Can we convert the energy we get from our food into electricity?

A project from Powerscourt National School, Enniskerry, Co. Wicklow

Key Concepts in this Lesson Plan

1. Energy gives us the ability to do everything - to move, to grow things, to make things. Without energy we would not exist.
2. Energy cannot be created nor destroyed - it can only be converted from one form to another.
3. There are many different forms of energy including:
   - **Chemical** - energy contained in chemicals that are released during reactions
   - **Potential** - energy that an object gains due to its position or state
   - **Solar** - energy given by the radiation of the sun
   - **Kinetic** - energy that ab object has due to its movement
   - **Electical** - energy that allows us to light our homes and charge our mobile phones
4. This video explores how Chemical Energy from food can be converted into Electrical Energy

Click here to watch video

As individuals we get our energy from the food and water we digest and this is called Chemical Energy

When we eat food and exercise (e.g. cycle a bike or go for a jog) we convert the chemical energy into Kinetic Energy

In this project the class then converted the Kinetic Energy into Electrical Energy

How did they do it?

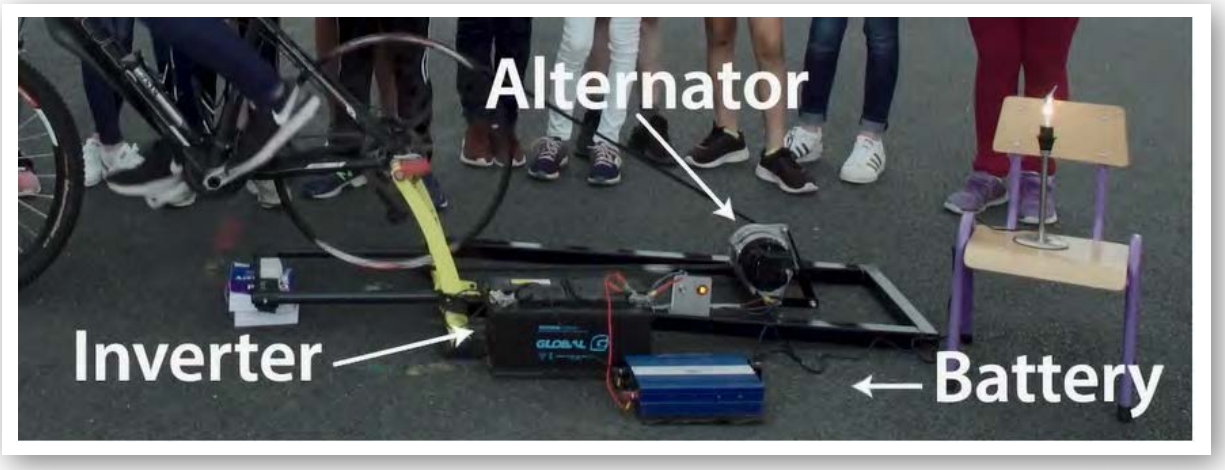
DEMONSTRATION 1

What you need:

A Bike - - - - A Stand to lift the back wheel and hold the alternator in place

An Alternator - - - - A Belt to connect the back wheel and alternator

An Inverter - - - - A Battery - - - - Some electrical coil - - - - A light bulb



How it works:

The belt is wrapped around the rim of the back wheel.

It is also wrapped around an alternator (which contains a magnet set inside coils of copper wire).

When the back wheel moves it has the effect of spinning the alternator (and in turn spinning the magnet inside the coils of copper wire).

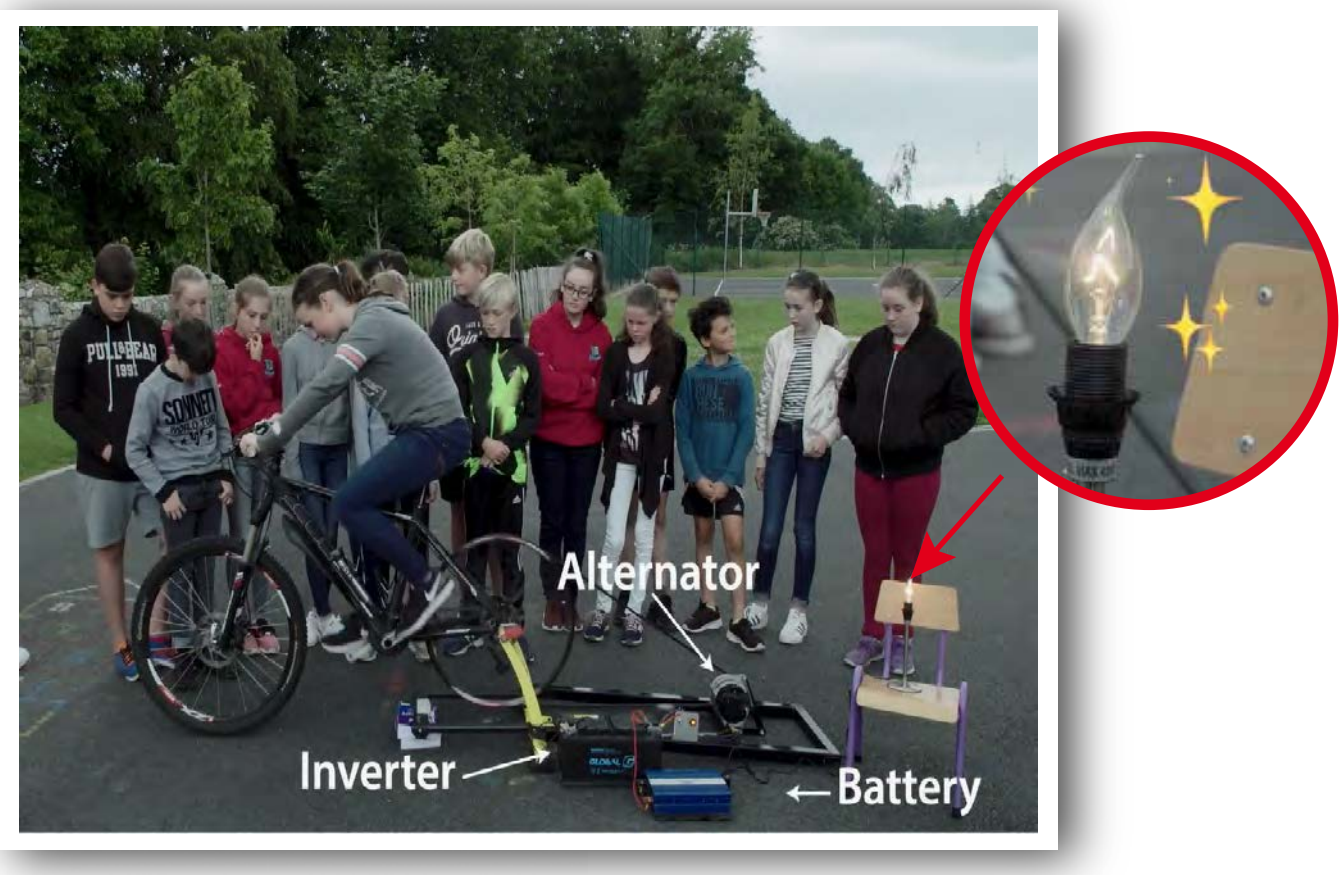
This creates electrical energy.

This electrical energy is fed into a battery where it is stored as chemical energy.

The battery is connected to an inverter.

Switching the inverter on allows the energy to flow from the battery to the light bulb and creates electrical energy.

If the inverter was not switched on the energy would remain (stored) in the battery until it was used.



In Summary

Chemical → Kinetic → Chemical → Electrical

This reinforces the **Law of Conservation of Energy**

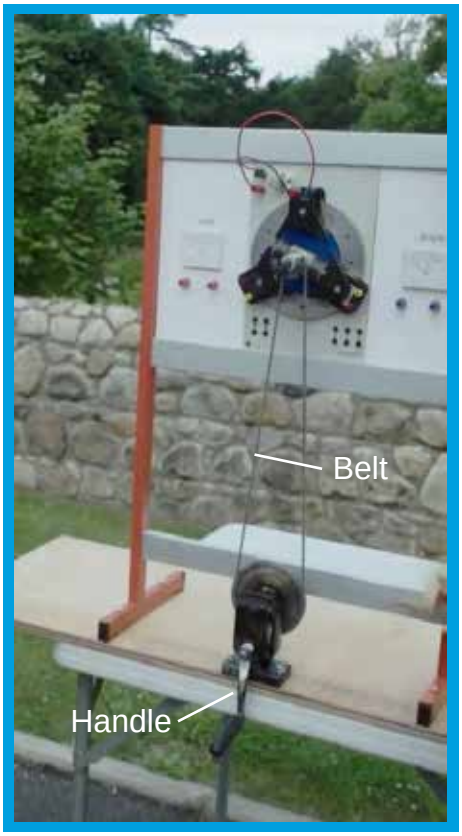
> Energy can neither be created nor destroyed;
> It can only be converted from one form to another

DEMONSTRATION 2.

The second demonstration is a much simpler version of the bicycle one.

We start by turning the handle - as with the bike we need energy (Chemical Energy) to give us the ability to do this.

If we didn't eat food or drink water we would not have the energy to turn the lever for long.



Turning the handle moves the belt and spins (Kinetic Energy) a magnet inside some copper wires. A connection is made to a light bulb which lights up (Electrical Energy).
No energy is stored in this experiment - as soon as you stop spinning no electricity is produced.

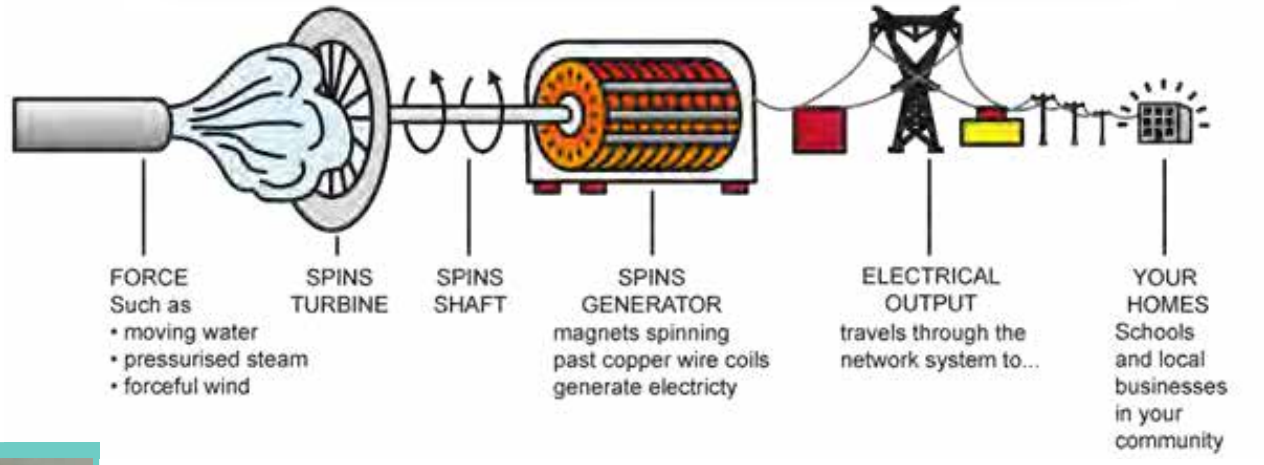
Chemical → Kinetic → Electrical

This is the simplest form of creating electrical energy - spinning a magnet inside a coil of copper wire. In this case the spinning creates just enough electricity to light a single light bulb.

In Power Stations the same principle is applied except on a much bigger scale.
Instead of cycling a bike or turning a handle, a massive force from **Pressurised Steam** turns a giant magnet inside coils of copper wire

Instead of cycling a bike or turning a handle a massive force from **Pressurised Water** turns the giant magnet inside coils of copper wire

Instead of cycling a bike or turning a handle a massive force from the **Wind** turns a giant magnet inside coils of copper wire



Special thanks to all the pupils of 5th and 6th class in Powerscourt National School and their teacher Mr. Middleton for their enthusiasm and help in making this video and lesson plan

Questions

1. The energy we get from food is called:

a) Kinetic energy
b) Chemical energy
c) Potential energy

2. Can you create energy from nothing?

a) Yes
b) No
c) Sometimes

3. Spinning a _____ inside a coil of wire is the simplest form of making electricity

a) Battery
b) Bike
c) Magnet

4. In the second experiment in the video what are the energy conversions that took place

a) Chemical - Kinetic - Electrical
b) Solar - Kinetic - Electrical
c) Chemical - Potential - Kinetic

5. Which of the following are renewable sources of energy?

a) Wind ☐
b) Gas ☐
c) Oil ☐
d) Solar ☐
e) Hydro ☐
f) Coal ☐
g) Wave ☐

Answers:

1. (b)
2. (b)
3. (c)
4. (a)
5. (a) (d) (e) (g)

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