

Key Concepts & Definitions:

Renewable Energy: Resources that are naturally replenished or inexhaustible on a human timescale (e.g., solar, wind, hydro, geothermal, biomass, tidal).

Non-Renewable Energy: Resources that are **finite** and cannot be **replenished** on a human timescale (e.g., fossil fuels: coal, oil, gas; nuclear fuel: uranium).

Reliability: How consistently an energy source can provide power on demand.

Intermittency: The characteristic of an energy source that is not continuously available (e.g., wind, solar, tidal).

Environmental Impact: Effects on the environment (e.g., greenhouse gas emissions, habitat destruction, visual pollution).

Section A: Key Terms & Classifications

1. Match the descriptions (i-v) to the correct energy resource classification or characteristic (A-E). Write the letter in the box provided.

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|---|-------------------------|-------|
| (i) A resource that is naturally replenished and will not run out. | A) Renewable | _____ |
| (ii) A resource that is finite and takes millions of years to form. | B) Non-renewable | _____ |
| (iii) An energy source that releases greenhouse gases when burned. | C) Fossil fuels | _____ |
| (iv) An energy source whose output depends on weather conditions. | D) Intermittent | _____ |
| (v) An energy source that uses uranium as its fuel. | E) Nuclear | _____ |

2. Complete the sentences below using the most appropriate scientific terms:

- a) Fossil fuels are considered _____ because they are _____ and take millions of years to form.
- b) Wind power is an _____ energy resource because its output depends on variable _____ conditions.
- c) Hydroelectric power is a _____ resource that is generally _____ but can have significant environmental impacts on local ecosystems.

Section B: Core Concepts & Explanations

3. Answer the following questions, providing clear scientific explanations:

- a) Explain why fossil fuels are considered non-renewable energy resources.

- b) Describe one environmental advantage of nuclear power compared to fossil fuels for electricity generation.

- c) Explain why solar power is considered an intermittent energy resource.

d) Compare the reliability of tidal power with wind power for generating electricity.

Section C: Exam Application & Extended Writing

4. A country is planning its future energy mix and considers two main options: coal-fired power stations and offshore wind farms. The table below summarises some characteristics of these two energy resources.

Characteristic	Coal (Fossil Fuel)	Offshore Wind
Reliability	High	Low
Greenhouse Gas Emissions (during operation)	High	Zero
Fuel Cost (after initial setup)	Significant	Zero
Visual Impact	Low (plant)	High (turbines)
Start-up Time	Medium	Instant

a) Based on the information in the table, identify which energy resource would be better suited for meeting a country’s **base load demand** (the minimum level of demand on an electrical grid over 24 hours). Justify your answer.

b) Evaluate the advantages and disadvantages of using fossil fuels and renewable energy resources for large-scale electricity generation in the UK.
