AQA GCSE

Design and Technology 8552

1

Energy generation

Unit 2
Energy, materials, systems and devices

PG ONLINE

Objectives

- Understand how power is generated from fossil and nuclear fuels
- Understand how power is generated from renewable energy sources such as: wind, solar, tidal, hydroelectric and biomass
- Be aware of the arguments for and against the selection of fossil fuels, renewable energy and nuclear power

Where does our energy come from?

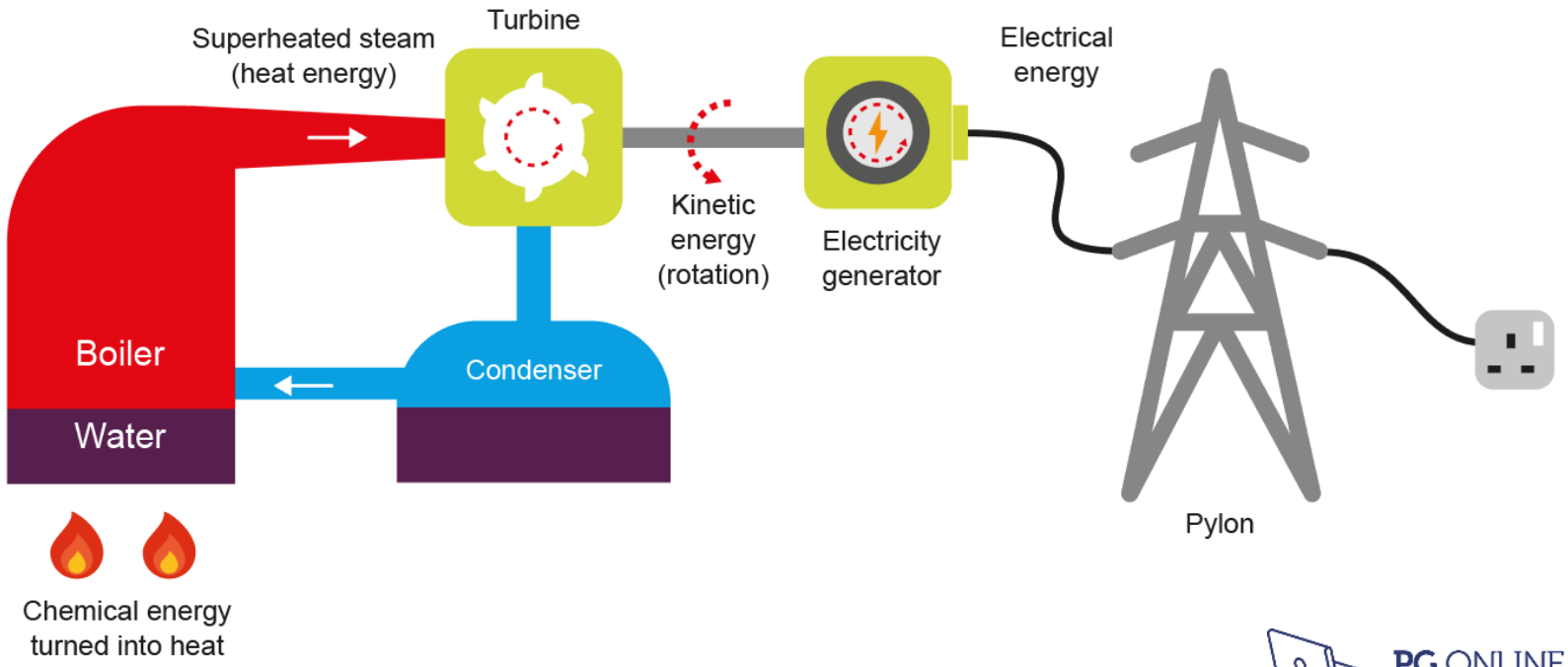
- Name as many energy sources as you can think of
  - How is power generated from these sources?

Fossil fuels

- Fossil fuels are formed from the fossilised remains of plants and animals over millions of years
  - Coal, oil and gas are extracted through mining and drilling
  - Why are fossil fuels considered a **finite** resource?
  - Why are they so relied upon for power generation?

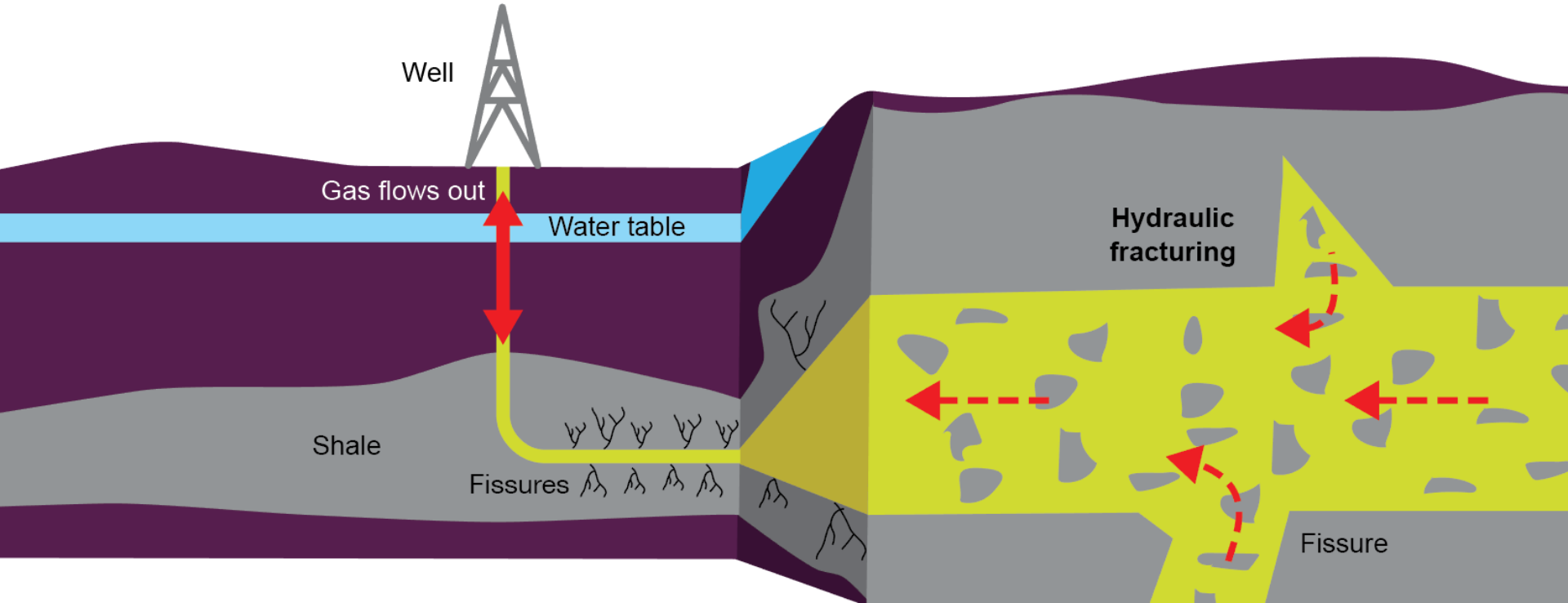
Energy generation

- Fossil fuels can be burned to superheat water under pressure, which in turn, drives turbines
  - How is energy from fuel converted to electricity at this point?



What is fracking?

- Fracking involves drilling into layers of shale rock deep in the earth to release pockets of gas
  - Water, sand and chemicals are injected into a well in order to force gas back up – what could go wrong?

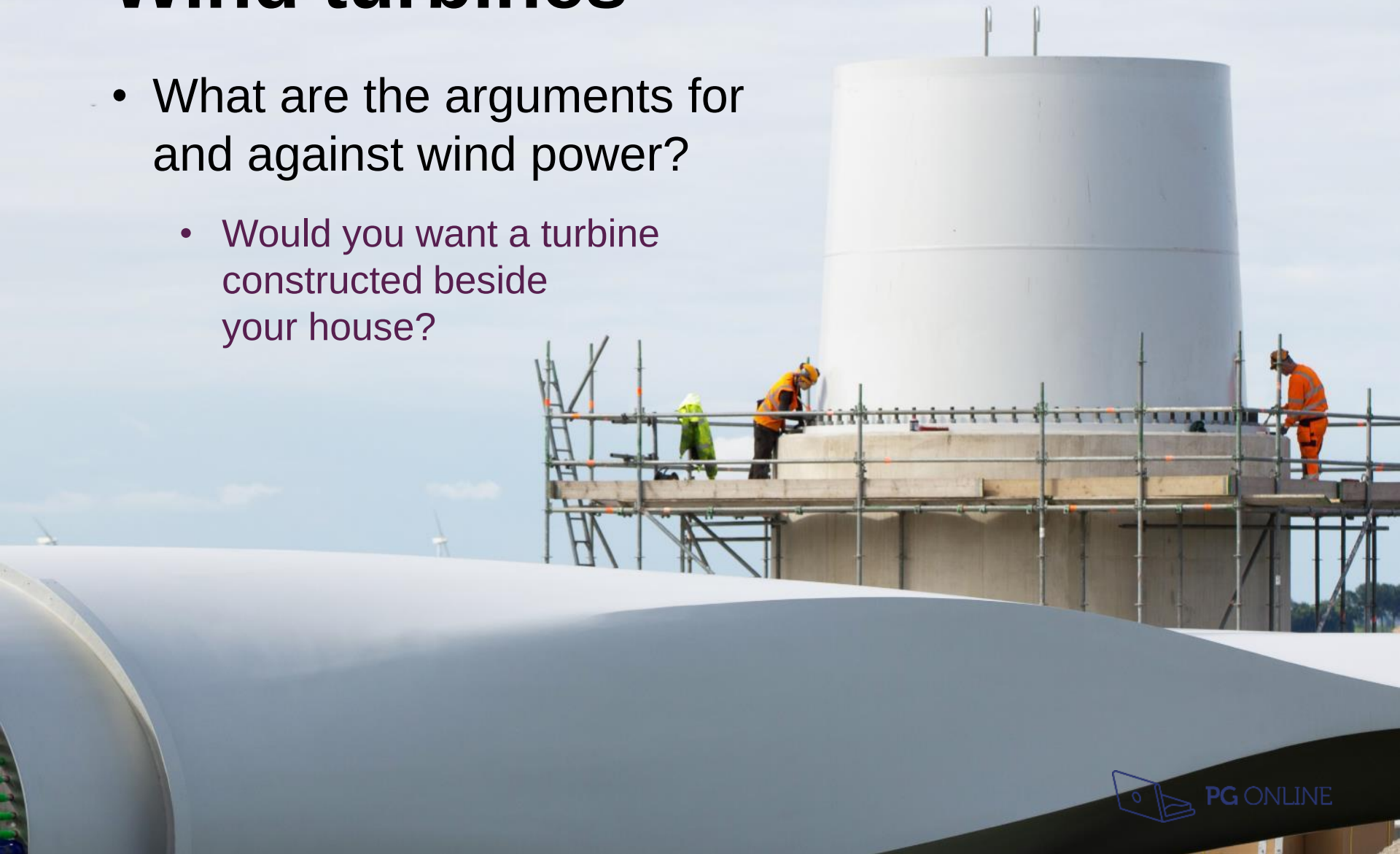


Renewable energy sources

- Renewable alternatives to fossil fuels include:
  - Wind
  - Solar
  - Tidal
  - Biomass
  - Hydroelectric
- Why are these classified as ‘renewable’?

Wind turbines

- What are the arguments for and against wind power?
  - Would you want a turbine constructed beside your house?



Wind turbines

- What are the arguments for and against wind power?

For	Against

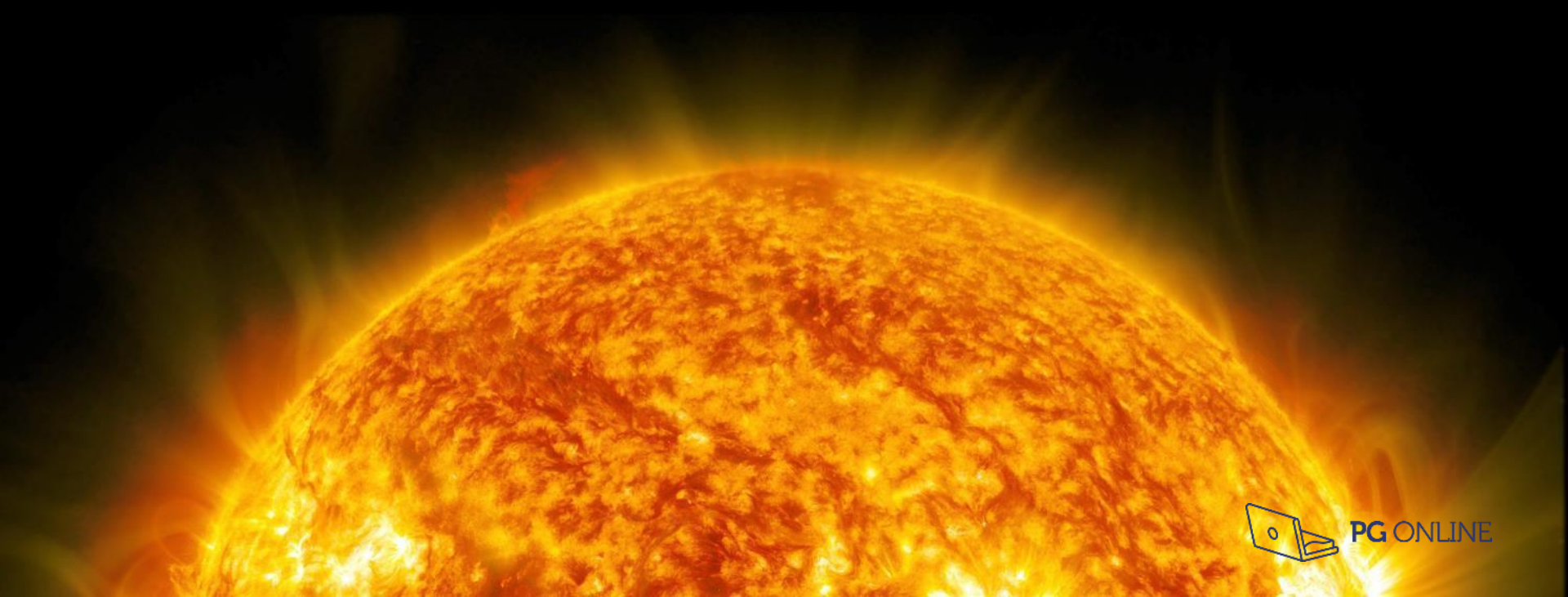
Wind turbines Answers

- What are the arguments for and against wind power?

For	Against
Low maintenance	Only work when windy
Clean energy	Eyesore to some
Higher winter output	Hazard to birds
Low cost energy	Noise

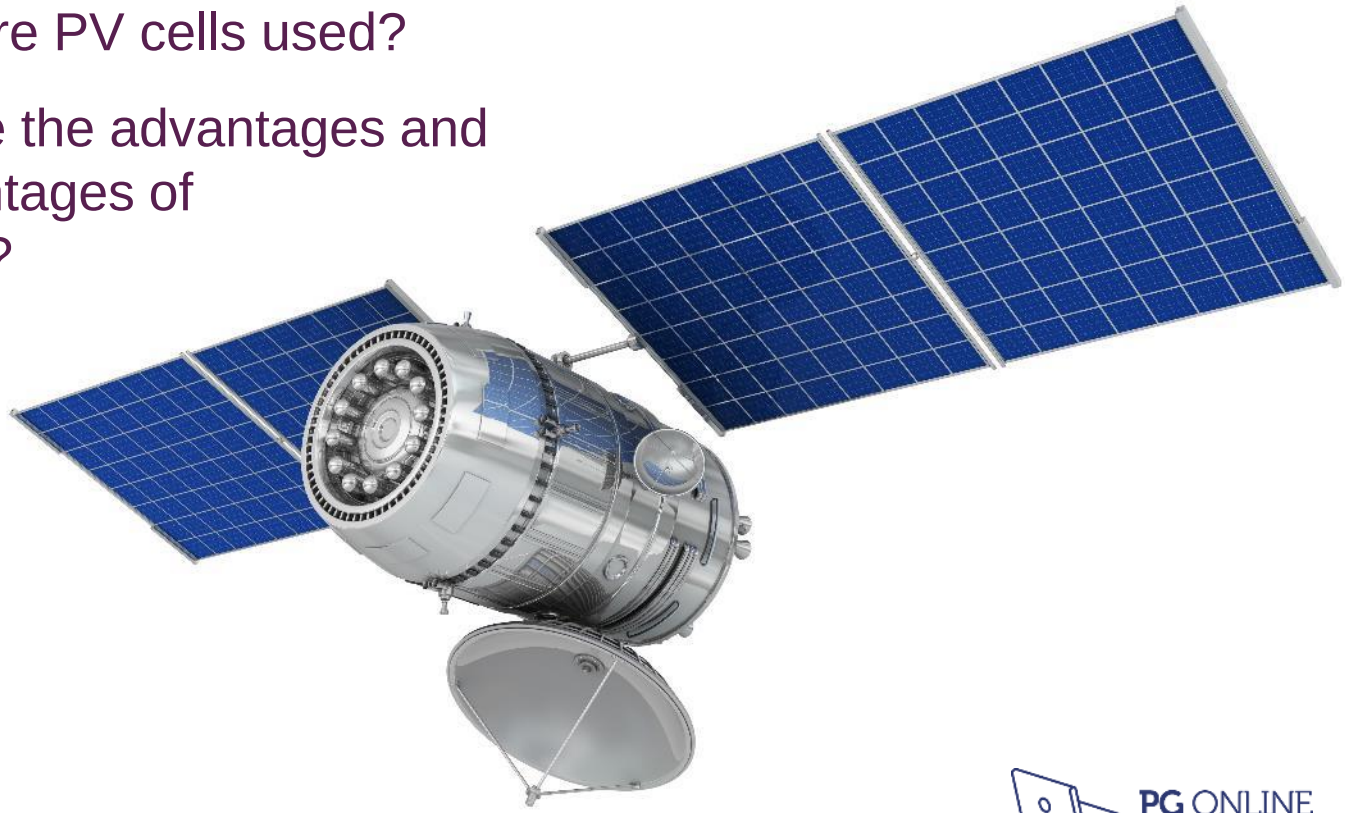
Solar energy

- The Sun produces a constant stream of solar energy that reaches Earth
  - In just **one hour** it provides enough energy to power the world for **one year**



Photovoltaic cells

- Light photons hit the PV cell which allows electrons to flow, creating an electric current
  - Where are PV cells used?
  - What are the advantages and disadvantages of PV cells?



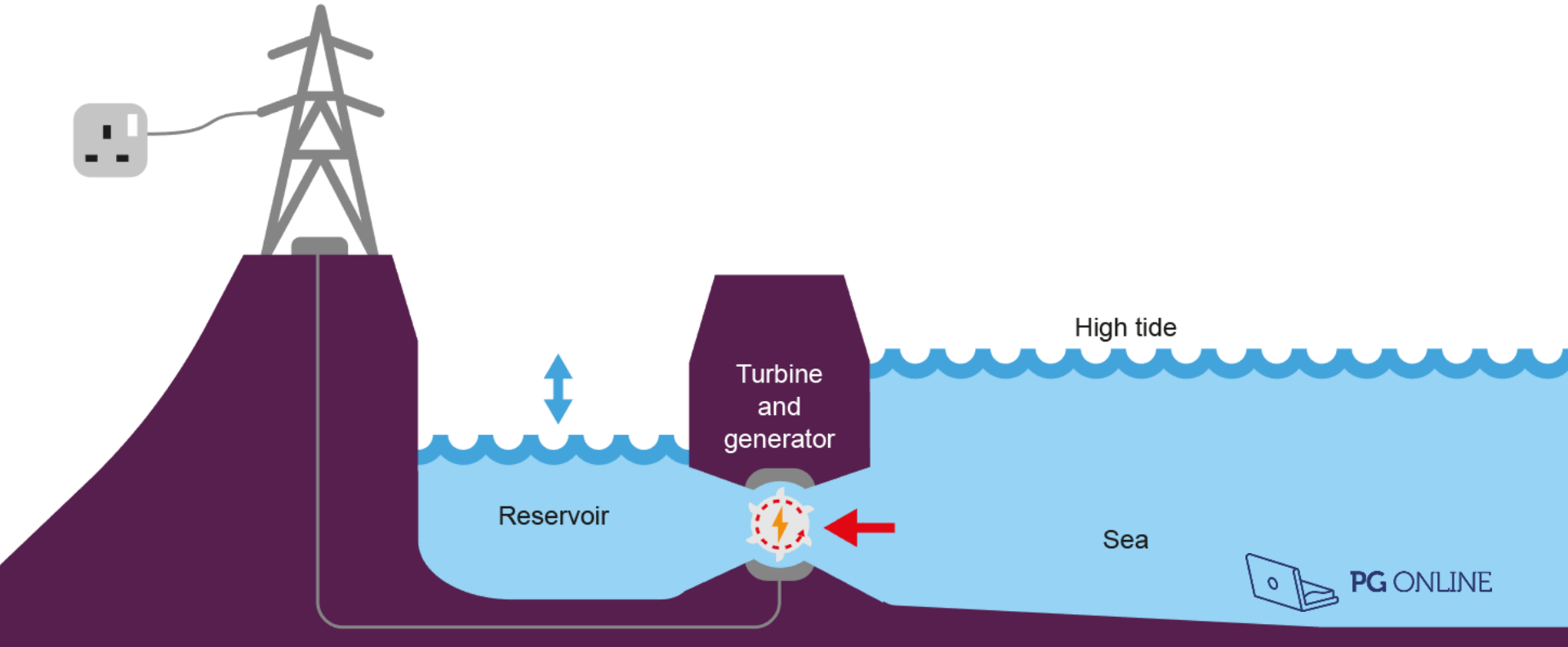
Solar energy

- The advantages and disadvantages of using PV cells to harness solar power include:

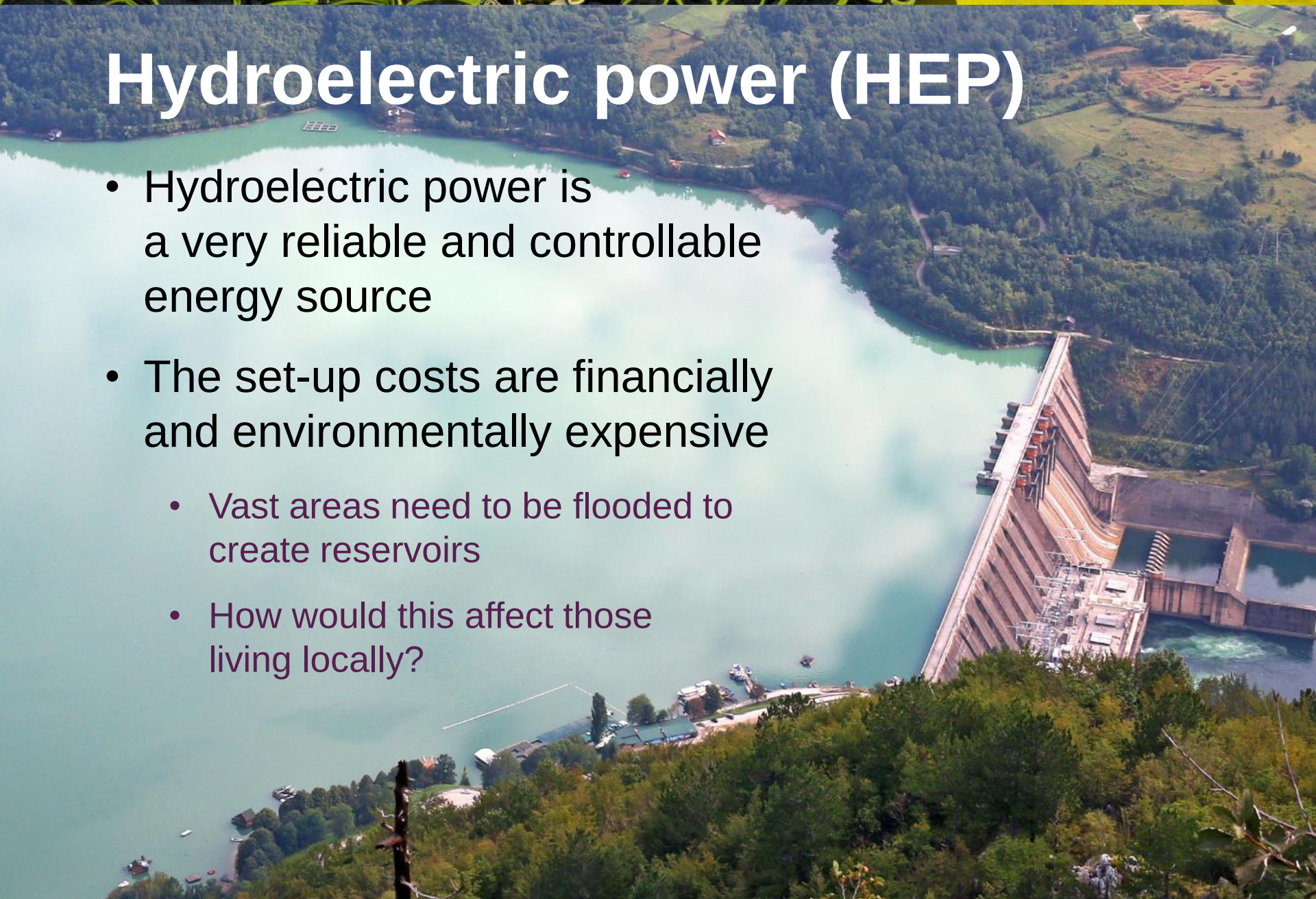
Advantages	Disadvantages
Low maintenance	Seasonal fluctuations
Clean energy	No power generated at night
Relatively low-cost	Complex positioning issues

Tidal energy

- The rise and fall of the tide forces water through turbines which drive generators to produce electricity
  - What are the advantages and disadvantages of this system?



Hydroelectric power (HEP)



- Hydroelectric power is a very reliable and controllable energy source
- The set-up costs are financially and environmentally expensive
  - Vast areas need to be flooded to create reservoirs
  - How would this affect those living locally?

Biofuel and biomass

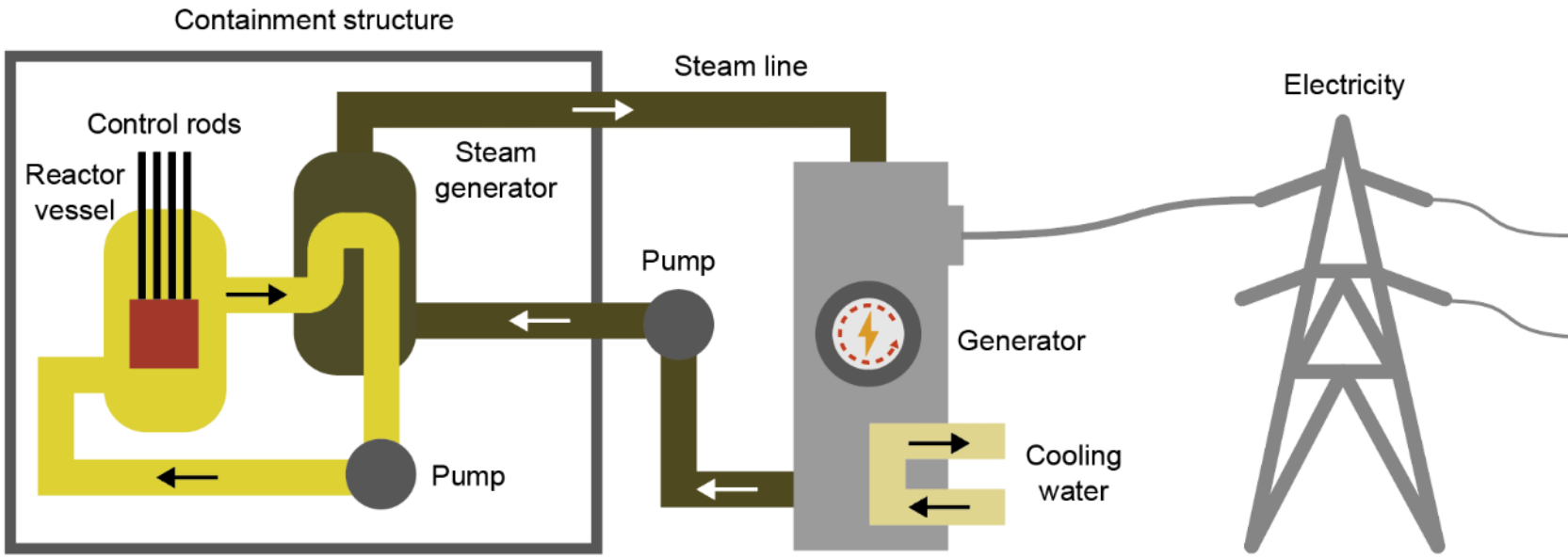
- Biofuel and biomass are created from organic matter which is burned to generate power
  - Biomass fuels include food and farm waste, compost and wood chips or compressed pellets
  - Why is biomass considered to be carbon neutral?

Nuclear power

- Nuclear power accounts for over 11% of the world's electricity
  - Is nuclear power a renewable energy source?

What about nuclear power?

- Nuclear power provides an abundant, reliable supply of clean energy
  - Why, therefore, is it so unpopular with some campaigners?



Worksheet 1

- Complete **Tasks 1** and **2** of the worksheet
  - Look at the mix of the UK's electricity supply
  - Examine the arguments for and against nuclear energy

Plenary

- Explain the role heated water plays in producing electricity along with turbines
- Explain how a mixture of energy sources can provide a reliable supply of electricity
- Explain why fossil fuels are a finite resource
  - What is their connection with greenhouse gases?

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