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Best Practice on Implementing Strategies for Energy Efficiency

Most Indian urban local bodies (ULBs) are struggling to cope with expenses that are higher than the revenues; a major part of the budget is spent on services such as water supply, street lighting and waste management. Consequently, some municipalities have undertaken significant steps to deal with the rising energy requirements as the spiraling costs incurred.

The Surat Municipal Corporation (SMC) initiated a strategy towards energy management and conservation in the city. It established an Energy Efficiency Cell in November 2001. The financial and environmental impact that the strategy had offers an insight into the innovative collective mind of a city government that proves an old adage that environment conservation means money saved.

Situation Before the Initiative

In the year 2000, Surat Municipal Corporation was faced with a difficult situation; it was facing rising electricity bills and was unable to cope with the costs. However, street lighting is one of the basic services, apart from, water supply, drainage which any urban local body is required to provide regardless of costs.

Out of its total electricity bill of Rs.390 million in year 2001, 60% was paid towards the water supply, 24% towards sewerage disposal system, 7% towards streetlight system and remaining be establishment costs.

Some of the major problems included:

- High capital, operational as well as maintenance costs. Poor knowledge of selection criteria for replacement of street lighting for luminaries and lamps.
- Ineffective time management for the maintenance of the street lighting as well as water and sanitation requirements.
- Lack of awareness on the part of the line officials of energy management as well as efficiency requirements and a general consciousness of the issue.

Continual increase in the energy bill made SMC to realize that needed to understand and analyze the major causes and to attempt to improve the situation. It realized the need for the provision of uniform illumination with increased energy efficiency. As part of this innovation, the government decided to facilitate future energy development in a scientific and systematic manner. It is in this background that the SMC established an “Energy Efficiency Cell” in November 2001 with two dedicated experienced electrical engineers for solely conducting regular energy efficiency related activities.

Implementation Strategies

In order to achieve the basic objectives of the SMC, the corporation decided:

- To identify & implement energy conservation projects.
- To find out sources for procuring power at lowest possible price



- To conduct in-house & external energy audit
- To carry out feasibility studies for power generation from conventional and non conventional energy sources
- To make representation in the Gujarat Electricity Regulatory Commission (GERC) for availing electricity energy at economical rates
- To scrutinize files having more than equal to 30 kw power loading
- To monitor the usages of electricity of entire corporation

The following interventions are part of the strategy of overall process of revival of Surat city:

1. Energy Conservation in transmission Grid for Potable Water

The SMC water supply system consists of four water treatment plants, nine water distribution stations and four pumping stations. Most of the water distribution stations are interconnected and a water transmission grid has been made for achieving reliability in availability of water. Detailed studies have been made of interconnections between Water Distribution Stations (WDS) and Water Treatment Plants (WTP) in the context of specific energy consumption i.e. Kwh/ML required for transmitting the water and accordingly the most economical route for transmitting water has been derived. By changing the transmission route for Umarwada WDS underground tank from Varachha Water Works to Sarthana Water Works, SMC has saved Rs.16.8 Million per annum (4.163 Million KWH/annum). Similarly, SMC has saved Rs.8.5 million per annum (2.08 million KWH/annum) by modifying the transmission route for filling underground tanks of Athwa and Khatodara WDS.

2. Street Lighting System

The SMC has converted 19570 fluorescent streetlight luminaries, having conventional FL lamp and copper wound ballasts consuming 50W luminaries, into an energy efficient luminaries. This was done by replacing with hi-lumen fluorescent lamp and electronic ballast with total power consumption of 28 W/ luminary keeping the same light output. The implementation was done in January 2003. This has resulted in saving of Rs.5 million per annum. (1.54 million kWh/annum)

After successful implementation, SMC has made a policy stating that any new fluorescent luminaries in street light system should be installed with electronic ballast and high lumen fluorescent lamp only. This has resulted in saving of Rs.3.5 million per annum. (1.1 million kWh/annum) till date.

The SMC also has started staggering usage of 50% streetlights on major 155 roads during low traffic period from midnight to morning which has resulted in saving of Rs.3.5 million per annum.(1.1 million kWh/annum) till date.

3. Energy Auditing

Energy auditing of 34 services with contract demand of more than 75kWh was done through an auditor approved by Government of Gujarat. The results are as below.

4. Revision of Electricity Tariff



SMC was successful in revising its tariff (a process done through GERC; from HTP-I to HTP-II {A} for 18 HT (high tension) services meant for water supply and sewage disposal system. This has resulted in saving of Rs.13 million per annum. It has also received special consideration in the demand charges for the HT Services of water supply and sewage disposal system which further resulted in savings of Rs.1.5 million per annum.

Some other Steps

- Average power factor for all HT services has been improved to 0.991 from 0.986 by installing Thyristor-based APFC panels (HT sensing) and quick replacement of faulty and de-rated capacitors wherever required.
- Energy Bill Monitoring System (EBMS) has been established for monitoring and controlling of the energy bill of all services.
- SMC has introduced contract-demand rationalization
- Conventional 100 watt GLS lamps have been replaced with LED based retrofits having 9.2 watt power consumption at 28 traffic junctions, which has resulted in a major saving.

Result and Impact

- The strategic step of establishing a dedicated Energy Efficiency Cell has contributed to environment protection by reduction in carbon dioxide emission to the tune of 21,830 tons.
- Since the inception of the cell, SMC has saved more then Rs.660 million per annum and 1.24 crore KWH per annum.
- Energy auditing has resulted in:
 - Total Energy Saving Possibilities (Implemented): Rs.8 million per annum
 - Total Energy Saving Realised: Rs.7.71 million per annum
 - Total Actual Investment Done: 13.0 million
- Average power factor for all HT services has been improved to 0.991 to 0.986 by installing Thyristor based APFC panels (HT sensing) and quick replacement of faulty and de-rated capacitors wherever required. This has resulted in the saving of Rs.17.69 lakh/ annum
- Because of the Energy Bill Monitoring System, the SMC has saved Rs.4 million per annum.
- Introduction of contract-demand rationalization has led to a saving of Rs.1.6 million.
- Replacement of conventional 100 watt GLS lamps with LED based retrofits has resulted in saving of Rs.0.9 million/annum

Sustainability

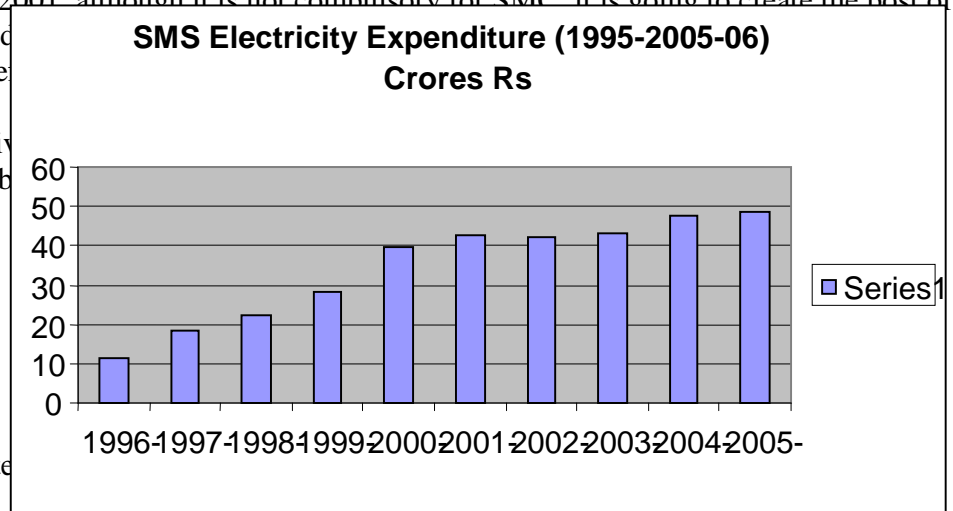
Energy consumption and bill data of all high tension and low tension services from January 2001 have been prepared and is being continuously monitored. The graph below indicates that the electricity expenditure rise is relatively more gradual indicating that the efficiency cell is making inroads into the operational activities of the ULB.

Further database of specific energy consumption e.g. kWh/ML of potable water distributed is prepared and it is also being monitored. Measurement of efficiency of most important machineries pump, motor, transformer, air conditioner are periodically checked through in house/external energy auditing.



Accordingly, improvement of efficiency of machinery/equipments is planned and executed. In the context of Energy Conservation Act, 2001 although it is not compulsory for SMC it is going to create the post of “Energy Manager” at the middle staff for improving the work e

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Lessons Learnt

- It is possible to look at alternate sources of energy to reduce the deficit.
- There is a need for such energy cells within urban local bodies in all cities.
- Awareness about energy conservation has increased among the different departments and employees of the SMC.

Replicability

The lessons from initiative clearly indicate that the formation of dedicated energy cell within the ULBs is very necessary and similar initiatives may be replicated.