135 government office buildings and almost 4,000 public park and streetlights with EELS. It also distributed 8.6 million CFLs nationwide and established an efficient building rating system for new and retrofitted buildings, based on similar ratings models in many other countries, and certified 32 government buildings as "green."

Retrofitted government office buildings reduced the cumulative lighting load about 2.72 MW (34%), or 9.6 GWh, per year, saving almost a third of the buildings' average energy consumption. The average level of illumination improved 50%. The payback period for the investment was 2 years without lighting replacement units and 4 years with replacement. Thus, government agencies complied with AOs 110 and 183, reduced electricity costs, and helped mitigate impending power shortages. This saving would not have materialized without strong collaboration between ADB and the DOE during project implementation.

LESSONS

Enabling policy. Notably, an enabling government framework for energy efficiency contributed to the project's success. The government-decreed AOs provided directions on energy management at a time when energy efficiency was an unfamiliar concept among public agencies. It also became a starting point for projects such as PEEP to initiate more energy efficiency activities. Government energy policies, a road map, laws, and executive legislation are critical for providing a robust and sound legal basis for project proponents and stakeholders.

Flexibility. A flexible approach to project design and scope is essential. Initially, external forces made adjustments necessary. Although the original plan included only 40 buildings, the project management team expanded the target to 135 building while maintaining implementation efficiency.

Energy efficiency lighting is a sound investment. EELS will result in significantly lower energy demand, consumption and, more importantly, energy savings. Whether borrowing from the markets or using internal resources to implement energy efficiency measures, EELS is a feasible option when considering return on investment and payback period. This success may further stimulate the government to retrofit cooling and refrigeration systems and motor loads of government buildings while involving the private sector.

Keywords

Energy efficiency, compact flourescent lamp, CFL, energy-efficient lighting systems, EELS, retrofitting, green buildings, Philippines

For further reading

- http://www.adb.org/sites/default/files/project-document/67368/42001-phi-rrp.pdf
- http://www.adb.org/features/bright-idea-energy-reduction

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