


Energy

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Materials used for educational purposes



ENERGY



Energy, in physics, is the capacity for doing **1**

It may exist in **2**, kinetic, thermal, electrical, chemical, nuclear, or other various forms.

There are, moreover, heat and work—i.e., energy in the process of **3** from one body to another. After it has been transferred, energy is always designated according to its **4**. Hence, heat transferred may become **5** energy, while work done may manifest itself in the form of **6** energy.

All forms of energy are associated with **7**. For example, any given body has kinetic energy if it is in motion. A tensioned device such as a bow or spring, though **8**, has the potential for creating motion; it contains potential energy because of its configuration. Similarly, nuclear energy is potential energy because it results from the configuration of subatomic particles in the nucleus of an atom.

motion

**nature
transfer**

thermal

at rest

mechanical

potential

work



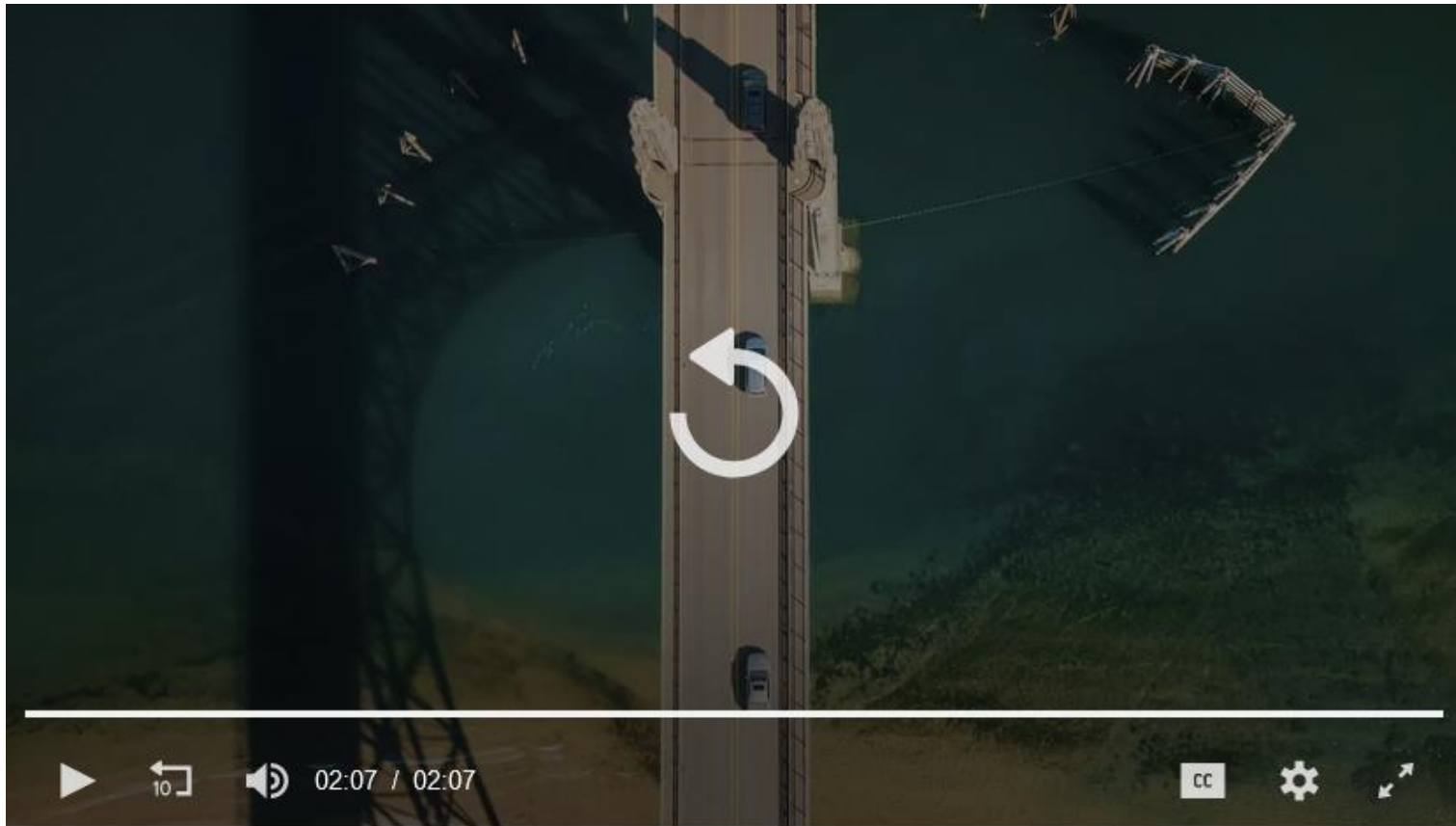
Energy, in physics, is the capacity for doing work.

It may exist in potential, kinetic, thermal, electrical, chemical, nuclear, or other various forms.

There are, moreover, heat and work—i.e., energy in the process of transfer from one body to another. After it has been transferred, energy is always designated according to its nature. Hence, heat transferred may become thermal energy, while work done may manifest itself in the form of mechanical energy.

All forms of energy are associated with motion. For example, any given body has kinetic energy if it is in motion. A tensioned device such as a bow or spring, though at rest, has the potential for creating motion; it contains potential energy because of its configuration. Similarly, nuclear energy is potential energy because it results from the configuration of subatomic particles in the nucleus of an atom.

<https://www.britannica.com/science/energy>



Discover how energy moves between thermal, chemical, mechanical, and other forms

How energy can change from one form to another. Examples presented include a lightbulb, a car's engine, and plant photosynthesis.

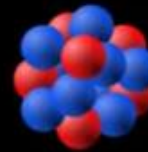
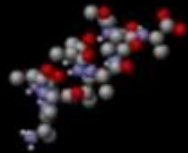
Image: Encyclopædia Britannica, Inc.

[See all videos for this article](#)

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TYPES OF ENERGY



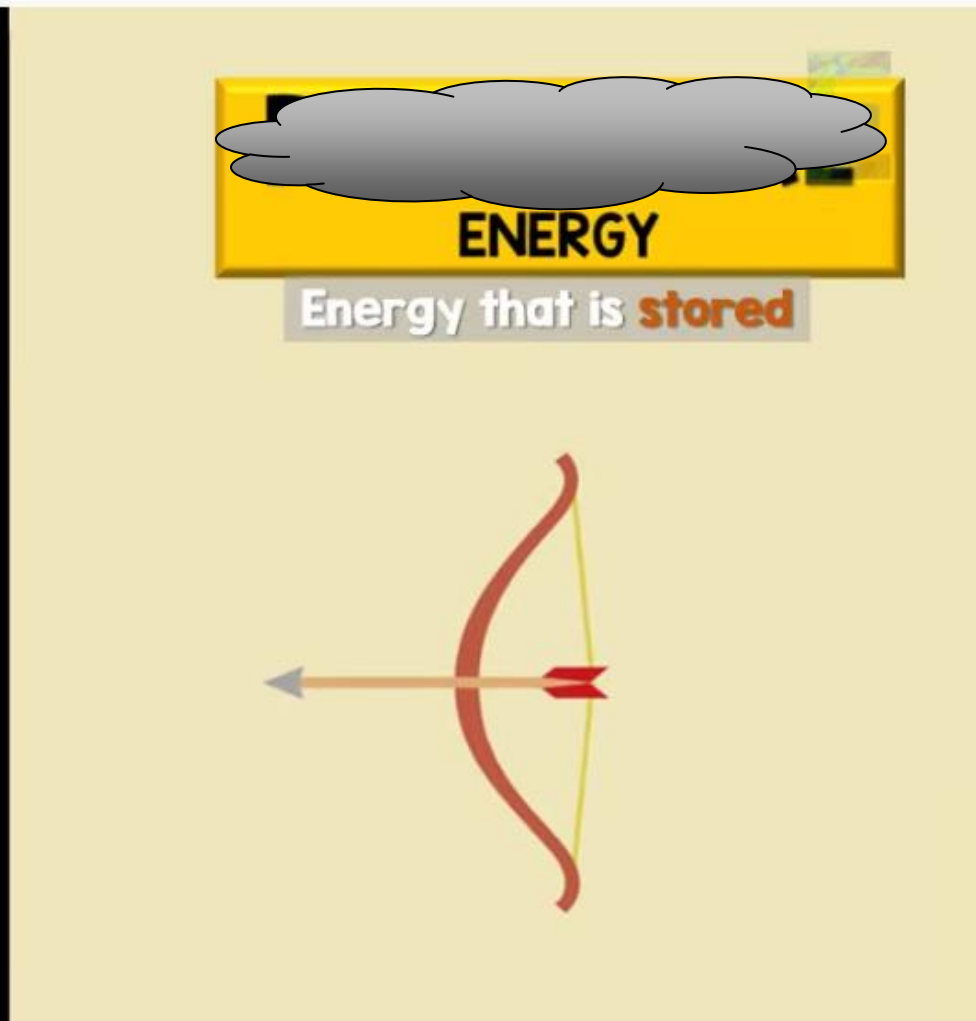
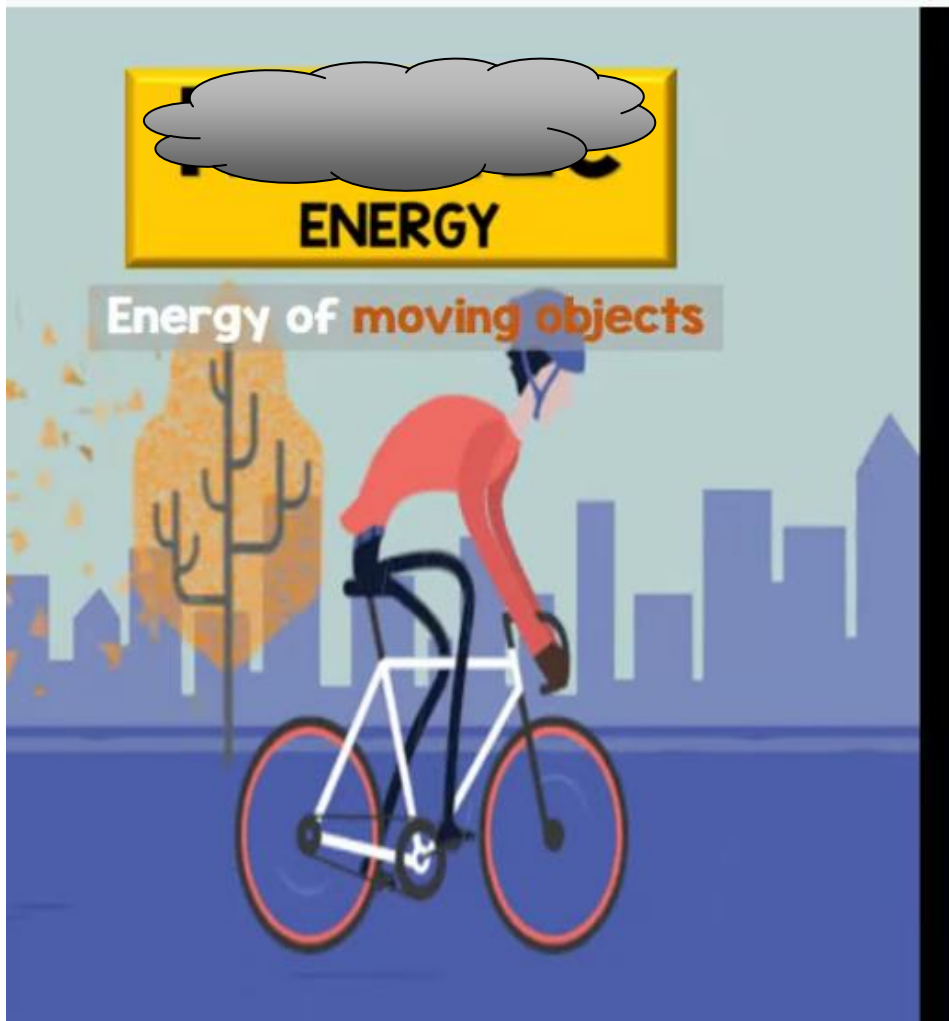
A video about energy:





**KEEP
CALM
AND
TEST
YOURSELF**

BASIC FORMS OF ENERGY



BASIC FORMS OF ENERGY

KINETIC ENERGY

Energy of **moving** objects



POTENTIAL ENERGY

Energy that is **stored**



Other types of energy include:

A 2x4 grid of energy-related icons, each on a grey cloud with a number. The icons are: 1. Fire; 2. Solar panel; 3. Lightbulb; 4. Microscope; 5. Nuclear reactor; 6. Wind turbine; 7. Tree; 8. Hammer.



Other types of energy include:



**Thermal
Energy**



**Radiant
Energy**



**Light
Energy**



**Chemical
Energy**



**Nuclear
Energy**



**Electrical
Energy**



**Gravitational
Energy**



**Mechanical
Energy**





Another video about energy:

What is energy?





**KEEP
CALM
AND
TEST
YOURSELF**

kinetic energy

(including

1

energy

2

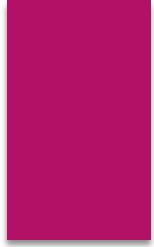
3

energies:

4

5

6



kinetic energy
(including sound)

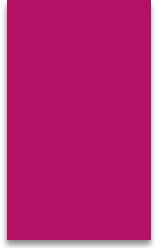
heat energy

Potential energies:

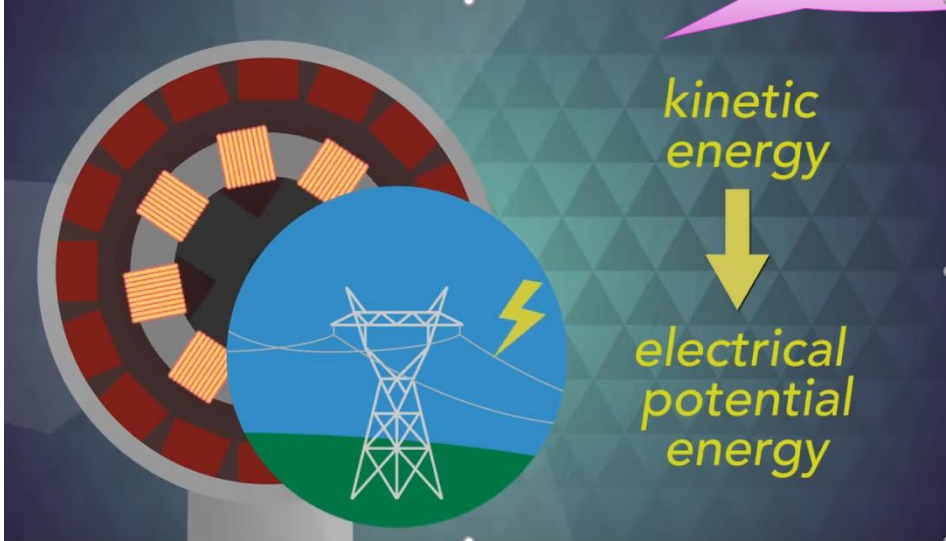
gravitational

electrical

chemical



What are the examples given in the video for the different types of energy ?



A video frame featuring a man in a blue shirt standing next to a green hillside. A string is attached to the top of the hill, and a small yellow character hangs from it. To the right, a bar chart titled "ENERGY-O-METER" shows two bars: a shorter blue bar labeled "gravitational potential energy" and a taller orange bar labeled "kinetic energy".

A video frame featuring a man in a blue shirt standing next to a cooking pot on a stove. The text "chemical potential energy" is written in yellow to the left of the pot. The pot is on a burner with a flame, and a white steam pipe is connected to it.

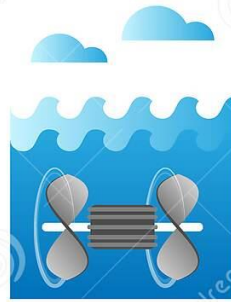
A diagram illustrating energy conversion. On the left, a red cooking pot is shown. To its right, a circular inset shows a smiling person. Below that, another circular inset shows a flexing arm. A yellow arrow points from the top inset down to the bottom inset. To the right of the arrow, the text "chemical potential energy" is written in yellow, with a yellow arrow pointing down to the text "heat energy & kinetic energy".

ENERGY SOURCES

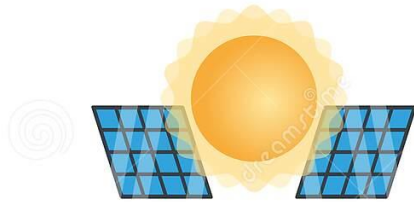
RENEWABLE ENERGY



Wind



Hydropower



Solar



Geothermal



Biomass

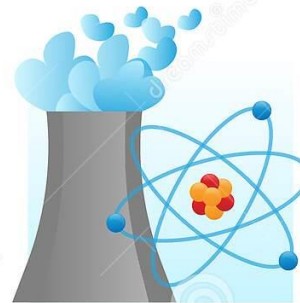
NON-RENEWABLE ENERGY



Oil



Coal



Nuclear



Natural Gas

Energy Resources

Sources of energy, or energy resources, are used for generating electricity and for transport, heating and cooking. Each energy resource has different benefits and drawbacks.

Non-Renewable Resources

These resources are finite and will eventually run out. Once they are depleted, they cannot be replenished.



Renewable Resources

These resources are infinite. They can be easily replenished and will not run out.



If a country needs more electricity, which resource should it use?

 Nuclear	 Fossil Fuel	 Wind	 Hydroelectric	 Solar	 Biomass
 <ul style="list-style-type: none"> ✓ Efficient, generates a lot of electricity ✗ Highly radioactive waste products, risk of accidents 	 <ul style="list-style-type: none"> ✓ Cheap fuel that is easy to obtain ✗ Produces the polluting gases carbon dioxide and sulfur dioxide 	 <ul style="list-style-type: none"> ✓ A non-polluting, renewable resource ✗ Wind turbines require a lot of space and only work when there is wind 	 <ul style="list-style-type: none"> ✓ Potential to generate a lot of electricity ✗ Dams are expensive to build and can negatively affect wildlife 	 <ul style="list-style-type: none"> ✓ Photovoltaic (PV) panels can be installed on individual buildings ✗ PV panels are expensive and only work when it is sunny 	 <ul style="list-style-type: none"> ✓ Releases only the CO₂ within biomass (plants) when it is burnt, so it is carbon neutral ✗ Requires land to grow plants, which reduces space for growing food

In reality, a country will use a range of different energy resources for its needs.

Non-renewable energy

What are non-renewable sources of energy?

- Most of the UK's electricity is generated by power stations that burn coal and gas.
- Our cars use petrol and diesel, which come from oil.

What are fossil fuels?

- Coal, oil and gas are called fossil fuels.
- They are formed from the fossilised remains of prehistoric plants.
- The plants became buried deep under the land and sea, slowly turning into coal, oil and gas over millions of years.

What's the problem?

- Fossil fuels can't be renewed.
- One day, the Earth's reserves of these fuels will run out.
- Scientists think that gases released when fossil fuels burn are causing climate change and pollution.

Electricity

Electricity is needed to make lots of things work, e.g. heating, lighting.

Tall pylons support cables that carry electricity safely to where it's needed. The cables may also run underground.

Coal

At a coal mine, shafts are dug to reach layers of coal deep below the Earth's surface or from open-cast mines on the surface.

Oil and gas

Oil and gas under the sea is collected by special platforms. Oil and gas can be burned to make electricity.

Power stations

Electricity is made in big buildings called power stations. They burn coal or oil to make power. Some power stations produce electricity from nuclear energy.

It's Only Natural

See www.dti.gov.uk/renewables/schools

Renewable energy



What is renewable energy?

- Renewable energy comes from sources that won't run out, including:
 - the wind
 - the sun
 - the waves and tides
 - natural underground heat
 - energy crops, wood and waste.
- We can use renewable energy to provide electricity and heat for homes and businesses.

Why do we need renewable energy?

- Most of the electricity we use in the UK comes from non-renewable sources, such as coal and gas.
- These 'fossil fuels' are running out.
- Burning them to provide energy also releases gases that contribute to climate change.
- Renewable sources of energy don't run out or pollute the environment.

Why don't we get all our electricity from renewable energy?

- It is important to have a mix of energy sources so, if one fails, another can be used. Also, many renewable technologies are still being developed.

Wind energy

Giant machines, called wind turbines, can be used to make electricity in windy places. Groups of wind turbines – or wind farms – are being built on land and out at sea.



Hydroelectric energy

Hydroelectric energy means energy from moving water. Water flowing from a reservoir to a river through a hydroelectric dam can be used to make power.



Biomass energy

Biomass is plant and animal matter (e.g. wood, straw, sewage and waste food), or trees grown for fuel. We can burn biomass to produce heat and electricity.



Solar energy

Solar energy means energy from the sun. The sun's light and heat can be captured by solar panels and turned into electricity or used to heat water.



Hydrogen fuel cells

Hydrogen fuel cells make 'clean' electricity from hydrogen gas. They work like batteries, and can power cars or buses.



Geothermal energy

Geothermal energy means the natural heat of the Earth. Geothermal power stations use heat from deep underground to generate electricity.



Wave energy

Waves are made when wind blows across the sea. The energy in waves can be used to make electricity by new technology such as the Pelamis wave machine.



Tidal energy

Every day, the tide at the seaside goes in and out, as the sea rises and falls. Marine turbines can use this movement to generate electric power.

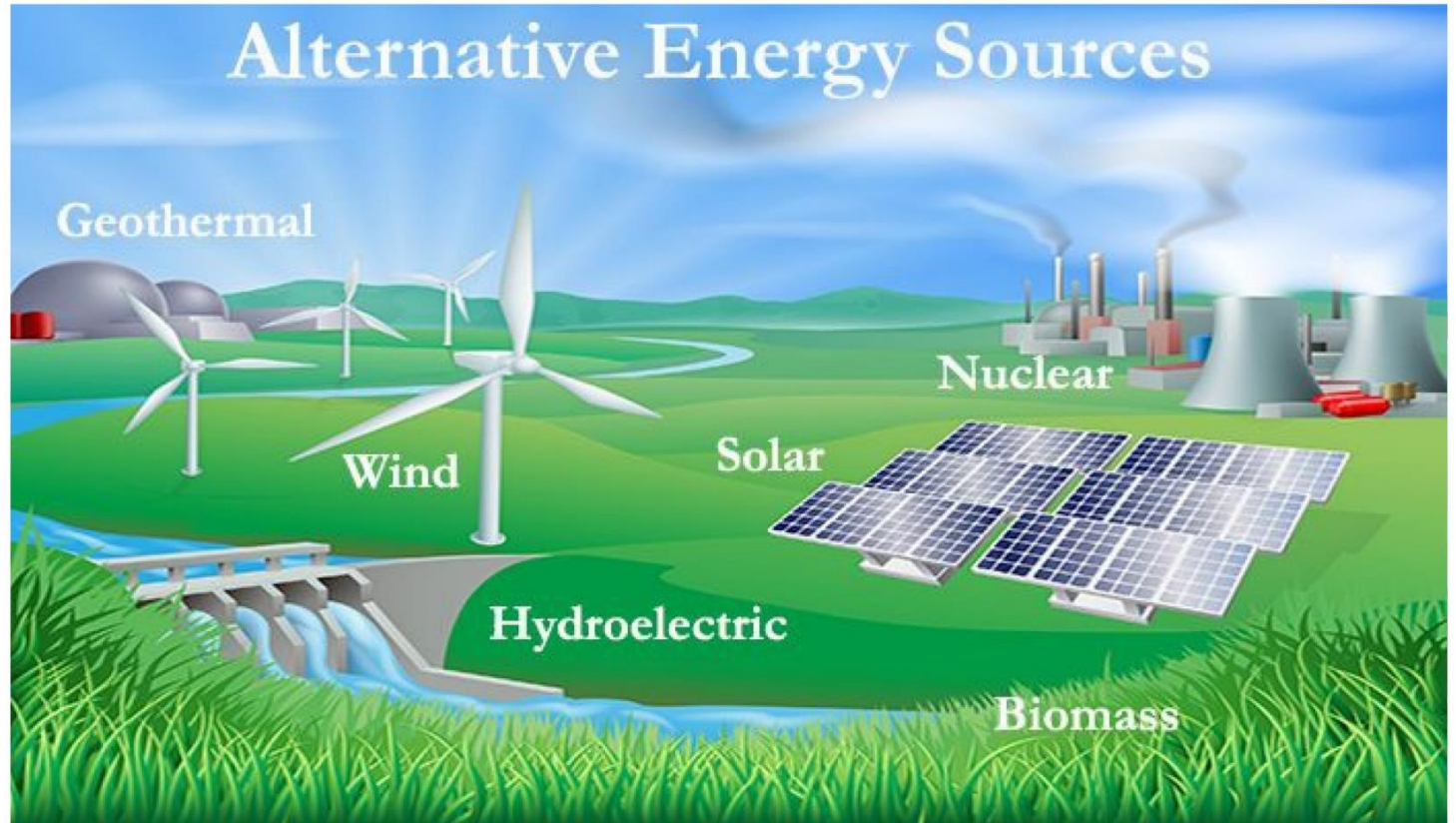


It's Only Natural

See www.dti.gov.uk/renewables/schools

What Are the 9 Most Commonly Used Alternative Energy Sources?

- Wind Energy. ...
- Solar Energy. ...
- Hydroelectric Energy. ...
- Geothermal Energy. ...
- Bioenergy. ...
- Nuclear Energy. ...
- Hydrogen Energy. ...
- Tidal Energy.





**KEEP
CALM
AND
BE**

ENERGY EFFICIENT