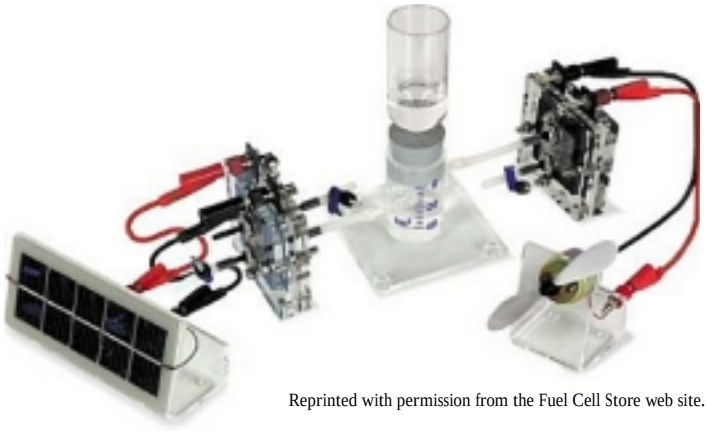
Power for Products

The energy a product uses throughout its life span is often a product's most significant environmental impact. Careful consideration should therefore be given to how much and what type of power a product will use. Experimental new uses are continually being found for fuel cells because of their high efficiency. With the decrease in power requirements of portable consumer electronics, comes the opportunity to use "human" or "self-power" from hand wound springs or from electricity created by compressing a crystal.



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This is a model of a completely renewable hydrogen energy system. Renewable energy produced by a solar panel is used to break water into hydrogen and oxygen. The hydrogen is used in the fuel cell to produce electricity, which runs a fan. The only outputs are water, electricity and heat — no pollution.

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Motorola prototype cell phone powered by a fuel cell.

The Power of Fuel Cells

Fuel cells used in combination with solar panels, a technology originally developed by National Aeronautics and Space Administration (NASA), is a source of renewable energy. Fuel cells are powered by hydrogen which can be obtained from water when it is hydrolyzed (split into hydrogen and oxygen) by solar power. There is no pollution created from this combination system that produces water, electricity and heat. Fuel cells can run on any source of hydrogen, including methanol. When a fossil fuel such as methanol is used as the source of hydrogen for a fuel cell, there is a small amount of carbon dioxide produced during a conversion process to free hydrogen from the hydrocarbon.

Although economic influences have kept this proven technology from being widely applied, manufacturers are beginning to experiment with this type of energy source. Motorola, for instance, has developed a cell phone powered by a methanol fuel cell. The methanol cartridge will last up to ten times longer than a rechargeable battery. Electrolux Corporation is experimenting with using fuel cells in common appliances such as vacuum cleaners. Other manufacturers are experimenting with putting them in electric bicycles.

Compression Power

The piezo effect, which produces electricity when crystals such as quartz are compressed, has been known for many years. The Volvo Car Company and Delft University of Technology found a new use for this effect when they developed an experimental remote control for unlocking car doors. Users of the remote control simultaneously push a button on the top and on the flexible bottom of the device. The compression created by the user puts pressure on a crystal, producing an electric charge. This charge is used by the circuit board in the remote control to unlock the car. No batteries are needed.

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Kinetic and Thermic Power

This thermic watch produced by Seiko Corporation runs on body heat — not disposable batteries.

Used with permission from the Seiko web site.

Seiko Corporation has been manufacturing watches that run off kinetic energy produced by the wearer's movements. The technology is so fully developed that the user can let the watch sit for up to four years, and it will still display the correct time. More recently a Seiko thermic watch that is powered by the user's body heat has been developed. No replaceable batteries are needed to power either of these watches.

Wind-up Spring Power

Wind-up spring power for flashlights and radios can be used in situations where electric power and batteries are unavailable. Hand cranks on these products allow the user to tighten steel strip springs. The steel strip springs, designed with constant force geometry in the devices, offer efficient energy transfer. By using a switch, the user can cause energy from the wind-up device to supply immediate power to the device or to store the electric charge in a battery for later use.

Other potential products to use this type of power include cell phones, transceivers, navigation aids, and military, disaster and medical equipment.

These flashlights and radios, developed by Freeplay Corporation, use wind-up spring mechanisms to store the energy that is used to power the products.

References

"Design of a Human Powered, Batteryless Remote Control for Volvo." Electronics Goes Green 2000+, Berlin, Germany, September 2000.

Seiko Corporation web site: www.seiko-corp.co.jp/english/press_releases/1999/04/1999_04_30_03.html.

Motorola web site: www.mot.com/home/.

Freeplay web site: www.freeplay.net.

Fuel Cell Store web site: www.fuelcellstore.com.