FOR FURTHER STUDY

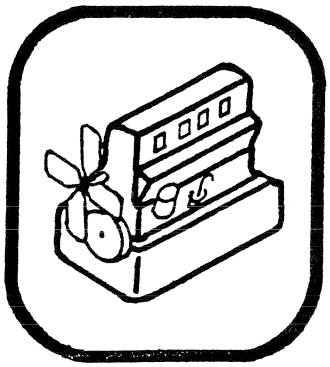
Duff, J. W. *Power: Prime mover of technology.* Bloomington, Ill.: McKnight, 1972.
Norbye, J. Direct ignition diesel. ***Popular Science,*** November 1980, *217*(5), 84–86.

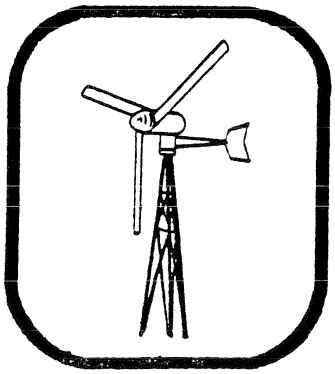
Energy Conversion and Storage

ENERGY CONVERSION

ENGINES

An engine is a machine that converts a burning or exploding fuel (energy) into mechanical force and motion. Internal combustion engines burn gasoline or diesel fuel and are used to turn wheels that power cars and trucks. Airplanes and spacecraft get their power from jet and rocket engines that burn fuel to create thrust.



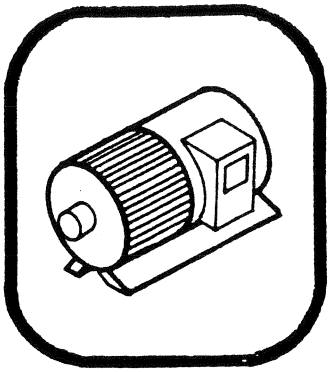


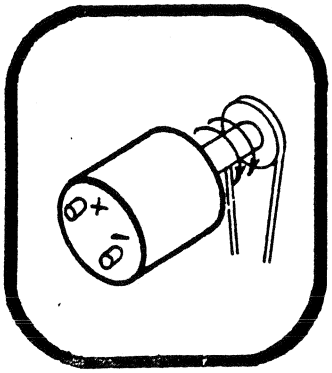
TURBINES

The kinetic energy of water, steam, or air is captured by the blades, or fins, of a turbine and is converted into mechanical and then electrical energy. Large turbines are used to generate electricity at such places as the Hoover Dam and Niagara Falls. A windmill is a turbine engine that harnesses wind energy to drive a pump or generator.

MOTORS

A motor is a device that converts electrical energy into mechanical energy, or motion. Some motors run on AC (alternating current) and DC (direct current). The electricity causes a magnetic field (electromagnet) to be produced. Fluctuations in this field cause the armature, which is connected to the shaft, to spin.





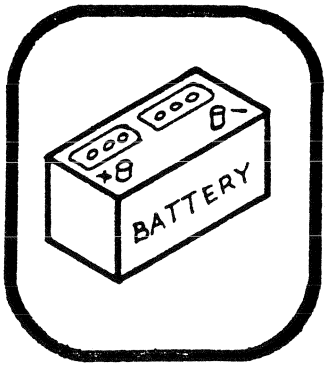
GENERATORS

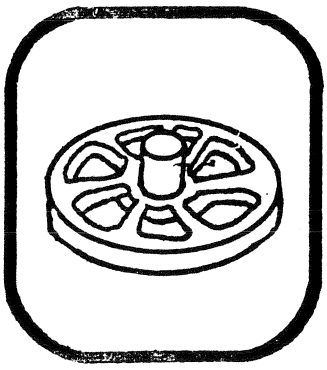
Generators are devices that are used to convert mechanical motion into electricity. They are just the opposite of motors. As a wire is passed through a magnetic field, an electric current is produced. With more wire and a larger magnet, a greater amount of electricity may be produced. Steam from burning fossil fuels or nuclear reactors is used to drive very large generators that generate much of the electricity in the U.S.

ENERGY STORAGE

BATTERIES AND FUEL CELLS

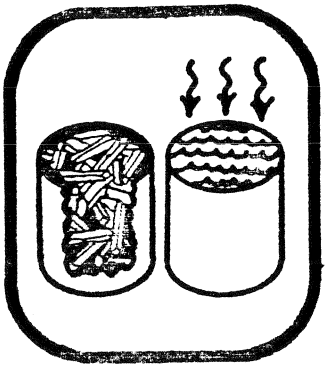
A battery is a device that stores chemicals and metals that produce electricity when activated. Direct current (DC) is the product of the reaction between the chemicals and the electrodes. A fuel cell is similar to a battery except that it does not have to be recharged and the electrodes do not decompose.





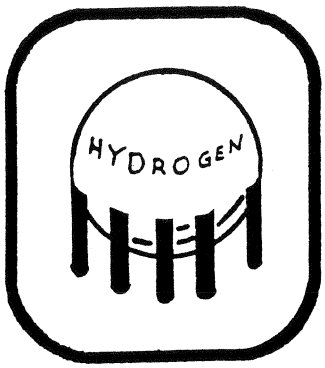
FLYWHEEL

A flywheel is a spinning wheel that is set into motion by other means. It takes advantage of the law of inertia. Energy is stored as the speed of the wheel is increased. Energy is released as the speed decreases or when a load is placed on it. Some experimental vehicles are using flywheels to save petrochemical fuels.



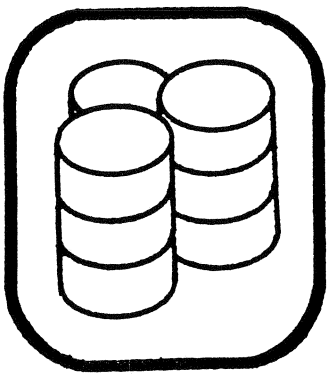
EUTECTIC SALTS

Solar energy can be stored in eutectic salts, or change-of-state storage, as it is also known. These salts are special compounds that change from crystals to liquids when heated to 32°C (90°F) or above. This change-of-state from a liquid to a solid or from a solid to a liquid requires a great deal of heat. For this reason, a lot of energy can be stored in a small volume of eutectic salts. Tanks full of eutectic salts are used to store heat in passive solar homes.



HYDROGEN

Hydrogen can be used to store energy. Electrical energy that is generated and not needed can be used to separate water into hydrogen and oxygen. This is called electrolysis. The hydrogen can then be stored and converted back into electricity, using a fuel cell, whenever it is needed.



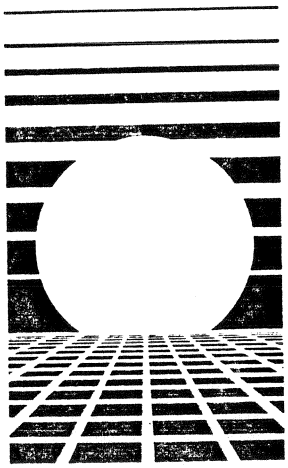
AIR AND WATER STORAGE

Solar energy can also be stored in water or air. Water can pass through a solar collector and absorb the heat that has built up inside. This water can then be put into storage tanks for later use. Hot air from a solar collector is usually forced through a large container of pebbles or rocks. This heats the rock and can be used later to heat cold air in a home or office.

FOR FURTHER STUDY

Crawley, G. M. *Energy*. New York: Macmillan, 1975.
Popular Science, August 1981. *219*(2), 48, 62–63.
Schwaller, A. E. *Energy technology: Sources of power*. Worcester, Mass.: Davis, 1980.

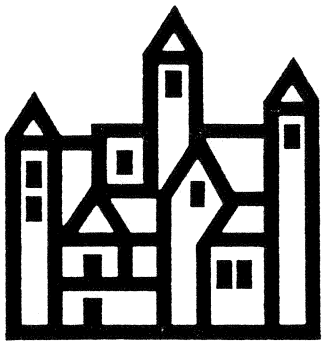
Social/Cultural Impacts of Energy



As our nation has developed over the past 200 years, society has been changed by energy resources and the way we live. Energy plays an important role in our lives, even if we don't always realize it. Our food, shelter, work, travel, and even the air we breathe, depend in part on energy resources and their use.

LIFE-STYLE

Our style of living (life-style) is affected by changes in energy costs and availability. When gasoline costs increase, we tend to cut down on our vacation plans and we make fewer trips to visit friends and relatives. Higher utility rates have forced many people to adjust thermostats in homes and business places to use less energy. Increased shipping costs have made some fresh fruit and vegetables more expensive. Energy-related cost increases such as these can affect the health and comfort of individuals and families.

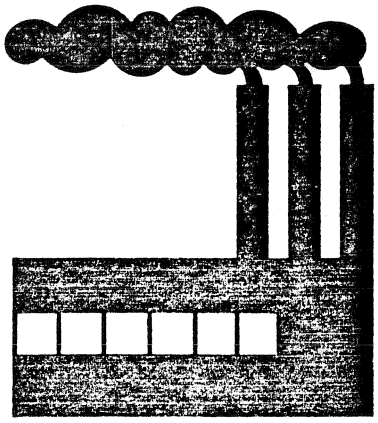


JOBS

The types of jobs available in the U.S. have also been affected by the energy situation. In colonial times, a large percentage of workers were employed in basic agriculture and related occupations. Today, as a result of technology and industrialization, most Americans are employed in the production of non-farm goods and services. Many jobs today are highly dependent on fuel and energy sources. When energy supplies dwindle or costs go up, plants may be shut down and workers laid off.

ENVIRONMENT

Many people believe it is important to keep our natural environment clean and fresh. The problem begins when we are forced to make choices between having cleaner air or cheaper fuel. Technologists call these choices **trade-offs**. In our quest for more and cheaper energy, we are sometimes faced with acid rain and mine drainage, spills, smog, and deforestation. In many cases, it is a close race between the harmful effects of increased energy production and use and the discovery of technical solutions to the problems.



INDUSTRIAL GROWTH

Energy also affects our society indirectly through industrial growth. Industry constantly strives to expand in order to provide more consumer goods and services. Most people interpret this as **progress**. But, as industry grows, so does its appetite for energy. As energy costs to industry increase, the extra costs are added to the price of consumer products and services. When that happens, many people are unable or unwilling to pay the higher prices. As a result, energy supply and demand is partly responsible for economic **inflation** (decreasing value of the dollar).