WESTMILL

WeSET

SUSTAINABLE ENERGY TRUST

Electricity

You've got the power!

You've got the power!

- What other types of energy can **electrical energy** be **transformed** into?
  - Thermal energy

You've got the power!

- What other types of energy can **electrical energy** be **transformed** into?
  - Thermal energy
  - Sound energy

You've got the power!

- What other types of energy can **electrical energy** be **transformed** into?
  - Thermal energy
  - Sound energy
  - Light energy

You've got the power!

- What other types of energy can **electrical energy** be **transformed** into?
  - Thermal energy
  - Sound energy
  - Light energy
  - Kinetic energy

You've got the power!

- What other types of energy can **electrical energy** be **transformed** into?
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You've got the power!

- What other types of energy can **electrical energy** be **transformed** into?
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  - Sound energy
  - Light energy
  - Kinetic energy
  - Mechanical energy
  - How would your life be different if you didn't have easy **access to electricity**?

Shedding a little light

- Electric lighting only became common place in homes in the **early 20th century**
- Other sources of light like **candles**, **gas** and **oil** lamps were used to read or work by
  - These light sources involved the use of a naked flame
  - Other than **light energy**, what types of energy does a flame generate?

A light bulb moment!

- Many people played a part in the development of the electric light bulb
  - 1806 **Humphry Davy** invents an **electric arc light**
  - 1841 **Frederick de Moleyns** patents first **incandescent** bulb
  - 1860 and 1879 **Joseph Wilson Swan** patents his bulb designs
  - 1880 **Thomas Edison** patents a commercially viable incandescent bulb

Task 1: Fill in the gaps

- Using the words in the list below, **fill in the gaps** in the following sentences

candles	flame	Thomas Edison	gaslights	arc light	heat	electric

- In 1880, _____ _____ patented an incandescent bulb. This had been a long journey of invention starting with Humphry Davy's ___ ___ almost 80 years before.

- By the early 1900s _____ lighting was commonplace in homes. Before that, homeowners had to use other light sources like _____ and gas or oil lamps. These also released a small amount of ____ energy as well as light energy.

- The problem was that these light sources used a naked _____ which sometimes resulted in fires and explosions. This was a particular problem in public places like theatres where _____ were used to light the front of the stage.

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Electrical energy sources

- There are two types of **source**
- **Renewable** sources include
  - Wind, Solar, Hydro, Geothermal and Biomass
- **Non-renewable** sources include
  - Coal, crude oil and natural gas
  - Is nuclear energy a **renewable** or **non-renewable** source?

Non-renewable

- Non-renewable sources are also known as **fossil fuels**
  - Why is this term used?
- Fossil fuels are also used to make some of the **materials** and **products** we use everyday
  - These include plastics, some fibres and fabrics, and cosmetics
  - What type of **energy** do fossil fuels contain?

Coal

- **Coal** is **mined** using heavy machinery and explosives
- It is the crushed and **burned** to heat water which creates steam
  - The steam drives a **turbine** which drives a **generator**
  - This energy goes through a **transformer** into **the grid**
  - How do we use coal **at home**?

Crude oil

- **Crude oil** reserves lie below the earth's crust on land and at sea
- It is obtained by **drilling a well** and **pumping** it to the surface
  - Like coal, crude oil is **burned** to create steam and the process of transformation is the same
  - How is crude oil is transformed into **mechanical energy**?

Natural gas

- **Natural gas** is often found in similar places to crude oil
- Separate **wells** are drilled to extract the natural gas
  - The gas is sent to processing plants through **pipelines**
  - Like coal and crude oil, gas is also used to generate electricity
  - What other **types of energy** do we use processed natural gas for in our homes?

Task 2: Fuel match

- Match the **fossil fuels, products and extraction methods below**

Natural gas	Coal	Crude oil
		
Drilling wells	Fracking	Mining

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- Match the **fossil fuels, products and extraction methods below**

Natural gas

Coal

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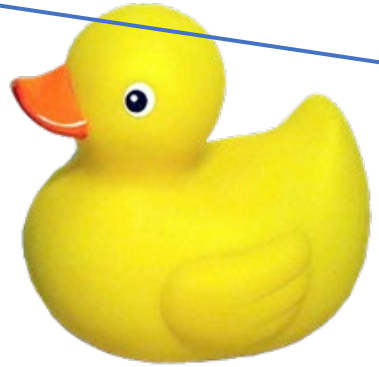

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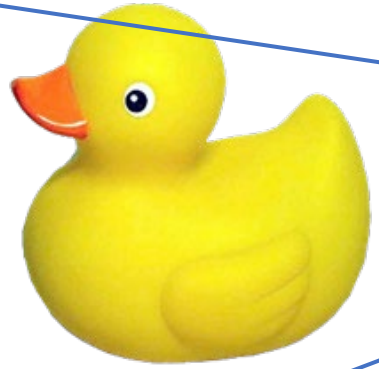

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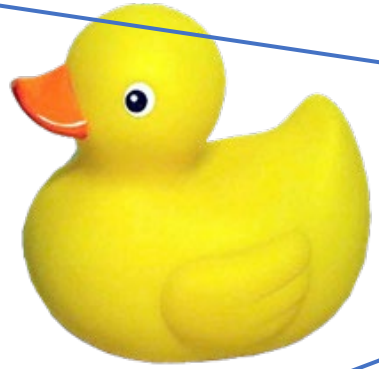

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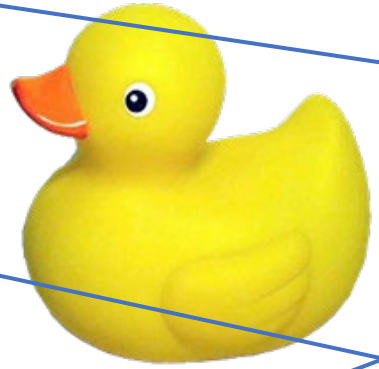

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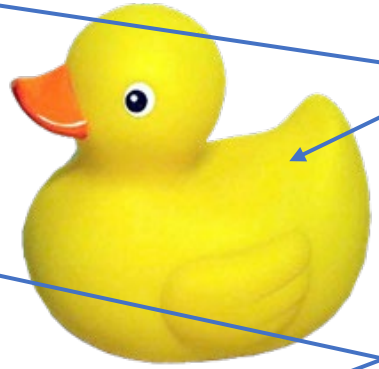

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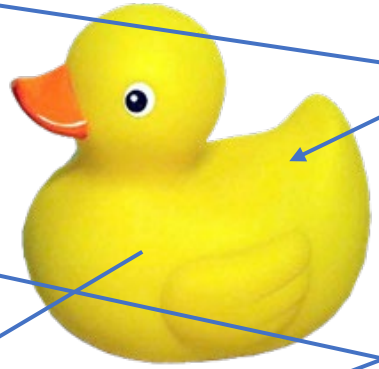

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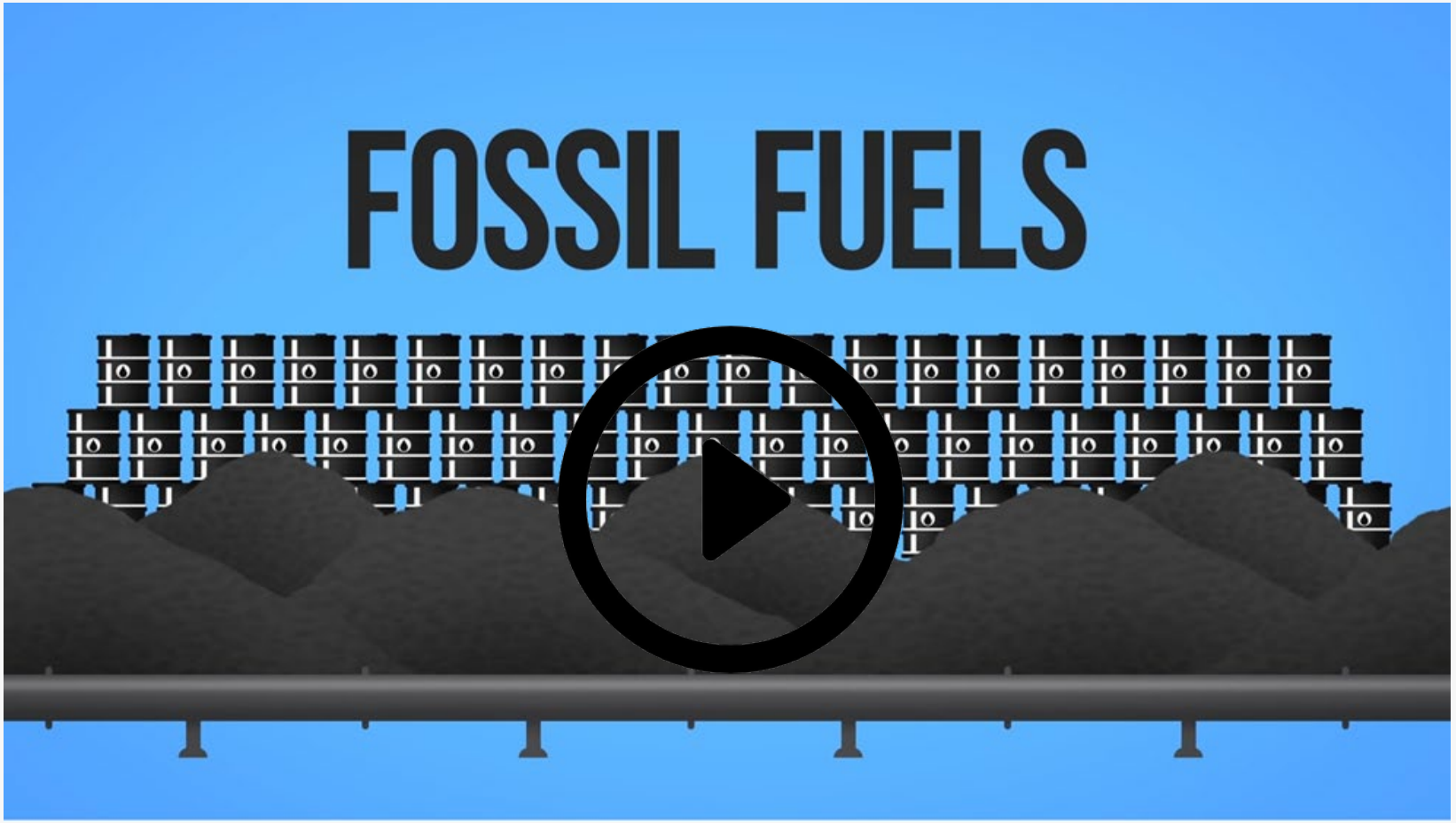
Fossil fuels



The problem with fossil fuels

- Fossil fuels are **finite** resources which means they will ultimately **run out**
- Processing fossil fuels causes **environmental damage**
  - Burning fossil fuels causes **pollution** and releases the **carbons** stored inside
  - What problems are caused by the release of **carbon dioxide (CO_2)** into the atmosphere?

Nuclear energy

- **Nuclear** or **atomic energy** is released by splitting **Uranium atoms** in a nuclear reactor
  - The reaction creates **radiation** which is used to heat water
  - The heat creates steam
  - The steam drives **turbines** which generate electricity
  - Where does **Uranium** comes from?

Why choose renewables?

- **Renewable energy** sources are more **sustainable**
  - What does sustainable mean?
- Renewable energy is **cleaner** as installation and use cause far **less pollution** than fossil fuels
  - In 2019 **renewables** provided roughly a third of the electricity generated in the UK
  - Do you know whether your energy supplier uses renewable energy?

Renewable energy

Wind

- **Wind** is a form of natural **kinetic energy**
- **Wind turbines** are used to generate **mechanical energy**
  - A generator transforms this into **electrical energy**
  - Wind power is a renewable, **sustainable** source of energy
  - Energy from wind has a much **lower environmental impact** than burning fossil fuels
  - Where might you find **wind turbines**?

Solar

- The **conversion** of energy from the sun into electricity is called **solar power**
- Commonly, **photovoltaic cells** are used to convert light into electric current
  - Internationally solar power is the **fastest growing** source of renewable energy
  - In the UK which **direction** do solar panels need to face to capture the most sunlight?

Hydro

- **Hydro power** harnesses the **kinetic energy** of running water or the **gravitational energy** of falling water
- Like **wind power**, a turbine to generates mechanical energy
  - **Hydroelectricity** is the name for electricity produced from hydro power
  - What is the name used for a manmade lake held back by a **dam**?

Geothermal

- **Geothermal** energy is **natural heat energy** stored under the earth's crust
- The Romans used geothermal energy to heat their baths
  - **Geothermal** energy can be used for domestic heating
  - The **steam** can also be used to drive turbines to generate electricity
  - Can you think of any places in the UK were there are **natural hots springs**?

Biomass

- **Biomass** is **organic material** used for heat and electricity
- It can be made from a **crop** which is grown specially or **biproducts** of another industry
  - Wood chip and **waste** from the **timber industry** is often used as biomass
  - Do you think there are any disadvantages to **burning** biomass?

Local renewables

- **Wind** and **solar** are the most common forms of renewable energy in the UK
- Both types of energy are produced at **Westmill**
  - There are 5 **wind turbines**
  - And over 20,000 **photovoltaic** solar panels
  - **How many homes** do you think **benefit** from this power?

Task 3: Renewable sources

- Identify the types of **renewable energy** from the sources pictured below, describe how the sources are **harnessed**
- The first one has been done as an example…

Biomass is organic material. It can be made from a crop grown specially or a **biproduct** of another industry like wood chip

It can be made in to pellets and **burned** to generate heat and electrical energy





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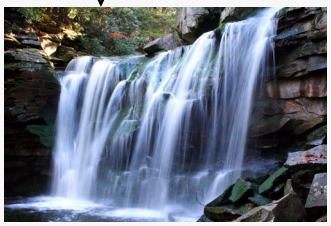
The force of the water turns a a **turbine** to generate mechanical energy



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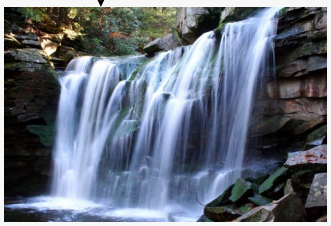

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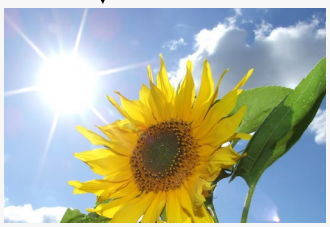
Photovoltaic cells are used to convert light into electric current



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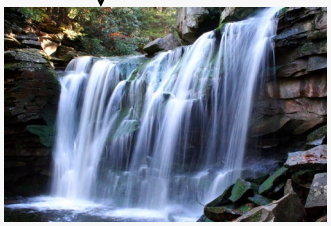

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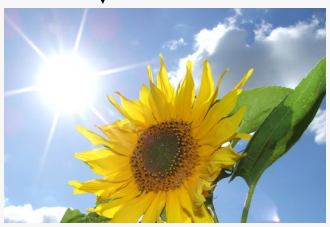

Wind power comes from the natural kinetic energy of the wind

Wind turbines are used to generate mechanical energy which turns a generator creating electrical energy

Looking into the future

- 20 years ago almost all of our electricity came from non-renewables like coal and gas
- The target is to have switched to **'clean energy'** by 2050
  - How can you help make this happen?
  - The **renewable energy sector** is exciting and it is growing fast
  - What type of jobs do you think are available to you in renewable energy?

Looking to the future

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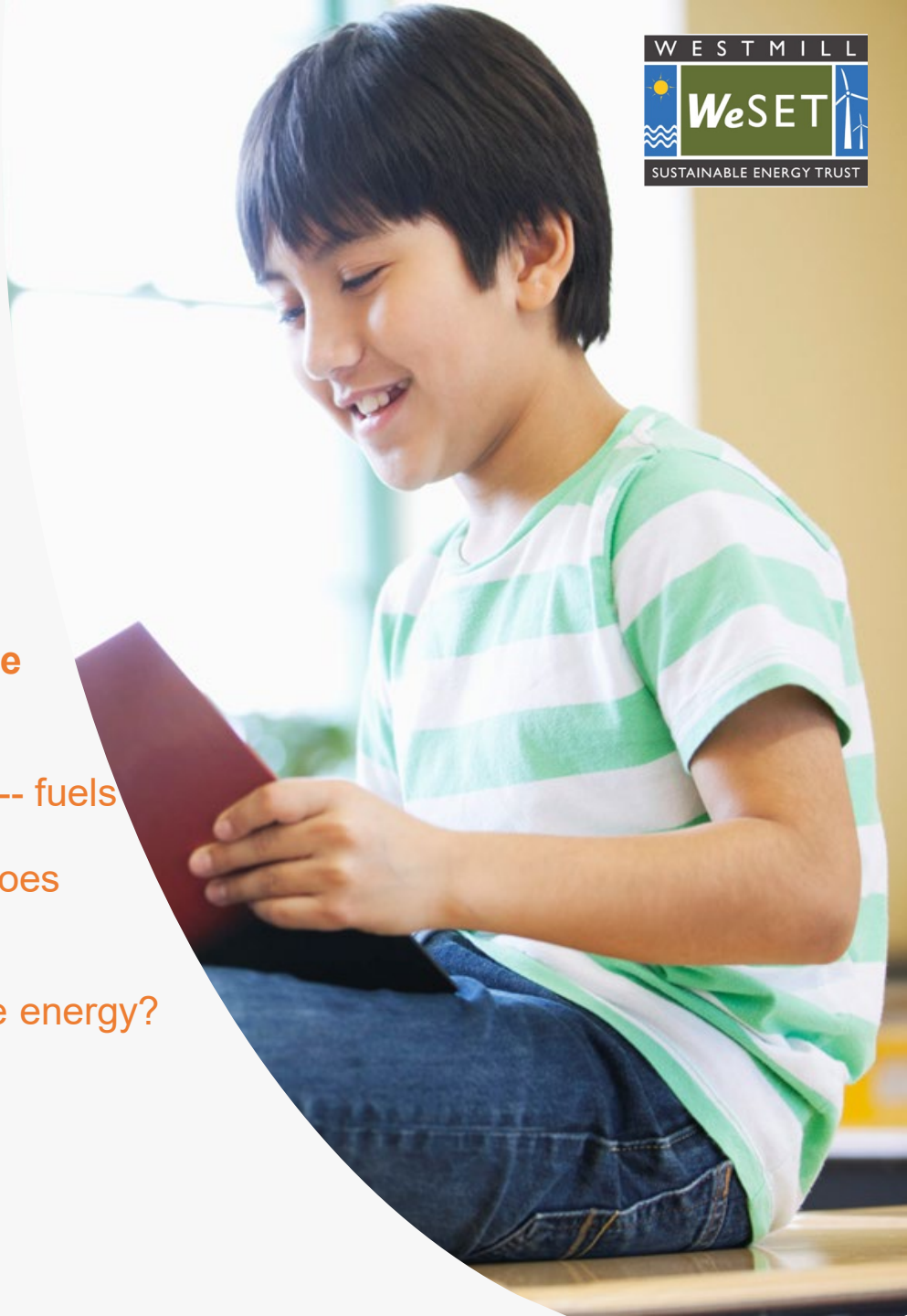

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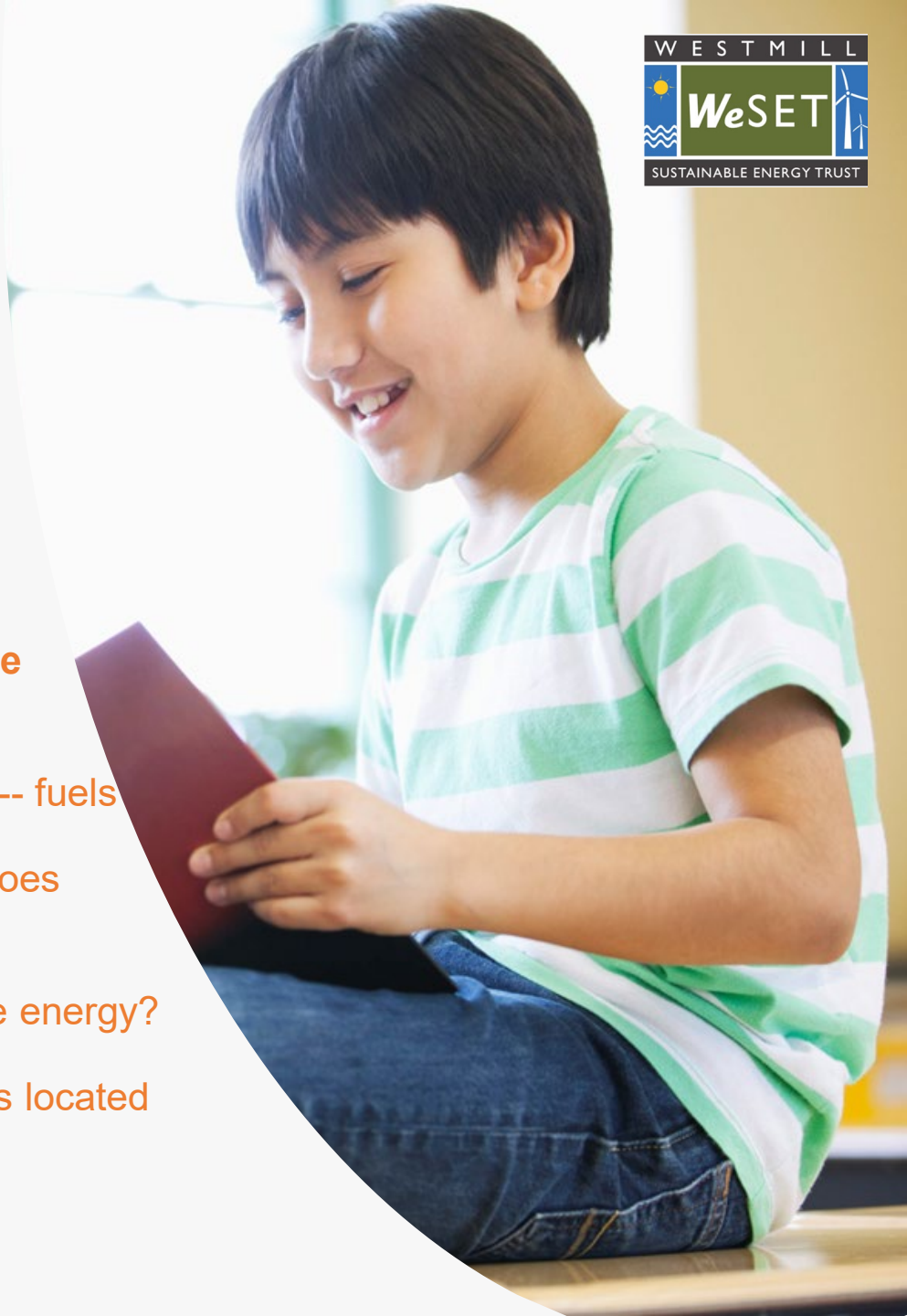
- Where can you find two of these sources located together?



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