

CAMBRIDGE INTERNATIONAL EXAMINATIONS
International General Certificate of Secondary Education

MARK SCHEME for the May/June 2013 series

**0417 INFORMATION AND COMMUNICATION
TECHNOLOGY**

0417/21

Paper 2 (Practical Test A), maximum raw mark 80

This mark scheme is published as an aid to teachers and candidates, to indicate the requirements of the examination. It shows the basis on which Examiners were instructed to award marks. It does not indicate the details of the discussions that took place at an Examiners' meeting before marking began, which would have considered the acceptability of alternative answers.

Mark schemes should be read in conjunction with the question paper and the Principal Examiner Report for Teachers.

Cambridge will not enter into discussions about these mark schemes.

Cambridge is publishing the mark schemes for the May/June 2013 series for most IGCSE, GCE Advanced Level and Advanced Subsidiary Level components and some Ordinary Level components.

| | | | |
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Centre Number

Offshore Wind Energy

Report by: Candidate Name

Title
 Data entry 100% accurate, centre aligned 1 mark
 26 pt, sans-serif, bold & underlined 1 mark

Subtitle
 Data entry 100% accurate, 18 pt sans-serif 1 mark
 Italic, bold, right aligned 1 mark

A Global Power Source



Wind harnesses the power of the wind. It is a clean, renewable energy source that is growing in North America, Canada and Asia. Onshore wind energy potential is concentrated in agricultural and industrial areas. The largest potential is found in low depth areas of the North Sea, the Baltic Seas and the Atlantic Ocean, with some local opportunities in areas of the Mediterranean and Black Seas. The deep offshore potential is even larger but costs mean development is slow.

offshore wind farm being installed in Denmark in 1991. Europe has taken the lead due to strong wind resources, shallow water in the North Sea and the Baltic Sea, and Government recognition of the role offshore wind will play to meet renewable energy needs.

potential equal to three times its electricity demand. Surrounded by a large shallow continental shelf with good access to available strong and constant offshore winds it is ideally placed to exploit the enormous potential for offshore wind power and offshore wind farm development. The sea is relatively shallow around the land masses allowing for turbine foundations to be driven into the seabed rather than attempting to accomplish a complicated floating system of turbines. To date, 9 offshore wind farms have been built around the UK coastline with 330 offshore turbines, equating to 778.4 MW of installed capacity. The UK has a target of securing 15% of all its energy needs for electricity, heat and transport from renewable sources.

New subhead 100% accurate & correct location 1 mark
 All subheads (6) formatted centre, sans-serif, 14 pt, bold, u/l 1 mark

Appropriate image in correct location 1 mark
 Text wrap, aligned left & top 1 mark
 Resized 3.5 cm high, aspect ratio maintained 1 mark

power. It is growing at the rate of 30% annually and is extensively used in Europe, Asia and the United States.

From an emerging fuel source twenty years ago, wind energy has transformed into a major business.

Body text
 3 columns, 1.5 cm col spacing 1 mark
 12 pt, serif font 1 mark
 Single line space, fully justified 1 mark

Footer
 Date left, Name & Cand Number right 1 mark

| Name | Sea | Capacity |
|----------------|-----------|----------|
| Thanet | North Sea | 300 |
| Gunfleet Sands | North Sea | 172 |
| Inner Dowsing | North Sea | 120 |
| Lynn | North Sea | 97 |
| Kentish Flats | North Sea | 90 |

DB extract

- Inserted in correct place within column width 1 mark
- UK, Operational, North Sea 1 mark
- Capacity >=90 1 mark
- Descending order of Capacity 1 mark
- Fields Name, Sea, Capacity in order 1 mark

Asia will soon overtake Europe as the region with the largest capacity.

Europe's offshore wind potential is huge with the technical potential of offshore wind being six to seven times greater than projected electricity demand. At the end of 2010 there were 1,136 offshore wind turbines installed and connected to the grid on 45 wind farms in 9 countries with an operating capacity of 2,396 MW. The 9 European countries with offshore wind power capacity in 2010 were:

| Offshore wind power in Europe | |
|-------------------------------|---------------|
| Country | Capacity (MW) |
| UK | 1341 |
| Denmark | 854 |
| Netherlands | 249 |
| Belgium | 195 |
| Sweden | 164 |
| Germany | 92 |
| Finland | 26 |
| Ireland | 25 |
| Norway | 2.3 |

Largest offshore wind farms

- Table**
- Correct place, 2 cols 11 rows, within column width 1 mark
 - Data entry 100% accurate 2 marks
 - Top row cells merged 1 mark
 - Top row only text bold and centred 1 mark
 - Font matches body text 1 mark
 - Top two rows only shaded grey 1 mark

... (MW) was the largest project under construction. These projects will be dwarfed by subsequent wind farms which are planned, including Dogger Bank at 9,000 MW, Norfolk Bank (7,200 MW), and Irish Sea (4,200 M).

but via undersea cables. The wind is much more reliable at sea, giving better and more consistent output and there is far less public opposition. The main benefits include:

- Bullets**
- Square bullets applied 1 mark
 - 1.5 line spacing 1 mark

- Higher wind speeds
- More often windy
- Less turbulence offshore
- Minimal visual impact

... visual impact

... sea is steadier, more consistent and not blocked by obstacles such as mountains, trees and buildings, resulting in higher output and more consistent electricity generation. This results in higher electricity yield per wind turbine.

Wind Energy Future

Over the past 10 years global wind power has grown at an average rate of over 30%. This is due to technology improvements and falling costs. Modern wind turbines have higher power ratings,

Offshore wind farms are more expensive than onshore farms due to the high transport costs of the turbines.

| | | | |
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efficiency and reliability. Countries all over the world are setting targets for wind power. It is estimated that 40,000 wind turbines will be installed in the next 10 years.

The European Union has set ambitious targets to provide 20% of Europe's energy from renewable sources by 2020. As a proven source of clean, affordable energy, wind resources have a vital role to play in realising these goals.

Conventional fuels have a dangerous impact on the climate and the drive for a future of cleaner, more sustainable energy technologies means wind power will go from strength to strength.

Power from North and Irish Seas

Title – correct, 100% accurate 1 mark

| Country | ID | Name | Number | Distance | Operational | Capacity | Height | Sea | Turbine_Capacity |
|------------------------------------|------|------------------------|--------|----------|-------------|----------|--------|-----------|------------------|
| Belgium | BE06 | Belwind | 66 | 46.0 | Yes | 330 | 117.0 | North Sea | 5.0 |
| Belgium | BE02 | Bligh Bank | 55 | 42.0 | Yes | 165 | 117.0 | North Sea | 3.0 |
| Belgium | BE07 | C-power II | 60 | 27.0 | Yes | 216 | 130.0 | North Sea | 3.6 |
| Belgium | BE04 | Eldepasco | 36 | 37.0 | Yes | 216 | 130.0 | North Sea | 6.0 |
| Belgium | BE05 | Th... | | | | 30 | 157.0 | North Sea | 5.0 |
| Denmark | DK02 | | | | | 160 | | | 2.0 |
| Denmark | DK05 | | | | | 209 | | | 2.3 |
| Germany | DE01 | Al... | | | | 60 | | | 5.0 |
| Germany | DE09 | En... | | | | 5 | | | 5.0 |
| Germany | DE10 | Hook... | | | Yes | 5 | 151.0 | North Sea | 5.0 |
| Ireland | IE01 | Arklow Bank | 7 | 10.0 | Yes | 25 | 129.0 | Irish Sea | 3.6 |
| Netherlands | NL02 | Egmond aan Zee | 36 | 10.0 | Yes | 108 | 115.0 | North Sea | 3.0 |
| Netherlands | NL01 | Princess Amalia | 60 | 23.0 | Yes | 120 | 99.0 | North Sea | 2.0 |
| Norway | NR01 | Hywind | 1 | 10.5 | Yes | 2 | 106.2 | North Sea | 2.0 |
| United Kingdom | UK04 | Barrow | 30 | 10.0 | Yes | 90 | 120.0 | Irish Sea | 3.0 |
| United Kingdom | UK10 | Beatrice Demonstration | 2 | 23.0 | Yes | 10 | 170.0 | North Sea | 5.0 |
| United Kingdom | UK14 | Blyth | 2 | 1.0 | Yes | 4 | 95.0 | North Sea | 2.0 |
| United Kingdom | UK07 | Burbo Bank | | | | | 137.0 | Irish Sea | 3.6 |
| United Kingdom | UK11 | Gunfleet Sands | | | | | 128.5 | North Sea | 3.6 |
| United Kingdom | UK09 | Inner Dowsing | | | | | 133.5 | North Sea | 4.0 |
| United Kingdom | UK06 | Kentish Flats | | | Yes | 30 | 115.0 | North Sea | 3.0 |
| United Kingdom | UK08 | Lynn | 27 | 5.2 | Yes | 97 | 133.5 | North Sea | 3.6 |
| United Kingdom | UK02 | North Hoyle | 30 | 8.0 | Yes | 60 | 107.0 | Irish Sea | 2.0 |
| United Kingdom | UK03 | Rhyl Flats | 25 | 8.0 | Yes | 90 | 133.5 | Irish Sea | 3.6 |
| United Kingdom | UK05 | Robin Rigg | 60 | 9.5 | Yes | 216 | 125.0 | Irish Sea | 3.6 |
| United Kingdom | UK01 | Scroby Sands | 30 | | | | 130.0 | North Sea | 2.0 |
| United Kingdom | UK19 | Thanet | 100 | | | | 130.0 | North Sea | 3.0 |
| United Kingdom | UK21 | Walney | 51 | 14.1 | Yes | 184 | 137.0 | Irish Sea | 3.6 |
| Total turbines in operation | | | 1002 | | | | | | |

3 records added, 100% accurate
Sorted by Country, then by Name
Specified fields in correct order
Data and labels all fully visible
Landscape, 1 page wide

Calculated field
Heading 100% accurate 1 mark
Calculated field 2 marks
Formatted to 1 dp 1 mark

Search
Sea = North Sea or Irish Sea 1 mark
Operational = Yes 1 mark

Calculated Sum of Number 1 mark
Label 100% accurate 1 mark

Candidate details on right 1 mark

Name, Centre Number, Candidate Number

Centre Number

Renewable Energy

Wind Power in Europe

Progress since 1 January 2009

Renewable Energy

KEY FACTS

- Mostly used to generate electricity
- Fastest growing segment of all renewable energy sources
- Favourable climate conditions in Europe
- A pollution-free energy source

Renewable Energy

PRODUCTION

- 142,000,000,000 kWh of electricity produced
- Equal to 4.2% of EU's electricity demand
- Equivalent to the needs of 35 million EU households

Renewable Energy

INVESTMENT

- €11 billion invested in wind turbines
- Saved fuel costs of €5.4 billion
- Avoided CO₂ costs of €2.275 billion

Renewable Energy

CO₂

- Avoided 91 million tonnes of CO₂
- Equivalent of taking 43 million cars off the roads
- Equal to 27% of the EU-15s Kyoto obligation

Renewable Energy

GROWTH PREDICTIONS

Global Wind Power Capacity

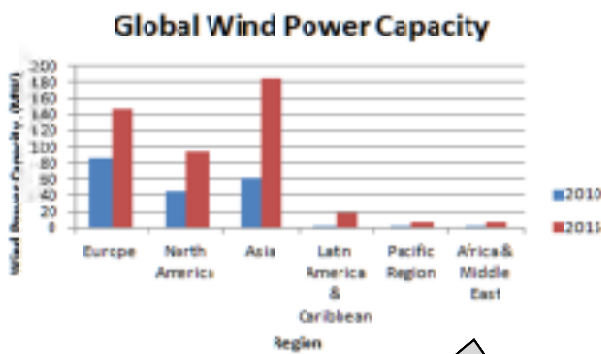
- China will be the fastest growing market
- Asia will overtake Europe as the region with the largest capacity

Centre Number

Renewable Energy



GROWTH PREDICTIONS

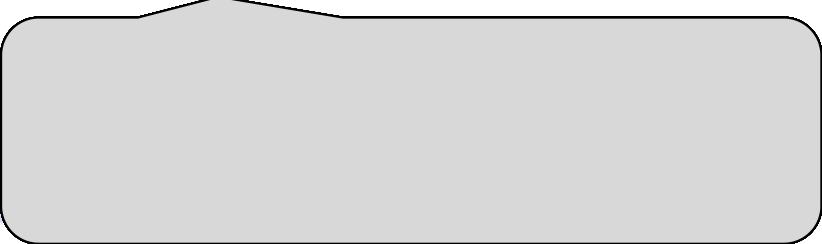
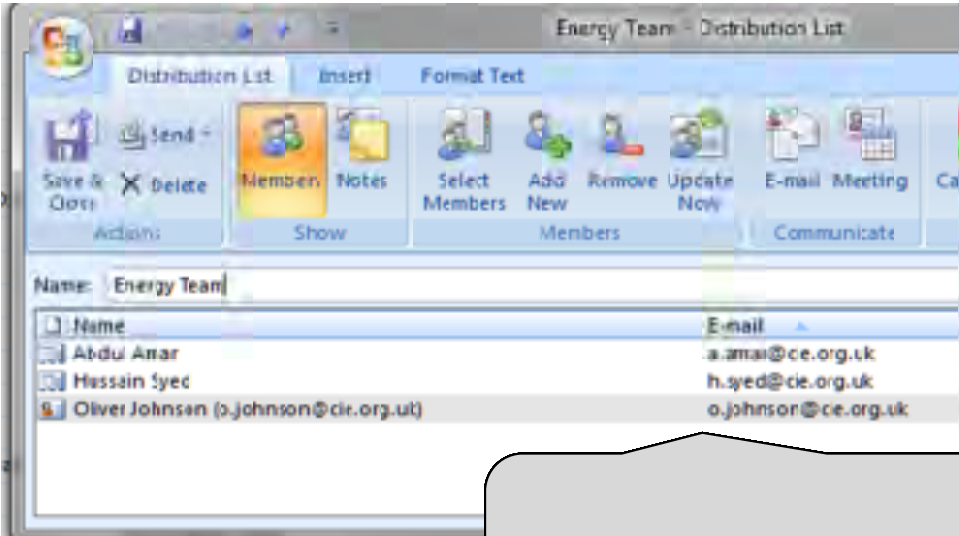


- China will be the fastest growing market
- Asia will overtake Europe as the region with the largest capacity

Centre Number, Candidate number, Name

Centre Number

Step 2 & 3 Contact details and distribution list



Step 28 Database field structure

| Field Name | Data Type |
|-------------|-----------|
| ID | Text |
| Country | Text |
| Number | Number |
| Name | Text |
| Distance | Number |
| Operational | Yes/No |
| Capacity | Number |
| Depth | Number |
| Height | Number |
| Diameter | Number |
| Sea | Text |

| General (lookup) | |
|------------------|---------|
| Field Size | Single |
| Format | Fixed |
| Decimal Places | 1 |
| Input Mask | |
| Caption | |
| Default Value | |
| Validation Rule | |
| Validation Text | |
| Required | No |
| Indexed | No |
| Smart Tag | |
| Text Align | General |

