



The great thing about electricity is that it's easily converted to other forms of energy, giving us the ability to create light, heat, chemical and mechanical energy. Let's have a closer look at some of its popular uses:

### Light



The simplest method of converting electrical energy to light energy is with a filament lamp. Filament refers to the special high resistance wire (usually tungsten) used inside the bulb, which can be drawn into very thin wires that does not melt even when heated to about 2600°C.

At this temperature it goes white hot or 'incandescent'. The wire would melt if it came into contact with air, so the air in the glass is replaced by Argon gas that will not support combustion.

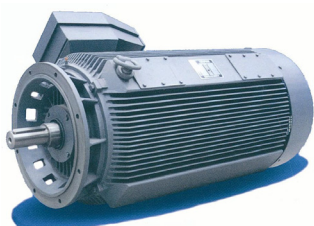
The Australian Government recently announced that it would phase out the use of incandescent light bulbs by 2012 in favour of compact fluorescent bulbs. According to the Government, up to 95% of the energy each standard light bulb uses is wasted, while compact fluorescents use only 20% as much electricity to produce the same amount of light.



In fluorescent lights, a current is passed through mercury vapour to produce ultra-violet energy. A fluorescent powder coating placed inside the tube absorbs the ultra-violet energy and, in turn, glows and gives off visible light. In both incandescent and fluorescent lamps only a small amount of energy is turned into light – the rest is converted into heat energy.

Have you ever noticed how most street lights magically come on when it starts getting dark? They are fitted with light sensing cells that automatically switch on when the daylight fades in the evening and off as daylight increases in the morning.

### Mechanical Energy



An electric motor designed to power a ship

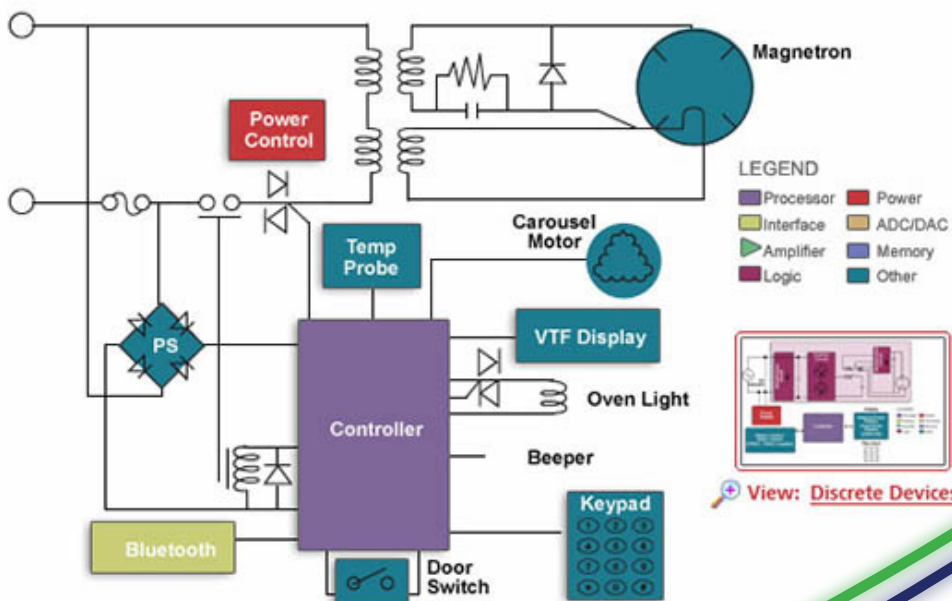
Turning electrical energy into mechanical energy has allowed human beings to significantly improve their lifestyles with appliances that can perform just about any task! The electric motor that turns the wheels of industry is also used to drive smaller appliances such as vacuum cleaners, refrigerators and washing machines.

The electric motor works by passing a current through a conductor that lies within a magnetic field, causing relative motion between the conductor and the field. The electrical motor takes in electrical energy and gives out mechanical energy as rotary motion.

### Heat Energy

There are not many things that beat a nice hot cup of tea on a cold winter night, and electricity allows us to enjoy that without having to make a fire like our ancestors used to do. Heat energy is used in many of our domestic and industrial appliances, including toasters and radiator elements used in kettles.

Electricity heats all wires that it flows through. The more electricity that flows through a given size wire, the warmer it will get. Electricity heats some types of wires more than others because it finds it harder to flow through them – these are called resistance wires. Also, the thicker the wire the more electricity can flow through it, so a thin wire will cause more heat. This is the foundation for appliances that use a special high resistance wire that is able to operate in air at high temperatures and for a long period of time without deterioration.

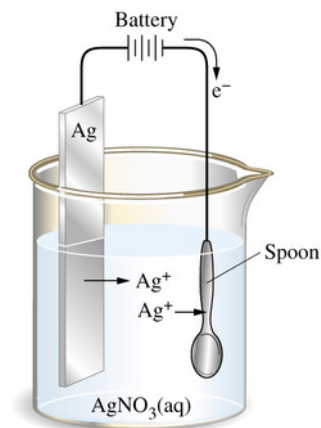




## Heat Energy Continued....

Heat energy can be used in enclosed spaces like the inside of an iron and electric jugs because there is no combustion with electricity. This makes electricity a very efficient way to produce heat, because there are no heat losses in an enclosed area like there would be, for example, in an open fire.

Another popular example of heat energy used in everyday living is microwave ovens. A magnetron is used to produce high frequency electromagnetic waves inside an oven. When microwaves meet something in their path, various things can happen. They pass through materials like glass and china without heating them, they bounce off metal surfaces, but they are absorbed by substances such as food. When this happens, the molecules in the food are disturbed, causing it to generate heat that warms or cooks the food.



Electro-plating

## Chemical Energy

Passing an electric current through an acid liquid from one metal plate to another is a process known as electro-plating. It takes tiny particles of metal from one plate (the positive connection or 'anode') through the liquid and deposits it onto the other plate (the negative connection or cathode). This allows a metal such as iron or steel to be covered with another metal that will, for instance, prevent it from rusting or give it highly polished surface.

Another process that breaks down the chemical compounds with an electric current (known as electrolysis) is used for the large-scale production of sodium, chlorine, hydrogen, oxygen and zinc, and can also purify copper, gold and similar substances.

## Refrigeration

Electrical energy is also used to keep our drinks cool and our food fresh. If gas or vapour is compressed it gets hot. If the hot compressed gas is immediately expanded to its original pressure, the temperature falls to what it was before compression, but if the hot compressed gas is cooled before expansion, it will be considerably lower than it was originally. This cooled gas can then be used to cool a refrigerator chamber.

In compression type refrigerators, a gas such as Freon is compressed by an electric compressor and then cooled by an electric fan. In cooling, the Freon condenses to a liquid that is still under pressure, and as the liquid expands through a valve it becomes a vapour at a very low temperature. This cold vapour circulates through a coiled tube surrounding the ice trays where it absorbs heat before returning to the compressor to repeat the cycle.

