

**THE ENERGY
CONSERVATION ACT,
2001**

INTRODUCTION

- 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/o reduced consumption from conventional energy sources.
- Individuals and organizations that are direct consumers of energy choose to conserve energy to reduce energy costs and promote economic security.
- Industrial and commercial users can increase energy use efficiency to maximize profit.



WHY TO CONSERVE IT ?



- We have limited resources available on earth.
- Our demands are continuously increasing day by day.
- It is possible that someday most of the non-renewable resources will be exhausted and we will have to switch over to alternate energy

We save our money when we save energy.



We reduce pollution when we save energy.



We save our energy when we save energy.



What we can do ?

- The need for efficient use of resources, energy conservation assume significance and must be an integral part of the policy tools
- **RECYCLE** waste materials into new products to prevent waste of potentially useful materials.
- **REPLACE** old light bulbs with energy saving fluorescent bulbs. They may cost more, but will save you much more in the long run.

RECYCLING IS AN EXCELLENT WAY OF SAVING ENERGY AND CONSERVING THE ENVIRONMENT.

Do you know that:

- 1 recycled tin would save enough energy to power a television for 3 hours.
- 1 recycled glass bottle would save enough energy to power a computer for 25 minutes.
- 1 recycled plastic bottle would save enough energy to power a 60-watt light bulb for 3 hours.
- 70% less energy is required to recycle paper compared with making it from raw materials.

THREE R's

- The slogan *reduce, reuse, recycle* is widely used to raise awareness against the use of non-renewable source of energy.
- Reduce consumption
- Reuse manufactured products
- Recycle raw materials



- India needs to sustain a **GDP growth rate per annum** over the next two to three decades in order to eliminate poverty
- Energy consumption will need to grow at a commensurate pace for such a GDP growth
- The present installed capacity is **1,38000 MW**
- The **estimated potential** for energy saving during peak hours is **9240 MW**

ENERGY CONSERVATION ACT 2001

- An Act to provide for **efficient use of energy and its conservation** and for matters connected therewith or incidental thereto
- It extends to the whole of India except the **state of Jammu and Kashmir**
- It was enacted by Parliament in the Fifty-second Year of the Republic of India on **October 2001**
- The Bureau of Energy Efficiency (BEE) came into force from **March 2002 onwards**

POWERS OF CENTRAL GOVT.

- Specify the norms for **processes and energy consumption standards** for any equipment, appliances which consumes, generates, transmits or supplies energy
- **Specify equipment or appliance** or class of equipments or appliances, as the case may be, for the purposes of the proposed legislation
- **Prohibit manufacture or sale or purchase or import** of equipment or appliances unless such equipment or appliances conforms to energy consumption standards
- **Direct display** of such particulars on label on equipment or on appliance

.....Powers Of Central Govt.

- Specify, having regard to the intensity or quantity of energy consumed by any user or class of users of energy **as designated consumer** for the purposes of the legislation
- **Direct any designated consumer** to get energy audit conducted by an accredited energy auditor
- **Direct designated consumer** to appoint energy manager in charge of activities for conservation of energy
- **Prescribe minimum qualifications** for appointment of energy managers

.....Powers Of Central Govt.

- Direct any designated consumer to furnish information with regard to energy consumed and action taken on the recommendation of the accredited energy auditor
- Direct any designated consumer to prepare a scheme for efficient use of energy and its conservation and implement such schemes as may be prescribed
- Prescribe energy conservation building codes for efficient use of energy and its conservation in the building or building complex

HOW WILL IT HELP ?



- **Let's Take an simple example :**
- let us assume electricity is available for Rs.4.00 per unit , a 100 watt bulb is used for 8 hrs a day then:
- If we replace a 100 watt bulb with 22 watt CFL ,
- The annual saving would be...
- Power saved : $100W - 22W = 78W$

ENERGY CONSERVATION IN INDIA

- About 70% of India's energy generation capacity is from fossil fuels, with coal accounting for 40% of India's total energy consumption followed by crude oil and natural gas at 24% and 6% respectively. India is largely dependent on fossil fuel imports to meet its energy demands.
- By 2030, India's dependence on energy imports is expected to exceed 53% of the country's total energy consumption. In 2009-10, the country imported 159.26 million tonnes of crude oil which amount to 80% of its domestic crude oil consumption and 31% of the country's total imports are oil imports. The growth of electricity generation in India has been hindered by domestic coal shortages^l and as a consequence, India's coal imports for electricity generation increased by 18% in 2010

Conservation Of Energy At Various Levels:-

- Energy conservation at household level**
- Energy conservation at community level**
- Energy conservation in industry and other places**
- Energy conservation in transportation sector**

Energy Conservation At Household Levels:-

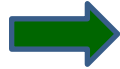
- **Energy conservation in major appliances for domestic use:-**
 - * **Energy Conservation in Refrigerator**
 - * **Energy Conservation in Oven/Microwave Oven**
 - * **Energy Conservation in Ironing**
 - * **Energy Conservation in Cooking**
 - * **Energy Conservation in Washing machine**
- **Energy Conservation During Lighting**
- **Energy Conservation During Cooling**

At Home



- We should not keep lights unnecessarily switched on.
- Reduce the energy your appliances consume by analyzing star ratings.
- Improve your water heating efficiency to reduce energy costs.

At Public Places



- Switch off the fans and lights in the places like bus terminal and railway stations when not necessary.
- Switch off the street lights.
- Big Hoardings, lightened up for the whole evening and nights are other wastage of power which can be and should be avoided

Energy Conservation At Community Level:-

- All unnecessary lights should be turned off especially when conference rooms etc. are not in use.
- Computers, monitors, photocopiers and other business equipments should be set to their energy saving mode.
- Skylights should be used for warehouses.
- We Should ensure that offices having air conditions have proper windows and all doors are closed when the air conditioner is in use.

Energy Conservation At

Community Level:-

● **Use Of Renewable Energy Resources:-**

- Alternative resources i.e. renewable energy sources should be used in place of nonrenewable energy sources e.g. solar energy, biogas, wind energy etc.
- solar energy for cooking and heating should be promoted.
- Projects involving wind-generated energy for community and municipal needs should be demonstrated to the whole community.
- Demonstration of biogas programmes is also required to tell people for the efficient use of it.

Energy Conservation At

Community Level:-

- Energy Conservation At Community Level For Housing Complexes:-
- Installation of photoelectric controls or timers should be used
- Water pumps should be switched off during non-peak utility hours
- Only single Elevator/Lift should be operated during “non-peak” hours
- Training programme about energy efficient repairs should be organized
- Locally manufactured, improved cook stoves should be introduced to reduce charcoal/fuel consumption

Energy conservation in industry and other places:-

- **Auditing**
- **Process modification**
- **Improved measuring instruments**
- **Energy loss reduction**
- **Light load reduction**

Energy conservation in transportation sector:-

- **Reduction of fuel consumption:-**

- Car speed should be maintained as far as possible 50 to 60 km/hr.
- We should avoid frequent starts and stops to reduce fuel consumption.
- We should apply brakes gradually as far as possible

- **Fuel economy- maximizing behaviour:-**

- Moderate driving
- Driving at lower speeds
- Turning off a vehicle's engine at stops rather than idling & using cruise control

Energy Efficient Devices:-

- CFL
- Pressurized steam cooker & Solar cooker
- Natural water cooler is a safe drinking water device which works on the principle of “cooling by evaporation”. No external source of energy such as electricity or ice is required.

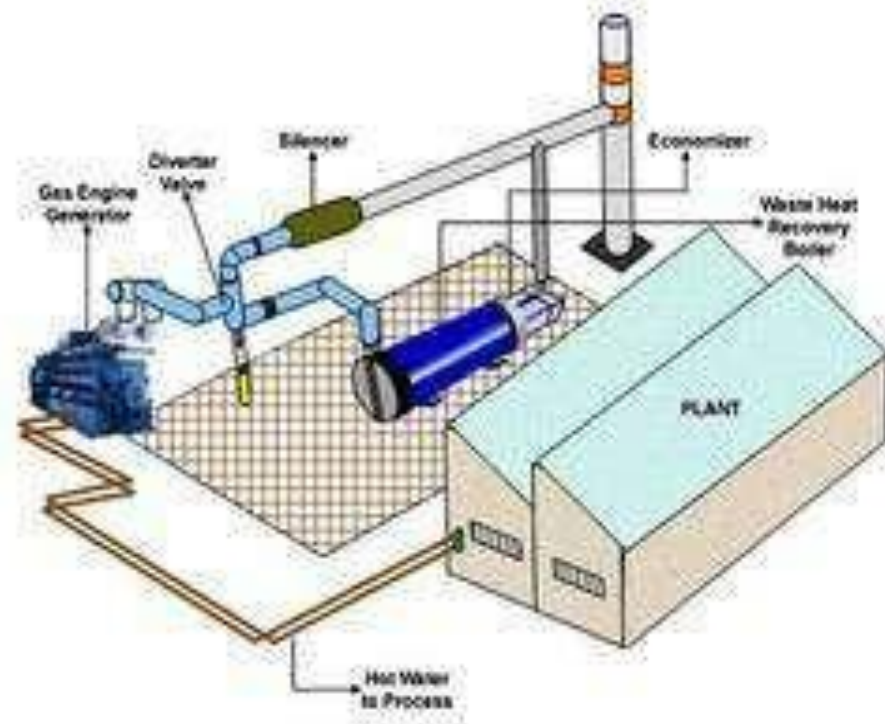


CONCEPT OF ENERGY AUDITING:-

- Energy auditing is a systematic approach to monitor industrial energy consumption and to find out the sources of energy wastage.
- The first and most important role of energy auditing is to identify the areas of energy consumption and to find the overuse for accessing the opportunity of saving energy.
- Analysis of energy use is done for identifying the areas of energy consumption.

Development & Design of Power plants:-

- Development, design and engineering of co-generation & captive power plants. Our engineering consultation services encompass Design and Engineering of Co-generation & Captive Power Plants. These services are executed within the shortest frame of time and meet the consultation requirements for:
- Co-generation power plants for sugar mills, rice mills, maize processing plants, industrial sector, etc.
- Waste heat recovery from hot gases and liquids for generation of steam for process use and power generation.



ENERGY CONSERVATION IN ELECTRICAL MOTORS

- Motor Efficiency = $\frac{\text{O/P Power}}{\text{Input Power}} \times 100$
Watt Losses-
Stator & rotor losses
Iron Losses
Friction & Windage losses Stray Load losses
- Energy Waste- Causes
 - @Use of less efficient motors
 - @Improper supply voltage
 - @Voltage fluctuations
 - @Poor power factor
 - @Less efficient driven equipment
 - @Idle running
- By supplying proper voltage and running the motor on proper load the efficiency of the motor can be increased.



Total saving in mcl from 95-96 till 2000-2001:-

| Sl. No. | Area of Saving | Saving in Crore Rupees |
|---------|---|------------------------|
| 1 | Power factor improvement in Talcher Coalfields | 26.04 |
| 2 | Power factor improvement in Ib-Valley Coalfields | 0.66 |
| 3 | Power factor penalty during 1998 - 1999 to 2000 - 2001. | (-) 0.22 |
| 4 | Over drawal penalty during 1998 - 1999 to 2000 - 2001. | (-) 0.95 |
| 5 | Saving due to higher Load factor | 3.46 |
| 6 | Prompt payment rebate | 0.84 |
| 7 | 10% rebate for domestic consumption | 10.29 |
| 8 | 5 paise/KWH, Electricity Duty from May 2000 to October 2000. | 0.37 |
| 9 | Supply of power for 7 consumer points from Jorabaga Sub-station | 0.64 |
| 10 | Transmission loss in Deulbera feeder | 0.60 |
| | Grand saving | 41.73 |
| | Refund expected from GRIDCO / CESCO / WESCO / HIW | 8.27 |
| | Total saving | 50.00 |

Energy Policy of India – Short term

- Maximize returns from the existing assets
- Reduce losses in transportation and in end use
- Initiate action to reduce energy intensity of different consuming sectors and promote conservation through organizational and fiscal measures
- Initiate steps to meet the basic energy need of rural and urban households so as to reduce the existing inequities.
- Maximize satisfaction of demand for energy from indigenous resources

Energy Policy of India – Medium term

- Progressive steps to substitute petroleum products by coal, natural gas and electricity
- Action for accelerated development of all renewable energy resources especially hydro potential
- Promote programmes to achieve self-reliance in energy sector
- Create appropriate organizational changes in consistent with the over all energy strategy

Energy Policy of India – Long term

- Promote an energy supply system, largely based on renewable sources of energy
- Promote technologies of production, transportation and use of energy that are environmentally benign and cost effective

POWERS OF STATE GOV'T.

- Amend the energy conservation building codes to suit the regional and local climatic conditions
- Direct every owner or occupier of a building or building complex being a designated consumer to comply with the provisions of the energy conservation building codes
- Direct if considered necessary for efficient use of energy and its conservation, any designated consumer to get energy audit conducted by an accredited energy auditor in such manner and at such intervals of time as may be specified by regulations

.....Powers Of State Govt.

- Designate any agency as designated agency to coordinate, regulate and enforce provisions of EC Act 2001 within the State
- Take all measures necessary to create awareness and disseminate information for efficient use of energy and its conservation

PENALTIES & APPELLATE TRIBUNAL

- If any person fails to comply, he shall be liable to a penalty not exceeding ten thousand rupees
- An additional penalty of one thousand rupees for every day during which such failures continues
- Member of State Commission shall be appointed as an adjudicating officer for holding an inquiry
- No civil court shall have jurisdiction to entertain any matter related to the inquiry
- To hear appeals against the orders of the adjudicating officer, the Central Govt. shall establish an ATEC

Advantages:-

- Energy conservation can result in increased financial capital, environmental quality, national security, personal security, and human comfort.
- Energy efficiency saves money.
- It is environmental friendly.
- It improves indoor air quality.
- Longer life span to appliances.

**INITIATIVES
OF
BUREAU OF
ENERGY EFFICIENCY**

POWERS OF BEE

- Recommend to the Central Government the norms for processes and energy consumption standards for equipment and appliances
- Recommend to the Central Government for notifying any user or class of users of energy as a designated consumer having regard to intensity or quantity of energy used by it
- Recommend to the Central Government the particulars required to be displayed on label of equipments or on appliances and manner of their display
- Take suitable steps to prescribe guidelines for energy conservation building codes

.....Powers Of BEE

- **Develop testing and certification procedure** and promote testing facilities for certification and testing for energy consumption of equipment and appliances
- **Promote use of energy efficient processes,** equipment, devices and systems
- **Specify qualifications** for the accredited energy auditors, the manners and interval of time in which the energy audit shall be conducted by such auditors
- **Specify certification procedures** for energy managers to be appointed by designated consumers

.....Powers Of BEE

- Prepare educational curriculum on efficient use of energy and its conservation for educational institutions, boards, universities or autonomous bodies and coordinate with them for inclusion of such curriculum in their syllabus

STATE DESIGNATED AGENCIES

- The Govt. during the XI Five Year Plan has initiated a scheme to strengthen institutions at national level as well as the State Designated Agencies (SDA's) at the state level
- SDA's are statutory bodies set up by states to implement energy conservation measures at state level and are expected to play the roles of a developmental agency, a facilitator and a regulator / enforcing body

STATE DESIGNATED AGENCIES

- The scheme seeks to develop and implement Energy Conservation Action Plan (ECAP) based on a uniform template evolved for taking measures necessary to build institutional and human capacity
- As a part of the scheme, an amount to the tune of Rs. 34.30 lakhs has already been disbursed to Department of Renewable Energy, Haryana as 1st installment for the financial year 2007-08

BACHAT LAMP YOJANA

- To promote energy efficient and high quality CFLs as replacement for incandescent bulbs in households
- The scheme seeks to leverage CDM revenues as a result of energy consumption reduction to reduce the price of the CFLs
- BEE will monitor the scheme under an approved methodology of CDM Executive Board of UNFCCC
- Target replacement of 400 million incandescent bulbs with CFLs could save an estimated 4000 MW demand during the XI plan

STANDARDS & LABELLING SCHEME

- It targets high-energy end use equipments and appliances to lay down minimum energy performance standards
- The scheme is being implemented on voluntary basis for Room Air conditioners, Refrigerator (No-Frost), Direct Cool and Tubular Fluorescent Lamps
- The wider proliferation of energy efficient equipments is expected to save 18 billion units per annum by 2011 which translates into annual saving of electricity worth Rs 5,500 crores and an avoided capacity addition of over 3000 MW during XI plan

ENERGY CONSERVATION BUILDING CODE

- Setting up of minimum energy efficiency standards for design and construction, while enhancing occupant comfort
- Building means any structure or erection or part of a structure or erection which is having a connected load of 500 kW & intended for commercial purpose only
- State Govt. can amend the code to suit local and regional climatic conditions
- The code deals with Building Envelope, HVAC, Lighting, Service Hot Water & Pumping and Electrical Power

AGRICULTURAL DSM

- It promises immense opportunity in **reducing the overall power consumption**
- **Improving efficiencies of ground water extraction** and reducing the subsidy burden of the states without sacrificing the service obligation of this sector
- An estimated capacity addition of 1000 MW can be avoided during the XI plan

MUNICIPAL DSM

- The energy costs constitute up to 60-70 percent of an Indian municipality's total cost of pumping water to its residents
- This financial constraint can be overcome through efficient water delivery systems
- This can translate into measurable energy savings due to reduced pumping requirements and improved performance
- An estimated capacity addition of 1000 MW can be avoided during the XI plan

SMALL & MEDIUM ENTERPRISES

- To promote energy efficiency in SMEs during the XI plan
- Many energy-intensive SMEs clusters located in various states of the country have **large potential for energy savings**
- Initially **25 clusters** in the country have been identified which have immense savings potential
- An estimated capacity addition of 500 MW can be avoided during the XI plan
- Many energy-intensive SMEs clusters located in various states of the country have large potential for energy savings. Initially 25 clusters in the country have been identified which have immense potential savings.

EXPECTED OUTCOMES

- Barriers for EE & DSM to be removed.
- The State Regulatory Commissions and Utilities to be encouraged to implement the Conservation initiatives
- Engagement of Stakeholders

Industrial and Commercial users

- Time of use tariff for industrial and commercial users.
- Incentives to industry to adopt conservation/efficiency measures

.....Expected Outcomes

States

- Encourage implementation of DSM programmes in Agriculture/ Municipalities

Domestic consumers

- Ensuring availability at low cost and promoting use of low cost CFLs.
- Awareness

- **Energy Strategy for future**

1. Appropriate EC measures and implementations
2. Expand the use of renewable energy
3. Implement a roadmap for a hydrogen economy
4. Expand the capacity of nuclear power generation
5. Remove the hurdles in the growth of hydro power potentials
6. Use substantially biomass, biogas and biofuels
7. Reduce demand by EC measures and aware strongly about energy management
8. Adoption advanced efficient technologies in industries, residential, Transportation
9. Augmenting the energy resources and supply.

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