Solutions

Marking: **M1** a correct method, **A1** the correct answer, **B1** an independent mark.

Each answer shows the steps, then the **result**.

2.1

renewable: replaced naturally as fast as it is used, e.g. wind, solar, HEP; non-renewable: a finite stock that is used up much faster than it forms, e.g. coal, oil, gas

2.2

any three, explained: natural resources available (e.g. coal reserves, rivers for HEP, strong sun); cost and access to technology; politics and energy security, e.g. avoiding imports from unstable suppliers; climate targets and public opinion, e.g. opposition to nuclear

3.1

(a) renewables $= 8\% + 7\% = 15\%$; $0.15 \times 2000 =$ **300** PJ

(b) any two: large coal reserves of its own; coal power is cheap and steady; existing power stations and mining jobs; less money for new technology

3.2

(a) advantage: no fuel cost / very low emissions / falling price; disadvantage: no output at night or in cloud, so storage is needed / uses land

(b) strength: very low CO_2 per unit, steady output day and night; limitation: high cost and 10+ years to build; radioactive waste and accident risk; public opposition; judgement: helpful where it is accepted, but slow, so renewables are faster for quick cuts

3.3

award up to [6]: low security: depends on few suppliers; supply and price can be cut by conflict or politics; build domestic renewables (wind, solar, HEP), which need no imported fuel; improve efficiency (insulation, transport), so less energy is needed; storage, grid links and a mix of sources to deal with variable output; limits: high early cost; land and materials; transition time; jobs in old industries; conclusion: diversification plus efficiency improves both goals, with justification

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