9.2 Impacts of Energy Insecurity and Large-Scale Strategies to Increase Supply: 30-minute Pack

AQA 8035 · Calculators not allowed · about 30 minutes

Total Marks

Name: _____ Date: ____ / ____ / _____

Answer ALL questions. Show all your working.

1 Describe and explain TWO trade-offs policymakers must consider when deciding between large-scale fracking, nuclear power or renewables to increase national energy supply.

(Total for Question 1 is 4 marks)

2 Evaluate the extent to which a policy mix of nuclear power plus large-scale renewables is the best strategy for the UK to increase energy supply and improve energy security.

(Total for Question 2 is 8 marks)

3 Describe one way that geopolitical tensions over energy supplies can affect the UK energy market, naming an effect.

(Total for Question 3 is 2 marks)

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4 Explain one economic benefit of continuing fossil fuel extraction such as fracking for shale gas for the UK economy.

(Total for Question 4 is 2 marks)

5 Explain one environmental drawback of large-scale onshore wind farms when deployed at scale in rural areas of the UK.

(Total for Question 5 is 2 marks)

6 The Hinkley Point C nuclear project in the UK is a named large-scale strategy to increase supply. Describe TWO benefits that supporters claim for nuclear power such as Hinkley Point C.

(Total for Question 6 is 2 marks)

7 Suggest THREE reasons why some communities oppose the development of new nuclear power stations in their area.

(Total for Question 7 is 3 marks)

8 Using the example of a large-scale solar farm, explain FOUR possible drawbacks to biodiversity and land use when converting agricultural land to solar arrays.

(Total for Question 8 is 4 marks)

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Mark scheme · 9.2 Impacts of Energy Insecurity and Large-Scale Strategies to Increase Supply: 30-minute Pack

Question 1

trade-off 1: speed and cost versus environmental impact, e.g. fracking can be quicker and cheaper to bring online but may cause local environmental damage and emissions, oe	**B1**
linked explanation for trade-off 1, e.g. policymakers must weigh short-term economic and security gains against long-term environmental harm and public opposition, oe	**B1**
trade-off 2: reliability and baseload versus safety and waste, e.g. nuclear provides reliable baseload power but raises issues of radioactive waste and high upfront costs, oe	**B1**
linked explanation for trade-off 2, e.g. policymakers balance the need for steady supply and low-carbon output with concerns about cost, safety and long-term waste management, oe	**B1**

Answer: They must balance speed and cost against environmental impact, for example fracking may be quicker and cheaper to start but risks local environmental damage and emissions; and weigh reliability and baseload against safety and waste, for example nuclear gives steady low-carbon power but involves high upfront costs, safety concerns and long-term radioactive waste.

Question 2

Level 4 A detailed, well-balanced evaluation that uses accurate, named evidence for both nuclear and renewables (eg Hinkley Point C, UK offshore wind growth); weighs benefits for energy security, carbon reduction and reliability against drawbacks such as cost, waste, intermittency and land-use; reaches a clear, justified conclusion about the overall effectiveness of a mixed policy.	**7-8**
Level 3 A clear evaluation that discusses advantages and disadvantages of combining nuclear and renewables with some supporting examples; a reasoned conclusion is given but the balance of evidence may be less developed.	**5-6**
Level 2 Some relevant points about nuclear and renewables are made, with limited supporting detail or examples; a simple judgement is offered with limited justification.	**3-4**
Level 1 One or two isolated points about strategies to increase supply are made, with little or no evaluation or supporting evidence.	**1-2**
Level 0 No relevant content.	**0**

Indicative content:

- Arguments supporting the mix: nuclear provides low-carbon baseload power and improves reliability while large-scale renewables such as offshore wind provide large low-carbon generation potential and reduce dependence on imports, together improving energy security and helping meet carbon targets.
- Examples to use: Hinkley Point C as a named nuclear project; UK offshore wind farms and planned solar/wave projects as named renewable developments.
- Costs and finance: nuclear has very high capital cost and long build times, which can strain public finances or require long-term contracts; renewables can have high upfront cost but falling unit costs and quicker deployment.
- Intermittency and storage: renewables are intermittent and require storage, grid upgrades or flexible generation to ensure supply matches demand; nuclear is less flexible but complements intermittent sources.
- Environmental and social drawbacks: nuclear creates radioactive waste and raises safety concerns; renewables at scale can have land-use and biodiversity impacts and local opposition; fracking, though not part of the mix here, exemplifies trade-offs between quick supply and local environmental damage.
- Policy implementation issues: planning, public acceptance, long-term waste solutions and investment certainty are critical; a mixed strategy requires coherent policy, investment in grid and storage, and public engagement.
- A reasoned conclusion might argue that a mixed policy is strong because it balances baseload and low-carbon variability, but it must be accompanied by investments in storage, network upgrades and clear waste management and financing plans to be the most effective approach.

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Question 3

disruption to imported supplies, e.g. pipeline or shipping interruptions, oe **B1**

linked consequence, e.g. this can push up wholesale prices and lead to higher consumer bills in the UK, oe **B1**

Answer: Geopolitical tensions can disrupt imported supplies, for example pipeline or shipping interruptions, which can push up wholesale prices and lead to higher consumer bills in the UK.

Question 4

reduces reliance on imported fuels, oe **B1**

linked detail, e.g. potentially lower wholesale prices and increased energy security leading to lower costs for industry and jobs in extraction areas, oe **B1**

Answer: It can reduce reliance on imported fuels, potentially lowering wholesale prices and increasing energy security, which can reduce costs for industry and support jobs in extraction areas.

Question 5

visual impact on landscapes, oe **B1**

linked detail, e.g. can affect scenic views, tourism and local sense of place, and may lead to local opposition, oe **B1**

Answer: They can have a strong visual impact on landscapes, affecting scenic views, tourism and a local sense of place, which can lead to local opposition to development.

Question 6

provides low-carbon baseload electricity, reducing greenhouse gas emissions compared with fossil fuels, oe **B1**

linked benefit, e.g. long-term, reliable electricity supply that supports industry and households, oe **B1**

Answer: It provides low-carbon baseload electricity which helps reduce greenhouse gas emissions compared with fossil fuels, and offers a long-term reliable electricity supply that supports industry and households.

Question 7

concern about radioactive waste and its long-term storage, oe **B1**

fear of accidents or perceived safety risks, oe **B1**

local disruption during construction and impact on property values or local environment, oe **B1**

Answer: Concerns include radioactive waste and its long-term storage, fear of accidents and perceived safety risks, and local disruption during construction with potential impacts on property values and the local environment.

Question 8

loss of existing habitat or farmland, oe **B1**

fragmentation of habitats, reducing movement of species between areas, oe **B1**

local microclimate changes, e.g. shading, altered ground temperature or water runoff patterns affecting plants and invertebrates, oe **B1**

possible disturbance during construction and maintenance, e.g. vehicle movement and human activity reducing wildlife presence, oe **B1**

Answer: Possible drawbacks include loss of existing habitat or farmland; fragmentation of habitats limiting species movement; local microclimate changes such as shading and altered runoff affecting plants and invertebrates; and disturbance during construction and maintenance from vehicles and human activity.

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