resources

efficient use

societal and environmental implications

9-12

Sunlight is the ultimate source of most of the energy we use. The energy in fossil fuels such as oil and coal comes from energy that plants captured from the sun long ago.

During any transformation of energy, there is inevitably some dissipation of energy into the environment. In this practical sense, energy gets "used up," even though it is still around somewhere.

A central factor in technological change has been how hot a fire could be made. The discovery of new fuels, the design of better ovens and furnaces, and the forced delivery of air or pure oxygen have progressively increased the maximum possible

Decisions to slow the depletion of energy resources can be made at many levels, from personal to national, and they always involve trade-offs involving economic costs and social values.

At times, environmental conditions are such that land and marine organisms reproduce and grow faster than they die and decompose to simple carbon containing molecules that are returned to the environment. Over time, layers of energy-rich

The useful energy output of a device--that is, what energy is available for further change--is always less than the energy input, with the difference usually appearing as thermal energy. One goal in the design of such devices is to make them as

When selecting fuels, it is important to consider the relative advantages and disadvantages of each fuel.

Industrialization brings an increased demand for and use of energy. Such usage contributes to having many more goods and services in the industrially developing nations but also leads to more rapid depletion of the earth's energy resources and to

Nuclear reactions release energy without the combustion products of burning fuels, but the radioactivity of fuels and their by-products poses other risks.

6-8

Some resources are not renewable or renew very slowly. Fuels already accumulated in the earth, for instance, will become more difficult to obtain as the most readily available resources run out. How long the resources will last,

Different ways of obtaining, transforming, and distributing energy have different environmental consequences.

Industry, transportation, urban development, agriculture, and most other human activities are closely tied to the amount and kind of energy available. People in different parts of the world have different amounts and kinds of

Energy from the sun (and the wind and water energy derived from it) is available indefinitely. Because the transfer of energy from these resources is weak and variable, systems are needed to collect and concentrate the energy.

Transformations and transfers of energy within a system usually result in some energy escaping into its surrounding environment. Some systems transfer less energy to their environment than others during these transformations and

By burning fuels, people are releasing large amounts of carbon dioxide into the atmosphere and transforming chemical energy into thermal energy which spreads throughout the environment.

People have invented ingenious ways of deliberately bringing about energy transformations that are useful to them.

Electrical energy can be generated from a variety of energy resources and can be transformed into almost any other form of energy. Electric circuits are used to distribute energy quickly and conveniently to distant locations.

Energy resources are more useful if they are concentrated and easy to transport.

Energy is required for technological processes such as taking apart, putting together, moving around, and communicating.

In many instances, manufacturing and other technological activities are performed at a site close to an energy resource. Some forms of energy are transported easily, others are not.

3-5

Sunlight is used to run many devices.

Moving air and water can be used to run machines.

When two objects are rubbed against each other, they both get warmer. In addition, many mechanical and electrical devices get warmer when they are used.

Some people try to reduce the amount of fuels they use in order to conserve resources, reduce pollution, or save money.

K-2

The sun warms the land, air, and water.

People burn fuels such as wood, oil, coal, or natural gas, or use electricity, to cook their food and warm their houses.