Energy Conservation Awareness Drive at Sir J. J. Hospital Mumbai, India

CASE STUDY INDEX

Country

- ☐ China
- ☒ India
- ☐ Mexico
- ☐ South Africa

Building Type

- ☒ Hospital
- ☐ Office
- ☐ Public Building
- ☐ School

Intervention

- ☒ Awareness Creation
- ☐ O&M
- ☐ Building Retrofits
- ☐ Other

Energy Savings

- ☐ Less than 10%
- ☒ 10 - 20%
- ☐ 20 - 30%
- ☐ More than 30%

About PEPS Case Studies:

The primary purpose of the case studies is to recognize exemplary efforts by public sector organizations to promote energy conservation/efficiency and encourage their replication at other organizations through information sharing. This case study was prepared by Lawrence Berkeley National Laboratory with support from Environmental Protection Agency and USAID. For more information, please contact Satish Kumar (SKumar@lbl.gov).

Background and Motivation

This case study documents the planning, implementation, and the results of the energy conservation initiative implemented by Maharashtra Public Works Department (MPWD) at the Sir Jamshedji Jeejeebhoy Hospital (Sir J. J. Hospital) in Mumbai.

Sir J. J. Hospital is one of the oldest and the largest hospitals in South-East Asia. This 1,352 bed hospital was established by Sir Jamshedji Jeejeebhoy almost 150 years ago and occupies an area of 65 acres in the heart of Mumbai. The hospital functions on a 24x7 basis and operation theatres, high-end medical equipment, lighting, HVAC systems, water heaters, elevators, and water pumps are responsible for more than 75% of the energy consumption.

Maharashtra Public Works Department, responsible for the operation and maintenance (O&M) of the hospital campus, implemented an *Awareness Campaign* to reduce energy consumption throughout the hospital campus. The primary problem identified by the MPWD staff was a lack of awareness among hospital employees resulting in wastage of electricity. In addition, inefficiency due to deferred maintenance and replacement, sub-optimal operating schedules (equipment left on when not needed), and reduced emphasis on the importance of O&M led to excessive energy consumption. The situation called for drastic measures when the local electric authority, Brihanmumbai Electricity Supply & Transport Undertaking (BEST), issued a warning to disconnect the power supply as a result of unpaid energy bills.

Planning the Effort

The Quality Circle Concept

An innovative concept developed in Japan after World War II provided the framework to organize and plan the effort. Adopted initially by the manufacturing sector in India, each Quality Circle is a small group of 6 to 12 employees from similar workgroups who meet on a regular basis to identify improvements in their respective work areas. Using established and proven techniques for problem solving in issues related to work quality, production

and human efficiency, sustained excellence within the group as well as within the organization is achieved by the Quality Circle team.

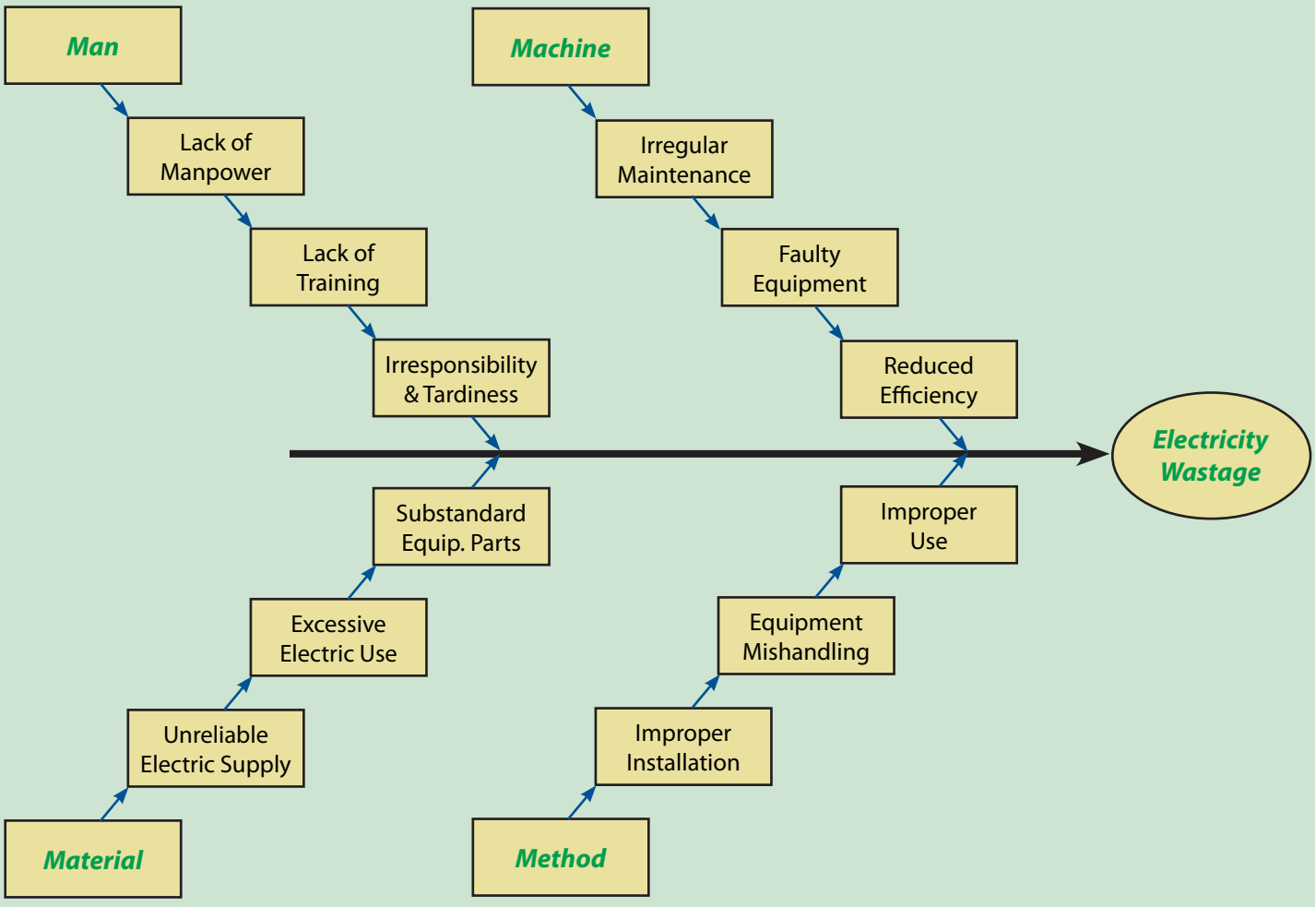
Initial Impetus

The project got underway in response to the Prime Minister of India's nationwide appeal in 2001 to all states to adopt and implement energy conservation measures. A Quality Circle project team comprising of eleven members implemented the initiative. MPWD took the lead role in adopting and implementing the concept of Quality Circle for this energy conservation awareness project.

The Sir J. J. Hospital project team adopted a multi-faceted energy conservation strategy identifying effective methods and techniques to improve energy efficiency and reduce wastage. Consisting of members from different levels of the organization, the Quality Circle met every week to discuss issues and problems related to energy usage and efficiency. The team conducted several brainstorming sessions raising issues related to energy wastage and working together to find solutions. The goal was to devise "no- or low-cost" methods to improve energy efficiency and conserve energy through education of the users through campaigns and posters. While the communication tools were targeted toward the end users, the project team made a very important decision during the planning stage to coordinate these educational and outreach activities by taking into confidence the management staff at each department.

Further, the team conducted several brainstorming sessions using the Ishikawa (also known as fish-bone and shown in the figure below) tool to assign responsibilities and delegate work to team members. The tool helped in the planning and subsequent execution by providing a framework to conduct a cause and effect analysis identifying the factors responsible for energy use and developing an effective strategy to use energy efficiently and minimize energy wastage at the Sir J. J. Hospital complex.

Ishikawa (Cause – Effect) Diagram



Design and Implementation

The primary challenge that the project team faced from the outset was in educating the primary users of the facilities and in creating awareness among hospital staff on the benefits of energy conservation and energy efficiency. The team overcame this challenge by interacting with the management staff, doctors, nurses, and students through direct interaction and through communication tools to reinforce the benefits of energy conservation on a continuous basis. The low- and no-cost O&M measures implemented to achieve effective solutions to minimize energy wastage and maximize savings are listed below:

- Catchy campaigns that made use of easy to remember slogans;
- Use of various communication tools such as posters at strategic locations to inform staff of the steps that can be taken to conserve energy and minimize wastage.

Although conserving energy by creating awareness was the main objective of the project, the following low- and no-cost measures were also implemented by the O&M staff at the hospital:

- Maximizing usage of natural light during the day through passages and corridors;
- Turning off office equipment, fans and air-conditioners during unoccupied hours;
- Educating people about reasonable and efficient usage of water heaters and other electrical appliances;
- Plugging air leakages in air-conditioned rooms such as office spaces, operation theatre;
- Turning off water pumps when the tanks filled up;

Through these efforts, a more responsible attitude towards the environment was cultivated among the hospital staff leading to substantial energy savings with little investment. To make these behavioral changes permanent, hospital staff were reminded about the benefits of energy conservation through the use of posters.

Quality checks and analysis included use of checklists and other performance enhancement tools to record the electricity costs over the period and analyze the data to evaluate the performance of the project.

Performance Evaluation and Results

Energy Savings

There was a concerted effort to evaluate the performance of the team from time to time. Moreover, the project team also quantified the electricity reduction resulting from the awareness campaign by using metered electricity data from the buildings during 2001-2004. The simple energy saving calculation and analysis was done by collecting metered monthly electricity consumption data and comparing it with the data for corresponding month of the preceding year. Although a preliminarily energy audit was performed for the entire hospital campus at the time the project started, no intervention measures have been implemented that would lead to reduction in electricity consumption. During the period of 2001-2004, the electricity tariff structure has remained the same.

Annual Energy and Cost Savings from the Project

Fiscal Year (April to March)	Energy Savings (kWh)	Cost Savings (million Rs.)
FY2002	473,000	2.13
FY2003	229,000	0.73
FY2004	110,000	0.99
Total Savings	**812,000**	**Rs. 3.85 million (Approx. $90,000)**

It has been estimated that the project has resulted in overall savings of Rs. 38.5 lakhs ($90,000). The table above lists the savings for three years. The team identified these savings as "national savings" and termed their effort as an attempt towards achieving the national goal of bridging the gap between demand and supply of electricity.

Ongoing Efforts and Future Plans

Quality Circle's innovative and successful approach toward energy conservation has been recognized and rewarded at both the state and national level. The team plans to continue educating the public and create awareness about the need for energy conservation. Also, campaigns and posters will continue to be used as a means of sharing knowledge on improved methods and techniques for effective energy use.

Among the future plans, the team plans to comply with the Energy Conservation Act established in 2001. Sustainable and energy efficient technologies such as solar water heaters and energy-efficient lighting will be studied and implemented to improve the overall building performance. The hospital management and the MPWD have also conducted an extensive energy audit of the facility and is currently identifying energy efficiency measures with the most assured and shortest payback that can be implemented to save even more energy.

Lessons Learned

As evident from the case study, the project has been successful in achieving the goal of energy conservation through simple strategies by involving everyone within the organization. From the various energy saving and

awareness measures implemented at the Sir J. J. Hospital, the few valuable and important lessons learned that can be identified are:

- It is critical that all the equipment and systems are operated and maintained properly. Mandatory and regular operation and maintenance (O&M) of all equipment and machinery need to be performed in order to detect any faulty or leaky connections and thereby prevent energy loss or decreased performance efficiency.
- Periodic training and education of building owners and/or facility managers are important in order to keep them updated with the newer technologies and effective ways to improve energy efficiency.·
- Programs to impart continued awareness about energy savings measures and educate the users are also important to achieve energy savings.·
- It is important to identify one person or a group (Energy Champion) and give them responsibility so that they can play a leadership role in planning and implementing the project in an effective fashion.

Acknowledgement

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