

**SAMPLE II**

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IS ENERGY CONSERVATION AUTOMATIC?

The conservation of energy is one of the most basic principles of physics; it is taught in basic courses and is valid in quantum mechanics and in relativity. It is a law of physics; energy is automatically conserved; we do not have to do anything to conserve it. This makes it strange that we are told how important it is that we conserve energy.

The explanation of this apparent contradiction starts with the fact that there are different forms of energy: chemical, electrical, mechanical, nuclear, wind, gravity, heat, etc. Energy of one form can be converted into energy of another form. When this is done the form of the energy changes, but the total amount of energy is unchanged. Much of the infrastructure of modern technology is devoted to conversion of energy from one form to another. A simple example is a flashlight. This device converts the chemical energy in the battery into heat in the filament of the flashlight bulb. (A small fraction of the heat is then converted to light by the filament.) The heat can be said to be a less useful form of energy than the chemical energy because it is easier to convert chemical energy to heat energy than the other way around. By using the flashlight, then, we have not lost energy but we have decreased the amount of useful energy.

We cannot run out of energy, but we can run out of useful energy, like the chemical energy in fossil fuels. It is useful energy what we are being asked to conserve.