



**M1.**

*allow 1 mark for each correct line  
if more than one line goes from an energy source then all lines from that energy source are wrong*

**[3]**

**M2.**

- (a) gas (burning) 1
- (b) (i) (transmission) cables and (step-up and step-down) transformers 1  
*if transformers are named ie step-up transformer then both step-up and step-down must be given  
mention of power station or consumer negates mark*
- (ii) voltage 1  
 more efficient 1
- (c) increase 1

**[5]**

**M3. (a) (i)** any **one** from:

- produces no (air / atmospheric) pollution  
*accept named pollutant eg CO<sub>2</sub>*  
*accept no harmful gases*  
*accept produces no emissions*  
*accept does not add to global warming*  
*environmentally friendly is insufficient*
- energy (source) is free  
*accept no fuel costs*  
*accept the wind / it is free*

1

(ii) any **one** from:

- waves
- tides
- falling water  
*accept hydroelectric*  
*do **not** accept water (flow)*
- solar  
*accept Sun / sunlight*  
*accept solar panels / cells*
- geothermal
- biofuel / biomass  
*accept a named biofuel*

1

(b) (i) 3000 (kilowatts)

*accept 3 megawatts / MW*  
*accept 3 000 000 watts / W*

1

(ii) (average) wind speed below 6 m/s

*answers giving a wind speed greater than 3 but less than 6  
m/s gain both marks*  
*allow 1 mark for calculating the output as 500 kW  
(maximum)*

*and*

*allow 1 mark for wind speed too low or wind not strong enough*

*do **not** accept wind above 25 m/s*

*do **not** accept the turbines are frozen*

2

(iii) A small amount of nuclear fuel generates a large amount of electricity.

*both required*

Nuclear power stations do not depend on the weather to generate electricity.

1

[6]

- M4.** (a) (i) correct data point identified (4, 0.96) 1
- (ii) a decrease in 1
- (b) (i) no / less atmospheric pollution 1  
*accept specific examples eg no CO<sub>2</sub> / greenhouse gases produced*  
*accept no harmful gases / fumes*  
*accept reduced pollution from transportation (of coal)*  
*accept does not contribute to global warming*  
*it / they refers to solar cells*  
*do **not** accept no / less pollution*  
*does not harm the environment is insufficient*  
*it is a renewable energy source is insufficient*
- (ii) 8 2  
*allow **1** mark for showing correct method ie  $\frac{7600}{950}$  provided that no subsequent step is shown*
- (iii) increase 1
- (iv) **these marks can score even if (b)(iii) is wrong** 1  
 less / no electricity generated  
*accept energy for electricity*  
*accept reduced power / voltage output*
- (because) lower light intensity (hitting solar panel / cell)  
**or**  
 so decreases money paid / gained (from selling electricity)  
*allow less light / sun (hitting solar panel / cell)* 1

- M5.** (a) grid *accept any unambiguous indication* 1
- (b) (i) A (only) 1
- (ii) D (only) 1
- (c) less than 1 **[4]**
- 
- M6.** (a) (i) an unreliable energy source 1
- (ii) a renewable energy source 1
- (b) plant / grow (at least) one new tree 1
- (c) greater than 4% 1 **[4]**

M7. (a) electrical

1

chemical

1

light

1

(b) 25% **or** 0.25

*allow 1 mark for correct substitution, ie  $50 \div 200$  provided no subsequent step shown **or** answers of 25 with a unit **or** 0.25 with a unit gain 1 mark  
answers of 25 without a unit **or** 0.25% gain 1 mark*

2

(c) the information board can be used anywhere it is needed

1

[6]

- M8.** (a) any **two** from:
- nuclear
  - oil
  - (natural) gas
- 2
- (b) 4 (hours) 1
- (c) a system of cables and transformers 1
- (d) The power output of wind turbines is unpredictable 1
- (e)  $1500 / 0.6$  1
- 2500 (wind turbines) 1
- allow 2500 with no working shown for 2 marks*
- (f) Most energy resources have negative environmental effects. 1

**[8]**

**M9.** (a) (i) changing the distance may / will affect / change the voltmeter reading  
*accept so only one independent variable*  
*accept distance affects speed of wind (turbine)*  
*accept it is a control variable*  
*accept to give valid results*  
*fair test is insufficient*  
*to make the results accurate is insufficient*

1

(ii) any sensible practical suggestions, eg

- so fan reaches a steady / full speed  
*accept power for speed*
- so wind (turbine) reaches a steady / full speed
- so voltmeter reaches / gives a steady reading  
*accept accurate or valid reading a correct reading is insufficient*  
*do **not** accept precise reading*

1

(iii) as the number of blades increases so does the (voltmeter) reading / output / voltage  
*number of blades affects the reading / output is insufficient*

1

further relevant detail, eg

- voltmeter increase is greatest up to 3 blades
- voltmeter reading hardly changes with 4, 5 or 6 blades  
*accept does not change between 4 and 6 blades*
- increase is directly proportional up to 3 blades
- it reaches a limit  
*accept does not change after 4 / 5 blades*
- a numerical example giving two pairs of numbers, eg 2 blades = 0.6V, 4 blades = 1V

1



(b) C

*reason scores only if C is chosen*

1

wind speed / strength varies

*accept wind is **not** constant / reliable*

1

[6]

<b>M10.</b>	(a)	(i)	77	1
		(ii)	Oil	1
	(b)	water	<i>accept H<sub>2</sub>O</i>	1
	(c)	Carbon dioxide causes global warming		1
				<b>[4]</b>

M11. (a) (i) water 1

heated

*accept boiled or turned to steam*

*do **not** accept evaporated*

1

generator

1

(ii) geothermal power stations provide a reliable source of electricity

1

(b) falling water

1

[5]