Energy Systems

The most useful and versatile form of energy is mechanical – that is anything that physically moves. Once you have mechanical energy you can perform work directly at almost 100% efficiency. The easiest form of energy to distribute throughout a household or community is electrical, and with generation efficiencies exceeding 90%, there is very little loss in converting from mechanical to electrical. Our basic energy system goal then is to produce adequate mechanical energy, any time of any day or night.

Since any form of energy may be converted to heat, the most versatile systems will be powered by heat. This would allow us to use the most locally available energy anywhere on the planet – be it wind, solar, or buffalo chips.

For energy to be readily available at will, some form of storage will be needed. If the energy source has been converted to heat, this will be a tank of water or other form of heat storage. For fuel-based heat sources it is the fuel itself.

The remaining component – and the most difficult one – will be that which converts the stored thermal energy into mechanical energy.

In a nutshell, the basic universal energy system will consist of:

1. An energy source optimized to the most locally available form/s of energy
2. Energy storage – quite likely water because
    a. It has a high specific heat
    b. It can be conveniently manipulated through pumps and plumbing
    c. It would be an important emergency resource to have on hand in the event of infrastructural problems
    d. It can store both heat and cold, to provide a wide temperature difference
3. An engine that can function off the temperature differences that can be conveniently created and stored locally. Additional engines might be provided to work at higher efficiencies directly from higher temperature energy sources

Sources of energy

The most common sources of sustainable energy are biomass (fire wood etc.), wind, solar, and water power. Others to consider would include geothermal, the spontaneous reactions of compost piles, and tidal power. Energy is available in any difference between two temperatures. Theoretically, you could acquire energy by storing heat from the warmest two hours of the day, and storing the “cold” from the coolest two hours of the night.

Solar energy is an incredible resource. On a good day, one square yard of collector surface squarely facing the sun is receiving almost one horse power of heat and light. Typically, 70% to 80% of this can actually be captured in the form of heat.

Constant progress has been made in the efficiency and cost reduction of solar electric cells over the past several decades, and efficiencies of up fifteen to twenty percent are now available to the public. They are quite practical in many applications, but they are dependent upon multi-million-dollar high-tech facilities. They are expensive, and their technology level makes their availability dependent upon stable, prosperous economies – something the future does not guarantee.

The most obvious problem with solar energy is that is quite rare in the middle of the night, so energy storage would be required.

Fire wood IS stored solar energy, and the process of storing it (growing it) reduces greenhouse gasses,

and generally improves the quality of life for all.

A distinction needs to be noted in the case of much-touted fuel cells, and other forms of hydrogen power. These are not actual sources of energy, but merely convert stored chemical energy into electrical energy.

When a small scale electrical system becomes important, ponder the opportunities available in the salvage of a single dead car. If you have some form of mechanical energy adequate to drive an alternator you could have a complete 12V electrical system. If you have the tools and know-how, an automotive alternator may be rewound with finer wire to produce higher voltages at lower RPM's. At a lesser scale, often a small electrical motor such as powers a window etc. can be rigged to generate electricity.

With the 42 volt standard being phased into some of the newer cars, automotive-based electrical systems will become even more practical.

Any form of energy can be converted to heat, and heat is easy to store. A system based upon the collection and storage of heat, coupled with an engine that can convert that heat into mechanical energy could be designed to fit virtually any energy source.