

ENERGY MANAGEMENT

List of Contents

1 Energy Management

- 1.1 Overview of energy management, need for energy conservation, Environmental Aspects
- 1.2 Need for energy conservation with brief description of oil and coal crisis.
- 1.3 Alternative sources of energy.
- 1.4 Energy efficiency- its significance

2Energy Conservation

- 2.1 Energy conservation in Domestic sector- Lighting, Home appliances
- 2.2 Energy conservation in Industrial sector-Industrial lighting, Distribution system, Motor Pumps, Fans, Blowers etc.,
- 2.3 Energy conservation in Agriculture sector Tube well pumps, Diesel-generating sets.
- 2.4 Macro Level approach for energy conservation at design stage.

1 Unit

1.1 Energy management

Energy management is the means to controlling and reducing your organization's energy consumption. And controlling and reducing your organization's energy consumption is important because it enables you to: Reduce costs

Energy management includes planning and operation of energy production and energy consumption units. Objectives are resource conservation, climate, protection and cost savings, while the users have permanent access to the energy they need.

Energy management can be broadly defined as the proactive, organized and systematic management of energy use in a building or organization to satisfy both environmental and economic requirements.

Companies across all sectors are turning to energy management as a means to reduce their operating costs. Specific requirements and practices differ by sector, but the core principles apply to all companies. It involves the following steps:

1. Collecting the data and metering your energy consumption
2. Identifying opportunities to save energy
3. Taking action to save energy
4. Tracking the progress and ongoing improvement

Whether you associate energy management with energy-saving efforts that focus on making better use of existing buildings or equipment, or with energy awareness, it doesn't matter.

1.2 We need to save energy in order to:

- Reduce the damage that we're doing to our planet, Earth. As a human race we would probably find things rather difficult without the Earth, so it makes good sense to try to make it last.
- Reduce our dependence on the fossil fuels that are becoming increasingly limited in supply.
- *Controlling and reducing energy consumption at your organization*
- Energy management is the means to controlling and reducing your organization's energy consumption... And controlling and reducing your organization's energy consumption is important because it enables you to:
- Reduce costs – this is becoming increasingly important as energy costs rise.
- Reduce carbon emissions and the environmental damage that they cause - as well as the cost-related implications of carbon taxes and the like, your organization may be keen to reduce its carbon footprint to promote a green, sustainable image. Not least because promoting such an image is often good for the bottom line.
- Reduce risk – the more energy you consume, the greater the risk that energy price increases or supply shortages could seriously affect your profitability, or even make it impossible for your business/organization to continue. With energy management you can

reduce this risk by *reducing* your demand for energy and by *controlling* it so as to make it more *predictable*.

How best to manage your energy consumption?

- Metering your energy consumption and collecting the data
- Finding and quantifying opportunities to save energy
- Targeting the opportunities to save energy
- Proper use as per need
- Public awareness
- Using energy efficient devices

Day-to-Day Energy Use



1.3 Energy Source

Non Renewable (limited in quantity or depleting)

Fossil Fuels

Coal

Natural Gas

Petroleum

Oil Shale

Tar Sands

Nuclear Fission

Renewable (unlimited by rate of use or non-depleting)

Solar

Hydro

Wind

Tidal

Biomass

Nuclear Fusion

1.4 Energy Efficiency

- *Efficiency Formula.* Efficiency is a measure of how much work or energy is conserved in a process. In many processes, work or energy is lost, for example as waste heat or vibration
- The efficiency is the energy output, divided by the energy input, and expressed as a percentage.

$$\text{Energy efficiency} = \frac{\text{usefull output energy}}{\text{total input energy}}$$

Multiple Choice Questions

Q1 Cloud base energy management system provides the ability to

- a. Remotely control HVAC
- b. Collect real time data
- c. Generate intelligent, specific and real time guidance
- d. Only b and c
- e. All of these

Q2 The energy strategies of companies have the principle of

- a. restoring and preserving the environment
- b. reducing wastes and pollutants
- c. educating the people about energy conservation
- d. all of these
- e. none of these

Q3 Maximum demand charges are given in

- a. kWh
- b. kVA
- c. kVAr
- d. All of these
- e. None of these

Q4 Energy management is a key component of

- a. Environmental management
- b. Carbon management
- c. Nitrogen management
- d. Water management

Q5 The main objective of energy management is to

- a. Minimize energy cost
- b. Minimum environmental effects
- c. Maintain optimum energy procurement and utilization
- d. Only A and B
- e. All of these

Short/long answer type questions

Q1 Define Energy Efficiency

Q1 Define energy Management and why we need energy management

Q2 Explain various types of energy sources

Unit 2

2.1 Energy Conservation in domestic Sector

- Begin by switching off the lights and the fans in the rooms that are not occupied.
- Use CFLs (compact fluorescent lamps) instead of ordinary incandescent lamps. These lamps may be more expensive but they last longer than the ordinary bulbs and are very energy efficient as they consume much less power.
- Use the washing machine at full loads, as the consumption of water will be the same whether you put in half a load of clothes or a full load.
- Mix hot water in the bucket for a bath rather than using a geyser shower. Showers consume more power and up to 90 litres of water for a bath.
- Change the heat element in the geyser every 5–6 years; this will enable heating to be faster and also save valuable power.

2.2 Energy Conservation in Industrial Sector

- The industrial sector is a major energy-consuming sector in India and uses about 50% of the total commercial energy available in the country. Of the commercial sources of energy, coal and lignite account for about 56%, oil and natural gas around 40%, hydro-electric power about 3% and nuclear power accounting for 1%. The level of energy consumption is very high.
- Policy Recommendations for Energy Conservation in Industrial Sector
- Technical and operational measures
- Fiscal and economic measures
- Energy pricing policies must ensure that
- Industrial licensing, production and growth
- Organizational measures
- Energy equipment
- Research and development

2.3 Energy Conservation Tips in Agriculture Sector:

- Selection of right capacity of pumps according to the irrigation requirement.
- Matching of pump set with source of water – canal or well.
- Matching of motor with appropriate size pump.
- Proper installation of the pump system – shaft alignment, coupling of motor and pump.
- Use of efficient transmission system. Maintain right tension and alignment of transmission belts.

- Use of low friction rigid PVC pipes and foot valves.
- Avoid use unnecessary bends and throttle valves

2.4 Energy Efficient Devices

- There are many different devices out there that can improve your building's energy efficiency and reduce costs
- (1) A LED lamp or LED light bulb is an electric light for use in light fixtures that produces light using light-emitting diode (LED). LED lamps have a lifespan many times longer than equivalent incandescent lamps, and are significantly more efficient than most fluorescent lamps, The most efficient commercially available LED lamps have efficiencies of 200 lumens per watt (lm/w)



(2) A **liquid-crystal display (LCD)** is a flat-panel display or other electronically modulated optical device that uses the light-modulating properties of liquid crystals. LCDs are used in a wide range of applications, including LCD televisions, computer monitors, instrument panels, aircraft cockpit displays, and indoor and outdoor signage. Small LCD screens are common in portable consumer devices such as digital cameras, watches, calculators, and mobile telephones, including smartphones. LCD screens are also used on consumer electronics products such as DVD players, video game devices and clocks. LCD screens have replaced heavy, bulky cathode ray tube (CRT) displays in nearly all applications.

(3) A **compact fluorescent lamp (CFL)** also called compact fluorescent light, energy-saving light, and compact fluorescent tube, is a fluorescent lamp designed to replace an incandescent light bulb; some types fit into light fixtures designed for incandescent bulbs. The lamps use a tube which is curved or folded to fit into the space of an incandescent bulb, and a compact electronic ballast in the base of the lamp.

Multiple Choice Questions

Q1 Total energy of a body is sum of

- A. kinetic energies
- B. potential energies
- C. forces
- D. *both a and b*

Q2 A nonrenewable energy is

- A. wind
- B. biomass
- C. *coal*
- D. tides

Q3 Energy can neither be created nor be destroyed, but it can be changed from one form to another", this law is known as

- E. kinetic energy
- F. potential energy
- G. conservation of energy
- H. *conservation principle*

Q4 One of energies that is known as renewable energy is

- A. coal
- B. oil
- C. *tides*
- D. natural gas

Q5 which of the following is more energy efficient?

- A. Incandescent Bulb
- B. Fluorescent Tube light
- C. CFL
- D. None of these

Q6 which of the following is an example of Renewable Energy source?

- A. Coal
- B. Petrol
- C. LPG
- D. Wind

Short/Long answer type questions

Q1 Explain Energy Conservation in domestic Sector.

Q2 Explain Energy Conservation in Industrial Sector

Q3 Give various types of energy efficient devices