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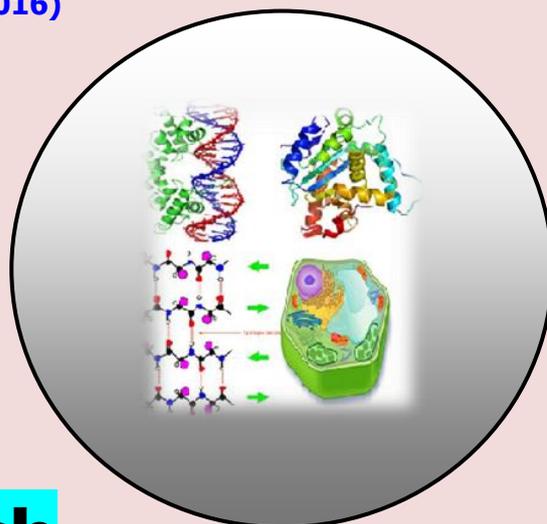
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Energy Conservation for Sustainable Development: An Overview

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ABSTRACT

Energy plays a very vital role in our day to day life. The rate at which we are using our energy resources shows that they hardly would last for another 40 years or more. So the need of the hour is to make efficient and judicious utilization of these resources for the purpose of sustainable development. In this paper a review has been made on the present energy scenario. We have talked about what energy conservation means and why we need to conserve our energy resources. Further different aspects of energy conservation have been discussed along with the advantages. The prototype also focuses on area like use of non-conventional energy sources.

Keywords: Sustainable development, Non-conventional energy sources and Energy pyramid.

INTRODUCTION

With the advancement in technology and modernization, there has been a rapid growth and impressive progress in the fields of industry, agriculture, communication, transport and other sectors necessitating growing consumption of energy for developmental and economic activities. Energy being an important element of our day to day activity 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 costlier and scarce. Among the various strategies that have been evolved for meeting energy demand, efficient use of energy and its conservation emerges out to be the least cost option in any given strategies to mitigate the gap between demand and supply, apart from being environmentally benign.

Conservation and energy efficiency measures play a central role in the present scenario where all efforts are being made to accelerate the developmental process as well as cope up with the increasing energy demands. Wise and judicious use of resources are the steps towards creating a sustainable energy system. Energy conservation is an objective to which the entire citizen in the country can and should contribute. Whether a household or a factory, a small shop or a large commercial building, a farmer or an 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 conservation is the mantra that leads to sustainable energy management (Nisha and R. U. Patil, 2009).

This paper has seven sections. Section I includes brief introduction of energy conservation. Section II to V discuss about present energy scenario, what energy conservation is, its need and various aspects. Advantages are presented in section VI. Section VII highlights the final conclusion of the review.

ENERGY SCENARIO

Energy is prime factor for national economic development. Although India's per capita energy consumption is one of the lowest (and much lower than developed countries) India still ranks fourth in the world in terms of total energy consumption and needs to accelerate the development of the sector to meet its growth aspirations.

Installed capacity of India: 288,665 MW

Limited fossil fuel stock up to 40 to 80 years only

ENERGY CONSERVATION

What is energy conservation? What does it actually mean? Energy conservation means efficient utilization of energy or reducing wastage of energy. It is very important to be taken into consideration that any energy conservation plan should not only try to eliminate wastage of energy but also aim towards not affecting in any way productivity and growth rate. It refers to reducing energy consumption through using less of an energy service. In other words, to conserve energy, you need to cut back on your usage. It is measured in physical terms. Energy conservation is the practice of decreasing the quantity of energy used while achieving a similar outcome of end use. It also means reduction or elimination of unnecessary energy used and wasted. Examples include unplugging home appliances when they are not in use, more use of public transportation, turning your thermostat down a degree or two in the wintertime, saving of fossil fuels or exhaustible sources by finding ways of exploiting the non-conventional sources of energy etc. In all of these examples, you are reducing the amount of energy you use by doing without or making due with less fuel or electricity. It further requires new investment in more efficient equipment to replace old inefficient ones. Thus energy conservation can result in more job opportunities, lower costs, cheaper and better products etc. This practice may also result in increased environmental quality, national security, personal financial security and higher savings. It is at the top of the sustainable energy hierarchy and lowers energy costs by preventing future resource depletion. There are two main principles of energy conservation planning that should be taken into consideration (a) Maximum energy efficiency and (b) Maximum cost effectiveness in energy use (Harpreet Kaur and Kamaldeep Kaur, 2012).

NEED OF ENERGY CONSERVATION

Energy should be conserved since we are consuming disproportionate amount of energy and that day is not far away when all our non-renewable resources will expire forcing us to rely just on renewable resources. The rate of consumption is not in tune with the rate of generation. Most of the energy that we use comes from fossil fuels like petroleum and coal that provide electricity and gas to power our growing energy needs. These fossil fuels that have taken years to form are on the verge of depleting soon as these are non-renewable resources which means that we will eventually run out.

Conserving energy not only helps to conserve resources but also in a way or other translates into financial savings. In last 200 years we have consumed about 60-70% of all resources. It is said that our energy resources may last only for another 40 years or so. For sustainable development energy efficiency measures needed to be adopted.

ASPECTS OF ENERGY CONSERVATION

There are three important aspects of energy conservation:

A. Economic Aspects

1) Reduction in cost of product: In some energy- intensive industries like steel, aluminium, cement, fertilizer, pulp and paper the cost of energy forms a significant part of the total cost of product. Energy conservation ultimately leads to economic benefits as the cost of production is reduced. Using energy efficient technologies will reduce the manufacturing cost and lead to production of cheaper and better quality products.

2) New job opportunities: Energy conservation usually requires new investments in more energy efficient equipment to replace old inefficient ones, monitoring of energy consumption, training of manpower etc. Thus energy conservation can result in new job opportunities.

B. Environmental Aspects

Every type of energy generation/ utilization process affects the environment to some extent, either directly or indirectly. The extent of degradation of the environment depends mainly on the type of primary energy source. Also, during each energy conversion stage a part of energy escapes to the surroundings and appear in the form of heat. Thus, energy is generated and utilized at the expense of adverse environmental impacts. Adoption of energy conservation means can minimize this damage.

C. Conservation of Non- Renewable Energy Assets

The vast bulk of energy used in the world today comes from fossil fuels, which are non-renewable. These resources were laid down many millions of years ago and are not being made any longer. This finite non-renewable asset is being used up very fast. The quantity of fossil fuels that world community uses in one minute actually took the earth a millennium to create. Therefore its prices are bound to go up relative to everything else. It is necessary to abandon waste practices in energy utilization and conserve this resource by all means for future generations (Jesse et al., 2012).

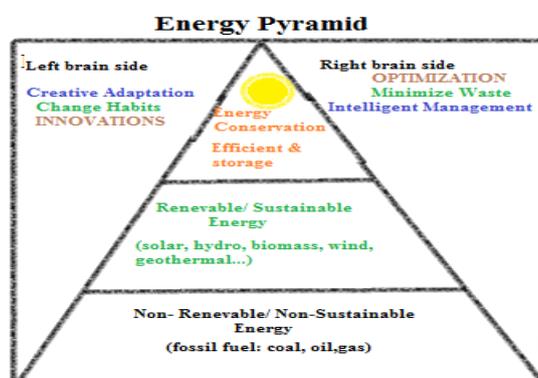


Figure 1. The Energy Pyramid.

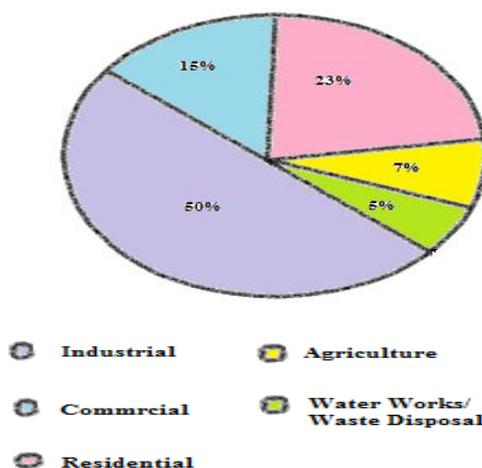


Figure 2. Electrical Energy Consumption.

ADVANTAGES OF ENERGY CONSERVATION

Energy conservation has several advantages that have been listed as:

- 1) **Decrease in air pollution:** Burning of fossil fuels to produce energy results in release of various harmful gases and fine particles in the air. Reducing the usage of these fuels and conserving can help in controlling pollution to maximum extent and further can result in better air quality.
- 2) **Longer lifespan to appliances:** Energy conservation products and electronics have a longer life span. So using these products are of great advantage as they can reduce the overall cost and maintenance costs.
- 3) **Better health and safety:** Conservation in one way or the other promotes a better, healthy life and further ensures safety at its maximum.
- 4) **Money is saved:** Use of energy conserving appliances for lighting and heating purposes decreases the electricity bills and hence saves money. Further more the energy is conserved less will be the usage cost (Joshi et al., 2013).

CONCLUSION

Energy is the prime mover of today's economic growth as well as forms the backbone of the sustenance of the modern economy and social structures. Future economic growth largely depends on the long-term availability of energy from the sources that are affordable, accessible and environmentally friendly. One of the major problems that are concerned with the supply of energy is the depleting nature of the extraction of fossil resources, combined with the need for making transition to renewable energy sources. Several measures for conservation of energy are therefore very important for consideration as they promise to fill the gap between the supply and the demand. Efficient and effective utilization of energy resources is not only conservational in nature but also it saves capital investment and is very much necessary for sustainable development. As it is very well known that increasing the supply by a watt always proves to be costlier than saving a watt thus conservation is really the cheapest of energy resources. Implementation of energy conservation methods will lead to energy saving which means increasing generation of energy with the available sources.

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