

**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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# 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 converts kinetic energy into mechanical energy. Offshore wind power is widely used as the future of renewable energy. Wind provides an

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

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

growing in North America, Canada and Asia.

Onshore wind energy potential is concentrated in agricultural and industrial north-western Europe. The largest potential is found in low depth 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.

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

**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).

**Page layout**

A4 Landscape 1 mark  
 Top & bottom margins 2 cm, left & right 2.5 cm 1 mark  
 No widows/orphans, split lists/tables, blank pages 1 mark  
 Consistent spacing, 1 cls below paras & subheads, above & below extract & table 1 mark  
 Document complete/paragraphs intact 1 mark

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.

**Bullets**

Square bullets applied 1 mark  
 1.5 line spacing 1 mark

The main benefits include:

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

... visual impact

... sea is steadier, more not blocked by obstacles, trees and buildings, output and more consistent electricity yield per wind turbine.

**Wind Energy Future**

Over the past 10 years global wind power grow at an over 30%. technology costs have modern wind power ratings,

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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
<b>Total turbines in operation</b>			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

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# Renewable Energy

## Wind Power in Europe

Progress since 1 January 2009

Import 6 slides 1 mark  
 New slide as first slide – correct layout 1 mark  
 Text entry correct 1 mark

# 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

Delete Slide 3 (*European Targets*) 1 mark  
 Move slide 6 (*Production*) to slide 3 1 mark

# Renewable Energy

## INVESTMENT

- €11 billion invested in wind turbines
- Saved fuel costs of €5.4 billion
- Avoided CO<sub>2</sub> costs of €2.275 billion

# Renewable Energy

## CO<sub>2</sub>

- Avoided 91 million tonnes of CO<sub>2</sub>
- Equivalent of taking 46 million cars off the roads
- Equal to 27% of the EU-15s Kyoto obligation

**Print**  
 Handout slides 6 to page 1 mark

# Renewable Energy

## GROWTH PREDICTIONS

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

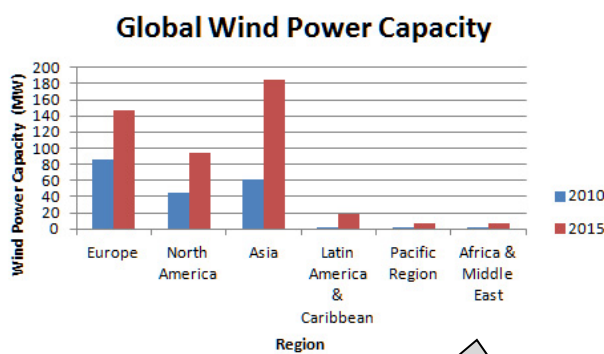
**Master slide**  
 Correct image placed top right – no distortion 1 mark  
 Thick 3 pt horizontal line across slide below image 1 mark  
 Text *Renewable Energy*, 72 pt, serif, left, above line, no wrap 1 mark  
 Centre No, Cand No, Name, 10 pt, serif, bottom right 1 mark  
 Auto slide no, bottom left 1 mark  
 All items created and appear on all slides with no overlap 1 mark

Centre Number

# Renewable Energy



## GROWTH PREDICTIONS



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

Vertical bar chart created from correct data 1 mark  
 Chart titles & legend created correctly, series labels displayed in full 1 mark  
 Chart placed to left of bullets 1 mark

Centre Number, Candidate number, Name

**Print**  
 Single slide 1 mark



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**Step 2 & 3 Contact details and distribution list**



Contact entry Abdul Amar, a.amar@cie.org.uk 1 mark  
 Contact entry Hussain Syed, h.syed@cie.org.uk 1 mark  
 Contact entry Oliver Johnson, o.johnson@cie.org.uk 1 mark  
 Created distribution list named Energy Team 1 mark  
 (100% accurate)  
 3 contacts stored in Energy Team group 1 mark

**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	
Field Size	Single
Format	Fixed
Decimal Places	1
Input Mask	
Caption	
Default Value	
Validation Rule	
Validation Text	
Required	No
Indexed	No
Smart Tags	
Text Align	General

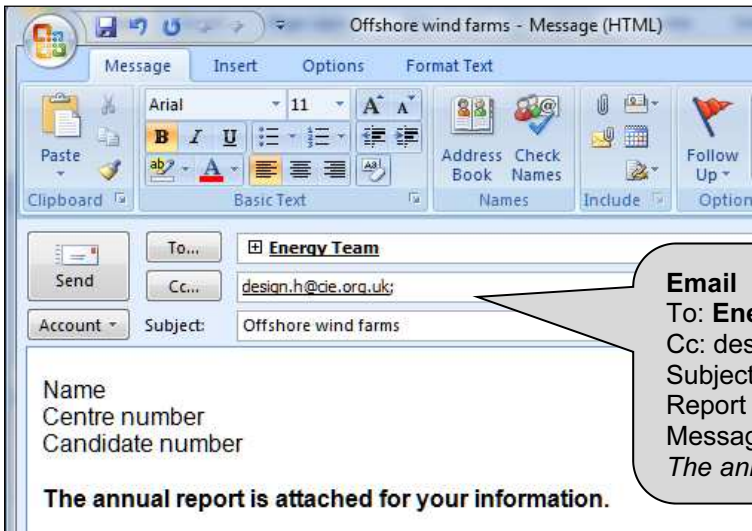
**Database structure**  
 Correct field names and data types 1 mark  
*Distance* and *Height* formatted to 1 dp 1 mark  
*Operational* as yes/no on report 1 mark  
 Boolean/logical set in design 1 mark



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**Step 51 Email Message**



**Email**

To: <b>Energy Team</b> group	1 mark
Cc: design.h@cie.org.uk	1 mark
Subject: <i>Offshore wind farms</i>	1 mark
Report file attached (doc or rtf)	1 mark
Message text & personal details correct	1 mark
<i>The annual report is attached for your information.</i>	