9.5 Energy Security Case Study: Whitelee Windfarm and Sustainable Energy Use: 10-minute Pack

AQA 8035 · Calculators not allowed · about 10 minutes

Total Marks

Name: _____ Date: ____ / ____ / _____

Answer ALL questions. Show all your working.

1 State the location of Whitelee Windfarm in the UK, giving the nearest major city and the broader region.

(Total for Question 1 is 2 marks)

2 State ONE reason why locating Whitelee on former forestry and moorland was chosen rather than in an urban area.

(Total for Question 2 is 1 mark)

3 State the installed electrical capacity of Whitelee Windfarm and explain what is meant by 'installed capacity'.

(Total for Question 3 is 2 marks)

4 Give ONE advantage of Whitelee Windfarm for local employment in the area around Glasgow.

(Total for Question 4 is 1 mark)

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5 Suggest ONE economic disadvantage to local land users from the creation of a large windfarm on previously used moorland or forestry.

(Total for Question 5 is 1 mark)

6 Suggest ONE reason why Whitelee's electricity output is described as intermittent and explain how this affects energy reliability.

(Total for Question 6 is 1 mark)

7 Explain ONE limitation of relying on a single large windfarm, such as Whitelee, to meet a region's energy needs.

(Total for Question 7 is 2 marks)

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Mark scheme · 9.5 Energy Security Case Study: Whitelee Windfarm and Sustainable Energy Use: 10-minute Pack

Question 1

nearest major city: Glasgow, oe **B1**

region: on Eaglesham Moor / South Lanarkshire / near Glasgow in west central Scotland, oe **B1**

Answer: Near Glasgow on Eaglesham Moor in South Lanarkshire, west central Scotland.

Question 2

reason: large open area with stronger and more consistent winds, available space for turbines and lower conflict with dense population, oe **B1**

Answer: Because moorland provides large open space with stronger, more consistent winds and fewer conflicts with dense population than urban areas.

Question 3

installed capacity: 539 MW **B1**

explanation: the maximum electrical power the windfarm can produce at any instant when all turbines are generating at full output, oe **B1**

Answer: Installed capacity 539 MW. This is the maximum electrical power the windfarm can produce at one time when all turbines are operating at full output.

Question 4

creates jobs, e.g. maintenance, operations, visitor centre staff, or construction jobs during building, oe **B1**

Answer: It creates jobs, for example in turbine maintenance and operations, visitor centre staff and construction roles during installation.

Question 5

example: loss of grazing land or forestry income, or disruption to existing local businesses during construction, oe **B1**

Answer: Loss of grazing land or forestry income for local land users, reducing their income during and after construction.

Question 6

reason: wind speed varies so turbines do not produce electricity continuously, oe **B1**

Answer: Because wind speeds vary, turbines do not produce electricity continuously; this intermittency means output can drop when wind is low, so other generation or storage is needed to maintain reliability.

Question 7

limitation stated, e.g. intermittency meaning output is variable and cannot be relied on at all times, oe **B1**

linked consequence, e.g. requires backup generation or storage, increasing overall system cost or complexity, oe **B1**

Answer: A limitation is intermittency, because output varies with wind so the region still needs backup generation or storage which increases cost and complexity.

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