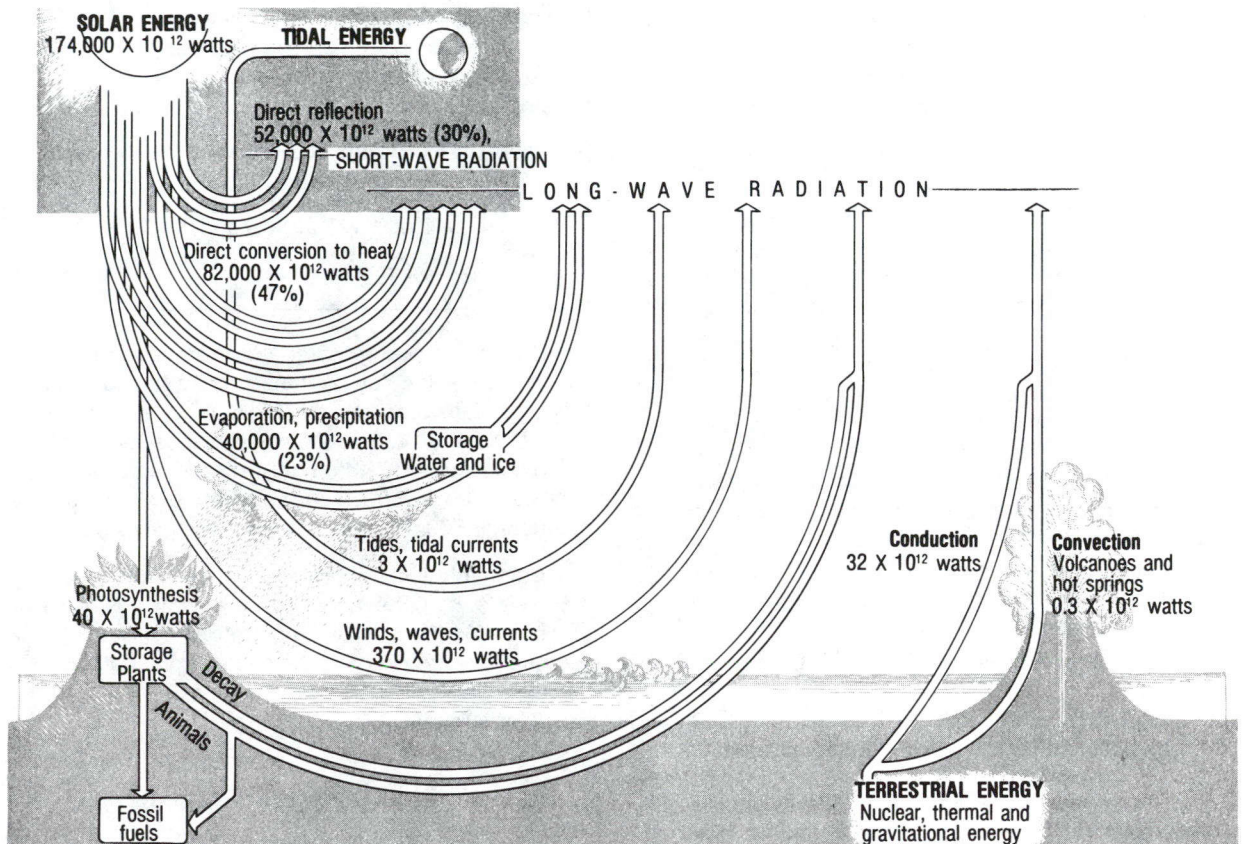


Figure 2-1: THE EARTH'S ENERGY BUDGET



Source: After Hubbert, 1974, p. 11.

By a huge margin, the largest source of energy available to the Earth is sunshine.

The obvious question then is how does this natural flow compare with society's energy needs? Accepting the estimate that the annual global demand for primary energy now exceeds 300 exajoules (300×10^{18} joules), we can roughly calculate that man is today converting energy for his own use at an average rate of nearly 10×10^{12} watts, or 10 terawatts. Clearly the world is not running out of energy in any absolute sense. *What is in question is the continuing availability of inexpensive, easily accessible energy in forms that society finds environmentally acceptable and convenient to use.*

Man has the following options to derive the energy required to sustain his society. He can intercept the energy continuously and inexhaustibly flowing through his natural environment as outlined in Figure 2-1; he can continue to draw upon the finite amount of energy stored in fossil fuels; or he can convert mass into energy via the processes of nuclear fission and, potentially, nuclear fusion.

Turning from nature to the flow of energy in an industrial society such as Canada's, we find it necessary to consider energy at several stages of use. Energy commodities at the point of production are referred to as *primary energy*. Crude oil, raw natural gas, coal, hydro-electricity and nuclear-electricity are the familiar primary energy commodities in Canada. Hydro-electricity and nuclear-electricity are used directly by consumers, as is most of Canada's natural gas production. Some primary energy is converted into other forms before being consumed. Petroleum products, electricity derived from the combustion of coal, oil or gas, and coke produced from coal are examples of primary energy conversions.

Energy delivered to the point of use is typically referred to as *secondary energy* or *end-use energy*. Since energy is invariably consumed in conversions and transmission or transportation, the secondary energy supply in a region or country is necessarily smaller than the primary energy supply (apart from energy imports, exports and changes in stocks).