

Date:

Learning objective:

Name:

To understand the benefits and drawbacks of different energy sources.

## Coal

Use the following information to note the benefits and drawbacks of the energy source in the table below.



Coal is a sedimentary rock formed over millions of years. It is found by drilling into the Earth's crust. It is non-renewable and will run out.

When coal is burned, carbon dioxide is released which warms the atmosphere, contributing to global warming. New research is looking into reducing these emissions.

Coal provides a huge amount of global energy, around 30%. Coal is quite a reliable source as it is not weather and season-dependent, unlike wind or solar power.



It is more straightforward to generate energy from coal than to generate hydropower or nuclear energy. However, digging for coal may disrupt or destroy surrounding natural habitats and wildlife. Coal mining equipment can be quite noisy and disturb communities. In addition, coal must be transported by lorries that use fuel and release emissions. This may require new roads to be built through

landscapes. Houses may need to be demolished to access the coal underneath them. Once a coal mine has been constructed, it is hard to rebuild over the top of it.

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## Natural gas

Use the following information to note the benefits and drawbacks of the energy source in the table below.



Natural gas is mostly composed of methane and is a fossil fuel. It can be burnt to generate energy for cooking, heating and powering machines. It produces less pollution than coal or oil but will eventually run out.

Natural gas provides around a fifth of global energy. It is easy to transport by ship or through pipes which contributes less to global warming than other fossil fuels. However, it can be quite tricky to process and store. It releases less carbon dioxide than coal and oil when burnt. It is a relatively cheap source of energy. It is found by drilling into the Earth's crust. This process can sometimes negatively impact the environment, as it requires huge amounts of water and dangerous chemicals. The process of extracting gas has occasionally created small earthquakes.

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## Crude oil

Use the following information to note the benefits and drawbacks of the energy source in the table below.



Crude oil is a thick, black liquid that provides a huge amount of global energy.

It is currently readily available, making it relatively cheap. However, it will eventually run out as it is non-renewable. It can be used to generate electricity. Crude oil can also be turned into fuel and petrol through an expensive process. When burnt, it releases greenhouse gases that contribute to climate change.

Even a small amount of oil can generate lots of energy, so it is very efficient. Oil can be stored easily in barrels or tanks until needed, which is not the case with renewable energy, such as solar and wind power. However, there are risks of oil spills. When oil spills occasionally happen in the sea, the oil spill damages natural habitats.



The oil industry creates many jobs for people, although it can sometimes be unsafe as it involves drilling into the Earth's crust. This process can sometimes negatively impact the environment, as it requires huge amounts of water and dangerous chemicals. The extraction of oil has occasionally created small earthquakes.

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# Hydropower

Use the following information to note the benefits and drawbacks of the energy source in the table below.



Hydropower is when moving water generates energy, usually using dams. Primarily, electricity is generated using water wheels, ocean tides and waves. It is a renewable energy source that will never run out and will regenerate naturally. It does not contribute to global warming. The dams used for hydropower are also used for human activity, such as fishing or boating. It is used as a backup water source for water shortages.

However, once set up, hydropower only provides a few job opportunities. It is a more complicated process to generate energy from hydropower than it is from coal. The facilities are expensive to build, as they have to be built into the water, but they are not considered expensive once set up. Dams for hydropower can disrupt the flow and behaviours of fish. Droughts or limited rainfall impact the amount of water in the dam and how much energy can be generated.

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## Wind power

Use the following information to note the benefits and drawbacks of the energy source in the table below.



Wind power refers to the energy generated by wind, mainly using wind turbines. It is a renewable energy source that will never run out and does not contribute to global warming. Wind turbines will only work when windy and can only generate power at certain times. Therefore, most locations will need a backup energy source for when this happens. There is a way to store the energy to use later, but this is expensive.

Wind farms, where there are many turbines, are costly to set up and repair but they are quite cheap to run. There are different types of wind turbines. Smaller ones are used in places with little space for wind turbines and larger ones in places with wide, open spaces.

However, they can be quite noisy, considered unattractive and are a danger to flying birds and bats. More recently, newer turbines are being made quieter. It is worth developing wind energy, as we will need to depend on it more as fossil fuels run out.

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## Geothermal energy

Use the following information to note the benefits and drawbacks of the energy source in the table below.

Geothermal energy is generated by the heat from the Earth's core, caused by the hot temperatures from magma. It heats water in naturally occurring springs (often used to bathe in) and is also used to generate electricity. It is a renewable resource, so it will not run out.



The gases released naturally through the gaps in the Earth's crust can contribute to global warming, but this is still a very small amount when compared to fossil fuel emissions. The process of digging into the Earth's crust to access this energy can negatively impact the environment as it requires huge amounts of water and occasionally creates small earthquakes. It is very expensive to set up but becomes a cheaper energy source once it has been.

At the moment, it is not a widely used way of generating energy but it is becoming more popular as more research becomes available. It is more reliable than wind and solar power, as the places that have geothermal energy will always be able to access it. However, this is only in certain locations around the globe, such as Iceland, and not all countries have this energy source.

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## Solar power

Use the following information to note the benefits and drawbacks of the energy source in the table below.



Solar power is generated by the light from the sun, mainly using solar panels. It can be used directly for heating, cooking and drying items but is now being converted into electricity too. It is a renewable source and is not a significant contributor to global warming compared to fossil fuels.

Solar power is only generated when there is daylight so at night or when the weather is cloudy and overcast, energy will need to be sourced from elsewhere. There are ways to store the energy for use later on, but this is expensive.

Solar panels can be added to the roofs of houses. They are expensive to set up but can help save money on energy bills over time. People can even sell extra electricity they generate to energy companies to make money. However, they are quite large and can be considered unattractive.

Solar panels are also used in more remote areas, to help certain communities in developing countries access electricity.

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## Nuclear power

Use the following information to note the benefits and drawbacks of the energy source in the table below.



Nuclear power uses radioactive materials. It can be used to generate electricity to power machines and heat homes. It does not contribute largely to global warming but it is not a renewable energy source, as it uses materials from the Earth's crust. These will eventually run out but in the distant future.

It creates waste that takes millions of years to break down and can be harmful if not stored properly. Nuclear energy can be expensive and complicated to generate and does not create many job opportunities compared to fossil fuels.

Nuclear energy plants take up less room than solar and wind farms and are more reliable as they can generate constant energy. It is expensive to build but cheaper once it is set up.

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## Biofuel

Use the following information to note the benefits and drawbacks of the energy source in the table below.



Biofuel is generated from natural materials, such as plant matter, animal manure and waste from crops. The energy released is used for cooking, heating homes and powering transport. It is a renewable source of energy. There is still debate about whether this type of energy contributes to global warming. Sometimes the crops grown for biofuel need pesticides which can have a harmful impact on the surrounding environment. These crops also need space to grow which may result in logging.

It is expensive to set up, but it is possible for biofuel to be generated using coal facilities, so there is no need to build new or separate buildings. It is a relatively reliable source of energy, although it is still being developed to use on a large scale. The cost of biofuel is the same as using crude oil for fuel, but as research develops, it may become cheaper.

Biofuel could be useful for countries that do not have their own oil supplies, so they do not have to import it from other countries.

Benefits	Drawbacks