INDIA[1]

Context and background

The total volume of public procurement in India is estimated to constitute about 30% of gross domestic product (GDP). There is no law that governs public procurement in India. The General Financial Rules issued by the Ministry of Finance lay down the basic principles of efficiency, economy, fairness and equitability and the promotion of competition in public procurement. The current guidelines do not mandate public authorities to include environmental and social criteria in public procurement. However, awareness about sustainability is growing. The use of public procurement as a tool to influence market trends in favour of environmentally and socially responsible products and services is a relatively new concept in India.

The Ministry of Railways, which administers Indian Railways, the national railroad carrier, is one of the central ministries in India. The procurement of goods, works and services in Indian Railways is governed by the General Financial Rules, codes, manuals and departmental guidelines. The Indian Railways Vision 2020 document states its intention to conserve energy by achieving 15% energy efficiency and to use a low-carbon, energy-efficient approach.

Many employees working for Indian Railways reside in a railways colony. Most of these households use energy inefficient incandescent lamps (ICLs) for their lighting needs, thus increasing peak electricity demand in the evening. The introduction of energy-efficient lighting solutions in these households involves many challenges, such as low consumer awareness of energy-efficient products, the quality of existing products on the market, poor availability of green products in rural markets, and most of all, the high initial cost of compact fluorescent lamps (CFLs) on the Indian market.

Objectives

In keeping with the goals of Vision 2020, Indian Railways took a unique initiative in 2008 to reduce the peak lighting loads in Indian Railways' residential quarters by replacing ICLs with energy-efficient CFLs. The project team used life-cycle costing (LCC) as a tool to demonstrate the potential benefits of using CFLs over ICLs for lighting needs even though the upfront purchase price of a CFL is approximately five or six times that of an ICL in India. The idea was to encourage the involvement of stakeholders in the project implementation phase so that they could experience the benefits of adopting greener products and services themselves. The resulting energy savings achieved through this project will reduce the total power demand and lead to a reduction of greenhouse gas emissions.

The secondary objective of the project was to demonstrate the use of the Clean Development Mechanism (CDM) under the Kyoto Protocol to finance an energy-efficiency project in an emerging economy. It leveraged money earned through the sale of certified emission reductions (CERs) generated during the project to distribute a maximum of 4 CFLs to 400 000 households across Indian Railways.

1. Case study submitted by Indian Railways.

Comparison of life-cycle costing for compact fluorescent lamps and incandescent lamps

Wattage of incandescent lamps	Wattage of compact fluorescent lamps of equivalent lumen	Consumption of electricity in burning incandescent lamps for 6 000 hours = wattage x hours/1 000 KWH	Consumption of electricity in burning compact fluorescent lamps for 6 000 hours = wattage x hours/1 000 KWH	Savings in electricity over life cycle of compact fluorescent lamps, i.e. burning for 6 000 hours. = (3-4)	Cost of electricity per KWH (in INR)	Savings on electricity bill over life cycle of compact fluorescent lamps = 5*6	Initial cost of each incandescent lamp (in INR)	Initial cost of compact fluorescent lamp of equivalent lumen (in INR)	Initial cost of incandescent lamp for burning 6 000 hours (in INR)	**Net savings per compact fluorescent lamp over life cycle (in INR) = 7-9+10**
1	2	3	4	5	6	7	8	9	10	**11**
100	20	600	120	480	5	2 400	15	130	90	**2 360**
100	23	600	138	462	5	2 310	15	130	90	**2 270**
60	14	360	84	276	5	1 380	11	90	66	**1 356**

Assumptions:

Life of compact fluorescent lamp – 6 000 hours

Life of incandescent lamp – 1 000 hours

Source: Indian Railways.

Implementation

The project was conceived and administered at the ministry level and was implemented by divisional units across country. The tender conditions included the requirement of high-quality CFLs as per Indian Standard IS: 15111 of reputed make with 10 000 burning hours. Further, they specified that the winner of the contract would recover the cost of the CFLs supplied to Indian Railways through the sale of CERs by registering it with the United Nations Framework Convention on Climate Change (UNFCCC) as a Clean Development Mechanism project. A globally advertised tender was launched in June 2008. The Project Implementation Deed dated 30 October 2009 was signed between CQC Malaysia Limited and Indian Railways.

Under the agreement, CQC was responsible for procuring high-quality CFLs as per the tender specifications and supplying CFLs to designated points as per advice from the divisional heads. CQC was to recover the cost of the CFLs through trading CERs. As per the agreement, 3% of the CERs were to be transferred to Indian Railways. Further, CQC was responsible for undertaking the process to acquire Clean Development Mechanism status, from the development of the project design document, obtaining host country approval, validation and registration of the project and project monitoring, to verification and certification with the UNFCCC. The Ministry of Railways, as the project beneficiary, was responsible for the distribution of CFLs in Indian Railways' housing colonies on a replacement basis, recordkeeping, storage of the CFLs and disposal at the end of their life as well as the safekeeping of released ICLs until verification.

The project team identified the stakeholders as Indian Railways employees residing in residential quarters, Philips India (the supplier of lamps) staff, Indian Railways employees involved in the project and local NGOs. CQC conducted training for supervisory staff involved in the distribution of the CFLs. The consumers residing in households were adequately briefed on the project during stakeholders meetings conducted at numerous different locations. They were also told that they needed

to install the CFLs in areas of maximum usage like the kitchen, drawing rooms and common utility areas where average lighting is a minimum of 3.5 hours per day, in order to achieve the maximum benefit.

The project activity started on 10 July 2009 with the signing of the master purchasing agreement between CQC and Philips India. The distribution of 1.41 million CFLs across India was completed in December 2009. The project was registered with the UNFCCC as a Clean Development Mechanism project in November 2010 after obtaining host country approval from the Ministry of Forest and Environment and validation by the UNFCCC's appointed Designated Operational Entity (DOE).

Impacts and monitoring

The project has been closely monitored since its beginning. Spot checks were conducted to verify that the CFLs were actually installed in households within two weeks of their distribution. Project co-ordinators were responsible for visiting at least 25% of the households participating in the project. Det Norske Veritas (DNV) independently validated the project for meeting all of the relevant UNFCCC requirements for the Clean Development Mechanism and all of the relevant host country criteria.

The project contributes to sustainable development using an energy-efficient technology which would otherwise not have such a large market penetration in India.

Economic benefits: The project resulted in direct energy savings of 112 500 MWh per annum and is expected to generate 486 130 units of CERs equivalent including a 3% share to Indian Railways.

Social benefits: More than 400 000 households (400 831) have directly benefitted from this project as they received free CFLs that will provide them with sustained savings over the years in terms of energy bills. Further, disposal or recycling of the ICLs and CFLs will require an informal/formal recycling industry, which will create additional employment and generate additional income to the recyclers.

Environmental benefits: Replacing ICLs with CFLs has reduced energy consumption by approximately 75 KWh per CFL per annum and thereby carbon emissions from upstream fossil fuel power generation. It resulted in a reduction of approximately 90 000 tonnes of CO_2 emissions (CER equivalent) per year. Clearly, the use of CFLs will reduce the production of glass as well as the utilisation of energy in ICL bulb production, among others.

In addition, one of the key benefits of this project is exemplified in the fact that India faces a chronic energy deficit. The country is straining its resources to build more fossil fuel plants to meet the ever-growing demand for electricity. The savings from this project will help improve the power supply for agricultural, domestic, industrial and commercial users in India. Most of all, the project raised awareness among more than 400 000 households about the importance of conserving energy.

Challenges and risks

The project had two components. First, justifying the procurement of CFLs, at a substantially higher initial cost, based on life-cycle costing instead of simply the initial economic cost. Second, financing the project using the Clean Development Mechanism through the sale of carbon emission reductions generated during the project. The conceptualisation and development of the bid document itself was a huge task for the project team, as both of these components needed to be merged together.

At the same time, the project design needed to secure the investment risk of a private player performing the contract over the period of the project's life cycle.

Supplying CFLs free of cost to households does not guarantee that consumers will then buy CFLs in the future. An awareness campaign was therefore necessary to demonstrate to stakeholders the benefits of adopting CFLs even if there is a very high initial cost. The team organised various stakeholder meetings across India to highlight the savings potential of CFLs over their life cycle and monthly electricity bill savings generated by using CFLs. This concept proved very useful to inform households of the benefits of adopting CFLs over ICLs. If stakeholders are not fully convinced of the potential for savings, they may revert back to using ICLs after the end of the first CFL's life supplied by Indian Railways.

The Clean Development Mechanism project has transaction costs and registering such a project with the UNFCCC takes 12-24 months. The process is very complex, requiring co-ordination with several agencies and stakeholders throughout the life of the project. Further, the development of the project design document, obtaining host country approval, project validation and registration, project monitoring, verification and certification with the UNFCCC requires a lot of documentation and technical expertise. The team, not expert in handling a project of this complexity, awarded the project's design and implementation to professionals through open bidding, limiting its own role to regulatory compliance.

The project was originally planned to distribute 2.6 million CFLs to Indian Railways households. However, during the actual distribution of the CFLs, many houses were found vacant, locked and abandoned. As a consequence, only 1.41 million CFLs could be distributed. This did not affect the economic viability of the project, but substantial variation between a projected quantity and actual quantity could, in other cases, have this effect.

The project was financed from the sale of CERs in the international carbon market, which fluctuates. This project was a success, as in 2010 the CER market was on the upswing and CQC was able to sell the CERs earned during this project at a good price. With the deepening recession in Europe, which has led to the crash of the international carbon trading market, such projects are at a heightened risk.

Key lessons learnt

Sustainable public procurement (SPP) is a demand-side policy intervention to reduce the consumption of resources. The consumer is central to any discussion on SPP. Therefore, the implementation of SPP, in practice, requires not only laws and guidelines but also a change in consumers' attitude towards the sustainable consumption of products and services. This project has been successful largely because consumers understood the benefits of using CFL and adopted the project wholeheartedly.

Governments can change consumers' consumption behaviour and orientate them towards greener products and services. This requires spreading information about the benefits of green products and services, and therefore, involving stakeholders is a key step for success.

Life-cycle costing (LCC), which refers to the total cost of ownership over the life of an asset, is an important tool for the selection of green products and services to provide value for money. At the same time, LCC has limitations due to the following reasons:

- Procurement professionals do not always have the technical knowledge to capture all costs themselves and have to depend on external sector experts.

- LCC must take into consideration all of the associated costs. However, it is often not possible to realistically establish the LCC of products and services due to non-availability of data for the use phase.

- In the case of competing products, procurement professionals depend on data provided by vendors for working out operation and maintenance costs. Accuracy of data must be closely checked.

- It is time consuming.

- It does not, *per se*, take into account the impacts of products and services on the environment and society.

Therefore, developing LCC technical expertise is crucial for its successful implementation. LCC should be used as tender evaluation criterion for products and services for which there is a considerable degree of confidence of capturing all of their current and future costs.

The project was conceptualised and designed at central level but was implemented through decentralised networks of offices across India. This exemplifies the importance of institutional structures in implementing such a project in the field.