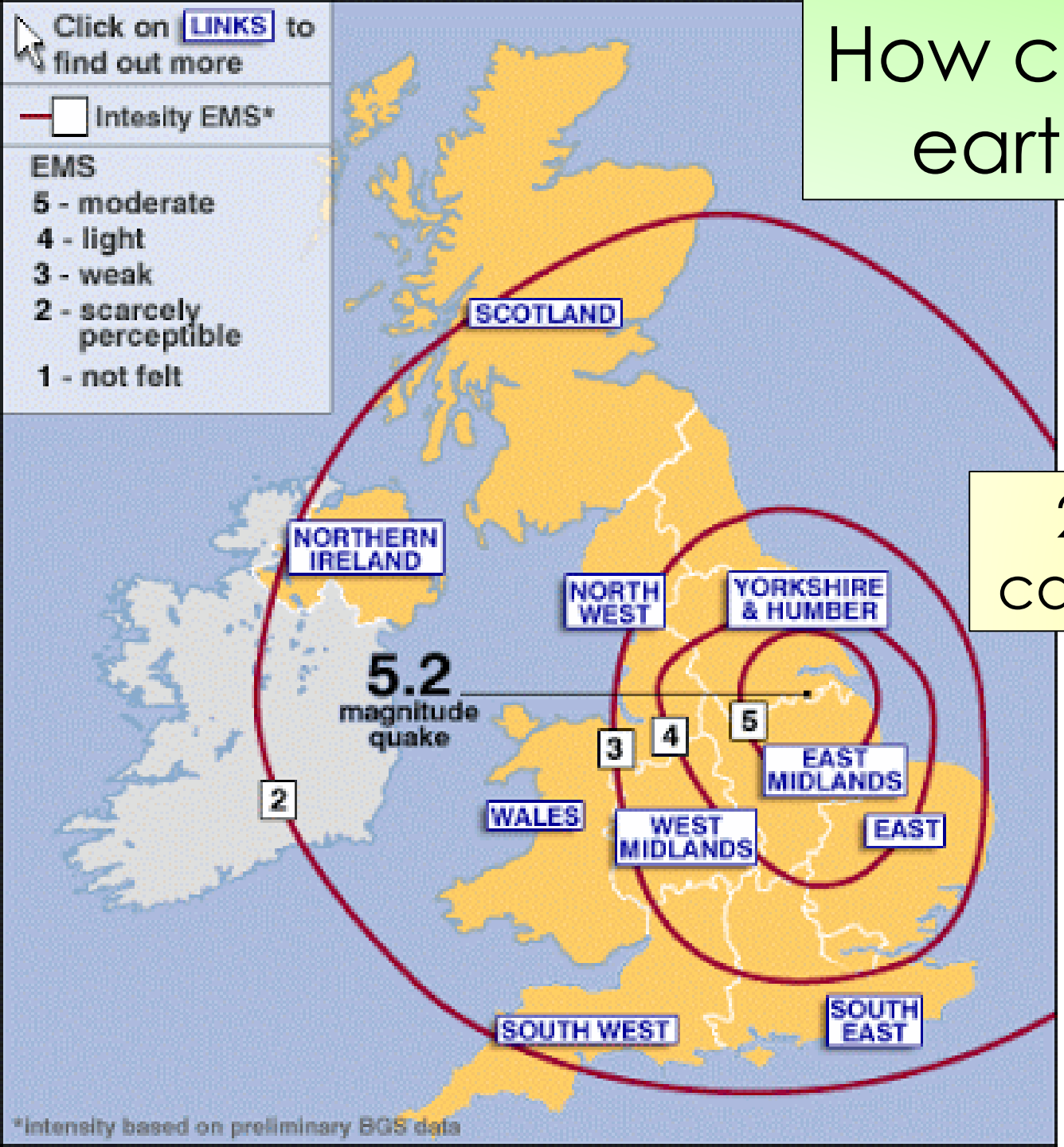
How can we have earthquakes?



2011 – 3 were caused by what?

Fracking – an issue in the USA

Water catching fire?

Video 1

Wednesday, 26 July 2017

Energy in the UK

Learning Objective:

-**Examine** the provision of energy in the UK

Learning Outcomes:

-**Describe** changes to the UK's energy mix

-**Explain** why the UK's energy mix has changed

-**Assess** why the UK will need a ***combination*** of types of energy in the future

Non-renewable resources are...

...those that can only be used once and will eventually run out, e.g. coal can only be burnt once.

Renewable resources can...

...be used over and over again. The sun and wind will never run out.

Non-renewable energy

What are non-renewable sources of energy?

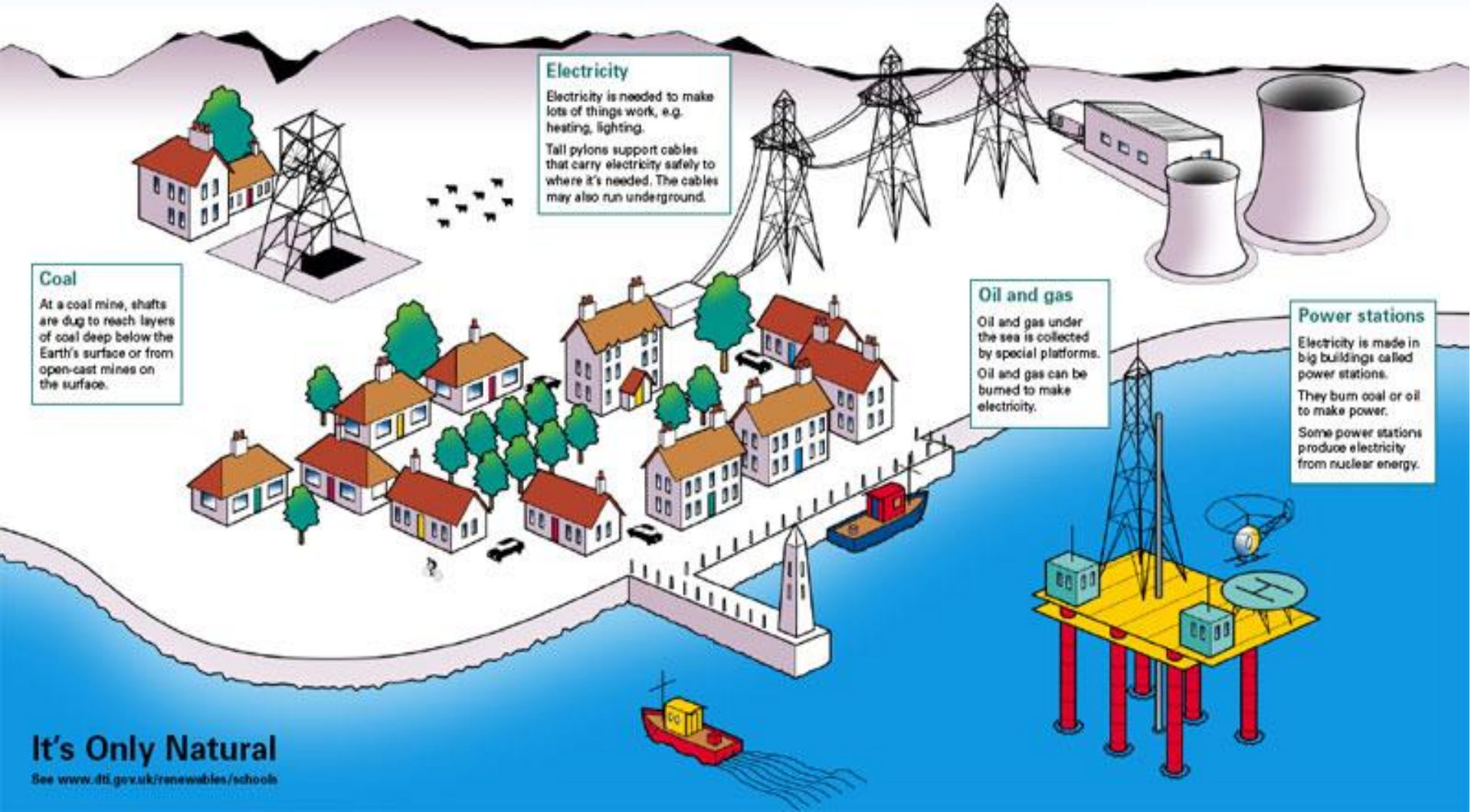
- Most of the UK's electricity is generated by power stations that burn coal and gas.
- Our cars use petrol and diesel, which come from oil.

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.

Geothermal energy

Geothermal energy means the natural heat of the Earth.

Geothermal power stations use heat from deep underground to generate electricity.

Hydrogen fuel cells

Hydrogen fuel cells make 'clean' electricity from hydrogen gas.

They work like batteries, and can power cars or buses.

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.

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.

Wave energy

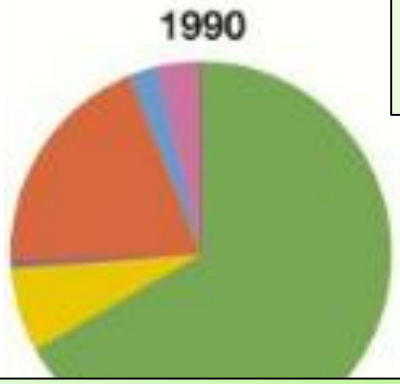
Waves are made when wind blows across the sea.

The energy in waves can be used to make electricity by new technology such as the Pelamis wave machine.

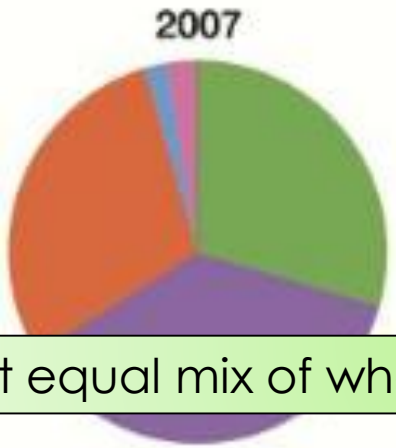
It's Only Natural

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

The UK's changing energy mix



Almost ¾ from what?



Almost equal mix of what?

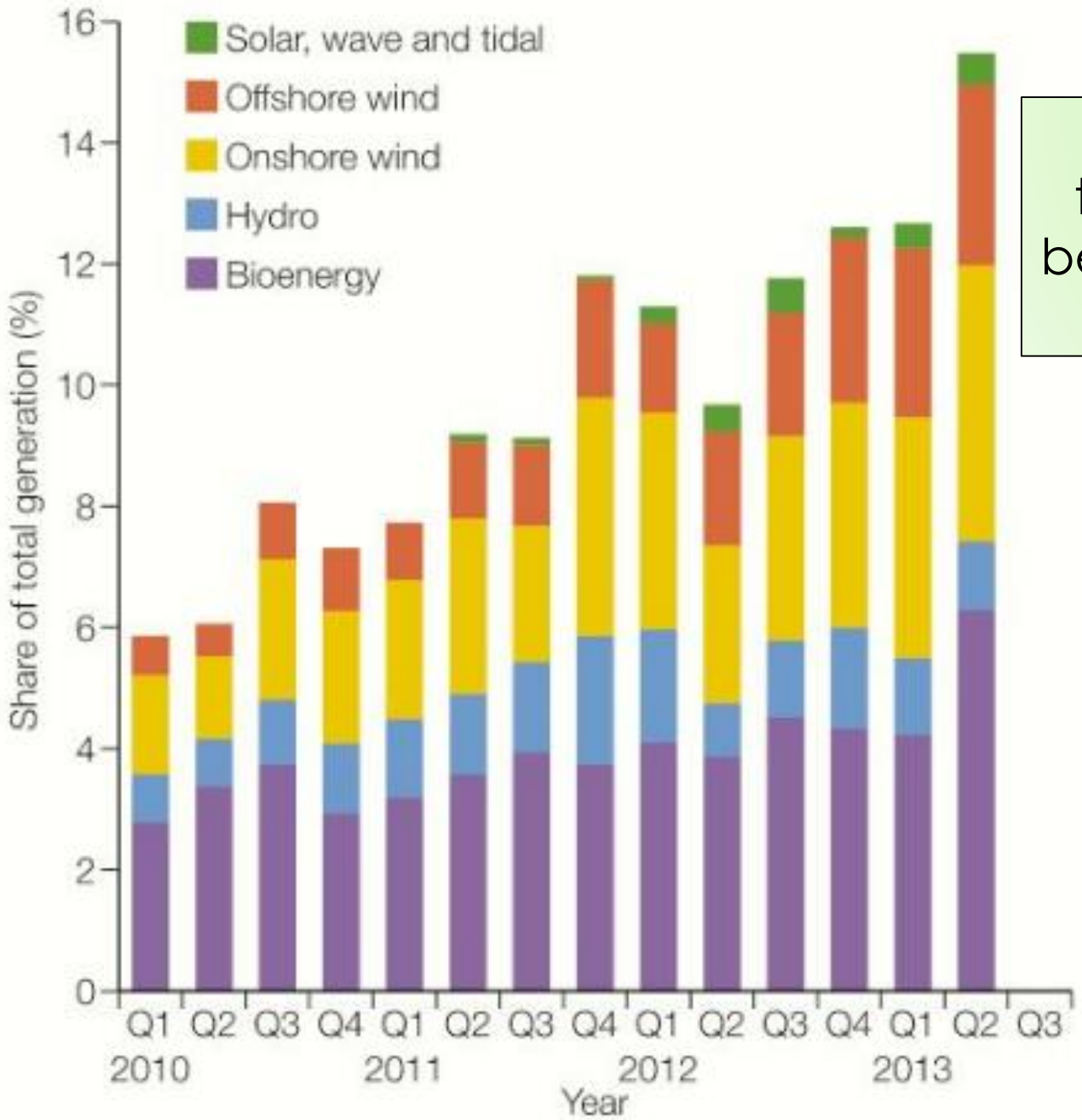
<u>Describe</u> the UK's changing energy mix from 1990 - 2014

How has there been a **60% fall** in energy use by industry and a **12% fall** in domestic energy use?

Importance of renewables – target of 15% by 2020

- Less heavy industry
- Changes in cars
- Low energy appliances
- Building structure

Renewable share of total electricity generation



Why are we these sources becoming more important?

Explain why the UK's energy mix has changed (why are we needing to use a range of types?)

- No longer ***self-sufficient*** in energy
- **75%** of the UK's oil and gas has gone
- By 2020 – **75%** of energy will ***need*** to be imported
- Coal has declined the most (1990-2007, more concerns about greenhouse gas emissions)
- Fossil fuels reserves will remain for several decades
- Coal imports are cheap, e.g. from Russia

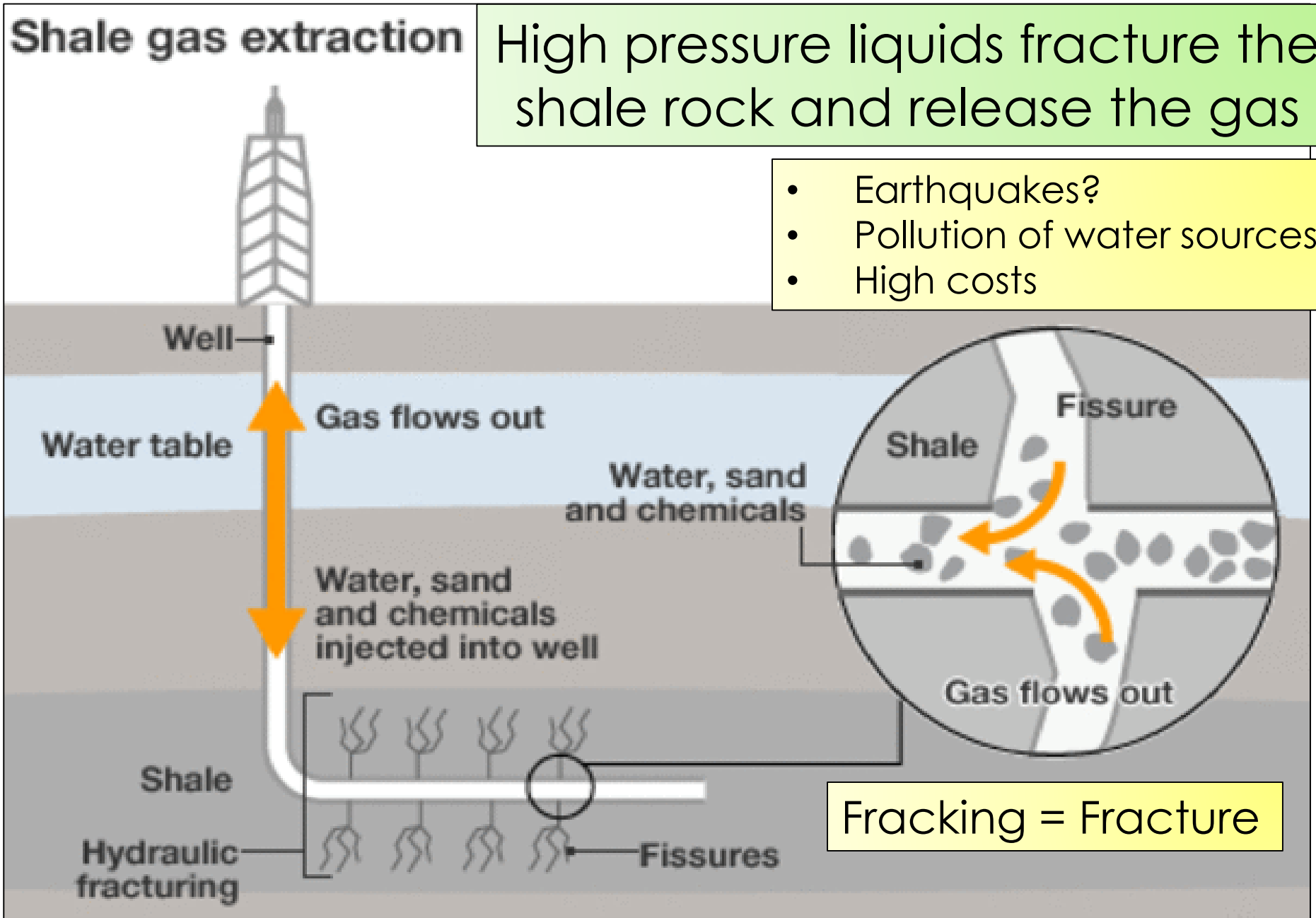
Learning Outcomes:

-**Describe** changes to the UK's energy mix

-**Explain** why the UK's energy mix has changed

-**Assess** why the UK will need a ***combination*** of types of energy in the future

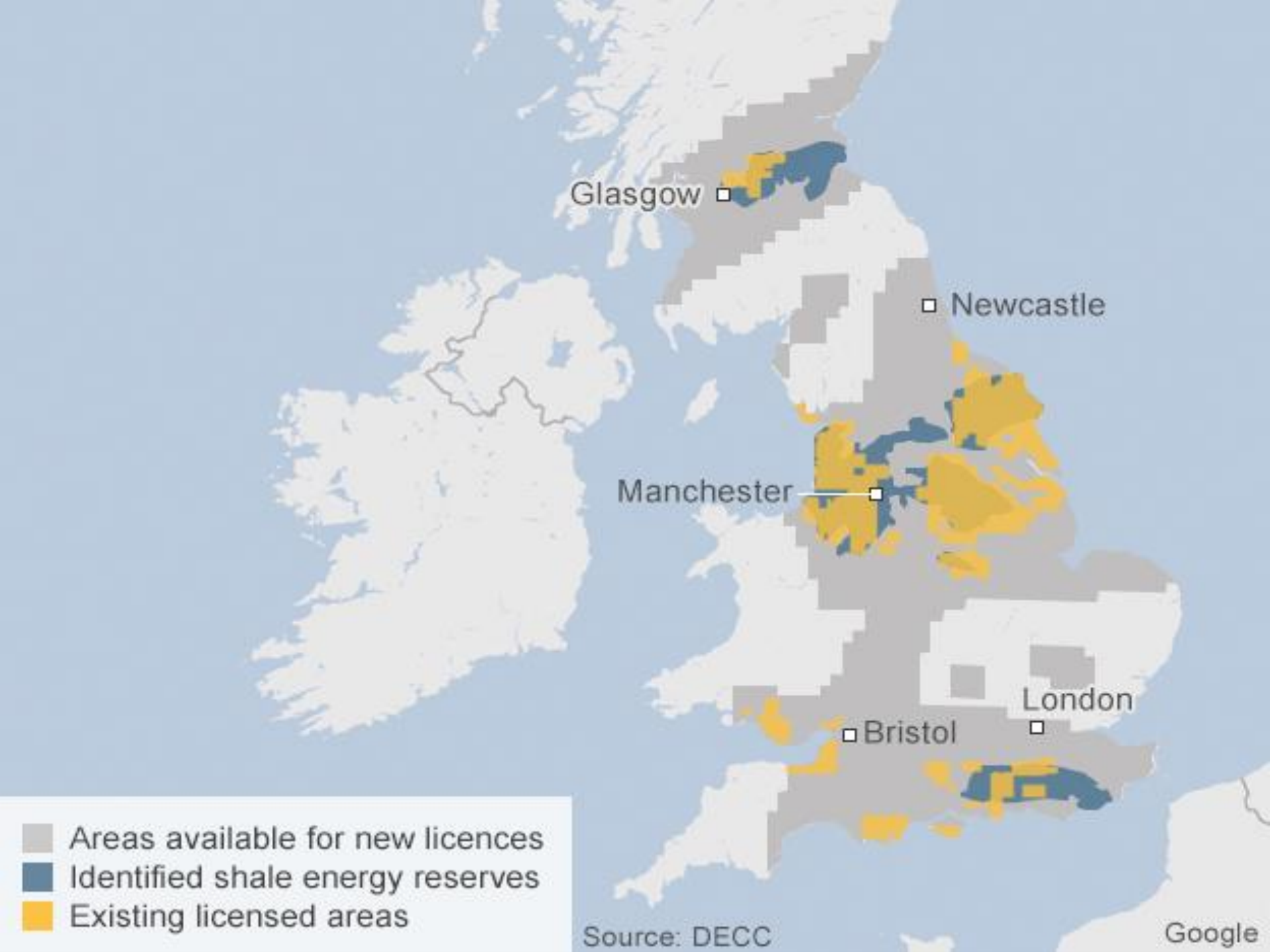
Fracking – the possibilities



High pressure liquids fracture the shale rock and release the gas

- Earthquakes?
- Pollution of water sources
- High costs

Fracking = Fracture


Glasgow
Newcastle
Manchester
London
Bristol
Areas available for new licences
Identified shale energy reserves
Existing licensed areas
Source: DECC
Google

Impacts of energy exploitation (development)

	Economic	Environmental
Nuclear power plants	They are expensive to build. The proposed Hinkley Point plant could cost £18 billion.	Storage of toxic and radioactive waste is a problem – also the risk of leaks.
	Construction of plants creates job opportunities and boosts the local economy.	Warm waste water can harm local ecosystems.
Wind farms	Some attract visitors as they are tourist attractions.	Visual and noise pollution - impact on the landscape.
	High construction costs.	Avoid harmful gas emissions and reduce the carbon footprint.

Which would be best for our local area?

	Economic	Environmental
Nuclear power plants	They are expensive to build. The proposed Hinkley Point plant could cost £18 billion. 	Storage of toxic and radioactive waste is a problem – also the risk of leaks. 
	Construction of plants creates job opportunities and boosts the local economy. 	Warm waste water can harm local ecosystems. 
Wind farms	Some attract visitors as they are tourist attractions. 	Visual and noise pollution - impact on the landscape. 
	High construction costs. 	Avoid harmful gas emissions and reduce the carbon footprint. 

Explain why the UK's energy mix will include ***both*** renewable and non-renewable sources in the **future**.

(6 marks)

Hints:

- Think about the **UK's reserves** of fuel types
- Future development of **technology**
- **Remote location** of some sources of energy
- **Negative** image of **nuclear** energy
- Possibilities of **fracking**