

# Energy Conservation

**Energy conservation** refers to efforts made to reduce energy consumption. Energy conservation can be achieved through increased efficient energy use, in conjunction with decreased energy consumption and/or reduced consumption from conventional energy sources

Energy being an important element of the infrastructure sector has to be ensured its availability on sustainable basis. On the other hand, the demand for energy is growing manifold and the energy sources are becoming scarce and costlier. Among the various strategies to be evolved for meeting energy demand, efficient use of energy and its conservation emerges out to be the least cost option in any given strategies, apart from being environmentally benign.

The steps to create sustainable energy system begin with the wise use of resources; energy efficiency is the mantra that leads to sustainable energy management.

## **Energy Demand And Supply**

On the energy demand and supply side, India is facing severe shortages. 70% of the total petroleum product demand is being met by imports, imposing a heavy burden on foreign exchange. Country is also facing Peak power and average energy shortages of 12% and 7% respectively. To provide power for all , additional capacity of 100,000 MW would be needed by 2012, requiring approximately Rs.8000 billion investment. Further, the per capita energy consumption in India is too low as compared to developed countries, which is just 4% of USA and 20% of the world average. The per capita consumption is targeted to grow to about 1000 kWh per year by 2012 , thus imposing extra demand on power system.

## **Importance Of Energy Conservation**

In a scenario where India tries to accelerate its development process and cope with increasing energy demands, conservation and energy efficiency measures are to play a central role in our energy policy. A national movement for energy conservation can significantly reduce the need for fresh investment in energy supply systems in coming years. It is imperative that all-out efforts are made to realize this potential. Energy conservation is an objective to which all the citizen in the country can contribute. Whether a household or a factory, a small shop or a large commercial building, a farmer or a office worker, every user and producer of energy can and must make this effort for his own benefit, as well as that of the nation

## Energy audit methodology

The methodology adopted for this audit was

Formation of audit groups for specific areas and end use

Visual inspection and data collection

Observations on the general condition of the facility and equipment and quantification

Identification / verification of energy consumption and other parameters by measurements

Detailed calculations, analyses and assumptions

Validation

Potential energy saving opportunities

Implementation

## Improving Power Factor

Adding power factor capacitors is generally the most economical way to improve a facility's power factor to minimize a power factor penalty.

While the current through an inductive load **lags** the voltage, current to a capacitor **leads** the voltage. Thus power factor capacitors serve as a leading reactive current generator to counter the lagging reactive current in a system.

This action is explained in terms of the energy stored in capacitors and induction devices. As the voltage in ac circuits varies sinusoidally, it alternately passes through zero-voltage points and maximum voltage points. As the voltage passes through zero voltage and starts toward maximum voltage the capacitor stores energy in its electrostatic field, and the induction device gives up energy from its electromagnetic field. As the voltage passes through a maximum point and starts to decrease, the capacitor gives up energy and the induction device stores energy.

Thus when a capacitor and an inductor are installed in the same circuit, there is an exchange of magnetizing current between them with the power factor capacitor actually supplying the magnetizing requirements of the induction device. The capacitor thus releases the energy source (the utility) from the need to supply the magnetizing current.

Simply stated, power factor capacitors supply the magnetizing current required by motors at or near the motor site, instead of from the utility. This frees up utility capacity to provide more real power.