

GCSE Physics

Worksheet: National and global energy resources

TIME 30 min	TOTAL 30 marks	CALCULATOR Allowed	DIFFICULTY Easy, Medium
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Topics: National and global energy resources

NAME	CLASS	DATE
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- Use black ink or black ball-point pen. Pencil should only be used for drawing.
- Answer all questions in the spaces provided.
- In all calculations, show clearly how you work out your answer.
- The marks for questions are shown in brackets.

0 1

0 1 . 1

 Which of these is a fossil fuel?

Tick (✓) **one** box.

Uranium

☐

Biomass

☐

Natural gas

☐

Wind

☐

[1 mark]

0 1 . 2

 Which **two** of these are advantages of using nuclear fuel to generate electricity, compared with fossil fuels?

Tick (✓) **two** boxes.

No carbon dioxide is released during generation

☐

It can respond instantly to changes in demand

☐

A small mass of fuel releases a very large amount of energy

☐

There is no risk of accidents

☐

[2 marks]

0 2

0 2 . 1

Wave power generates electricity from the movement of...

Tick (✓) **one** box.

tides

☐

waves at the sea surface

☐

wind

☐

rivers

☐

[1 mark]

0 2 . 2

Is wave power a renewable or a non-renewable energy resource?

.....

.....

.....

[1 mark]

0 2 . 3

Which **two** statements about wave power are correct?

Tick (✓) **two** boxes.

Wave power produces no carbon dioxide during generation

☐

Wave power can provide a constant, reliable output at all times

☐

Wave-powered generators can be damaged by storms

☐

Wave power uses a fuel that must be imported

☐

[2 marks]

0 3

Energy resources can be renewable or non-renewable.

0 3 . 1

What is meant by a **renewable** energy resource?

.....

.....

[1 mark]

0 3 . 2

Which **two** energy resources are renewable?

Tick (✓) **two** boxes.

coal

☐

geothermal

☐

natural gas

☐

nuclear fuel

☐

tides

☐

[2 marks]

0 3 . 3

Name **one** energy resource that is used for transport.

.....

.....

[1 mark]

0 4

Electricity can be generated using wind turbines, solar cells and gas-fired power stations.

0 4 . 1

Explain why wind turbines are **not** a reliable way of generating electricity.

.....

.....

.....

.....

[2 marks]

0 4 . 2

Solar cells generate no electricity at night.

Give **one** other reason why the output of solar cells varies.

.....

.....

[1 mark]

0 4 . 3

Gas-fired power stations are often used to meet sudden increases in the demand for electricity.
Suggest why.

.....

.....

.....

.....

[2 marks]

0 4 . 4

Give **one** environmental problem caused by burning natural gas.

.....

.....

[1 mark]

.....

0 5

Table 1 shows the percentage of the electricity in one country that was generated from different energy resources in 2010 and in 2024.

Table 1

Energy resource	Percentage in 2010	Percentage in 2024
coal	30	1
natural gas	44	36
nuclear	17	13
wind	3	28
solar	0	6
biofuel	4	12
hydro-electric	2	4

0 5 . 1

Calculate the percentage of the electricity generated from renewable energy resources in 2024.

.....

.....

.....

.....

Percentage = %

[2 marks]

0 5 . 2

Describe the main changes shown in Table 1.

.....

.....

.....

.....

.....

.....

[3 marks]

0 5 . 3

Suggest **two** reasons for these changes.

.....

.....

.....

.....

[2 marks]

0 6

Energy resources are used for transport, for heating and for generating electricity.

0 6 . 1

Give **two** energy resources that are used for heating homes.

.....

.....

.....

.....

[2 marks]

0 6 . 2

Some cars use bio-ethanol as a fuel. Bio-ethanol is made from sugar cane.
Explain why bio-ethanol is a renewable energy resource.

.....

.....

[1 mark]

0 6 . 3

Burning bio-ethanol releases carbon dioxide.
Explain why bio-ethanol is sometimes described as ‘carbon neutral’.

.....

.....

.....

.....

[2 marks]

0 6 . 4

Give **one** disadvantage of growing crops to make biofuels.

[1 mark]

END OF QUESTIONS

Original practice questions written to match the specification. Not produced by, affiliated with or endorsed by AQA.

Mark scheme

GCSE Physics · Worksheet: National and global energy resources · 30 marks

Question 1 (3 marks)

01.1 [1 mark]

Correct: Natural gas

01.2 [2 marks]

Correct: No carbon dioxide is released during generation; A small mass of fuel releases a very large amount of energy

Question 2 (4 marks)

02.1 [1 mark]

Correct: waves at the sea surface

02.2 [1 mark]

Answer: Renewable

- renewable (1)
-

02.3 [2 marks]

Correct: Wave power produces no carbon dioxide during generation; Wave-powered generators can be damaged by storms

Question 3 (4 marks)

03.1 [1 mark]

Answer: A resource that is being (or can be) replenished as it is used.

- (a resource that) is (being) replenished as it is used / will not run out (1)
-

03.2 [2 marks]

Correct: geothermal; tides

03.3 [1 mark]

Answer: Oil (petrol or diesel), or a biofuel.

- oil / petrol / diesel / biofuel / (natural) gas (1)

Notes: Do not accept electricity (it is not an energy resource).

Question 4 (6 marks)

04.1 [2 marks]

Answer: The wind does not always blow (its speed varies), so the power output varies and cannot be increased to match demand.

- the wind does not always blow / the wind speed varies (1)
- so the power output varies / cannot be matched to demand (1)

04.2 [1 mark]

Answer: Cloud cover (or shorter days / lower Sun in winter).

- cloud cover / weather / season / shorter days in winter / angle of the Sun (1)

04.3 [2 marks]

Answer: They have a short start-up time, and their output can be controlled by changing the rate at which fuel is burned.

- (gas-fired power stations) have a short start-up time / can be started quickly (1)
- the output can be controlled / increased when needed (by burning more fuel) (1)

04.4 [1 mark]

Answer: It releases carbon dioxide, which contributes to global warming (climate change).

- releases carbon dioxide which contributes to global warming / climate change / releases nitrogen oxides which contribute to acid rain (1)

Notes: Do not accept 'pollution' unqualified.

Question 5 (7 marks)

05.1 [2 marks]

Answer: 50%

- $28 + 6 + 12 + 4$ (1)
- 50 (%) (1)

Notes: Allow 1 mark for adding only three of the four renewable resources (22, 38, 44 or 46 (%)).

05.2 [3 marks]

Answer: Coal fell from 30% to almost nothing; natural gas and nuclear fell slightly; wind rose from 3% to 28%; solar and biofuel increased.

- the use of coal decreased greatly (from 30% to 1%) (1)
- the use of wind increased greatly (from 3% to 28%) (1)
- the use of solar / biofuel / renewables increased (1)
- the use of natural gas / nuclear decreased (slightly) (1)
- the total percentage from fossil fuels halved (from 74% to 37%) (1)

Any 3 of the points above.

05.3 [2 marks]

Answer: Any two from: to reduce carbon dioxide emissions / climate change; fossil fuels are running out; renewable technologies have become cheaper; government targets or policies; to reduce reliance on imported fuel.

- to reduce carbon dioxide emissions / global warming / climate change (1)
- fossil fuel reserves are running out / are non-renewable (1)
- the cost of wind turbines / solar cells has fallen (1)
- government targets / laws / subsidies (1)
- to reduce reliance on imported fuels (1)

Any 2 of the points above.

Question 6 (6 marks)

06.1 [2 marks]

Answer: Any two from: natural gas; heating oil; coal; wood (biofuel); the Sun (solar water heating); geothermal.

- natural gas (1)
- oil (1)
- coal (1)
- wood / biofuel (1)
- the Sun / solar (water heating) (1)
- geothermal (1)

Any 2 of the points above.

Notes: Do not accept electricity (it is not an energy resource).

06.2 [1 mark]

Answer: More sugar cane can be grown to replace what is used, so it is replenished as it is used.

- (more) sugar cane can be grown / the crop can be replaced (as quickly as it is used) (1)

06.3 [2 marks]

Answer: The sugar cane absorbs carbon dioxide from the air as it grows (photosynthesis), balancing the carbon dioxide released when the fuel burns.

- the sugar cane absorbs / takes in carbon dioxide (for photosynthesis) as it grows (1)
- (the same amount as) the carbon dioxide released when bio-ethanol is burned (1)

06.4 [1 mark]

Answer: The land could be used to grow food (or forests are cleared, destroying habitats).

- uses land that could grow food / leads to deforestation / destroys habitats (1)
-