Energy generation

Unit 2 · Energy, materials, systems and devices · matches the "Energy generation" lesson slides (about 60 minutes)

Teacher notes for someone teaching this lesson without a Design and Technology background, including a cover or supply teacher standing in for the usual class teacher.

IF YOU ONLY DO ONE THING (RUSHED COVER LESSON)

If you only do one thing: make sure every pupil can say what "Fossil fuels" means in their own words before the lesson ends. Coal, oil and gas: finite fuels burned to release energy, producing CO2. Ask two or three pupils to explain it back to you - do not just ask "does that make sense?".

Key facts in plain language

These are the facts this lesson depends on. They are written in plain English, not subject jargon, so you can say them in your own words while you teach.

Fossil fuels:
Coal, oil and gas: finite fuels burned to release energy, producing CO2.

Renewable:
An energy source that will not run out, such as wind, solar or tidal.

Non-renewable:
An energy source that will run out, such as fossil fuels or nuclear fuel.

Turbine:
A machine turned by steam, wind or water that drives a generator.

Nuclear power:
Energy released by splitting uranium atoms (fission) to heat water into steam.

Biomass:
Plant or animal material burned or fermented to release energy.

Common misconceptions

Drawn from the wrong answers pupils pick in this lesson's own question bank, paired with the explanation that is already written for the right answer.

Pupils may think: "Natural gas" is correct.
Why it is wrong: the correct answer is "Wind". Wind is replenished naturally and will not run out. The others are finite.

Pupils may think: "A boiler" is correct.
Why it is wrong: the correct answer is "A turbine". Steam, wind or water turns a turbine, which spins the generator. The boiler only makes the steam.

Pupils may think: "They are renewable, so supplies are unpredictable" is correct.
Why it is wrong: the correct answer is "Burning them releases CO2, adding to climate change". Burning coal, oil and gas releases CO2 and other pollutants.

Pupils may think: "Its output depends on the wind and the sunlight" is correct.
Why it is wrong: the correct answer is "Its radioactive waste stays dangerous for thousands of years". Nuclear produces very little CO2, but its waste stays dangerous for thousands of years.

Pupils may think: "Renewable sources produce too little power to be useful" is correct.
Why it is wrong: the correct answer is "Wind and solar vary, so other sources must cover demand". Wind and solar vary, so reliable sources or storage cover the gaps.

Talking points to follow the slide deck

The slide deck for this lesson follows the usual DT Classroom shape: a retrieval starter, then each key term below in turn, worked examples, exam-style practice, then an exit ticket. Use these lines as you reach each part - they are the same facts as above, just phrased as something you can say out loud.

When the deck reaches "Fossil fuels": say — Coal, oil and gas: finite fuels burned to release energy, producing CO2. Ask: "can someone give me an example?"

When the deck reaches "Renewable": say — An energy source that will not run out, such as wind, solar or tidal. Ask: "can someone give me an example?"

When the deck reaches "Non-renewable": say — An energy source that will run out, such as fossil fuels or nuclear fuel. Ask: "can someone give me an example?"

When the deck reaches "Turbine": say — A machine turned by steam, wind or water that drives a generator. Ask: "can someone give me an example?"

When the deck reaches "Nuclear power": say — Energy released by splitting uranium atoms (fission) to heat water into steam. Ask: "can someone give me an example?"

When the deck reaches "Biomass": say — Plant or animal material burned or fermented to release energy. Ask: "can someone give me an example?"

Worked answers to this lesson's questions

The same question bank used for this lesson's knowledge organiser self-check and worksheet exam practice. Use this page as the answer key, or cover the right-hand explanation and hand out the questions as a silent task (see the cover lesson box below).

1. Which of these is a renewable energy source?

a) Natural gas, b) Coal, c) Wind, d) Uranium

Answer: c) Wind. Wind is replenished naturally and will not run out. The others are finite.

2. What do most power stations use to turn a generator?

a) A boiler, b) A condenser, c) A turbine, d) A transformer

Answer: c) A turbine. Steam, wind or water turns a turbine, which spins the generator. The boiler only makes the steam.

3. What is a main disadvantage of burning fossil fuels?

a) They are renewable, so supplies are unpredictable, b) They produce radioactive waste that lasts for years, c) They only generate power when the weather allows, d) Burning them releases CO2, adding to climate change

Answer: d) Burning them releases CO2, adding to climate change. Burning coal, oil and gas releases CO2 and other pollutants.

4. Which is a disadvantage of nuclear power?

a) Its output depends on the wind and the sunlight, b) Its radioactive waste stays dangerous for thousands of years, c) It releases large amounts of CO2 while it is running, d) It cannot provide a steady supply of power through the night

Answer: b) Its radioactive waste stays dangerous for thousands of years. Nuclear produces very little CO2, but its waste stays dangerous for thousands of years.

5. Why is a mix of energy sources usually used?

a) Renewable sources produce too little power to be useful, b) Using several sources stops fossil fuels running out, c) Wind and solar vary, so other sources must cover demand, d) The National Grid can only accept one type at a time

Answer: c) Wind and solar vary, so other sources must cover demand. Wind and solar vary, so reliable sources or storage cover the gaps.

READY-TO-RUN COVER LESSON

Project the existing lesson slides as normal; read the key facts and talking points above before the lesson starts.

Low-prep silent task (needs no workshop tools or machinery): write or display the numbered questions above without the "Answer:" line, and have pupils answer them in silence on paper. Mark from the answers above at the end, or next lesson.

If the lesson plan calls for tools, machinery, heat or anything hands-on, do not run that part as a non-specialist cover teacher - set the silent task above instead and leave the practical for the subject teacher. See the general workshop safety guide in the Teachers hub.