Energy

5

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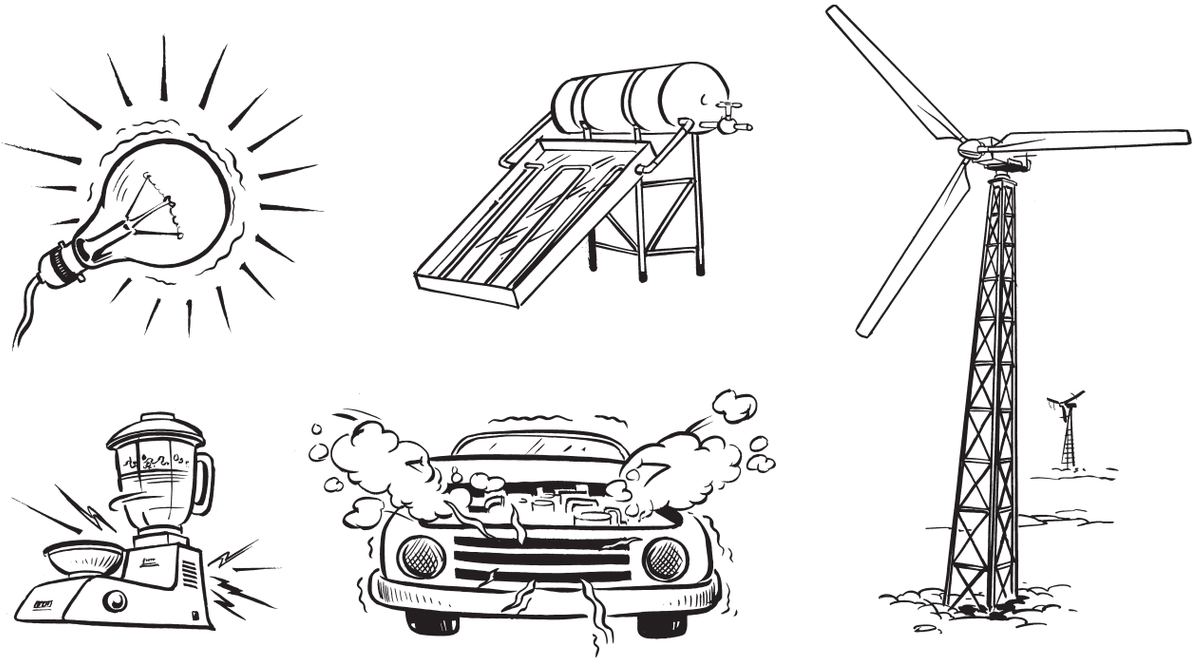

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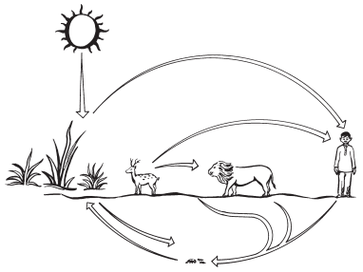


Energy is all around us—in sunlight, in light bulbs and fans, in buses, cars and tractors, in T.V. sets, in the power of our muscles and in the food we eat. Energy is used to grow our food, to cook it, to keep us warm or cool, to move us from one place to another. It is a vital force in our lives. Every technological advance in human history has, in a major way, been a result of our increasing ability to harness energy, convert it to useful forms and put it to various uses.

While energy drives the present day economy and countries as such, there are several issues related to energy which need to be considered for balanced and sustainable growth. These range from environmental and social impact of how the energy is produced, to the inefficient and unsustainable uses of energy, leaving a question on how long the current energy usage can be sustained.

5.2

On completion of this unit, you should be able to:

- Understand the impact of energy usage - environmental, social, economic.

5.3 ENERGY AND ITS USE

Energy is an essential ingredient of all activity on earth. Human society has progressed because it has learnt to harness and use moiré and more energy. Every technological advancement in human history has, in a major way, been a result of our increasing ability to harness energy, convert it to useful forms and put it to various uses, the galloping increase in our use of energy has also created problems. Some of these problems are local, some global; some immediate, some looming ahead. For example, the increasing demand for fuelwood in rural and urban areas of India is contributing to the denudation and degradation of forests in some parts of the country. The pollutants released into the atmosphere by the burning of fossil fuels are making the air unsafe to breathe.

Energy sources can be classified into two basic categories, non-renewable and renewable, depending on the time period over which they can be replenished. The degree of renewability is determined by the human timescale.

Non renewable Sources: Fossil fuels are organic remains which have, through the process of fossilization, over millions of years, become coal, oil and natural gas. They cannot be renewed over time scales relevant to humans. They are therefore non-renewable sources of energy.

Renewable Sources: Renewable sources of energy or flow sources rely on the energy flows and sources in the environment and thus have the potential of being continually replenished. These include biomass, solar energy as well as wind energy.

5.4 ENERGY USAGE: SOME CONCERNS

There are several problems and issues associated with availability and requirement, growing imports, inequitable distribution, inefficient technology, unsustainability and environmental costs. Let us look at these concerns in brief.

Shortages: Like most developing countries, India suffers from energy shortages. Rising fuelwood prices and the dependence of the poor on the low-quality crop residues and cattle dung are indications of the shortage of fuelwood.

Dependence on imported oil: India's demand for oil has been steadily rising. The persistent shortages of coal and power supply have contributed to a more rapid increase in the consumption of petroleum products than had been anticipated. This increasing demand of oil and other petroleum based fuels cannot be met by just in-country production and hence increased dependence on imported oil has become a concern today for our country.

Inequities: India has so far followed development policies that equate development with growth, and economic growth with increased consumption of commercial energy. This approach to energy planning has further magnified the existing inequities between rich and poor, urban and rural, in Indian society.

Inefficiency: Widespread inefficiency in power generation, transmission, management and use intensifies energy shortages. Some industries and power plants use outdated equipments and processes, For example, the manufacture of steel in India requires twice as much energy as that required in an industrialized country.

Unsustainability: By definition, the use of non-renewable energy sources in the long run is not sustainable. Although biomass is a renewable resource, the current pattern of consumption of biomass fuels is unsustainable. For example, the over-harvesting of forests, partly for timber and other demands, and partly to meet the firewood demand in urban areas is causing deforestation.

5.4.1

Fill in the blanks

a) Energy sources can be categorized into two basic categories, _____ _____ and _____.

b) _____ is an example of a renewable source of energy.

c) _____, _____ and _____ _____ are examples of fossil fuels.

5.5 SUBSIDIZING ENERGY

Energy is hugely subsidized in India. The idea being to supply power to those who cannot afford it at the cost price. But is the benefit of subsidies really reaching the target group. Subsidizing power eventually leads to over consumption and wastage. Subsidy means that the government is charging less fro consumers than what the cost is of providing the power. For example, in the year 1999 at Delhi:

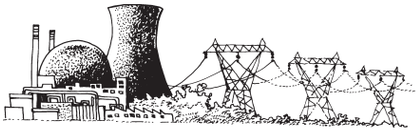
- Kerosene was sold at Rs. 5.46 a litre when it actually costed the government Rs. 10.54 per litre, translating into a loss of Rs. 3,700 per litre.
- LPG was sold at Rs 196 per cylinder although it costed the govt. Rs 294 to supply one. This burnt a hole of Rs. 7,200 in government finances annually.
- Diesel was sold at Rs. 8.52 per litre (ex-refinery price) while the cost price was Rs. 10.14 per litre.
- Electricity tariffs for the domestic and agricultural sectors are less than the average cost of supply, while the tariff for the commercial and industrial sectors are more than the average cost of supply.

If you were the decision-maker, you would abolish subsidy/restructure it/continue as it is. Support your answer with reasons.

5.6 ENERGIZING LOCALLY

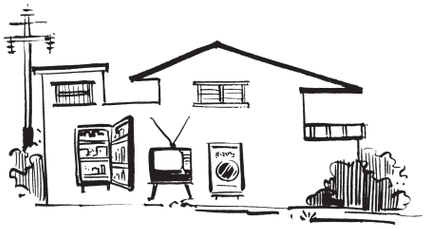
Bounded by the River Pampa on one side, and the dense Sabarimala forests on the others, Thulapally in Kerala was till recently not provided with electricity. Thulapally was not connected to the main grid line because it was quite far away from it. Feeling the crunch,

it was in the late nineties that the people of Thulapally approached the Malnadu Development Society (MDS), a local NGO, with a request to help them do something about this. Technical personnel of MDS surveyed the village and on the basis of their study, felt that it would be possible to generate electricity through a micro-hydel project here. This suggestion was discussed at length with the local community. After several rounds of discussion, they were convinced, and a local Committee was set up for the implementation of the project. Several sub-committees were formed to look after specific aspects like organizing people, collecting materials, etc. Funds were found for the project through the UNDP Small Grants Programme. The project got on steam, and within 50 days, people had power!



About 150 houses have been given connections, as have 10 shops/ establishments and five institutions. Each house is allowed four Compact Flurosent lamps (CFLs). Besides, 25 houses have been given power for television sets. Electricity is supplied for about six hours everyday and a charge of Rs. 50 per household with 4 lamps is imposed.

Quality of life in the village changed overnight. Quite apart from the immediate benefits, several long term benefits are anticipated: a positive impact on the health of women, because of their reduced exposure to smoke; an anticipated long term impact on educational attainments of the children of the village, who can now pursue their studies more easily; reduced dependence on the forests nearby for firewood.



The management of the project too is entirely in the hands of the local community. There is a General Body of all power consumers which makes the policies and is the final authority. The General Body elects a nine member Executive Committee which looks after the management and administration of the project. The technical upkeep and maintenance of the generator is done by a trained local youth. If there are problems in the distribution system they are set right by the local electrician.

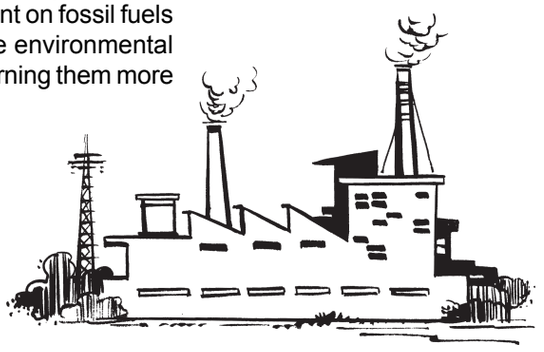
This has served as a pilot for many in the vicinity. In nearby Moolakayam village, 28 families now have electricity generated in a similar initiative. In far away Idukki district, a similar micro-hydel project has been put up, benefiting 51 families.

1. Do you think small and decentralized modes of power generation are the way ahead? Why? What are the possible limitations of such projects?
2. If you have to sell a product that uses renewable energy or less energy, though it is expensive than the other regular units, how will you sell it? What strategy would you use?

5.7 OPTIONS FOR THE FUTURE

Although India uses much less commercial energy than industrialized countries, the rapid industrial and commercial expansion, the projected growth of the population and the increasing consumerism leading to greater per capita energy use point ot substantial energy use in the future.

To improve our energy future, we need to take steps to increase energy supplies *sustainably* and reduce energy demand through *efficient use*. We need to shift towards renewable energy sources that are more equitably distributed, more affordable and less environmentally destructive than fossil fuels. At the same time we must recognize that however rapidly we move towards renewable energy sources, we will remain dependent on fossil fuels for several decades to come. We therefore need to reduce environmental impact of our current energy resources by finding ways of burning them more cleanly and efficiently.



5.8

Rampur has grown to be a rich industrial locality in the past decade. Many industries have given employment to people in the region and its population has also arisen dramatically in the last few years. The power plant which supplies electricity to Rampur was built many decades ago and is unable to cope with the increasing demand of energy in the city now.

The Chief Minister of the state has called for a meeting with people concerned including Minister of Energy, industrialists and environmentalists. The stance/ position that these stakeholders hold with regard to energy supply is as follows:

Chief Minister: S/he is a sincere and shrewd politician. CM wishes to help Rampur to develop further, by setting up a power plant. More so because CM has invested a large share of your earnings on industries in Rampur. CM is also concerned about the environment in general, and that of Rampur in particular. The place has a large beautiful Revati Talav (lake) which has lot of migratory birds visiting it during various seasons.

Minister of Energy: S/he wants more development to occur in Rampur. By setting up a large power plant, the Minister wants to increase his/her popularity to increase in the state. The Minister wants to set up a large dam across the river Nandini that flows close to Rampur. (This river is a major source for irrigation. It becomes dry during severe summer). The Minister has plans to give employment to people who get displaced, in industries that would experience growth and the new industries that would be set up, or give them land to take up agricultural activities in the nearby villages.

Leading Industrialist: The industrialist believes that industries need more energy and is totally against conservation. Even a little conservation in the industrial sectors, s/he feels making a sacrifice in terms of quality and production rate. This means reducing the growth rate and progress of Rampur and the state.

Environmentalist: The environmentalist feels that with more development. Rampur's environment is getting increasingly degraded. The air has become polluted and birds that visited the beautiful Revati talav (lake) are slowly decreasing in number. The environmentalist feels that setting up of solar power units in wastelands nearby, coupled with conservation measures by one and all, could easily solve the current crisis.

You are a research scientist in the town of 'Rampur'. Through this meeting, the Chief Minister wants to decide on the type of energy source to depend on for generating power for Rampur. You have been called because of your knowledge and expertise in energy sources and supply. You are of the opinion that new power plant can be postponed as you feel that energy conservation can stretch the energy resources, eliminating or reducing the need for additional energy supply. Each of the concerned persons have their own interest or concerns for energy and it is your job to convince them of conservation rather than a new plant.

The information available to you through which you have to convince the participants is as follows:

You know that average efficiency of power plants is only 44 per cent and transmission loss is as high as 22 per cent. You feel that Ministry of Energy should focus on these. You are aware of processes and technologies that can cut down energy use. You are also aware of advantages and disadvantages of different type of sources:

- Coal: The main advantage is relative abundance, more than any other source, with a supply for more than 50 years at today's rate of use. The primary disadvantages are the dangerous nature of coal mining, pollution from ash, and sulphur dioxide emissions, which cause acid rain.
- Nuclear: The advantages include the potential to produce energy with low fuel costs and no air pollution. The disadvantages are the lack of foolproof technical know-how in operation, exposure to radiation to workers, disposal problem with the nuclear waste and the possibility of a catastrophic accident.
- Solar: Advantages include low operational costs and no pollution. But solar power is land intensive with high initial expense and needs some kind of storage facility, for the lack of sunlight at night. Further, output depends on the weather, requiring sunny days.
- Hydroelectric Power: The main advantages are that it is pollution free, renewable and relatively cheap. On the other hand, making dams is land-intensive, involves very high initial expense, requires abundant supply of water (which is seasonal in most parts of the country), disturbs the natural eco-system, is highly prone to natural disasters like earthquake, causes waterlogging in areas nearby, is subject to siltation, and involves resettlement in the submergence area of the dam.

With this information and background available, write some convincing arguments for each of the person to convince them to your side.