Department of Energy & Climate Change

A National Statistics Publication

# DIGEST OF UNITED KINGDOM ENERGY STATISTICS 2015

Department
of Energy &
Climate Change

# Digest of United Kingdom Energy Statistics 2015

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**A National Statistics publication** **London: TSO**

First published 2015

ISBN 9780115155314

# Digest of United Kingdom Energy Statistics

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**This is a National Statistics publication**

The United Kingdom Statistics Authority has designated these statistics as National Statistics, in accordance with the Statistics and Registration Service Act 2007 and signifying compliance with the UK Statistics Authority: Code of Practice for Official Statistics.

Designation can be broadly interpreted to mean that the statistics:

- meet identified user needs
- are well explained and readily accessible
- are produced according to sound methods, and
- are managed impartially and objectively in the public interest

Once statistics have been designated as National Statistics it is a statutory requirement that the Code of Practice shall continue to be observed.

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**Monthly and quarterly data are also available for Energy, Solid fuels and derived gases, Petroleum, Gas, Electricity and Renewables at:**
**www.gov.uk/government/organisations/department-of-energy-climate-change/about/statistics#energy-sector-statistics**

**Information on Energy Prices is available at:**
**www.gov.uk/government/organisations/department-of-energy-climate-change/about/statistics#energy-price-statistics**

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# Introduction

I This issue of the Digest of United Kingdom Energy Statistics (DUKES) continues a series which commenced with the Ministry of Fuel and Power Statistical Digest for the years 1948 and 1949, published in 1950. The Ministry of Fuel and Power Statistical Digest was previously published as a Command Paper, the first being that for the years 1938 to 1943, published in July 1944 (Cmd. 6538). A publication tracing the history of energy production and use over the past 60 years was produced in 2009 to mark the 60th anniversary of DUKES. The publication is available at: www.gov.uk/government/collections/digest-of-uk-energy-statistics-dukes

II The current issue updates the figures given in the Department of Energy and Climate Change's (DECC) *Digest of United Kingdom Energy Statistics 2014*, published in July 2014.

III This printed and bound issue consists of seven chapters and four annexes. The first chapter deals with overall energy. The other chapters cover the specific fuels, renewable sources of energy and combined heat and power. The annexes cover conversion factors and calorific values, a glossary of terms, further sources of information and major events in the energy industries.

IV This Digest is also available on the internet. Some additional information appears on the internet only. The tables on the internet are provided in Microsoft Excel format. Most internet versions of the tables include data for earlier years, which are not provided in the printed copy publication. For example commodity and energy balances (see VII and VIII, below) for 1998 to 2011 are included on the internet, and tables that show five years in this printed version show seventeen years in their internet form because page sizes are not a limiting factor. In addition, the following appear on the internet version only:

Long term trends text and tables
Major events from 1990 to 2015 - Annex D
(only Major events for 2013 to 2015 appear in the printed and bound version)
Energy and the environment – Annex E
UK oil and gas resources - Annex F
Foreign trade – Annex G
Flow charts – Annex H
Energy balance: net calorific values – Annex I
Heat reconciliation – Annex J

V Annual information on prices is included in the publication *Energy Prices*. The data are also available on the DECC section of the GOV.UK website. Further information on these publications can be found in Annex C.

VI Where necessary, data have been converted or adjusted to provide consistent series. However, in some cases changes in methods of data collection have affected the continuity of the series. The presence of remaining discontinuities is indicated in the chapter text or in footnotes to the tables.

VII Chapters 2, 3, 4, 5 and 6 contain production and consumption of individual fuels and are presented using *commodity balances*. A commodity balance illustrates the flows of an individual fuel through from production to final consumption, showing its use in transformation (including heat generation) and energy industry own use. Further details of commodity balances and their use are given in Annex A, paragraphs A.7 to A.42.

VIII The individual commodity balances are combined in an *energy balance,* presented in Chapter 1, *Energy*. The energy balance differs from a commodity balance in that it shows the interactions between different fuels in addition to illustrating their consumption. The energy balance thus gives a fuller picture of the production, transformation and use of energy showing all the flows. Expenditure on energy is also presented in energy balance format in Chapter 1. Further details of the energy balance and its use, including the methodology introduced in the 2003 Digest for heat, are given in Annex A, paragraphs A.43 to A.58.

IX Chapter 1 also covers general energy statistics and includes tables showing energy consumption by final users and an analysis of energy consumption by main industrial groups. Fuel production and consumption statistics are derived mainly from the records of fuel producers and suppliers.

X Chapters 6 and 7 summarise the results of surveys conducted by Ricardo-AEA on behalf of DECC which complement work undertaken by DECC. These chapters estimate the contribution made by renewable energy sources to energy and combined heat and power (CHP) production and consumption in the United Kingdom.

XI Some of the data shown in this Digest may contain previously unpublished revisions and estimates of trade from HM Revenue and Customs and the Office for National Statistics. These data are included in Annex G.

## Definitions

XII The text at the beginning of each chapter explains the main features of the tables. Technical notes and definitions, given at the end of this text, provide detailed explanations of the figures in the tables and how they are derived. Further information on methodologies are also provided on the DECC section of the GOV.UK website for each fuel at:
www.gov.uk/government/organisations/department-of-energy-climate-change/about/statistics.

XIII Most chapters contain some information on 'oil' or 'petroleum'; these terms are used in a general sense and vary according to usage in the field examined. In their widest sense they are used to include all mineral oil and related hydrocarbons (except methane) and any derived products.

XIV An explanation of the terms used to describe electricity generating companies is given in Chapter 5, paragraphs 5.66 to 5.72.

XV Data in this issue have been prepared on the basis of the Standard Industrial Classification (SIC 2007) as far as is practicable. For further details of classification of consumers see Chapter 1, paragraphs 1.56 to 1.60.

XVI Where appropriate, further explanations and qualifications are given in footnotes to the tables.

## Proposed change to use net calorific values when producing energy statistics

XVII A consultation was launched in the 2005 edition of the Digest seeking views of users as to whether Net Calorific Values (NCVs) should be used in place of Gross Calorific Values (GCVs). As a result of this consultation, DECC recognised that there are good arguments both for and against moving from GCV to NCV. However it was concluded that there would be no demonstrable advantage to changing the method of presenting UK Energy statistics, and so GCVs continue to be used in this edition and will be used in future editions of the Digest. The fuel specific NCVs will continue to be published, and are shown in Annex A. The total energy balances on a net calorifc basis are now being produced as part of the internet version of the Digest, Annex I.

## Geographical coverage

XVIII The geographical coverage of the statistics is the United Kingdom. However, within UK trade statistics, shipments to the Channel Islands and the Isle of Man from the United Kingdom are not classed as exports. Supplies of solid fuel and petroleum to these islands, from the UK, are therefore included as part of United Kingdom inland consumption or deliveries.

## Periods

XIX Data in this Digest are for calendar years or periods of 52 weeks, depending on the reporting procedures within the fuel industry concerned. Actual periods covered are given in the notes to the individual fuel chapters

## Revisions

XX The tables contain revisions to some of the previously published figures, and where practicable the revised data have been indicated by an 'r'. The 'r' marker is used whenever the figure has been revised from that published in the printed copy of the 2014 Digest, even though some figures

may have been amended on the internet version of the tables. A table showing the size of revisions to key aggregates is available (Chapter 1, table 1J). Statistics on energy in this Digest are classified as National Statistics. This means that they are produced to high professional standards as set out in the UK Statistics Authority's Code of Practice for Official Statistics. The Code of Practice requires that all the public bodies that produce official statistics "Publish a revisions policy for those outputs that are subject to scheduled revisions, and provide a statement explaining the nature and extent of revisions at the same time that they are released". The following statement outlines the policy on revisions for energy statistics.

**Revisions to data published in the *Digest of UK Energy Statistics*.**
It is intended that any revisions should be made to previous years' data only at the time of the publication of the Digest (i.e. in July 2015 when this Digest is published, revisions can be made to 2013 and earlier years). In exceptional circumstances previous years' data can be amended between Digest publication dates, but this will only take place when quarterly *Energy Trends* is published. The reasons for substantial revisions will be explained in the 'Highlights' sheet of the internet version of the table concerned. Valid reasons for revisions of Digest data include:

- revised and validated data received from a data supplier;
- the figure in the Digest was wrong because of a typographical or similar error.

In addition, when provisional annual data for a new calendar year (e.g. 2015) are published in *Energy Trends* in March of the following year (e.g. March 2016), percentage growth rates are liable to be distorted if the prior year (i.e. 2014) data are constrained to the Digest total, when revisions are known to be required. In these circumstances the prior year (i.e. 2014) data will be amended for all affected tables in *Energy Trends* and internet versions of all affected Digest tables will be clearly annotated to show that the data has been up-dated in *Energy Trends*.

**Revisions to 2015 data published in *Energy Trends* prior to publication in the 2016 edition of the *Digest of UK Energy Statistics.***

- All validated amendments from data suppliers will be updated when received and published in the next statistical release.
- All errors will be amended as soon as identified and published in the next statistical release.
- Data in energy and commodity balances format will be revised on a quarterly basis, to coincide with the publication of *Energy Trends*.

Further details on the UK Statistics Authority's Code of Practice for Official Statistics can be found at: www.statisticsauthority.gov.uk/assessment/code-of-practice/index.html. DECC's statements of compliance with the Code are available at: www.gov.uk/government/collections/decc-statistics-governance. The UK Statistics Authority undertake regular assessments of DECC's energy statistics and their reports can be accessed at:
www.statisticsauthority.gov.uk/assessment/assessment/assessment-reports/index.html.
The authority's recommendations have been incorporated into this publication and other DECC energy statistical publications and outputs.

## Energy data on the internet

XXI Energy data are held on the DECC section of the GOV.UK website, under "statistics". The Digest is available at: www.gov.uk/government/collections/digest-of-uk-energy-statistics-dukes. Information on further DECC energy publications available both in printed copy format and on the Internet is given in Annex C.

XXII The Department of Energy and Climate Change was created on 3 October 2008. This Department took over energy policy from the former Department for Business, Enterprise and Regulatory Reform (BERR) and climate change policy from the Department for Environment, Food and Rural Affairs (Defra). Within this publication references to DECC's predecessor Departments refer to BERR or Defra.

XXIII Short term statistics are published:

- monthly, by DECC on the Internet;
- quarterly, by DECC on the internet in *Energy Trends,* and *Energy Prices;*
- quarterly, by DECC in a Statistical Press Release which provides a summary of information published in *Energy Trends* and *Energy Prices* publications;

## Table numbering

XXIV Page 10 contains a list showing the tables in the order in which they appear in this issue, and their corresponding numbers in previous issues.

## Symbols used

XXV The following symbols are used in this Digest:

| | |
|---|---|
| .. | not available |
| - | nil or not separately available |
| r | revised since the previous edition |

## Rounding convention

XXVI Individual entries in the tables are rounded independently and this can result in totals, which are different from the sum of their constituent items.

## Acknowledgements

XXVII Acknowledgement is made to the main coal producing companies, the electricity companies, the oil companies, the gas pipeline operators, the gas suppliers, National Grid, the Institute of Petroleum, the Coal Authority, the United Kingdom International Steel Statistics Bureau, Ricardo-AEA, the Department for Environment, Food and Rural Affairs, the Department for Transport, OFGEM, Building Research Establishment, HM Revenue and Customs, the Office for National Statistics, and other contributors to the enquiries used in producing this publication.

## Cover photograph

XXVIII The cover illustration used for this Digest and other DECC energy statistics publications is from a photograph by Peter Askew. It was a winning entry in the DTI News Photographic Competition in 2002.

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XXX For enquiries concerning particular data series or chapters contact those named on page 9 or at the end of the relevant chapter.

*Kevin Harris, Production Team*
*July 2015*

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# Tables as they appear in this issue and their corresponding numbers in the previous three issues

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| | - | 1.1 | 1.2 | 1.3 | | 4.3 | 4.3 | 4.3 | 4.3 |
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# Chapter 1
# Energy

## Key points

- In 2014, UK energy production was down 1.7 per cent on a year earlier, its smallest fall since 2002. There were falls in nuclear output due to outages and in coal production due to mine closures, though there was increased output from renewables. UK Continental Shelf output declined at a much slower rate than recently with gas output up for the first time since 2000. (Tables 1.1 and 1.2).

- Imports in 2014 were down from the record high levels of 2013, though exports were at their lowest level since 1980. Net imports decreased marginally and accounted for 46 per cent of energy used in the UK.

- Primary energy consumption was down 6.6 per cent; and on a temperature adjusted basis primary energy consumption was down 2.6 per cent continuing the downward trend of the last nine years. The UK experienced record warm weather in 2014 with temperatures on average 1.2 degrees Celsius warmer than 2013. (Table 1.1.7).

- Final energy consumption fell by 5.6 per cent with less energy used for heating (more details are available in Energy Consumption in the UK: www.gov.uk/government/collections/energy-consumption-in-the-uk) with temperature adjusted final energy consumption down 1.0 per cent.

- Fossil fuels remain the dominant source of energy supply, accounting for 84.5 per cent, though this is a record low level. Supply from renewables increased, with its contribution accounting for 7.0 per cent of final consumption on the EU agreed basis (see Chapter 6).

- In 2014, there was a further switch in the main sources of electricity generation away from the fossil fuels of coal and gas to more low carbon generation. Generation from coal fell by 36 per cent, as a number of plants closed or switched to burning biomass; gas rose by 5.1 per cent with lower prices; nuclear output fell by 9.7 per cent with renewables up by 21 per cent. The overall renewables share of generation increased to a record 19 per cent share of generation.

- Provisional DECC estimates suggest that overall emissions fell by 45 million tonnes of carbon dioxide (MtCO2) (9.7 per cent) to 422.0 MtCO2 between 2013 and 2014.

## Introduction

1.1 This chapter presents figures on overall energy production and consumption. Figures showing the flow of energy from production, transformation and energy industry use through to final consumption are presented in the format of an energy balance based on the individual commodity balances in Chapters 2 to 6.

1.2 The chapter begins with aggregate energy balances covering the last three years (Tables 1.1 to 1.3) starting with the latest year, 2014. Energy value balances then follow this for the same years (Tables 1.4 to 1.6) and Table 1.7 shows sales of electricity and gas by sector in value terms. Table 1.8 covers final energy consumption by the main industrial sectors over the last five years, followed by Table 1.9, which shows the fuels used for electricity generation by these industrial sectors. The explanation of the principles behind the energy balance and commodity balance presentations, and how this links with the figures presented in other chapters, is set out in Annex A. Information on long term trends (Tables 1.1.1 to 1.1.8) for production, consumption, and expenditure on energy, as well as long term temperature data and analyses such as the relationship between energy consumption and the economy of the UK are available on DECC's energy statistics web site at:

www.gov.uk/government/collections/digest-of-uk-energy-statistics-dukes

### Calorific values when producing energy statistics

1.3 In this publication Gross Calorific Values (GCVs) are used to convert fuel from their original units to tonnes of oil equivalent (toe). An alternative is to use Net Calorific Values (NCVs) as detailed in paragraph XVII of the introduction. The fuel specific GCVs and NCVs are shown at Annex A. However, as some EU targets are calculated on data converted using net calorific values, aggregate energy balances for the most recent years have been calculated using NCVs; these are used in Table 6.7, and are available on the internet version, Annex I, of this publication at: www.gov.uk/government/collections/digest-of-uk-energy-statistics-dukes.

### The energy industries

1.4 The energy industries in the UK play a central role in the economy by producing, transforming and supplying energy in its various forms to all sectors. They are also major contributors to the UK's Balance of Payments through the exports of crude oil and oil products. The box below summarises the energy industries' contribution to the economy in 2014, based on the latest available data from the Office for National Statistics (ONS):

- 2.8 per cent of GDP;
- 13 per cent of total investment;
- 37 per cent of industrial investment in 2013;
- 162,000 people directly employed (5.9 per cent of industrial employment);
- Many others indirectly employed (e.g. an estimated 207,000 in support of UK Continental Shelf activities).

1.5 The share of GDP at 2.8 per cent compares to a peak level of 10.4 per cent in 1982. The share fell to below 4 per cent in most years since 2000, with the latest fall largely due to the decline in the value of oil and gas production; wholesale gas prices fell by around 25 per cent in 2014. In the last 10 years investment has grown sharply, though levels in 2014 were broadly the same as those in 2012 and 2013. Employment has remained broadly unchanged in the last five years, but up from 10 years ago.

## Aggregate energy balance (Tables 1.1, 1.2 and 1.3)

1.6 These tables show the flows of energy in the United Kingdom from production to final consumption through conversion into secondary fuels such as coke, petroleum products, secondary electricity and heat sold. The figures are presented on an energy supplied basis, in tonnes of oil equivalent (toe), a unit of energy where 1 toe = 41.868 GJ, see also paragraph 1.29 for other energy units.

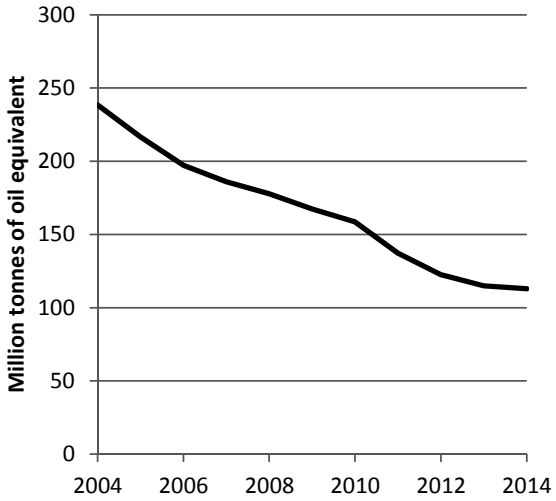
1.7 Indigenous production in 2014 was down 1.7 per cent on 2013. UK energy production has fallen in each year since 1999 (chart 1.1), due mainly to the longer term decline in UK Continental Shelf (UKCS) output, and is down by 62 per cent over this period. The fall in 2014 though was the smallest since 2002, as renewables output and gas grew with new finds offsetting the decline in production from the more established fields. However, coal production declined further in 2014, due to mine closures and geological issues affecting a number of other sites, oil production continued to fall albeit at a slower pace, and nuclear output declined due to planned and unplanned outages. More details on these changes are given in the later fuel specific chapters.

1.8 In 2014, the primary supply of fuels was 201.0 million tonnes of oil equivalent (mtoe), a 6.4 per cent decrease compared to 2013. Chart 1.2 illustrates the figures for the production and consumption of individual primary fuels in 2014. In 2014, aggregate primary fuel consumption was not met by indigenous production; this continues the trend since 2004 when the UK became a net importer of fuel. However, as explained in subsequent chapters, the UK has traded fuels such as oil and gas regardless of whether it has been a net exporter or importer. Imports in 2014 at 164.8 million toe fell back by 7.7 per cent from last year's record level, though exports at 70.7 million toe were down 7.1 and at their lowest level since 1980. The UK remained a net importer of all main fuel types in 2014; in

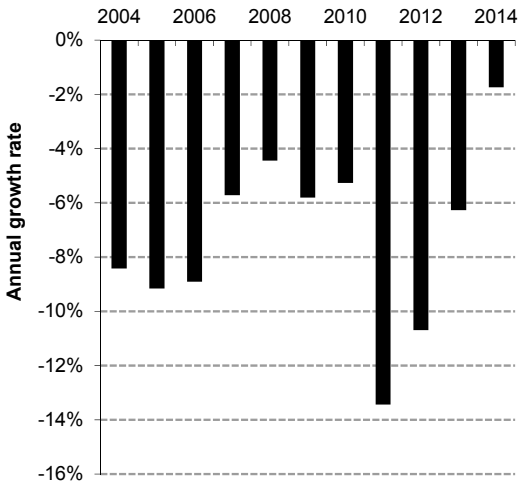
2013 the UK became a net importer of petroleum products for the first time since 1973 largely due to the closure of the Coryton refinery. In 2014 the UK net import gap fell back to 94 million toe from last year's high of 102 million toe. Net imports accounted for 46 per cent of energy used in the UK in 2014.

## Chart 1.1: UK energy production

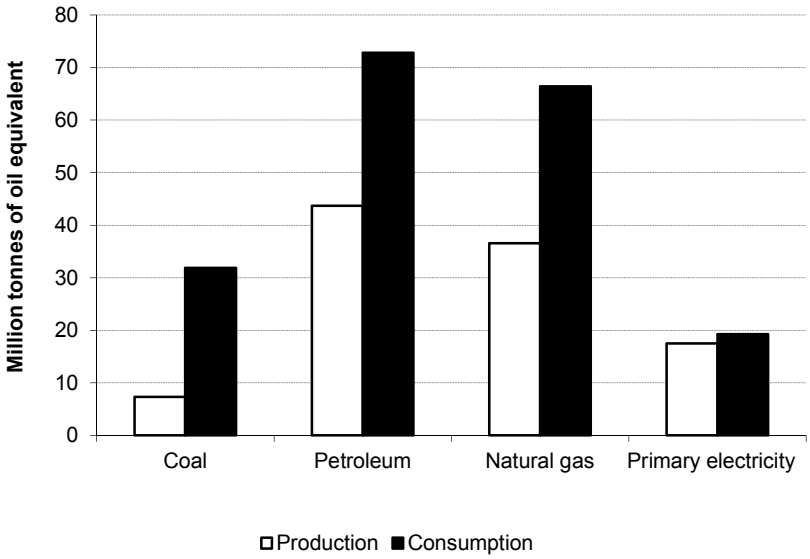
### Level




### Annual growth rate




## Chart 1.2: Production and consumption of primary fuels 2014




*Note: Includes non-energy use of petroleum and gas. Differences between consumption and production are made up by foreign trade, marine bunkers and stock changes.*

1.9 Total primary energy demand was 6.3 per cent lower in 2014 than in 2013 at 201.4 mtoe. The very small difference between demand and supply is classed as the statistical difference, which is explained in paragraph 1.62. The large fall in demand was mainly due to the record warm weather in the UK in 2014. Temperatures in 2014 were on average 1.2 degrees Celsius warmer than those in 2013 resulting in decreased demand for heating. There has been a general trend since 2005 for underlying demand to fall. Primary energy consumption (primary supply less non-energy use) was down by 6.6 per cent in 2014. On a temperature corrected basis, primary energy consumption was

estimated to have fallen by just over 2.6 per cent. A table showing temperature corrected demand is shown in Table 1.1.4 in the internet annex on long term trends, while Chart 1.3 shown below, shows the continued fall in primary energy consumption. Chart 1.4 shows the composition of primary demand in 2014.

**Chart 1.3: Primary energy consumption**

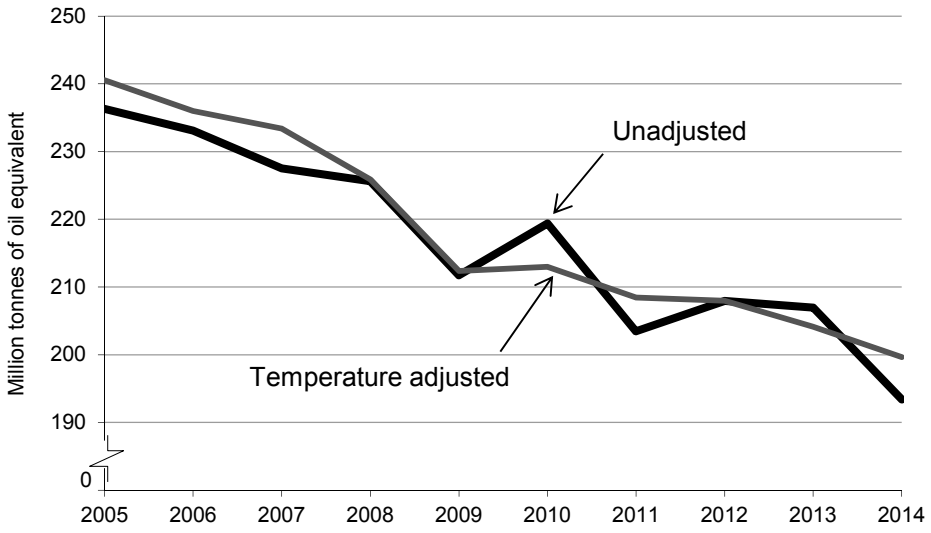
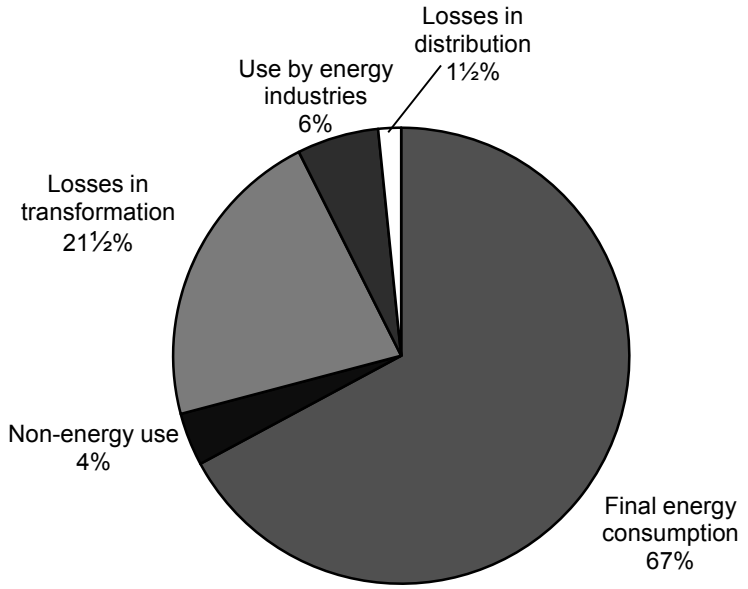



**Chart 1.4: Primary demand 2014**




**Primary demand: 201.4 million tonnes of oil equivalent**

1.10 The transformation section of the energy balance shows, for each fuel, the net inputs for transformation uses. For example, Table 1.1 shows that 3,784 thousand tonnes of oil equivalent of coal feeds into the production of 3,450 thousand tonnes of oil equivalent of coke, representing a loss of 334 thousand tonnes of oil equivalent in the manufacture of coke in 2014. In 2014, energy losses during the production of electricity and other secondary fuels amounted to 43.7 million tonnes of oil equivalent, (22 per cent of primary supply) shown in the transformation row in Table 1.1.

1.11 The transfers row in Tables 1.1 to 1.3 should ideally sum to zero with transfers from primary oils to petroleum products amounting to a net figure of zero. Similarly the manufactured gases and natural gas transfers should sum to zero. However differences in calorific values between the transferred fuels can result in non-zero values.

1.12 In 2014, both coal and gas accounted for 30 per cent of UK generation. Coal's share declined from 36 per cent, due to the closure of several power stations and the conversion of another to using biomass. Generation from gas increased by 5.1 per cent, and it's share increased from 27 per cent, as prices declined, down 18 per cent on 2013 levels (Table 3.2.1 of DECC's *Quarterly Energy Prices*). Nuclear output declined by 9.7 per cent due to planned and unplanned outages affecting a number of plants. Generation from renewable sources grew by 21 per cent with increases from all major sources: generation from bioenergy contributed 40 per cent of the increase, wind 32 per cent, solar 18 per cent and hydro the remaining 10 per cent. The annual growth rates from renewables sectors varied: with bioenergy up 25 per cent, wind 13 per cent on increased capacity, solar output doubled and hydro up 25 per cent on increased rainfall. Generation from nuclear and renewables both accounted for around 19 per cent of generation. More details on renewable generation are available in Chapter 6. Data in the energy balance tables show fuel inputs and overall generation but do not directly show the generation from each specific fuel, this detail is available in Table 5.5 in Chapter 5.

1.13 The reduction in energy use due to the warmer weather and the reduced use of fossil fuels for electricity generation contributed to a sharp decrease in carbon dioxide emissions between 2013 and 2014. Provisional DECC estimates suggest that overall emissions fell by 45 million tonnes of carbon dioxide ($MtCO_2$) (9.7 per cent) to 422.0 MtCO2 between 2013 and 2014. More details of carbon dioxide emissions are available in a Statistical Release, published in March, which is available on the DECC section of the GOV.UK website at: www.gov.uk/government/collections/uk-greenhouse-gas-emissions.

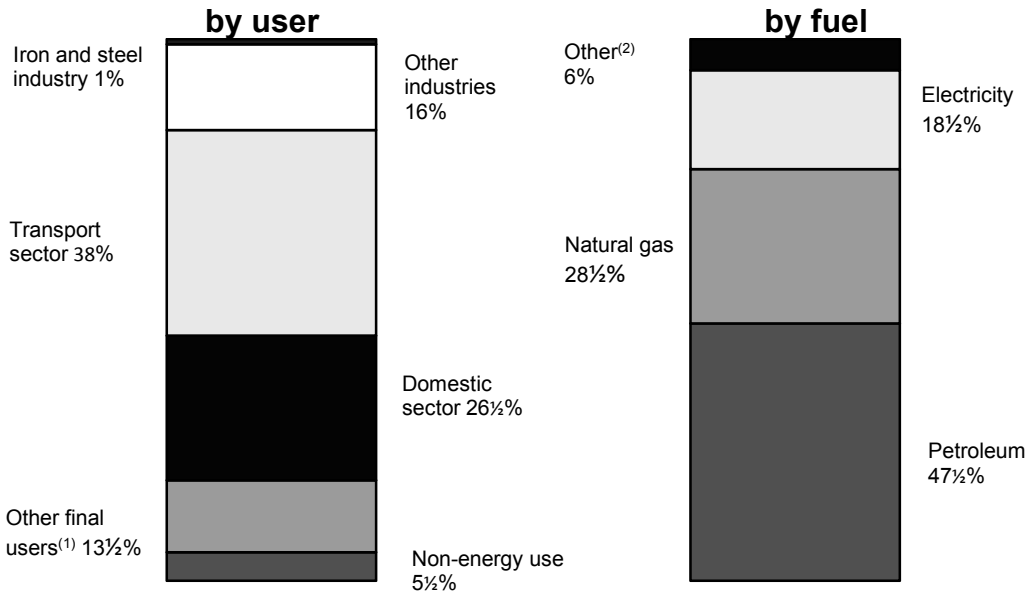
1.14 The energy industry use section of the table represents use of fuels by the energy industries themselves. This section also includes consumption by those parts of the iron and steel industry which behave like an energy industry i.e. they are involved in the transformation processes (see paragraph A.20 of Annex A). In 2014, energy industry use amounted to 11.7 million tonnes of oil equivalent of energy (5.8 per cent of primary demand), continuing a general decline broadly matching the fall in UK energy production.

1.15 Losses presented in the energy balance include distribution and transmission losses in the supply of manufactured gases, natural gas, and electricity. Recorded losses have been broadly unchanged for the last three years.

1.16 Total final consumption, which includes non-energy use of fuels, was 142.8 million tonnes of oil equivalent in 2014; this is an 8.2 million tonnes of oil equivalent decrease, 5.4 per cent down, on the consumption in 2013. The majority of this decrease was from the domestic sector, where consumption fell by 14.4 per cent. This sharp fall in consumption was mainly due to the warmer weather mentioned earlier in this Chapter, but there were also contributions from improvements in energy efficiency. On average over 50,000 energy efficiency improvements have been installed in UK domestic properties in each month over the past two years. On a temperature adjusted basis domestic consumption is estimated to have fallen by 1.2 per cent, slightly below the average fall of 2.2 per cent per annum seen since 2004. A similar large fall in consumption occurred in the services sector with consumption down by 9.5 per cent, again mainly due to reduced demand for heating. Industrial consumption and non-energy use fell by 1.0 and 2.4 per cent respectively with transport demand up 1.1 per cent. Final energy consumption in 2014 is accounted for by the transport sector (37.9 per cent), the domestic sector (26.7 per cent), the industrial sector (16.8 per cent), the services sector (13.3 per cent) and non-energy use (5.3 per cent). These figures are illustrated in Chart 1.5. Recent trends in industrial consumption are shown in Table 1.8 and are discussed in paragraphs 1.26 to 1.27. Final energy consumption on a temperature corrected basis is estimated to be down 1.0 per cent in 2014, continuing the downward trend of the last 10 years.

1.17 The main fuels used by final consumers in 2014 were petroleum products (47.5 per cent), natural gas (28.4 per cent) and electricity (18.3 per cent). The amount of heat that was bought for final consumption accounted for 1.0 per cent of the total final energy consumption.

## Chart 1.5: Final consumption 2014




**Total: 142.8 million tonnes of oil equivalent**

*(1) Includes services and agricultural sectors.*
*(2) Includes coal, manufactured fuels, renewables & waste, and heat sold.*

1.18 Of the petroleum products consumed by final users 10.2 per cent was for non-energy purposes; for natural gas 1.1 per cent was consumed for non-energy purposes. Non-energy use of fuels includes use as chemical feedstocks and other uses such as lubricants. Non-energy use of fuels for 2014 is shown in Table 1A. Further details of non-energy use are given in Chapter 2 paragraph 2.32, Chapter 3, paragraph 3.38 and Chapter 4, paragraph 4.24.

## Table 1A: Non-energy use of fuels 2014

**Thousand tonnes of oil equivalent**

| | Petroleum | Natural gas | Manufactured fuel |
|---|---|---|---|
| Petrochemical feedstocks | 4,209 | 467 | 136 |
| Other | 2,748 | - | - |
| **Total** | **6,958** | **467** | **136** |

1.19 The data in the energy balances (Table 1.1) can be viewed in a number of ways, with a number of other statistics derived to produce different descriptions of the UK energy market. Recently greater focus has been given to looking at import dependency and also at fossil fuel dependency. Import dependency (Table 1B) is calculated by dividing net imports by primary supply, including an addition for the energy supplied to marine bunkers.

## Table 1B: Net import dependency 2012 to 2014

Thousand tonnes of oil equivalent

| | 2012 | 2013 | 2014 |
|---|---|---|---|
| Net imports | 94,106 | 102,467 | 94.065 |
| Primary energy supply + bunkers | 218,219 | 217,408 | 203,453 |
| **Net import dependency** | 43.1% | 47.1% | 46.2% |

1.20 The energy used in the UK can also be classified by whether its source was from fossil fuels, low-carbon sources or other (Table 1C). The main fossil fuel sources in the UK are coal, gas and oil. The low carbon sources include nuclear and renewables such as wind; hydro; solar photovoltaics (pv) and biofuels. In 2014, the share of energy from fossil fuels decreased to a record low of 84.5 per cent, whilst that from low-carbon sources increased from having a 13.1 per cent to a 14.2 per cent share. The largest component of this series is currently nuclear; though its share of energy supplied decreased from 7.5 per cent to 7.2 per cent in 2014. There was a rise though in the share from renewables; with increases in wind output, solar pv, hydro and bioenergy. The 'other' category, shown for completeness, includes net imports of electricity, as imports and exports could come from either of the previous categories, and non-biodegradable wastes. Headline data, taken from Table 6.7 later in this publication, show that renewables had a "normalised" 7.0 per cent share of final energy consumption in 2014 (the normalisation process takes out weather effects from this statistic; see paragraph 6.54). There are other ways to measure renewables contribution to energy, and these are discussed in more detail in Chapter 6.

## Table 1C: Fossil fuel and low carbon dependencies 2012 to 2014

Per cent

| | 2012 | 2013 | 2014 |
|---|---|---|---|
| Fossil fuel | 87.1% | 85.9% | 84.5% |
| Low-carbon | 12.1% | 13.1% | 14.2% |
| Other | 0.8% | 0.9% | 1.3% |

# Value balance of traded energy (Tables 1.4, 1.5 and 1.6)

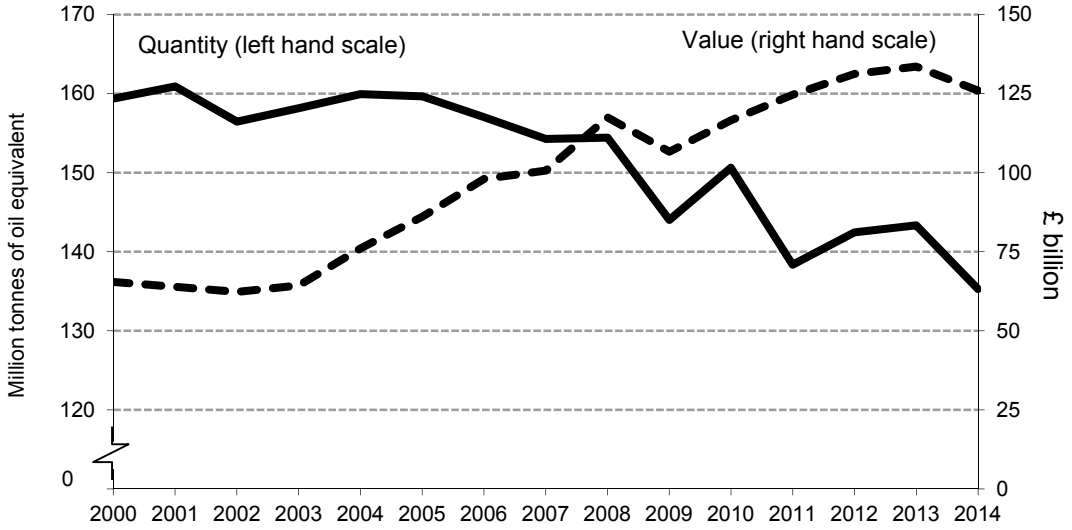
1.21 Tables 1.4 to 1.6 present the value of traded energy in a similar format to the energy balances. The balance shows how the value of inland energy supply is made up from the value of indigenous production, trade, tax and margins (profit and distribution costs). The lower half of the tables show how this value is generated from the final expenditure on energy (from the industrial and domestic sectors) through transformation processes and other energy sector users. The balances only contain values of energy which are traded, i.e. where a transparent market price is applicable. Further technical notes are given in paragraphs 1.39 to 1.45. In keeping with the energy balances, the value balances, since 2000, have included data on heat generation and heat sold. Additionally, an estimate of the amount of Climate Change Levy (CCL) and the Carbon Price Support (CPS) paid is included in Tables 1.4, 1.5 and 1.6. The CCL was introduced in April 2001 and is payable by non-domestic final consumers of gas, electricity, coal, coke and LPG, with the CPS, a tax on fossil fuel used to generate electricity, introduced in April 2013.

1.22 Total expenditure by final consumers in 2014 is estimated at £126,025 million, (£125,565 million shown as actual final consumption and £460 million of coal consumed by the iron and steel sector in producing coke for their own consumption). This is down by 5.7 per cent on 2013, with the most significant changes being the reduced volume of domestic gas consumed in 2013, and the reduced price for petroleum products. In 2014, crude oil prices averaged just under $100 per barrel, down compared to the levels between 2011 and 2013 of around $110 per barrel, which were up sharply compared to an average price of $80 per barrel in 2010. Chart 1.6 shows energy consumption and expenditure by final users.

1.23 The value balance demonstrates how the value chain works in the production and consumption of energy. For example, in 2014, £18,185 million of crude oil was indigenously produced, of which £14,670 million was exported; and £24,145 million of crude oil was imported. Allowing for stock changes, this provides a total value of UK inland crude oil supply of £27,385 million. This fuel was then completely consumed within the petroleum industry in the process of producing £34,410 million of petroleum products. Again, some external trade and stock changes took place before arriving at a basic value of petroleum products of £35,775 million. In supplying the fuel to final consumers,

distribution costs were incurred and some profit was made amounting to £2,325 million, whilst duty and tax meant a further £33,620 million was added to the basic price to arrive at the final market value of £71,995 million. This was the value of petroleum products purchased, of which industry purchased £2,380 million, domestic consumers for heating purposes purchased £1,425 million, with the vast majority £63,105 million, purchased by the transport sector.

**Chart 1.6: Energy consumption and estimated expenditure on energy by final users**




1.24 Of the total final expenditure on energy in 2014 (£126 billion), the biggest share, 52 per cent, fell to the transport sector. Industry purchased 10 per cent (£13 billion), the domestic sector purchased 27 per cent (£33 billion), with the remaining 11 per cent (£14 billion) purchased by the service sector.

## Sales of electricity and gas by sector (Table 1.7)

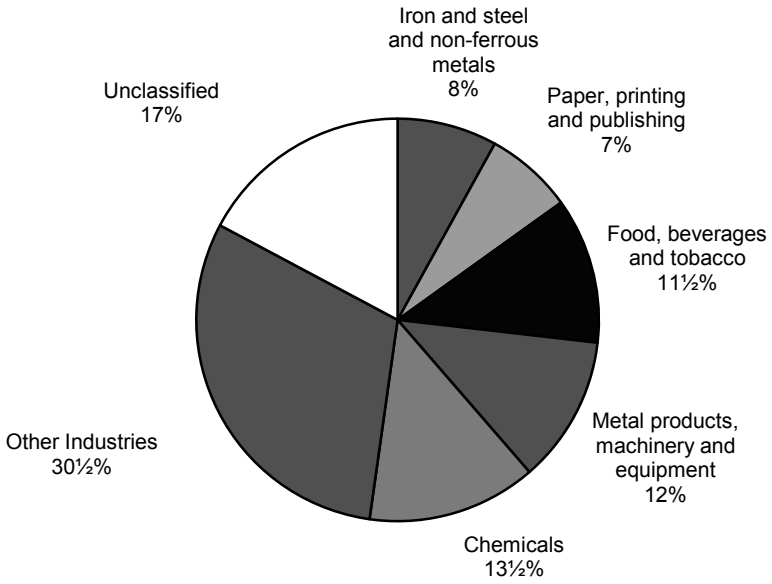
1.25 Table 1.7 shows broad estimates for the total value of electricity and gas to final consumption. Net selling values provide some indication of typical prices paid in broad sectors and can be of use to supplement more detailed and accurate information contained in the rest of this chapter. More detailed information on energy prices is available in *Energy Prices*, available on DECC's energy statistics website at: www.gov.uk/government/collections/quarterly-energy-prices

## Energy consumption by main industrial groups (Table 1.8)

1.26 This table presents final energy consumption for the main industrial sub-sectors over the last five years. So far as is practicable, the user categories have been regrouped on the basis of the 2007 Standard Industrial Classification (see paragraphs 1.56 to 1.60). However, some data suppliers have difficulty in classifying consumers to this level of detail and the breakdown presented in these tables must therefore be treated with caution. The groupings used are consistent with those used in Table 1.9 which shows industrial sectors' use of fuels for generation of electricity (autogeneration).

1.27 In 2014, 24.0 million tonnes of oil equivalent were consumed by the main industrial groups. The largest consuming groups were chemicals (13.6 per cent), metal products, machinery and equipment (11.8 per cent), food, beverages and tobacco (11.7 per cent), iron and steel and non-ferrous metals (8.0 per cent), and paper, printing and publishing (7.1 per cent). The figures are illustrated in Chart 1.7. The large other industries sector includes mineral products (11.8 per cent) as well as a number of the smaller energy consuming sectors.

**Chart 1.7: Energy consumption by main industrial groups 2014**




**Total final energy consumption by industry**
**24.0 million tonnes of oil equivalent**

## Fuels consumed for electricity generation by main industrial groups (autogeneration) (Table 1.9)

1.28 This table gives details of the amount of each fuel consumed by industries in order to generate electricity for their own use. Fuel consumption is consistent with the figures given for "other generators" in Table 5.4 of Chapter 5. The term autogeneration is explained further in paragraphs 1.33 and 1.34. Electricity produced via autogeneration is included within the figures for electricity consumed by industrial sectors in Table 1.8. Table 1.9 has been produced using the information currently available and shows the same sector detail as Table 1.8, data cannot be given in as much detail as in the individual commodity balances and the energy balance because it could disclose information about individual companies. Table 1.9 allows users to allocate the fuel used for autogeneration to individual industry groups in place of the electricity consumed. Further information on the way Table 1.9 links with the other tables is given in paragraph 1.34.

# Technical notes and definitions

## I Units and measurement of energy

### Units of measurement

1.29 The original units of measurement appropriate to each fuel are used in the individual fuel chapters. A common unit of measurement, the tonne of oil equivalent (toe), which enables different fuels to be compared and aggregated, is used in Chapter 1. In common with the International Energy Agency and with the Statistical Office of the European Communities, the tonne of oil equivalent is defined as follows:

1 tonne of oil equivalent = $10^7$ kilocalories
= 396.83 therms
= 41.868 Gigajoules (GJ)
= 11,630 Kilowatt hours (kWh)

This unit should be regarded as a measure of energy content rather than a physical quantity. One tonne of oil is not equal to one tonne of oil equivalent.

### Thermal content - energy supplied basis of measurement

1.30 Tables 1.1 to 1.3, 1.8 and 1.1.1 to 1.1.5 (available on the DECC section of GOV.UK at: www.gov.uk/government/statistics/energy-chapter-1-digest-of-united-kingdom-energy-statistics-dukes are compiled on an energy-supplied basis. Detailed data for individual fuels are converted from original units to tonnes of oil equivalent using gross calorific values and conversion factors appropriate to each category of fuel. The results are then aggregated according to the categories used in the tables. Gross calorific values represent the total energy content of the fuel, including the energy needed to evaporate the water present in the fuel (see also paragraph 1.54).

1.31 Estimated gross and net calorific values for 2014 are given in Table A.1 in Annex A. Calorific values are reviewed each year in collaboration with the fuel industries, and figures for earlier years can be found in Table A.2 and A.3. To construct energy balances on an energy supplied basis calorific values are required for production, trade, and stocks, as follows:

**Coal** The weighted average gross calorific value of all indigenous coal consumed is used to derive the thermal content of coal production and undistributed stocks. Thermal contents of imports and exports allow for the quality of coal. Thermal contents of changes in coal stocks at secondary fuel producers are the average calorific values of indigenous coal consumed.

**Petroleum** Work carried out in 1997 to revise calorific values for petroleum products did not find any recent work on the subject. In the absence of such work, the gross calorific values, included in Annex A and used in the construction of these energy balances from 1990 onwards, have been calculated using a formula derived by the US Bureau of Standards. This formula estimates the gross calorific value of products according to their density as follows:

$GJ = 51.83 - 8.78 \times d^2$, where *d* is the density of the product in terms of kilograms per litre.

For crude petroleum and refinery losses, the weighted average calorific value for all petroleum products from UK refineries is used. A notional figure of 42.9 GJ per tonne is used for non-energy petroleum products (industrial and white spirits, lubricants, bitumen, petroleum coke, waxes and miscellaneous products).

**Gases** Although the original unit for gases is the cubic metre, figures for gases are generally presented in the fuel sections of this Digest in gigawatt hours (GWh), having been converted from cubic metres using gross calorific values provided by the industries concerned. Conversion factors between units of energy are given on the flap inside the back cover and in Annex A.

**Electricity and heat** Unlike other fuels, the original unit used to measure electricity and heat is a measure of energy. The figures for electricity and heat can therefore be converted directly to toe using the conversion factors on the flap inside the back cover and in Annex A.

**Primary electricity** Hydro electricity and net imports of electricity are presented in terms of the energy content of the electricity produced (the energy supplied basis). This is consistent with international practice. Primary inputs for nuclear electricity assume the thermal efficiencies at nuclear stations given in Chapter 5, Table 5.9 (36.2 per cent in 2014). (See Chapter 5, paragraphs 5.74 and 5.82).

## Non-energy uses of fuel

1.32 Energy use of fuel mainly comprises use for lighting, heating, motive power and power for appliances. Non-energy use includes use as chemical feedstocks, solvents, lubricants and road making material. It should be noted that the amounts of non-energy use of natural gas included in the Digest are approximate. Further discussion of non-energy uses of lubricating oils and petroleum coke appears in Chapter 3, paragraph 3.43.

## Autogeneration of electricity

1.33 Autogeneration is defined as the generation of electricity by companies whose main business is not electricity generation, the electricity being produced mainly for that company's own use. Estimated amounts of fuel used for thermal generation of electricity by such companies, the output of electricity and the thermal losses incurred in generation are included within the Transformation section in the energy balances shown in Tables 1.1 to 1.3. Electricity used in the power generation process by autogenerators is shown within the Energy Industry Use section. Electricity consumed by industry and commerce from its own generation is included as part of final consumption. This treatment is in line with the practice in international energy statistics.

1.34 Figures on total amount of fuel used and electricity generated by autogenerators, and the amount of electricity for own consumption is shown in Tables 1.9, and 5.1 to 5.5. Table 1.9 summarises the figures by broad industrial groups. Much of the power generated is from combined heat and power (CHP) plants and data from Chapter 7 are included within Table 1.9. Differences will occur where CHP plants are classified to major power producers, and this mainly affects the chemicals sector. The method of allocating fuel used in CHP plants between electricity production and heat production is described in Chapter 7 paragraphs 7.36 to 7.42. This method can give rise to high implied conversion efficiencies in some sectors, most notably in the iron and steel sector.

## Final consumption, deliveries, stock changes

1.35 Figures for final consumption relate to deliveries, if fuels can be stored by users and data on actual consumption are not available. Final consumption of petroleum and solid fuels is on a deliveries basis throughout, except for the use of solid fuels by the iron and steel industry. Figures for domestic use of coal are based on deliveries to merchants. Figures for stock changes in Tables 1.1 to 1.3 cover stocks held by primary and secondary fuel producers, major distributors of petroleum products, and stocks of coke and breeze held by the iron and steel industry; for coal they also include an estimate of volumes in transit. Figures for stock changes in natural gas represent the net amount put into storage by gas companies operating pipelines.

1.36 Figures for final consumption of electricity include sales by the public distribution system and consumption of electricity produced by generators other than the major electricity producing companies. Thus electricity consumption includes that produced by industry and figures for deliveries of other fuels to industry exclude amounts used to generate electricity (except for years prior to 1987, shown in tables giving long term trends).

## Heat sold

1.37 Heat sold is defined as heat that is produced and sold under the provision of a contract. The heat sold figures have been derived from two sources covering CHP plants and community heating schemes without CHP plants. Data for heat sold were supplied by CHP plants to the Combined Heat and Power Quality Assurance Programme and were processed by Ricardo-AEA. Data for heat consumption from community heating schemes were derived from the Building Research Establishment's (BRE) 'Nationwide Survey of Community Heating' that was carried out in 1997, a database of community heating schemes in social housing in 2000, and Community Heating Sales Surveys undertaken between 2003 and 2005. The estimates from these sources have been used to

derive heat sold figures since 1999. When information about where the heat was generated was not available from the BRE sources, it was assumed that domestic sector heat consumption was provided by the commercial sector, public sector heat consumption was provided by the public administration and industrial sectors (using proportions derived from CHP statistics) and that industrial sector heat consumption was provided by the industrial sector. The introduction of heat sold into the energy balances has not affected the individual fuel totals, since the energy used to generate the heat has been deducted from the final consumption section of the energy balance and transferred to the transformation section. The figures that are included in the balances should be treated as indicative of the amount of heat sold. Annex J of the Digest, at: www.gov.uk/government/collections/digest-of-uk-energy-statistics-dukes shows the quantity of fuel by consuming sector used to produce heat that is subsequently sold.

## II Energy balances (Tables 1.1, 1.2 and 1.3)

1.38 Tables 1.1, 1.2 and 1.3 show the energy flows as the primary fuels are processed (or used) and as the consequent secondary fuels are used. The net inputs to transformation are shown in the transformation rows and hence outputs from transformation processes into which primary fuels are input (such as electricity generation, heat generation or petroleum refining) appear as positive figures under the secondary product's heading in the tables. Similarly the net inputs are shown as negative figures under the primary fuel headings.

## III Value balances (Tables 1.4, 1.5 and 1.6)

### Valuation of energy purchases

1.39 In common with the rest of the chapter, these tables covering energy expenditure follow a balance format. While a user may derive data on a similar basis as that previously published, the balance tables allow for more varied use and interpretation of traded energy value data. That said, the tables continue to only show values for energy that has to be purchased and therefore do not include estimated values of a sector's internal consumption, such as coal used in the process of coal extraction.

### The value balance

1.40 The tables balances around **market value of inland consumption**, with the lower half of the tables showing the total value of consumption by end users, sub divided into energy sector users and final users both for energy and non-energy use. The top half of the tables show the supply components that go to make up the final market value of inland consumption, namely upstream cost of production, imports, taxes and the margins and costs of delivering and packaging the fuel for the final consumer. The total final consumers' value of energy consumption is represented by the lines 'total non-energy sector use' and iron and steel sectors' purchases of coal for use in solid fuel manufacture.

1.41 All figures are estimates and have been rounded to the nearest £5 million.

### Fuel definitions in value balances

1.42 **Crude oil** includes Natural Gas Liquids (NGLs) and refinery feedstocks. **Natural gas** does not include colliery methane. **Electricity** only includes electricity delivered via the public distribution system and therefore does not value electricity produced and consumed by autogenerators; however the fuels used by autogenerators are included under Transformation. **Manufactured solid fuels** include coke, breeze and other solid manufactured fuels, mainly products from patent fuel and carbonisation plants. **Other fuels** include all other fuels not separately listed, where they can be clearly considered as traded and some reasonable valuation can be made. Fuels mainly contributing to this year's values are wood, coke oven and colliery methane gases sold on to other industrial users and some use of waste products such as poultry litter.

### Energy end use

1.43 Values represent the cost to the final user including transportation of the fuel. They are derived, except where actual values are available, from the traded element of the volumes presented in aggregate energy balance and end user prices collected from information supplied by users or energy

suppliers. The **energy sector** consists of those industries engaged in the production and sale of energy products, but values are not given for consumption of self-generated fuels e.g. coke oven gas used by coke producers. Many of the processes in the **iron and steel** industry are considered to be part of the energy sector in the energy balances, but for the purposes of this economic balance their genuine purchases are treated as those of final consumers, except for purchases of coal directly used in coke manufacture, which is shown separately as part of manufacture of solid fuel. Coal used directly in or to heat blast furnaces is shown as iron and steel final use. **Transformation** includes those fuels used directly in producing other fuels e.g. crude oil in petroleum products. **Electricity generators** keep and use significant stocks of coal, and the stocks used in consumption each year are shown separately. The value and margins for these being assumed to be the same as other coal purchased in the year. **Road transport** includes all motor spirit and DERV (diesel-engined road vehicle) use. **Commercial and other users** include public administration and miscellaneous uses not classified to the industrial sector.

### Supply

1.44 The supply side money chain is derived using various methods. **Indigenous production** represents the estimated basic value of in-year sales by the upstream producers. This value is gross of any taxes or cost they must meet. The valuation problems in attributing network losses in gas and electricity between upstream and downstream within this value chain means any costs borne are included in the production value. **Imports and exports** are valued in accordance with data published by HM Revenue and Customs, contained in Annex G (which can be found on the Internet at: www.gov.uk/government/collections/digest-of-uk-energy-statistics-dukes). However, crude oil is treated differently, where the value is formed from price data taken from a census survey of refiners and volume data taken from Table 3.1. These values are considered to reflect the complete money chain more accurately than Tables G.1 to G.6. **Stock changes** are those for undistributed stocks except for coal where coke oven and generators' stocks are included. A stock increase takes money out of the money chain and is therefore represented as a negative. **Distribution costs** are arrived at by removing an estimate of producers' value along with any taxes from the end user values shown. For most fuels, the estimate of producer value is derived from the consumption used for end use and the producer price taken from survey of producers. No sector breakdown is given for gas and electricity margins because it is not possible to accurately measure delivery costs for each sector. **Taxes** include VAT where not refundable and duties paid on downstream sales. Excluded are the gas and fossil fuel levies, petroleum revenue tax and production royalties and licence fees. The proceeds from the fossil fuel levy are redistributed across the electricity industry, whilst the rest are treated as part of the production costs.

### Sales of electricity and gas by sector (Table 1.7)

1.45 This table provides data on the total value of gas and electricity sold to final consumers. The data are collected from the energy supply companies. The data are useful in indicating relative total expenditure between sectors, but the quality of data provided in terms of industrial classification has been worsening in recent years. Net selling values provide an indication of typical prices paid in broad sectors.

## IV Measurement of energy consumption

### Primary fuel input basis

1.46 Energy consumption is usually measured in one of three different ways. The first, known as the primary fuel input basis, assesses the total input of primary fuels and their equivalents. This measure includes energy used or lost in the conversion of primary fuels to secondary fuels (for example in power stations and oil refineries), energy lost in the distribution of fuels (for example in transmission lines) and energy conversion losses by final users. Primary demands as in Table 1.1, 1.2 and 1.3 are on this basis.

### Final consumption - energy supplied basis

1.47 The second method, known as the energy supplied basis, measures the energy content of the fuels, both primary and secondary, supplied to final users. Thus it is net of fuel industry own use and conversion, transmission and distribution losses, but it includes conversion losses by final users. Table 1D presents shares of final consumption on this basis. The final consumption figures are presented on this basis throughout Chapter 1.

1.48 Although this is the usual and most direct way to measure final energy consumption, it is also possible to present final consumption on a primary fuel input basis. This can be done by allocating the conversion losses, distribution losses and energy industry use to final users. This approach can be used to compare the total primary fuel use which each sector of the economy accounts for. Table 1E presents shares of final consumption on this basis.

## Final consumption - useful energy basis

1.49 Thirdly, final consumption may be expressed in the form of useful energy available after deduction of the losses incurred when final users convert energy supplied into space or process heat, motive power or light. Such losses depend on the type and quality of fuel and the equipment used and on the purpose, conditions, duration and intensity of use. Statistics on useful energy are not sufficiently reliable to be given in this Digest; there is a lack of data on utilisation efficiencies and on the purposes for which fuels are used.

## Shares of each fuel in energy supply and demand

1.50 The relative importance of the energy consumption of each sector of the economy depends on the method used to measure consumption. Shares of final consumption on an energy supplied basis (that is in terms of the primary and secondary fuels directly consumed) in 2014 are presented in Table 1D. For comparison, Table 1E presents shares of final consumption on a primary fuel input basis.

### Table 1D: Primary and secondary fuels consumed by final users in 2014 – energy supplied basis

| | Percentage of each fuel | | | | | | Percentage of each sector | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Industry | Transport | Domestic | Others | Total | | Solid fuels | Petr-oleum | Gas | Electricity | Bio-energy | Total |
| Solid fuels | 77 | 0 | 22 | 1 | 100 | Industry | 9 | 19 | 34 | 35 | 3 | 100 |
| Petroleum | 7 | 86 | 4 | 2 | 100 | Transport | 0 | 97 | - | 1 | 2 | 100 |
| Gas | 20 | - | 60 | 21 | 100 | Domestic | 2 | 7 | 63 | 25 | 4 | 100 |
| Electricity | 31 | 1 | 36 | 32 | 100 | Others | 0 | 8 | 45 | 45 | 2 | 100 |
| Bioenergy | 17 | 31 | 42 | 10 | 100 | | | | | | | |
| **All fuels** | **17** | **40** | **28** | **14** | **100** | **All users** | **2** | **46** | **30** | **19** | **3** | **100** |

### Table 1E: Total primary fuel consumption by final users in 2014 - primary input basis

| | Percentage of each fuel | | | | | | Percentage of each sector | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Industry | Transport | Domestic | Others | Total | | Coal | Petr-oleum | Gas | Primary electricity | Bio-energy | Total |
| Coal | 36 | 1 | 34 | 29 | 100 | Industry | 30 | 11 | 38 | 14 | 6 | 100 |
| Petroleum | 7 | 85 | 4 | 3 | 100 | Transport | 1 | 96 | 0 | 0 | 2 | 100 |
| Gas | 25 | 0 | 50 | 24 | 100 | Domestic | 21 | 5 | 56 | 12 | 7 | 100 |
| Primary electricity | 31 | 1 | 36 | 32 | 100 | Others | 28 | 5 | 44 | 17 | 7 | 100 |
| Bioenergy | 26 | 13 | 38 | 24 | 100 | | | | | | | |
| **All fuels** | **22** | **30** | **30** | **19** | **100** | **All users** | **18** | **33** | **33** | **10** | **5** | **100** |

1.51 In 2014, every 1 toe of secondary electricity consumed by final users required, on average, 1.0 toe of coal, 0.7 toe of natural gas, 0.5 toe of primary electricity (nuclear) and 0.3 toe of oil and bioenergy combined. The extent of this primary consumption is hidden in Table 1D, which presents final consumption only in terms of the fuels directly consumed. When all such primary consumption is allocated to final users, as in Table 1E, the relative importance of fuels and sectors changes; the transport sector, which uses very little electricity, declines in importance, whilst the true cost of final consumption in terms of coal use can now be seen.

1.52 Another view comes from shares of users' expenditure on each fuel (Table 1F based on Table 1.4). In this case the importance of fuels which require most handling by the user (solids and liquid fuels) is slightly understated, and the importance of uses taxed at higher rates (transport) is overstated in the "All users" line.

## Table 1F: Value of fuels purchased by final users in 2014

**Percentage of each sector**

| | Solid fuels | Petroleum | Gas | Secondary electricity | Heat | Biofuels | Total |
|---|---|---|---|---|---|---|---|
| Industry | 8 | 19 | 17 | 53 | 2 | 1 | 100 |
| Transport | - | 96 | - | 1 | - | 4 | 100 |
| Domestic | 1 | 4 | 43 | 50 | - | 2 | 100 |
| Others | - | 7 | 20 | 72 | 1 | - | 100 |
| **All users** | **1** | **54** | **15** | **27** | **0** | **2** | **100** |

### Systems of measurement - international statistics

1.53 The systems of energy measurement used in various international statistics differ slightly from the methods of the Digest. The key difference is the conversion factors used in DECC's headline data that change the units for fuels for a volume or weight measure to an energy basis, as discussed in the paragraph below. However, in line with the International Recommendations for Energy Statistics (IRES) the UK does make data available on both bases. Other differences are that both the International Energy Agency (IEA) as well as the United Nations' IRES have International Aviation Bunkers as well as International Marine Bunkers shown together and not included in the country's energy supply. The UK in its energy balances continues to show fuel used for international marine bunkers in this manner but has continued to show fuel for international aviation as part of final consumption - this practice is also followed by Eurostat.

### Net calorific values

1.54 Calorific values (thermal contents) used internationally are net rather than gross. The difference between the net and gross thermal content is the amount of energy necessary to evaporate the water present in the fuel or formed during the combustion process. The differences between gross and net values are generally taken to be 5 per cent for liquid and solid fuels (except for coke and coke breeze where there is no difference), 10 per cent for gases (except for blast furnace gas, 1 per cent), 15 per cent for straw, and 16 per cent for poultry litter. The calorific value of wood is highly dependent on its moisture content. In Annex A, the gross calorific value is given as 14.9 GJ at 20 per cent moisture content and 18.6 GJ for dry wood. Both gross and net calorific values are shown in Annex A. Energy balances on a net calorific basis are published in an annex to DUKES available via the internet.

## V Definitions of fuels

1.55 The following paragraphs explain what is covered under the terms "primary" and "secondary" fuels.

### Primary fuels

**Coal -** Production comprises all grades of coal, including slurry.

**Primary oils** - This includes crude oil, natural gas liquids (NGLs) and feedstock.

**Natural gas liquids -** Natural gas liquids (NGLs) consist of condensates ($C_5$ or heavier) and petroleum gases other than methane $C_1$, that is ethane $C_2$, propane $C_3$ and butane $C_4$, obtained from the onshore processing of associated and non-associated gas. These are treated as primary fuels when looking at primary supply but in the consumption data presented in this chapter these fuels are treated as secondary fuels, being transferred from the primary oils column in Tables 1.1, 1.2 and 1.3.

**Natural gas -** Production relates to associated or non-associated methane $C_1$ from land and the United Kingdom sector of the Continental Shelf. It includes that used for drilling production and pumping operations, but excludes gas flared or re-injected. It also includes colliery methane piped to the surface and consumed by collieries or others.

**Nuclear electricity -** Electricity generated by nuclear power stations belonging to the major power producers. See Chapter 5, paragraphs 5.66 to 5.72.

**Natural flow hydro-electricity -** Electricity generated by natural flow hydroelectric power stations, whether they belong to major power producers or other generators. Pumped storage stations are not included (see under secondary electricity below).
**Renewable energy sources -** In this chapter figures are presented for renewables and waste in total. Further details, including a detailed breakdown of the commodities and technologies covered are in Chapter 6.

### Secondary fuels

**Manufactured fuel -** This heading includes manufactured solid fuels such as coke and breeze, other manufactured solid fuels, liquids such as benzole and tars and gases such as coke oven gas and blast furnace gas. Further details are given in Chapter 2, Tables 2.5 and 2.6.
**Coke and breeze –** Coke, oven coke and hard coke breeze. Further details are given in Chapter 2, Table 2.5.
**Other manufactured solid fuels –** Manufactured solid fuels produced at low temperature carbonisation plants and other manufactured fuel and briquetting plants. Further details are given in Chapter 2, Table 2.5.
**Coke oven gas -** Gas produced at coke ovens, excluding low temperature carbonisation plants. Gas bled or burnt to waste is included in production and losses. Further details are given in Chapter 2, Table 2.6.
**Blast furnace gas -** Blast furnace gas is mainly produced and consumed within the iron and steel industry. Further details are given in Chapter 2, Table 2.6.
**Petroleum products -** Petroleum products produced mainly at refineries, together with inland deliveries of natural gas liquids.
**Secondary electricity -** Secondary electricity is that generated by the combustion of another fuel, usually coal, natural gas, biofuels or oil. The figure for outputs from transformation in the electricity column of Tables 1.1, 1.2 and 1.3 is the total of primary and secondary electricity, and the subsequent analysis of consumption is based on this total.
**Heat sold** – Heat sold is heat that is produced and sold under the provision of a contract.

## VI Classification of consumers

1.56 The Digest has been prepared, as far as is practicable, on the basis of the *Standard Industrial Classification (SIC)2007* (www.ons.gov.uk/ons/guide-method/classifications/current-standard-classifications/standard-industrial-classification/index.html). Table 1G shows the categories of consumers together with their codes in SIC 2007. SIC(2007) replaced SIC(2003) on 1 January 2008, with energy statistics being compiled on the new basis from 2010. SIC(2003) was introduced at the start of 2003; the previous classification SIC(1992) was used from 1995. Between 1986 and 1994 data in the Digest were prepared on the basis of SIC(1980). The changes in classification between SIC(1992), SIC(2003) and SIC(2007) are mainly in the very detailed classifications at the four or five digit level. As such the classifications used for energy statistics are unaffected by these changes.

1.57 The coverage varies between tables (e.g. in some instances the 'other' category is split into major constituents, whereas elsewhere it may include transport). This is because the coverage is dictated by what data suppliers can provide. The table also shows the disaggregation available within industry. This disaggregation forms the basis of virtually all the tables that show a disaggregated industrial breakdown.

1.58 There is also an 'unclassified' category in the industry sector (see Table 1G). In cases where the data supplier has been unable to allocate an amount between categories, but the Department of Energy and Climate Change has additional information, from other data sources, with which to allocate between categories, then this has been done. Where such additional information is not available the data are included in the 'unclassified' category, enabling the reader to decide whether to accept a residual, pro-rate, or otherwise adjust the figures. The 'miscellaneous' category also contains some unallocated figures for the services sector.

## Table 1G: SIC 2007 classifications

| | |
|---|---|
| Fuel producers | 05-07, 09, 19, 24.46, 35 |
| | |
| Final consumers: | |
| | |
| **Industrial** | |
| Unclassified | See paragraph 1.58 |
| Iron and steel | 24, (*excluding* 24.4, 24.53, 24.54) |
| Non-ferrous metals | 24.4, (*excluding* 24.46), 24.53, 24.54 |
| Mineral products | 08, 23 |
| Chemicals | 20-21 |
| Mechanical engineering and metal products | 25, 28 |
| Electrical and instrument engineering | 26-27 |
| Vehicles | 29-30 |
| Food, beverages & tobacco | 10-12 |
| Textiles, clothing, leather, & footwear | 13-15 |
| Paper, printing & publishing | 17-18 |
| Other industries | 16, 22, 31-33, 36-39 |
| Construction | 41-43 |
| | |
| **Transport** | 49-51 (part*) |
| | |
| **Other final users** | |
| Domestic | Not covered by SIC 2007 |
| Public administration | 84-88 |
| Commercial | 45-47, 49-51 (part*), 52-53, 55-56, 58-66, 68-75, 77-82 |
| Agriculture | 01-03 |
| Miscellaneous | 90-99 |

* Note – transport sector includes only energy used for motion/traction purposes. Other energy used by transport companies is classified to the commercial sector.

1.59 In Tables 7.8 and 7.9 of Chapter 7 the following abbreviated grouping of industries (Table 1H), based on SIC 2007, is used in order to prevent disclosure of information about individual companies.

## Table 1H: Abbreviated grouping of Industry

| | |
|---|---|
| Iron and steel and non-ferrous metal | 24 |
| Chemicals | 20-21 |
| Oil refineries | 19.2 |
| Paper, printing and publishing | 17-18 |
| Food, beverages and tobacco | 10-12 |
| Metal products, machinery and equipment | 25, 26, 27, 28, 29, 30 |
| Mineral products, extraction, mining and agglomeration of solid fuels | 05, 06, 08, 23 |
| Sewage Treatment | (parts of 36 and 37) |
| Electricity supply | 35.1 |
| Other industrial branches | 07, 13, 14, 15,16, 19.1, 24.46, 22, 31, 32, 33, 35.2, 36 & 37 (remainder) 41, 42, 43 |
| Transport, commerce, and administration | 1, 2, 3, 45 to 99 (except 93) |
| Other | 35.3, 93 |

1.60 In Tables 1.8 and 1.9 the list above is further condensed and includes only manufacturing industry and construction as follows in Table 1I.

## Table 1I: Abbreviated grouping of Industry for Tables 1.8 and 1.9

| | |
|---|---|
| Iron and steel and non-ferrous metals | 24 |
| Chemicals | 20-21 |
| Paper, printing and publishing | 17-18 |
| Food, beverages and tobacco | 10-12 |
| Metal products, machinery and equipment | 25-30 |
| Other (including construction) | 08, 13-16, 19, 22-23, 31-33, 36-39, 41-43 |

## VII Monthly and quarterly data

1.61 Monthly and quarterly data on energy production and consumption (including on a seasonally adjusted and temperature corrected basis) split by fuel type are provided on the DECC section of the GOV.UK website at: www.gov.uk/government/statistics/total-energy-section-1-energy-trends. Quarterly figures are also published in DECC's quarterly statistical bulletins *Energy Trends* and *Energy Prices*. See Annex C for more information about these bulletins.

## VIII Statistical differences

1.62 Tables 1.1 to 1.3 each contain a statistical difference term covering the difference between recorded supply and recorded demand. These statistical differences arise for a number of reasons. The data within each table are taken from varied sources, as described above and in later chapters; for example producers, intermediate consumers (such as electricity generators), final consumers and HM Revenue and Customs. Also, some of the figures are estimated either because data in the required detail are not readily available within the industry or because the methods of collecting the data do not cover the smallest members of the industry. Typically, the supply of fuels is easier to measure than demand, and thus greater reliance can be made of these numbers.

## IX Revisions

1.63 Table 1J below shows a summary of the revisions made to the major energy aggregates between this year's edition of DUKES and the immediately preceding version. This year, the revisions window for DUKES was again 2008, with changes to methodology and revised data allowed back to that date. Key methodological changes this year included a reassessment of domestic wood use, which resulted in increased estimates – details are available in Chapter 6 paragraphs 6.101 to 6.107. Other revisions have been made to petroleum with a change in the source of downstream oil data; some reclassification of feedstocks into finished products, which effects energy use in petroleum refineries and exports of oil; and to non-energy use of petroleum products. Details are available in Chapter 3 paragraphs 3.57 to 3.61. Gas imports and energy industry use have been revised as detailed in Chapter 4 paragraph 4.14.

### Table 1J: Revisions since DUKES 2014

Thousand tonnes of oil equivalent

| | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | Percentage revisions to 2013 data |
|---|---|---|---|---|---|---|---|
| Indigenous production | 677 | 573 | 659 | 494 | 574 | 544 | 0.5% |
| Primary supply | 673 | 624 | 814 | 634 | 845 | 1,187 | 0.6% |
| Primary demand | 753 | 465 | 830 | 516 | 807 | 1,187 | 0.6% |
| Transformation | 25 | 82 | -245 | -72 | 66 | -127 | 0.3% |
| Energy industry use | 0 | -86 | -171 | -145 | -112 | -18 | -0.1% |
| Final consumption | 332 | 623 | 742 | 574 | 1,015 | 1,006 | 0.7% |
| Industry | 0 | 0 | -11 | 1 | 204 | 7 | 0.0% |
| Transport | 15 | 15 | 15 | -27 | -11 | 145 | 0.3% |
| Other | 537 | 476 | 631 | 478 | 697 | 715 | 1.1% |
| Non energy use | -220 | 132 | 107 | 121 | 125 | 140 | 1.8% |

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# 1.1 Aggregate energy balance 2014
# Gross calorific values

Thousand tonnes of oil equivalent

| | Coal | Manufactured fuel(1) | Primary oils | Petroleum products | Natural gas(2) | Bioenergy & waste(3) | Primary electricity | Electricity | Heat sold | Total |
|---|---|---|---|---|---|---|---|---|---|---|
| **Supply** | | | | | | | | | | |
| Indigenous production | 7,289 | - | 43,705 | - | 36,583 | 7,876 | 17,457 | - | - | 112,910 |
| Imports | 27,289 | 669 | 58,852 | 31,782 | 41,029 | 3,151 | - | 1,997 | - | 164,770 |
| Exports | -319 | -80 | -33,865 | -24,848 | -10,998 | -361 | - | -234 | - | -70,704 |
| Marine bunkers | - | - | - | -2,484 | - | - | - | - | - | -2,484 |
| Stock change(4) | -2,831 | -151 | -648 | +309 | -205 | - | - | - | - | -3,525 |
| **Primary supply** | **31,428** | **439** | **68,045** | **4,760** | **66,409** | **10,666** | **17,457** | **1,764** | **-** | **200,966** |
| **Statistical difference**(5) | -67 | -3 | -56 | -199 | -75 | - | - | -48 | - | -449 |
| **Primary demand** | **31,496** | **442** | **68,101** | **4,959** | **66,483** | **10,666** | **17,457** | **1,812** | **-** | **201,415** |
| Transfers | - | +9 | -1,687 | +1,687 | -12 | - | -3,607 | +3,607 | - | -3 |
| **Transformation** | **-29,552** | **1,449** | **-66,414** | **65,392** | **-21,017** | **-6,609** | **-13,850** | **25,287** | **1,625** | **-43,688** |
| Electricity generation | -24,114 | -916 | - | -523 | -18,779 | -6,534 | -13,850 | 25,287 | - | -39,429 |
| Major power producers | -23,999 | - | - | -176 | -16,330 | -3,156 | -13,850 | 22,918 | - | -34,593 |
| Autogenerators | -115 | -916 | - | -347 | -2,449 | -3,378 | - | 2,369 | - | -4,836 |
| Heat generation | -320 | -51 | - | -72 | -2,238 | -75 | - | - | 1,625 | -1,132 |
| Petroleum refineries | - | - | -66,414 | 66,065 | - | - | - | - | - | -349 |
| Coke manufacture | -3,784 | 3,450 | - | - | - | - | - | - | - | -334 |
| Blast furnaces | -1,150 | -1,229 | - | - | - | - | - | - | - | -2,379 |
| Patent fuel manufacture | -183 | 195 | - | -78 | - | - | - | - | - | -66 |
| Other | - | - | - | - | - | - | - | - | - | - |
| **Energy industry use** | **0** | **802** | **-** | **4,123** | **4,246** | **-** | **-** | **2,162** | **285** | **11,619** |
| Electricity generation | - | - | - | - | - | - | - | 1,420 | - | 1,420 |
| Oil and gas extraction | - | - | - | 701 | 3,654 | - | - | 45 | - | 4,399 |
| Petroleum refineries | - | - | - | 3,422 | 98 | - | - | 391 | 285 | 4,197 |
| Coal extraction | 0 | - | - | - | 14 | - | - | 60 | - | 75 |
| Coke manufacture | - | 381 | - | - | - | - | - | 7 | - | 388 |
| Blast furnaces | - | 421 | - | - | 29 | - | - | 38 | - | 488 |
| Patent fuel manufacture | - | - | - | - | - | - | - | - | - | - |
| Pumped storage | - | - | - | - | - | - | - | 86 | - | 86 |
| Other | - | - | - | - | 451 | - | - | 115 | - | 565 |
| **Losses** | **-** | **216** | **-** | **-** | **590** | **-** | **-** | **2,456** | **-** | **3,262** |
| **Final consumption** | **1,943** | **881** | **-** | **67,915** | **40,619** | **4,057** | **-** | **26,088** | **1,339** | **142,843** |
| **Industry** | **1,496** | **563** | **-** | **4,348** | **7,953** | **702** | **-** | **8,029** | **896** | **23,986** |
| Unclassified | - | 46 | - | 3,376 | 1 | 702 | - | - | - | 4,125 |
| Iron and steel | 38 | 517 | - | 8 | 468 | - | - | 326 | - | 1,357 |
| Non-ferrous metals | 15 | - | - | 0 | 169 | - | - | 384 | - | 568 |
| Mineral products | 782 | - | - | 200 | 1,301 | - | - | 549 | - | 2,832 |
| Chemicals | 49 | - | - | 124 | 1,242 | - | - | 1,378 | 467 | 3,262 |
| Mechanical engineering etc | 10 | - | - | - | 500 | - | - | 585 | - | 1,094 |
| Electrical engineering etc | 5 | - | - | 1 | 214 | - | - | 499 | - | 718 |
| Vehicles | 39 | - | - | 209 | 373 | - | - | 403 | - | 1,024 |
| Food, beverages etc | 38 | - | - | 111 | 1,766 | - | - | 895 | - | 2,811 |
| Textiles, leather etc | 41 | - | - | 53 | 444 | - | - | 233 | - | 772 |
| Paper, printing etc | 79 | - | - | 36 | 675 | - | - | 906 | - | 1,695 |
| Other industries | 394 | - | - | 39 | 432 | - | - | 1,754 | 429 | 3,047 |
| Construction | 5 | - | - | 192 | 366 | - | - | 118 | - | 681 |
| **Transport** (6) | **9** | **-** | **-** | **52,559** | **-** | **1,243** | **-** | **366** | **-** | **54,177** |
| Air | - | - | - | 12,419 | - | - | - | - | - | 12,419 |
| Rail | 9 | - | - | 658 | - | - | - | 360 | - | 1,027 |
| Road | - | - | - | 38,713 | - | 1,243 | - | 6 | - | 39,962 |
| National navigation | - | - | - | 769 | - | - | - | - | - | 769 |
| Pipelines | - | - | - | - | - | - | - | - | - | - |
| **Other** | **438** | **182** | **-** | **4,050** | **32,199** | **2,112** | **-** | **17,694** | **444** | **57,119** |
| Domestic | 414 | 182 | - | 2,552 | 23,912 | 1,688 | - | 9,362 | 52 | 38,162 |
| Public administration | 16 | - | - | 359 | 3,179 | 85 | - | 1,565 | 381 | 5,586 |
| Commercial | 4 | - | - | 470 | 4,165 | 56 | - | 6,446 | 11 | 11,152 |
| Agriculture | - | - | - | 368 | 76 | 283 | - | 321 | - | 1,047 |
| Miscellaneous | 4 | - | - | 301 | 867 | 0 | - | - | - | 1,172 |
| **Non energy use** | **-** | **136** | **-** | **6,958** | **467** | **-** | **-** | **-** | **-** | **7,561** |

*(1) Includes all manufactured solid fuels, benzole, tars, coke oven gas and blast furnace gas.*
*(2) Includes colliery methane.*
*(3) Includes geothermal and solar heat.*
*(4) Stock fall (+), stock rise (-).*
*(5) Primary supply minus primary demand.*
*(6) See paragraphs 5.12 regarding electricity use in transport and 6.41 regarding renewables use in transport.*

# 1.2 Aggregate energy balance 2013
# Gross calorific values

Thousand tonnes of oil equivalent

| | Coal | Manufactured fuel(1) | Primary oils | Petroleum products | Natural gas(2) | Bioenergy & waste(3) | Primary electricity | Electricity | Heat sold | Total |
|---|---|---|---|---|---|---|---|---|---|---|
| **Supply** | | | | | | | | | | |
| Indigenous production | 7,973r | - | 44,468 | - | 36,523 | 7,482r | 18,462r | - | - | 114,908r |
| Imports | 32,122 | 593 | 64,675 | 31,520r | 46,011 | 2,167 | - | 1,508 | - | 178,596r |
| Exports | -447 | -83 | -36,192r | -29,463r | -9,429 | -247 | - | -267 | - | -76,129r |
| Marine bunkers | - | - | - | -2,691 | - | - | - | - | - | -2,691 |
| Stock change(4) | -810r | -87 | +791 | +84 | +53 | - | - | - | - | +31r |
| **Primary supply** | **38,838r** | **423** | **73,743r** | **-550r** | **73,157** | **9,402r** | **18,462r** | **1,241** | **-** | **214,715r** |
| **Statistical difference**(5) | -199r | +0r | -104 | -69r | +162r | - | - | -89r | - | -298r |
| **Primary demand** | **39,036r** | **423r** | **73,847r** | **-481r** | **72,995r** | **9,402r** | **18,462r** | **1,330r** | **-** | **215,013r** |
| Transfers | - | +5r | -2,122r | +2,117r | -5 | - | -3,020r | +3,020r | - | -5r |
| **Transformation** | **-37,087r** | **1,519r** | **-71,724r** | **70,910r** | **-19,867r** | **-5,607r** | **-15,442** | **27,614r** | **1,531r** | **-48,153r** |
| Electricity generation | -31,432 | -939 | - | -585r | -17,740r | -5,546r | -15,442r | 27,614r | - | -44,071r |
| Major power producers | -31,309r | - | - | -231r | -15,065r | -2,403 | -15,442r | 25,301r | - | -39,149r |
| Autogenerators | -123r | -939 | - | -355r | -2,675r | -3,142r | - | 2,312r | - | -4,923r |
| Heat generation | -378 | -51 | - | -68 | -2,126r | -61r | - | - | 1,531r | -1,153r |
| Petroleum refineries | - | - | -71,724r | 71,658r | - | - | - | - | - | -67r |
| Coke manufacture | -4,020 | 3,574 | - | - | - | - | - | - | - | -446 |
| Blast furnaces | -1,073 | -1,304r | - | - | - | - | - | - | - | -2,376r |
| Patent fuel manufacture | -184r | 239 | - | -95 | - | - | - | - | - | -40r |
| Other | - | - | - | - | - | - | - | - | - | - |
| **Energy industry use** | **2** | **777** | **-** | **4,644r** | **4,632r** | **-** | **-** | **2,324r** | **160** | **12,539r** |
| Electricity generation | - | - | - | - | - | - | - | 1,538 | - | 1,538 |
| Oil and gas extraction | - | - | - | 672 | 4,003 | - | - | 49 | - | 4,725 |
| Petroleum refineries | - | - | - | 3,972r | 99 | - | - | 402r | 160 | 4,633r |
| Coal extraction | 2 | - | - | - | 14 | - | - | 68 | - | 84 |
| Coke manufacture | - | 378 | - | - | - | - | - | 7 | - | 385 |
| Blast furnaces | - | 400 | - | - | 31 | - | - | 38 | - | 468r |
| Patent fuel manufacture | - | - | - | - | - | - | - | - | - | - |
| Pumped storage | - | - | - | - | - | - | - | 88r | - | 88r |
| Other | - | - | - | - | 485r | - | - | 133 | - | 619r |
| **Losses** | **-** | **215** | **-** | **-** | **643** | **-** | **-** | **2,384r** | **-** | **3,242r** |
| **Final consumption** | **1,948r** | **954r** | **-** | **67,902r** | **47,848r** | **3,795r** | **-** | **27,255r** | **1,372r** | **151,074r** |
| **Industry** | **1,430r** | **594r** | **-** | **4,324r** | **7,997r** | **573r** | **-** | **8,398r** | **921r** | **24,236r** |
| Unclassified | - | 74 | - | 3,352r | 1 | 573r | - | - | - | 4,000r |
| Iron and steel | 38 | 520r | - | 4 | 459 | - | - | 327 | - | 1,348r |
| Non-ferrous metals | 14 | - | - | 0 | 166r | - | - | 381 | - | 561r |
| Mineral products | 776r | - | - | 195r | 1,306r | - | - | 578 | - | 2,855r |
| Chemicals | 54r | - | - | 120r | 1,229r | - | - | 1,485r | 510r | 3,397r |
| Mechanical engineering etc | 8 | - | - | - | 488r | - | - | 607 | - | 1,103r |
| Electrical engineering etc | 4 | - | - | 1 | 225 | - | - | 531 | - | 760 |
| Vehicles | 37 | - | - | 205r | 385r | - | - | 436 | - | 1,063r |
| Food, beverages etc | 31 | - | - | 134 | 1,773r | - | - | 953r | 0r | 2,891r |
| Textiles, leather etc | 42 | - | - | 52r | 444r | - | - | 249 | - | 787r |
| Paper, printing etc | 70r | - | - | 35r | 700r | - | - | 929r | - | 1,735r |
| Other industries | 350r | - | - | 38r | 445r | - | - | 1,796r | 411r | 3,041r |
| Construction | 5 | - | - | 187r | 377 | - | - | 126 | - | 695r |
| **Transport** (6) | **10** | **-** | **-** | **52,094r** | **-** | **1,092r** | **-** | **367r** | **-** | **53,563r** |
| Air | - | - | - | 12,434r | - | - | - | - | - | 12,434r |
| Rail | 10 | - | - | 656r | - | - | - | 364r | - | 1,030r |
| Road | - | - | - | 38,177 | - | 1,092r | - | 3 | - | 39,271 |
| National navigation | - | - | - | 828 | - | - | - | - | - | 828 |
| Pipelines | - | - | - | - | - | - | - | - | - | - |
| **Other** | **508r** | **221** | **-** | **4,356r** | **39,370r** | **2,130r** | **-** | **18,490r** | **451r** | **65,526r** |
| Domestic | 484r | 221 | - | 2,869r | 29,450r | 1,748r | - | 9,755 | 52 | 44,577r |
| Public administration | 16 | - | - | 346r | 3,819r | 104r | - | 1,618 | 384r | 6,288r |
| Commercial | 4 | - | - | 457r | 4,969r | 53r | - | 6,784r | 15r | 12,281r |
| Agriculture | - | - | - | 392r | 94 | 225r | - | 333 | - | 1,044r |
| Miscellaneous | 5r | - | - | 292r | 1,037r | 0 | - | - | - | 1,335r |
| **Non energy use** | **-** | **140** | **-** | **7,128r** | **481** | **-** | **-** | **-** | **-** | **7,749r** |

*(1) Includes all manufactured solid fuels, benzole, tars, coke oven gas and blast furnace gas.*
*(2) Includes colliery methane.*
*(3) Includes geothermal and solar heat.*
*(4) Stock fall (+), stock rise (-).*
*(5) Primary supply minus primary demand.*
*(6) See paragraphs 5.12 regarding electricity use in transport and 6.41 regarding renewables use in transport.*

# 1.3 Aggregate energy balance 2012
# Gross calorific values

Thousand tonnes of oil equivalent

| | Coal | Manufactured fuel(1) | Primary oils | Petroleum products | Natural gas(2) | Bioenergy & waste(3) | Primary electricity | Electricity | Heat sold | Total |
|---|---|---|---|---|---|---|---|---|---|---|
| **Supply** | | | | | | | | | | |
| Indigenous production | 10,583r | - | 48,756 | - | 38,925 | 6,846r | 17,482r | - | - | 122,591r |
| Imports | 29,061 | 148 | 66,090r | 28,688r | 47,250 | 1,725 | - | 1,182 | - | 174,143r |
| Exports | -368 | -393 | -33,837r | -32,678r | -12,384 | -306 | - | -161 | - | -80,126r |
| Marine bunkers | - | - | - | -2,812 | - | - | - | - | - | -2,812 |
| Stock change(4) | +1,955r | +66r | -532 | +146 | -23 | - | - | - | - | +1,612r |
| **Primary supply** | **41,231r** | **-179r** | **80,477r** | **-6,657r** | **73,768** | **8,265r** | **17,482r** | **1,021** | **-** | **215,407r** |
| **Statistical difference**(5) | +223r | -8 | -152r | -85r | -160r | - | - | -49r | - | -231r |
| **Primary demand** | **41,008r** | **-172r** | **80,629r** | **-6,572r** | **73,928r** | **8,265r** | **17,482r** | **1,070r** | **-** | **215,638r** |
| Transfers | - | +5 | -2,215r | +2,190r | -5 | - | -2,276r | +2,276r | - | -25r |
| **Transformation** | **-39,259r** | **1,732r** | **-78,414r** | **77,506r** | **-20,777r** | **-5,059r** | **-15,205** | **28,731r** | **1,533** | **-49,212r** |
| Electricity generation | -34,316 | -801r | - | -716 | -18,619r | -4,934r | -15,205 | 28,731r | - | -45,862r |
| Major power producers | -33,655 | - | - | -397 | -15,848r | -1,766 | -15,205 | 26,139r | - | -40,732r |
| Autogenerators | -661 | -801r | - | -319 | -2,772r | -3,169r | - | 2,591r | - | -5,130r |
| Heat generation | -286 | -51 | - | -81 | -2,157 | -125 | - | - | 1,533 | -1,168 |
| Petroleum refineries | - | - | -78,414r | 78,374r | - | - | - | - | - | -39r |
| Coke manufacture | -3,775 | 3,507r | - | - | - | - | - | - | - | -268r |
| Blast furnaces | -750 | -1,106r | - | - | - | - | - | - | - | -1,856r |
| Patent fuel manufacture | -131r | 183 | - | -71 | - | - | - | - | - | -19r |
| Other | - | - | - | - | - | - | - | - | - | - |
| **Energy industry use** | **3** | **700r** | **-** | **5,166** | **4,844r** | **-** | **-** | **2,252r** | **307** | **13,271r** |
| Electricity generation | - | - | - | - | - | - | - | 1,545r | - | 1,545r |
| Oil and gas extraction | - | - | - | 670 | 4,167 | - | - | 49 | - | 4,885 |
| Petroleum refineries | - | - | - | 4,496 | 139 | - | - | 326r | 307 | 5,269r |
| Coal extraction | 3 | - | - | - | 17 | - | - | 71 | - | 90 |
| Coke manufacture | - | 386r | - | - | - | - | - | 7 | - | 393r |
| Blast furnaces | - | 314r | - | - | 23 | - | - | 32 | - | 368r |
| Patent fuel manufacture | - | - | - | - | - | - | - | - | - | - |
| Pumped storage | - | - | - | - | - | - | - | 87 | - | 87 |
| Other | - | - | - | - | 498r | - | - | 136 | - | 634r |
| **Losses** | **-** | **87** | **-** | **-** | **678** | **-** | **-** | **2,485r** | **-** | **3,251r** |
| **Final consumption** | **1,747** | **779r** | **-** | **67,958r** | **47,624r** | **3,206r** | **-** | **27,340r** | **1,226** | **149,879r** |
| **Industry** | **1,212** | **461r** | **-** | **4,669r** | **7,870** | **459r** | **-** | **8,442r** | **766** | **23,879r** |
| Unclassified | - | 49 | - | 3,824r | 2 | 459r | - | - | - | 4,334r |
| Iron and steel | 36 | 412r | - | 5r | 438 | - | - | 290 | - | 1,181r |
| Non-ferrous metals | 13 | - | - | - | 163 | - | - | 432 | - | 608 |
| Mineral products | 743 | - | - | 168r | 1,298 | - | - | 580 | - | 2,789r |
| Chemicals | 49 | - | - | 124r | 1,307r | - | - | 1,500r | 336 | 3,316r |
| Mechanical engineering etc | 8 | - | - | 0 | 502 | - | - | 608 | - | 1,118 |
| Electrical engineering etc | 3 | - | - | 2r | 226 | - | - | 532 | - | 764r |
| Vehicles | 35 | - | - | 147r | 344 | - | - | 437 | - | 964r |
| Food, beverages etc | 31 | - | - | 126r | 1,734 | - | - | 958r | 3 | 2,851r |
| Textiles, leather etc | 43 | - | - | 46r | 450 | - | - | 250 | - | 790r |
| Paper, printing etc | 80 | - | - | 29r | 609 | - | - | 934r | 1 | 1,653r |
| Other industries | 166 | - | - | 41r | 436r | - | - | 1,791r | 426 | 2,860r |
| Construction | 5 | - | - | 157r | 362 | - | - | 128 | - | 651r |
| **Transport** (6) | **12** | **-** | **-** | **52,422r** | **-** | **958** | **-** | **367r** | **-** | **53,758r** |
| Air | - | - | - | 12,408 | - | - | - | - | - | 12,408 |
| Rail | 12 | - | - | 673r | - | - | - | 364r | - | 1,048r |
| Road | - | - | - | 38,508 | - | 958 | - | 2 | - | 39,468 |
| National navigation | - | - | - | 833 | - | - | - | - | - | 833 |
| Pipelines | - | - | - | - | - | - | - | - | - | - |
| **Other** | **523** | **185** | **-** | **4,047r** | **39,258r** | **1,789r** | **-** | **18,532r** | **460** | **64,794r** |
| Domestic | 506 | 185 | - | 2,707r | 29,672 | 1,495r | - | 9,860r | 52 | 44,476r |
| Public administration | 8 | - | - | 321r | 3,718r | 89 | - | 1,625r | 402 | 6,163r |
| Commercial | 4 | - | - | 394r | 4,934r | 46r | - | 6,714r | 6 | 12,097r |
| Agriculture | 1 | - | - | 363r | 100 | 158r | - | 333 | - | 955r |
| Miscellaneous | 4 | - | - | 262r | 835r | 0 | - | - | - | 1,102r |
| **Non energy use** | **-** | **133** | **-** | **6,820r** | **496** | **-** | **-** | **-** | **-** | **7,449r** |

*(1) Includes all manufactured solid fuels, benzole, tars, coke oven gas and blast furnace gas.*
*(2) Includes colliery methane.*
*(3) Includes geothermal and solar heat.*
*(4) Stock fall (+), stock rise (-).*
*(5) Primary supply minus primary demand.*
*(6) See paragraphs 5.12 regarding electricity use in transport and 6.41 regarding renewables use in transport.*

# 1.4 Value balance of traded energy in 2014[(1)]

£million

| | Coal | Manufactured fuels | Crude oil | Petroleum products | Natural gas | Electricity | Heat sold | Other fuels | Total |
|---|---|---|---|---|---|---|---|---|---|
| **Supply** | | | | | | | | | |
| Indigenous production | 450 | 265 | 18,185 | 34,410 | 6,655 | 16,525 | 530 | 2,155 | 79,180 |
| Imports | 2,235 | 75 | 24,145 | 16,455 | 7,250 | 1,020 | - | 610 | 51,785 |
| Exports | -55 | -20 | -14,670 | -14,080 | -2,005 | -125 | - | - | -30,960 |
| Marine bunkers | - | - | - | -1,150 | - | - | - | - | -1,150 |
| Stock change | -335 | -30 | -275 | 135 | -40 | - | - | - | -545 |
| **Basic value of inland consumption** | **2,290** | **285** | **27,385** | **35,775** | **11,860** | **17,425** | **530** | **2,765** | **98,310** |
| **Tax and margins** | | | | | | | | | |
| **Distribution costs and margins** | **575** | **25** | **-** | **2,325** | **11,860** | **16,915** | **-** | **115** | **31,815** |
| Electricity generation | 230 | - | - | 5 | - | - | - | - | 235 |
| Solid fuel manufacture | 120 | - | - | - | - | - | - | - | 120 |
| of which iron & steel sector | 105 | - | | - | - | - | - | - | 105 |
| Iron & steel final use | 35 | 10 | | - | - | - | - | - | 45 |
| Other industry | 85 | - | - | 400 | - | - | - | - | 485 |
| Air transport | - | - | - | 175 | - | - | - | - | 175 |
| Rail and national navigation | - | - | - | 40 | - | - | - | - | 40 |
| Road transport | - | - | - | 1,110 | - | - | - | 115 | 1,225 |
| Domestic | 100 | 10 | - | 110 | - | - | - | - | 220 |
| Agriculture | - | - | - | 30 | - | - | - | - | 30 |
| Commercial and other services | 5 | - | - | 50 | - | - | - | - | 55 |
| Non energy use | - | - | - | 410 | 125 | - | - | - | 535 |
| **VAT and duties** | **10** | **5** | **-** | **33,620** | **680** | **800** | **-** | **1,435** | **36,550** |
| Electricity generation | - | - | - | 30 | - | - | - | - | 30 |
| Iron & steel final use | - | - | - | - | - | - | - | - | - |
| Other industry | - | - | - | 260 | - | - | - | - | 260 |
| Air transport | - | - | - | 10 | - | - | - | - | 10 |
| Rail and national navigation | - | - | - | 170 | - | - | - | - | 170 |
| Road transport | - | - | - | 32,890 | - | - | - | 1,410 | 34,300 |
| Domestic | 10 | 5 | - | 90 | 680 | 800 | - | 25 | 1,610 |
| Agriculture | - | - | - | 30 | - | - | - | - | 30 |
| Commercial and other services | - | - | - | 135 | - | - | - | - | 135 |
| **Climate Change Levy/Carbon Price Support** | **485** | **-** | **-** | **280** | **475** | **255** | **-** | **-** | **1,495** |
| **Total tax and margins** | **1,065** | **30** | **-** | **36,220** | **13,015** | **17,970** | **-** | **1,555** | **69,860** |
| **Market value of inland consumption** | **3,355** | **315** | **27,385** | **71,995** | **24,875** | **35,395** | **530** | **4,315** | **168,170** |
| **Energy end use** | | | | | | | | | |
| **Total energy sector** | **2,740** | **-** | **27,385** | **1,225** | **5,535** | **1,240** | **95** | **1,300** | **39,520** |
| **Transformation** | 2,740 | - | 27,385 | 220 | 4,610 | 935 | - | 1,300 | 37,190 |
| Electricity generation | 2,180 | - | - | 185 | 4,120 | 935 | - | 1,300 | 8,720 |
| of which from stocks | 45 | - | - | - | - | - | - | - | 45 |
| Heat Generation | 30 | - | - | 30 | 490 | - | - | - | 555 |
| Petroleum refineries | - | - | 27,385 | - | - | - | - | - | 27,385 |
| Solid fuel manufacture | 530 | - | - | - | - | - | - | - | 530 |
| of which iron & steel sector | 460 | - | - | - | - | - | - | - | 460 |
| **Other energy sector use** | **-** | **-** | **-** | **1,005** | **925** | **305** | **95** | **-** | **2,330** |
| Oil & gas extraction | - | - | - | 345 | 805 | 45 | - | - | 1,190 |
| Petroleum refineries | - | - | - | 660 | 20 | 195 | 95 | - | 970 |
| Coal extraction | - | - | - | - | - | 60 | - | - | 60 |
| Other energy sector | - | - | - | - | 100 | 5 | - | - | 105 |
| **Total non energy sector use** | **615** | **260** | **-** | **67,865** | **19,215** | **34,160** | **435** | **3,015** | **125,565** |
| **Industry** | **405** | **155** | **-** | **2,380** | **2,145** | **6,800** | **295** | **80** | **12,255** |
| Iron & steel final use | 160 | 140 | - | 5 | 125 | 235 | - | 20 | 685 |
| Other industry | 245 | 15 | - | 2,375 | 2,015 | 6,565 | 295 | 65 | 11,575 |
| **Transport** | **5** | **-** | **-** | **63,105** | **-** | **405** | **-** | **2,310** | **65,825** |
| Air | - | - | - | 6,580 | - | - | - | - | 6,580 |
| Rail and national navigation | 5 | - | - | 890 | - | 390 | - | - | 1,285 |
| Road | - | - | - | 55,635 | - | 15 | - | 2,310 | 57,960 |
| **Other final users** | **210** | **105** | **-** | **2,380** | **17,070** | **26,950** | **140** | **625** | **47,485** |
| Domestic | 205 | 105 | - | 1,425 | 14,290 | 16,800 | 15 | 590 | 33,435 |
| Agriculture | - | - | - | 235 | 30 | 430 | - | 25 | 715 |
| Commercial and other services | 5 | - | - | 720 | 2,750 | 9,720 | 125 | 10 | 13,335 |
| **Total value of energy end use** | **3,355** | **260** | **27,385** | **69,090** | **24,750** | **35,395** | **530** | **4,315** | **165,085** |
| **Value of non energy end use** | **-** | **55** | **-** | **2,905** | **125** | **-** | **-** | **-** | **3,085** |
| **Market value of inland consumption** | **3,355** | **315** | **27,385** | **71,995** | **24,875** | **35,395** | **530** | **4,315** | **168,170** |

*(1) For further information see paragraphs 1.39 to 1.44.*

# 1.5 Value balance of traded energy in 2013[(1)]

£million

| | Coal | Manufactured fuels | Crude oil | Petroleum products | Natural gas | Electricity | Heat sold | Other fuels | Total |
|---|---|---|---|---|---|---|---|---|---|
| **Supply** | | | | | | | | | |
| Indigenous production | 535r | 370r | 21,330 | 41,595r | 7,755r | 16,700r | 620r | 2,170r | 91,075r |
| Imports | 3,235r | 65r | 30,100 | 18,585r | 10,985 | 935 | - | 415 | 64,325r |
| Exports | -90r | -25r | -17,460r | -18,905r | -2,510 | -170 | - | - | -39,155r |
| Marine bunkers | - | - | - | -1,400 | - | - | - | - | -1,400 |
| Stock change | -30r | -65r | 380 | -45 | 15 | - | - | - | 255r |
| **Basic value of inland consumption** | **3,645** | **345r** | **34,350r** | **39,835r** | **16,245r** | **17,470r** | **620r** | **2,585r** | **115,095r** |
| **Tax and margins** | | | | | | | | | |
| **Distribution costs and margins** | **615** | **20r** | **-** | **2,475r** | **11,670r** | **17,335r** | **-** | **110** | **32,220r** |
| Electricity generation | 245 | - | - | 5 | - | - | - | - | 250 |
| Solid fuel manufacture | 165 | - | - | - | - | - | - | - | 165 |
| of which iron & steel sector | 140 | - | - | - | - | - | - | - | 140 |
| Iron & steel final use | 40 | - | - | - | - | - | - | - | 40r |
| Other industry | 70 | 5 | - | 385r | - | - | - | - | 460r |
| Air transport | - | - | - | 190r | - | - | - | - | 190r |
| Rail and national navigation | - | - | - | 40r | - | - | - | - | 40r |
| Road transport | - | - | - | 1,155 | - | - | - | 110 | 1,260 |
| Domestic | 90r | 15 | - | 125r | - | - | - | - | 230 |
| Agriculture | - | - | - | 30r | - | - | - | - | 30r |
| Commercial and other services | 5 | - | - | 95r | - | - | - | - | 100r |
| Non energy use | - | - | - | 445r | 145 | - | - | - | 590r |
| **VAT and duties** | **10** | **5** | **-** | **33,635r** | **790r** | **790** | **-** | **1,310r** | **36,540r** |
| Electricity generation | - | - | - | 30r | - | - | - | - | 30r |
| Iron & steel final use | - | - | - | - | - | - | - | - | - |
| Other industry | - | - | - | 255r | - | - | - | - | 255r |
| Air transport | - | - | - | 10 | - | - | - | - | 10 |
| Rail and national navigation | - | - | - | 175r | - | - | - | - | 175r |
| Road transport | - | - | - | 32,895 | - | - | - | 1,280 | 34,175 |
| Domestic | 10 | 5 | - | 105r | 790r | 790 | - | 30r | 1,730r |
| Agriculture | - | - | - | 30r | - | - | - | - | 30r |
| Commercial and other services | - | - | - | 130r | - | - | - | - | 130r |
| **Climate Change Levy/Carbon Price Support** | **235** | **-** | **-** | **135** | **325** | **370** | **-** | **-** | **1,065** |
| **Total tax and margins** | **860** | **25r** | **-** | **36,240r** | **12,785r** | **18,490r** | **-** | **1,420r** | **69,825r** |
| **Market value of inland consumption** | **4,505** | **370r** | **34,350r** | **76,075r** | **29,030r** | **35,960r** | **620r** | **4,005r** | **184,920r** |
| **Energy end use** | | | | | | | | | |
| **Total energy sector** | **3,840r** | **-** | **34,350r** | **1,465r** | **6,530r** | **1,310r** | **65** | **1,085r** | **48,645r** |
| **Transformation** | 3,840r | - | 34,350r | 255r | 5,300r | 980r | - | 1,085r | 45,810r |
| Electricity generation | 3,080 | - | - | 220r | 4,730r | 980r | - | 1,085r | 10,100r |
| of which from stocks | 30 | - | - | - | - | - | - | - | 30 |
| Heat Generation | 35 | - | - | 35 | 570r | - | - | - | 640r |
| Petroleum refineries | - | - | 34,350r | - | - | - | - | - | 34,350r |
| Solid fuel manufacture | 720r | - | - | - | - | - | - | - | 720r |
| of which iron & steel sector | 620 | - | - | - | - | - | - | - | 620 |
| **Other energy sector use** | **-** | **-** | **-** | **1,210r** | **1,230r** | **335** | **65** | **-** | **2,835r** |
| Oil & gas extraction | - | - | - | 375 | 1,070 | 45 | - | - | 1,495 |
| Petroleum refineries | - | - | - | 830 | 25 | 215 | 65 | - | 1,140r |
| Coal extraction | - | - | - | - | - | 65 | - | - | 65 |
| Other energy sector | - | - | - | - | 130r | 5 | - | - | 135r |
| **Total non energy sector use** | **665r** | **310r** | **-** | **71,500r** | **22,355r** | **34,650r** | **555r** | **2,920r** | **132,960r** |
| **Industry** | **425** | **185r** | **-** | **2,595r** | **2,440r** | **7,130r** | **375r** | **85** | **13,240r** |
| Iron & steel final use | 190 | 160r | - | - | 145 | 255 | - | 25r | 775r |
| Other industry | 235 | 25r | - | 2,595r | 2,295r | 6,870r | 375r | 65 | 12,465r |
| **Transport** | **5** | **-** | **-** | **66,035r** | **-** | **390r** | **-** | **2,175** | **68,605r** |
| Air | - | - | - | 7,205r | - | - | - | - | 7,205r |
| Rail and national navigation | 5 | - | - | 1,020r | - | 375 | - | - | 1,395r |
| Road | - | - | - | 57,810 | - | 15r | - | 2,175 | 60,000r |
| **Other final users** | **240r** | **125** | **-** | **2,870r** | **19,915r** | **27,130r** | **180** | **655r** | **51,115r** |
| Domestic | 230r | 125 | - | 1,790r | 16,570r | 16,600r | 20 | 620r | 35,965r |
| Agriculture | - | - | - | 260r | 40 | 435 | - | 25r | 760r |
| Commercial and other services | 5 | - | - | 815r | 3,305r | 10,095r | 160r | 10 | 14,390r |
| **Total value of energy end use** | **4,505** | **310r** | **34,350r** | **72,965r** | **28,885r** | **35,960r** | **620r** | **4,005r** | **181,605r** |
| **Value of non energy end use** | **-** | **55** | **-** | **3,110r** | **145** | **-** | **-** | **-** | **3,315r** |
| **Market value of inland consumption** | **4,505** | **370r** | **34,350r** | **76,075r** | **29,030r** | **35,960r** | **620r** | **4,005r** | **184,920r** |

*(1) For further information see paragraphs 1.39 to 1.44.*

# 1.6 Value balance of traded energy in 2012[(1)]

£million

| | Coal | Manufactured fuels | Crude oil | Petroleum products | Natural gas | Electricity | Heat sold | Other fuels | Total |
|---|---|---|---|---|---|---|---|---|---|
| **Supply** | | | | | | | | | |
| Indigenous production | 990r | 480r | 23,685 | 43,635r | 7,840r | 16,195r | 625 | 2,015r | 95,470r |
| Imports | 3,315r | 15r | 31,270r | 18,370r | 10,045r | 670r | - | 515 | 64,205r |
| Exports | -55 | -135r | -16,435r | -19,695r | -2,715r | -100 | - | - | -39,140r |
| Marine bunkers | - | - | - | -1,485 | - | - | - | - | -1,485 |
| Stock change | 195 | -60r | -255 | 65 | -5 | - | - | - | -65r |
| **Basic value of inland consumption** | **4,445r** | **300r** | **38,260r** | **40,885r** | **15,165r** | **16,765r** | **625** | **2,530r** | **118,980r** |
| **Tax and margins** | | | | | | | | | |
| **Distribution costs and margins** | **785** | **20** | **-** | **2,340r** | **11,275r** | **16,065** | **-** | **95** | **30,585r** |
| Electricity generation | 415 | - | - | 10 | - | - | - | - | 425 |
| Solid fuel manufacture | 195 | - | - | - | - | - | - | - | 195 |
| of which iron & steel sector | 175 | - | - | - | - | - | - | - | 175 |
| Iron & steel final use | 35 | 10r | - | - | - | - | - | - | 50r |
| Other industry | 45 | - | - | 290r | - | - | - | - | 335r |
| Air transport | - | - | - | 195 | - | - | - | - | 195 |
| Rail and national navigation | - | - | - | 45 | - | - | - | - | 45 |
| Road transport | - | - | - | 1,170 | - | - | - | 95 | 1,270 |
| Domestic | 90 | 10 | - | 145 | - | - | - | - | 245 |
| Agriculture | - | - | - | 30r | - | - | - | - | 30r |
| Commercial and other services | 5 | - | - | 85r | - | - | - | - | 85 |
| Non energy use | - | - | - | 375r | 135 | - | - | - | 510r |
| **VAT and duties** | **10** | **5** | **-** | **33,940r** | **750** | **745** | **-** | **1,175r** | **36,625r** |
| Electricity generation | - | - | - | 45 | - | - | - | - | 45 |
| Iron & steel final use | - | - | - | - | - | - | - | - | - |
| Other industry | - | - | - | 270r | - | - | - | - | 270r |
| Air transport | - | - | - | 10 | - | - | - | - | 10 |
| Rail and national navigation | - | - | - | 180 | - | - | - | - | 180 |
| Road transport | - | - | - | 33,190 | - | - | - | 1,140 | 34,330 |
| Domestic | 10 | 5 | - | 100 | 750 | 745 | - | 35r | 1,650r |
| Agriculture | - | - | - | 30r | - | - | - | - | 30r |
| Commercial and other services | - | - | - | 115 | - | - | - | - | 115 |
| **Climate Change Levy** | **5** | **-** | **-** | **-** | **190** | **445** | **-** | **-** | **640** |
| **Total tax and margins** | **800** | **25** | **-** | **36,280r** | **12,210r** | **17,260** | **-** | **1,275r** | **67,855r** |
| **Market value of inland consumption** | **5,245r** | **330r** | **38,260r** | **77,165r** | **27,375r** | **34,030** | **625** | **3,805r** | **186,835r** |
| **Energy end use** | | | | | | | | | |
| **Total energy sector** | **4,640r** | **-** | **38,260r** | **1,650** | **6,345r** | **1,220** | **125** | **995r** | **53,245r** |
| **Transformation** | 4,640r | - | 38,260r | 325 | 5,150r | 885 | - | 995r | 50,255r |
| Electricity generation | 3,750 | - | - | 280 | 4,615r | 885 | - | 995r | 10,530r |
| of which from stocks | 55 | - | - | - | - | - | - | - | 55 |
| Heat Generation | 30 | - | - | 40 | 535 | - | - | - | 610 |
| Petroleum refineries | - | - | 38,260r | - | - | - | - | - | 38,260r |
| Solid fuel manufacture | 855 | - | - | - | - | - | - | - | 855 |
| of which iron & steel sector | 765 | - | - | - | - | - | - | - | 765 |
| **Other energy sector use** | **-** | **-** | **-** | **1,330** | **1,195r** | **335** | **125** | **-** | **2,985r** |
| Oil & gas extraction | - | - | - | 385 | 1,035 | 45 | - | - | 1,465 |
| Petroleum refineries | - | - | - | 940 | 35 | 220 | 125 | - | 1,320 |
| Coal extraction | - | - | - | - | - | 65 | - | - | 70 |
| Other energy sector | - | - | - | - | 125r | 5 | - | - | 130r |
| **Total non energy sector use** | **605** | **275r** | **-** | **72,600r** | **20,895r** | **32,805r** | **500** | **2,810r** | **130,490r** |
| **Industry** | **360** | **175r** | **-** | **2,705r** | **2,180** | **6,755** | **315** | **80** | **12,565r** |
| Iron & steel final use | 175 | 160r | - | 5 | 125 | 210 | - | 20 | 685r |
| Other industry | 185 | 15r | - | 2,705r | 2,055 | 6,545 | 315 | 60 | 11,880r |
| **Transport** | **5** | **-** | **-** | **67,180r** | **-** | **355r** | **-** | **1,950** | **69,490r** |
| Air | - | - | - | 7,430 | - | - | - | - | 7,430 |
| Rail and national navigation | 5 | - | - | 1,055r | - | 355r | - | - | 1,415r |
| Road | - | - | - | 58,695 | - | - | - | 1,950 | 60,645 |
| **Other final users** | **240** | **105** | **-** | **2,715r** | **18,715r** | **25,695r** | **185** | **780r** | **48,435r** |
| Domestic | 235 | 105 | - | 1,740 | 15,720 | 15,690 | 20 | 735r | 34,250r |
| Agriculture | - | - | - | 240r | 40 | 415 | - | 35 | 730r |
| Commercial and other services | 5 | - | - | 730r | 2,955r | 9,590r | 165 | 10 | 13,455r |
| **Total value of energy end use** | **5,245r** | **275r** | **38,260r** | **74,250r** | **27,240r** | **34,030** | **625** | **3,805r** | **183,730r** |
| **Value of non energy end use** | **-** | **55** | **-** | **2,915r** | **135** | **-** | **-** | **-** | **3,105r** |
| **Market value of inland consumption** | **5,245r** | **330r** | **38,260r** | **77,165r** | **27,375r** | **34,030** | **625** | **3,805r** | **186,835r** |

*(1) For further information see paragraphs 1.39 to 1.44.*

# 1.7 Sales of electricity and gas by sector

## United Kingdom

| | 2010 | 2011 | 2012 | 2013 | 2014 |
|---|---|---|---|---|---|
| **Total selling value (£ million)**[1] | | | | | |
| Electricity generation - Gas | 5,449 | 5,275 | 4,614r | 4,733r | 4,119 |
| Industrial - Gas[2] | 1,771 | 2,053 | 2,173 | 2,433r | 2,137 |
| - Electricity | 6,656 | 6,879 | 7,092 | 7,462r | 7,109 |
| of which: | | | | | |
| Fuel industries | 322 | 335 | 337 | 333 | 306 |
| Industrial sector | 6,334 | 6,545 | 6,755 | 7,129r | 6,802 |
| Domestic sector - Gas | 13,595 | 11,738 | 14,970 | 15,782r | 13,610 |
| - Electricity | 13,477 | 13,860 | 14,942 | 15,809r | 15,999 |
| Other - Gas | 2,796 | 2,878 | 3,122r | 3,489r | 2,900 |
| - Electricity | 9,750 | 9,758 | 10,363r | 10,920r | 10,556 |
| of which: | | | | | |
| Agricultural sector | 407 | 403 | 416 | 437 | 428 |
| Commercial sector | 7,776 | 7,748 | 8,162r | 8,622r | 8,259 |
| Transport sector | 280 | 302 | 357r | 390r | 407 |
| Public lighting | 147 | 151 | 164 | 170 | 161 |
| Public admin. and other services | 1,139 | 1,155 | 1,264 | 1,300 | 1,301 |
| **Total, all consumers** | **53,493** | **52,441** | **57,276r** | **60,627r** | **56,430** |
| **of which gas** | **23,610** | **21,943** | **24,879r** | **26,436r** | **22,765** |
| **of which electricity** | **29,883** | **30,498** | **32,397r** | **34,191r** | **33,664** |
| **Average net selling value per kWh sold (pence)**[1] | | | | | |
| Electricity generation - Gas | 1.461 | 1.914 | 2.135 | 2.299 | 1.890 |
| Industrial - Gas | 1.790 | 2.172 | 2.375 | 2.616 | 2.310 |
| - Electricity | 6.726 | 7.142 | 7.585 | 7.992 | 8.071 |
| of which: | | | | | |
| Fuel industries | 7.106 | 7.390 | 8.048 | 8.217 | 8.619 |
| Industrial sector | 6.707 | 7.130 | 7.563 | 7.981 | 8.048 |
| Domestic sector - Gas | 3.490 | 4.001 | 4.338 | 4.608 | 4.894 |
| - Electricity | 11.343 | 12.433 | 13.089 | 14.017r | 14.822 |
| Other - Gas | 2.412 | 2.588 | 2.800 | 3.024 | 3.009 |
| - Electricity | 9.545 | 9.711 | 10.286r | 10.855r | 11.102 |
| of which: | | | | | |
| Agricultural sector | 10.110 | 10.202 | 10.740 | 11.284 | 11.486 |
| Commercial sector | 10.110 | 10.202 | 10.740 | 11.284 | 11.486 |
| Transport sector | 6.880 | 7.390 | 8.385 | 9.142 | 9.558 |
| Public lighting | 7.510 | 7.910 | 8.590 | 9.166 | 9.622 |
| Public admin. and other services | 7.510 | 7.910 | 8.590 | 9.166 | 9.622 |
| **Average, all consumers** | **4.123** | **4.842** | **5.340r** | **5.701r** | **5.782** |
| **of which gas** | **2.416** | **2.833** | **3.256r** | **3.494r** | **3.324** |
| **of which electricity** | **9.341** | **9.893** | **10.505r** | **11.146r** | **11.565** |

*(1) Excludes VAT where payable - see paragraph 1.45 for a definition of average net selling value.*

*(2) Excludes Fuel Industry use*

# 1.8 Final energy consumption by main industrial groups[1]

Thousand tonnes of oil equivalent

| | 2010 | 2011 | 2012 | 2013 | 2014 |
|---|---|---|---|---|---|
| **Iron and steel and non-ferrous metals** | | | | | |
| Coal | 61 | 51 | 49 | 52 | 53 |
| Manufactured solid fuels *(2)* | 301 | 281 | 343r | 445r | 451 |
| Blast furnace gas | 87 | 64 | 26 | 13r | 12 |
| Coke oven gas | 97 | 59 | 43 | 62 | 54 |
| Natural gas | 686 | 659 | 600 | 625r | 638 |
| Petroleum | 6 | 4 | 5 | 4 | 8 |
| Electricity | 909 | 931 | 723 | 708 | 709 |
| **Total iron and steel and non-ferrous metals** | **2,147** | **2,050** | **1,789r** | **1,908r** | **1,925** |
| **Chemicals** | | | | | |
| Coal | 51 | 50 | 49 | 54r | 49 |
| Natural gas | 1,502 | 1,379 | 1,307r | 1,229r | 1,242 |
| Petroleum | 312 | 189 | 124r | 120r | 124 |
| Electricity | 1,587 | 1,517 | 1,500r | 1,485r | 1,378 |
| Heat purchased from other sectors *(3)* | 415 | 350 | 336 | 510r | 467 |
| **Total chemicals** | **3,866** | **3,484** | **3,316r** | **3,397r** | **3,262** |
| **Metal products, machinery and equipment** | | | | | |
| Coal | 48 | 48 | 46 | 49 | 53 |
| Natural gas | 1,008 | 1,028 | 1,073 | 1,098r | 1,087 |
| Petroleum | 125 | 138 | 149r | 206r | 210 |
| Electricity | 1,685 | 1,619 | 1,577 | 1,574 | 1,486 |
| Heat purchased from other sectors *(3)* | - | - | - | - | - |
| **Total metal products, machinery and equipment** | **2,866** | **2,833** | **2,845r** | **2,926r** | **2,836** |
| **Food, beverages and tobacco** | | | | | |
| Coal | 30 | 32 | 31 | 31 | 38 |
| Natural gas | 1,714 | 1,764 | 1,734 | 1,773r | 1,766 |
| Petroleum | 157 | 141 | 126 | 134r | 111 |
| Electricity | 991 | 973 | 958r | 953r | 895 |
| Heat purchased from other sectors *(3)* | 1 | 2 | 3 | 0r | - |
| **Total food, beverages and tobacco** | **2,893** | **2,912** | **2,851r** | **2,891r** | **2,811** |

*(1) Industrial categories used are described in Table 1l. Data excludes energy used to generate heat for all fuels except manufactured solid fuels and electricity.*
*(2) Includes tars, benzole, coke and breeze and other manufactured solid fuels.*
*(3) Data equates to heat sold information in the energy balances.*

# 1.8 Final energy consumption by main industrial groups[1] (continued)

Thousand tonnes of oil equivalent

| | 2010 | 2011 | 2012 | 2013 | 2014 |
|---|---|---|---|---|---|
| **Paper, printing and publishing** | | | | | |
| Coal | 71 | 71 | 80 | 70 | 79 |
| Natural gas | 700 | 641 | 609 | 700r | 675 |
| Petroleum | 33 | 30 | 29r | 35r | 36 |
| Electricity | 942 | 938 | 934 | 929r | 906 |
| Heat purchased from other sectors *(3)* | 1 | 1 | 1 | - | - |
| **Total paper, printing and publishing** | **1,747** | **1,681** | **1,653r** | **1,735r** | **1,695** |
| **Other industries** | | | | | |
| Coal | 1,051r | 941r | 957 | 1,173r | 1,222 |
| Natural gas | 2,894 | 2,654 | 2,545 | 2,572r | 2,544 |
| Petroleum | 459 | 392 | 412r | 473r | 483 |
| Electricity | 2,875r | 2,824r | 2,750r | 2,749r | 2,654 |
| Heat purchased from other sectors *(3)* | 405 | 417 | 426 | 411r | 429 |
| **Total other industries** | **7,683r** | **7,228r** | **7,090r** | **7,378r** | **7,332** |
| **Unclassified** | | | | | |
| Manufactured solid fuels *(2)* | 55 | 42 | 49 | 74 | 46 |
| Coke oven gas | - | - | - | - | - |
| Natural gas | 2 | 2 | 2 | 1 | 1 |
| Petroleum | 4,390 | 3,604r | 3,824r | 3,352r | 3,376 |
| Bioenergy & waste | 449r | 506r | 459r | 573r | 702 |
| **Total unclassified** | **4,896r** | **4,154r** | **4,334r** | **4,000r** | **4,125** |
| **Total** | | | | | |
| Coal | 1,311r | 1,194 | 1,212 | 1,430r | 1,496 |
| Manufactured solid fuels *(2)* | 356 | 323 | 392 | 519r | 497 |
| Blast furnace gas | 87 | 64 | 26 | 13r | 12 |
| Coke oven gas | 97 | 59 | 43 | 62 | 54 |
| Natural gas | 8,506 | 8,127 | 7,870 | 7,997r | 7,953 |
| Petroleum | 5,482 | 4,500 | 4,669r | 4,324r | 4,348 |
| Bioenergy & waste | 449 | 506r | 459r | 573r | 702 |
| Electricity | 8,987 | 8,801 | 8,442r | 8,398r | 8,029 |
| Heat purchased from other sectors *(3)* | 822 | 769 | 766 | 921r | 896 |
| **Total** | **26,098r** | **24,344** | **23,879r** | **24,236r** | **23,986** |

# 1.9 Fuels consumed for electricity generation (autogeneration) by main industrial groups[1]

**Thousand tonnes of oil equivalent**
***(except where shown otherwise)***

| | 2010 | 2011 | 2012 | 2013 | 2014 |
|---|---|---|---|---|---|
| **Iron and steel and non-ferrous metals** | | | | | |
| Coal (2) | 633 | 651 | 521 | - | - |
| Blast furnace gas | 453 | 454 | 591 | 740 | 734 |
| Coke oven gas | 196 | 196 | 182 | 172 | 155 |
| Natural gas | 40 | 37 | 39 | 39r | 37 |
| Petroleum | 9 | 7 | 7 | 7 | 7 |
| Other (including renewables) (3) | 50 | 60 | 63 | 58 | 71 |
| **Total fuel input (4)** | **1,381** | **1,404** | **1,402** | **1,016r** | **1,003** |
| **Electricity generated by iron & steel and non-ferrous** | **425** | **429** | **370** | **185** | **185** |
| **metals (5) (in GWh)** | 4,946 | 4,983 | 4,303 | 2,153r | 2,156 |
| **Electricity consumed by iron and steel and non-ferrous** | **335** | **349** | **187** | **167** | **182** |
| **metals from own generation (6) (in GWh)** | 3,895 | 4,065 | 2,170 | 1,937r | 2,111 |
| **Chemicals** | | | | | |
| Coal | 110 | 109 | 110 | 110 | 110 |
| Natural gas | 731 | 718 | 727 | 662r | 481 |
| Petroleum | 11 | 6 | 6 | 6 | 6 |
| Other (including renewables) (3) | 51 | 68 | 42r | 52r | 50 |
| **Total fuel input (4)** | **937** | **900** | **885r** | **829r** | **646** |
| **Electricity generated by chemicals (5)** | **407** | **379** | **412r** | **368r** | **273** |
| (in GWh) | 4,729 | 4,404 | 4,793r | 4,279r | 3,181 |
| **Electricity consumed by chemicals from own generation (6)** | **224** | **239** | **242r** | **226** | **199** |
| *(in GWh)* | 2,610 | 2,783 | 2,811r | 2,624r | 2,318 |
| **Metal products, machinery and equipment** | | | | | |
| Coal | - | - | - | - | - |
| Natural gas | 58 | 42 | 42 | 42 | 41 |
| Petroleum | 6 | 6 | 6 | 6 | 6 |
| Other (including renewables) (3) | 50 | 48 | 48 | 49 | 49 |
| **Total fuel input (4)** | **114** | **96** | **95** | **96** | **96** |
| **Electricity generated by metal products, machinery** | **37** | **22** | **22** | **24** | **23** |
| **and equipment (5) (in GWh)** | 435 | 251 | 256 | 279r | 270 |
| **Electricity consumed by metal products, machinery** | **32** | **21** | **21** | **23** | **22** |
| **and equipment from own generation (6) (in GWh)** | 376 | 241 | 245 | 268r | 259 |
| **Food, beverages and tobacco** | | | | | |
| Coal | 4 | 4 | 4 | 4 | 5 |
| Natural gas | 375 | 361 | 352 | 345r | 348 |
| Petroleum | 6 | 4 | 3 | 3 | 2 |
| Other (including renewables) (3) | 4 | 6 | 10r | 25r | 30 |
| **Total fuel input (4)** | **388** | **375** | **369r** | **377r** | **385** |
| **Electricity generated by food, beverages and tobacco (5)** | **184** | **186** | **187r** | **187r** | **193** |
| (in GWh) | 2,139 | 2,157 | 2,178r | 2,177r | 2,244 |
| **Electricity consumed by food, beverages and tobacco** | **109** | **110** | **115r** | **112r** | **111** |
| **from own generation (6) (in GWh)** | 1,264 | 1,277 | 1,339r | 1,300r | 1,289 |

*(1) Industrial categories used are described in Table 1l.*
*(2) The power plant in this category was reclassified as a Major Power Producer in 2013 so no longer appears in the autogeneration figures*
*(3) Includes hydro electricity, solid and gaseous renewables and waste.*
*(4) Total fuels used for generation of electricity. Consistent with figures for fuels used by other generators in Table 5.4.*

# 1.9 Fuels consumed for electricity generation (autogeneration) by main industrial groups[1] (continued)

**Thousand tonnes of oil equivalent**
***(except where shown otherwise)***

| | 2010 | 2011 | 2012 | 2013 | 2014 |
|---|---|---|---|---|---|
| **Paper, printing and publishing** | | | | | |
| Coal | 32 | 30 | 26 | 10r | - |
| Natural gas | 382 | 368 | 417 | 301r | 262 |
| Petroleum | 1 | 0 | 0 | 0 | 0 |
| Other (including renewables) (3) | 75 | 83 | 94 | 145r | 241 |
| **Total fuel input (4)** | **489** | **480** | **538** | **456r** | **503** |
| **Electricity generated by paper, printing and publishing (5)** | **200** | **195** | **210** | **187r** | **204** |
| (in GWh) | 2,326 | 2,264 | 2,441r | 2,180r | 2,376 |
| **Electricity consumed by paper, printing and publishing** | **111** | **126** | **141** | **137r** | **158** |
| **from own generation (6) (in GWh)** | 1,292 | 1,468 | 1,642r | 1,589r | 1,843 |
| **Other industries** | | | | | |
| Coal | - | - | - | - | - |
| Coke oven gas | 25 | 28 | 28 | 28 | 28 |
| Natural gas | 103 | 79 | 71 | 59r | 143 |
| Petroleum | 4 | 6 | 6 | 2r | 3 |
| Other (including renewables) (3) | 1,878r | 1,918r | 1,924r | 1,942r | 1,932 |
| **Total fuel input (4)** | **2,009r** | **2,032r** | **2,028r** | **2,031r** | **2,106** |
| **Electricity generated by other industries (5)** | **118** | **116** | **119r** | **124r** | **159** |
| (in GWh) | 1,373 | 1,347r | 1,380r | 1,445r | 1,846 |
| **Electricity consumed by other industries from own** | **102** | **103** | **106r** | **114r** | **148** |
| **generation (6) (in GWh)** | 1,182r | 1,192 | 1,238r | 1,324r | 1,722 |
| **Total** | | | | | |
| Coal | 778 | 794 | 661 | 123r | 114 |
| Blast furnace gas | 453 | 454 | 591 | 740 | 734 |
| Coke oven gas | 221 | 224 | 210 | 200 | 183 |
| Natural gas | 1,687 | 1,605 | 1,647 | 1,448r | 1,311 |
| Petroleum | 35 | 28 | 27 | 24r | 24 |
| Other (including renewables) (3) | 2,143r | 2,182r | 2,181r | 2,270r | 2,373 |
| **Total fuel input (4)** | **5,317r** | **5,287r** | **5,317r** | **4,804r** | **4,738** |
| **Electricity generated (5)** | **1,371** | **1,325** | **1,320r** | **1,076r** | **1,038** |
| (in GWh) | 15,949 | 15,408r | 15,351r | 12,513r | 12,074 |
| **Electricity consumed from own generation (6)** | **913** | **948** | **812r** | **778r** | **820** |
| (in GWh) | 10,619r | 11,025 | 9,445r | 9,043r | 9,542 |

*(5) Combined heat and power (CHP) generation (i.e. electrical output from Table 7.8) plus non-chp generation, so tha the total electricity generated is consistent with the "other generators" figures in Table 5.6.*

*(6) This is the electricity consumed by the industrial sector from its own generation and is consistent with the othe generators final users figures used within the electricity balances (Tables 5.1 and 5.2). These figures are less than the total generated because some of the electricity is sold to the public distribution system and other users.*

*(7) The figures presented here are consistent with other figures presented elsewhere in this publication as detailed a (4), (5), and (6) above but are further dissaggregated. Overall totals covering all autogenerators can be derived by adding in figures for transport, services and the fuel industries. These can be summarised as follows.*

**Thousand tonnes of oil equivalent**

| **Fuel input** | **2010** | **2011** | **2012** | **2013** | **2014** |
|---|---|---|---|---|---|
| All industry | 5,317r | 5,287r | 5,317r | 4,804r | 4,738 |
| Fuel industries | 1,349r | 1,732r | 1,981r | 1,799r | 1,930 |
| Transport, Commerce and Administration | 284 | 284 | 367 | 405r | 417 |
| Services | 1,405 | 1,381 | 814r | 1,040r | 1,269 |
| **Total fuel input** | **8,356r** | **8,684r** | **8,478r** | **8,049r** | **8,354** |
| **Electricity generated** | **2,917** | **3,006r** | **3,036r** | **2,962r** | **3,276** |
| **Electricity consumed** | **1,520r** | **1,554r** | **1,489r** | **1,567r** | **1,773** |
| | | | | | **GWh** |
| **Electricity generated** | **33,926r** | **34,960r** | **35,309r** | **34,443r** | **38,104** |
| **Electricity consumed** | **17,681r** | **18,079r** | **17,318r** | **18,223r** | **20,625** |

# Chapter 2
# Solid fuels and derived gases

## Key points

- Figures for 2014 show that coal production decreased by 8.1 per cent on 2013 to an all-time low of 12 million tonnes (Table 2.4), following the closure of a number of mines/companies, including Maltby, Daw Mill, Unity and Scottish Coal Company in 2013 and unfavourable geological conditions at some of the remaining mines.

- In 2014 UK imports were 42 million tonnes, a decrease of 15 per cent on 2013 (49 million tonnes) due to lower demand from generators (Table 2.4).

- In 2014 Russia was the UK's largest supplier of coal imports with a share of 42 per cent. The other main suppliers were the USA with a 26 per cent share and Colombia with a 23 per cent share (Table 2B).

- Demand for coal between 2013 and 2014 decreased by 20 per cent, from 60 million tonnes in 2013 to 49 million tonnes in 2014 (Table 2.4), with a 23 per cent decrease in the use of coal for electricity generation.

- In 2014 around 79 per cent of demand for coal was from major power producers for electricity generation with around a further 10 per cent used for the manufacture of coke (Table 2.4).

- Total stock levels increased in 2014 to 19 million tonnes, which was 4.2 million tonnes higher than in 2013, due to less consumption from generators (table 2.4).

## Introduction

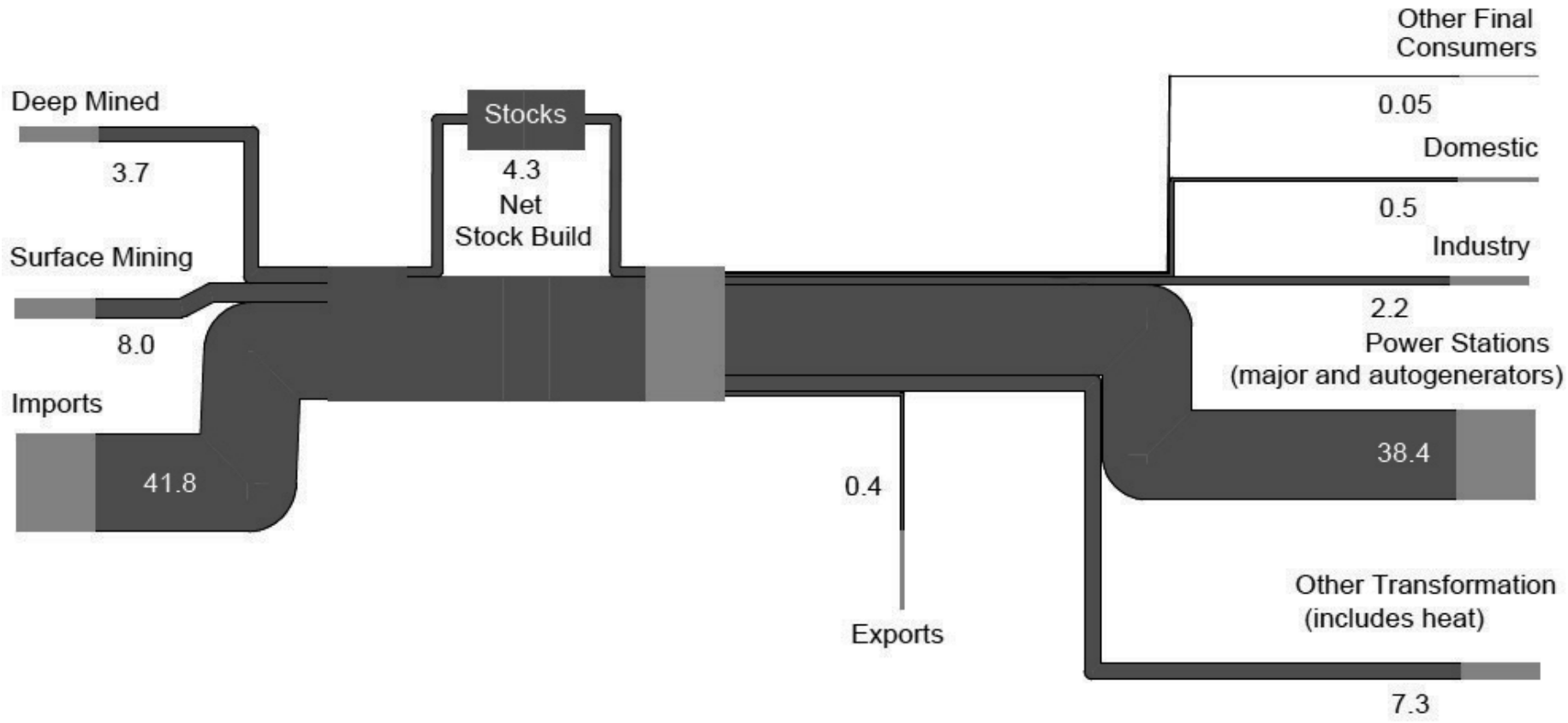
2.1 This chapter presents statistics on supply and demand for coal during the period 2012 to 2014 by grade of coal (steam coal, anthracite and coking coal). These are shown as commodity balances in Tables 2.1 to 2.3. Table 2.4 shows the same data as published in Table 2.1 to 2.3 at an aggregated level, i.e. not split by grade of coal, for the latest five years.

2.2 An energy flow chart for 2014 (page 42), shows the flows of coal from production and imports through to consumption. It is a way of simplifying the figures that can be found in the commodity balance for coal in Table 2.4. It illustrates the flow of coal from the point at which it becomes available from home production or imports (on the left) to the eventual final use of coal (on the right).

2.3 The supply and demand for manufactured solid fuels, (including coke oven coke, coke breeze, other manufactured solid fuels (patent fuel), coke oven gas, blast furnace gas and benzole and tar.) is shown in the commodity balances in Tables 2.5 and 2.6 for the latest five years.

2.4 Other data in the chapter shows: UK production and employment categorised by type of mine and devolved administration during 2012 to 2014 (Table 2A); UK imports of coal in 2014 split by grade of coal and country of origin (Table 2B); whilst Map 2A presents all UK coal production sites and ports of entry for international trade.

# Coal flow chart 2014 (million tonnes of coal)




Notes: This flow chart is based on the data that appear in Tables 2.1 and 2.4.
Surface mining includes slurry and recovered coal.

2.5 Information on long-term trends on coal production, consumption and stocks (Tables 2.1.1 and 2.1.2) are available on the DECC section of the GOV.UK website at:
www.gov.uk/government/collections/digest-of-uk-energy-statistics-dukes

2.6 Detailed statistics on imports and exports of solid fuels are shown in Annex G (Table G2), available on the DECC section of the GOV.UK website at:
www.gov.uk/government/collections/digest-of-uk-energy-statistics-dukes

# Coal (Tables 2.1, 2.2, 2.3 and 2.4)

## Coal Production and Trade

2.7 Figures for 2014 show that coal production including slurry decreased by 8.1 per cent on 2013 to an all-time low of 12 million tonnes in 2014 (Chart 2.1).

2.8 **Deep mined** production, which contributed 7.6 per cent to UK coal supply in 2014 (32 per cent of total UK production), fell by 9.9 per cent on 2013. This was due to the closure of a number of mines in 2013 (Maltby, Daw Mill and Unity) and geological conditions at some of the remaining mines. Similarly, **surface mine** production decreased by 7.2 per cent and contributed 16 per cent to UK coal supply. This was mainly due to Scottish Coal Company going into liquidation in April 2013 and geological conditions at some mines. Together, production from deep mines and surface mines accounted for 24 per cent of UK coal supply.

2.9 **Steam coal**, mainly used by power stations, accounted for 87 per cent of total coal production in 2014, with 12 per cent **anthracite** and the remainder **coking coal** (Table 2.1).

2.10 Production of slurry was 95 thousand tonnes in 2013. In 2014 no slurry was produced as the main sites that produce slurry have closed (Table 2.4).

2.11 Table 2A shows how production of coal is divided between England, Wales and Scotland. In 2014, 56 per cent of coal output was in England, 22 per cent in both Scotland and Wales. There is no longer any deep mining of coal in Scotland (Map 2A).

### Table 2A: Output from UK coal mines and employment in UK coal mines [1, 2]

| | | Million tonnes | | | Number | | |
|---|---|---|---|---|---|---|---|
| | | Output | | | Employment | | |
| | | 2012 | 2013 | 2014 | 2012 | 2013 | 2014 |
| **Deep mined** | England | 6.0 | 4.0 | 3.6 | 3,114 | 1,882 | 1,650 |
| | Wales | 0.1 | 0.1 | 0.0 | 327 | 71 | 116 |
| | Total | 6.2 | 4.1 | 3.7 | 3,441 | 1,953 | 1,766 |
| **Surface mining** | England | 3.0 | 3.4 | 2.9 | 595 | 615 | 505 |
| | Scotland | 4.8 | 2.8 | 2.5 | 1,096 | 454 | 647 |
| | Wales | 2.4 | 2.3 | 2.5 | 695 | 693 | 683 |
| | Total | 10.1 | 8.6 | 7.9 | 2,386 | 1,762 | 1,835 |
| **Total** | England | 9.0 | 7.4 | 6.5 | 3,709 | 2,497 | 2,155 |
| | Scotland | 4.8 | 2.8 | 2.5 | 1,096 | 454 | 647 |
| | Wales | 2.5 | 2.4 | 2.5 | 1,022 | 764 | 799 |
| | Total | 16.3 | 12.7 | 11.5 | 5,827 | 3,715 | 3,601 |

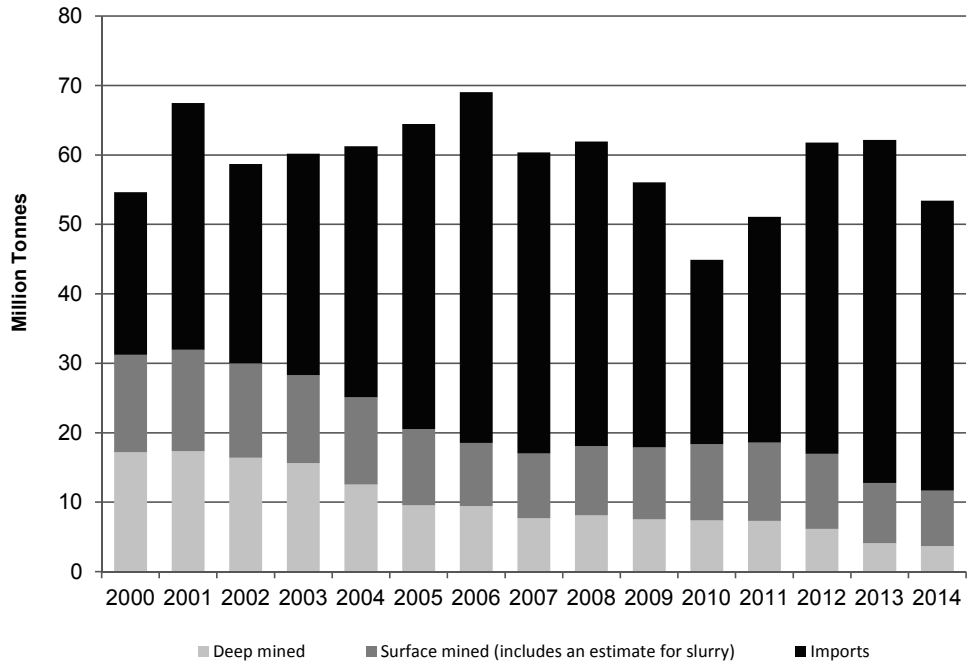
Source: The Coal Authority

1. *Output is the tonnage declared by operators to the Coal Authority, including estimated tonnages. It excludes estimates of slurry recovered from dumps, ponds, rivers, etc.*
2. *Employment includes contractors and is as declared by licensees to the Coal Authority at 31 December each year.*

2.12 Employment in the coal industry has followed a similar pattern to UK production levels. Table 2A also shows how numbers employed in the production of coal have changed over the last three years. During 2014 total employment, including contractors, was 3 per cent lower than in 2013. At 31 December 2014, 60 per cent of the 3,601 people employed in UK coal mining worked in England, while 18 per cent were employed in Scotland and 22 per cent in Wales.

2.13 Based on comparative EU statistics for 2013[1], Poland had the highest coal production, contributing 69 per cent (76 million tonnes) to the EU total. The UK was the second largest EU hard coal producer accounting for 11 per cent (13 million tonnes) of total EU production (110 million tonnes). Other EU countries such as Germany have higher lignite and brown coal production.

**Chart 2.1: Coal production and imports 2000 to 2014**




2.14 In 2014 UK imports were 42 million tonnes, a decrease of 15 per cent on 2013 (49 million tonnes). In 2013 UK imports rose 10 per cent compared with 2012 (45 million tonnes).

**Table 2B: Imports of coal in 2014[1]**

**Thousand tonnes**

| | Steam coal | Coking coal | Anthracite | Total |
|---|---|---|---|---|
| Russia | 16,245 | 1,396 | 35 | 17,676 |
| United States of America | 7,975 | 3,019 | 0 | 10,994 |
| Colombia | 9,672 | - | 9 | 9,681 |
| Australia | - | 1,249 | - | 1,249 |
| European Union[2] | 690 | 32 | 42 | 764 |
| Canada | 0 | 434 | - | 434 |
| Republic of South Africa | 129 | - | 7 | 136 |
| Other countries | 582 | 214 | 34 | 830 |
| **Total all countries** | **35,294** | **6,344** | **127** | **41,765** |

Source: HM Revenue and Customs, ISSB

1. *Country of origin basis.*
2. *Includes non-EU coal routed through the Netherlands.*

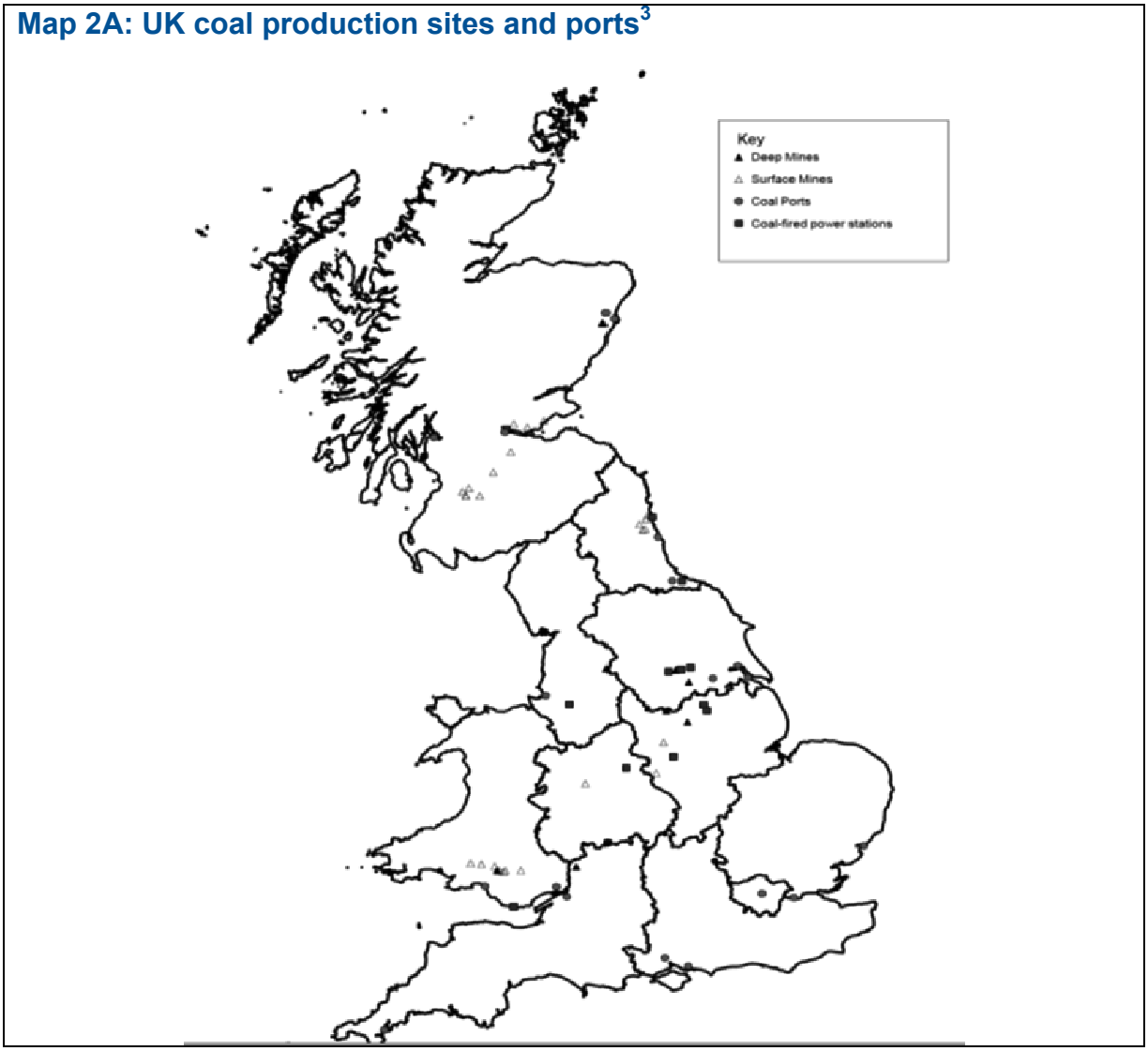
[1] *EU statistics for 2014 are not yet available on the Eurostat website http://epp.eurostat.ec.europa.eu/portal/page/portal/eurostat/home. The statistics being referenced refer to steam coal, anthracite and coking coal.*

2.15 Table 2B shows that, in 2014, 42 per cent (18 million tonnes) of the UK's total coal imports came from Russia and another 53 per cent (22 million tonnes) from Colombia, the USA and Australia combined.

2.16 Steam coal accounted for 85 per cent of the total imports, 15 per cent was coking coal, with anthracite accounting for the remainder. Imports from Russia decreased by 13 per cent in 2014 compared to 2013, from 20 million tonnes to 18 million tonnes. In 2014, Russia accounted for 46 per cent (16 million tonnes) of total steam coal imports. A further 27 per cent (10 million tonnes) came from Colombia and 23 per cent (8 million tonnes) came from the USA. The UK imported 48 per cent (3.0 million tonnes) of coking coal from the USA with a further 22 per cent (1.4 million tonnes) from Russia and 20 per cent (1.3 milion tonnes) from Australia. The small volume of imported anthracite coal (0.1 million tonnes) was mainly from the European Union (33 per cent) and China (22 per cent).

2.17 The UK and Germany have consistently been the top two coal importing countries in the EU. In 2013, these two countries accounted for 20 (49 million tonnes) and 22 per cent (54 million tonnes) respectively of total EU imports (250 million tonnes). The Netherlands followed with a 19 per cent (46 million tonnes) share of the total[2].

## Map 2A: UK coal production sites and ports[3]



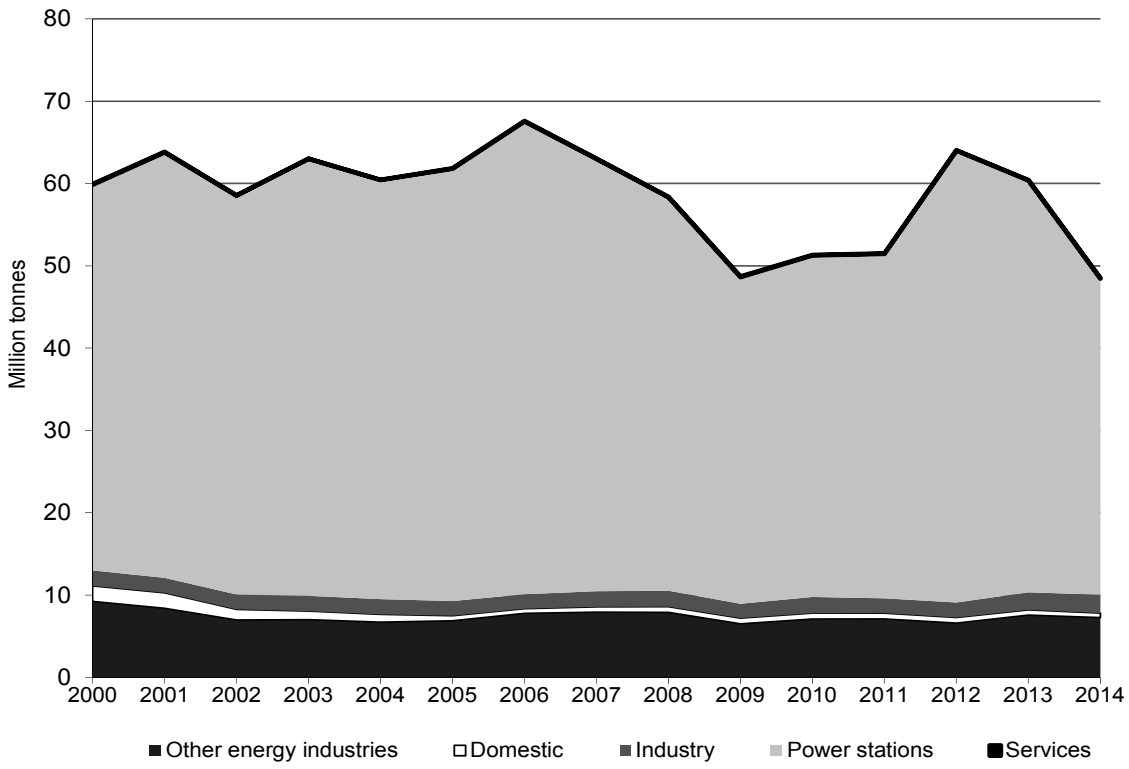

[2] *EU statistics for 2014 are not yet available on the Eurostat website http://epp.eurostat.ec.europa.eu/portal/page/portal/eurostat/home. The statistics being referenced refer to hard coal (steam coal, anthracite and coking coal).*

[3] *Some of the ports are on the river*

## Coal Consumption

2.18 In 2014 the demand for coal decreased by 20 per cent compared with 2013, as coal for electricity generation fell. Consumption by electricity generators was down by 23 per cent to 38 million tonnes (a new record low). The decline was due to a number of reasons: outages at several power stations, the closure of Uskmouth and the partial closure of Ferrybridge C during 2014, a second unit of Drax being converted to biomass, lower demand for electricity overall and changes in the relative prices of coal and gas. The price of coal purchased by major power producers fell by 7.8 per cent in 2014, but the price of gas fell by a larger 18 per cent.[4] Eighty-three per cent (40 million tonnes) of demand for all coal was for steam coal, 13 per cent (6.5 million tonnes) was for coking coal and the remaining 3 per cent (1.6 million tonnes) was for anthracite. These proportions have been broadly stable in the past few years.

### Chart 2.2: Coal consumption, 2000 to 2014




2.19 The transformation sector represented 94 per cent (46 million tonnes) of overall demand for coal in 2014 (49 million tonnes). Electricity generation accounted for 93 per cent of demand for steam coal and 44 per cent of demand for anthracite. Coking coal was used in coke ovens (77 per cent) and blast furnaces (23 per cent) in the UK iron and steel industry. Coking coal used in blast furnaces increased by 7.3 per cent from 1.4 million tonnes in 2013 to 1.5 million tonnes in 2014. A flow chart, similar to that shown on page 42 has been produced for manufactured fuel, and is included in the internet version in annex H.

2.20 Electricity generation use of coal by major power producers fell by 23 per cent from 50 million tonnes in 2013 to 38 million tonnes (a new record low) in 2014. Coal use by autogenerators fell by 6.9 per cent in 2014 from 199 thousand tonnes in 2013 to 185 thousand tonnes (a new record low). This followed the reclassification of Lynemouth power station (previously used to power Rio Tinto's aluminium works) from autogenerator to major power producer following RWE's takeover in December 2012.

[4] *Energy Prices – table 3.2.1*

2.21 Coal consumption by final consumers accounted for 5.8 per cent (2.8 million tonnes) of total demand in 2014, an increase of 0.6 per cent from 2013. Final consumption mainly covers steam raising, space or hot water heating, or heat for processing. Steam coal accounted for 77 per cent of this final consumption (up 4.7 per cent from 2013).

2.22 The industrial sector is the largest final consumer (accounting for 79 per cent of total final consumption in 2014). Eighty per cent of the coal used in the industrial sector was steam coal, with manufacturers of mineral products (e.g. cement, glass and brick) being the largest users.

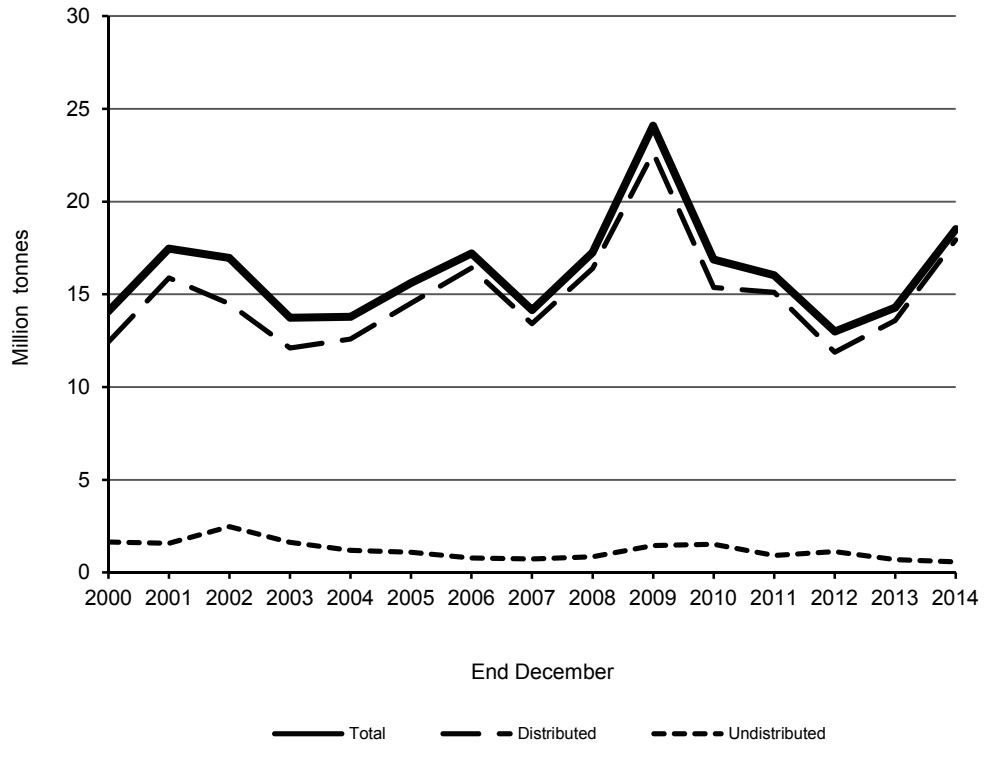
2.23 The domestic sector accounted for 19 per cent of the final consumption of coal, with 63 per cent of this demand being for steam coal and the remainder for anthracite. Domestic consumption fell by 14 per cent in 2014 compared with 2013.

2.24 In 2013, the UK was the third largest consumer of coal among the EU countries, accounting for 19 per cent (60 million tonnes) of total coal consumption in the EU (330 million tonnes), after being overtaken by Germany. The top consumer was Poland accounting for 25 per cent (78 million tonnes) of total EU consumption, while Germany was second accounting for 20 per cent (63 million tonnes)[5].

## Coal Stocks

2.25 Following a record low stock level in 2012, stocks increased in 2013 and 2014. In 2014 there were 4.2 million tonnes more total stocks held than at the end of 2013. Undistributed stocks (stocks held at collieries and surface mine sites) of 0.6 million tonnes at the end of 2014 were 0.1 million tonnes lower than a year earlier, but stocks at major power stations and coke ovens, as a whole, increased by 5.5 million tonnes as demand fell and accounted for 92 per cent of total stocks in 2014.

### Chart 2.3: Coal stocks in the UK 2000 to 2014



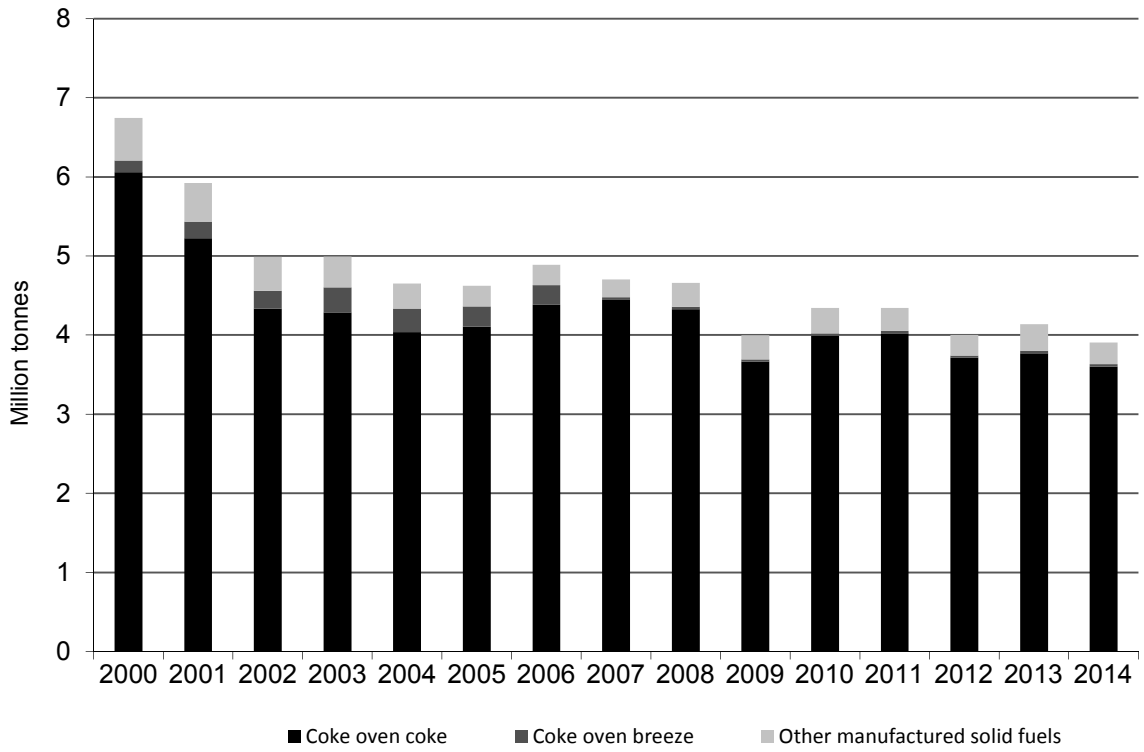

[5] *EU statistics for 2014 are not yet available on the Eurostat website http://epp.eurostat.ec.europa.eu/portal/page/portal/eurostat/home. The statistics being referenced refer to hard coal (steam coal, anthracite and coking coal).*

# Manufactured Solid Fuels (Tables 2.5 and 2.6)

## Production, Trade and Consumption

2.26 In 2014, around 92 per cent of manufactured solid fuel production was **coke oven coke**, a proportion that has remained the same for the past 15 years. In 2014, 81 per cent of the UK's supply of coke oven coke was home produced, with the remainder being imported, chiefly from the USA (3.0 million tonnes), Russia (1.3 million tonnes) and Australia (1.2 million tonnes). The trade figures come from H M Revenue and Customs. Between 2013 and 2014, home produced coke oven coke decreased by 4.4 per cent to 3.6 million tonnes. Monckton Coke and Chemicals, the only dedicated coke plant in the UK closed in December 2014. However, coke is still being produced and used at steelworks, mainly Port Talbot, SSI and Scunthorpe.

**Chart 2.4: Total manufactured solid fuels production in the UK 2000 to 2014**



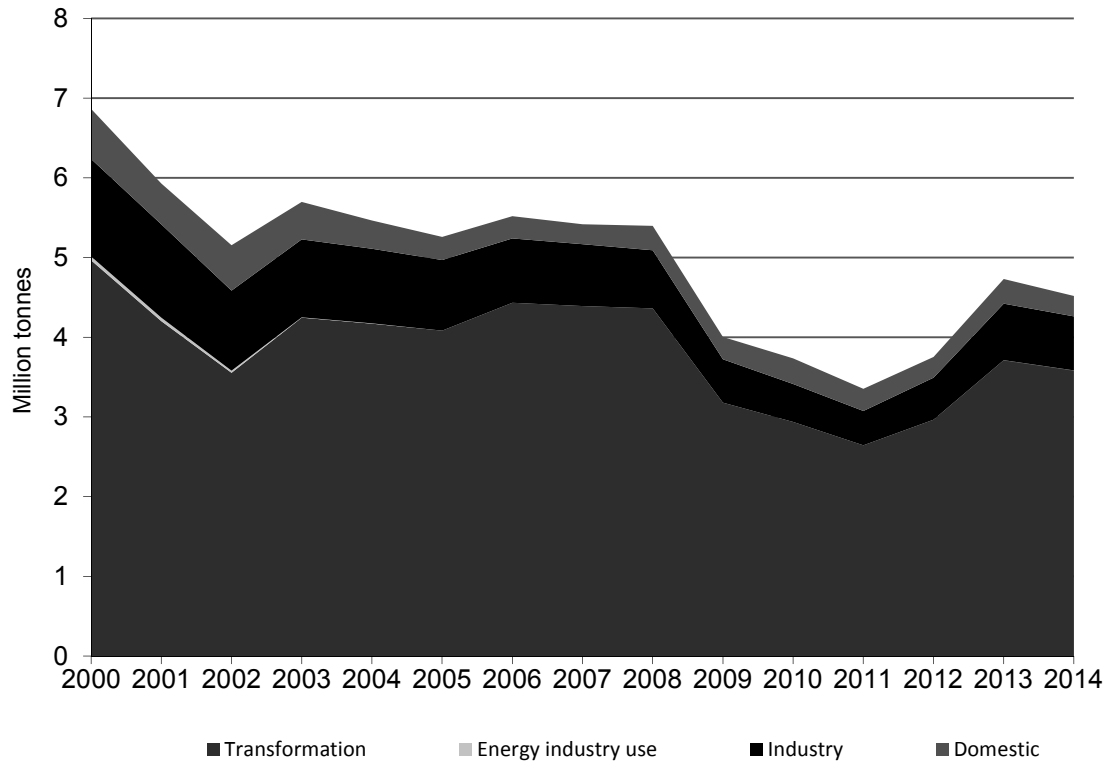

2.27 The main purpose of coke oven coke is for use in blast furnaces in the UK iron and steel industry. In 2013 coke oven coke used in blast furnaces had increased to 3.3 million tonnes due to the re-opening of Teesside steelworks in April 2012 which gradually increased operations over the next year, and the newly opened furnace at Port Talbot in February 2013. In 2014, blast furnace use had fallen to 3.1 million tonnes, down 3.9 per cent from 2013, representing 98 per cent of total demand. The rest of production was added to stocks.

2.28 Most of the supply of **coke breeze** is from re-screened coke oven coke, with direct production accounting for only 2.9 per cent of total supply in 2014. In that year, 41 per cent of coke breeze was used in blast furnaces (0.4 million tonnes) for transformation and 59 per cent used for final consumption (Chart 2.5).

2.29 Other manufactured solid fuels (patent fuels) are manufactured smokeless fuels, produced mainly for the domestic market. A small amount of these fuels (only 5.8 per cent of total supply in 2014) was imported, but exports generally exceed this.

2.30 The carbonisation and gasification of solid fuels in coke ovens produces coke oven gas as a by-product. In 2014, production of coke oven gas was 0.1 per cent lower than in 2013 (8.5 TWh). Some of this (43 per cent) was used to fuel the coke ovens themselves. Another 25 per cent was used for electricity generation, 7.3 per cent for iron and steel and other industrial processes (including heat production), 10 per cent in blast furnaces and 7.9 per cent was lost.

**Chart 2.5: Total manufactured solid fuels consumption in the UK 2000 to 2014**




2.31 Blast furnace gas is a by-product of iron smelting in a blast furnace. A similar product is obtained when steel is made in basic oxygen steel (BOS) converters and "BOS" gas is included in this category. Most of these gases are used in other parts of integrated steel works. Blast furnace gas production had increased in 2013 (see paragraph 2.27). Production decreased by 1.2 per cent in 2014 compared with 2013. The generation of electricity in 2014 used 55 per cent of total blast furnace gas and BOS gas, while 31 per cent was used in coke ovens and blast furnaces themselves, 1.2 per cent used in general heat production, 12 per cent was lost or burned as waste and a further 0.8 per cent was used in the iron and steel industry.

2.32 Demand for benzole and tars decreased by 3.0 per cent from 2013 (1,630 GWh), to 1,582 GWh in 2014, all of which was met by domestic production. From 2009, based on information from the EU-ETS, all consumption of these products has been allocated to non-energy use – see also paragraph 2.54 (d) and (e).

# Technical notes and definitions

2.33 These notes and definitions are in addition to the technical notes and definitions covering all fuels and energy as a whole in Chapter 1, paragraphs 1.28 to 1.63. Additional guidance on the compilation of the solid fuels and derived gases statistics can be found in the document 'Data Sources and Methodologies', available on the DECC section of the GOV.UK website at: www.gov.uk/government/collections/coal-statistics. For notes on the commodity balances and definitions of the terms used in the row headings see Annex A. While the data in the printed and bound copy of this Digest cover only the most recent 5 years, these notes also cover data for earlier years that are available on the DECC website.

## Coal production

2.34 **Deep mined**: The statistics cover saleable output from deep mines including coal obtained from working on both revenue and capital accounts. All licensed collieries (and British Coal collieries prior to 1995) are included, even where coal is only a subsidiary product.

2.35 **Surface** mines: The figures cover saleable output and include the output of sites worked by operators under agency agreements and licences, as well as the output of sites licensed for the production of coal as a subsidiary to the production of other minerals. The term 'surface mining' has now replaced opencast production as defined in DUKES pre-2011. Opencast production is a particular type of surface mining technique.

2.36 **Other sources/Slurry**: Estimates of slurry etc recovered and disposed of from dumps, ponds, rivers, etc.

## Steam coal, coking coal and anthracite

2.37 **Steam coal** is coal classified as such by UK coal producers and by importers of coal. It tends to have calorific values at the lower end of the range.

2.38 **Coking coal** is coal sold by producers for use in coke ovens and similar carbonising processes. The definition is not therefore determined by the calorific value or caking qualities of each batch of coal sold, although calorific values tend to be higher than for steam coal.

2.39 **Anthracite** is coal classified as such by UK coal producers and importers of coal. Typically it has a high heat content making it particularly suitable for certain industrial processes and for use as a domestic fuel. Some UK anthracite producers have found a market for their lower calorific value output at power stations.

## Allocation of imported coal

2.40 Although data are available on consumption of home produced coal, and also on consumption of imported coal by secondary fuel producers, there is only very limited direct information on consumption of imported coal by final users. Guidance on how DECC allocate imports to final users is outlined in paragraph 3.2.5 of the 'Data Sources and Methodologies' document. This guidance can be found on the DECC section of the GOV.UK website at: www.gov.uk/government/collections/coal-statistics.

## Coal consumption

2.41 Figures for actual consumption of coal are available for all fuels and power producers and for final use by the iron and steel industry. The remaining final users' consumption figures are based on information on disposals to consumers by producers and on imports.

2.42 Annex A of this Digest outlines the principles of energy and commodity balances and defines the activities that fall within these parts of the balances. However, the following additional notes relevant to solid fuels are given below:

**Transformation: Blast furnaces**: Coking coal injected into blast furnaces is shown separately within the balance tables.

**Transformation: Low temperature carbonisation plants and patent fuel plants**: Coal used at these plants for the manufacture of domestic coke such as Coalite and of briquetted fuels such as Phurnacite and Homefire.

**Consumption: Industry**: The statistics comprise sales of coal by the six main coal producers and a few small producers to the iron and steel industry (excluding those used at coke ovens and blast furnaces) and to other industrial sectors, estimated proportions of anthracite and steam coal imports, and submission made to the EU Emissions Trading Scheme. The figures exclude coal used for industries' own generation of electricity, which appear separately under transformation.

**Consumption: Domestic**: Some coal is supplied free of charge to retired miners and other retired eligible employees through the National Concessionary Fuel Scheme (NCFS). The concessionary fuel provided in 2014 is estimated at 42.6 thousand tonnes. This estimate is included in the domestic steam coal and domestic anthracite figures.

## Stocks of coal

2.43 Undistributed stocks are those held at collieries and surface mine sites. It is not possible to distinguish these two locations in the stock figures. Distributed stocks are those held at power stations and stocking grounds of the major power producing companies (as defined in Chapter 5, paragraphs 5.71 and 5.72), coke ovens, low temperature carbonisation plants and patent fuel plants.

## Coke oven coke (hard coke), hard coke breeze and other manufactured fuels

2.44 The statistics cover coke produced at coke ovens owned by Corus plc, Coal Products Ltd and other producers. Low temperature carbonisation plants are not included (see paragraph 2.45, below). Breeze (as defined in paragraph 2.46) is excluded from the figures for coke oven coke.

2.45 Breeze can generally be described as coke screened below 19 mm (¾ inch) with no fines removed, but the screen size may vary in different areas and to meet the requirements of particular markets. Coke that has been transported from one location to another is usually re-screened before use to remove smaller sizes, giving rise to further breeze.

2.46 The coke screened out by producers as breeze and fines appears as transfers in the coke breeze column of the balances. Transfers out of coke oven coke have not always been equal to transfers into coke oven breeze. This was due to differences arising from the timing, location of measurement and the practice adopted by the iron and steel works. Since 2000, however, the Iron and Steel Statistics Bureau have been able to reconcile these data. Since 2007, most of the supply of coke breeze was reclassified to coke oven coke following better information received by the Iron and Steel Statistics Bureau.

2.47 Figures are derived from returns made to HM Revenue and Customs and are broken down in greater detail in Annex G on the DECC section of the GOV.UK website at:
www.gov.uk/government/collections/digest-of-uk-energy-statistics-dukes.

2.48 In Table 2.5, the export figures used for hard coke, coke breeze and other manufactured solid fuels for the years before 1998 (as reported on the DECC web site) are quantities of fuel exported as reported to DECC or its predecessor Departments by the companies concerned, rather than quantities recorded by HM Revenue and Customs in their Trade Statistics. A long-term trend commentary and tables on exports are on the DECC section of the GOV.UK website at:
www.gov.uk/government/collections/digest-of-uk-energy-statistics-dukes.

2.49 In 1998, an assessment using industry data showed that on average over the previous five years 91 per cent of imports had been coke and 9 per cent breeze and it is these proportions that have been used for 1998 and subsequent years in Table 2.5.

2.50 The calorific value for coke breeze has been set the same as for coke oven coke. This is following information from the iron and steel industry on the similarities between the two types of manufactured fuels.

2.51 Imports and exports of manufactured smokeless fuels can contain small quantities of non-smokeless fuels.

2.52 Other manufactured solid fuels are mainly solid smokeless fuels for the domestic market for use in both open fires and in boilers. A smaller quantity is exported (although exports are largely offset by similar quantities of imports in most years). Manufacture takes place in patented fuel plants and low-temperature carbonisation plants. The brand names used for these fuels include Homefire, Phurnacite, Ancit and Coalite.

2.53 Consumption of coke and other manufactured solid fuels: These are disposals from coke ovens to merchants. The figures also include estimated proportions of coke imports.

## Blast furnace gas, coke oven gas, benzole and tars

2.54 The following definitions are used in the tables that include these fuels:

**(a) Blast furnace gas**: includes Basic Oxygen Steel furnace (BOS) gas. Blast furnace gas is the gas produced during iron ore smelting when hot air passes over coke within the blast ovens. It contains carbon monoxide, carbon dioxide, hydrogen and nitrogen. In a BOS furnace the aim is not to introduce nitrogen or hydrogen into the steel making process, so pure oxygen gas and suitable fluxes are used to remove the carbon and phosphorous from the molten pig iron and steel scrap. A similar fuel gas is thus produced.

**(b) Coke oven gas**: is a gas produced during the carbonisation of coal to form coke at coke ovens. In 2009, some coke oven gas was produced using a combination of gases other than natural gas and blast furnace gas. This total has been added to the production of coke oven gas rather than transfers because it is specifically defined as the mixture of natural gas, blast furnace gas and BOS gas. See the paragraph below on synthetic coke oven gas for a complete definition of this.

**(c) Synthetic coke oven gas**: is mainly natural gas that is mixed with smaller amounts of blast furnace and BOS gas to produce a gas with almost the same qualities as coke oven gas. The transfers row of Table 2.6 shows the quantities of blast furnace gas used for this purpose and the total input of gases to the synthetic coke oven gas process. There is a corresponding outward transfer from natural gas in Chapter 4, Table 4.1.

**(d) Benzole**: a colourless, liquid, flammable, aromatic hydrocarbon by-product of the iron and steel making process. It is used in the UK as a solvent in the manufacture of styrenes and phenols. All consumption of benzole has been allocated to non-energy use from 2009 onwards.

**(e) Tars**: viscous materials usually derived from the destructive distillation of coal, which are by-products of the coke and iron making processes. . All consumption of tars has been allocated to non-energy use from 2009 onwards.

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# 2.1 Commodity balances 2014

## Coal

Thousand tonnes

| | Steam coal | Coking coal | Anthracite | Total |
|---|---|---|---|---|
| **Supply** | | | | |
| Production | 10,161 | 99 | 1,388 | 11,648 |
| Other sources | - | - | - | - |
| Imports | 35,294 | 6,344 | 127 | 41,765 |
| Exports | -343 | -1 | -81 | -425 |
| Marine bunkers | - | - | - | - |
| Stock change *(1)* | -3,945 | -276 | -108 | -4,329 |
| Transfers | - | - | - | - |
| **Total supply** | **41,167** | **6,165** | **1,326** | **48,658** |
| Statistical difference *(2)* | +752 | -325 | -269 | +158 |
| **Total demand** | **40,415** | **6,490** | **1,595** | **48,500** |
| **Transformation** | **38,222** | **6,490** | **954** | **45,665** |
| Electricity generation | 37,706 | - | 695 | 38,400 |
| Major power producers | 37,521 | - | 695 | 38,215 |
| Autogenerators | 185 | - | - | 185 |
| Heat generation | 516 | - | - | 516 |
| Petroleum refineries | - | - | - | - |
| Coke manufacture | - | 4,977 | - | 4,977 |
| Blast furnaces | - | 1,513 | - | 1,513 |
| Patent fuel manufacture and low temperature carbonisation | - | - | 259 | 259 |
| **Energy industry use** | **1** | **-** | **-** | **1** |
| Electricity generation | - | - | - | - |
| Oil and gas extraction | - | - | - | - |
| Petroleum refineries | - | - | - | - |
| Coal extraction | 1 | | - | 1 |
| Coke manufacture | - | - | - | - |
| Blast furnaces | - | - | - | - |
| Patent fuel manufacture | - | - | - | - |
| Pumped storage | - | - | - | - |
| Other | - | - | - | - |
| **Losses** | - | - | - | - |
| **Final consumption** | **2,193** | **-** | **641** | **2,834** |
| **Industry** | **1,801** | **-** | **439** | **2,240** |
| Unclassified | - | - | - | - |
| Iron and steel | 2 | - | 52 | 54 |
| Non-ferrous metals | 25 | - | - | 25 |
| Mineral products | 1,173 | - | 0 | 1,173 |
| Chemicals | 78 | - | - | 78 |
| Mechanical engineering etc | 14 | - | - | 14 |
| Electrical engineering etc | 7 | - | - | 7 |
| Vehicles | 55 | - | - | 55 |
| Food, beverages etc | 34 | - | 20 | 54 |
| Textiles, leather, etc | 59 | - | - | 59 |
| Paper, printing etc | 136 | - | - | 136 |
| Other industries | 211 | - | 366 | 577 |
| Construction | 7 | - | - | 7 |
| **Transport** | **13** | **-** | **-** | **13** |
| Air | - | - | - | - |
| Rail *(3)* | 13 | - | - | 13 |
| Road | - | - | - | - |
| National navigation | - | - | - | - |
| Pipelines | - | - | - | - |
| **Other** | **379** | **-** | **202** | **581** |
| Domestic | 345 | - | 202 | 547 |
| Public administration | 23 | - | - | 23 |
| Commercial | 5 | - | - | 5 |
| Agriculture | - | - | - | - |
| Miscellaneous | 6 | - | - | 6 |
| **Non energy use** | **-** | **-** | **-** | **-** |

*(1) Stock fall (+), stock rise (-).*

*(2) Total supply minus total demand.*

*(3) Estimate revised following research carried out into heritage railways.*

# 2.2 Commodity balances 2013

## Coal

Thousand tonnes

| | Steam coal | Coking coal | Anthracite | Total |
|---|---|---|---|---|
| **Supply** | | | | |
| Production | 11,078 | 179 | 1,415 | 12,673 |
| Other sources | 95 | - | -r | 95r |
| Imports | 42,995 | 6,246 | 161 | 49,402 |
| Exports | -443 | -9 | -142r | -593 |
| Marine bunkers | - | - | - | - |
| Stock change *(1)* | -1,818 | +312 | 177r | -1,328r |
| Transfers | - | - | - | - |
| **Total supply** | **51,908** | **6,729** | **1,612r** | **60,248r** |
| Statistical difference *(2)* | -116r | 30 | -91r | -177r |
| **Total demand** | **52,024r** | **6,698** | **1,703r** | **60,425r** |
| **Transformation** | **49,975r** | **6,698** | **933r** | **57,607r** |
| Electricity generation | 49,361r | - | 680r | 50,041r |
| Major power producers | 49,163r | - | 680r | 49,842 |
| Autogenerators | 199r | - | - | 199r |
| Heat generation | 609 | - | - | 609 |
| Petroleum refineries | - | - | - | - |
| Coke manufacture | - | 5,288 | - | 5,288 |
| Blast furnaces | - | 1,411 | - | 1,411 |
| Patent fuel manufacture and low temperature carbonisation | 5 | - | 254r | 259r |
| **Energy industry use** | **3** | **-** | **-** | **3** |
| Electricity generation | - | - | - | - |
| Oil and gas extraction | - | - | - | - |
| Petroleum refineries | - | - | - | - |
| Coal extraction | 3 | | - | 3 |
| Coke manufacture | - | - | - | - |
| Blast furnaces | - | - | - | - |
| Patent fuel manufacture | - | - | - | - |
| Pumped storage | - | - | - | - |
| Other | - | - | - | - |
| **Losses** | - | - | - | - |
| **Final consumption** | **2,047r** | **-** | **769r** | **2,816r** |
| **Industry** | **1,616r** | **-** | **516r** | **2,131r** |
| Unclassified | - | - | - | - |
| Iron and steel | 2 | - | 51 | 53 |
| Non-ferrous metals | 23 | - | - | 23 |
| Mineral products | 1,170 | - | 0 | 1,170 |
| Chemicals | 86 | - | - | 86 |
| Mechanical engineering etc | 12 | - | - | 12 |
| Electrical engineering etc | 6 | - | - | 6 |
| Vehicles | 52 | - | - | 52 |
| Food, beverages etc | 25 | - | 19 | 44 |
| Textiles, leather, etc | 59 | - | - | 59 |
| Paper, printing etc | 122r | - | - | 122r |
| Other industries | 53 | - | 445r | 498r |
| Construction | 6 | - | - | 6 |
| **Transport** | **14** | **-** | **-** | **14** |
| Air | - | - | - | - |
| Rail *(3)* | 14 | - | - | 14 |
| Road | - | - | - | - |
| National navigation | - | - | - | - |
| Pipelines | - | - | - | - |
| **Other** | **417** | **-** | **254r** | **671r** |
| Domestic | 383 | - | 254r | 636r |
| Public administration | 22 | - | - | 22 |
| Commercial | 5 | - | - | 5 |
| Agriculture | - | - | - | - |
| Miscellaneous | 7 | - | - | 7 |
| **Non energy use** | - | - | - | - |

*(1) Stock fall (+), stock rise (-).*

*(2) Total supply minus total demand.*

*(3) Estimate revised following research carried out into heritage railways.*

# 2.3 Commodity balances 2012

## Coal

Thousand tonnes

| | Steam coal | Coking coal | Anthracite | Total |
|---|---|---|---|---|
| **Supply** | | | | |
| Production | 14,691 | 386 | 1,210 | 16,287 |
| Other sources | 680 | - | -r | 680r |
| Imports | 39,619 | 5,071 | 125 | 44,815 |
| Exports | -365 | -13 | -110 | -488 |
| Marine bunkers | - | - | - | - |
| Stock change *(1)* | +2,585 | +525 | -144r | +2,966r |
| Transfers | - | - | - | - |
| **Total supply** | **57,209** | **5,968** | **1,082r** | **64,259r** |
| Statistical difference *(2)* | +210 | 16 | -9r | +217r |
| **Total demand** | **57,000** | **5,952** | **1,091r** | **64,042r** |
| **Transformation** | **54,897** | **5,952** | **649r** | **61,498r** |
| Electricity generation | 54,431 | - | 470 | 54,901 |
| Major power producers | 53,367 | - | 470 | 53,837 |
| Autogenerators | 1,064 | - | - | 1,064 |
| Heat generation | 461 | - | - | 461 |
| Petroleum refineries | - | - | - | - |
| Coke manufacture | - | 4,965 | - | 4,965 |
| Blast furnaces | - | 987 | - | 987 |
| Patent fuel manufacture and low temperature carbonisation | 5 | - | 179r | 184r |
| **Energy industry use** | **4** | **-** | **-** | **4** |
| Electricity generation | - | - | - | - |
| Oil and gas extraction | - | - | - | - |
| Petroleum refineries | - | - | - | - |
| Coal extraction | 4 | - | - | 4 |
| Coke manufacture | - | - | - | - |
| Blast furnaces | - | - | - | - |
| Patent fuel manufacture | - | - | - | - |
| Pumped storage | - | - | - | - |
| Other | - | - | - | - |
| **Losses** | - | - | - | - |
| **Final consumption** | **2,099** | **-** | **442** | **2,541** |
| **Industry** | **1,584** | **-** | **243** | **1,826** |
| Unclassified | - | - | - | - |
| Iron and steel | 2 | - | 49 | 51 |
| Non-ferrous metals | 21 | - | - | 21 |
| Mineral products | 1,123 | - | 0 | 1,123 |
| Chemicals | 76 | - | - | 76 |
| Mechanical engineering etc | 11 | - | - | 11 |
| Electrical engineering etc | 5 | - | - | 5 |
| Vehicles | 50 | - | - | 50 |
| Food, beverages etc | 27 | - | 17 | 44 |
| Textiles, leather, etc | 62 | - | - | 62 |
| Paper, printing etc | 138 | - | - | 138 |
| Other industries | 62 | - | 177 | 239 |
| Construction | 6 | - | - | 6 |
| **Transport** | **16** | **-** | **-** | **16** |
| Air | **-** | **-** | **-** | **-** |
| Rail *(3)* | 16 | - | - | 16 |
| Road | - | - | - | - |
| National navigation | - | - | - | - |
| Pipelines | - | - | - | - |
| **Other** | **499** | **-** | **199** | **698** |
| Domestic | 475 | - | 199 | 674 |
| Public administration | 12 | - | - | 12 |
| Commercial | 5 | - | - | 5 |
| Agriculture | 1 | - | - | 1 |
| Miscellaneous | 6 | - | - | 6 |
| **Non energy use** | **-** | **-** | **-** | **-** |

*(1) Stock fall (+), stock rise (-).*

*(2) Total supply minus total demand.*

*(3) Estimate revised following research carried out into heritage railways.*

# 2.4 Supply and consumption of coal

Thousand tonnes

| | 2010 | 2011 | 2012 | 2013 | 2014 |
|---|---|---|---|---|---|
| **Supply** | | | | | |
| Production | 17,817 | 17,892 | 16,287 | 12,673 | 11,648 |
| Deep-mined | 7,390 | 7,312 | 6,153 | 4,089 | 3,685 |
| Surface mining *(1)* | 10,426 | 10,580 | 10,134 | 8,584 | 7,962 |
| Other sources *(2)* | 530r | 660r | 680r | 95r | - |
| Imports | 26,541 | 32,527 | 44,815 | 49,402 | 41,765 |
| Exports | -715 | -491 | -488 | -593 | -425 |
| Stock change *(3)* | +7,206 | +836 | +2,966r | -1,328r | -4,329 |
| **Total supply** | **51,378r** | **51,424r** | **64,259r** | **60,248r** | **48,658** |
| **Statistical difference** *(4)* | +54r | -83r | +217r | -177r | +158 |
| **Total demand** | **51,324r** | **51,507r** | **64,042r** | **60,425r** | **48,500** |
| **Transformation** | **48,584** | **48,946r** | **61,498r** | **57,607r** | **45,665** |
| Electricity generation | 41,498 | 41,850 | 54,901 | 50,041r | 38,400 |
| Major power producers | 40,230 | 40,566 | 53,837 | 49,842r | 38,215 |
| Autogenerators | 1,268 | 1,284 | 1,064 | 199r | 185 |
| Heat generation | 477 | 562 | 461 | 609 | 516 |
| Coke manufacture | 5,399 | 5,282 | 4,965 | 5,288 | 4,977 |
| Blast furnaces | 978 | 995 | 987 | 1,411 | 1,513 |
| Patent fuel manufacture and low temperature carbonisation | 231 | 258r | 184r | 259r | 259 |
| **Energy industry use** | **5** | **4** | **4** | **3** | **1** |
| Coal extraction | 5 | 4 | 4 | 3 | 1 |
| **Final consumption** | **2,736r** | **2,557r** | **2,541** | **2,816r** | **2,834** |
| **Industry** | **1,959r** | **1,798** | **1,826** | **2,131r** | **2,240** |
| Unclassified | - | - | - | - | - |
| Iron and steel | 64r | 53 | 51 | 53 | 54 |
| Non-ferrous metals | 24 | 23 | 21 | 23 | 25 |
| Mineral products | 1,063 | 1,056 | 1,123 | 1,170 | 1,173 |
| Chemicals | 79 | 78 | 76 | 86r | 78 |
| Mechanical engineering etc | 13 | 11 | 11 | 12 | 14 |
| Electrical engineering etc | 5 | 5 | 5 | 6 | 7 |
| Vehicles | 51 | 53 | 50 | 52 | 55 |
| Food, beverages etc | 43 | 45 | 44 | 44 | 54 |
| Textiles, clothing, leather, etc | 67 | 64 | 62 | 59 | 59 |
| Pulp, paper, printing etc | 123 | 122 | 138 | 122r | 136 |
| Other industries | 423r | 280 | 239 | 498r | 577 |
| Construction | 4 | 7 | 6 | 6 | 7 |
| **Transport** | **19** | **15** | **16** | **14** | **13** |
| **Other** | **758r** | **744r** | **698** | **671r** | **581** |
| Domestic | 719r | 705r | 674 | 636r | 547 |
| Public administration | 28 | 26 | 12 | 22 | 23 |
| Commercial | 4 | 5 | 5 | 5 | 5 |
| Agriculture | 1 | 1 | 1 | - | - |
| Miscellaneous | 6 | 7 | 6 | 7 | 6 |
| **Non energy use** | | | | | |
| **Stocks at end of year** *(5)* | | | | | |
| Distributed stocks | 15,368 | 15,115r | 11,883r | 13,591r | 17,944 |
| Of which: | | | | | |
| Major power producers | 13,370 | 13,496 | 9,561 | 11,871 | 17,091 |
| Coke ovens | 1,338 | 1,355 | 831 | 518 | 795 |
| Undistributed stocks | 1,517 | 926 | 1,120 | 696 | 576 |
| **Total stocks** *(6)* | **16,884** | **16,041r** | **13,003r** | **14,287r** | **18,520** |

*(1) The term 'surface mining' has now replaced opencast production. Opencast production is a surface mining technique.*
*(2) Estimates of slurry etc. recovered from ponds, dumps, rivers, etc.*
*(3) Stock fall (+), stock rise (-).*
*(4) Total supply minus total demand.*
*(5) Excludes distributed stocks held in merchants' yards, etc., mainly for the domestic market, and stocks held by the industrial sector.*
*(6) For some years, closing stocks may not be consistent with stock changes, due to additional stock adjustments.*

# 2.5 Supply and consumption of coke oven coke, coke breeze and other manufactured solid fuels

Thousand tonnes

| | 2010 | 2011 | 2012 | 2013 | 2014 |
|---|---|---|---|---|---|
| **Coke oven coke** | | | | | |
| **Supply** | | | | | |
| Production | 3,990 | 4,021 | 3,712 | 3,769 | 3,601 |
| Imports | 44 | - | 147 | 764 | 823 |
| Exports | -437 | -427 | -450 | -75 | -85 |
| Stock change *(1)* | -145 | -520 | +341 | +178 | -64 |
| Transfers | -833 | -744 | -1,021 | -1,277 | -1,075 |
| **Total supply** | **2,619** | **2,331** | **2,728r** | **3,358** | **3,199** |
| **Statistical difference** *(2)* | **-** | **-** | **-** | **-** | **-** |
| **Total demand** | **2,619** | **2,331** | **2,728r** | **3,358** | **3,199** |
| **Transformation** | **2,554** | **2,287** | **2,674** | **3,271** | **3,144** |
| Blast furnaces | 2,554 | 2,287 | 2,674 | 3,271 | 3,144 |
| **Energy industry use** | **-** | **-** | **-** | **-** | **-** |
| **Final consumption** | **66** | **44** | **55** | **87** | **55** |
| **Industry** | **55** | **35** | **48** | **82** | **49** |
| Unclassified | 48 | 28 | 35 | 69 | 35 |
| Iron and steel | 7 | 7 | 13 | 13r | 14 |
| Non-ferrous metals | **-** | **-** | **-** | **-** | **-** |
| **Other** | **10** | **9** | **7** | **6** | **6** |
| Domestic | 10 | 9 | 7 | 6 | 6 |
| **Stocks at end of year** *(3)* | **464** | **972** | **393** | **196r** | **362** |
| **Coke breeze** | | | | | |
| **Supply** | | | | | |
| Production *(4)* | 32 | 31 | 31 | 32 | 31 |
| Imports | 69 | 26 | 46 | 55 | 103 |
| Exports | -46 | -40 | -71 | -11 | -3 |
| Stock change *(1)* | -83 | -8 | -255 | -283 | -132 |
| Transfers | 833 | 744 | 1,021 | 1,277 | 1,071 |
| **Total supply** | **805** | **753** | **772** | **1,069** | **1,070** |
| **Statistical difference** *(2)* | **-** | **-** | **-** | **-** | **-** |
| **Total demand** | **805** | **753** | **772** | **1,069** | **1,070** |
| **Transformation** | **384** | **358** | **293r** | **442** | **440** |
| Coke manufacture | **-** | **-** | **-** | **-** | **-** |
| Blast furnaces | 384 | 358 | 293r | 442 | 440 |
| **Energy industry use** | **-** | **-** | **-** | **-** | **-** |
| **Final consumption** | **421** | **395** | **479r** | **627** | **629** |
| **Industry** | **421** | **395** | **479r** | **627** | **629** |
| Unclassified | 4 | 7 | 10 | 14 | 9 |
| Iron and steel | 416 | 388 | 469r | 613r | 620 |
| **Stocks at end of year** *(3)* | **279** | **210** | **437** | **477** | **300** |
| **Other manufactured solid fuels** | | | | | |
| **Supply** | | | | | |
| Production | 318 | 289 | 258 | 336 | 274 |
| Imports | 10 | 21 | 15 | 15 | 14 |
| Exports | -35 | -32 | -32 | -30 | -24 |
| Stock change *(1)* | +13 | -13 | +7 | -17 | -15 |
| **Total supply** | **306** | **265** | **248** | **303** | **249** |
| **Statistical difference** *(2)* | -5 | -4 | -5 | -1 | -1 |
| **Total demand** | **311** | **270** | **253** | **304** | **250** |
| **Transformation** | **-** | **-** | **-** | **-** | **-** |
| **Energy industry use** | **-** | **-** | **-** | **-** | **-** |
| Patent fuel manufacture | **-** | **-** | **-** | **-** | **-** |
| **Final consumption** | **311** | **270** | **253** | **304** | **250** |
| **Industry** | **-** | **-** | **-** | **-** | **-** |
| Unclassified | **-** | **-** | **-** | **-** | **-** |
| **Other** | **311** | **270** | **253** | **304** | **250** |
| Domestic | 311 | 270 | 253 | 304 | 250 |
| **Stocks at end of year** *(3)* | **18** | **32** | **24** | **42** | **57** |

*(1) Stock fall (+), stock rise (-).*
*(2) Total supply minus total demand.*
*(3) Producers stocks and distributed stocks.*
*(4) See paragraph 2.29.*

# 2.6 Supply and consumption of coke oven gas, blast furnace gas, benzole and tars

GWh

| | 2010 | 2011 | 2012 | 2013 | 2014 |
|---|---|---|---|---|---|
| **Coke oven gas** | | | | | |
| **Supply** | | | | | |
| Production | 8,822 | 8,845 | 8,257 | 8,479 | 8,473 |
| Imports | - | - | - | - | - |
| Exports | - | - | - | - | - |
| Transfers *(1)* | +274 | +62 | +60 | +64r | +146 |
| **Total supply** | **9,096** | **8,907** | **8,317** | **8,544r** | **8,620** |
| **Statistical difference** *(2)* | -62 | -62 | -1 | -1r | -1 |
| **Total demand** | **9,158** | **8,969** | **8,318r** | **8,545r** | **8,620** |
| **Transformation** | **2,984** | **3,019** | **2,858** | **2,741** | **2,541** |
| Electricity generation | 2,566 | 2,601 | 2,440 | 2,322 | 2,123 |
| Heat generation | 418 | 418 | 418 | 418 | 418 |
| Other | - | - | - | - | - |
| **Energy industry use** | **4,235** | **4,300** | **4,567r** | **4,525** | **4,599** |
| Coke manufacture | 3,861 | 3,832 | 3,816r | 3,643 | 3,725 |
| Blast furnaces | 374 | 469 | 751r | 882 | 874 |
| Other | - | - | - | - | - |
| **Losses** | **617** | **758** | **192** | **389** | **682** |
| **Final consumption** | **1,321** | **891** | **701** | **890r** | **798** |
| **Industry** | **1,321** | **891** | **701** | **890r** | **798** |
| Unclassified | 198 | 200 | 198 | 174 | 165 |
| Iron and steel | 1,123 | 691 | 504r | 716r | 633 |
| **Blast furnace gas** | | | | | |
| **Supply** | | | | | |
| Production | 11,404 | 10,503 | 11,694r | 15,576r | 15,386 |
| Imports | - | - | - | - | - |
| Exports | - | - | - | - | - |
| Transfers *(1)* | -11 | -2 | -4 | -4 | -7 |
| **Total supply** | **11,393** | **10,501** | **11,690r** | **15,572r** | **15,380** |
| **Statistical difference** *(2)* | -71 | -70 | -48 | +17r | -34 |
| **Total demand** | **11,464** | **10,571** | **11,738r** | **15,555r** | **15,414** |
| **Transformation** | **5,444** | **5,462** | **7,052r** | **8,782** | **8,711** |
| Electricity generation | 5,265 | 5,283 | 6,873r | 8,602 | 8,532 |
| Heat generation | 179 | 179 | 179 | 179 | 179 |
| Other | - | - | - | - | - |
| **Energy industry use** | **3,674** | **3,370** | **3,569** | **4,516** | **4,732** |
| Coke manufacture | 732 | 657 | 672 | 751 | 711 |
| Blast furnaces | 2,943 | 2,713 | 2,898r | 3,765 | 4,021 |
| Other | - | - | - | - | - |
| **Losses** | **1,335** | **993** | **817** | **2,111** | **1,835** |
| **Final consumption** | **1,010** | **746** | **300r** | **146r** | **135** |
| **Industry** | **1,010** | **746** | **300r** | **146r** | **135** |
| Unclassified | - | - | - | - | - |
| Iron and steel | 1,010 | 746 | 300r | 146r | 135 |
| **Benzole and tars** *(3)* | | | | | |
| **Supply** | | | | | |
| Production | 1,696 | 1,657 | 1,543 | 1,630 | 1,582 |
| **Final consumption** *(4)* | **1,696** | **1,657** | **1,543** | **1,630** | **1,582** |
| Unclassified | - | - | - | - | |
| Iron and steel | - | - | - | - | |
| Non energy use | 1,696 | 1,657 | 1,543 | 1,630 | 1,582 |

*(1) To and from synthetic coke oven gas, see paragraph 2.53.*
*(2) Total supply minus total demand.*
*(3) Because of the small number of benzole suppliers, figures for benzole and tars cannot be given separately*
*(4) From 2009, unclassified final consumption has been recorded under non energy use*

# 2.7 Deep mines and surface mines in production at 31 December 2014

## Deep mines[1]

| Licensee | Site Name | Location |
|---|---|---|
| **Ayle Colliery Company Ltd** | Ayle Colliery | Northumberland |
| **Energybuild Mining Ltd** | Aberpergwm Colliery | Neath Port Talbot |
| **European Coal Products Ltd** | Eckington Colliery | Derbyshire |
| **Grimebridge Colliery Company Ltd** | Hill Top Colliery | Lancashire |
| **Hatfield Colliery Partnership Ltd** | Hatfield Colliery | Doncaster |
| **NH Colliery Ltd** | Nant Hir No.2 Colliery | Neath Port Talbot |
| **Ray Ashly, Richard Daniels and Neil Jones** | Monument Colliery | Gloucestershire |
| **Three D's Mining Ltd** | Dan-y-Graig No.4 Colliery | Neath Port Talbot |
| **UK Coal Kellingley Ltd** | Kellingley Colliery | North Yorkshire |
| **UK Coal Thoresby Ltd** | Thoresby Colliery | Nottinghamshire |

## Surface mines[2]

| Licensee | Site Name | Location |
|---|---|---|
| **Bryn Bach Coal Ltd** | Glan Lash | Carmarthenshire |
| **Celtic Energy Ltd** | East Pit | Neath Port Talbot |
| | Nant Helen | Powys |
| | Selar | Neath Port Talbot |
| **H J Banks & Company Ltd** | Brenkley Lane | Newcastle upon Tyne |
| | Rusha Site | West Lothian |
| | Shotton | Northumberland |
| **Hall Construction Services Ltd** | Earlseat | Fife |
| **Glenmuckloch Restoration Ltd** | Glenmuckloch Site | Dumfries & Galloway |
| **Kier Minerals Ltd** | Greenburn Project | East Ayrshire |
| **Land Engineering Services Ltd** | Comrie Colliery Site | Fife |
| **Miller Argent (South Wales) Ltd** | Ffos-y-Fran Land Reclamation Scheme | Merthyr Tydfil |
| **Hargreaves Surface Mining Ltd** | Muir Dean Site | Fife |
| **OCCW (Broken Cross) Ltd** | Broken Cross Site | South Lanarkshire |
| **OCCW (Duncanziemere) Ltd** | Laigh Glenmuir Site | East Ayrshire |
| **OCCW (House of Water) Ltd** | House of Water Site | East Ayrshire |
| **OCCW (Netherton) Ltd** | Netherton | East Ayrshire |
| **Tower Regeneration Ltd** | Tower Colliery Surface Mining Site | Rhondda Cynon Taff |
| **UKCSMR Ltd** | Butterwell Disposal Point | Northumberland |
| | Lodge House | Derbyshire |
| | Minorca | Leicestershire |
| | Potland Burn | Northumberland |

*(1) In addition, there was 1 underground mines on care & maintenance :-*
*Unity Mine in Neath Port Talbot licensed to Unity Mine Ltd*

*(2) In addition, there were 2 surface mines on care & maintenance :-*
*Bwlch Ffos site in Neath Port Talbot licensed to Horizon Mining Ltd (in administration)*
*St Ninians site in Fife licensed to the OCCW (St Ninians) Ltd*

***Source: The Coal Authority***

# Chapter 3
# Petroleum

## Key points

- Production of crude oil and Natural Gas Liquids (NGLs) from the UK's North Sea fields decreased by 1.8 per cent between 2013 and 2014, a far smaller drop than that seen in recent years. Indigenous production has been falling by nearly 8 per cent per annum over the last 10 years but the rate of decline slowed in 2014. Total production is now less than thirty per cent of the UK's peak production of 1999 (Table 3.1, Chart 3.1).

- Despite the decrease in oil production, net imports of primary oils decreased in 2014 due to a fall in refinery demand. Exports were more than 2 million tonnes lower in 2014 but imports were down by over 5 million tonnes. Exports of crude oil are now at their lowest level since 1978. (Table 3.1, Chart 3.1).

- UK refinery production fell to 60.3 million tonnes of product in 2014, down 7.8 per cent from 65.4 million tonnes in 2013. Production loss from the closure of Milford Haven refinery in 2014 and Coryton in 2012 has not been made up by other refineries, many of which have reduced their distillation capacity in recent years. Overall, UK production is around thirty per cent lower than in 2000 (Table 3.2, Chart 3.4).

- The fall in production meant that the UK was a net importer of petroleum products in 2014 by more than 6 million tonnes, the highest such figure since 1984, the year of the miner's strike. Prior to 2013 the UK was consistently a net exporter but whilst product imports were only up marginally on 2013 exports decreased by 16 per cent (Table 3.2, Chart 3.4).

- Refinery production does not meet demand for every product. Around 40 per cent of the UK's diesel (DERV) is produced in the UK and around 60 per cent of jet fuel (ATF). Whereas UK refineries continue to produce substantial volumes of petrol (motor spirit), nearly 16 million tonnes, more than sufficient to meet UK demand.

## Introduction

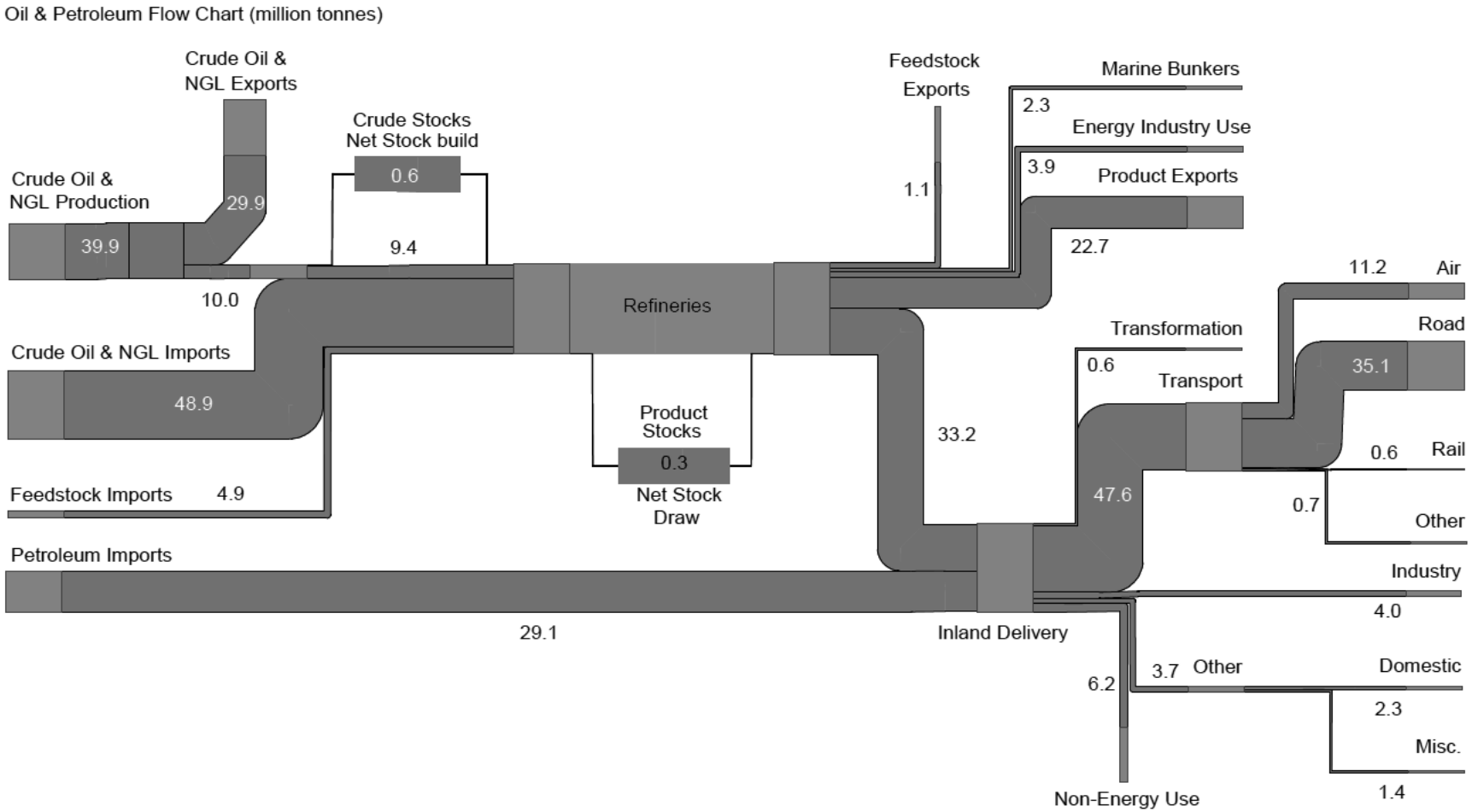
3.1 This chapter covers the supply and demand of primary oils and petroleum products. The first part of the chapter covers the supply and demand of primary oils; crude oil and Natural Gas Liquids (NGLs), and feedstocks. The second part of the chapter covers the supply and demand of refined petroleum products.

3.2 The supply and demand of primary oils and petroleum products are shown as commodity balances at the end of the chapter, in Tables 3.1 and 3.2 to 3.4 respectively. Additional tables show information on refinery capacity, as well as additional detail on deliveries into consumption.

3.3 In addition to the information in this chapter, there is considerable data on DECC's website. Information on long-term trends (Tables 3.1.1 and 3.1.2) and the annex on the oil and gas resources in the UK (Annex F) provide a more complete picture of the UK oil and gas production sector. These tables are only available in the internet version of this publication which can be found on the DECC section of the GOV.UK website at www.gov.uk/government/collections/digest-of-uk-energy-statistics-dukes.

3.4 A flow chart of the movement of primary oils and petroleum products for 2014 is provided, showing the flow from indigenous production and imports to eventual uses. The flows are measured in million tonnes and the widths of the bands are approximately proportional to the size of the flow they represent.

# Petroleum Flow Chart 2014 (million tonnes)

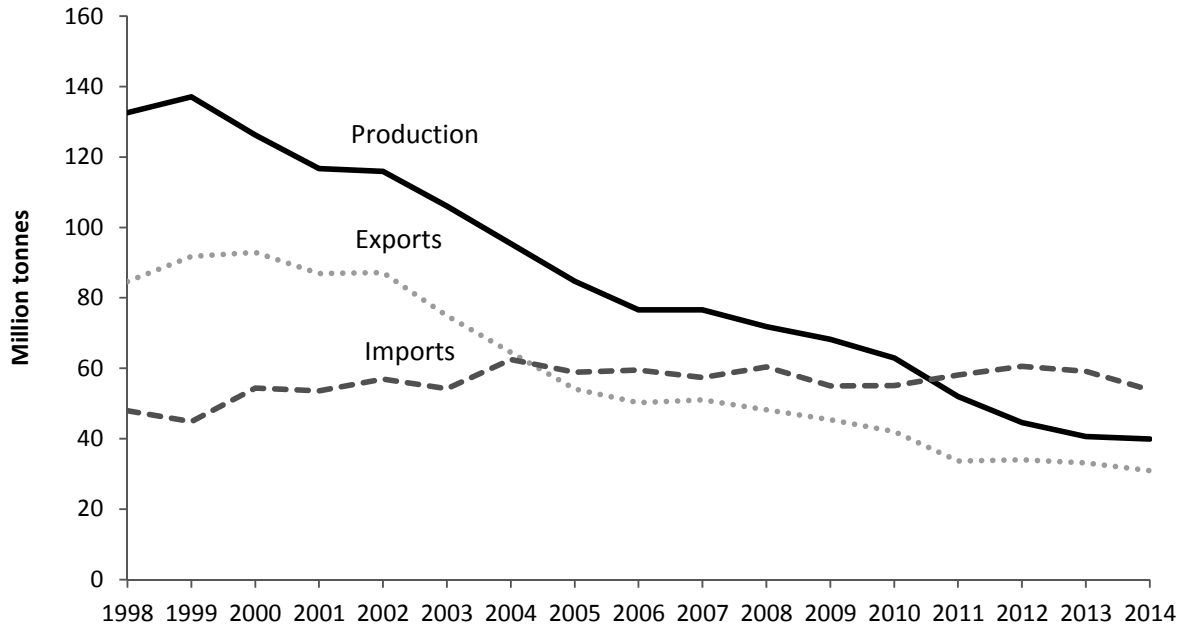



**Note:**
This flow chart is based on the data that appear in Tables 3.1 and 3.2.
The numbers on either side of the flow chart will not match due to losses in transformation.
Biofuels are not included.

## Supply and demand for primary oil (Table 3.1)

3.5 Table 3.1 shows details of the production, supply and disposals of primary oils (crude oil, NGLs and feedstocks) in 2012, 2013 and 2014. The table examines the supply chain from the production of primary oils recorded by individual oil terminals and oil fields, to their disposal either to UK refineries or to export. It also covers the use of these primary oils as recorded by UK refineries.

**Chart 3.1: Production, imports and exports of primary oils 1998 to 2014**




3.6 Chart 3.1 summarises the main trends since 1998. Production from the United Kingdom Continental Shelf (UKCS) peaked in 1999 and has been in decline since. Production of primary oils in 2014, at 39.9 million tonnes, showed a 1.8 per cent reduction on 2013. This is a much slower rate of decline than seen in recent years, on average, year-on-year primary oil production has been decreasing by nearly 8 per cent a year since 1999. A fall in the amount of crude produced was partly offset by an increase in NGL production, this was boosted by two new fields coming on line in late 2013. However, production is now just under thirty per cent of 1999 peak oil production.

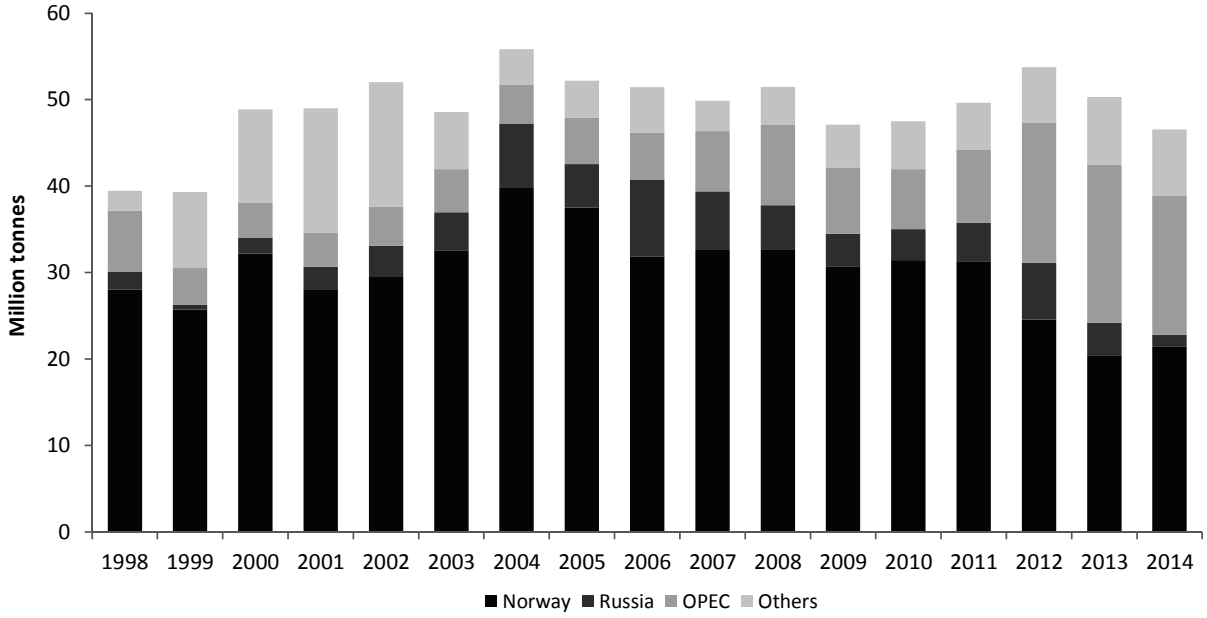
3.7 DECC's Energy Development Unit publishes data on field-by-field production. These are available three months in arrears owing to the need to protect commercially sensitive data. These data can be accessed at www.gov.uk/oil-and-gas-uk-field-data.

3.8 The UK is a net importer of crude oils but North Sea production remains significant. Figures for 2014 are not fully available but in 2013 the UK produced more crude oil than any other country in the European Union (EU), and the second most in the European Economic Area after Norway.

3.9 Whilst the UK's production of crude oil and NGLs would be sufficient to meet nearly two thirds of refinery demand, there is an active trade in oil which leads to significant volumes of oil being imported and exported to meet global and UK demand. Further declines in exports and increases in imports will be seen as indigenous production continues to decline, 2011 was the first year where imports exceeded production and the trend has continued since then.

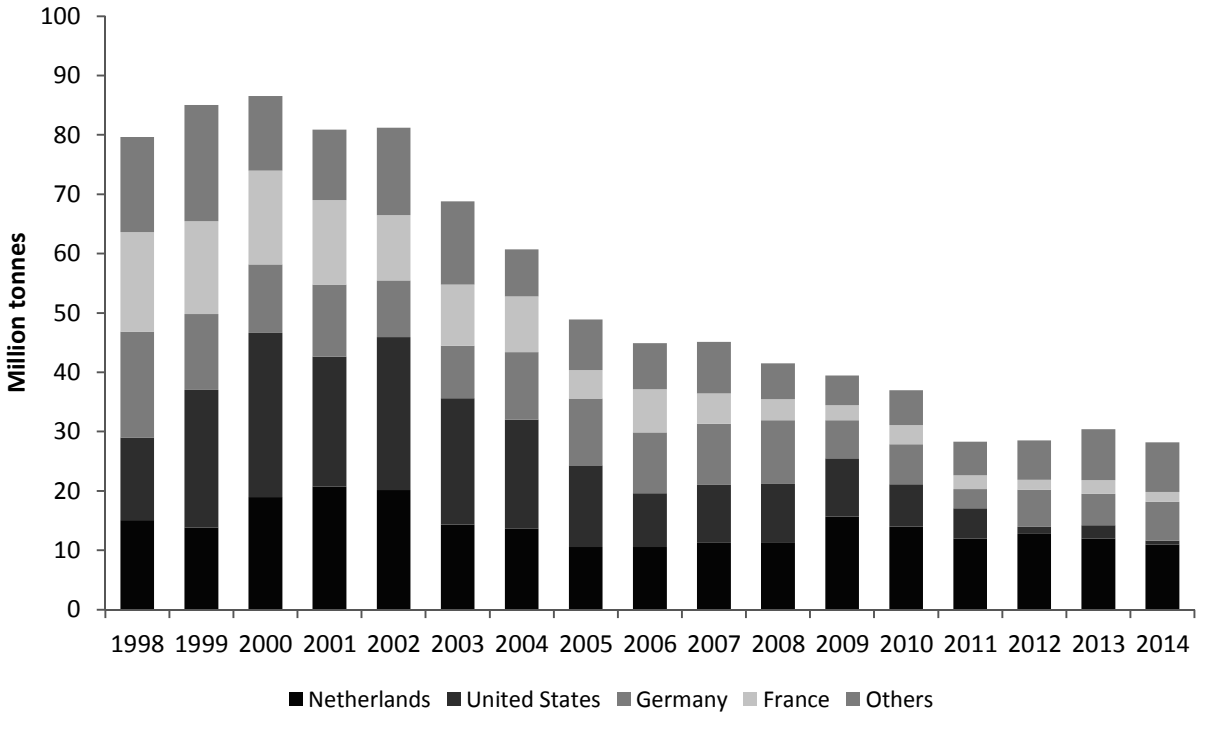
3.10 The sources of crude oil imports from other countries are shown in Chart 3.2. The principal source of the UK's imports has consistently been Norway, historically accounting for around 65 per cent of all imports given not only its proximity to the UK but also the similarity in its crude types. The proportion of crude oil sourced from Norway has dropped in recent years and now stands at 46 per cent. Imports from OPEC countries have increased to make up the difference and now consist of 36 per cent of the UK's crude imports.

## Chart 3.2: Source of UK crude oil imports 1998 to 2014




3.11 Crude oil exports decreased slightly in 2014 and at 28 million tonnes are now at their lowest level since 1978. Chart 3.3 shows exports are substantially lower than their peak of 87 million tonnes in 2000. Crude oil is principally exported to the Netherlands, Germany, France and historically the US. Exports to the Netherlands remained steady in 2014 accounting for 39 per cent of the total whilst exports to Germany increased by 24 per cent. Exports to France and other countries are down, and exports to the USA have decreased significantly to 1 million tonnes, down from 28 million tonnes in 2000.

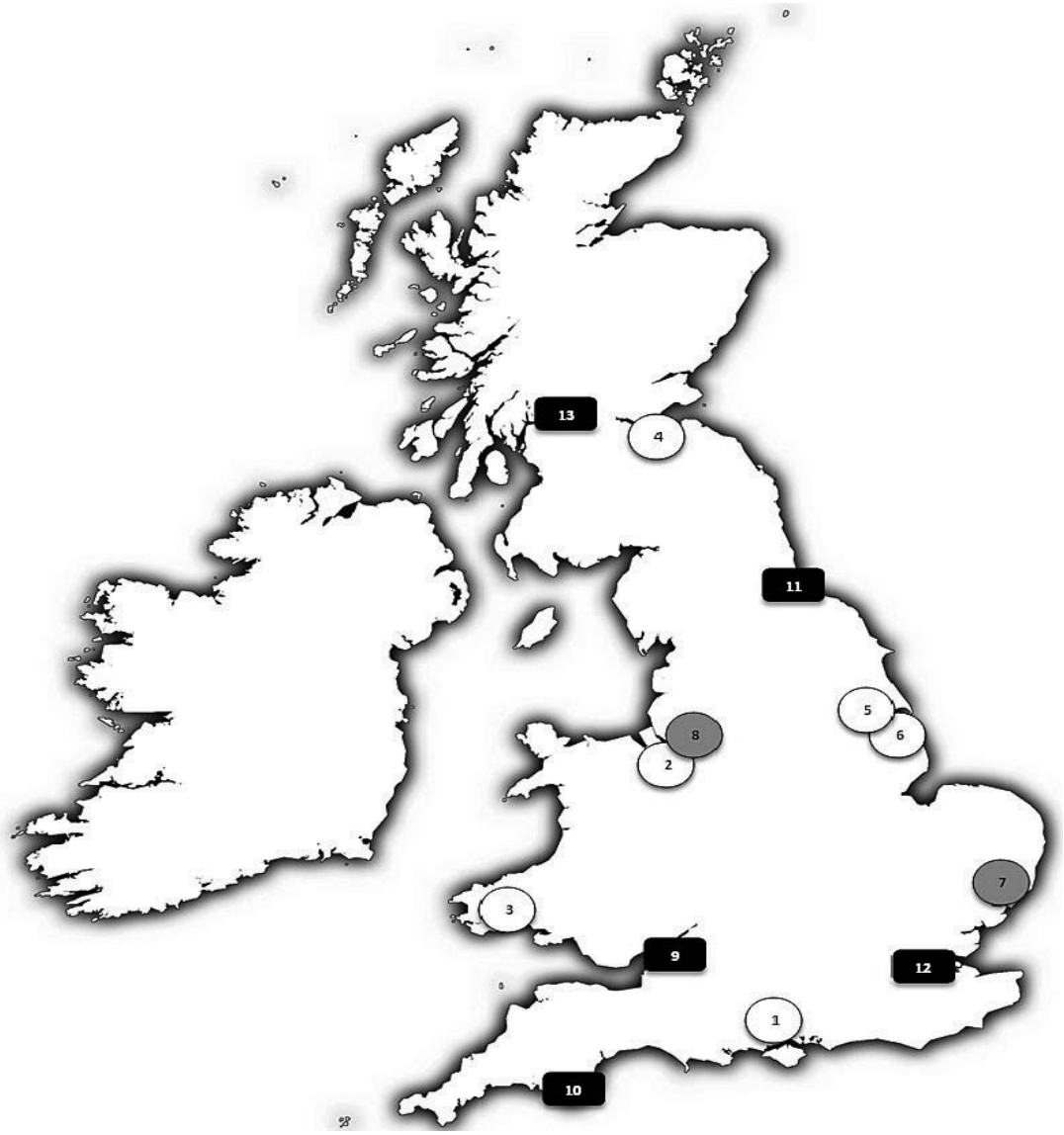
## Chart 3.3: Destination of UK crude oil exports 1998 to 2014



## UK refineries

3.12 A significant proportion of the UK's primary oil is processed into petroleum products at the UK's six refineries. Data for refinery capacity as at the end of 2014 are presented in table 3A, with the location of these refineries illustrated in Map 3A. For this year the location of the UK's major import terminals are also marked.

### Map 3A: Distribution of UK refineries and import terminal clusters as at end 2014




| Number | Refinery |
|---|---|
| 1 | Fawley Exxon |
| 2 | Stanlow Essar |
| 3 | Pembroke Valero |
| 4 | Grangemouth Ineos |
| 5 | Killingholme Phillips 66 |
| 6 | Lindsey Total |

| Number | Petrochem Refinery |
|---|---|
| 7 | Harwich Petrochem Carless |
| 8 | Eastham Refinery |

| Number | Import Terminal |
|---|---|
| 9 | Avonmouth Esso, Valero & KPIAC |
| 10 | Plymouth Valero/Greenergy |
| 11 | Teeside Vopak, Greenergy & Inter |
| 12 | Thames Cluster - West Thurrock Vopak, Purfleet Esso & Grays NuStar |
| 13 | Clydebank NuStar |

## Table 3A: UK refinery processing capacity as at end 2014

Million tonnes per annum

| Number | Refinery | Distillation | Reforming | Cracking and Conversion |
|---|---|---|---|---|
| 1 | Fawley Exxon | 13.1 | 4.4 | 5.0 |
| 2 | Stanlow Essar | 9.5 | 1.5 | 4.0 |
| 3 | Pembroke Valero | 10.8 | 1.5 | 6.3 |
| 4 | Grangemouth Ineos | 10.0 | 1.8 | 3.3 |
| 5 | Killingholme Phillips 66 | 11.9 | 2.6 | 10.7 |
| 6 | Lindsey Total | 10.1 | 1.4 | 3.8 |
| **Number** | **Petrochem Refinery** | **Distillation** | **Reforming** | **Cracking and Conversion** |
| 7 | Harwich Petrochem Carless | - | - | - |
| 8 | Eastham Refinery | 1.2 | - | - |
| **Total all refineries** | | **66.6** | **13.2** | **33.1** |

3.13 Refinery capacity has decreased as Murco's refinery at Milford Haven ceased refining in the summer of 2014. Between 2009 and 2014, two other refineries ceased operation in the UK (the Petroplus Teeside refinery in 2009, and the Petroplus Coryton refinery in 2012). There has also been some rationalisation of capacity at other UK refineries in recent years and refining capacity is down over 25 per cent on its 2008 total.

## Supply and demand for petroleum products (Tables 3.2 to 3.4)

3.14 These tables show details of the production, supply and disposal of petroleum products into the UK market in 2012, 2013 and 2014.

3.15 The upper half of the table represents the supply side and calculates overall availability of the various products in the UK by combining production at refineries with trade (imports and exports), stock changes, product transfers and deliveries to international marine bunkers (fuel used by ships travelling to a foreign destination).

3.16 The lower half of the table reports the demand side and covers the uses made of the different products, including the use made within the refining process, and details of the amounts reported by oil companies within the UK as delivered for final consumption.

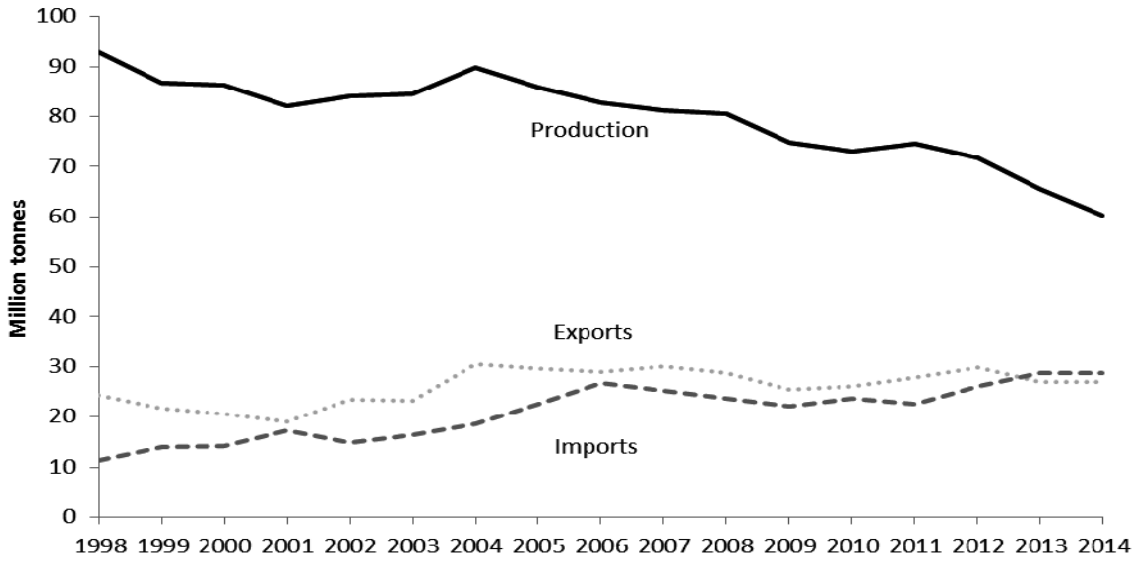
3.17 Following consultation with industry, DECC have made revisions to trade figures (mainly for middle distillate fuels), naphtha production, feedstock usage and non-energy use. The majority of these changes relate to 2012 to 2014 but refinery production of naphtha has been revised for 2008 through 2013. For more details please see 3.58 – 3.62 of the technical notes.

## Supply of petroleum products

3.18 Chart 3.4 below shows the production output of petroleum products since 1998. In 2014, the UK's refineries produced 60.3 million tonnes of product, down 7.8 per cent on last year and down 30 per cent on 2000. This was partly due to the cessation of refining activity at Milford Haven and maintenance issues at another major refinery. There has also been rationalisation elsewhere in the sector as well as an on-going decline in UK refinery production. However, the UK's refinery capacity remains substantial with only Germany and Italy having significantly greater capacity than the UK.

3.19 In 2014 the UK was a net importer of petroleum products by 6.3 million tonnes, the largest figure for net imports since 1984 when industrial action in the coal industry led to greater imports of petroleum for power generation. Production has been in decline for some time but the UK had been a net exporter of petroleum in every other year between 1974 and 2012. In 2014 imports increased by just 1 per cent but exports decreased by 15 per cent.

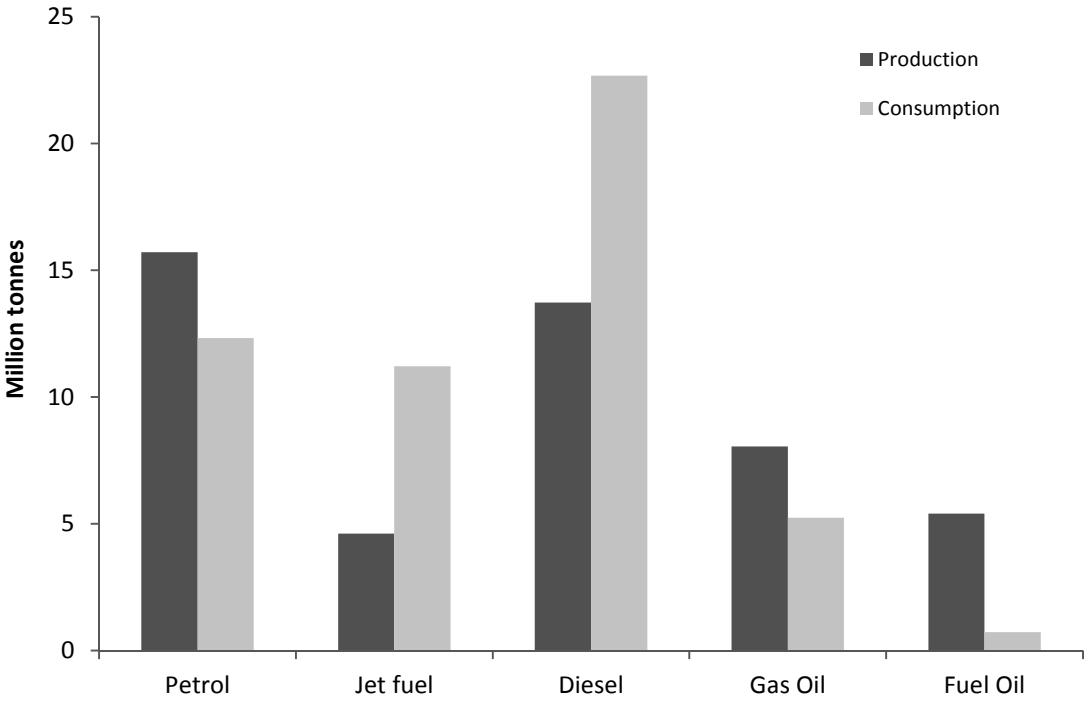
## Chart 3.4: Production, imports and exports of petroleum products 1998 to 2014




3.20 Given the recent contraction in UK refinery output, production is now nearly 6 million tonnes below demand. In addition to this, domestic supply and demand is not matched on a product by product basis. The UK's refineries – in common with many other European countries – are geared to produce petrol (motor spirit) for domestic cars and fuel oil for electricity generation. With the increasing dieselisation of the UK's car fleet, and the switch from fuel oil to other fuels for electricity generation, UK production of individual petroleum products is no longer aligned with market demand. To balance demand the UK trades widely and is one of the largest importers of jet fuel (Aviation Turbine Fuel) in the OECD and one of the largest exporters of petrol.

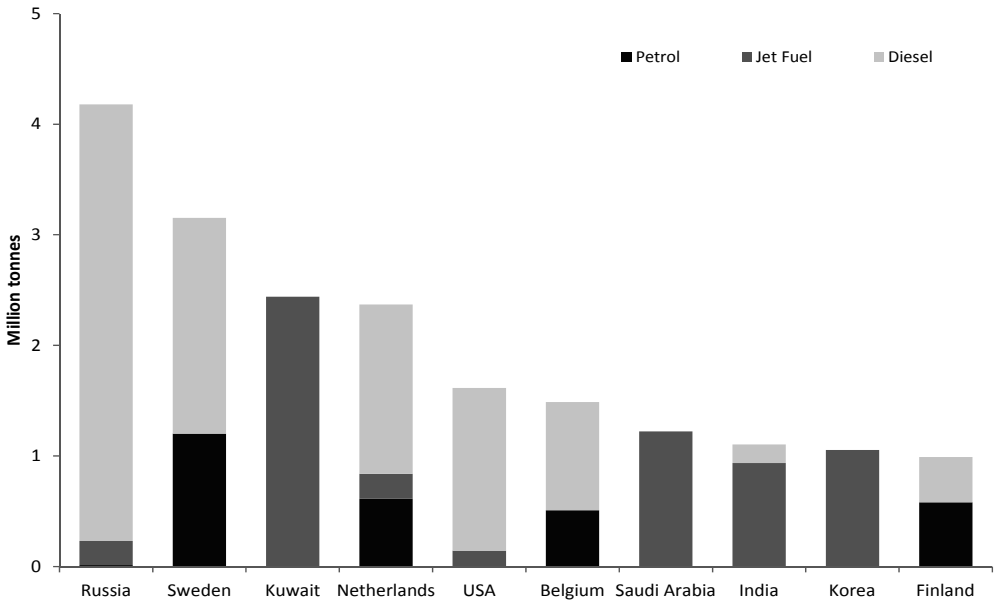
3.21 Chart 3.5 shows production and consumption figures for the key petroleum products, and illustrates the deficit for jet and diesel fuel (DERV), and the surpluses for petrol, gas oil, and fuel oil.

## Chart 3.5: Production and consumption of key petroleum products 2014



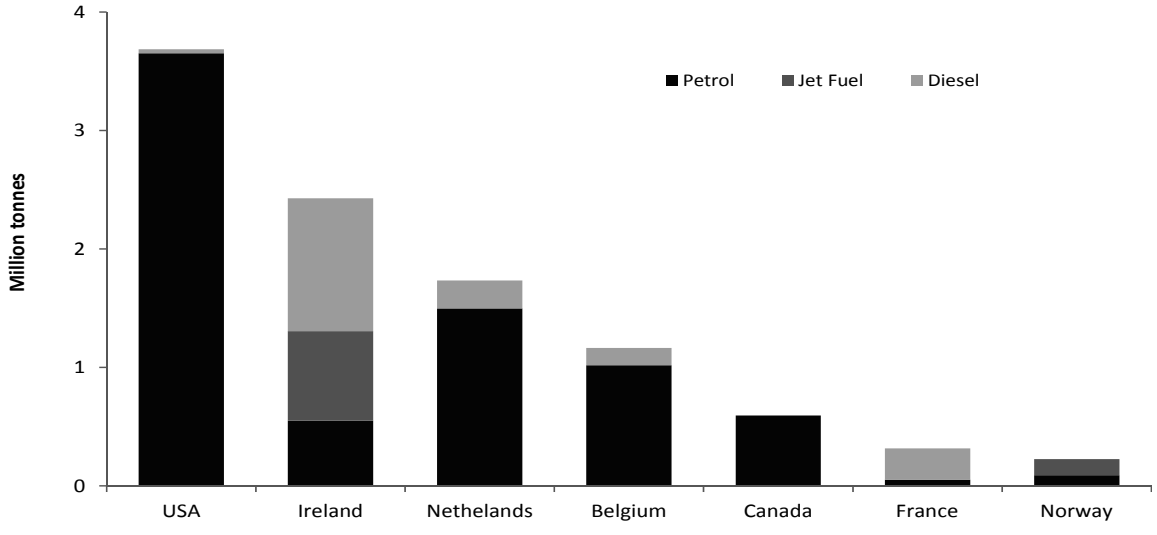
3.22 Chart 3.6 shows the source of transport fuels imported by the UK in 2014. The ten countries shown account for around 85 per cent of the total volume of imports. Historically the bulk of the products have come via the Netherlands, which acts as a major trading hub (the fuel might have been refined from elsewhere in Europe or beyond). However, Russia and Sweden were the biggest sources of transport fuels, being especially large suppliers of diesel. The diversity of supply is increasing as demand for key transport fuels increases. The chart shows that there is a clear split between imports from European countries (which are mainly diesel) and imports from Asia (where the bulk of jet fuel is sourced from generally more modern refinery operations than seen in Europe). These trade data are provisional and subject to change.

**Chart 3.6: Source of transport fuel imports 2014**




3.23 Similarly, chart 3.7 shows the exports by country for the three principal transport fuels in 2014. The chart covers 90 per cent of these exports. A considerable portion of the UK's total exports (nearly a third) is petrol exported to the United States. Ireland imports a substantial volume of its products from the UK as it has no indigenous production of aviation fuel.

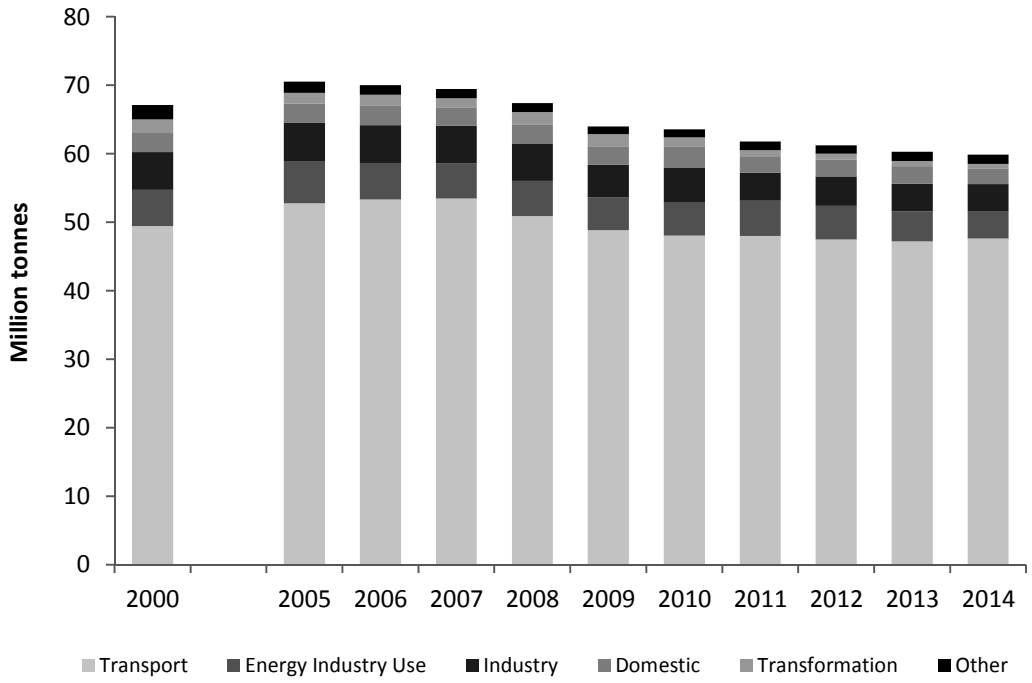
**Chart 3.7: Destination of transport fuel exports 2014**



## Consumption of petroleum products

3.24 Tables 3.2 to 3.4 show the consumption of oil products during the period 2012 to 2014, by consumers and products. The chart below shows that the principal use for petroleum products is consistently for transport, consuming nearly over 70 per cent of total demand in 2014.

**Chart 3.8: Petroleum products used for energy (share by main sector)**

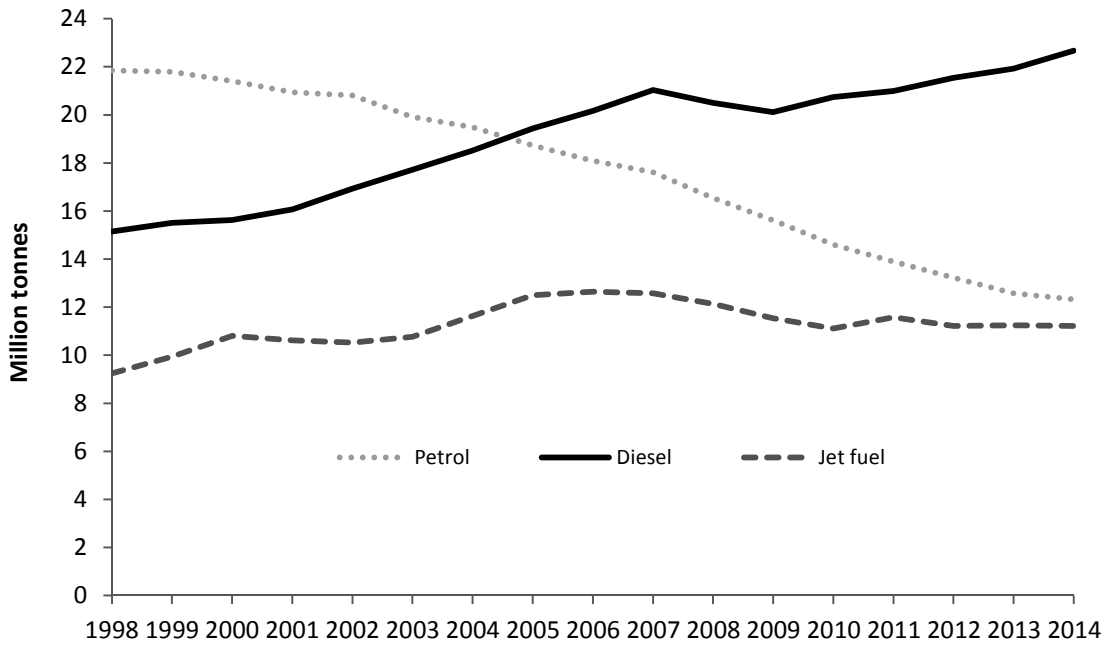



## Consumption of transport fuels (Table 3.6)

3.25 The three main transport fuels – petrol, jet fuel and diesel – account for over 70 per cent of the UK's total demand of petroleum products. Around 6 per cent of oil is used by industry. Less than 1 per cent of oil is used for electricity generation with the remainder mainly being used for refinery fuel, heating homes and non-energy use (typically used as petrochemical feedstock).

3.26 Whilst the proportion of petroleum delivered to transport has remained relatively constant over time, the mix of fuels has changed greatly as many motorists have switched from petrol to diesel. Chart 3.9 shows that consumption of petrol decreased by 2.0 per cent in 2014 and an average of 3.6 per cent year-on-year since 2000 while deliveries of diesel have increased by 2.5 per cent year-on-year (with a downturn in deliveries during the recession) over the same period.

## Chart 3.9: Petrol, Diesel and Jet fuel deliveries 1998 to 2014




3.27 Jet fuel deliveries increased more than 20 per cent between 1998 and 2014, but remain 11 per cent down on the 2006 peak. Demand in recent years has been consistent, being between 11 and 11.5 million tonnes each year. Despite robust passenger numbers post the economic downturn, increased efficiencies in the air-line industry have meant that less fuel has been needed.

3.28 The increase in diesel sales reflects in part the changing pattern of fuel consumption within the UK. The table below, derived from information provided by Ricardo-AEA, shows that the share of diesel being consumed by cars and taxis almost doubled between 1995 and 2014.

## Table 3B: Estimated consumption of road transport fuels by vehicle class

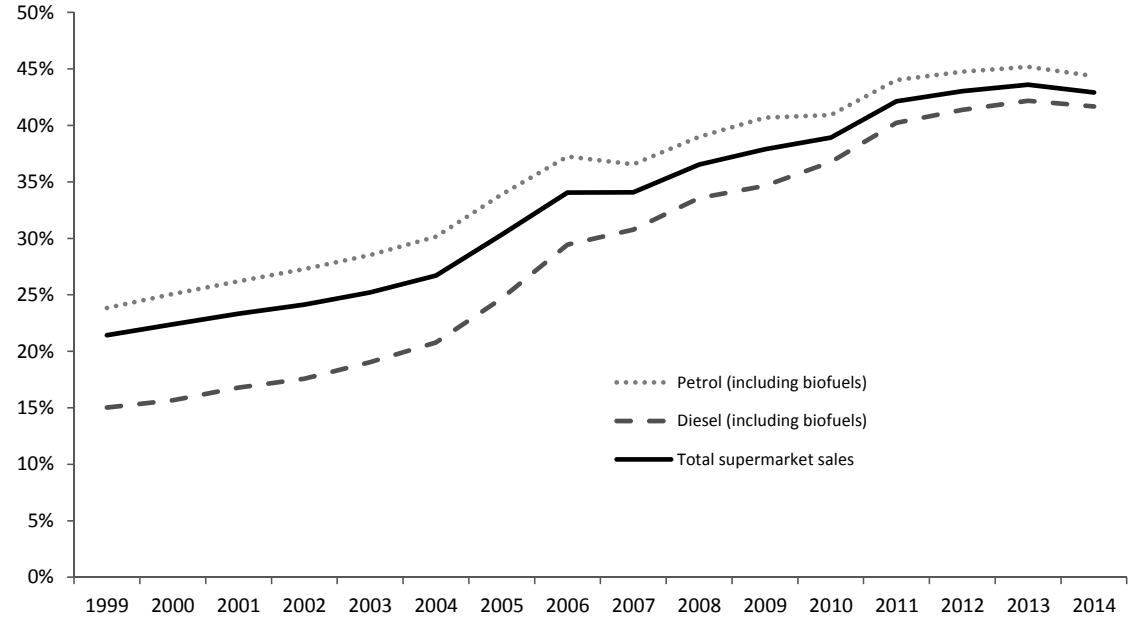
| | 1995 | 2000 | 2005 | 2010 | 2014 (e) |
|---|---|---|---|---|---|
| **Petrol:** | | | | | |
| Cars and taxis | 93% | 96% | 97% | 97% | 97% |
| Light goods vehicles | 7% | 3% | 2% | 2% | 2% |
| Motor cycles etc | 1% | 1% | 1% | 1% | 1% |
| **Diesel:** | | | | | |
| Cars and taxis | 19% | 25% | 31% | 35% | 37% |
| Light goods vehicles | 15% | 21% | 22% | 22% | 22% |
| Heavy goods vehicles | 58% | 46% | 39% | 36% | 35% |
| Buses and coaches | 8% | 8% | 8% | 7% | 6% |

Source: Ricardo-AEA. Percentages exclude off road use of diesel.

3.29 Table 3.6 provides details of the consumption of motor spirit, gas oil/diesel and fuel oils for the period 2010 to 2014. The table includes information on retail, supermarket and commercial sales of motor spirit and DERV that are of interest but cannot be accommodated within the commodity balances. The supermarket sales refer to Asda, Morrisons, Sainsbury's and Tesco only.

3.30 In 2014, the proportion of road fuels sold by supermarkets fell for the first time since this data was first recorded in 1999. However, supermarkets still possess a much greater market share than they did in 1999, accounting for 44 per cent of motor spirit sales and 42 per cent of DERV sales compared to 24 per cent and 15 per cent respectively.

## Chart 3.10: Percentage of road fuels sold by supermarkets 1999 to 2014




## Biofuels in transport

3.31 The quantity of biofuels blended into motor spirit and DERV are shown in Table 3.6 of this chapter. Total consumption of biofuels and road fuels are shown in Table 3C, this is based on the volume of fuel for which excise duty has been paid to HM Revenue and Customs (HMRC). As a percentage of road fuels, biofuels have increased significantly since 2003, and now represent 3.9 per cent of total road fuels; consumption had dipped in 2012 but in 2014 was higher than ever before. Further details on biofuel consumption can be found in Chapter 6, paragraphs 6.37 to 6.42. Biofuels are also included in the overall energy balances in Chapter 1.

## Table 3C: Consumption of Biodiesel and Bioethanol in the UK 2004 to 2014

Unit: Million litres

| Year | Biodiesel | All diesel including biodiesel | Biodiesel as % diesel share | Bioethanol | All petrol including bioethanol | Bioethanol as % petrol share | Biofuels as % of road fuels |
|---|---|---|---|---|---|---|---|
| **2004** | 21 | 22,181 | 0.1% | 0 | 27,025 | 0.0% | 0.0% |
| **2005** | 33 | 23,233 | 0.1% | 85 | 25,693 | 0.3% | 0.2% |
| **2006** | 169 | 24,286 | 0.7% | 95 | 24,724 | 0.4% | 0.5% |
| **2007** | 347 | 25,501 | 1.4% | 153 | 24,019 | 0.6% | 1.0% |
| **2008** | 886 | 25,686 | 3.4% | 206 | 22,709 | 0.9% | 2.3% |
| **2009** | 1,044 | 25,089 | 4.2% | 320 | 22,029 | 1.5% | 2.9% |
| **2010** | 1,049 | 25,773 | 4.1% | 631 | 20,650 | 3.1% | 3.6% |
| **2011** | 925 | 25,926 | 3.6% | 652 | 19,548 | 3.3% | 3.5% |
| **2012** | 634 | 26,348 | 2.4% | 775 | 18,792 | 4.1% | 3.1% |
| **2013** | 766 | 26,969 | 2.8% | 820 | 18,020 | 4.6% | 3.5% |
| **2014** | 954 | 27,985 | 3.4% | 812 | 17,674 | 4.6% | 3.9% |

*Source: HM Revenue and Customs*

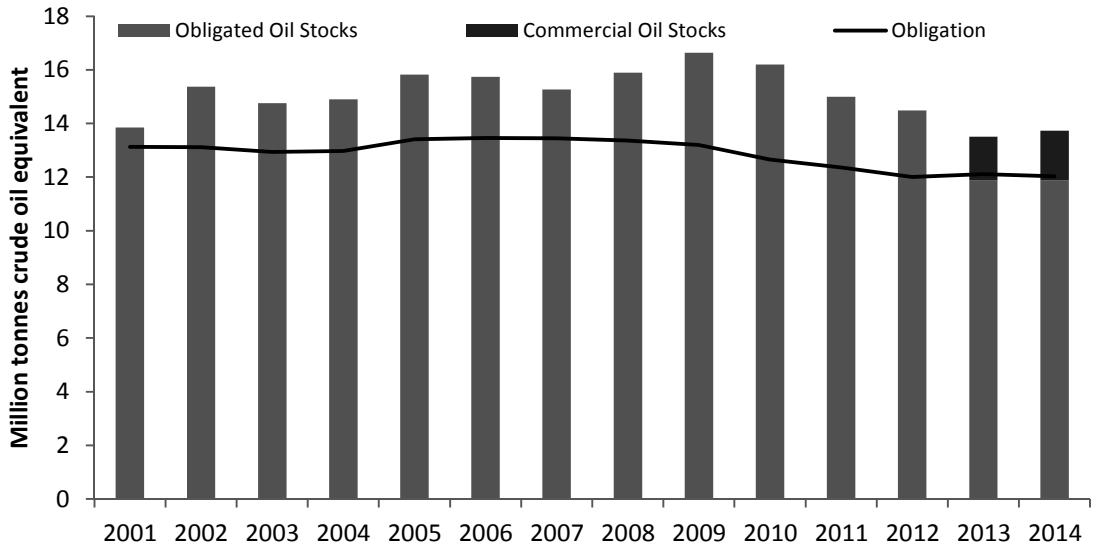
## Stocks of oil (Table 3.7)

3.32 Table 3.7 shows the stocks of oil held either in the UK or on behalf of the UK. Stocks of crude oil and the various downstream petroleum products (petrol, diesel and other similar products) were 0.9 per cent lower at the end of 2014 versus 2013. At the end of 2014, UK companies held stocks equal to around 77 days of normal consumption.

3.33 In addition to stocks held for commercial purposes by oil companies operating in the UK, the UK obliges significant suppliers into the oil market to hold stocks of oil to help reduce the adverse impact on the UK and global economy of any disruptions to supply. The UK is required to hold these stocks under an EU directive (based on days of consumption held) and IEA qualifying arrangements (based on days of net imports held).

3.34 Chart 3.11 shows the total stocks over time, split into those stocks that are reserved to meet the condition of the EU directive (obligated oil stocks) and those stocks that are held under normal commercial arrangements (commercial oil stocks). The chart also shows the obligation on the UK to hold stocks under the EU directive (currently equivalent to 61 days of consumption).

**Chart 3.11: UK Oil stocks 2001 to 2014**



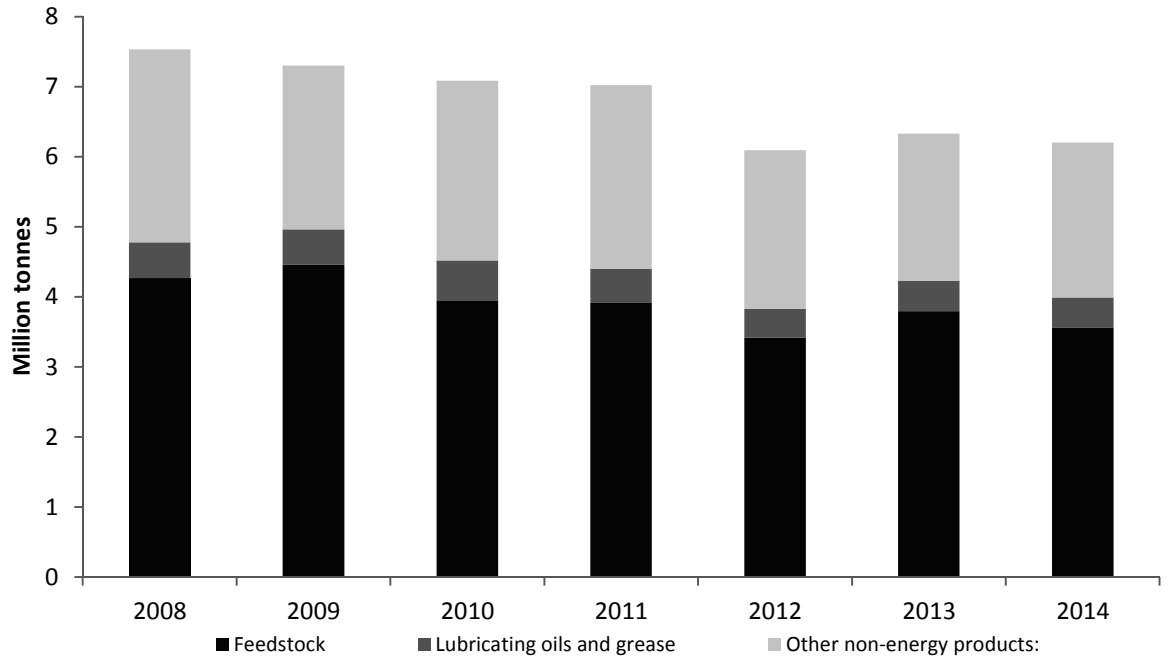

3.35 From 2013, following the introduction of a new EU directive on oil stocking, which was implemented at the end of 2012, commercial stocks can no longer be counted towards the EU's obligation. As a result, the UK's stocks are, on average, at around 60 days and marginally short of the EU's 61 day requirement. The UK is substantially above its requirement to the IEA (to hold 90 days of net imports), holding 196 days of net imports.

3.36 Further information on the method by which the UK obligates companies is described in www.gov.uk/government/uploads/system/uploads/attachment_data/file/401952/Guidance_for_Stakeholders_version_FEBRUARY_2015.pdf

## Inland deliveries for non-energy uses (Table 3.8)

3.37 Table 3.8 summarises additional data on the non–energy uses made of the total deliveries of oil products included as the bottom line in the commodity balances in Tables 3.2 to 3.4. It provides extra information on the uses of lubricating oils and greases by use, and details of products used as petro-chemical feedstocks. Chart 3.12 below shows the principal use of non-energy products since 2008.

**Chart 3.12: Use of non-energy products 2008 to 2014**




3.38 The principal products for non-energy use are gases used as feedstocks in petrochemical plants. Natural gas liquids used as feedstocks accounted for over 45 per cent of the fuel put to non-energy use in 2014. Bitumen for road surfacing (23 per cent of non-energy use) and naphtha (12 per cent) are the other most significant fuels.

## Technical notes and definitions

3.39 These notes and definitions are in addition to the technical notes and definitions covering all fuels and energy as a whole in Chapter 1.

### Sources of data

3.40 The majority of the data included in the text and tables of this chapter are derived from DECC's Downstream Oil Reporting System (DORS), which replaced the UK Petroleum Industry Association (UKPIA) reporting system in 2005. Data relating to the inland operations of the UK oil industry (i.e. information on the supply, refining and distribution of oil in the UK) are collected from companies. The data format and coverage have been designed to meet most of the needs of both Government and the industry itself. Each member of UKPIA and a number of other contributing companies provides returns on its refining activities and deliveries of various products to the internal UK market. This information is supplemented whenever necessary to allow for complete coverage within the statistics, with separate exercises carried out on special topics (for example, supermarket shares) or with the use of additional data (such as trade data from HM Revenue and Customs (HMRC) to cover import activity by non-reporting companies). In addition to these data sources, DECC make use of the Emissions data from the EU's Emissions Trading Scheme provided on major energy users. In particular ensuring the consistency of data published on fuel used within the refineries (refinery gases and petroleum coke) and the sectoral usage of Gas oil and Fuel oil.

3.41 For 2014's data, DECC introduced a new reporting form to major oil importers and these have led to revisions to some of the previous trade data with subsequent knock-on effects to consumption in 2014 which have been estimated backwards. The new form has indicated the need for more detailed surveys of large importers within the UK and from January 2015 all major importers are now obliged to complete the more detailed DORS form used by refiners.

3.42 DECC are working with industry throughout 2015 to implement the new survey. Whilst the survey will offer substantially greater insight (particularly with respect to trade and blending activities) these new data might require further revisions. Should that be the case we would anticipate documenting the methodology and the results of any significant change through an upcoming Energy Trend article.

### Statistical differences

3.43 In Tables 3.1 to 3.5, there are headings titled "statistical differences". These are differences between the separately observed figures for production and delivery of crude oil and products during the path of their movement from the point of production to the point of consumption.

3.44 The statistical differences headings listed in the primary oil commodity balances (Table 3.1) are differences between the separately observed and reported figures for production from onshore or offshore fields and supply to the UK market that cannot be accounted for by any specific factors. Primarily they result from inaccuracies in the meters at various points along offshore pipelines. These meters vary slightly in their accuracy within accepted tolerances, giving rise to both losses and gains when the volumes of oil flowing are measured. Errors may also occur when non-standard conditions are used to meter the oil flow.

3.45 The statistical difference for primary oils in the table includes own use in onshore terminals and gas separation plants, losses, platform and other field stock changes. Another factor is the time lag that can exist between production and loading onto tankers being reported at an offshore field and the arrival of these tankers at onshore refineries and oil terminals. This gap is usually minimal and works such that any effect of this at the start of a month is balanced by a similar counterpart effect at the end of a month. However, there can be instances where the length of this interval is considerable and, if it happens at the end of a year, there can be significant effects on the statistical differences seen for the years involved.

3.46 Another technical factor that can contribute to the statistical differences relates to the recording of quantities at the producing field (which is the input for the production data) and at oil terminals and refineries, since they are in effect measuring different types of oil. Terminals and refineries are able to measure a standardised, stabilised crude oil, that is, with its water content and content of Natural Gas Liquids (NGLs) at a standard level and with the amounts being measured at standard conditions. However, at the producing field they are dealing with a "live" crude oil that can have a varying level of water and NGLs within it. While offshore companies report live crude at field, the disposals from oil

terminals and offshore loading fields are reported as stabilised crude oil. This effectively assumes that terminal disposals are stabilised crude production figures. These changes were introduced in the 2002 edition of this Digest.

3.47 Part of the overall statistical difference may also be due to problems with the correct reporting of individual NGLs at the production site and at terminals and refineries. It is known that there is some mixing of condensate and other NGLs in with what might otherwise be stabilised crude oil before it enters the pipeline. This mixing occurs as it removes the need for separate pipeline systems for transporting the NGLs and it also allows the viscosity of the oil passing down the pipeline to be varied as necessary. While the quantity figures recorded by terminals are in terms of stabilised crude oil, with the NGL component removed, there may be situations where what is being reported does not comply with this requirement.

3.48 With the downstream sector, the statistical differences can similarly be used to assess the validity and consistency of the data. From the tables, these differences are generally a very small proportion of the totals involved.

3.49 Refinery data are collated from details of individual shipments received and made by each refinery and terminal operating company. Each year there are thousands of such shipments, which may be reported separately by two or three different companies involved in the movement. While intensive work is carried out to check these returns, it is possible that some double counting of receipts may occur.

3.50 Temperature, pressure and natural leakage also contribute to the statistical differences. In addition, small discrepancies can occur between the estimated calorific values used at the field and the more accurate values measured at the onshore terminal where data are shown on an energy basis. The statistical differences can also be affected by rounding, clerical errors or unrecorded losses, such as leakage. Other contributory factors are inaccuracies in the reporting of the amounts being disposed of to the various activities listed, including differences between the quantities reported as going to refineries and the actual amounts passing through refineries.

3.51 Similarly, the data under the statistical difference headings in Tables 3.2 to 3.4 are the differences between the deliveries of petroleum products to the inland UK market reported by the supplying companies and estimates for such deliveries. These estimates are calculated by taking the output of products reported by refineries and then adjusting it by the relevant factors (such as imports and exports of the products, changes in the levels of stocks etc.).

3.52 It may be thought that such differences should not exist as the data underlying both the observed deliveries into the UK market and the individual components of the estimates (i.e. production, imports, exports, stocks) come from the same source (the oil companies). While it is true that each oil company provides data on its own activities in each area, there are separate areas of operation within the companies that report their own part of the overall data. Table 3D below illustrates this.

## Table 3D Sources of data within oil companies

| Area covered | Source |
|---|---|
| Refinery production | Refinery |
| Imports and exports | Refinery, logistics departments, oil traders |
| Stocks | Refinery, crude and product terminals, major storage and distribution sites |
| Final deliveries | Sales, marketing and accounts departments |

3.53 Each individual reporting source will have direct knowledge of its own data. For example, refineries will know what they produce and how much leaves the refinery gate as part of routine monitoring of the refinery operations. Similarly other data such as sales to final consumers or imports and exports will be closely monitored. Companies will ensure that each component set of data reported is as accurate as possible but their reporting systems may not be integrated, meaning that internal consistency checks across all reported data cannot be made. Each part of a company may also work to different timings as well, which may further add to the degree of differences seen.

3.54 The main area where there is known to be a problem is with the “Transfers” heading in the commodity balances. The data reported under this heading have two components. Firstly, there is an allowance for reclassification of products within the refining process. For example, butane can be added to motor spirit to improve the octane rating, aviation turbine fuel could be reclassified as domestic kerosene if its quality deteriorates, and much of the fuel oil imported into the UK is further refined into other petroleum products. Issues can arise with product flows between different reporting companies, for example when company A delivers fuel oil to company B who report a receipt of a feedstock. Secondly, and in addition to these inter-product transfers, the data also include an allowance to cover the receipt of backflows of products from petrochemical plants that are often very closely integrated with refineries. A deduction for these backflows thus needs to be included under the "Transfers" heading so that calculated estimates reflect net output and are thus more comparable with the basis of the observed deliveries data.

3.55 There is scope for error in the recording of these two components of transfers. With inter-product transfers, the data are recorded within the refinery during the refining and blending processes where the usual units used to record the changes are volumes rather than masses. Different factors apply for each product when converting from a volume to mass basis, as shown by the conversion factors given in Annex A of this Digest. Thus, a balanced transfer in volume terms may not be equivalent when converted to a mass basis. This is thought to be the main source of error within the individual product balances.

3.56 With the backflows data, the scope for error results from the recording of observed deliveries data being derived from sales data on a "net" basis and will therefore exclude the element of backflows data as received at the refinery. For example, these could be seen simply as an input of fuel oils to be used as a feedstock, and thus recorded as an input without their precise nature being recorded – in effect a form of double-counting. This relationship between the petrochemical sector and refineries is thought to be one of the main sources of error in the overall oil commodity balances.

## Revisions to published data

3.57 Following consultation with industry, DECC have made a number of revisions to the statistics published here. The revisions affect data for 2008 through 2013 and the provisional data for 2014 previously published in Energy Trends.

3.58 Research conducted by DECC and industry through 2013 illustrated that refinery production of naphtha had been under-reported in recent years and a new reporting mechanism was agreed that has led to more accurate data in 2014. Using these new data as a basis, revisions have been made to both naphtha production and transfers into petrol for 2008 through to 2013. Consumption of motor spirit has not been affected by this change.

3.59 Refinery feedstocks produced from a small number of refineries have been reclassified as finished products as a result of discussions with the International Energy Agency and industry contacts. The changes have led to the amount of feedstock processed by refineries increasing from 2012 through 2014.

3.60 Following the introduction of new data collection templates in 2014, DECC have made revisions to the total amount of petroleum products imported. This has been possible with the provision of more detailed data by non-refining companies in 2014 and more detailed analysis of data in 2012 and 2013, giving a more accurate picture of imports and final consumption in the UK. The change in imports mostly affects middle distillate fuels.

3.61 Last year, there were major revisions to the non-energy use of several products in DUKES. This year, DECC carried out a more detailed analysis of the final destination of NGLs (propane, butane and condensate) which were previously recorded as ‘unknown’ on the upstream data collection system, PPRS. Research identified that some disposals that were previously assumed to be exported were being consumed the UK by a petrochemical plant for non-energy use.

## Indigenous production

3.62 The term indigenous is used throughout this chapter and includes oil from the UK Continental Shelf, both offshore and onshore.

## Deliveries

3.63 These are deliveries into consumption, as opposed to being estimates of actual consumption or use. They are split between inland deliveries and deliveries to marine bunkers. Inland deliveries will not necessarily be consumed in the UK (e.g. aviation fuels).

## Imports and exports

3.64 The information given under the headings "imports" and "exports" in this chapter are the figures recorded by importers and exporters of oil. They can differ in some cases from the import and export figures provided by HMRC that are given in Annex G on DECC's energy statistics website. Such differences arise from timing differences between actual and declared movements but also result from the Customs figures including re-exports. These are products that may have originally entered the UK as imports from another country and been stored in the UK prior to being exported back out of the UK, as opposed to having been actually produced in the UK.

3.65 We are currently undertaking a review of trade data which could result in changes to these data.

## Marine bunkers

3.66 This covers deliveries to be used by ocean going and coastal vessels under international bunker contracts. Other deliveries to fishing, coastal and inland vessels are excluded. As part of DECC's audit programme, UK refinery contacts reviewed the provision of fuel to marine bunkers in 2009. Whilst a number of companies have reviewed their methodology there are still issues with determining the final destination of fuel when these are supplied to third parties that are not part of DECC's monitoring programme. This issue impacts on both the volumes delivered directly to marine vessels, and whether those vessels are engaged in domestic or international navigation.

3.67 Whilst DECC will continue to work closely with reporting companies to improve the estimation of marine fuel use. We have aligned energy demand for shipping in line with the estimates of marine fuel use in the UK's National Atmospheric Emissions Inventory (NAEI). The NAEI figures use DECC's estimate of marine fuels and derive the split between international and domestic use based on an activity based study of the UK's marine fuel use.

## Crude and process oils

3.68 These are all feedstocks, other than distillation benzene, for refining at refinery plants. Gasoline feedstock is any process oil whether clean or dirty which is used as a refinery feedstock for the manufacture of gasoline or naphtha. Other refinery feedstock is any process oil used for the manufacture of any other petroleum products.

## Refineries

3.69 Refineries distil crude and process oils to obtain petroleum products. This excludes petrochemical plants, plants only engaged in re-distilling products to obtain better grades, crude oil stabilisation plants and gas separation plants.

## Products used as fuel (energy use)

3.70 The following paragraphs define the product headings used in the text and tables of this chapter. The products are used for energy, either directly as a fuel or as an input into electricity generation.

**Refinery fuel** - Petroleum products used as fuel at refineries.

**Ethane** - A naturally gaseous straight-chain hydrocarbon (C2H6) in natural gas and refinery gas streams. Primarily used, or intended to be used, as a chemical feedstock.

**Propane** - Hydrocarbon containing three carbon atoms (C3H8), gaseous at normal temperature but generally stored and transported under pressure as a liquid. Used mainly for industrial purposes but also as transport Liquid Petroleum Gas (LPG), and some domestic heating and cooking.

**Butane** - Hydrocarbon containing four carbon atoms (C4H10), otherwise as for propane. Additionally used as a constituent of motor spirit to increase vapour pressure and as a chemical feedstock.

**Naphtha** (Light distillate feedstock) - Petroleum distillate boiling predominantly below 200°C.

**Aviation spirit** - All light hydrocarbon oils intended for use in aviation piston-engine power units, including bench testing of aircraft engines.

**Motor spirit** - Blended light petroleum components used as fuel for spark-ignition internal-combustion engines other than aircraft engines:

(i) Premium unleaded grade - all finished motor spirit, with an octane number (research method) not less than 95.

(ii) Lead Replacement petrol / Super premium unleaded grade - finished motor spirit, with an octane number (research method) not less than 97.

**Aviation turbine fuel** (ATF) - All other turbine fuel intended for use in aviation gas-turbine power units and including bench testing of aircraft engines.

**Burning oil** (kerosene or "paraffin") - Refined petroleum fuel, intermediate in volatility between motor spirit and gas oil, used primarily for heating. White spirit and kerosene used for lubricant blends are excluded.

**Gas/diesel oil** - Petroleum fuel having a distillation range immediately between kerosene and light-lubricating oil:

(i) **DERV (Diesel Engined Road Vehicle) fuel** - automotive diesel fuel for use in high speed, compression ignition engines in vehicles subject to Vehicle Excise Duty.

(ii) **Gas oil** - used as a burner fuel in heating installations, for industrial gas turbines and as for DERV (but in vehicles not subject to Vehicle Excise Duty e.g. agricultural vehicles, fishing vessels, construction equipment used off road and usually coloured with a red marker dye). Gas oil used for oil and gas extraction is included from 2005 onwards.

(iii) **Marine diesel oil** - heavier type of gas oil suitable for heavy industrial and marine compression-ignition engines.

**Fuel oil** - Heavy petroleum residue blends used in atomising burners and for heavy-duty marine engines (marine bunkers, etc.) with heavier grades requiring pre-heating before combustion. Excludes fuel oil for grease making or lubricating oil and fuel oil sold as such for road making.

## Products not used as fuel (non-energy use)

3.71 The following paragraphs define the product headings used in the text and tables of this chapter, which are used for non-energy purposes.

**Feedstock for petroleum chemical plants** - All petroleum products intended for use in the manufacture of petroleum chemicals. This includes middle distillate feedstock of which there are several grades depending on viscosity. The boiling point ranges between 200°C and 400°C. (A deduction has been made from these figures equal to the quantity of feedstock used in making the conventional petroleum products that are produced during the processing of the feedstock. The output and deliveries of these conventional petroleum products are included elsewhere as appropriate.)

**White spirit and specific boiling point (SBP) spirits** - These are refined distillate intermediates with a distillation in the naphtha / kerosene range. **White spirit** has a boiling range of about 150°C to 200°C and is used as a paint or commercial solvent. **SBP spirit** is also known as **Industrial**

**spirit** and has a wider boiling range that varies up to 200°C dependent upon its eventual use. It has a variety of uses that vary from use in seed extraction, rubber solvents and perfume.

**Lubricating oils** (and grease) - Refined heavy distillates obtained from the vacuum distillation of petroleum residues. Includes liquid and solid hydrocarbons sold by the lubricating oil trade, either alone or blended with fixed oils, metallic soaps and other organic and/or inorganic bodies. A certain percentage of inland deliveries are re-used as a fuel, but all inland deliveries of lubricating oils have been classified as non-energy use only. Some deliveries are used for energy purposes, but it is difficult to estimate energy use figures with any degree of accuracy, hence no such estimates appear in the commodity balance tables. DUKES Table 3.8 (prior to 2010, table 3D, within the main text) provides limited information on the use of lubricants and grease. The information which was published under the heading of "Motors" has been amended to now include "Gear Oils and Transmission" to give a full picture of the lubricants used by vehicles.

**Bitumen** - The residue left after the production of lubricating oil distillates and vacuum gas oil for upgrading plant feedstock. Used mainly for road making and building construction purposes. Includes other petroleum products such as creosote and tar mixed with bitumen for these purposes and fuel oil sold specifically for road making.

**Petroleum wax** - Includes paraffin wax, which is a white crystalline hydrocarbon material of low oil content normally obtained during the refining of lubricating oil distillate, paraffin scale, slack wax, microcrystalline wax and wax emulsions. Used for candle manufacture, polishes, food containers, wrappings etc.

**Petroleum cokes** - Carbonaceous material derived from hydrocarbon oils, uses for which include metallurgical electrode manufacture. Quantities of imports of this product are used as a fuel as it has a higher energy content than coal, though a lower energy content than fuel oils.

**Miscellaneous products** - Includes aromatic extracts, defoament solvents and other minor miscellaneous products.

## Main classes of consumer

3.72 The following are definitions of the main groupings of users of petroleum products used in the text and tables of this chapter.

**Electricity generators** - Petroleum products delivered for use by major power producers and other companies for electricity generation including those deliveries to the other industries listed below which are used for autogeneration of electricity (Tables 3.2 to 3.4). This includes petroleum products used to generate electricity at oil refineries and is recorded in the Transformation section, as opposed to other uses of refinery fuels that are recorded in the Energy Industry Use section. From the 2009 chapter of the Digest, data in Chapter 3 (Table 3.2 to 3.4) has been aligned with Chapter 5 (Table 5.4). The data on oil used for electricity generation collected from major power producers and autogenerators is judged to be at least as accurate as the data from refiners on deliveries, and has the advantage of consistency. These data have been revised back to 2005.

**Agriculture -** Deliveries of fuel oil and gas oil/diesel for use in agricultural power units, dryers and heaters. Burning oil for farm use.

**Iron and steel -** Deliveries of petroleum products to steel works and iron foundries. This is now based on information from the Iron and Steel Statistics Bureau.

**Other industries** - The industries covered correspond to the industrial groups shown in Table 1G of Chapter 1, excluding Iron and Steel.

**National navigation -** Fuel oil and gas/diesel oil delivered, other than under international bunker contracts, for fishing vessels, UK oil and gas exploration and production, coastal and inland shipping and for use in ports and harbours.

**Railways** - Deliveries of fuel oil, gas/diesel oil and burning oil to railways now based on estimates produced by AEA Energy and Environment as part of their work to compile the UK National

Atmospheric Emissions Inventory (NAEI).

**Air transport** - Total inland deliveries of aviation turbine fuel and aviation spirit. The figures cover deliveries of aviation fuels in the UK to international and other airlines, British and foreign Governments (including armed services) and for private flying. In order to compile the NAEI, AEA Energy and Environment need to estimate how aviation fuel usage splits between domestic and international consumption. Information from AEA Energy and Environment suggests that virtually all aviation spirit is used domestically while just 5 per cent of aviation turbine fuel use is for domestic consumption. A further 5 per cent is estimated to be consumed by the military.

**Road transport** - Deliveries of motor spirit and DERV fuel for use in road vehicles of all kinds.

**Domestic -** Fuel oil and gas oil delivered for central heating of private houses and other dwellings and deliveries of kerosene (burning oil) and liquefied petroleum gases for domestic purposes (see Tables 3.2 to 3.4).

**Public services** - Deliveries to national and local Government premises (including educational, medical and welfare establishments and British and foreign armed forces) of fuel oil and gas oil for central heating and of kerosene (burning oil).

**Miscellaneous** - Deliveries of fuel oil and gas oil for central heating in premises other than those classified as domestic or public.

## Monthly and quarterly data

3.73 Monthly or quarterly aggregate data for certain series presented in this chapter are available. This information can be obtained free of charge by following the links given in the Energy Statistics section of the DECC website on GOV.UK at: www.gov.uk/government/organisations/department-of-energy-climate-change/about/statistics.

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# 3.1 Commodity balances 2012 - 2014[1]

Primary oil

Thousand tonnes

| | Crude oil | Ethane | Propane | Butane | Condensate | Total NGL | Feedstock | Total primary oil |
|---|---|---|---|---|---|---|---|---|
| **2012** | | | | | | | | |
| **Supply** | | | | | | | | |
| Production | 42,052 | 422 | 759 | 566 | 761 | 2,508 | - | 44,561 |
| Imports | 53,763 | 367 | 463 | 307 | 440 | 1,577 | 5,135r | 60,476 |
| Exports | -28,535 | -6 | -648r | -302r | -336r | -1,291r | -1,120r | -30,946r |
| Stock change (2) | -587 | .. | .. | .. | .. | -40 | +141 | -486 |
| Transfers (3) | - | -783 | -535r | -293r | -372r | -1,982r | +120r | -1,862r |
| **Total supply** | **66,694** | .. | .. | .. | .. | **772r** | **4,276r** | **71,741r** |
| Statistical difference (4)(5) | -117 | .. | .. | .. | .. | +22r | -2 | -98 |
| **Total demand (5)** | **66,811** | .. | .. | .. | .. | **750** | **4,278r** | **71,839r** |
| Transformation (Petroleum refineries) | 66,811 | .. | .. | .. | .. | 750 | 4,278r | 71,839r |
| Energy industry use | - | - | - | - | - | - | - | - |
| **2013** | | | | | | | | |
| **Supply** | | | | | | | | |
| Production | 38,456 | 341 | 683 | 542 | 624 | 2,190 | - | 40,646 |
| Imports | 50,311 | 515 | 582 | 396 | 666 | 2,158 | 6,667 | 59,137 |
| Exports | -30,376 | -14 | -563r | -384r | -333 | -1,293r | -1,436r | -33,105r |
| Stock change (2) | +615 | .. | .. | .. | .. | +19 | +90 | +724 |
| Transfers (3) | - | -843 | -680r | -327r | -371 | -2,221r | +463 | -1,758r |
| **Total supply** | **59,007** | .. | .. | .. | .. | **853** | **5,784r** | **65,644r** |
| Statistical difference (4)(5) | -20 | .. | .. | .. | .. | -16 | -8 | -44 |
| **Total demand (5)** | **59,026** | .. | .. | .. | .. | **870** | **5,791r** | **65,687r** |
| Transformation (Petroleum refineries) | 59,026 | .. | .. | .. | .. | 870 | 5,791r | 65,687r |
| Energy industry use | - | - | - | - | - | - | - | - |
| **2014** | | | | | | | | |
| **Supply** | | | | | | | | |
| Production | 37,474 | 384 | 789 | 605 | 675 | 2,453 | - | 39,928 |
| Imports | 46,570 | 584 | 582 | 418 | 736 | 2,320 | 4,907 | 53,798 |
| Exports | -28,204 | -14 | -769 | -505 | -395 | -1,683 | -1,060 | -30,946 |
| Stock change (2) | -497 | .. | .. | .. | .. | -26 | -69 | -592 |
| Transfers (3) | - | -944 | -576 | -317 | -340 | -2,177 | +817 | -1,361 |
| **Total supply** | **55,342** | .. | .. | .. | .. | **888** | **4,596** | **60,826** |
| Statistical difference (4)(5) | - | .. | .. | .. | .. | +1 | +2 | +3 |
| **Total demand (5)** | **55,342** | .. | .. | .. | .. | **887** | **4,594** | **60,823** |
| Transformation (Petroleum refineries) | 55,342 | .. | .. | .. | .. | 887 | 4,594 | 60,823 |
| Energy industry use | - | - | - | - | - | - | - | - |

*(1) As there is no use made of primary oils and feedstocks by industries other than the oil and gas extraction and petroleum refining industries, other industry headings have not been included in this table. As such, this table is a summary of the activity of what is known as the Upstream oil industry.*

*(2) Stock fall (+), stock rise (-).*

*(3) Transfers direct from the source to the petrochemical sector.*

*(4) Total supply minus total demand.*

*(5) Figures for total demand for the individual NGLs (and thus for the statistical differences as well) are not available.*

# 3.2 Commodity balances 2014

Petroleum products

Thousand tonnes

| | Ethane | Propane | Butane | Other gases | Naphtha | Aviation spirit | Motor spirit | White Spirit & SBP | Aviation turbine fuel |
|---|---|---|---|---|---|---|---|---|---|
| **Supply** | | | | | | | | | |
| Production | - | 1,382 | 723 | 2,211 | 2,290 | - | 15,709 | 165 | 4,635 |
| Other sources | 944 | 576 | 317 | - | 340 | - | - | - | - |
| Imports | - | 295 | 127 | - | 733 | 17 | 3,482 | 46 | 8,157 |
| Exports | - | -392 | -506 | - | -585 | - | -8,683 | -80 | -1,072 |
| Marine bunkers | - | - | - | - | - | - | - | - | - |
| Stock change *(2)* | - | -27 | -3 | -0 | -14 | 2 | 113 | -5 | 123 |
| Transfers | - | -2 | 0 | 24 | -1,952 | -0 | 1,610 | -0 | -642 |
| **Total supply** | **944** | **1,833** | **657** | **2,235** | **811** | **18** | **12,232** | **125** | **11,201** |
| **Statistical difference *(3)*** | **-** | **-4** | **-13** | **2** | **10** | **0** | **-94** | **-1** | **-19** |
| **Total demand** | **944** | **1,837** | **670** | **2,233** | **802** | **18** | **12,326** | **126** | **11,220** |
| **Transformation** | **-** | **11** | **-** | **214** | **-** | **-** | **-** | **-** | **-** |
| Electricity generation | - | - | - | 214 | - | - | - | - | - |
| Major power producers | - | - | - | - | - | - | - | - | - |
| Autogenerators | - | - | - | 214 | - | - | - | - | - |
| Heat generation | - | 11 | - | - | - | - | - | - | - |
| Petroleum refineries | - | - | - | - | - | - | - | - | - |
| Coke manufacture | - | - | - | - | - | - | - | - | - |
| Blast furnaces | - | - | - | - | - | - | - | - | - |
| Patent fuel manufacture | - | - | - | - | - | - | - | - | - |
| Other | - | - | - | - | - | - | - | - | - |
| **Energy industry use** | **-** | **-** | **-** | **1,907** | **-** | **-** | **-** | **-** | **-** |
| Electricity generation | - | - | - | - | - | - | - | - | - |
| Oil & gas extraction | - | - | - | - | - | - | - | - | - |
| Petroleum refineries | - | - | - | 1,907 | - | - | - | - | - |
| Coal extraction | - | - | - | - | - | - | - | - | - |
| Coke manufacture | - | - | - | - | - | - | - | - | - |
| Blast furnaces | - | - | - | - | - | - | - | - | - |
| Patent fuel manufacture | - | - | - | - | - | - | - | - | - |
| Pumped storage | - | - | - | - | - | - | - | - | - |
| Other | - | - | - | - | - | - | - | - | - |
| **Losses** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **-** |
| **Final consumption** | **944** | **1,826** | **670** | **112** | **802** | **18** | **12,326** | **126** | **11,220** |
| **Industry** | **-** | **321** | **34** | **-** | **38** | **-** | **-** | **-** | **-** |
| Unclassified | - | 318 | 34 | - | 38 | - | - | - | - |
| Iron & steel | - | 3 | - | - | - | - | - | - | - |
| Non-ferrous metals | - | - | - | - | - | - | - | - | - |
| Mineral products | - | - | - | - | - | - | - | - | - |
| Chemicals | - | - | - | - | - | - | - | - | - |
| Mechanical engineering, etc | - | - | - | - | - | - | - | - | - |
| Electrical engineering, etc | - | - | - | - | - | - | - | - | - |
| Vehicles | - | - | - | - | - | - | - | - | - |
| Food, beverages, etc | - | - | - | - | - | - | - | - | - |
| Textiles, leather, etc | - | - | - | - | - | - | - | - | - |
| Paper, printing etc | - | - | - | - | - | - | - | - | - |
| Other industries | - | - | - | - | - | - | - | - | - |
| Construction | - | - | - | - | - | - | - | - | - |
| **Transport** | **-** | **88** | **-** | **-** | **-** | **18** | **12,326** | **-** | **11,220** |
| Air | - | - | - | - | - | 18 | - | - | 11,220 |
| Rail | - | - | - | - | - | - | - | - | - |
| Road | - | 88 | - | - | - | - | 12,326 | - | - |
| National navigation | - | - | - | - | - | - | - | - | - |
| Pipelines | - | - | - | - | - | - | - | - | - |
| **Other** | **-** | **297** | **19** | **-** | **-** | **-** | **-** | **-** | **-** |
| Domestic | - | 212 | 19 | - | - | - | - | - | - |
| Public administration | - | - | - | - | - | - | - | - | - |
| Commercial | - | - | - | - | - | - | - | - | - |
| Agriculture | - | 85 | 0 | - | - | - | - | - | - |
| Miscellaneous | - | - | - | - | - | - | - | - | - |
| **Non energy use *(4)*** | **944** | **1,120** | **617** | **112** | **763** | **-** | **-** | **126** | **-** |

*(1) Includes marine diesel oil.*
*(2) Stock fall (+), stock rise (-).*
*(3) Total supply minus total demand.*
*(4) For further details on non-energy usage see paragraphs 3.38 and 3.39.*

# 3.2 Commodity balances 2014 (continued)

Petroleum products

Thousand tonnes

| Burning oil | DERV | Gas Oil [1] | Fuel oils | Lubri -cants | Bitu -men | Petroleum coke | Misc. products | Total Products | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | **Supply** |
| 2,093 | 13,726 | 8,049 | 5,409 | 373 | 1,006 | 1,745 | 783 | 60,300 | Production |
| - | - | - | - | - | - | - | - | 2,177 | Other sources |
| 619 | 11,460 | 1,423 | 1,004 | 386 | 465 | 537 | 306 | 29,055 | Imports |
| -164 | -1,942 | -3,463 | -4,148 | -337 | -62 | -567 | -746 | -22,748 | Exports |
| - | - | -1,280 | -1,059 | - | - | - | - | -2,340 | Marine bunkers |
| -15 | -61 | 24 | 107 | 29 | 18 | 16 | -13 | 292 | Stock change *(2)* |
| 621 | -509 | 489 | -616 | -20 | -18 | - | 199 | -817 | Transfers |
| **3,154** | **22,674** | **5,241** | **696** | **430** | **1,409** | **1,730** | **528** | **65,920** | **Total supply** |
| **-26** | **-1** | **-0** | **-32** | **-6** | **-1** | **-** | **2** | **-180** | **Statistical difference *(3)*** |
| **3,179** | **22,675** | **5,241** | **728** | **436** | **1,410** | **1,730** | **526** | **66,100** | **Total demand** |
| **-** | **-** | **114** | **200** | **-** | **-** | **91** | **-** | **630** | **Transformation** |
| - | - | 109 | 147 | - | - | - | - | 471 | Electricity generation |
| - | - | 46 | 122 | - | - | - | - | 168 | Major power producers |
| - | - | 63 | 25 | - | - | - | - | 303 | Autogenerators |
| - | - | 5 | 52 | - | - | - | - | 68 | Heat generation |
| - | - | - | - | - | - | - | - | - | Petroleum refineries |
| - | - | - | - | - | - | - | - | - | Coke manufacture |
| - | - | - | - | - | - | - | - | - | Blast furnaces |
| - | - | - | - | - | - | 91 | - | 91 | Patent fuel manufacture |
| - | - | - | - | - | - | - | - | - | Other |
| **-** | **-** | **647** | **174** | **-** | **-** | **1,164** | **-** | **3,892** | **Energy industry use** |
| - | - | - | - | - | - | - | - | - | Electricity generation |
| - | - | 647 | - | - | - | - | - | 647 | Oil & gas extraction |
| - | - | - | 174 | - | - | 1,164 | - | 3,245 | Petroleum refineries |
| - | - | - | - | - | - | - | - | - | Coal extraction |
| - | - | - | - | - | - | - | - | - | Coke manufacture |
| - | - | - | - | - | - | - | - | - | Blast furnaces |
| - | - | - | - | - | - | - | - | - | Patent fuel manufacture |
| - | - | - | - | - | - | - | - | - | Pumped storage |
| - | - | - | - | - | - | - | - | - | Other |
| **-** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **Losses** |
| **3,179** | **22,675** | **4,480** | **355** | **436** | **1,410** | **475** | **526** | **61,578** | **Final Consumption** |
| **1,270** | **-** | **1,873** | **171** | **-** | **-** | **326** | **-** | **4,033** | **Industry** |
| 1,246 | - | 1,116 | 53 | - | - | 326 | - | 3,130 | Unclassified |
| - | - | 0 | 4 | - | - | - | - | 7 | Iron & steel |
| - | - | - | 0 | - | - | - | - | 0 | Non-ferrous metals |
| - | - | 179 | 6 | - | - | - | - | 184 | Mineral products |
| - | - | 92 | 24 | - | - | - | - | 116 | Chemicals |
| - | - | - | - | - | - | - | - | - | Mechanical engineering etc |
| - | - | 1 | - | - | - | - | - | 1 | Electrical engineering etc |
| 24 | - | 163 | 5 | - | - | - | - | 193 | Vehicles |
| - | - | 33 | 73 | - | - | - | - | 106 | Food, beverages etc |
| - | - | 49 | - | - | - | - | - | 49 | Textiles, leather, etc |
| - | - | 33 | - | - | - | - | - | 33 | Paper, printing etc |
| - | - | 36 | - | - | - | - | - | 36 | Other industries |
| - | - | 172 | 6 | - | - | - | - | 177 | Construction |
| **-** | **22,675** | **1,234** | **87** | **-** | **-** | **-** | **-** | **47,648** | **Transport** |
| - | - | - | - | - | - | - | - | 11,238 | Air |
| - | - | 607 | - | - | - | - | - | 607 | Rail |
| - | 22,675 | - | - | - | - | - | - | 35,089 | Road |
| - | - | 627 | 87 | - | - | - | - | 714 | National navigation |
| - | - | - | - | - | - | - | | - | Pipelines |
| **1,909** | **-** | **1,357** | **96** | **-** | **-** | **-** | **-** | **3,678** | **Other** |
| 1,909 | - | 159 | - | - | - | - | - | 2,299 | Domestic |
| - | - | 307 | 26 | - | - | - | - | 333 | Public administration |
| - | - | 384 | 52 | - | - | - | - | 436 | Commercial |
| - | - | 242 | 5 | - | - | - | - | 332 | Agriculture |
| - | - | 265 | 13 | - | - | - | - | 278 | Miscellaneous |
| **-** | **-** | **17** | **1** | **436** | **1,410** | **149** | **526** | **6,220** | **Non energy use *(4)*** |

# 3.3 Commodity balances 2013

## Petroleum products

Thousand tonnes

| | Ethane | Propane | Butane | Other gases | Naphtha | Aviation spirit | Motor spirit | White Spirit & SBP | Aviation turbine fuel |
|---|---|---|---|---|---|---|---|---|---|
| **Supply** | | | | | | | | | |
| Production | - | 1,474 | 852 | 2,454 | 2,013r | - | 17,691r | 106 | 4,527 |
| Other sources | 843 | 680r | 327r | - | 371 | - | - | - | - |
| Imports | - | 326r | 105 | - | 1,000r | 15 | 4,442r | 219 | 8,219r |
| Exports | - | -597 | -568 | - | -738 | - | -10,809r | -49 | -970 |
| Marine bunkers | - | - | - | - | - | - | - | - | - |
| Stock change *(2)* | - | 14 | -3 | 0 | 93 | 1 | -356 | -10 | -20 |
| Transfers | - | - | - | 23 | -1,727r | -0 | 1,606r | 12 | -519r |
| **Total supply** | **843** | **1,897r** | **712r** | **2,477** | **1,011r** | **16** | **12,575r** | **278** | **11,238r** |
| **Statistical difference *(3)*** | **3** | **-3r** | **3r** | **0** | **-1r** | **0** | **1r** | **-1** | **-4r** |
| **Total demand** | **840r** | **1,900r** | **709r** | **2,477** | **1,012r** | **16** | **12,574** | **279** | **11,242r** |
| **Transformation** | **-** | **7** | **-** | **222r** | **-** | **-** | **-** | **-** | **-** |
| Electricity generation | - | - | - | 222r | - | - | - | - | - |
| Major power producers | - | - | - | - | - | - | - | - | - |
| Autogenerators | - | - | - | 222r | - | - | - | - | - |
| Heat generation | - | 7 | - | - | - | - | - | - | - |
| Petroleum refineries | - | - | - | - | - | - | - | - | - |
| Coke manufacture | - | - | - | - | - | - | - | - | - |
| Blast furnaces | - | - | - | - | - | - | - | - | - |
| Patent fuel manufacture | - | - | - | - | - | - | - | - | - |
| Other | - | - | - | - | - | - | - | - | - |
| **Energy industry use** | **-** | **-** | **-** | **2,112r** | **-** | **-** | **-** | **-** | **-** |
| Electricity generation | - | - | - | - | - | - | - | - | - |
| Oil & gas extraction | - | - | - | - | - | - | - | - | - |
| Petroleum refineries | - | - | - | 2,112r | - | - | - | - | - |
| Coal extraction | - | - | - | - | - | - | - | - | - |
| Coke manufacture | - | - | - | - | - | - | - | - | - |
| Blast furnaces | - | - | - | - | - | - | - | - | - |
| Patent fuel manufacture | - | - | - | - | - | - | - | - | - |
| Pumped storage | - | - | - | - | - | - | - | - | - |
| Other | - | - | - | - | - | - | - | - | - |
| **Losses** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **-** |
| **Final consumption** | **840r** | **1,894r** | **709r** | **143** | **1,012r** | **16** | **12,574** | **279** | **11,242r** |
| **Industry** | **-** | **204r** | **-** | **-** | **103r** | **-** | **-** | **-** | **-** |
| Unclassified | - | 203r | - | - | 103r | - | - | - | - |
| Iron & steel | - | 1 | - | - | - | - | - | - | - |
| Non-ferrous metals | - | - | - | - | - | - | - | - | - |
| Mineral products | - | - | - | - | - | - | - | - | - |
| Chemicals | - | - | - | - | - | - | - | - | - |
| Mechanical engineering, etc | - | - | - | - | - | - | - | - | - |
| Electrical engineering, etc | - | - | - | - | - | - | - | - | - |
| Vehicles | - | - | - | - | - | - | - | - | - |
| Food, beverages, etc | - | - | - | - | - | - | - | - | - |
| Textiles, leather, etc | - | - | - | - | - | - | - | - | - |
| Paper, printing etc | - | - | - | - | - | - | - | - | - |
| Other industries | - | - | - | - | - | - | - | - | - |
| Construction | - | - | - | - | - | - | - | - | - |
| **Transport** | **-** | **94** | **-** | **-** | **-** | **16** | **12,574** | **-** | **11,242r** |
| Air | - | - | - | - | - | 16 | - | - | 11,242r |
| Rail | - | - | - | - | - | - | - | - | - |
| Road | - | 94 | - | - | - | - | 12,574 | - | - |
| National navigation | - | - | - | - | - | - | - | - | - |
| Pipelines | - | - | - | - | - | - | - | - | - |
| **Other** | **-** | **374** | **28** | **-** | **-** | **-** | **-** | **-** | **-** |
| Domestic | - | 272 | 28 | - | - | - | - | - | - |
| Public administration | - | - | - | - | - | - | - | - | - |
| Commercial | - | - | - | - | - | - | - | - | - |
| Agriculture | - | 102 | 0 | - | - | - | - | - | - |
| Miscellaneous | - | - | - | - | - | - | - | - | - |
| **Non energy use *(4)*** | **840r** | **1,221r** | **681r** | **143** | **909r** | **-** | **-** | **279** | **-** |

*(1) Includes marine diesel oil.*
*(2) Stock fall (+), stock rise (-).*
*(3) Total supply minus total demand.*
*(4) For further details on non-energy usage see paragraphs 3.38 and 3.39.*

# 3.3 Commodity balances 2013 (continued)

Petroleum products

Thousand tonnes

| Burning oil | DERV | Gas Oil [1] | Fuel oils | Lubri -cants | Bitu -men | Petroleum coke | Misc. products | Total Products | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | **Supply** |
| 2,705 | 14,831 | 8,193 | 6,574r | 387r | 777 | 1,773 | 1,017 | 65,375r | Production |
| - | - | - | - | - | - | - | - | 2,221r | Other sources |
| 678r | 10,115r | 1,208r | 620r | 411r | 648 | 577r | 187 | 28,769r | Imports |
| -381 | -2,843 | -3,310r | -4,677r | -395 | -75 | -578 | -919 | -26,910r | Exports |
| - | - | -1,248 | -1,292 | - | - | - | - | -2,540 | Marine bunkers |
| 52 | 46r | 91 | 93 | 47 | -1 | 78 | -19 | 106 | Stock change *(2)* |
| 447r | -253r | 250 | -401 | -22 | 13 | - | 107 | -463 | Transfers |
| **3,501r** | **21,896r** | **5,185r** | **916r** | **428r** | **1,361** | **1,850r** | **373** | **66,559r** | **Total supply** |
| **-6r** | **-30r** | **11r** | **5r** | **-9r** | **2** | **-0** | **-42r** | **-69r** | **Statistical difference *(3)*** |
| **3,507r** | **21,926** | **5,174r** | **911r** | **437r** | **1,358** | **1,851r** | **416r** | **66,628r** | **Total demand** |
| **-** | **-** | **93r** | **237r** | **-** | **-** | **162** | **-** | **722r** | **Transformation** |
| - | - | 88r | 185r | - | - | 51 | - | 546r | Electricity generation |
| - | - | 30r | 156r | - | - | 51 | - | 237r | Major power producers |
| - | - | 58 | 29r | - | - | - | - | 309r | Autogenerators |
| - | - | 5 | 53 | - | - | - | - | 65 | Heat generation |
| - | - | - | - | - | - | - | - | - | Petroleum refineries |
| - | - | - | - | - | - | - | - | - | Coke manufacture |
| - | - | - | - | - | - | - | - | - | Blast furnaces |
| - | - | - | - | - | - | 111 | - | 111 | Patent fuel manufacture |
| - | - | - | - | - | - | - | - | - | Other |
| **-** | **-** | **619** | **344r** | **-** | **-** | **1,245** | **58** | **4,378r** | **Energy industry use** |
| - | - | - | - | - | - | - | - | - | Electricity generation |
| - | - | 619 | - | - | - | - | - | 619 | Oil & gas extraction |
| - | - | - | 344r | - | - | 1,245 | 58 | 3,759r | Petroleum refineries |
| - | - | - | - | - | - | - | - | - | Coal extraction |
| - | - | - | - | - | - | - | - | - | Coke manufacture |
| - | - | - | - | - | - | - | - | - | Blast furnaces |
| - | - | - | - | - | - | - | - | - | Patent fuel manufacture |
| - | - | - | - | - | - | - | - | - | Pumped storage |
| - | - | - | - | - | - | - | - | - | Other |
| **-** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **Losses** |
| **3,507r** | **21,926** | **4,461r** | **330** | **437r** | **1,358** | **444r** | **358r** | **61,528** | **Final Consumption** |
| **1,383r** | **-** | **1,833r** | **150** | **-** | **-** | **343r** | **-** | **4,016r** | **Industry** |
| 1,359r | - | 1,092r | 15 | - | - | 343r | - | 3,115r | Unclassified |
| - | - | 0 | 3 | - | - | - | - | 4 | Iron & steel |
| - | - | - | 0 | - | - | - | - | 0 | Non-ferrous metals |
| - | - | 175r | 5 | - | - | - | - | 180r | Mineral products |
| - | - | 90r | 21 | - | - | - | - | 111r | Chemicals |
| - | - | - | - | - | - | - | - | - | Mechanical engineering etc |
| - | - | 1 | - | - | - | - | - | 1 | Electrical engineering etc |
| 24 | - | 160r | 5 | - | - | - | - | 189r | Vehicles |
| - | - | 32 | 96 | - | - | - | - | 128 | Food, beverages etc |
| - | - | 48r | - | - | - | - | - | 48r | Textiles, leather, etc |
| - | - | 33r | - | - | - | - | - | 33r | Paper, printing etc |
| - | - | 35r | - | - | - | - | - | 35r | Other industries |
| - | - | 168r | 5 | - | - | - | - | 173r | Construction |
| **-** | **21,926** | **1,282r** | **89** | **-** | **-** | **-** | **-** | **47,222r** | **Transport** |
| - | - | - | - | - | - | - | - | 11,257r | Air |
| - | - | 604r | - | - | - | - | - | 604r | Rail |
| - | 21,926 | - | - | - | - | - | - | 34,593 | Road |
| - | - | 678 | 89 | - | - | - | - | 767 | National navigation |
| - | - | - | - | - | - | - | | - | Pipelines |
| **2,125r** | **-** | **1,329r** | **90** | **-** | **-** | **-** | **-** | **3,946r** | **Other** |
| 2,125r | - | 156r | - | - | - | - | - | 2,580r | Domestic |
| - | - | 301r | 19 | - | - | - | - | 320r | Public administration |
| - | - | 376r | 47 | - | - | - | - | 423r | Commercial |
| - | - | 237r | 14 | - | - | - | - | 353r | Agriculture |
| - | - | 259r | 10 | - | - | - | - | 269r | Miscellaneous |
| **-** | **-** | **17r** | **-** | **437r** | **1,358** | **101r** | **358r** | **6,344r** | **Non energy use *(4)*** |

# 3.4 Commodity balances 2012

Petroleum products

Thousand tonnes

| | Ethane | Propane | Butane | Other gases | Naphtha | Aviation spirit | Motor spirit | White Spirit & SBP | Aviation turbine fuel |
|---|---|---|---|---|---|---|---|---|---|
| **Supply** | | | | | | | | | |
| Production | - | 1,573 | 939r | 2,632 | 2,328r | - | 18,650r | 72 | 5,775 |
| Other sources | 783 | 535r | 293r | - | 372r | - | - | - | - |
| Imports | - | 207 | 86 | - | 672 | 19 | 4,184 | 172 | 7,127 |
| Exports | - | -506 | -641 | - | -917 | - | -11,042r | -25 | -1,320 |
| Marine bunkers | - | - | - | - | - | - | - | - | - |
| Stock change *(2)* | - | -4 | 13 | 0 | 35 | -2 | 26 | -1 | 96 |
| Transfers | - | - | 0 | 23 | -1,428r | -0 | 1,400r | -0 | -479 |
| **Total supply** | **783** | **1,805r** | **690r** | **2,655** | **1,062r** | **17** | **13,218** | **218** | **11,199** |
| **Statistical difference *(3)*** | **-** | **1r** | **1r** | **0** | **-32r** | **-0** | **-13** | **-1** | **-22** |
| **Total demand** | **783** | **1,804r** | **689r** | **2,655** | **1,094r** | **17** | **13,231** | **219** | **11,221** |
| **Transformation** | **-** | **18** | **-** | **191** | **-** | **-** | **-** | **-** | **-** |
| Electricity generation | - | - | - | 191 | - | - | - | - | - |
| Major power producers | - | - | - | - | - | - | - | - | - |
| Autogenerators | - | - | - | 191 | - | - | - | - | - |
| Heat generation | - | 18 | - | - | - | - | - | - | - |
| Petroleum refineries | - | - | - | - | - | - | - | - | - |
| Coke manufacture | - | - | - | - | - | - | - | - | - |
| Blast furnaces | - | - | - | - | - | - | - | - | - |
| Patent fuel manufacture | - | - | - | - | - | - | - | - | - |
| Other | - | - | - | - | - | - | - | - | - |
| **Energy industry use** | **-** | **0** | **0** | **2,348** | **-** | **-** | **-** | **-** | **-** |
| Electricity generation | - | - | - | - | - | - | - | - | - |
| Oil & gas extraction | - | - | - | - | - | - | - | - | - |
| Petroleum refineries | - | 0 | - | 2,348 | - | - | - | - | - |
| Coal extraction | - | - | - | - | - | - | - | - | - |
| Coke manufacture | - | - | - | - | - | - | - | - | - |
| Blast furnaces | - | 0 | 0 | - | - | - | - | - | - |
| Patent fuel manufacture | - | - | - | - | - | - | - | - | - |
| Pumped storage | - | - | - | - | - | - | - | - | - |
| Other | - | - | - | - | - | - | - | - | - |
| **Losses** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **-** |
| **Final consumption** | **783** | **1,786r** | **689r** | **116** | **1,094r** | **17** | **13,231** | **219** | **11,221** |
| **Industry** | **-** | **277** | **95r** | **-** | **183r** | **-** | **-** | **-** | **-** |
| Unclassified | - | 275 | 94r | - | 183r | - | - | - | - |
| Iron & steel | - | 2 | 0 | - | - | - | - | - | - |
| Non-ferrous metals | - | - | - | - | - | - | - | - | - |
| Mineral products | - | - | - | - | - | - | - | - | - |
| Chemicals | - | - | - | - | - | - | - | - | - |
| Mechanical engineering, etc | - | - | - | - | - | - | - | - | - |
| Electrical engineering, etc | - | - | - | - | - | - | - | - | - |
| Vehicles | - | - | - | - | - | - | - | - | - |
| Food, beverages, etc | - | - | - | - | - | - | - | - | - |
| Textiles, leather, etc | - | - | - | - | - | - | - | - | - |
| Paper, printing etc | - | - | - | - | - | - | - | - | - |
| Other industries | - | - | - | - | - | - | - | - | - |
| Construction | - | - | - | - | - | - | - | - | - |
| **Transport** | **-** | **93** | **-** | **-** | **-** | **17** | **13,231** | **-** | **11,221** |
| Air | - | - | - | - | - | 17 | - | - | 11,221 |
| Rail | - | - | - | - | - | - | - | - | - |
| Road | - | 93 | - | - | - | - | 13,231 | - | - |
| National navigation | - | - | - | - | - | - | - | - | - |
| Pipelines | - | - | - | - | - | - | - | - | - |
| **Other** | **-** | **378** | **27** | **-** | **-** | **-** | **-** | **-** | **-** |
| Domestic | - | 270 | 27 | - | - | - | - | - | - |
| Public administration | - | - | - | - | - | - | - | - | - |
| Commercial | - | - | - | - | - | - | - | - | - |
| Agriculture | - | 108 | 0 | - | - | - | - | - | - |
| Miscellaneous | - | - | - | - | - | - | - | - | - |
| **Non energy use *(4)*** | **783** | **1,038r** | **567r** | **116** | **910r** | **-** | **-** | **219** | **-** |

*(1) Includes marine diesel oil.*
*(2) Stock fall (+), stock rise (-).*
*(3) Total supply minus total demand.*
*(4) For further details on non-energy usage see paragraphs 3.38 and 3.39.*

# 3.4 Commodity balances 2012 (continued)

## Petroleum products

Thousand tonnes

| Burning oil | DERV | Gas Oil [1] | Fuel oils | Lubri -cants | Bitu -men | Petroleum coke | Misc. products | Total Products | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | **Supply** |
| 2,268 | 15,772 | 8,941 | 7,504r | 457 | 1,222 | 2,245 | 1,252 | 71,630r | Production |
| - | - | - | - | - | - | - | - | 1,982r | Other sources |
| 702 | 9,541 | 1,365r | 660 | 443 | 225 | 624 | 178 | 26,207r | Imports |
| -112 | -3,377 | -4,270 | -5,640r | -479 | -151 | -582 | -841 | -29,904r | Exports |
| - | - | -1,123 | -1,540 | - | - | - | - | -2,663 | Marine bunkers |
| 40 | -133 | 7 | 90 | -11 | -11 | -22 | 6 | 128 | Stock change *(2)* |
| 446 | -268 | 217 | -14 | -0 | 63 | -r | -78 | -120r | Transfers |
| **3,343** | **21,535** | **5,137r** | **1,059** | **410** | **1,348** | **2,264** | **518** | **67,260r** | **Total supply** |
| **14** | **-3** | **-11r** | **8** | **-3** | **-6** | **3** | **-24** | **-87r** | **Statistical difference *(3)*** |
| **3,329** | **21,538** | **5,148r** | **1,052** | **412** | **1,355** | **2,261** | **541** | **67,347r** | **Total demand** |
| **-** | **-** | **60** | **390** | **-** | **-** | **194** | **-** | **853** | **Transformation** |
| - | - | 54 | 337 | - | - | 111 | - | 694 | Electricity generation |
| - | - | 41 | 261 | - | - | 111 | - | 413 | Major power producers |
| - | - | 13 | 76 | - | - | - | - | 281 | Autogenerators |
| - | - | 5 | 52 | - | - | - | - | 76 | Heat generation |
| - | - | - | - | - | - | - | - | - | Petroleum refineries |
| - | - | - | - | - | - | - | - | - | Coke manufacture |
| - | - | - | - | - | - | - | - | - | Blast furnaces |
| - | - | - | - | - | - | 83 | - | 83 | Patent fuel manufacture |
| - | - | - | - | - | - | - | - | - | Other |
| **-** | **-** | **617** | **346** | **-** | **-** | **1,606** | **-** | **4,916** | **Energy industry use** |
| - | - | - | - | - | - | - | - | - | Electricity generation |
| - | - | 617 | - | - | - | - | - | 617 | Oil & gas extraction |
| - | - | 0 | 346 | - | - | 1,606 | - | 4,299 | Petroleum refineries |
| - | - | - | - | - | - | - | - | - | Coal extraction |
| - | - | - | - | - | - | - | - | - | Coke manufacture |
| - | - | - | - | - | - | - | - | 0 | Blast furnaces |
| - | - | - | - | - | - | - | - | - | Patent fuel manufacture |
| - | - | - | - | - | - | - | - | - | Pumped storage |
| - | - | - | - | - | - | - | - | - | Other |
| **-** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **Losses** |
| **3,329** | **21,538** | **4,471r** | **316** | **412** | **1,355** | **461** | **541** | **61,577r** | **Final Consumption** |
| **1,332** | **-** | **1,993r** | **122** | **-** | **-** | **308** | **-** | **4,310r** | **Industry** |
| 1,332 | - | 1,326r | 7 | - | - | 308 | - | 3,527r | Unclassified |
| - | - | 1 | 2 | - | - | - | - | 5 | Iron & steel |
| - | - | - | - | - | - | - | - | - | Non-ferrous metals |
| - | - | 152r | 3 | - | - | - | - | 155r | Mineral products |
| - | - | 97r | 17 | - | - | - | - | 115r | Chemicals |
| - | - | - | 0 | - | - | - | - | 0 | Mechanical engineering etc |
| - | - | 2 | 0 | - | - | - | - | 2 | Electrical engineering etc |
| - | - | 133r | 3 | - | - | - | - | 136r | Vehicles |
| - | - | 33 | 87 | - | - | - | - | 120 | Food, beverages etc |
| - | - | 42 | - | - | - | - | - | 42 | Textiles, leather, etc |
| - | - | 26 | - | - | - | - | - | 26 | Paper, printing etc |
| - | - | 38r | - | - | - | - | - | 38r | Other industries |
| - | - | 142r | 3 | - | - | - | - | 145r | Construction |
| **-** | **21,538** | **1,303r** | **89** | **-** | **-** | **-** | **-** | **47,491r** | **Transport** |
| - | - | - | - | - | - | - | - | 11,238 | Air |
| - | - | 620r | - | - | - | - | - | 620r | Rail |
| - | 21,538 | - | - | - | - | - | - | 34,861 | Road |
| - | - | 683 | 89 | - | - | - | - | 772 | National navigation |
| - | - | - | - | - | - | - | - | - | Pipelines |
| **1,996** | **-** | **1,159r** | **105** | **-** | **-** | **-** | **-** | **3,665r** | **Other** |
| 1,996 | - | 141r | - | - | - | - | - | 2,435r | Domestic |
| - | - | 262r | 36 | - | - | - | - | 298r | Public administration |
| - | - | 322r | 43 | - | - | - | - | 365r | Commercial |
| - | - | 203r | 14 | - | - | - | - | 325r | Agriculture |
| - | - | 230r | 12 | - | - | - | - | 242r | Miscellaneous |
| **-** | **-** | **16r** | **0** | **412** | **1,355** | **154** | **541** | **6,111r** | **Non energy use *(4)*** |

# 3.5 Supply and disposal of petroleum[1]

Thousand tonnes

| | 2010 | 2011 | 2012 | 2013 | 2014 |
|---|---|---|---|---|---|
| **Primary oils (Crude oil, NGLs and feedstocks)** | | | | | |
| Indigenous production *(2)* | 62,962 | 51,972 | 44,561 | 40,646 | 39,928 |
| Imports | 55,064 | 58,092 | 60,476r | 59,137 | 53,798 |
| Exports *(3)* | -42,064 | -33,625r | -30,946r | -33,105r | -30,946 |
| Transfers - Transfers to products *(4)* | -2,440 | -2,255r | -1,982r | -2,221r | -2,177 |
| Product rebrands (5) | +71 | 19 | 120r | 463 | +817 |
| Stock change *(6)* | -39 | 611 | -486 | 724 | -592 |
| Use during production *(7)* | - | - | - | - | - |
| Calculated refinery throughput *(8)* | 73,553 | 74,815r | 71,741r | 65,644r | 60,826 |
| Overall statistical difference *(9)* | 10 | -265r | -98r | -44 | 3 |
| **Actual refinery throughput** | **73,543** | **75,080** | **71,839r** | **65,687r** | **60,823** |
| **Petroleum products** | | | | | |
| Losses in refining process *(10)* | 566 | 373 | 209r | 312r | 523 |
| Refinery gross production *(11)* | 72,977 | 74,707 | 71,630r | 65,375r | 60,300 |
| Transfers - Transfers to products *(4)* | 2,440r | 2,255r | 1,982r | 2,221r | 2,177 |
| Product rebrands *(5)* | -71 | -19 | -120r | -463 | -817 |
| Imports | 23,665 | 22,656 | 26,207r | 28,769r | 29,055 |
| Exports *(12)* | -26,065 | -27,800 | -29,904r | -26,910r | -22,748 |
| Marine bunkers | -2,807 | -3,130 | -2,663 | -2,540 | -2,340 |
| Stock changes *(6)* - Refineries | 568 | 46r | 102 | 79 | 266 |
| Power generators | 26 | 142r | 26 | 26 | +26 |
| Calculated total supply | 70,734r | 68,857r | 67,260r | 66,559r | 65,920 |
| Statistical difference *(9)* | +61r | +28r | -87r | -69r | -180 |
| **Total demand** *(4)* | **70,673r** | **68,829r** | **67,347r** | **66,628r** | **66,100** |
| Of which: | | | | | |
| Energy use | 63,566 | 61,774r | 61,236r | 60,284r | 59,881 |
| Of which, for electricity generation *(13)* | 1,144 | 722 | 694 | 546r | 471 |
| total refinery fuels *(13)* | 4,378 | 4,585 | 4,299 | 3,759r | 3,245 |
| Non-energy use | 7,107 | 7,055r | 6,111r | 6,344r | 6,220 |

*(1) Aggregate monthly data on oil production, trade, refinery throughput and inland deliveries are available - see paragraph 3.67 and Annex C.*
*(2) Crude oil plus condensates and petroleum gases derived at onshore treatment plants.*
*(3) Includes NGLs, process oils and re-exports.*
*(4) Disposals of NGLs by direct sale (excluding exports) or for blending.*
*(5) Product rebrands (inter-product blends or transfers) represent petroleum products received at refineries/ plants and used as feedstock for refinery or cracking unit operations.*
*(6) Impact of stock changes on supplies. A stock fall is shown as (+) as it increases supplies, and vice-versa for a stock rise (-).*
*(7) Own use in onshore terminals and gas separation plants. These figures ceased to be available from January 2001 with the advent of the new PPRS system.*
*(8) Equivalent to the total supplies reported against the upstream transformation sector in Table 3.1.*
*(9) Supply greater than (+) or less than (-) recorded throughput or disposals.*
*(10) Calculated as the difference between actual refinery throughput and gross refinery production.*
*(11) Includes refinery fuels.*
*(12) Excludes NGLs.*
*(13) Figures cover petroleum used to generate electricity by all major power producers and by all other generators, including petroleum used to generate electricity at refineries.*

# 3.6 Additional information on inland deliveries of selected products[1]

Thousand Tonnes

| | 2010 | 2011 | 2012 | 2013 | 2014 |
|---|---|---|---|---|---|
| **Motor spirit** | | | | | |
| of which, Hydrocarbon *(2)* | 14,602 | 13,895 | 13,231 | 12,574 | 12,326 |
| of which, Bio-ethanol *(3)* | 501r | 517r | 615r | 650r | 645 |
| **Total Motor Spirit including Bio-ethanol** | **15,103r** | **14,412r** | **13,845r** | **13,224r** | **12,971** |
| of which, sold through Supermarkets (4) | 6,179 | 6,345 | 6,196 | 5,974 | 5,755 |
| of which, sold through Refiners, and other traders *(5)* | 8,924r | 8,067r | 7,649r | 7,250r | 7,216 |
| of which, sold via commercial sales *(6)* | - | - | - | - | - |
| **Diesel Road Fuel** | - | - | - | - | - |
| Hydrocarbon *(7)* | 20,740 | 20,991 | 21,538 | 21,926 | 22,675 |
| Bio-diesel (8) | 933r | 825r | 563r | 682r | 850 |
| **Total Diesel Road Fuel including Bio-diesel** | **21,673r** | **21,816r** | **22,101r** | **22,607r** | **23,525** |
| of which, sold through Supermarkets (4) | 5,115 | 5,722 | 5,959 | 6,217 | 6,394 |
| of which, sold through Refiners, and other traders *(5)* | 8,800r | 8,502r | 8,446r | 8,519r | 8,946 |
| of which, sold via commercial sales *(6)* | 7,758 | 7,591 | 7,696 | 7,871 | 8,185 |
| **Other gas diesel oil (9)** | **5,059** | **4,759** | **4,990** | **5,174r** | **5,241** |
| **Aviation Fuels** | - | - | - | - | - |
| **Total Sales - Aviation fuels** | **11,137** | **11,594** | **11,238** | **11,257r** | **11,238** |
| Aviation spirit | 21 | 21 | 17 | 16 | 18 |
| Aviation turbine fuel | 11,116 | 11,574 | 11,221 | 11,242r | 11,220 |
| **Fuel Oil** | - | - | - | - | - |
| **Total Sales - Fuel Oils** | **1,371** | **939** | **707r** | **569r** | **554** |
| Light | 511 | 449 | 367r | 219r | 175 |
| Medium | 112 | 106 | 118r | 139r | 126 |
| Heavy | 749 | 384 | 221r | 209r | 255 |

*(1) Monthly data for inland deliveries of oil products are available -*
*See DECC website: www.gov.uk/government/organisations/department-of-energy-climate-change/series/oil-statistics.*
*(2) Demand excluding bioethanol. Based on HMRC duty data.*
*(3) Bioethanol based on HMRC duty data, excluding other renewables.*
*(4) Sales by supermarkets are collected by a monthly reporting system. Includes Asda, Morrisons, Sainsburys and Tesco only.*
*(5) Total sales excluding supermarket and commercial sales.*
*(6) Commercial sales are currently estimated based on road movements and a number of assumptions. Further details are available at: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/295224/Supermarket_share_of_retail_sales.pdf.*
*(7) Demand excluding biodiesel. Based on HMRC duty data.*
*(8) Biodiesel based on HMRC duty data, excluding other renewables.*
*(9) This includes gas diesel oil used for other purposes such as heating and middle distillate feedstock destined for use in the petrochemical industry.*

# 3.7 Stocks of crude oil and petroleum products at end of year[(1)]

Thousand tonnes

| | 2010 | 2011 | 2012 | 2013 | 2014 |
|---|---|---|---|---|---|
| **Crude and process oils** | | | | | |
| Refineries *(2)* | 4,110 | 3,889 | 3,829 | 3,592 | 3,876 |
| Terminals *(3)* | 1,049 | 694 | 1,194 | 1,102 | 1,147 |
| Offshore *(4)* | 520 | 540 | 473 | 513 | 460 |
| Net bilateral stocks *(5)* | 210 | 151 | 195 | 1,469 | 1,728 |
| **Total crude and process oils** *(6)* | **5,889** | **5,274** | **5,690** | **6,677** | **7,211** |
| | | | | | |
| Petroleum products | | | | | |
| Ethane | - | - | - | - | - |
| Propane | 18 | 23 | 28 | 19 | 46 |
| Butane | 31 | 38 | 25 | 29 | 35 |
| Other petroleum gases | - | - | - | - | - |
| Naphtha | 229 | 199 | 165 | 112 | 140 |
| Aviation spirit | 4 | 3 | 5 | 4 | 5 |
| Motor spirit | 1,140 | 846 | 727 | 1,287 | 1,141 |
| White spirit & SBP | 9 | 7 | 9 | 18 | 24 |
| Aviation turbine fuel | 1,188 | 1,216 | 1,229 | 1,162 | 999 |
| Burning oil | 209 | 238 | 198 | 287 | 231 |
| *Gas/Diesel oil (7)(8)* | 4,018 | 3,776 | 4,222 | 2,482 | 2,399 |
| of which, DERV | 641 | 545 | 1,240 | 1,662 | 1,592 |
| Fuel oils *(9)* | 687 | 645 | 514 | 1,340 | 1,060 |
| Lubricating oils | 180 | 132 | 143 | 186 | 67 |
| Bitumen | 101 | 95 | 106 | 127 | 101 |
| Petroleum wax | 8 | 6 | 4 | 10 | 3 |
| Petroleum coke | 236 | 252 | 274 | 236 | 318 |
| Miscellaneous products | 104 | 92 | 88 | 228 | 302 |
| **Total all products** | **8,164** | **7,569** | **7,735** | **7,528** | **6,871** |
| Of which : net bilateral stocks *(5)* | 2,563 | 2,100 | 2,441 | 2,432 | 2,064 |

*(1) Aggregate monthly data on the level of stocks of crude oil and oil products are available - see paragraph 3.67 and Annex C.*
*(2) Stocks of crude oil, NGLs and process oils at UK refineries.*
*(3) Stocks of crude oil and NGLs at UKCS (UK continental shelf) pipeline terminals.*
*(4) Stocks of crude oil in tanks and partially loaded tankers at offshore fields.*
*(5) The difference between stocks held abroad for UK use under approved bilateral agreements and the equivalent stocks held in the UK for foreign use.*
*(6) Includes process oils held abroad for UK use approved by bilateral agreements.*
*(7) Includes marine diesel oil.*
*(8) The increase in gas oil stocks and the decrease in fuel oil stocks can be attributed to the change in patterns of stocks held abroad, under bilateral agreements, by UK companies as part of their national stocking obligation.*

# 3.8 Additional information on inland deliveries for non-energy uses[(1)(2)]

Thousand tonnes

| | 2010 | 2011 | 2012 | 2013 | 2014 |
|---|---|---|---|---|---|
| **Feedstock for petroleum chemical plants:** | | | | | |
| Propane | 1,208r | 1,261r | 1,038r | 1,221r | 1,120 |
| Butane | 652r | 679r | 567r | 681r | 617 |
| Other gases | 1,199 | 1,003 | 899 | 983r | 1,056 |
| Total gases | 3,059r | 2,944r | 2,504r | 2,885r | 2,793 |
| Naphtha (LDF) | 881r | 969r | 910r | 909r | 763 |
| Middle Distillate Feedstock (MDF) | 21r | 34r | 16r | 17r | 17 |
| Other products | - | - | - | - | - |
| Total feedstock | 3,960r | 3,946r | 3,430r | 3,811r | 3,573 |
| **Lubricating oils and grease:** | | | | | |
| Aviation | 4 | 4 | 4 | 3 | 1 |
| Industrial | 337 | 248 | 197 | 241r | 297 |
| Marine | 19 | 19 | 17 | 25r | 20 |
| Other motors, Gear oils & Transmissions | 216 | 216 | 191 | 165r | 114 |
| Agricultural | 4 | 4 | 3 | 3 | 3 |
| Fuel oil sold as lubricant | - | - | - | - | - |
| Total lubricating oils and grease | 580 | 491 | 412 | 437r | 436 |
| **Other non-energy products:** | | | | | |
| Industrial spirit/white spirit | 224 | 143 | 219 | 279 | 126 |
| Bitumen | 1,370 | 1,621 | 1,355 | 1,358 | 1,410 |
| Petroleum coke | 301 | 262 | 154 | 101r | 149 |
| Miscellaneous products | 671 | 592 | 542 | 358r | 526 |
| Total other non-energy products | 2,566 | 2,618 | 2,268 | 2,096r | 2,211 |
| **Total non-energy use** | **7,107r** | **7,055r** | **6,111r** | **6,344r** | **6,220** |

*(1) Aggregate monthly data on the total non energy use of oil products are available - see paragraph 3.73 and Annex C*
*(2) For further details on non-energy usage see paragraphs 3.37 and 3.38*

# Chapter 4
# Natural gas

## Key points

- UK natural gas production in 2014 was up 0.2 per cent on 2013 to 425 TWh. Although small the increase contrasts with the long term decline in UK natural gas production which has fallen by an average of 8 per cent from the peak production in 2000 to the end of 2013.
- Imports fell by 11 per cent in 2014 versus 2013; exports increased by 17 per cent. Net imports were 18 per cent lower in 2014 compared to 2013 (Table 4.1).
- Imports of Liquefied Natural Gas (LNG) increased to 124 TWh in 2014, driven by increasing global supply and weaker than expected demand in Asia. Pipeline imports were down by 19 per cent in 2014, driven primarily by decreased imports from Belgium and Norway in 2014. These decreases were primarily due to a reduction in demand for natural gas within the UK during 2014.
- Total gas demand (natural gas plus colliery methane) decreased by 9 per cent in 2014 to 773 TWh. This drop reflects the large reduction seen in gas used for domestic consumption and by the services sector. There was increased gas use in generation.

## Introduction

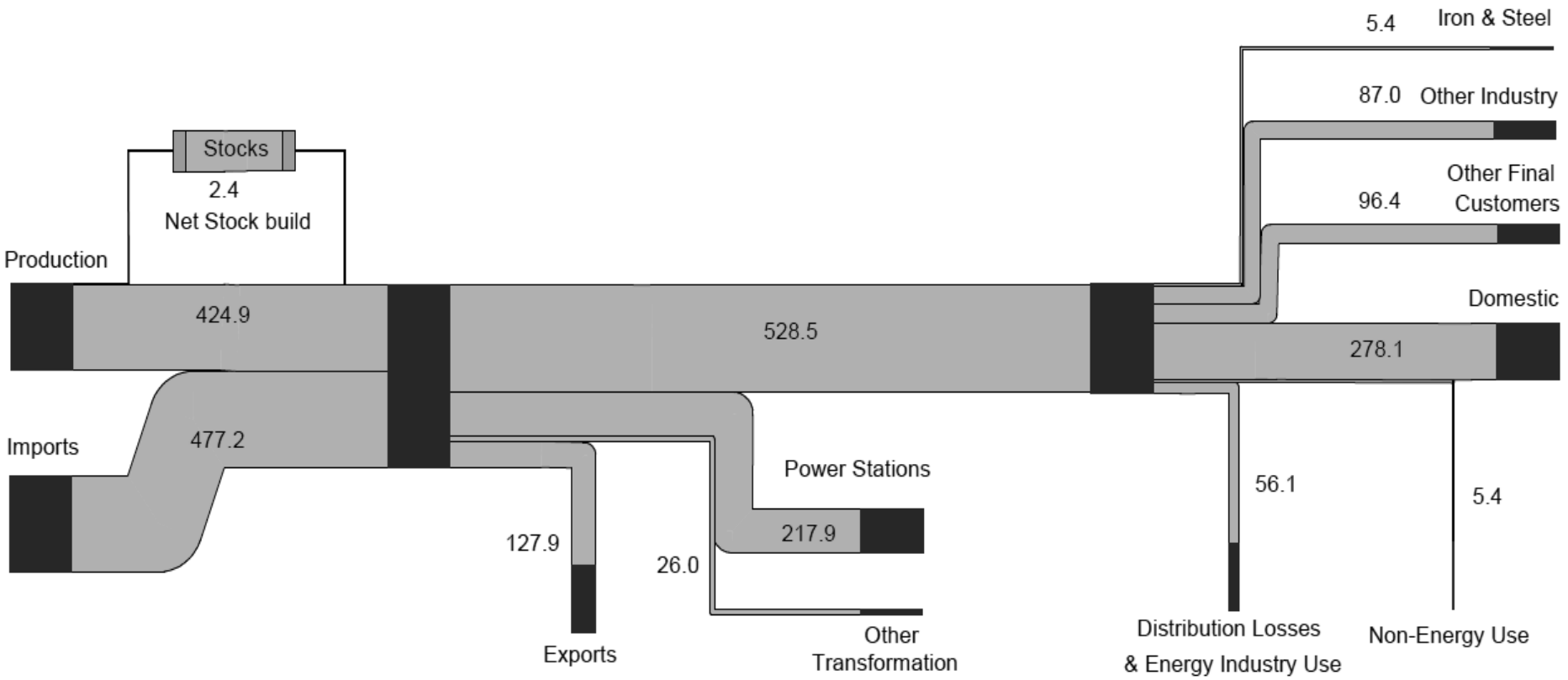
4.1 This chapter presents six data tables on the production, transmission and consumption of natural gas and colliery methane, and two maps showing flows of gas in and around Europe and the gas transmission system in the UK (pages 97 & 101).

4.2 An energy flow chart for 2014, showing the flows of natural gas from production and imports through to consumption, is included overleaf as a way of simplifying the figures that can be found in the commodity balance tables. It illustrates the flow of gas from the point at which it becomes available from indigenous production or imports (on the left) to the eventual final use of gas (on the right) as well as the gas transformed into other forms of energy or exported.

4.3 Table 4.1 shows the commodity balances for natural gas and colliery methane, both separately and in aggregate. In Table 4.2, the two gases are aggregated and presented as a five year time-series, showing supply, transformation and consumption. The natural gas statistics include bio-methane gas which is currently being produced by a small number of companies to feed into the national grid. At this stage volumes are small, but as this increases we will look to present these in separately. A more detailed examination of the various stages of natural gas from gross production through to consumption is given in Table 4.3. Table 4.4 details the UK's gas storage sites and interconnector pipelines, while Table 4.5 shows the UK's imports and exports of gas and Table 4.6 shows LNG imports by terminal. Long-term trends, commentary and a table on production and consumption of gas back to 1970 are to be found on the DECC section of the GOV.UK website at: www.gov.uk/government/collections/digest-of-uk-energy-statistics-dukes.

4.4 Petroleum gases are covered in Chapter 3. Gases manufactured in the coke-making and iron and steel-making processes (coke oven gas and blast furnace gas) appear in Chapter 2. Biogases (landfill gas and sewage gas) are part of Chapter 6. Details of net selling values of gas for the domestic, industrial and other sectors are to be found in Chapter 1.

# Natural gas flow chart 2014 (TWh)



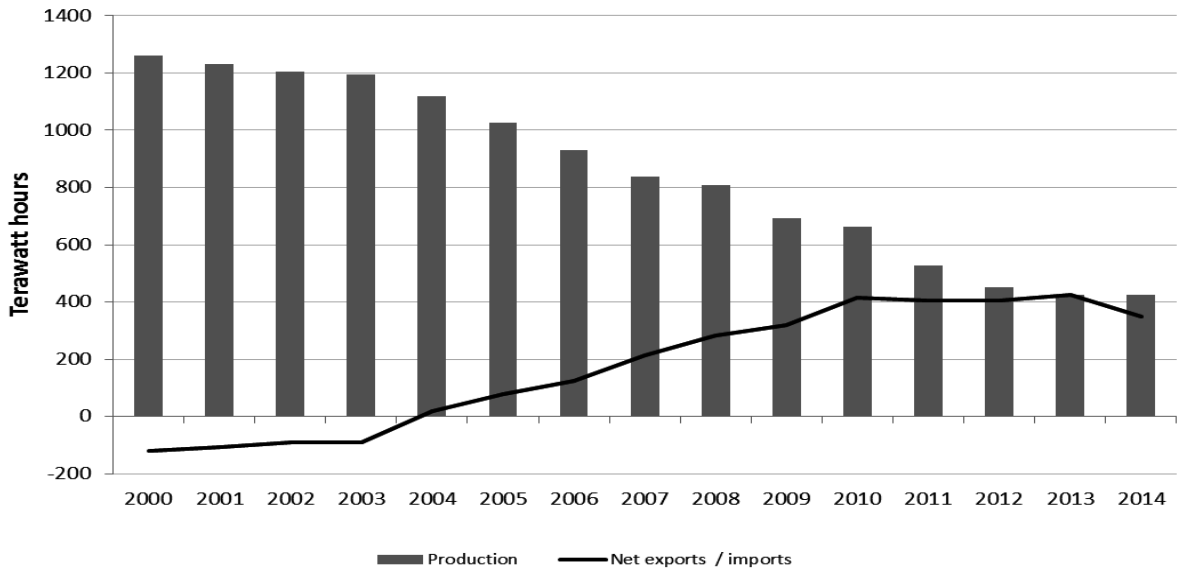

Notes:
This flow chart is based on the data that appear in Table 4.1, excluding colliery methane.

## Commodity balances for gas (Tables 4.1 and 4.2)

4.5 Apart from 2014, which showed a marginal increase, UK Continental Shelf (UKCS) production of natural gas has been in decline since the turn of the millennium. Between 2000 and 2013, gas production fell at a rate of 8 per cent per year. However, the rate of decline over the past 14 years has varied and there have been large year-on-year falls in production in 2011 and 2012 (20.8 and 14.1 per cent respectively). In 2014 production increased by 0.2 per cent, the first year-on year increase since the peak of 2000. In context UK production in 2014 (at 425 TWh) was only 34 per cent of the level produced in 2000 (1,260 TWh). Despite this the UK, along with the Netherlands, remains one of the two major gas-producing nations within the EU. In 2014, the UK's indigenous production was sufficient to meet around half of the UK's demand.

4.6 The UK imports natural gas by pipeline from Norway, Belgium and the Netherlands and LNG by ship. The UK has been a net importer of gas since 2004, with net imports of gas in 2014 accounting for 45 per cent of supply. The UK imported 477 TWh in 2014. In 2009 two new LNG terminals at Milford Haven (Dragon and South Hook) opened and contributed to the 33 per cent increase in LNG imports between 2010 and 2011.

**Chart 4.1: Natural gas production and net exports/imports 2000 to 2014**

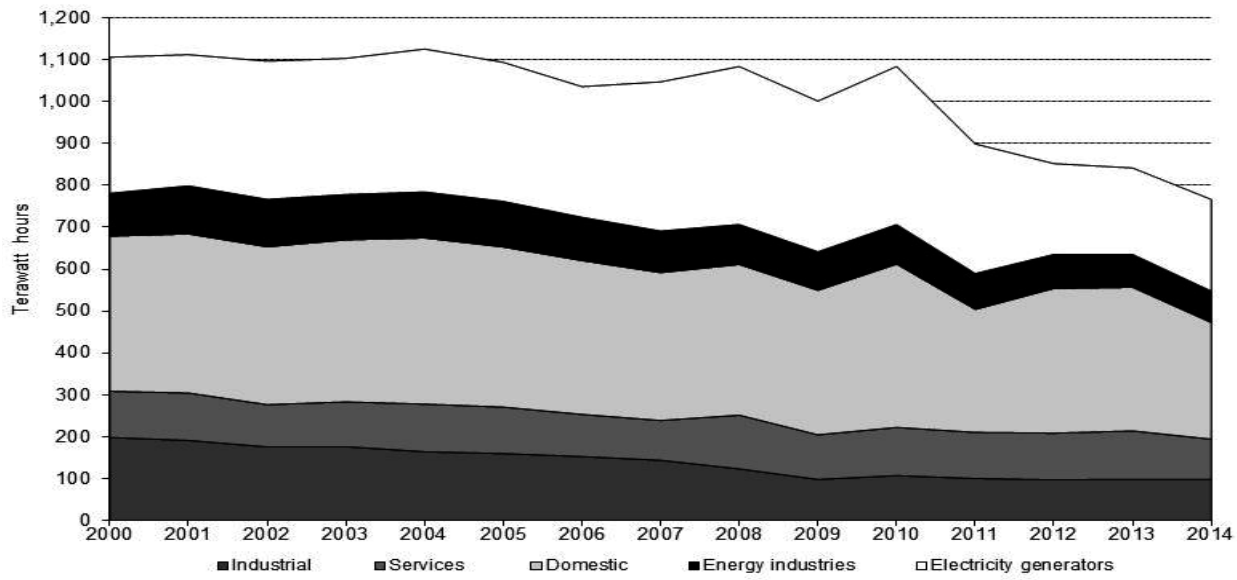



4.7 LNG imports have declined from the 2011 peak and, by 2014, were 124 TWh; this is 45 per cent lower than 2011. The broad decline in LNG imports up to 2014 reflects increased demand elsewhere attracting LNG away from the UK (particularly in Japan, which is yet to restart any nuclear power plants). However, 2014 saw an increase in LNG imports to the UK by 21 per cent compared to 2013 driven by increasing global supply and weaker than expected demand in Asia. Prior to 2014 LNG imports had been on a downward trajectory from their 2011 peak. Pipeline imports into the UK from Belgium, Norway and the Netherlands decreased in 2014. The decrease in pipeline imports reflects both lower demand and a transfer towards importing LNG.

4.8 Total gas demand (including colliery methane) decreased from 849 TWh in 2013 to 773 TWh in 2014, an 8.9 per cent decline. Gas demand has now fallen each year since 2010. Chart 4.2 shows how this varies by sector. Demand for gas for domestic purposes decreased by 19 per cent in 2014, reflecting warmer temperatures. Gas used by the industrial sector was down by 0.7 per cent but gas used for electricity generation increased by 5.9 per cent reflecting a decrease in coal generation and lower wholesale gas prices, particularly during the final six months of 2014. Chart 4.2 also illustrates the importance of temperature on short-term gas demand patterns (especially in the domestic sector), with demand being higher in 2010 (a cold year, average temperature 9°C) and lower in 2014 (a warm year, average temperature 10.9°C).

4.9 More detailed analysis of gas consumption in the domestic sector is available in the National Energy Efficiency Data-Framework (NEED): www.gov.uk/government/collections/national-energy-efficiency-data-need-framework. Sectoral breakdowns of gas use have been modified since last year to more accurately represent consumption (see paragraph 4.30). Definitions for each sector in Chart 4.2 are provided in paragraph 4.31.

**Chart 4.2: Consumption of natural gas 2000 to 2014**




## UK continental shelf and onshore natural gas (Table 4.3)

4.10 Table 4.3 shows natural gas flows, from production, through transmission and onto consumption. This table departs from the standard balance methodology and definitions to maintain the link with historical data and with monthly data given on DECC's energy statistics website. The relationship between total UK gas consumption shown in Table 4.3 and total demand for natural gas given in Table 4.1 is illustrated in the technical notes and definitions (paragraphs 4.34 to 4.37).

4.11 Table 4.3 also includes two rows at the bottom of the table showing gas stocks and gas storage capacity at the end of the year. Storage data are not available before 2004. Stocks data for 2006 onwards have been sourced from the National Grid and storage capacity data from its 2014 Ten Year Statement.

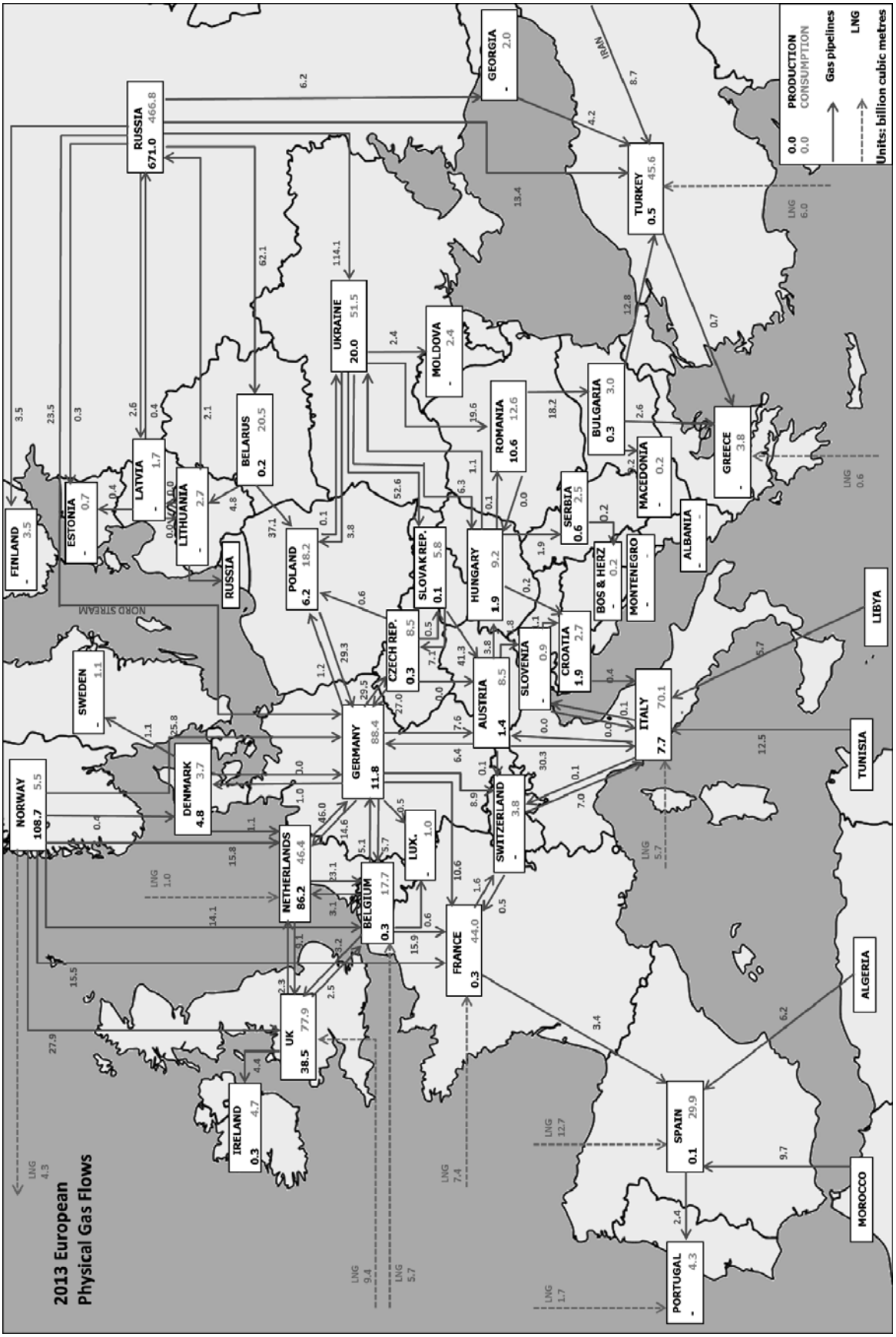
## Gas storage sites and import/export pipelines (Table 4.4)

4.12 This table details current gas storage facilities in the UK as of 31 May 2015 and also the two operational pipelines that bring gas to the UK from continental Europe. Significant increases in onshore and offshore storage capacity/deliverability are being considered at existing and new sites. National Grid's Gas Transportation Ten Year Statement includes public details of such projects in Great Britain. Total storage in the UK stands at 4.6 billion cubic metres, with total demand for 2014 recorded at 70 billion cubic metres.

## Natural gas imports and exports (Tables 4.5 and 4.6)

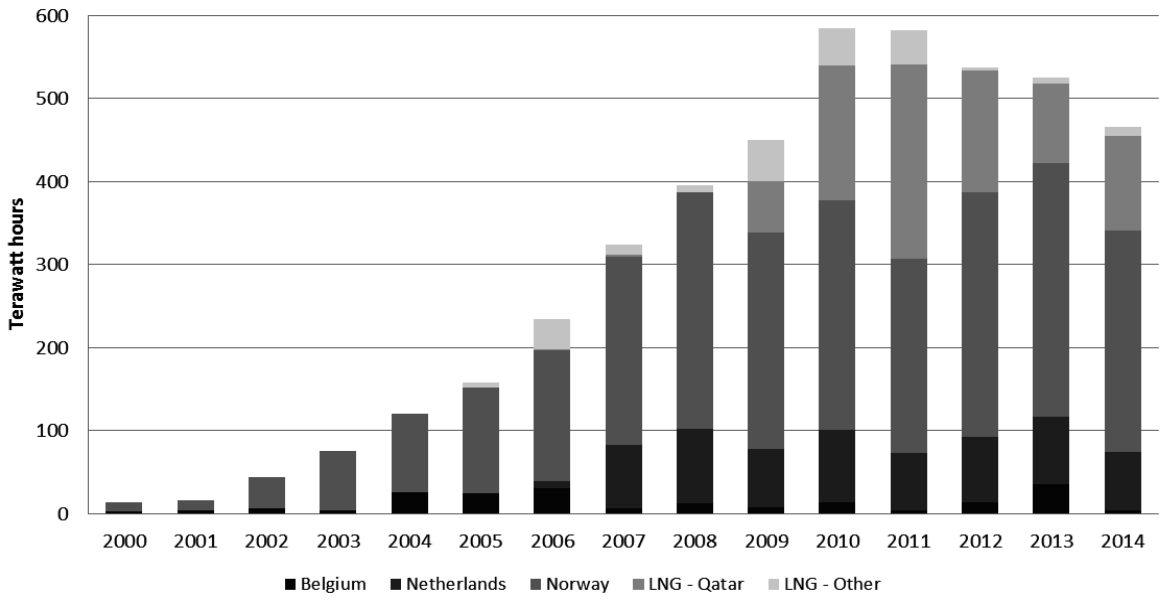
4.13 These tables show how much gas was imported to, and exported from, the UK via i.) the interconnector pipelines, ii.) UKCS gas fields using the Dutch offshore pipeline system, and iii.) via ships to the UK's LNG terminals. Norwegian gross gas imports were 57 per cent of total gas imports compared to 58 per cent in 2013. In 2014, 58 per cent of gas exports were to continental Europe, with the remaining 42 per cent to the Republic of Ireland. The flows of gas across Europe for 2013 are illustrated in Map 4.1, originally published in Energy Trends December 2014 www.gov.uk/government/uploads/system/uploads/attachment_data/file/386890/Physical_gas_flows.pdf.

## Map 4.1: Gas European Transit System




Source: International Energy Agency and DECC. Gas data are less transparent at the wider European level given missing information on transit flows and incomplete trade information. The above map was produced using published International Energy Agency data to reconstruct the missing physical gas flow data and is based on 2013 data.

## Chart 4.3: Imports of Natural Gas 2000 to 2014

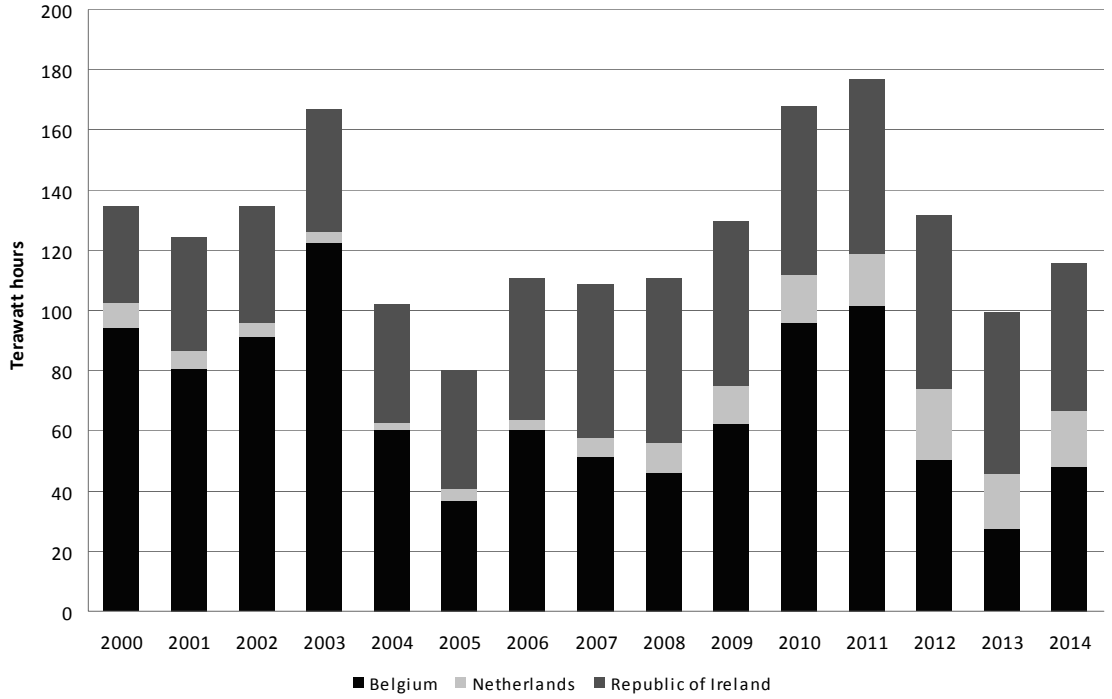



4.14 Chart 4.3 shows the share of natural gas imports by interconnector pipelines and LNG since 2000. The methodology for calculating LNG imports has been updated for 2008 to 2013 to reflect LNG terminal own use (details provided in special article in Energy Trends June 2014: www.gov.uk/government/uploads/system/uploads/attachment_data/file/326368/ET_June_2014.pdf). Imports have increased sharply since 2000, reflecting the decline in the UK's indigenous production. Physical pipeline imports comprised 73 per cent of natural gas imports in 2014, with LNG making up 27 per cent. Over the past four years overall imports have declined; this reflects the decrease in natural gas demand during this time (see Chart 4.2).

4.15 The UK imports natural gas via pipeline (from Norway, the Netherlands and Belgium) and shipped LNG (to terminals at Milford Haven (South Hook and Dragon), the Isle of Grain and Teesside Gasport). Over recent years, the most significant changes to the UK's import diversity include the completion of the interconnector from the Netherlands at the end of 2006 (resulting in significant natural gas imports from the Netherlands) and completion of two new LNG terminals in 2009. LNG's share of total gas imports have risen from 25 per cent in 2009 to 47 per cent in 2011, but fell to 20 per cent in 2013 because of increased demand from Asia driving up prices their and thus attracting LNG. Despite this, LNG remains an important component of the UK's energy mix. In 2014 LNG imports increased 21 per cent driven by increasing global supply and weaker than expected demand in Asia. In 2014, Qatar accounted for 92 per cent of LNG imports. The origins of LNG imports can be found in Table 4.5 and the total import volumes by each LNG terminal in Table 4.6.

4.16 The increased import infrastructure afforded by the new LNG terminals has ensured that UK exports remain robust, despite the decrease in the UK's production. Chart 4.4 shows a significant increase in UK exports since the turn of the decade, with record levels of exports in 2011. Exports to the Republic of Ireland were 8.4 per cent lower than in 2013. Additionally, a small amount of gas is exported to the Norwegian Continental Shelf for injection into the Ula field reservoir, but this accounts for less than 0.1 per cent of total exports. The total volume of gas traded in 2014 was down 7 per cent to 581 TWh.

## Chart 4.4: Exports of Natural Gas 2000 to 2014




## Sub-national gas data

4.17 Table 4A gives the number of consumers with a gas demand below 73,200 kWh per year in gas year 2013 (see Technical Terms and Definitions) and the total number of gas consumers. The table covers customers receiving gas from the national transmission system. The 'below 73,200 kWh' category covers both domestic and small business customers, and it was this section of the market that was progressively opened up to competition between April 1996 and May 1998. It should be noted that the data are for gas year 2013, which is approximately one year in arrears of the other data presented in this chapter (aside from the European gas map).

### Table 4A: Consumption by gas customers by region in 2013[1,2,3]

| | Consumption by customers below 73,200 kWh (2,500 therms) annual demand | | Consumption by all customers (where regional classification is possible) | |
|---|---|---|---|---|
| Region/Country | Number of consumers (thousands) | Gas sales 2013 (GWh) | Number of consumers (thousands) | Gas sales 2013 (GWh) |
| North East | 1,089 | 15,301 | 1,101 | 23,902 |
| North West | 2,876 | 39,022 | 2,908 | 64,640 |
| Yorkshire and the Humber | 2,103 | 29,506 | 2,127 | 51,549 |
| East Midlands | 1,745 | 24,292 | 1,764 | 38,266 |
| West Midlands | 2,089 | 28,395 | 2,113 | 44,682 |
| East | 2,040 | 28,259 | 2,063 | 43,622 |
| London | 3,009 | 41,065 | 3,052 | 61,946 |
| South East | 3,169 | 44,491 | 3,209 | 62,709 |
| South West | 1,822 | 22,099 | 1,842 | 32,858 |
| Wales | 1,111 | 14,477 | 1,122 | 23,453 |
| Scotland | 1,965 | 28,073 | 1,989 | 48,647 |
| Great Britain | 23,020 | 314,979 | 23,291 | 496,277 |

*Source: Xoserve and the independent gas transporters.*

*[1] These data cover the gas year (1st October to 30th September). Please note that the gas data are weather normalised.*

*[2] Customers with an annual consumption of 73,200 kWh or lower will include some small industrial and commercial consumers.*

*[3] Data excludes approximately 56,000 customers (0.2 per cent) for whom regional allocation was not possible.*

4.18 In March 2015, DECC published sub-national energy statistics data on its website: www.gov.uk/government/collections/sub-national-gas-consumption-data, including consumption data at both regional ("NUTS1") and local ("LAU1") level (see article in December 2011 Energy Trends for definition). Data for earlier years are presented on the website.

## Table 4B: Domestic gas market penetration (in terms of percentage of customers supplied) by region, Quarter 4 2014

| Region/Country[1] | All Payment Types | |
|---|---|---|
| | Home supplier | Other large supplier |
| North Scotland | 33 | 67 |
| South Wales | 31 | 69 |
| North East | 35 | 65 |
| South East | 37 | 63 |
| East Midlands | 38 | 62 |
| Southern | 39 | 61 |
| South West | 41 | 59 |
| Yorkshire | 41 | 59 |
| South Scotland | 40 | 60 |
| Eastern | 42 | 58 |
| West Midlands | 43 | 57 |
| North West | 45 | 55 |
| Merseyside and N Wales | 46 | 54 |
| London | 50 | 50 |
| Great Britain | 41 | 59 |

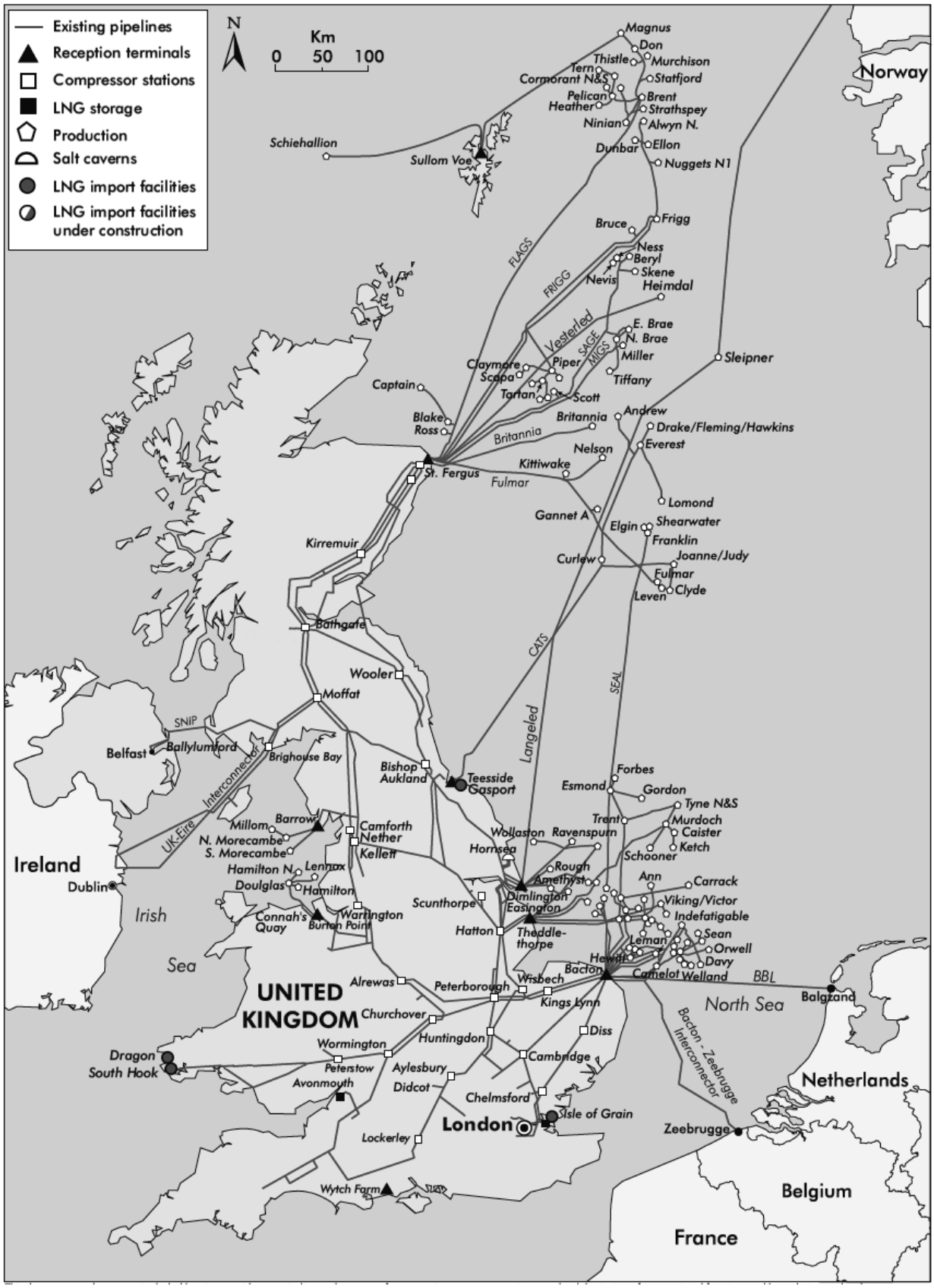
[1] *The regions used in this table are the distribution areas of the former public electricity suppliers. This marks a change from previous years, where regions were based on Transco local distribution zones (LDZs).*

4.19 Table 4B gives market penetration in more detail, by distribution areas of the former public electricity suppliers supplied by the larger energy companies. Data on the share of the smaller companies are not currently available and the table has not been adjusted for survey coverage. Coverage is estimated at around 93 per cent. All those not surveyed are with non-home suppliers. As a result the data above are biased toward the home supplier by around 4 percentage points. By the end of December 2014, around 37 per cent of customers were supplied by British Gas[1]. For all types of domestic customer, it is in the markets in North Scotland, South Wales and the North East of England that new suppliers have had most success averaging over 65 per cent of the market share.

4.20 Competition in the domestic market remained broadly unchanged between 2008 and 2013. During 2014 in some cases mentioned below the concentration of sales by the largest three and largest six suppliers for each relevant sector has diluted compared to 2013. This reflects customers switching to smaller or cheaper providers. An estimated 2 million customers with small suppliers, compared to an estimated 1 million at the end of 2013. In 2014, the largest three suppliers accounted for just under two thirds of sales and the largest six accounting for over 90 per cent. This was similar to 2013, however the concentration has reduced for 2014. Data on supply into the industrial sector in 2014 show that the largest three suppliers accounted for 51 per cent and the largest six suppliers 80 per cent of sales, almost identical to 2013. The commercial sector decreased in concentration compared to last year, with the largest three and largest six suppliers accounting for 47 and 76 per cent of sales respectively compared to 53 and 87 per cent during 2013.

[1] www.centrica.com/files/reports/2014ar/centar14_performance_measure.pdf#ref_performance

## Map 4.2: The National Gas Transmission System 2014




Source: International Energy Agency and DECC

# Technical notes and definitions

These notes and definitions are in addition to the technical notes and definitions covering all fuels and energy as a whole in Chapter 1, paragraphs 1.29 to 1.63. For notes on the commodity balances and definitions of the terms used in the row headings see Annex A, paragraphs A.7 to A.42. While the data in the printed and bound copy of this Digest cover only the most recent five years, these notes also cover data for earlier years that are available on the DECC energy statistics web site.

## Definitions used for production and consumption

4.21 **Natural gas** production in Tables 4.1 and 4.2 relates to the output of indigenous methane at land terminals and gas separation plants (includes producers' and processors' own use). For further explanation, see Annex F on DECC's energy statistics web site under 'Production of gas' - www.gov.uk/government/collections/digest-of-uk-energy-statistics-dukes. Output of the Norwegian share of the Frigg and Murchison fields is included under imports. A small quantity of onshore produced methane (other than colliery methane) is also included.

4.22 **Colliery methane** production is colliery methane piped to the surface and consumed at collieries or transmitted by pipeline to consumers. As the output of deep-mined coal declines so does the production of colliery methane, unless a use can be found for gas that was previously vented. The supply of methane from coal measures that are no longer being worked or from drilling into coal measures is licensed under the same legislation as used for offshore gas production.

4.23 **Transfers** of natural gas include natural gas use within the iron and steel industry for mixing with blast furnace gas to form a synthetic coke oven gas. For further details see paragraph 2.54 in Chapter 2.

4.24 **Non-energy gas**: Non-energy use is gas used as feedstock for petrochemical plants in the chemical industry as raw material for the production of ammonia (an essential intermediate chemical in the production of nitrogen fertilisers) and methanol. The contribution of liquefied petroleum gases (propane and butane) and other petroleum gases is shown in Tables 3.2 to 3.4 of Chapter 3. Firm data for natural gas are not available, but estimates for 2009 to 2014 are shown in Table 4.2 and estimates for 2011 to 2014 in Table 4.1. The estimates for the years up to 2011 have been obtained from AEA's work for the National Atmospheric Emissions Inventory; 2012-13 data are DECC extrapolations. For DUKES 2016, we will be exploring non-energy use in more detail to improve the accuracy of these data.

## Sectors used for sales/consumption

4.25 For definitions of the various sectors used for sales and consumption analyses see Chapter 1 paragraphs 1.55 to 1.60 and Annex A, paragraphs A.31 to A.42.

## Data collection

4.26 Production figures are generally obtained from returns made under DECC's Petroleum Production Reporting System (PPRS). DECC also obtain data on the transmission of natural gas from National Grid (who operate the National Transmission System) and from other pipeline operators. Data on consumption are based on returns from gas suppliers and UK Continental Shelf (UKCS) producers who supply gas directly to customers, (see paragraph 4.28).

4.27 The production data are for the UK (including natural gas from the UKCS - offshore and onshore). The restoration of a public gas supply to parts of Northern Ireland in 1997 means that all tables in this chapter, except Tables 4A and 4B, cover the UK.

4.28 DECC carry out an annual survey of gas suppliers to obtain details of gas sales to the various categories of consumer. The larger gas suppliers (defined as those with more than about a 0.5 per cent share of the UK market up to 1997 and those known to supply more than 1,750 GWh per year for 1998 onwards) provide a detailed breakdown of sales for final consumption to DECC on an annual basis. This provides the main data source for the UK's gas demand. Prior to 2013 data, companies supplying less than 1,750 GWh provided gas sales as a single sum which was then apportioned across sectors using the same proportional split as seen in the data from the large suppliers. From 2013 onwards, data from smaller suppliers were provided broken down by broad sector (e.g. domestic, other industry etc.) to allow more accurate apportioning of these data.

4.29 Data on sectoral gas use are primarily derived from surveys of large and small gas suppliers. Beyond this, data for electricity generation by major power producers are adjusted, such that the data agree with a separate data set collected via the Major Power Producers' (MPP) survey. Data for autogenerators are similarly adjusted to match CHP data (see Chapter 7) provided to DECC, with the appropriate amount of gas used for autogeneration being subtracted from each sector and added to the autogeneration figure. The same methodology is applied for heat sold, which makes up the heat generation figure. For 2000 and subsequent years, gas consumption for the iron and steel sector is based on data provided by the Iron and Steel Statistics Bureau (ISSB) rather than gas suppliers since gas suppliers were over estimating their sales to this sector. The difference between the ISSB and gas suppliers'' figures has been re-allocated to other sectors.

4.30 We updated our gas data collection methodology and analysis last year (see Energy Trends June 2014 special feature for details: www.gov.uk/government/statistics/energy-trends-june-2014). This change in methodology has resulted in shifts in sectoral gas use going back to 2008. In particular, gas use has shifted out of the industrial sector, with a subsequent increase in the services sector.

4.31 The sectors as defined in Chart 4.2 can be mapped across from Table 4.1 as follows: Industrial = Coke manufacture + Blast furnaces + Industry (sum) + Non energy use. Services = Public administration + Commercial + Agriculture + Miscellaneous. Domestic = Domestic. Energy industries = Heat generation + Oil and gas extraction + Petroleum refineries + Coal extraction + Other (Energy industry use). Electricity generators = Electricity generation.

## Period covered

4.32 Figures generally relate to years ended 31 December. However, before 2004, data for natural gas for electricity generation relate to periods of 52 weeks as set out in Chapter 5, paragraphs 5.83 and 5.84.

## Monthly and quarterly data

4.33 Monthly data on natural gas production and supply are available from DECC's energy statistics website: www.gov.uk/government/collections/gas-statistics in monthly Table 4.2. A quarterly commodity balance for natural gas (which includes consumption data) is published in DECC's quarterly statistical bulletin *Energy Trends* and is also available from quarterly Table 4.1 on the DECC section of the GOV.UK website.

## Statistical and metering differences

4.34 Table 4.3 shows production, transmission and consumption figures for UK continental shelf and onshore natural gas. Production includes waste and own use for drilling, production and pumping operations, but excludes gas flared. Gas available in the UK excludes waste, own use for drilling etc., stock change, and includes imports net of exports. Gas transmitted (input into inland transmission systems) is after stock change, own use, and losses at inland terminals. The amount consumed in the UK differs from the total gas transmitted by the gas supply industry because of losses in transmission, differences in temperature and pressure between the points at which the gas is measured, delays in reading meters and consumption in the works, offices, shops, etc. of the undertakings. The figures include an adjustment to the quantities billed to consumers to allow for the estimated consumption remaining unread at the end of the year.

4.35 In Table 4.3 there are several headings that refer to statistical or metering differences. These arise because measurement of gas flows, in volume and energy terms, takes place at several points along the supply chain. The main sub-headings in the table represent the instances in the supply chain where accurate reports are made of the gas flows at that particular key point in the supply process. It is possible to derive alternative estimates of the flow of gas at any particular point by taking the estimate for the previous point in the supply chain and then applying the known losses and gains in the subsequent part of the supply chain. The differences seen when the actual reported flow of gas at any point and the derived estimate are compared are separately identified in the table wherever possible, under the headings statistical or metering differences.

4.36 The relationship between total UK gas consumption shown in this Table 4.3 and total demand for natural gas given in the balance Table 4.1 is illustrated for 2014 as follows:

| | GWh |
|---|---|
| Total UK consumption (Table 4.3) | 719,816 |
| *Plus* producers' own use | 42,494 |
| *Plus* operators' own use | 3,331 |
| | *Equals* |
| Consumption of natural gas | 765,641 |
| *Plus* upstream losses and metering differences | - |
| *Plus* downstream losses – leakage assessment | 1,370 |
| *Plus* downstream losses – own gas use | 30 |
| *Plus* downstream losses – theft | 154 |
| *Plus* downstream losses – iron and steel losses | 1 |
| *Plus* downstream metering differences | 5,302 |
| | *Equals* |
| Total demand for natural gas (Table 4.1) | 772,497 |

4.37 The statistical difference row in Table 4.1 is made up of the following components in 2014:

| | GWh |
|---|---|
| Statistical difference between gas available at terminals and gas input to downstream (Table 4.3) | -488 |
| *Plus* Downstream gas industry: Distribution losses and metering differences | -379 |
| | *Equals* |
| Statistical difference for natural gas (Table 4.1) | -867 |

4.38 Losses and metering differences attributable to the information provided on the upstream gas industry are zero from 2001 onwards because these data are no longer reported in the revised PPRS System. This simplified system for reporting the production of crude oil, NGLs and natural gas in the UK was implemented from 1 January 2001; it reduced the burden on the respondents and improved the quality of data reported on gas production.

4.39 The differences in the natural gas commodity balances arise from several factors:-

- Limitations in the accuracy of meters used at various points of the supply chain. While standards are in place on the accuracy of meters, there is a degree of error allowed which, when large flows of gas are being recorded, can become significant.
- Differences in the methods used to calculate the flow of gas in energy terms. For example, at the production end, rougher estimates of the calorific value of the gas produced are used which may be revised only periodically, rather than the more accurate and more frequent analyses carried out further down the supply chain. At the supply end, although the calorific value of gas shows day-to-day variations, for the purposes of recording the gas supplied to customers a single calorific value is used. Until 1997 this was the lowest of the range of calorific values for the actual gas being supplied within each LDZ, resulting in a "loss" of gas in energy terms. In 1997 there was a change to a "capped flow-weighted average" algorithm for calculating calorific values resulting in a reduction in the losses shown in the penultimate row of Table 4.3. This change in algorithm, along with improved meter validation and auditing procedures, also reduced the level of the "metering differences" row within the downstream part of Table 4.3.
- Differences in temperature and pressure between the various points at which gas is measured. Until February 1997 British Gas used "uncorrected therms" on their billing system for tariff customers when converting from a volume measure of the gas used to an energy measure. This made their supply figure too small by a factor of 2.2 per cent, equivalent to about 1 per cent of the wholesale market.
- Differences in the timing of reading meters. While National Transmission System meters are read daily, customers' meters are read less frequently (perhaps only annually for some domestic

customers) and profiling is used to estimate consumption. Profiling will tend to underestimate consumption in a strongly rising market.

- Other losses from the system, for example theft through meter tampering by consumers.

4.40 The headings in Table 4.3 show where, in the various stages of the supply process, it has been possible to identify these metering differences as having an effect. Usually they are aggregated with other net losses as the two factors cannot be separated. Whilst the factors listed above can give rise to either losses or gains, losses are more common. However, the negative downstream gas metering difference within the transmission system in 2003 was an anomaly that was investigated by National Grid during 2004. They concluded that this unaccounted for element of National Transmission System shrinkage was due to an exceptional run of monthly negative figures between February and June 2003 within what is usually a variable but mainly positive series. However, after a comprehensive investigation of this exceptional period no causal factors were identified. It is probable that the meter error or errors that caused this issue were corrected during the validation of metering.

4.41 Care should be exercised in interpreting the figures for individual industries in these commodity balance tables. As companies switch contracts between gas suppliers, it has not been possible to ensure consistent classification between and within industry sectors and across years. The breakdown of final consumption includes a substantial amount of estimated data prior to 2013.

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# 4.1 Commodity balances

Natural gas

GWh

| | 2012 | | | 2013 | | | 2014 | | |
|---|---|---|---|---|---|---|---|---|---|
| | Natural gas | Colliery methane | Total Natural gas | Natural gas | Colliery methane | Total Natural gas | Natural gas | Colliery methane | Total Natural gas |
| **Supply** | | | | | | | | | |
| Production | 452,094 | 602 | 452,696 | 424,153 | 604 | 424,757 | 424,897 | 562 | 425,459 |
| Other sources | - | - | - | - | - | - | - | - | - |
| Imports | 549,518 | - | 549,518 | 535,105 | - | 535,105 | 477,163 | - | 477,163 |
| Exports | -144,023 | - | -144,023 | -109,664 | - | -109,664 | -127,907 | - | -127,907 |
| Marine bunkers | - | - | - | - | - | - | - | - | - |
| Stock change *(1)* | -269 | - | -269 | +621 | - | +621 | -2,383 | - | -2,383 |
| Transfers *(2)* | -56 | - | -56 | -61 | - | -61 | -140 | - | -140 |
| **Total supply** | **857,265** | **602** | **857,867** | **850,155** | **604** | **850,759** | **771,630** | **562** | **772,192** |
| **Statistical difference** *(3)* | -1,858r | - | -1,858r | +1,888r | - | +1,888r | -867 | - | -867 |
| **Total demand** | **859,123r** | **602** | **859,725r** | **848,267r** | **604** | **848,871r** | **772,497** | **562** | **773,059** |
| **Transformation** | **241,148r** | **486** | **241,634r** | **230,558r** | **491** | **231,049r** | **243,972** | **451** | **244,423** |
| Electricity generation | 216,056r | 486 | 216,543r | 205,831r | 491 | 206,322r | 217,944 | 451 | 218,395 |
| Major power producers | 184,307r | - | 184,307r | 175,210r | - | 175,210r | 189,919 | - | 189,919 |
| Autogenerators | 31,750r | 486 | 32,236r | 30,621r | 491 | 31,112r | 28,026 | 451 | 28,476 |
| Heat generation *(4)* | 25,091 | - | 25,091 | 24,727r | - | 24,727r | 26,028 | - | 26,028 |
| Petroleum refineries | - | - | - | - | - | - | - | - | - |
| Coke manufacture | - | - | - | - | - | - | - | - | - |
| Blast furnaces | - | - | - | - | - | - | - | - | - |
| Patent fuel manufacture | - | - | - | - | - | - | - | - | - |
| Other | - | - | - | - | - | - | - | - | - |
| **Energy industry use** | **56,235r** | **98** | **56,333r** | **53,775r** | **98** | **53,873r** | **49,281** | **98** | **49,379** |
| Electricity generation | - | - | - | - | - | - | - | - | - |
| Oil and gas extraction | 48,461 | - | 48,461 | 46,556 | - | 46,556 | 42,494 | - | 42,494 |
| Petroleum refineries | 1,619 | - | 1,619 | 1,151 | - | 1,151 | 1,140 | - | 1,140 |
| Coal extraction | 96 | 98 | 194 | 60 | 98 | 158 | 70 | 98 | 168 |
| Coke manufacture | - | - | - | - | - | - | - | - | - |
| Blast furnaces | 266 | - | 266 | 363 | - | 363 | 338 | - | 338 |
| Patent fuel manufacture | - | - | - | - | - | - | - | - | - |
| Pumped storage | - | - | - | - | - | - | - | - | - |
| Other | 5,793r | - | 5,793r | 5,645r | - | 5,645r | 5,240 | - | 5,240 |
| **Losses** *(5)* | **7,891** | - | **7,891** | **7,474** | - | **7,474** | **6,856** | - | **6,856** |
| **Final consumption** | **553,849r** | **18** | **553,867r** | **556,460r** | **15** | **556,475r** | **472,388** | **13** | **472,401** |
| **Industry** | **91,506** | **18** | **91,524** | **92,990r** | **15** | **93,005r** | **92,480** | **13** | **92,493** |
| Unclassified | - | 18 | 18 | - | 15 | 15 | - | 13 | 13 |
| Iron and steel | 5,091 | - | 5,091 | 5,338 | - | 5,338 | 5,448 | - | 5,448 |
| Non-ferrous metals | 1,890 | - | 1,890 | 1,931r | - | 1,931r | 1,969 | - | 1,969 |
| Mineral products | 15,092 | - | 15,092 | 15,184r | - | 15,184r | 15,136 | - | 15,136 |
| Chemicals | 15,205r | - | 15,205r | 14,288r | - | 14,288r | 14,449 | - | 14,449 |
| Mechanical Engineering, etc | 5,836 | - | 5,836 | 5,672r | - | 5,672r | 5,810 | - | 5,810 |
| Electrical engineering, etc | 2,633 | - | 2,633 | 2,613 | - | 2,613 | 2,493 | - | 2,493 |
| Vehicles | 4,006 | - | 4,006 | 4,483r | - | 4,483r | 4,342 | - | 4,342 |
| Food, beverages, etc | 20,163 | - | 20,163 | 20,616r | - | 20,616r | 20,538 | - | 20,538 |
| Textiles, leather, etc | 5,233 | - | 5,233 | 5,158 | - | 5,158 | 5,163 | - | 5,163 |
| Paper, printing, etc | 7,081 | - | 7,081 | 8,142r | - | 8,142r | 7,849 | - | 7,849 |
| Other industries | 5,071r | - | 5,071r | 5,178r | - | 5,178r | 5,027 | - | 5,027 |
| Construction | 4,205 | - | 4,205 | 4,387 | - | 4,387 | 4,255 | - | 4,255 |
| **Transport** | - | - | - | - | - | - | - | - | - |
| Air | - | - | - | - | - | - | - | - | - |
| Rail | - | - | - | - | - | - | - | - | - |
| Road | - | - | - | - | - | - | - | - | - |
| National navigation | - | - | - | - | - | - | - | - | - |
| Pipelines | - | - | - | - | - | - | - | - | - |
| **Other** | **456,573r** | - | **456,573r** | **457,873r** | - | **457,873r** | **374,478** | - | **374,478** |
| Domestic | 345,080 | - | 345,080 | 342,501r | - | 342,501r | 278,101 | - | 278,101 |
| Public administration | 43,243 | - | 43,243 | 44,419r | - | 44,419r | 36,969 | - | 36,969 |
| Commercial | 57,377 | - | 57,377 | 57,791r | - | 57,791r | 48,443 | - | 48,443 |
| Agriculture | 1,162 | - | 1,162 | 1,096 | - | 1,096 | 886 | - | 886 |
| Miscellaneous | 9,711r | - | 9,711r | 12,065r | - | 12,065r | 10,079 | - | 10,079 |
| **Non energy use** | **5,771** | - | **5,771** | **5,598** | - | **5,598** | **5,430** | - | **5,430** |

*(1) Stock fall (+), stock rise (-).*

*(2) Natural gas used in the manufacture of synthetic coke oven gas.*

*(3) Total supply minus total demand.*

*(4) Heat sold to third parties. Heat generation data are not available before 1999. For earlier years gas used to generate heat for sale is allocated to final consumption by sector.*

*(5) Refers to downstream losses. For an explanation of what is included under these losses, see paragraph 4.36.*

# 4.2 Supply and consumption of natural gas and colliery methane[1]

GWh

| | 2010 | 2011 | 2012 | 2013 | 2014 |
|---|---|---|---|---|---|
| **Supply** | | | | | |
| Production | 665,182 | 526,711 | 452,696 | 424,757 | 425,459 |
| Imports | 592,554 | 588,475 | 549,518 | 535,105 | 477,163 |
| Exports | -176,399 | -183,689 | -144,023 | -109,664 | -127,907 |
| Stock change *(2)* | +15,271 | -22,623 | -269 | +621 | -2,383 |
| Transfers | -263 | -60 | -56 | -61 | -140 |
| **Total supply** | **1,096,345** | **908,813** | **857,867** | **850,759** | **772,192** |
| **Statistical difference** *(3)* | -23r | +208r | -1,858r | +1,888r | -867 |
| **Total demand** | **1,096,368r** | **908,605r** | **859,725r** | **848,871r** | **773,059** |
| **Transformation** | **400,828r** | **332,012r** | **241,634r** | **231,049r** | **244,423** |
| Electricity generation | 377,121r | 309,076r | 216,543r | 206,322r | 218,395 |
| Major power producers | 345,685r | 277,527r | 184,307r | 175,210r | 189,919 |
| Autogenerators | 31,436 | 31,548 | 32,236r | 31,112r | 28,476 |
| Heat generation | 23,707 | 22,936 | 25,091 | 24,727r | 26,028 |
| Other | - | - | - | - | - |
| **Energy industry use** | **71,219r** | **62,905r** | **56,333r** | **53,873r** | **49,379** |
| Electricity generation | - | - | - | - | - |
| Oil and gas extraction | 61,124 | 53,163 | 48,461 | 46,556 | 42,494 |
| Petroleum refineries | 1,785 | 1,757 | 1,619 | 1,151 | 1,140 |
| Coal extraction | 260 | 223 | 194 | 158 | 168 |
| Coke manufacture | - | - | - | - | - |
| Blast furnaces | 641 | 453 | 266 | 363 | 338 |
| Other | 7,409r | 7,309r | 5,793r | 5,645r | 5,240 |
| **Losses** *(4)* | **12,795** | **9,926** | **7,891** | **7,474** | **6,856** |
| **Final consumption** | **611,526r** | **503,762r** | **553,867r** | **556,475r** | **472,401** |
| **Industry** | **98,929** | **94,515** | **91,524** | **93,005r** | **92,493** |
| Unclassified | 25 | 21 | 18 | 15 | 13 |
| Iron and steel | 6,124 | 5,829 | 5,091 | 5,338 | 5,448 |
| Non-ferrous metals | 1,856 | 1,840 | 1,890 | 1,931r | 1,969 |
| Mineral products | 18,562 | 16,093 | 15,092 | 15,184r | 15,136 |
| Chemicals | 17,467 | 16,034 | 15,205r | 14,288r | 14,449 |
| Mechanical engineering, etc | 5,556 | 5,661 | 5,836 | 5,672r | 5,810 |
| Electrical engineering, etc | 2,635 | 2,529 | 2,633 | 2,613 | 2,493 |
| Vehicles | 3,533 | 3,762 | 4,006 | 4,483r | 4,342 |
| Food, beverages, etc | 19,936 | 20,516 | 20,163 | 20,616r | 20,538 |
| Textiles, leather, etc | 5,425 | 5,348 | 5,233 | 5,158 | 5,163 |
| Paper, printing, etc | 8,140 | 7,458 | 7,081 | 8,142r | 7,849 |
| Other industries | 5,373 | 5,155 | 5,071r | 5,178r | 5,027 |
| Construction | 4,296 | 4,270 | 4,205 | 4,387 | 4,255 |
| **Transport** | - | - | - | - | - |
| Road *(5)* | - | - | - | - | - |
| **Other** | **504,508r** | **403,297r** | **456,573r** | **457,873r** | **374,478** |
| Domestic | 389,595 | 293,400 | 345,080 | 342,501r | 278,101 |
| Public administration | 45,473 | 42,960 | 43,243 | 44,419r | 36,969 |
| Commercial | 57,320 | 55,757 | 57,377 | 57,791r | 48,443 |
| Agriculture | 1,619 | 1,351 | 1,162 | 1,096 | 886 |
| Miscellaneous | 10,501r | 9,830r | 9,711r | 12,065r | 10,079 |
| **Non energy use** | **8,089** | **5,949** | **5,771** | **5,598** | **5,430** |

*(1) Colliery methane figures included within these totals are as follows:*

| | 2010 | 2011 | 2012 | 2013 | 2014 |
|---|---|---|---|---|---|
| **Total production** | **829** | **680** | **602** | **604** | **562** |
| Electricity generation | 618 | 497 | 486 | 491 | 451 |
| Coal extraction | 186 | 162 | 98 | 98 | 98 |
| Other industries | 25 | 21 | 18 | 15 | 13 |
| **Total consumption** | **829** | **680** | **602** | **604** | **562** |

*(2) Stock fall (+), stock rise (-).*
*(3) Total supply minus total demand.*
*(4) Refers to downstream losses. For an explanation of what is included under these losses, see paragraph 4.36.*

# 4.3 UK continental shelf and onshore natural gas production and supply[1]

GWh

| | 2010 | 2011 | 2012 | 2013 | 2014 |
|---|---|---|---|---|---|
| **Upstream gas industry:** | | | | | |
| Gross production *(2)* | 664,353 | 526,030 | 452,094 | 424,153 | 424,897 |
| *Minus* Producers' own use *(3)* | 61,124 | 53,163 | 48,461 | 46,556 | 42,494 |
| Exports | 176,399 | 183,689 | 144,023 | 109,664 | 127,907 |
| *Plus* Imports of gas | 592,554 | 588,475 | 549,518 | 535,105 | 477,163 |
| Gas available at terminals *(4)* | 1,019,384 | 877,653 | 809,129 | 803,038 | 731,659 |
| *Minus* Statistical difference *(5)* | 68 | -662 | -331 | -440 | -488 |
| **Downstream gas industry:** | | | | | |
| Gas input into the national transmission system *(6)* | 1,019,316 | 878,316 | 809,460 | 803,478 | 732,148 |
| *Minus* Operators' own use (7) | 6,268 | 5,852 | 3,900 | 3,534 | 3,331 |
| Stock change (storage sites) *(8)* | -15,271 | 22,623 | 269 | -621 | 2,383 |
| Metering differences *(5)* | 10,848 | 8,037 | 6,099 | 5,697 | 5,302 |
| Gas output from the national transmission system *(9)* | 1,017,471 | 841,804 | 799,191 | 794,869 | 721,132 |
| *Minus* Leakage assessment *(10)* | 1,642 | 1,603 | 1,537 | 1,537 | 1,370 |
| Own use gas *(11)* | 33 | 32 | 34 | 34 | 30 |
| Theft *(12)* | 270 | 253 | 218 | 203 | 154 |
| Transfers *(13)* | 263 | 60 | 56 | 61 | 140 |
| Losses *(14)* | 3 | 3 | 3 | 2 | 1 |
| Statistical difference and metering differences *(5)* | -92r | 869r | -1,527r | 2,328r | -379 |
| **Total UK consumption** *(15)* | **1,015,352r** | **838,984r** | **798,871r** | **790,704r** | **719,816** |
| Stocks of gas (at end year) *(16)* | 20,740 | 43,363 | 43,632 | 43,011 | 45,394 |
| Storage capacity *(17)* | 47,310 | 47,310 | 47,310 | 47,310 | 47,310 |

*(1) For details of where to find monthly updates of natural gas production and supply see paragraph 4.33.*
*(2) Includes waste and producers' own use, but excludes gas flared.*
*(3) Gas used for drilling, production and pumping operations.*
*(4) The volume of gas available at terminals for consumption in the UK as recorded by the terminal operators.*
*(5) Measurement of gas flows, in volume and energy terms, occurs at several points along the supply chain. As such, differences are seen between the actual recorded flow through any one point and estimates calculated for the flow of gas at that point. More detail on the reasons for these differences is given in the technical notes and definitions section of this chapter, paragraphs 4.38 to 4.41.*
*(6) Gas received as reported by the pipeline operators. The pipeline operators include National Grid, who run the national pipeline network, and other pipelines that take North Sea gas supplies direct to consumers.*
*(7) Gas consumed by pipeline operators in pumping operations and on their own sites.*
*(8) Stocks of gas held in specific storage sites, either as liquefied natural gas, pumped into salt cavities or stored by pumping the gas back into an offshore field. Stock rise (+), stock fall (-).*
*(9) Including public gas supply, direct supplies by North Sea producers, third party supplies and stock changes.*
*(10) This is a National Grid assessment of leakage through the local distribution system based on the National Leakage Reduction Monitoring Model.*
*(11) Currently quivalent to about 0.0113 per cent of LDZ throughput, this is an assessment of the energy used to counter the effects of gas cooling on pressure reduction.*
*(12) Calculated by National Grid as 0.02 per cent of LDZ throughput, this is theft before the gas reaches customer meters.*
*(13) Transfers are the use within the iron and steel industry for the manufacture of synthetic coke oven gas.*
*(14) Data for losses from the Iron and Steel Statistics Bureau Survey, converted from gigajoules to GWh assuming 0.2778 terajoules per GWh*
*(15) See paragraph 4.36 for an explanation of the relationship between these "Total UK consumption" figures and "Total demand" shown within the balance tables.*
*(16) Due to storage reconciliations, own use and metering differences, over a long period of years the stock levels based on gas put into storage and gas taken out of storage no longer reconciled with storage levels reported by National Grid. For 2011 action was taken to rectify this.*
*(17) Data compiled by DECC from individual storage site information. Converted from billion cubic metres to GWh assuming 11.02 kWh per cubic metre.*

# 4.4 Gas storage sites and import/export facilities in the United Kingdom at 31 May 2015

| Owner | Site | Location | Space (Billion $m^3$) | Approximate maximum delivery (Million $m^3$/day) | Type | Status *(2)* |
|---|---|---|---|---|---|---|
| **Operational storage** | | | | | | |
| Centrica Storage Ltd | Rough | Southern North Sea | 3.30 | 41 | Depleted field | Long |
| Scottish and Southern Energy & Statoil | Aldbrough | East Yorkshire | 0.30 | 40 | Salt cavern | Medium |
| E.ON | Holford | Cheshire | 0.20 | 22 | Salt cavern | Medium |
| Scottish and Southern Energy | Hornsea | East Yorkshire | 0.30 | 18 | Salt cavern | Medium |
| EDF Trading | Holehouse Farm | Cheshire | 0.05 | 11 | Salt cavern | Medium |
| Humbly Grove Energy | Humbly Grove | Hampshire | 0.30 | 7 | Depleted field | Medium |
| Scottish Power | Hatfield Moor | South Yorkshire | 0.07 | 2 | Depleted field | Medium |
| National Grid LNGS | Avonmouth | Avon and Somerset | 0.08 | 13 | LNG | Short |

| Facilities | Owner | Between / Location | Max flow rate (Million $m^3$/day) |
|---|---|---|---|
| **Imports** | | | |
| **Operational pipelines** | | | |
| Bacton-Zeebrugge Interconnector | Interconnector (UK) Limited | Zeebrugge and Bacton | 74 |
| Langeled Pipeline | Gassco | Nyhamna and Easington | 72 |
| BBL Pipeline | BBL Company | Balgzand and Bacton | 53 |
| Vesterled Pipeline | Gassco | Heimdal Riser Platform | 39 |
| Tampen Link | Gassco | Links Statfjord to FLAGS (terminating at St Fergus) | 27 |
| Gjøa Pipeline | Gassco | Links Gjøa/Vega to FLAGS and St Fergus (terminating at St Fergus) | 17 |
| **Liquefied Natural Gas (LNG) terminals** | | | |
| South Hook | Qatar Petroleum and ExxonMobil | Milford Haven | 58 |
| Isle of Grain | National Grid Grain LNG | Kent | 56 |
| Dragon | BG Group and Petronas | Milford Haven | 21 |
| Teesside GasPort | Excelerate | Teesside | 11 |
| **Exports** | | | |
| Bacton-Zeebrugge Interconnector | Interconnector (UK) Limited | Bacton and Zeebrugge | 55 |
| UK- Irish Gas Interconnector | Bord Gais | Moffat and Ireland | 31 |

(1) Information on gas storage as detailed in the National Grid Gas Ten Year Statement 2013

*(2) Long range, medium range or short range storage. Status is determined both by capacity size and injection, deliverability and storage re-cycling rates.*

# 4.5 Natural gas imports and exports (1)

GWh

| | 2010 | 2011 | 2012 | 2013 | 2014 |
|---|---|---|---|---|---|
| **Imports** | | | | | |
| *by pipelines from:* | | | | | |
| Belgium *(2)* | 13,568 | 4,032 | 14,264 | 35,367 | 3,949 |
| The Netherlands *(3)* | 87,120 | 69,001 | 78,258 | 81,519 | 70,293 |
| Norway *(4)* | 276,807 | 234,194 | 294,586 | 305,516 | 267,041 |
| Liquefied Natural Gas (5) | 206,846 | 274,794 | 150,097 | 102,620 | 123,912 |
| *of which:* | | | | | |
| *Algeria* | *11,697* | *2,687* | *1,311* | *4,492* | *5,774* |
| *Australia* | - | - | - | - | - |
| *Egypt* | *1,282* | *890* | *145* | *755* | - |
| *Nigeria* | *3,729* | *13,025* | *475* | - | *534* |
| *Norway* | *9,038* | *10,114* | *1,735* | *1,068* | - |
| *Qatar* | *162,384* | *234,077* | *146,431* | *95,204* | *113,600* |
| *Trinidad & Tobago* | *16,896* | *5,903* | - | *1,101* | *4,004* |
| *USA* | - | *1,575* | - | - | - |
| *Yemen* | *1,821* | *6,521* | - | - | - |
| **Total Imports** | **584,341** | **582,021** | **537,205** | **525,022** | **465,195** |
| **Exports to:** | | | | | |
| Belgium *(2)* | 95,932 | 101,526 | 50,343 | 27,458 | 48,074 |
| The Netherlands *(6)* | 15,830 | 17,544 | 23,729 | 18,597 | 18,852 |
| Norway *(7)* | 158 | 125 | 49 | 20 | 9 |
| Republic of Ireland *(8)* | 56,266 | 58,041 | 57,590 | 53,508 | 49,004 |
| **Total Exports** | **168,186** | **177,236** | **131,711** | **99,583** | **115,939** |
| **Net Imports** *(9)* | **416,155** | **404,785** | **405,494** | **425,439** | **349,256** |

(1) This table is also shown as Table G.5 of the Internet Annex G to the Digest.

(2) Physical flows of gas through the Bacton-Zeebrugge Interconnector. In tables 4.1 to 4.3 the commercial flows of gas through the pipeline are used. Commercial flows are the amounts of gas that companies requested be supplied through the pipeline. Net imports are the same whichever measurement is used.

(3) Physical flows via the Bacton-Balgzand (BBL) pipeline. Commissioned in November 2006.

(4) Currently via the Langeled and Vesterled pipelines, the Tampen Link (from Statfjord to FLAGS) and Gjoa/Vega (to FLAGS).

(5) From various sources to the Isle of Grain, Milford Haven and Teesside.

(6) Direct exports from the Grove, Chiswick, Markham, Minke, Stamford, Windermere and Wingate offshore gas fields using the Dutch offshore gas pipeline infrastructure.

(7) With effect from September 2007, UK gas from the Blane field to the Norwegian Ula field for injection into the Ula reservoir.

(8) Includes gas to the Isle of Man for which separate figures are not available.

(9) A negative figure means the UK was a net exporter of gas.

# 4.6 Liquefied Natural Gas imports by terminal

GWh

| | 2010 | 2011 | 2012 | 2013 | 2014 |
|---|---|---|---|---|---|
| **LNG Imports via:** | | | | | |
| Dragon (*Milford Haven) (1)* | 19,383 | 28,790 | 1,819 | 968 | 3,326 |
| Isle of Grain (*Isle of Grain*) *(2)* | 60,667 | 86,357 | 38,196 | 15,664 | 13,314 |
| South Hook (*Milford Haven*) *(3)* | 126,796 | 159,646 | 110,082 | 85,989 | 106,776 |
| Teesside GasPort (*Teesside*) *(4)* | - | - | - | - | - |
| | **206,846** | **274,794** | **150,097** | **102,620** | **123,416** |

*(1) Dragon began importing LNG to the UK in August 2009.*

*(2) LNG imports at Canvey Island commenced in 1965 but ceased in the early 1980's when, with increasing supplies from the North Sea, imports were no longer required. UK natural gas production peaked in 2000 and as a result of falling production LNG imports recommenced at the Isle of Grain in 2005.*

*(3) South Hook began importing LNG to the UK in April 2009.*

*(4) Teesside GasPort was commissioned in February 2007.*

# Chapter 5
# Electricity

## Key points

- Electricity generation (including pumped storage) in the UK fell by 5.6 per cent, from 359 TWh in 2013 to 339 TWh in 2014. Total electricity supply (including net imports) decreased by 3.8 per cent. (Tables 5.5 and 5.1)
- Final consumption of electricity in 2014, at 303 TWh, was down 4.3 per cent on 2013 and at its lowest level since 1995. (Table 5.1).
- Coal's share fell from 36 to 30 per cent, as generation fell from 131 TWh to 101 TWh; gas' share of generation increased from 27 per cent in 2013 to 30 per cent in 2014, as generation from gas increased from 96 TWh to 101 TWh. (Table 5.5)
- Renewables' share of generation increased from 14.8 per cent in 2013 to a new record 19.1 per cent in 2014, as a result of increased capacity. (Table 6A, in chapter 6)
- Low carbon electricity's share of generation increased from 35 per cent to a record 39 per cent, due to increased renewables generation. Nuclear generation decreased by 9.7 per cent, due to a number of outages in the second half of the year. (Table 5.5)
- Total capacity was 1.5 GW lower at the end of 2014 at 85 GW, with the closure of several stations almost offset by new renewable capacity. (Table 5.6)
- The UK remained a net importer of electricity in 2014, with net imports contributing 5.7 per cent of electricity supply. (Table 5.1)

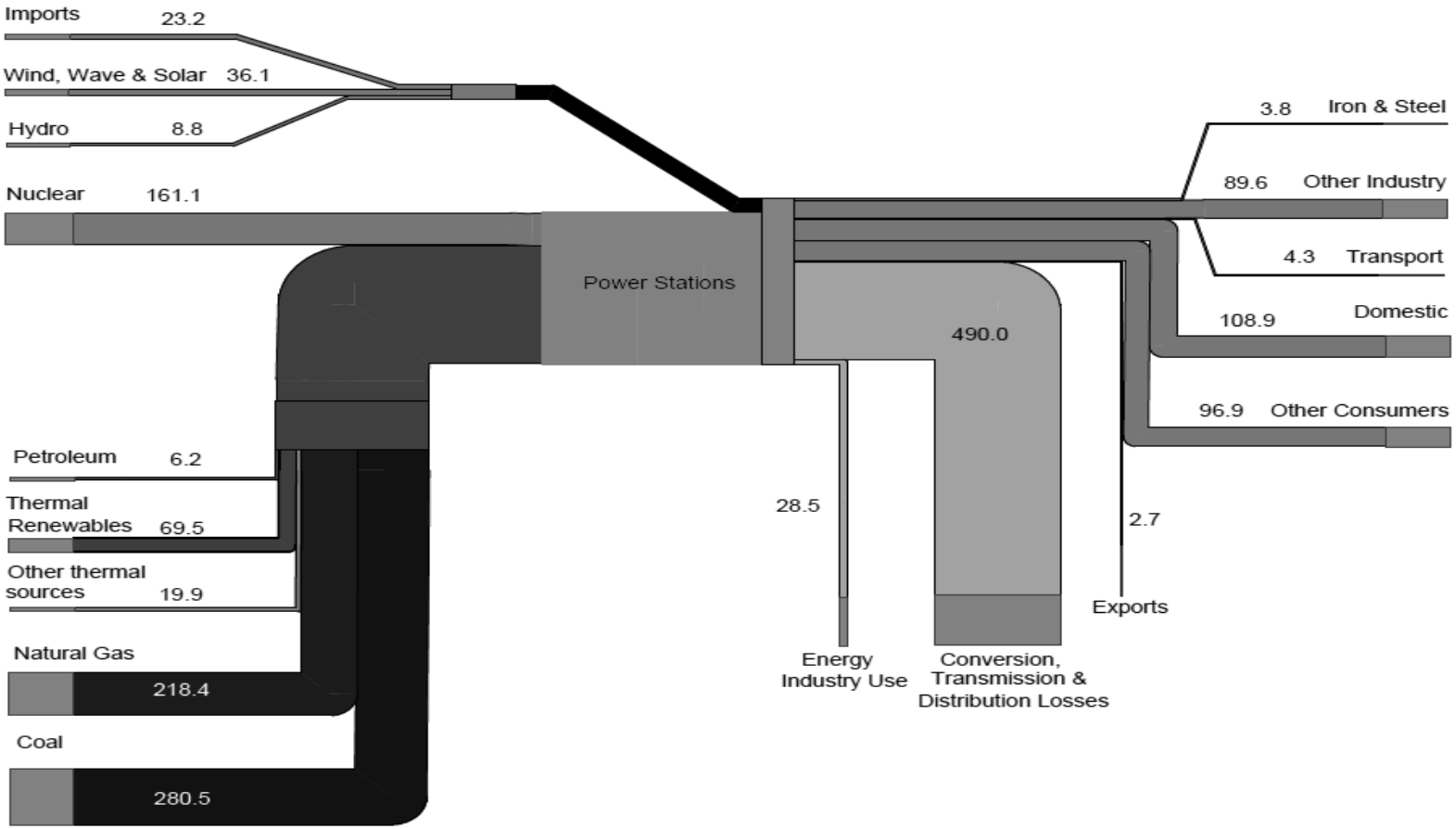
## Introduction

5.1 This chapter presents statistics on electricity from generation through to sales, and it includes statistics on generating capacity, fuel used for generation, load factors and efficiencies, and a map showing the electricity network in the United Kingdom and the location of the main power stations as at the end of May 2015 (page 127).

5.2 An energy flow chart for 2014, showing the flows of electricity from fuel inputs through to consumption, is included overleaf. This is a way of simplifying the figures that can be found in the commodity balance tables. It illustrates the flow of primary fuels from the point at which they become available for the production of electricity (on the left) to the eventual final use of the electricity produced or imported (on the right) as well as the energy lost in conversion, transmission and distribution.

5.3 Commodity balances for electricity, for each of the last five years, form the introductory table (Table 5.1). Table 5.2 separates out the public distribution system for electricity from electricity generated and consumed by autogenerators and uses a commodity balance format. Fuels used to generate electricity in the UK in each of the last five years are covered in Table 5.3. Table 5.4 shows the relationship between the commodity balance definitions and traditional Digest definitions of electricity, so that the most recent data can be linked to the long term trends data, which can be found on DECC's energy statistics web site. Table 5.5 shows the relationship between fuels used, generation and supply in each of the latest five years. Tables on plant capacity (Tables 5.6, 5.7 and 5.8) and on plant loads and efficiency (Table 5.9) have been included. Table 5.10 lists individual power stations in operation and is supplemented by a table showing large scale Combined Heat and Power (CHP) schemes in the UK (Table 5.11). The long term trends commentary and tables on fuel use, generation, supply and consumption back to 1970 can be found on DECC section of the GOV.UK website, at: www.gov.uk/government/collections/digest-of-uk-energy-statistics-dukes

# Electricity flow chart 2014 (TWh)




Notes:
This flow chart is based on the data in Tables 5.1 (for imports, exports, use, losses and consumption) and 5.5 (fuel used).
1. Hydro includes generation from pumped storage while electricity used in pumping is included under Energy Industry Use.
2. Conversion, Transmission and Distribution Losses is calculated as fuel used (Table 5.5) minus generation (Table 5.5) plus losses (Table 5.1).

## Commodity balances for electricity (Table 5.1)

5.4 In 2014, total electricity supply was 359 TWh, a fall of 3.8 per cent on 2013. Of this, just over 93 per cent of UK electricity supply was home produced and almost six per cent was from imports, net of exports. For electricity, supply is totally driven by demand – the impacts of improving energy efficiency and warmer temperatures, left final consumption in 2014 at its lowest level since 1995 (see paragraph 5.10). Table 5A below summarises the trend in total generation and supply over the last three years.

### Table 5A: Electricity generation and supply

GWh

| | 2012 | 2013 | 2014 |
|---|---|---|---|
| Total Generation (excl. pumped storage) | 360,612 | 356,264 | 336,043 |
| Total Supply | 375,450 | 373,597 | 359,437 |

5.5 In 2014, indigenous production fell by 5.7 per cent on 2013, to its lowest level since 1995. Of the 336 TWh produced (excluding pumped storage production), 89 per cent was from major power producers and 11 per cent from other generators, while 31 per cent was from primary sources (including nuclear, wind, solar and hydro) and 69 per cent from secondary sources (including coal, gas, oil and bioenergy).

5.6 Net imports in 2014 were up by 42 per cent on 2013, to a record 21 TWh. Imports rose by 33 per cent to their highest ever level, whilst exports were down by 12 per cent. In 2014, net imports from continental Europe via interconnectors with France and the Netherlands increased by 37 per cent to 23 TWh, with record levels from both the France (85 per cent utilisation) and Netherlands (90 per cent utilisation) interconnectors. This was offset by 2.4 TWh of net exports to Ireland. Net exports to the Republic of Ireland in 2014 (via the Wales interconnector, which opened in 2012) were up by 11 per cent compared to 2013; exports to the Republic of Ireland accounted for 95 per cent of UK exports in 2014. Net imports contributed 5.7 per cent of electricity supply in 2014, up from 3.9 per cent in 2013. Table 5B below shows the UK's net imports via interconnectors during the past three years.

### Table 5B: Net Imports via interconnectors 2012 to 2014

*GWh*

| | France - UK[1] | Ireland - N. Ireland[2] | Netherland - UK[1] | Ireland - Wales[1] | Total |
|---|---|---|---|---|---|
| 2012 | 6,365 | -153 | 5,763 | -104 | 11,871 |
| 2013 | 10,302 | -47 | 6,335 | -2,161 | 14,429 |
| 2014 | 14,951 | 111 | 7,856 | -2,408 | 20,510 |

*1. Figures taken from the demand data available on the National Grid website at www2.nationalgrid.com/UK/Industry-information/Electricity-transmission-operational-data/Data-Explorer/.*

*2. Figures taken from data available on the SEMO website at www.semo.com/marketdata/pages/energysettlement.aspx.*

5.7 Electricity generated by each type of fuel is also shown on the second page of Table 5.1. The link between electricity generated and electricity supplied is made in Table 5.5, and is discussed further in paragraphs 5.25 to 5.32.

5.8 Overall electricity demand fell by 3.9 per cent, from 375 TWh in 2013 to 360 TWh in 2014[1]. Of total demand, 29 TWh (7.9 per cent) was used within the energy industry, 29 TWh (7.9 per cent) was accounted for by losses, and 303 TWh (84 per cent) was final consumption, which fell by 4.3 per cent on 2013, remaining at its lowest level since 1995.

5.9 Temperatures influence the actual level of consumption especially in the winter months, as customers adjust heating levels in their homes and businesses. In 2014, temperatures were 1.2 degrees warmer than 2013 and it was the warmest year recorded since 1970. The average temperature during the first six months of 2014 was 2.5 degrees warmer than 2013 and included the warmest first quarter in seven years.

[1] *The term statistical difference is used to define the difference between total supply and total demand – see paragraph 5.90*

5.10 With the warmer temperatures in 2014, domestic consumption fell by 4.0 per cent on 2013, from 113 TWh to 109 TWh. Domestic consumption has generally been declining on account of milder winters and continuing energy efficiency improvements. Commercial sector consumption in 2014 fell on 2013's level, by 5.0 per cent, to 75 TWh. Agriculture consumption fell by 3.8 per cent, while public administration consumption fell by 3.3 per cent on 2013.

5.11 With the manufacturing sector having slowed since 2010, industrial consumption of electricity decreased, by 4.4 per cent on 2013, from 98 TWh to 93 TWh. Iron and steel fell by 0.5 per cent, while the other sectors fell by 5.3 per cent across the industrial sector.

5.12 Consumption in the transport sector was down slightly in 2014, at 4.3 TWh. Of this, 96 per cent of transport electricity consumption came from rail, as in 2013.

5.13 Industrial consumption accounted for 26 per cent of total demand for electricity, less than the share of consumption by households (30 per cent), with transport and the services sector accounting for 22 per cent. Within the industrial sector, the three largest specified consuming industries are chemicals, food and paper, which together account for 40 per cent of industrial consumption. Taken together, the engineering industries and vehicles accounted for a further 19 per cent of industrial consumption of electricity. The iron and steel sector is also a substantial user of electricity but part of its consumption is included against blast furnaces and coke ovens under energy industry uses. A note on the estimates included within these figures can be found in paragraphs 5.86 to 5.89. Chart 5.1 shows the total demand for electricity in 2014, by final consumer.

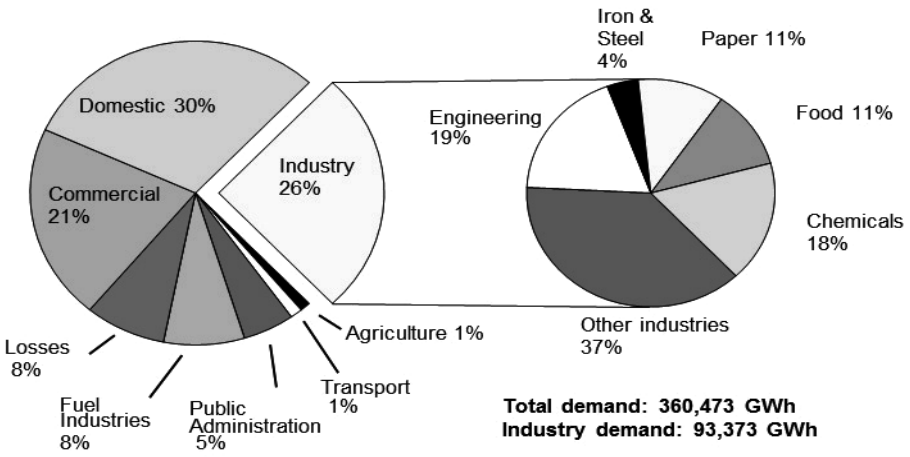
5.14 Consumption by the energy industries fell by 6.2 per cent. This decrease was largely driven by a decrease in the amount of electricity used in generation, which accounts for 60 per cent of the energy industries' total use of electricity. This decrease was due to the fall in generation from coal power stations (which use more electricity in production than gas stations) and an increase in generation from wind and hydro. Additionally, 14 per cent of energy industry use is accounted for by pumping at pumped storage stations (see 'pumped storage' line in Table 5.1), while petroleum refineries are also significant consumers with 16 per cent of energy industry use. Energy industry use as a proportion of total demand was 7.9 per cent in 2014.

5.15 Losses as a proportion of electricity demand in 2014, at 7.9 per cent, were up by 0.5 percentage points on 2013 (7.4 per cent). The losses item has three components[2]:

- transmission losses (6.5 TWh) from the high voltage transmission system, which represented about 23 per cent of the figure in 2014;
- distribution losses (21 TWh), which occur between the gateways to the public supply system's network and the customers' meters, and accounted for about 74 per cent of losses; and
- theft or meter fraud (1.0 TWh, around 3 per cent).

[2] *See paragraph 5.78 for further information on the calculation of losses.*

**Chart 5.1: Electricity demand by sector 2014**




## Commodity balances for the public distribution system and for other generators (Table 5.2)

5.16 Table 5.2 expands on the commodity balance format to show consumption divided between electricity distributed over the public distribution system (PDS) and electricity provided by other generators (largely autogeneration and generation from renewable sources). Major power producers (MPPs) provide the majority of power to the PDS, with the remainder made up of transfers from other generators and net imports. Further information on the definitions of other generators and MPPs can be found in paragraph 5.66. Table 5.2 also expands the domestic sector (to show consumption by payment type) and the commercial sector (to show detailed data beyond that presented in Table 5.1).

5.17 The proportion of electricity supplied by the public distribution system dropped marginally to 94 per cent in 2014. Of electricity supplied by other generators, 39 per cent (15 TWh) was transferred to the public distribution system in 2014, a decrease of around 1.5 percentage points on 2013.

5.18 In 2014, 5.2 per cent of final consumption of electricity was by other generators and did not pass over the public distribution system. This was a slight increase on the 4.5 per cent in 2013. A substantial proportion of electricity used in the energy industries is self-generated (around 23 per cent in 2014). At petroleum refineries the proportion is even higher; in 2014, 75 per cent of electricity consumed was self-generated.

5.19 In 2014, 9.5 per cent of the industrial demand for electricity was met by autogeneration, an increase of 0.9 percentage points on the previous year. Table 1.9 in Chapter 1 shows the fuels used by autogenerators to generate this electricity within each major sector and also the quantities of electricity generated and consumed.

5.20 Of the electricity consumed by the domestic sector in 2014, 19 per cent was reported as being purchased under some form of off-peak pricing structure (e.g. Economy 7). Fifteen per cent of consumption was through prepayment systems, broadly unchanged from the level in 2013.

5.21 Domestic consumption of electricity produced, and consumed, by households with micro-generation units (such as solar photovoltaic panels) installed is also shown in the table from 2010. The number of these installations has increased sharply since the Great Britain Feed in Tariff (FiT) scheme was launched in April 2010 (see paragraph 6.18 for further information on FiTs uptake). In 2014, consumption of self-produced electricity by the domestic sector increased by 42 per cent on 2013, to stand at 940 GWh, more than forty times the 23 GWh consumed in 2010. However, self-produced electricity still only accounts for 0.9 per cent of domestic consumption.

## Electricity fuel use, generation and supply (Tables 5.3 & 5.5)

5.22 In Table 5.3, fuel used by electricity generators is measured in both original units and, for comparative purposes, in the common unit of million tonnes of oil equivalent. In Table 5.5, figures are quoted in a third unit, namely GWh, in order to show the link between fuel use and electricity generated[3] as well as showing generation from conventional steam stations and from combined cycle gas turbine stations over the most recent five years.

5.23 A historical series of fuel used in generation on a consistent, energy supplied, fuel input basis is available at Table 5.1.1 on the DECC section of the GOV.UK website and accessible from the Digest of UK Energy Statistics home page: www.gov.uk/government/collections/digest-of-uk-energy-statistics-dukes

5.24 Fuel used in 2014 fell 7.6 per cent, from 76.1 million tonnes of oil equivalent (mtoe) to 70.3 mtoe, with coal use down by 23 per cent, and gas use up by 5.9 per cent.

5.25 Total electricity generated (including pumped storage) in the United Kingdom in 2014 was 339 TWh, a decrease of 5.6 per cent on the 359 TWh in 2013 due to a fall in demand. Major power producers (MPPs, as defined in paragraph 5.67) accounted for 89 per cent of electricity generation in 2014. Generation by MPPs was down 7.4 per cent on 2013, at 301 TWh, while generation by other generators was 11 per cent up on a year earlier, at 38 TWh.

5.26 In 2014 there was a 9.7 per cent decrease in generation from nuclear, from 71 TWh to 64 TWh due to planned and unplanned outages affecting four EDF nuclear stations. This was following successive increases in generation since 2010 (during which there had been extensive maintenance outages, particularly to Sizewell B which was offline for six months).

5.27 Generation from gas increased by 5.1 per cent, from 96 TWh in 2013 to 101 TWh in 2014. This was mainly due to due to lower wholesale gas prices between June and August and to help meet the shortfall in generation caused by nuclear outages in the second half of the year. In 2014, generation from coal decreased 23 per cent, from 131 TWh in 2013 to 101 TWh due to the closure of several power stations and the conversion of a second unit at Drax from coal to biomass. Generation by coal in the 'Other Generators' sector had seen a large fall in 2013, this was mainly due to Lynemouth power station being re-classified as a MPP (following the closure of the aluminium smelter it previously powered).

5.28 In 2014, generation from oil continued to fall, to 1.9 TWh, a 10 per cent reduction on 2013, its lowest level in the last eighteen years, and a fall of 4.8 TWh on 2008's ten year high.

5.29 Generation by all renewable sources[4] rose 21 per cent, to 65 TWh, between 2013 and 2014. Increased capacity in 2014 resulted in overall wind and solar generation[5] increasing by 19 per cent to 36 TWh. With rainfall levels in catchment areas during 2014 around 15 per cent higher than 2013, hydro generation increased by 25 per cent, from 4.7 TWh to a record 5.9 TWh. Over the same period, generation from bio-energy (including biodegradable wastes) rose 25 per cent to 23 TWh, due to the conversion of second unit at Drax from coal to biomass during 2014[6]. More information on renewable electricity can be found in Chapter 6.

5.30 Table 5.5 also shows electricity supplied data, which deducts stations' own use of electricity from its generation. These data take into account the fact that some stations use relatively more electricity than others in the generation process itself. In total, gross electricity supplied in 2014 was

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*3 Conversion factors for switching between mtoe, GWh and other units of energy can be found on page 233 and inside back cover flap.*

*4 Renewables includes wind, natural flow hydro, solar, wave, tidal and bioenergy (including co-firing).*

*5 Including generation from wave and tidal.*

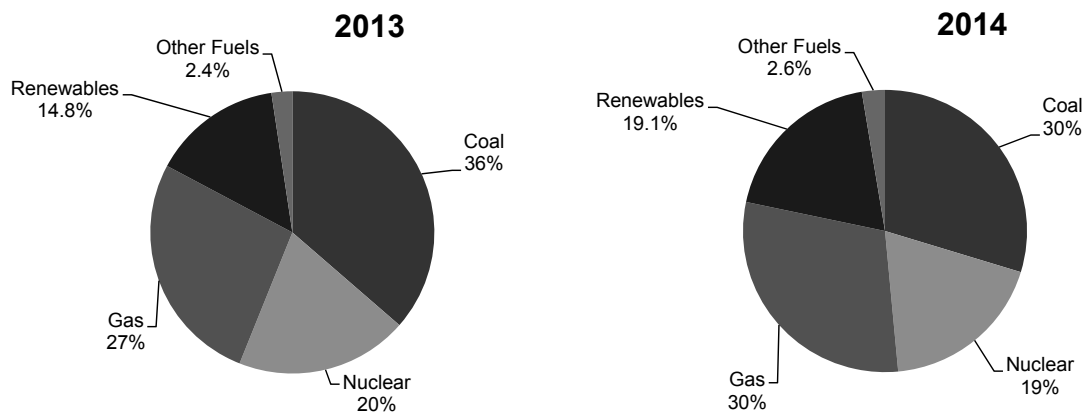
*6 For consistency with the Renewables chapter (Chapter 6), non-biodegradable wastes (previously included in thermal renewables / bio-energy) have been moved to the 'other fuels' category for 2007 onwards. Prior to this, they remain in thermal renewables.*

5.5 per cent less than in 2013, at 322 TWh. For coal-fired stations it was 23 per cent less, for nuclear it was 9.7 per cent less, while for gas stations it was 5.1 per cent more.

5.31 Chart 5.2 shows the share of 2014 generation by fuel, on an output basis (i.e. the percentage of electricity generated by the fuel), compared with 2013. Further information on this, and the alternative, input basis, of comparing fuel use, can be found in paragraphs 5.74 to 5.75

5.32 Gas' share of generation in 2014, at 30 per cent, was 3.0 percentage points higher than in 2013. Coal's share, at 30 per cent, was 6.7 percentage points less than in 2013. Nuclear's 19 per cent share was 0.8 percentage points down from 2013. Renewables' share increased from 14.8 per cent in 2013 to a new record 19.1 per cent in 2014. Other fuels, including oil and pumped storage, increased from 2.4 per cent in 2013 to 2.6 per cent in 2014.

**Chart 5.2: Shares of electricity generation, by fuel**




## Relating measurements of supply, consumption and availability (Table 5.4)

5.33 Table 5.4 shows the relationship between these terms for the latest five years. For the full definitions of the terms used in the commodity balances see Annex A, paragraphs A.7 to A.42.

## Plant capacity (Tables 5.6, 5.7 and 5.8)

5.34 Table 5.6 shows capacity, i.e. the maximum power available at any one time, for MPPs and other generators by type of plant. From 2006 onwards, MPP capacities are measured in Transmission Entry Capacity (TEC) terms, rather than Declared Net Capacity (DNC)[7].

5.35 In 2014, total capacity of all generators was 84,987 MW, down 1.4 per cent from the 86,200 MW installed at the end of 2013. MPPs fell by 1,538 MW, from 78,508 MW to 76,970 MW. This was mostly due to the closure of Barking (CCGT), Uskmouth and the partial closure of Ferrybridge C (both coal). Some of this reduction in capacity was offset by the increase in wind capacity (de-rated, see paragraph 5.79), which increased by 800 MW in 2014 after a similarly large increase in 2013, along with a 390 MW increase in capacity of renewables other than hydro and wind. The past five years have seen the closure, capacity reduction, full or partial mothballing, or conversion to biomass, of several large power stations. These are summarised in table 5C below.

[7] *The effect of this change has been to increase the capacity of MPPs by about 2,000 MW in total. A full definition of TEC and DNC is given in paragraph 5.79. Wind, small scale hydro, and solar photovoltaic DNC is de-rated to take into account intermittency. Renewables installed capacity figures are given in table 6.4.*

## Table 5C: Major Power Producers capacity closed, converted or reduced (as at end of May 2015), since end-2010

| Site | Fuel | Status | Previous Capacity (MW) | New Capacity (MW) | Year of closure, capacity reduction or conversion |
|---|---|---|---|---|---|
| Fife | CCGT | Closed | 123 | 0 | 2011 |
| Derwent | CCGT-CHP | Closed | 228 | 0 | 2012 |
| Shotton | CCGT-CHP | Closed | 210 | 0 | 2012 |
| Kingsnorth A | Coal/Oil | Closed | 1,940 | 0 | 2012 |
| Grain A | Oil | Closed | 1,300 | 0 | 2012 |
| Oldbury | Nuclear [1] | Closed | 434 | 0 | 2012 |
| Wylfa (Reactor 1) | Nuclear [2] | Partially Closed | 980 | 490 | 2012 |
| Keadby | CCGT | Mothballed | 749 | 0 | 2013 |
| Kings Lynn | CCGT | Mothballed | 340 | 0 | 2013 |
| Roosecote | CCGT | Mothballed | 229 | 0 | 2013 |
| Cockenzie | Coal | Closed | 1,152 | 0 | 2013 |
| Drax | Coal [3] | Partially Converted | 3,870 | 3,870 | 2013 |
| Ironbridge | Coal [4] | Converted | 940 | 360 | 2013 |
| Tilbury B | Coal [5] | Closed | 750 | 0 | 2013 |
| Didcot A | Coal/Gas | Closed | 1,958 | 0 | 2013 |
| Fawley | Oil | Closed | 1,036 | 0 | 2013 |
| Teesside | OCGT [6] | Closed | 45 | 0 | 2013 |
| Ferrybridge C | Coal [7] | Partially Closed | 1,960 | 980 | 2014 |
| Drax | Coal [3] | Partially Converted | 3,870 | 3,870 | 2013 |
| Uskmouth | Coal [8] | Closed | 363 | 0 | 2014 |
| Barking | CCGT | Closed | 1,000 | 0 | 2014 |
| Littlebrook D | Oil | Closed | 1,370 | 0 | 2015 |

*1. Reactor 2 with capacity of 217 MW closed on 30 June 2011, reactor 1 with capacity of 217 MW closed on 29 February 2012.*

*2. Reactor 2 with a capacity of 490 MW closed on 30 April 2012.*

*3. Partly converted to biomass. One unit (645 MW) converted in 2013 and a second unit (also 645 MW) converted in 2014. Overall capacity remains at 3,870 MW (coal 2,580 MW, biomass 1,290 MW).*

*4. Converted from coal to dedicated biomass in 2013 (at 900 MW), before reducing to 360 MW in April 2014.*

*5. Converted from coal at 1,063 MW capacity to dedicated biomass at 750 MW capacity in 2011 before closing in 2013.*

*6. Reduced capacity from 1,875 MW (CCGT 1,830 MW / OCGT 45 MW) to 45 MW (OCGT) in 2011 before closing in 2013.*

*7. Two units (980 MW) closed in April 2014.*

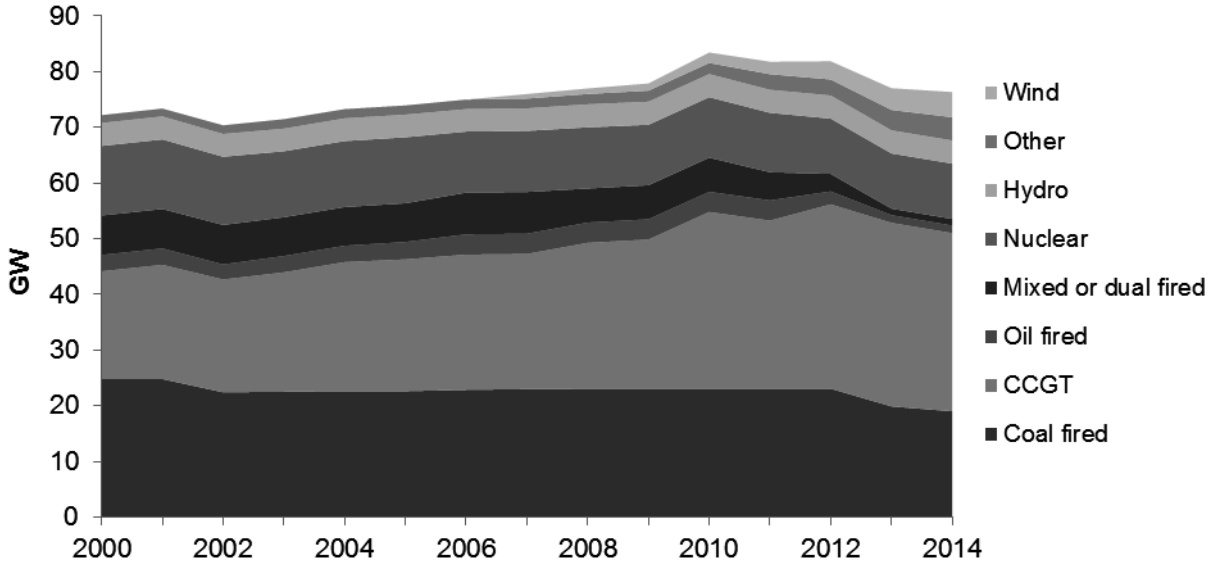
*8. One unit (120 MW) closed in April 2013, with the remaining two closing in April 2014.*

5.36 At the end of 2014, MPPs accounted for 91 per cent of the total generating capacity, broadly in line with the previous four years. The capacity of other generators increased by 325 MW (4.2 per cent), with a 247 MW increase in capacity from renewables other than hydro and wind[8], a 265 MW increase in capacity from conventional steam stations and a 182 MW increase in wind capacity offset by a net 373 MW decrease in CCGT stations. A breakdown of the capacity of the MPPs' plants at the end of December each year from 2000 to 2014 is shown in Chart 5.3.

5.37 Table 5.7 separates the capacities of MPPs geographically to show England and Wales, Scotland and Northern Ireland. In 2014, 82 per cent of the generating capacity in the UK owned by MPPs was in England and Wales, 14 per cent was in Scotland and 3.3 per cent in Northern Ireland. Of the net decrease in UK capacity of 1,822 MW between 2013 and 2014, there was a 2,020 MW fall in England and Wales and a 198 MW increase in Scotland. The capacity in Northern Ireland remained unchanged in 2014.

*8 Approximately 74 MW of this increase is due to solar photovoltaic capacity installed under the Feed in Tariff (FiT) scheme. For further information on FiTs, see paragraph 6.18.*

**Chart 5.3: Generating capacity of major power producers 2000-2014**




*1. 'Other' includes gas turbines, oil engines and renewables other than hydro.*
*2. 'Hydro' includes natural flow and pumped storage.*
*3. 'Mixed or dual fired' includes non-CCGT stations that can be fuelled by a combination of gas, coal and oil*
*4. Wind included from 2007*

5.38 In Table 5.8, data for the generating capacity for generators other than MPPs are shown according to the industrial classification of the generator. For CHP, schemes are classified according to the sector that receives the majority of the heat (as opposed to the sector in which the CHP operator was considered to operate). In 2014, 56 per cent of capacity was in the commercial and domestic sectors, a 3.4 percentage points increase on a year earlier[9]. In 2014, the chemicals sector and the oil and gas terminals and oil refineries sector each had 11 and 12 per cent of capacity respectively, while engineering and other metal trades had a 2.9 per cent share and paper, printing and publishing and food, drink and tobacco had a combined share of 12 per cent.

5.39 In addition to tables 5.6-5.8, table 5.12 showing installed capacity, disaggregated by connection type (high voltage or low voltage) and technology, can be found on the DECC section of the GOV.UK website, at: www.gov.uk/government/collections/digest-of-uk-energy-statistics-dukes

## Plant loads, demand and efficiency (Table 5.9)

5.40 Table 5.9 shows the maximum load met each year, load factors (by type of plant and for the system in total) and indicators of thermal efficiency. Maximum demand figures cover the winter period ending the following March. With the advent of BETTA (see paragraph 5.53), England, Wales and Scotland are covered by a single network and a single maximum load is shown for Great Britain for 2006 to 2014.

5.41 Maximum load (demand) in the UK during the winter of 2014/2015 occurred on 19 January 2015. At 53,858 MW, this was 0.8 per cent higher than the previous winter's maximum on 25 November 2013. In 2014/15, the maximum load in Great Britain occurred on 19 January 2015 at the half hour period ending 17:30 (52,516 MW), at which time Northern Ireland had a load of 1,342 MW. However, in Northern Ireland the maximum load occurred on 10 December 2014 at the period ending 17:30 (1,770 MW), which was 4.7 per cent above that of the previous winter. In Great Britain the highest ever load met was 60,118 MW on 10 December 2002.

[9] *The total capacity of 'Other Generators' fell in 2007 as, from this point, the capacity of major wind farm operators are included under MPPs (see paragraph 5.68). In 2008, Shotton CHP plant was re-classified as a MPP as the electricity generated is now exported to the grid rather than for use in the nearby paper mill. This change in classification led to a fall in capacity in the paper, printing and publishing sector.*

5.42 Maximum demand in 2014/2015 was 70 per cent of the UK capacity of major power producers (MPPs) (as shown in Table 5.6) as measured at the end of December 2014, a marginal increase on 2013/2014.

5.43 In Great Britain, maximum demand in December 2014 was 70 per cent of the England, Wales and Scotland capacity of MPPs (Table 5.7). For Northern Ireland, the proportion was 53 per cent (64 per cent in 2013/14). These percentages do not include the capacities available via the interconnectors with neighbouring grid systems nor demand for electricity via these interconnectors.

5.44 Plant load factors measure how intensively each type of plant has been used. The load factor of nuclear stations in 2014 at 66.6 per cent was 7.1 percentage points lower than in 2013, due to planned and unplanned outages at four EDF nuclear stations. With generation from gas increasing in 2014 to help meet demand, the CCGT load factor increased to 30.5 per cent. This was following reductions in each year since 2009, from 2008's eight-year high of 71.0 per cent. Between 2013 and 2014, the load factor for coal fired power stations decreased by 7.8 percentage points, to 51.2 per cent, the lowest since 2011.

5.45 Load factors for natural flow hydro and wind (as well as other renewables) can be found in table 6.5[10]. Wind speeds were broadly unchanged in 2014 and there was a slight decrease in the overall wind load factor (on an unchanged configuration basis) of 0.8 percentage points, from 31.0 per cent in 2013 to 30.2 per cent in 2014. Onshore wind fell from 27.9 per cent to 26.4 per cent, while offshore wind remained broadly unchanged at 37.7 per cent, higher than the load factor for CCGT stations in 2014. Rainfall (in the main hydro areas) was 15 per cent higher in 2014 compared to 2013, leading to an increase in the hydro load factor (on an unchanged configuration basis) of 7.4 percentage points, from 31.5 per cent to 38.8 per cent in 2014[11]. Pumped storage use is less affected by the weather and the load factor fell successively from 2009 to 2011, as lower peak time demand for electricity and lower prices deterred its use. In 2014, the load factor remained at 2013 levels, at 12.0 per cent.

5.46 Thermal efficiency measures the efficiency with which the heat energy in fuel is converted into electrical energy. Generally, nuclear efficiency has remained between 38 and 40 per cent over the last decade with older, with an increase of 0.3 percentage points from 2013 to 39.6% in 2014. The efficiencies presented here are calculated using **gross** calorific values to obtain the energy content of the fuel inputs[12].

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*10 The load factors presented in table 5.9 use transmission entry capacity (as presented in table 5.6). For hydro and wind, this has been de-rated for intermittency, so is not suitable for calculating load factors. The installed capacity measure used in Chapter 6 has not been de-rated.*

*11 For renewables load factors, including the unchanged configuration and standard (average beginning and end of year) measures, see table 6.5*

*12 For more information on gross and net calorific values, see paragraph 5.81*

## Power stations in the United Kingdom (Tables 5.10 and 5.11)

5.47 Table 5.10 lists the operational power stations owned by Major Power Producers in the United Kingdom as at the end of May 2015, along with their installed capacity and the year they began to generate electricity. Where a company operates several stations they are grouped together.

5.48 Table 5.11 shows CHP schemes of 1 MW and over for which the information is publicly available. However, it is the total power output of these stations that is given, not just that which is classed as good quality CHP under the CHP Quality Assurance programme (CHPQA, see Chapter 7), since CHPQA information for individual sites is not publicly available.

5.49 In Table 5.10, generating stations using renewable sources are also listed in aggregate form in the "Other power stations" section apart from hydro, wind and biomass/waste stations operated by the major power producers, which appear in the main table. For completeness, CHP stations not appearing in the main table are included in aggregate in this section. Details of the interconnectors between England and France, England and the Netherlands, Scotland and Northern Ireland, Northern Ireland and the Irish Republic, and Wales and the Irish Republic are also given in this table. The total installed capacity of all the power stations individually listed in Table 5.10 is 80,946 MW[13].

### Carbon dioxide emissions from power stations

5.50 It is estimated that carbon dioxide emissions from power stations accounted for 30 per cent of the UK's total carbon dioxide emissions in 2014. Emissions vary by type of fuel used to generate the electricity and emissions estimates for all electricity generation for 2012 to 2014 are shown in Table 5D below.

**Table 5D: Estimated carbon dioxide emissions from electricity supplied 2012 to 2014** [1,2]

| Fuel | Emissions (tonnes of carbon dioxide per GWh electricity supplied) | | |
|---|---|---|---|
| | 2012 | 2013 | 2014 [3] |
| Coal | 906 | 906 | 903 |
| Gas | 386 | 380 | 365 |
| All fossil fuels | 699 | 690 | 642 |
| All fuels (including nuclear and renewables) | 482 | 448 | 394 |

*1. The carbon intensity figures presented in Table 5D are different to those produced for the Greenhouse Gas Inventory (GHGI). The differences arise due to slightly differing methodologies, including geographical coverage and treatment of autogenerators but principally because the GHGI presents figures based on a 5-year rolling average whereas those in Table 5A are presented as single year figures.*

*2. The numerator includes emissions from power stations, with an estimate added for auto-generation. The denominator (electricity supplied by all generators) used in these calculations can be found in table 5.5, with the figure for All fuels in 2014 being 318,522 GWh.*

*3. The 2014 emissions figures are provisional.*

### Sub-national electricity data

5.51 The collection of data relating to regional and local consumption of electricity began in 2004. For details of the availability of local level electricity (and gas) data see Chapter 4, paragraph 4.17 and the sub-national electricity statistics pages on the DECC section of the GOV.UK website at: www.gov.uk/government/collections/sub-national-electricity-consumption-data. A summary of electricity consumption at regional level is given in Table 5E and relates to 2013. The regional data will not sum exactly to the figures given in table 5.4 as the regional data are not based exactly on a calendar year and are obtained via different data sources.

*13 The total installed capacity for stations listed in table 5.10 differs from the total in table 5.6, as the latter is on a Transmission Entry Capacity basis, and taken as at the end of 2014. See paragraph 5.79 for more information on the measures of capacity.*

## Table 5E: Electricity sales 2013

| | Domestic sector sales (GWh) | Number of domestic customers (thousand)[1] | Industrial and commercial sector sales (GWh) | Number of I & C customers (thousand)[1] | All consumers sales (GWh) |
|---|---|---|---|---|---|
| Greater London | 13,102 | 3,440 | 27,376 | 397 | 40,478 |
| South East | 16,058 | 3,755 | 22,744 | 331 | 38,802 |
| North West | 11,977 | 3,153 | 20,191 | 236 | 32,168 |
| Scotland | 10,653 | 2,765 | 15,220 | 214 | 25,873 |
| East of England | 10,956 | 2,574 | 15,800 | 217 | 26,756 |
| West Midlands | 9,494 | 2,388 | 14,997 | 196 | 24,492 |
| South West | 10,346 | 2,460 | 13,931 | 248 | 24,277 |
| Yorkshire and the Humber | 8,603 | 2,348 | 15,083 | 179 | 23,686 |
| East Midlands | 7,770 | 2,003 | 13,342 | 159 | 21,113 |
| Wales | 5,180 | 1,386 | 10,366 | 124 | 15,546 |
| North East | 4,102 | 1,199 | 7,767 | 81 | 11,869 |
| Unallocated Consumption | 180 | 50 | 4,737 | 24 | 4,917 |
| Great Britain | 108,420 | 27,521 | 181,556 | 2,404 | 289,976 |
| Northern Ireland[2] | | | | | 7,834 |
| Sales direct from high voltage lines[3] | | | | | 3,879 |
| Total | | | | | 301,689 |

*1. Figures are the number of Meter Point Administration Numbers (MPANs); every metering point has this unique reference number.*
*2. Northern Ireland data are based on data for electricity distributed provided by Northern Ireland Electricity.*
*3. Based on estimate provided by Ofgem.*

5.52 By the end of December 2014, over 67 per cent of customers were no longer with their home supplier. Table 5F gives market penetration in more detail, by distribution areas of the former public electricity suppliers supplied by the largest of the UK's energy companies. Data on the share of supply by the smaller companies are not currently available so the table has not been adjusted for the survey coverage. For all types of domestic customer, it is in the markets in the West Midlands, the North West and the North East of England that new suppliers have had most success. As of the end of 2014, the share of the market not supplied by the home supplier stood at 57 per cent of the credit market, 67 per cent of the direct debit market, and 62 per cent of the pre-payment market.

## Table 5F: Domestic electricity market penetration (in terms of percentage of customers supplied) by Public Electricity Supply area and payment type, fourth quarter of 2014

| | Home Supplier | | | Other Major Supplier | | |
|---|---|---|---|---|---|---|
| Region | Credit | Direct Debit | Prepayment | Credit | Direct Debit | Prepayment |
| West Midlands | 35 | 25 | 24 | 65 | 75 | 76 |
| North West | 38 | 25 | 31 | 62 | 75 | 69 |
| Yorkshire | 35 | 27 | 24 | 65 | 73 | 76 |
| North East | 35 | 26 | 21 | 65 | 74 | 79 |
| Eastern | 43 | 28 | 29 | 57 | 72 | 71 |
| East Midlands | 41 | 29 | 35 | 59 | 71 | 65 |
| South East | 42 | 33 | 36 | 58 | 67 | 64 |
| Merseyside and North Wales | 38 | 29 | 39 | 62 | 71 | 61 |
| South West | 44 | 34 | 40 | 56 | 66 | 60 |
| London | 45 | 37 | 42 | 55 | 63 | 58 |
| Southern Scotland | 43 | 36 | 52 | 57 | 64 | 48 |
| Southern | 55 | 43 | 48 | 45 | 57 | 52 |
| South Wales | 62 | 49 | 63 | 38 | 51 | 37 |
| Northern Scotland | 72 | 60 | 70 | 28 | 40 | 30 |
| Great Britain | 43 | 33 | 38 | 57 | 67 | 62 |

## Structure of the industry

5.53 Up to March 2005 the electricity industries of Scotland, Northern Ireland and England and Wales operated independently although interconnectors joined all three grid systems together. From April 2005, under the British Electricity Trading and Transmission Arrangements (BETTA) introduced in the Energy Act 2004, the electricity systems of England and Wales and Scotland have been integrated. The paragraphs below describe the position up to March 2005 but indicate the further changes that have been made under BETTA.

5.54 From the period immediately after privatisation of the industry in 1990, when there were seven generating companies in England and Wales and 12 Regional Electricity Companies distributing and supplying electricity to customers in their designated area, there were many structural and business changes and residual flotations. At the end of 2014, there were 38 major power producers operating in Great Britain. Competition developed in mainland Britain as follows:

(a) From 1 April 1990, customers with peak loads of more than 1 MW (about 45 per cent of the non-domestic market) were able to choose their supplier;

(b) From 1 April 1994, customers with peak loads of more than 100 kW were able to choose their supplier;

(c) Between September 1998 and May 1999, the remaining part of the electricity market (i.e. below 100 kW peak load) was opened up to competition. Paragraph 5.52 and Table 5F give more details of the opening up of the domestic gas and electricity markets to competition.

5.55 Since the late 1990s, there have been commercial moves toward vertical re-integration between generating, electricity distribution and/or electricity supply businesses. Those mergers that have taken place were approved by the relevant competition authority. Initially the National Grid Company was owned by the 12 privatised regional electricity companies, but was floated on the Stock Exchange in 1995. National Grid (and its predecessors since 1990) has owned and operated the high voltage transmission system in England and Wales linking generators to distributors and some large customers. The transmission system is linked to continental Europe via an interconnector to France under the English Channel, and since 1 April 2011, to the Netherlands under the North Sea (see Table 5.10). Up to March 2005, the Scottish transmission system was regarded as being linked to that in England and Wales by two interconnectors but under BETTA National Grid also took on responsibility for operating the system in Scotland, to form a single Great Britain transmission network.

5.56 In Scotland, until the end of March 2005, the two main companies, Scottish Power and Scottish and Southern Energy, covered the full range of electricity provision. They operated generation, transmission, distribution and supply businesses. In addition, there were a number of small independent hydro stations and some independent generators operating fossil-fuelled stations, which sold their output to Scottish Power and Scottish and Southern Energy.

5.57 The electricity supply industry in Northern Ireland has been in private ownership since 1993 with Northern Ireland Electricity plc (NIE) (part of the Viridian Group) responsible for power procurement, transmission, distribution and supply in the Province. Generation is provided by three private sector companies who own the four major power stations. In December 2001, the link between Northern Ireland's grid and that of Scotland was inaugurated. A link between the Northern Ireland grid and that of the Irish Republic was re-established in 1996, along which electricity is both imported and exported. However, on 1 November 2007 the two grids were fully integrated and a joint body SEMO (Single Electricity Market Operator) was set up by SONI (System Operator for Northern Ireland) and Eirgrid from the Republic to oversee the new single market. In July 2012, an interconnector between the Irish Republic and Wales began operations.

5.58 In March 2001, the means of trading electricity changed with the introduction in England and Wales of the New Electricity Trading Arrangements (NETA). This replaced the Electricity Pool of England and Wales. These arrangements were based on bi-lateral trading between generators, suppliers, traders and customers. They were designed to be more efficient and provide greater choice for market participants, whilst maintaining the operation of a secure and reliable electricity system. The system included forwards and futures markets, a balancing mechanism to enable National Grid,

as system operator, to balance the system, and a settlement process. In April 2005 this system was extended to Scotland under BETTA.

## Comparisons of electricity in the European Union in 2013[14]

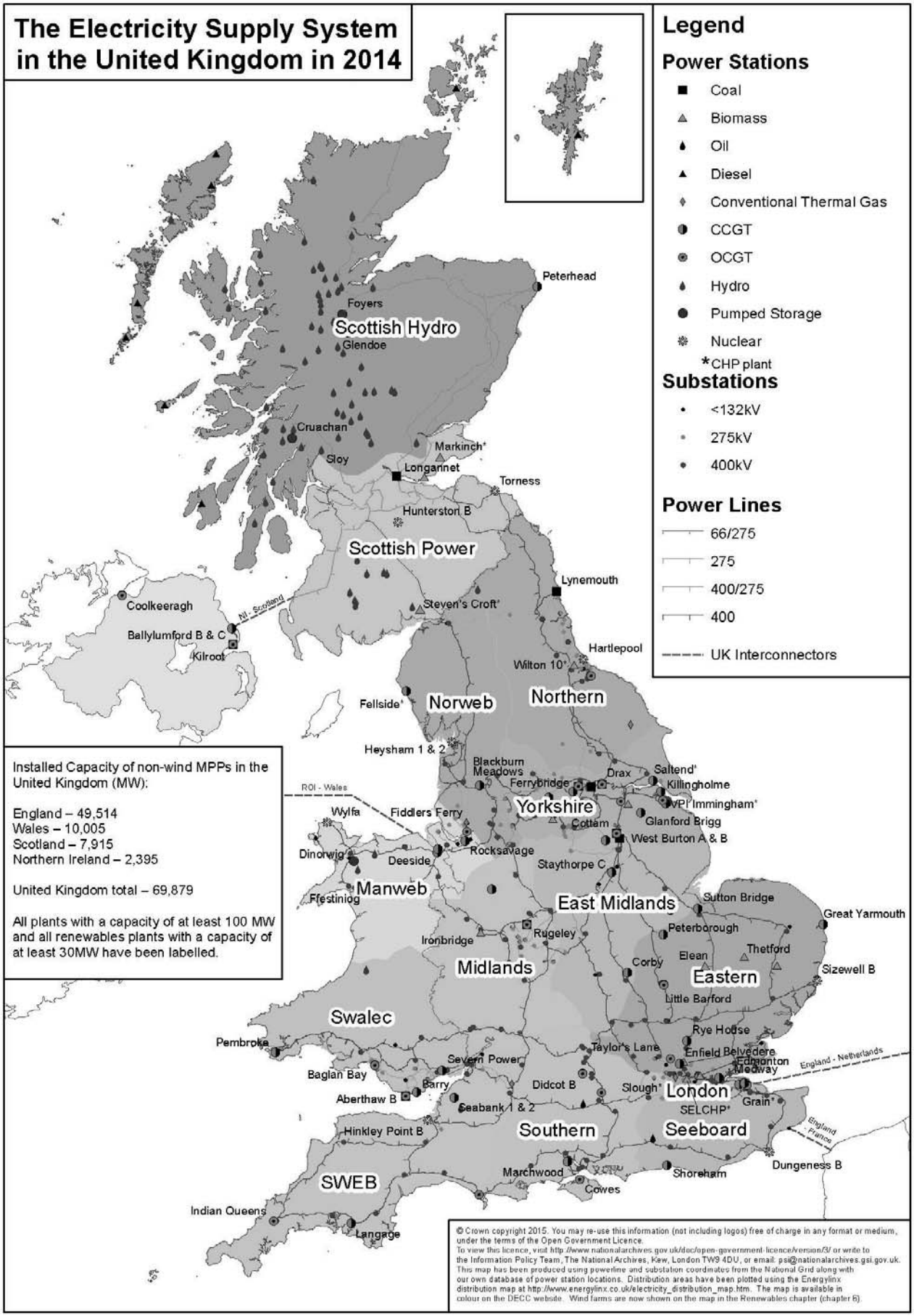
5.59 The European Union (EU) as a whole generated 3,254 TWh of electricity in 2013. Of this, 11 per cent was generated in the UK. Germany generated the largest share of electricity in the EU, with 20 per cent. Industry had 36 per cent of EU final electricity consumption, households 30 per cent, services 30 per cent and, transport 2 per cent.

5.60 In 2013, the largest sources of the EU's generation were coal and nuclear, each with a share of 27 per cent of total generation and gas 16 per cent. France sources the largest share of its generation from nuclear, with 74 per cent, while 43 per cent of Sweden's electricity is from nuclear. The largest shares of coal in the generation mix are in Germany (with over half coming from lignite/brown coal), with 44 per cent, and Denmark, with 41 per cent. Italy and Spain source the largest share of their electricity from gas, with 38 per cent and 20 per cent of generation respectively in 2013.

5.61 Renewables represented 28 per cent of the EU's generation. Sweden sources 55 per cent of its electricity from renewables (mainly hydro, but also 8 per cent from biomass). Denmark's 48 per cent renewables share comes from wind (32 per cent) and biomass (15 per cent), the highest share of generation from wind in the EU. Spain's 40 per cent renewables share comes mainly from wind (19 per cent) and hydro (14 per cent). Italy had 38 per cent of its generation from renewables, with Germany and France 26 per cent and 18 per cent respectively.

5.62 France's exports, net of imports, were 8 per cent of its generation in 2013, making it the highest net exporter of electricity. For Italy, however, net imports represented 15 per cent of its electricity requirements, making it the highest net importer.

[14] *At the time of writing, the latest available data were for 2013. Data from Eurostat, at: http://ec.europa.eu/eurostat/data/database*


The Electricity Supply System in the United Kingdom in 2014
Legend
Power Stations
Coal
Biomass
Oil
Diesel
Conventional Thermal Gas
CCGT
OCGT
Hydro
Pumped Storage
Nuclear
*CHP plant
Substations
<132kV
275kV
400kV
Power Lines
66/275
275
400/275
400
UK Interconnectors
Installed Capacity of non-wind MPPs in the United Kingdom (MW):
England – 49,514
Wales – 10,005
Scotland – 7,915
Northern Ireland – 2,395
United Kingdom total – 69,879
All plants with a capacity of at least 100 MW and all renewables plants with a capacity of at least 30MW have been labelled.
Peterhead
Foyers
Scottish Hydro
Glendoe
Cruachan
Sloy
Markinch*
Longannet
Torness
Hunterston B
Scottish Power
Coolkeeragh
NI - Scotland
Ballylumford B & C
Kilroot
Lynemouth
Steven's Croft*
Hartlepool
Wilton 10*
Fellside*
Norweb
Northern
Heysham 1 & 2
Blackburn Meadows
Ferrybridge
Drax
Saltend*
Killingholme
VPI Immingham*
Yorkshire
Glanford Brigg
Cottam
West Burton A & B
ROI - Wales
Wylfa
Fiddlers Ferry
Dinorwig
Deeside
Rocksavage
Staythorpe C
Manweb
Ffestiniog
East Midlands
Sutton Bridge
Great Yarmouth
Peterborough
Rugeley
Ironbridge
Thetford
Elean
Corby
Midlands
Eastern
Sizewell B
Little Barford
Swalec
Rye House
Pembroke
Taylor's Lane
Enfield Belvedere
Edmonton
Medway
England - Netherlands
Severn Power
Baglan Bay
Barry
Didcot B
Slough*
London
Grain*
Aberthaw B
Seabank 1 & 2
SELCHP*
Hinkley Point B
Southern
Seeboard
England - France
Dungeness B
Marchwood
Shoreham
SWEB
Cowes
Indian Queens
Langage
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To view this licence, visit http://www.nationalarchives.gov.uk/doc/open-government-licence/version/3/ or write to the Information Policy Team, The National Archives, Kew, London TW9 4DU, or email: psi@nationalarchives.gsi.gov.uk.
This map has been produced using powerline and substation coordinates from the National Grid along with our own database of power station locations. Distribution areas have been plotted using the Energylinx distribution map at http://www.energylinx.co.uk/electricity_distribution_map.htm. The map is available in colour on the DECC website. Wind farms are now shown on the map in the Renewables chapter (chapter 6).

## Technical notes and definitions

5.63 These notes and definitions are in addition to the technical notes and definitions covering all fuels and energy as a whole in Chapter 1, paragraphs 1.29 to 1.62. For notes on the commodity balances and definitions of the terms used in the row headings see Annex A, paragraphs A.7 to A.42. While the data in the printed and bound copy of this Digest cover only the most recent five years, these notes also cover data for earlier years that are available on the DECC energy statistics web site.

### Electricity generation from renewable sources

5.64 Figures on electricity generation from renewable energy sources are included in the tables in this section. Further detailed information on renewable energy sources is included in Chapter 6.

### Combined heat and power

5.65 Electricity generated from combined heat and power (CHP) schemes, CHP generating capacities and fuel used for electricity generation are included in the tables in this chapter. However, more detailed analyses of CHP schemes are set out in Chapter 7.

### Generating companies

5.66 Following the restructuring of the electricity supply industry in 1990, the term "Major generating companies" was introduced into the electricity tables to describe the activities of the former nationalised industries and distinguish them from those of autogenerators and new independent companies set up to generate electricity. The activities of the autogenerators and the independent companies were classified under the heading "Other generating companies". In the 1994 Digest, a new terminology was adopted to encompass the new independent producers, who were then beginning to make a significant contribution to electricity supply. Under this terminology, all companies whose prime purpose is the generation of electricity are included under the heading "Major power producers" (or MPPs). The term "Other generators" ("Autogenerators" in the balance tables) is restricted to companies who produce electricity as part of their manufacturing or other commercial activities, but whose main business is not electricity generation. "Other generators" also covers generation by energy services companies at power stations on an industrial or commercial site where the main purpose is the supply of electricity to that site, even if the energy service company is a subsidiary of a MPP. Additionally (and particularly since 2010), this category includes generation from the domestic sector.

5.67 The definition of MPPs was amended in 2008 to include major wind farm companies, but this change only applies to data for 2007 onwards. Most generators of electricity from renewable sources (apart from large scale hydro, large scale wind and some biofuels) are also included as "Other generators" because of their comparatively small size, even though their main activity is electricity generation.

5.68 Major wind farm operators have been included under MPPs, for 2007 onwards, in the monthly, quarterly, and annual tables of electricity statistics produced by DECC. Until then, all generation using wind turbines was excluded from the MPP classification. This was because originally such generation was by small independent companies and collecting data on a monthly basis was prohibitively costly and unnecessarily burdensome on such companies.

5.69 Generation from wind has now become more concentrated in the hands of larger companies and DECC has extended its system of monthly data collection to cover the largest wind power companies. The intention is that, in future, any company whose wind generation capacity increases to above 50 MW will be asked to provide monthly data for generation from wind and thus be included in the list of MPPs.

5.70 The inclusion of major wind farm operators under MPPs affects the majority of the electricity tables in DUKES, with figures for MPPs and the public distribution system increased, and other generators reduced for 2007 onwards.

5.71 **Major power producers at the end of 2014 were:**
AES Electric Ltd, Baglan Generation Ltd, British Energy plc, Centrica Energy, CEP Wind 2 Ltd/CEP Wind 3 Ltd, Coolkeeragh ESB Ltd, Corby Power Ltd, DONG Energy UK Ltd, Drax Power Ltd, E.On

UK, EDF Energy, Eggborough Power Ltd, Energy Power Resources, Engie, Falck Renewables Ltd, Fred Olsen, Greencoat UK Wind, Infinis, Intergen, , LondonWaste Ltd, Magnox Ltd, MPF Operations Ltd, Peel Energy Ltd, Px Ltd, RES Ltd, Riverside Resources Recovery Ltd, RWE Npower plc, Scottish and Southern Energy plc, Scottish Power plc, Semcorp Utilities (UK) Ltd, SELCHP Ltd, Statkraft Energy Ltd, Statkraft Wind UK Ltd, Third Energy Trading Ltd, Vattenfall Wind Power, VPI Immingham LLP.

5.72 **Additionally, the following major wind farm companies are included**, beginning with data for 2007:

CEP Wind 2 Ltd, Dong Energy, Engie, Falck, Fred Olsen, Greencoat UK Wind, HG Capital, Infinis, Peel, Renewable Energy Systems, Statkraft Wind UK Ltd, Vattenfall Wind Power.

Generation from wind farms owned or operated by the following MPPs that had previously been excluded from the MPP category are now included for 2007 onwards:

Centrica Energy, EDF Energy, E.On UK plc, RWE Npower plc, Scottish Power plc, Scottish and Southern Energy plc.

## Types of station

5.73 The various types of station identified in the tables of this chapter are as follows:

**Conventional steam stations** are stations that generate electricity by burning fossil fuels to convert water into steam, which then powers steam turbines.

**Nuclear stations** are also steam stations but the heat needed to produce the steam comes from nuclear fission.

**Gas turbines** use pressurised combustion gases from fuel burned in one or more combustion chambers to turn a series of bladed fan wheels and rotate the shaft on which they are mounted. This then drives the generator. The fuel burnt is usually natural gas or gas oil.

**Combined cycle gas turbine (CCGT) stations** combine in the same plant gas turbines and steam turbines connected to one or more electrical generators. This enables electricity to be produced at higher efficiencies than is otherwise possible when either gas or steam turbines are used in isolation. The gas turbine (usually fuelled by natural gas or oil) produces mechanical power (to drive the generator) and waste heat. The hot exhaust gases (waste heat) are fed to a boiler, where steam is raised at pressure to drive a conventional steam turbine that is also connected to an electrical generator.

**Natural flow hydro-electric stations** use natural water flows to turn turbines.

**Pumped storage hydro-electric stations** use electricity to pump water into a high level reservoir. This water is then released to generate electricity at peak times. Where the reservoir is open, the stations also generate some natural flow electricity; this is included with natural flow generation. As electricity is used in the pumping process, pumped storage stations are net consumers of electricity.

**Wind farms** use wind flows to turn turbines.

**Other stations** include stations burning fuels such as landfill gas, sewage sludge, biomass and waste.

## Electricity supplied – input and output basis

5.74 The energy supplied basis defines the primary input (in million tonnes of oil equivalent, Mtoe) needed to produce 1 TWh of hydro, wind, or imported electricity as:

$$\text{Electricity generated (TWh)} \times 0.085985$$

The primary input (in Mtoe) needed to produce 1 TWh of nuclear electricity is similarly

$$\frac{\text{Electricity generated (TWh)} \times 0.085985}{\text{Thermal efficiency of nuclear stations}}$$

5.75 Figures on fuel use for electricity generation can be compared in two ways. Table 5.3 illustrates one way by using the volumes of **fuel input** to power stations (after conversion of inputs to an oil equivalent basis), but this takes no account of how efficiently that fuel is converted into electricity. The fuel input basis is the most appropriate to use for analysis of the quantities of particular fuels used in electricity generation (e.g. to determine the additional amount of gas or other fuels required as coal use declines under tighter emissions restrictions). A second way uses the amount of electricity generated and supplied by each fuel. This **output** basis is appropriate for comparing how much, and what percentage, of electricity generation comes from a particular fuel. It is the most appropriate method to use to examine the dominance of any fuel and for diversity issues. Percentage shares based on fuel outputs reduce the contribution of coal and nuclear, and increase the contribution of gas (by three percentage points in 2014) compared with the fuel input basis. This is because of the higher conversion efficiency of gas.

## Public distribution system

5.76 This comprises the grid systems in England and Wales, Scotland and Northern Ireland. In April 2005 the Scotland and England and Wales systems were combined into a single grid.

## Sectors used for sales/consumption

5.77 The various sectors used for sales and consumption analyses are standardised across all chapters of the 2015 Digest. For definitions of the sectors see Chapter 1 paragraphs 1.56 to 1.60 and Annex A paragraphs A.31 to A.42.

## Losses

5.78 The losses component of electricity demand are calculated as follows:
Transmission losses: electricity lost as a percentage of electricity entering the GB transmission system (as reported by National Grid); this is applied to the electricity available figure in DUKES 5.4 (338,557 GWh in 2014).
Distribution losses: electricity lost in distribution as a percentage of electricity entering the distribution system (as reported by the distribution network operators); this is applied to electricity available less transmission losses.
Theft: a fixed percentage of 0.3 per cent is assumed to be stolen from the distribution network. This is applied to electricity available less transmission losses.

## Transmission Entry Capacity, Declared Net Capacity and Installed Capacity

5.79 Transmission Entry Capacity (TEC) is a Connection and Use of System Code term that defines a generator's maximum allowed export capacity onto the transmission system. In the generating capacity statistics of the 2007 Digest, it replaced Declared Net Capacity (DNC) as the basis of measurement of the capacity of Major Power Producers from 2006. DNC is the maximum power available for export from a power station on a continuous basis minus any power generated or imported by the station from the network to run its own plant. It represents the nominal maximum capability of a generating set to supply electricity to consumers. The maximum rated output of a generator (usually under specific conditions designated by the manufacturer) is referred to as its Installed Capacity. For the nuclear industry, the World Association of Nuclear Operators (WANO) recommends that capacity of its reactors is measured in terms of Reference Unit Power (RUP) and it is the RUP figure that is given as the installed capacity of nuclear stations.

5.80 DNC is used to measure the maximum power available from generating stations that use renewable resources. For wind and wave and small scale hydro a factor is applied to declared net capability to take account of the intermittent nature of the energy source (e.g. 0.43 for wind, 0.365 for small scale hydro and 0.17 for solar photovoltaics). Further information on this can be found in paragraph 6.115, and at: www.legislation.gov.uk/uksi/1990/264/made?view=plain

## Load factors

5.81 The following definitions are used in Table 5.9:

**Maximum load** – Twice the largest number of units supplied in any consecutive thirty minutes commencing or terminating at the hour.

**Simultaneous maximum load met** – The maximum load on the transmission network at any one time, net of demand met by generation connected to the distribution network. From 2005 (following

the introduction of BETTA – see paragraph 5.53) it is measured by the sum of the maximum load met in Great Britain and the load met at the same time in Northern Ireland. Prior to 2005 it was measured by the sum of the maximum load met in England and Wales and the loads met at the same time by companies in other parts of the United Kingdom.

**Plant load factor** – The average hourly quantity of electricity supplied during the year, expressed as a percentage of the average output capability at the beginning and the end of year.

**System load factor** – The average hourly quantity of electricity available during the year expressed as a percentage of the maximum demand nearest the end of the year or early the following year.

## Thermal efficiency

5.82 Thermal efficiency is the efficiency with which heat energy contained in fuel is converted into electrical energy. It is calculated for fossil fuel burning stations by expressing electricity generated as a percentage of the total energy content of the fuel consumed (based on average gross calorific values). For nuclear stations it is calculated using the quantity of heat released as a result of fission of the nuclear fuel inside the reactor. The efficiency of CHP systems is discussed separately in Chapter 7, paragraph 7.23 and 7.24 and Table 7D. Efficiencies based on gross calorific value of the fuel (sometimes referred to as higher heating values or HHV) are lower than the efficiencies based on net calorific value (or lower heating value LHV). The difference between HHV and LHV is due to the energy associated with the latent heat of the evaporation of water products from the steam cycle which cannot be recovered and put to economic use.

## Period covered

5.83 Until 2004, figures for the MPPs relate to periods of 52 weeks as listed below (although some data provided by electricity supply companies related to calendar months and were adjusted to the statistical calendar). In 2004, a change was made to a calendar year basis. This change was made in the middle of the year and the data are largely based on information collected monthly. The January to May 2004 data are therefore based on the 21 weeks ended 29 May 2004 and the calendar months June to December 2004, making a total of 361 days. In terms of days, 2004 is therefore 1.1 per cent shorter than 2005:

| **Year** | **52 weeks ended** |
|---|---|
| 2003 | 28 December 2003 |
| 2004 | 21 weeks ended 29 May 2004 and 7 months ended 31 December 2004 |
| 2005 – 2014: | 12 months ended 31 December |

5.84 Figures for industrial, commercial and transport undertakings relate to calendar years ending on 31 December, except for the iron and steel industry where figures relate to the following 52 or 53 week periods:

| **Year** | **53 weeks ended** |
|---|---|
| 2003 | 3 January 2004 |
| | **52 weeks ended** |
| 2004 | 1 January 2005 |
| 2005 | 31 December 2005 |
| 2006 | 30 December 2006 |
| 2007 | 29 December 2007 |
| 2008 | 27 December 2008 |
| | **53 weeks ended** |
| 2009 | 2 January 2010 |
| | **52 weeks ended** |
| 2010 | 1 January 2011 |
| 2011 | 31 December 2011 |
| 2012 | 29 December 2012 |
| 2013 | 28 December 2013 |
| 2014 | 27 December 2014 |

## Monthly and quarterly data

5.85 Monthly and quarterly data on fuel use, electricity generation and supply and electricity availability and consumption are available on the DECC section of the GOV.UK website at: www.gov.uk/government/collections/electricity-statistics. Monthly data on fuel used in electricity generation by MPPs are given in Monthly Table 5.3 and monthly data on supplies by type of plant and type of fuel are given in Monthly Table 5.4. Monthly data on availability and consumption of electricity by the main sectors of the economy are given in Monthly Table 5.5. A quarterly commodity balance for electricity is published in DECC's quarterly statistical bulletin *Energy Trends* (Quarterly Table 5.2) along with a quarterly table of fuel use for generation, electricity generated, and electricity supplied by all generators (Quarterly Table 5.1). Both these quarterly tables are also available from DECC's energy statistics web site. See Annex C for more information about *Energy Trends*.

## Data collection

5.86 For MPPs, as defined in paragraphs 5.66 to 5.68, the data for the tables in this Digest are obtained from the results of an annual DECC inquiry, sent to each company, covering generating capacity, fuel use, generation and sales of electricity (where a generator also supplies electricity).

5.87 Similarly, an annual inquiry is sent to licensed suppliers of electricity to establish electricity sales by these companies. Electricity consumption for the iron and steel sector is based on data provided by the Iron and Steel Statistics Bureau (ISSB) rather than electricity suppliers since electricity suppliers tend to over-estimate their sales to this sector by including some companies that use steel rather than manufacture it. The difference between the ISSB and electricity suppliers' figures has been re-allocated to other sectors. A further means of checking electricity consumption data is now being employed on data for 2006 and subsequent years. A monthly inquiry is sent to electricity distributors, as well as the National Grid, to establish electricity distribution and transmission losses. Copies of the survey questionnaires are available in *electricity statistics: data sources and methodologies*, at:
www.gov.uk/government/collections/electricity-statistics.

5.88 A sample of companies that generate electricity mainly for their own use (known as autogenerators or autoproducers – see paragraph 5.66, above) is covered by a quarterly inquiry commissioned by DECC but carried out by the Office for National Statistics (ONS). Where autogenerators operate a combined heat and power (CHP) plant, this survey is supplemented (on an annual basis) by information from the CHP Quality Assessment scheme (for autogenerators who have registered under the scheme – see Chapter 7 on CHP). There are two areas of autogeneration that are covered by direct data collection by DECC, mainly because the return contains additional energy information needed by the Department. These are the Iron and Steel industry, and generation on behalf of London Underground.

5.89 In addition to the above sources, some administrative data is used for renewable generation and capacity in the hands of non major power producers - this includes data from the Renewables Obligation and Feed in Tariff schemes.

## Statistical differences

5.90 Statistical differences are included in Tables 5.1 and 5.2. These arise because data collected on production and supply do not match exactly with data collected on sales or consumption. One of the reasons for this is that some of the data are based on different calendars as described in paragraphs 5.83 and 5.84, above. Sales data based on calendar years will always have included more electricity consumption than the slightly shorter statistical year of exactly 52 weeks.

5.91 Care should be exercised in interpreting the figures for individual industries in the commodity balance tables. Where companies have moved between suppliers, it has not been possible to ensure consistent classification between and within industry sectors and across years. The breakdown of final consumption includes some estimated data. In 2014, for about five per cent of consumption of electricity supplied by the public distribution system, the sector figures are partially estimated.

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# 5.1 Commodity balances

## Electricity

GWh

| | 2010 | 2011 | 2012 | 2013 | 2014 |
|---|---|---|---|---|---|
| **Total electricity** | | | | | |
| **Supply** | | | | | |
| Production | 378,622r | 364,516r | 360,612r | 356,264r | 336,043 |
| Other sources *(1)* | 3,150 | 2,906 | 2,966 | 2,904r | 2,883 |
| Imports | 7,144 | 8,689 | 13,742 | 17,533 | 23,230 |
| Exports | -4,481 | -2,467 | -1,871 | -3,103 | -2,720 |
| Marine bunkers | - | - | - | - | - |
| Stock change | - | - | - | - | - |
| Transfers | - | - | - | - | - |
| **Total supply** | **384,435r** | **373,644r** | **375,450r** | **373,597r** | **359,437** |
| **Statistical difference *(2)*** | -420r | -631r | -570r | -1,037r | -562 |
| **Total demand** | **384,855r** | **374,274r** | **376,020r** | **374,634r** | **359,998** |
| **Transformation** | - | - | - | - | - |
| **Energy industry use** | **28,998r** | **28,319r** | **29,156r** | **29,932r** | **28,027** |
| Electricity generation | 16,112r | 16,430r | 17,968r | 17,891r | 16,520 |
| Oil and gas extraction | 563 | 576 | 565 | 570 | 524 |
| Petroleum refineries | 5,034 | 4,684 | 3,793r | 4,679r | 4,548 |
| Coal extraction and coke manufacture | 1,040 | 929 | 902 | 873 | 776 |
| Blast furnaces | 297 | 253 | 369 | 438 | 440 |
| Patent fuel manufacture | - | - | - | - | - |
| Pumped storage | 4,212 | 3,843 | 3,978 | 3,930 | 3,884 |
| Other | 1,740 | 1,603 | 1,581 | 1,551 | 1,334 |
| **Losses** | **27,032** | **28,128r** | **28,905r** | **27,725r** | **28,562** |
| **Final consumption** | **328,825r** | **317,827r** | **317,959r** | **316,978r** | **303,409** |
| **Industry** | **104,523r** | **102,361r** | **98,175r** | **97,669r** | **93,373** |
| Unclassified | - | - | - | - | - |
| Iron and steel | 3,842 | 3,852r | 3,376 | 3,804r | 3,786 |
| Non-ferrous metals | 6,726 | 6,971 | 5,028 | 4,430 | 4,464 |
| Mineral products | 7,266 | 7,010 | 6,747 | 6,726 | 6,389 |
| Chemicals | 18,454 | 17,637 | 17,450r | 17,274r | 16,029 |
| Mechanical engineering, etc | 7,653 | 7,261 | 7,072 | 7,064r | 6,800 |
| Electrical engineering, etc | 6,657 | 6,383 | 6,189 | 6,172 | 5,798 |
| Vehicles | 5,284 | 5,188 | 5,081 | 5,067r | 4,686 |
| Food, beverages, etc | 11,520 | 11,319 | 11,137r | 11,082r | 10,411 |
| Textiles, leather, etc | 3,050 | 2,992 | 2,910 | 2,894 | 2,709 |
| Paper, printing, etc | 10,954 | 10,904 | 10,866r | 10,806r | 10,532 |
| Other industries | 21,496 | 21,304 | 20,828r | 20,886r | 20,396 |
| Construction | 1,621 | 1,539 | 1,494 | 1,464 | 1,373 |
| **Transport *(3)*** | **4,251r** | **4,253r** | **4,263r** | **4,268r** | **4,259** |
| Air | - | - | - | - | - |
| Rail *(4)* | 4,233r | 4,232r | 4,236r | 4,235r | 4,192 |
| Road *(5)* | 18r | 21r | 26r | 33r | 68 |
| National navigation | - | - | - | - | - |
| Pipelines | - | - | - | - | - |
| **Other** | **220,052r** | **211,213r** | **215,521r** | **215,040r** | **205,776** |
| Domestic | 118,833r | 111,591r | 114,667r | 113,445r | 108,881 |
| Public administration | 19,101 | 18,396 | 18,903r | 18,820r | 18,203 |
| Commercial | 78,090r | 77,278r | 78,081r | 78,901r | 74,965 |
| Agriculture | 4,029 | 3,948 | 3,871 | 3,874 | 3,728 |
| Miscellaneous | - | - | - | - | - |
| **Non energy use** | - | - | - | - | - |

# 5.1 Commodity balances (continued)

Electricity

GWh

| | 2010 | 2011 | 2012 | 2013 | 2014 |
|---|---|---|---|---|---|
| **Electricity production** | | | | | |
| **Total production** *(6)* | **378,622r** | **364,516r** | **360,612r** | **356,264r** | **336,043** |
| **Primary electricity** | | | | | |
| **Major power producers** | **73,051r** | **86,414r** | **91,711r** | **98,174r** | **95,146** |
| Nuclear | 62,140 | 68,980 | 70,405 | 70,607r | 63,748 |
| Large scale hydro *(6)* | 2,505 | 4,291 | 3,898 | 3,348 | 4,333 |
| Small scale hydro | 198 | 303 | 272r | 261 | 301 |
| Wind *(7)* | 8,208r | 12,840r | 17,137r | 23,958r | 26,763 |
| **Other generators** | **2,951r** | **4,142r** | **5,169r** | **7,551r** | **10,555** |
| Nuclear | - | - | - | - | - |
| Large scale hydro | 587 | 698 | 733 | 678 | 720 |
| Small scale hydro | 275r | 388r | 382 | 415r | 530 |
| Wind, wave and solar photovoltaics *(7)* | 2,090r | 3,056r | 4,054r | 6,459r | 9,304 |
| **Secondary electricity** | | | | | |
| **Major power producers** | **271,645r** | **243,141r** | **233,592r** | **223,647r** | **202,794** |
| Coal | 103,941 | 104,797 | 140,164 | 130,204 | 100,158 |
| Oil | 2,271 | 1,074 | 1,132 | 745 | 530 |
| Gas | 161,748 | 132,753 | 86,229 | 82,891r | 88,871 |
| Renewables | 3,685r | 4,518r | 6,067r | 9,285r | 12,707 |
| Other | - | - | - | 522 | 528 |
| Other generators | **30,975r** | **30,818r** | **30,139r** | **26,892r** | **27,549** |
| Coal | 3,753 | 3,774 | 2,992 | 564 | 549 |
| Oil | 2,532 | 2,043 | 1,439 | 1,346r | 1,351 |
| Gas | 13,908 | 13,767 | 13,931r | 13,137r | 12,057 |
| Renewables | 8,236r | 8,435r | 8,581r | 8,873r | 9,995 |
| Other | 2,545r | 2,799r | 3,196r | 2,971r | 3,597 |
| **Primary and secondary production** *(8)* | | | | | |
| Nuclear | 62,140 | 68,980 | 70,405 | 70,607r | 63,748 |
| Hydro | 3,565r | 5,680r | 5,285 | 4,702r | 5,885 |
| Wind, wave and solar photovoltaics | 10,297r | 15,896r | 21,191r | 30,417r | 36,068 |
| Coal | 107,694 | 108,571 | 143,156 | 130,768r | 100,707 |
| Oil | 4,803 | 3,117 | 2,571 | 2,091r | 1,881 |
| Gas | 175,656 | 146,520 | 100,160r | 96,028r | 100,928 |
| Other renewables | 11,921r | 12,953r | 14,648r | 18,159r | 22,702 |
| Other | 2,545r | 2,799r | 3,196r | 3,493r | 4,125 |
| **Total production** | **378,622r** | **364,516r** | **360,612r** | **356,264r** | **336,043** |

*(1) Pumped storage production.*
*(2) Total supply minus total demand.*
*(3) From 2004, non-traction Transport sector consumption is included under 'Transport Services'.*
*(4) From 2004, this includes light rail and metro systems (eg. London Underground).*
*(5) Included from 2004.*
*(6) Excludes pumped storage production.*
*(7) From 2007, major wind farm companies are included under Major Power Producers, see paragraph 5.68.*
*(8) These figures are the same as the electricity generated figures in Table 5.5 except that they exclude pumped storage production. Table 5.5 shows that electricity used on works is deducted to obtain electricity supplied. It is electricity supplied that is used to produce Chart 5.2 showing each fuel's share of electricity output (see paragraph 5.31).*

# 5.2 Commodity balances

Public distribution system and other generators

GWh

| | 2012 | | | 2013 | | | 2014 | | |
|---|---|---|---|---|---|---|---|---|---|
| | **Public distribution system** | **Other generators** | **Total** | **Public distribution system** | **Other generators** | **Total** | **Public distribution system** | **Other generators** | **Total** |
| **Supply** | | | | | | | | | |
| Major power producers | 325,304r | - | 325,304r | 321,821r | - | 321,821r | 297,939 | - | 297,939 |
| Other generators | - | 35,309r | 35,309r | - | 34,443r | 34,443r | - | 38,104 | 38,104 |
| Other sources *(1)* | 2,966 | - | 2,966 | 2,904r | - | 2,904r | 2,883 | - | 2,883 |
| Imports | 13,742 | - | 13,742 | 17,533 | - | 17,533 | 23,230 | - | 23,230 |
| Exports | -1,871 | - | -1,871 | -3,103 | - | -3,103 | -2,720 | - | -2,720 |
| Transfers | 15,882r | -15,882r | - | 13,998r | -13,998r | 373,597r | 14,916 | -14,916 | 359,437 |
| **Total supply** | **356,023r** | **19,426r** | **375,450r** | **353,152r** | **20,445r** | **373,597r** | **336,249** | **23,188** | **359,437** |
| **Statistical difference *(2)*** | -1,112r | 541r | -570r | -897r | -140r | -1,037r | -1,239 | +677 | -562 |
| **Total demand** | **357,135r** | **18,885r** | **376,020r** | **354,049r** | **20,585r** | **374,634r** | **337,488** | **22,510** | **359,998** |
| **Transformation** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **-** |
| **Energy industry use** | **24,025r** | **5,131r** | **29,156r** | **23,656r** | **6,275r** | **29,932r** | **21,395** | **6,631** | **28,027** |
| Electricity generation | 15,859r | 2,108r | 17,968r | 15,669r | 2,222r | 17,891r | 13,957 | 2,563 | 16,520 |
| Oil and gas extraction | 565 | - | 565 | 570 | - | 570 | 524 | - | 524 |
| Petroleum refineries | 1,338 | 2,456r | 3,793r | 1,291 | 3,388r | 4,679r | 1,149 | 3,399 | 4,548 |
| Coal extraction and coke manufacture | 825 | 77 | 902 | 796 | 77r | 873 | 700 | 76 | 776 |
| Blast furnaces | - | 369 | 369 | - | 438r | 438r | - | 440 | 440 |
| Pumped storage | 3,978 | - | 3,978 | 3,930 | - | 3,930 | 3,884 | - | 3,884 |
| Other fuel industries | 1,460 | 121 | 1,581 | 1,402 | 150 | 1,551 | 1,181 | 154 | 1,334 |
| **Losses** | **28,889r** | **15** | **28,905r** | **27,703r** | **22** | **27,725r** | **28,546** | **17** | **28,562** |
| Transmission losses | 6,757r | | 6,757r | 6,351r | | 6,351r | 6,489 | | 6,489 |
| Distribution losses | 21,105r | 15 | 21,120r | 20,317r | 22 | 20,339r | 21,059 | 17 | 21,076 |
| Theft | 1,040 | | 1,040 | 1,036r | | 1,036r | 997 | | 997 |
| **Final consumption** | **304,221r** | **13,739r** | **317,959r** | **302,690r** | **14,288r** | **316,978r** | **287,547** | **15,862** | **303,409** |
| **Industry** | **89,313** | **8,862r** | **98,175r** | **89,314** | **8,356r** | **97,669r** | **84,517** | **8,856** | **93,373** |
| Iron and steel | 2,807 | 568 | 3,376 | 2,960 | 845r | 3,804r | 2,967 | 820 | 3,786 |
| Non-ferrous metals | 3,888 | 1,140 | 5,028 | 3,875 | 555r | 4,430 | 3,706 | 759 | 4,464 |
| Mineral products | 6,641 | 106 | 6,747 | 6,627 | 99 | 6,726 | 6,287 | 102 | 6,389 |
| Chemicals | 14,639 | 2,811r | 17,450r | 14,650 | 2,624r | 17,274r | 13,711 | 2,318 | 16,029 |
| Mechanical engineering etc | 6,970 | 245 | 7,215 | 6,955 | 268r | 7,223r | 6,567 | 259 | 6,827 |
| Electrical engineering etc | 6,184 | - | 6,184 | 6,166 | - | 6,166 | 5,792 | - | 5,792 |
| Vehicles | 4,942 | - | 4,942 | 4,914 | - | 4,914 | 4,664 | - | 4,664 |
| Food, beverages etc | 9,798 | 1,339r | 11,137r | 9,782 | 1,300r | 11,082r | 9,121 | 1,289 | 10,411 |
| Textiles, leather, etc | 2,905 | - | 2,905 | 2,887 | - | 2,887 | 2,702 | - | 2,702 |
| Paper, printing etc | 9,224 | 1,642r | 10,866r | 9,216 | 1,589r | 10,806r | 8,689 | 1,843 | 10,532 |
| Other industries | 19,837 | 996r | 20,834r | 19,833 | 1,061r | 20,894r | 18,952 | 1,451 | 20,403 |
| Construction | 1,479 | 15 | 1,494 | 1,449 | 15 | 1,464 | 1,358 | 15 | 1,373 |
| **Transport *(3)*** | **4,263r** | **-** | **4,263r** | **4,268r** | **-** | **4,268r** | **4,259** | **-** | **4,259** |
| Rail *(4)* | 4,236r | - | 4,236r | 4,235r | - | 4,235r | 4,192 | - | 4,192 |
| Road *(5)* | 26r | - | 26r | 33r | - | 33r | 68 | - | 68 |
| **Other** | **210,645r** | **4,876r** | **215,521r** | **209,108r** | **5,932r** | **215,040r** | **198,770** | **7,006** | **205,776** |
| Domestic *(6)* | 114,155 | 512r | 114,667r | 112,782r | 663r | 113,445r | 107,941 | 940 | 108,881 |
| Standard | 76,315 | - | 76,315 | 76,060 | - | 76,060 | 73,645 | - | 73,645 |
| Economy 7 and other off-peak *(7)* | 19,239 | - | 19,239 | 18,740 | - | 18,740 | 17,418 | - | 17,418 |
| Prepayment (standard) | 14,219 | - | 14,219 | 13,850r | - | 13,850r | 13,096 | - | 13,096 |
| Prepayment (off-peak) *(7)* | 4,382 | - | 4,382 | 4,131 | - | 4,131 | 3,734 | - | 3,734 |
| Sales under any other arrangement | 0 | - | 0 | - | - | - | 48 | - | 48 |
| Public administration | 16,617 | 2,285r | 18,903r | 16,041 | 2,779r | 18,820r | 15,197 | 3,006 | 18,203 |
| Public lighting *(8)* | 1,908 | - | 1,908 | 1,859 | - | 1,859 | 1,674 | - | 1,674 |
| Other public sector | 14,710 | 2,285r | 16,995r | 14,182 | 2,779r | 16,960r | 13,523 | 3,006 | 16,529 |
| Commercial | 76,001r | 2,079r | 78,081r | 76,411r | 2,490r | 78,901r | 71,904 | 3,060 | 74,965 |
| Shops | 27,808 | - | 27,808 | 30,272 | - | 30,272 | 28,106 | - | 28,106 |
| Offices | 24,779 | - | 24,779 | 24,864 | - | 24,864 | 23,665 | - | 23,665 |
| Hotels | 8,723 | - | 8,723 | 8,767 | - | 8,767 | 8,467 | - | 8,467 |
| Combined domestic/ commercial premises | 2,604 | - | 2,604 | 2,684 | - | 2,684 | 2,326 | - | 2,326 |
| Post and telecommunications | 5,986 | - | 5,986 | 5,904 | - | 5,904 | 6,086 | - | 6,086 |
| Unclassified | 2,374 | - | 2,374 | - | - | - | - | - | - |
| Transport services | 3,728r | - | 3,728r | 3,920r | - | 3,920r | 3,254 | - | 3,254 |
| Agriculture | 3,871 | - | 3,871 | 3,874 | - | 3,874 | 3,728 | - | 3,728 |

*(1) Pumped storage production.*
*(2) Total supply minus total demand.*
*(3) From 2004, non-traction Transport sector consumption is included under 'Transport Services'.*
*(4) From 2004, this includes light rail and metro systems (eg. London Underground).*
*(5) Included from 2004.*
*(6) From 2011, this includes consumption by domestic generators. See paragraph 5.21.*
*(7) Electricity consumed under an off-peak tariff.*
*(8) Sales for public lighting purposes are increasingly covered by wider contracts that cannot distinguish the public lighting element*

# 5.3 Fuel used in generation[1]

| | Unit | 2010 | 2011 | 2012 | 2013 | 2014 |
|---|---|---|---|---|---|---|
| | | | | | | **Original units of measurement** |
| **Major power producers (2)** | | | | | | |
| Coal | M tonnes | 40.23 | 40.57 | 53.84 | 49.84 | 38.21 |
| Oil (3) | " | 0.456 | 0.294 | 0.302 | 0.186 | 0.168 |
| Gas (5) | GWh | 345,685r | 277,527r | 184,307r | 175,210r | 189,919 |
| **Other generators (2)** | | | | | | |
| Transport undertakings: | | | | | | |
| Gas | GWh | 18 | 14 | 13 | 10 | 10 |
| Undertakings in industrial and commercial sectors: | | | | | | |
| Coal (4) | M tonnes | 1.2678 | 1.2836 | 1.0641 | 0.1987 | 0.1850 |
| Oil (5) | " | 0.48 | 0.38 | 0.28 | 0.309r | 0.30 |
| Gas (6) | GWh | 31,436r | 31,548r | 32,236r | 31,112r | 28,476 |
| | | | | | | **Mtoe** |
| **Major power producers (2)** | | | | | | |
| Coal | | 24.780 | 25.232 | 33.666 | 31.310 | 24.000 |
| Oil (3) | | 0.634 | 0.346 | 0.407 | 0.239 | 0.182 |
| Gas | | 29.724r | 23.863r | 15.848 | 15.065 | 16.330 |
| Nuclear | | 13.926 | 15.626 | 15.206 | 15.443 | 13.850 |
| Hydro (natural flow) (7) | | 0.2324 | 0.395r | 0.359r | 0.3103 | 0.398 |
| Wind | | 0.706r | 1.104r | 1.473r | 2.060r | 2.301 |
| Other renewables (7) | | 1.013 | 1.263 | 1.766 | 2.403r | 3.156 |
| Net imports | | 0.229 | 0.535 | 1.021 | 1.241 | 1.764 |
| **Total major power producers (2)** | | **71.245r** | **68.363r** | **69.745r** | **68.072r** | **61.981** |
| Of which: conventional thermal and other stations (10) | | 27.882r | 28.413r | 37.721r | 36.296r | 29.829 |
| combined cycle gas turbine stations | | **28.975** | **23.394** | **15.438** | **14.782** | **16.140** |
| **Other generators (2)** | | | | | | |
| Transport undertakings: | | | | | | |
| Gas (6) | | 0.002 | 0.001 | 0.001 | 0.001 | 0.001 |
| Undertakings in industrial and commercial sectors: | | | | | | |
| Coal (4) | | 0.782 | 0.794 | 0.661 | 0.123r | 0.115 |
| Oil (5) | | 0.544 | 0.437 | 0.320 | 0.355r | 0.349 |
| Gas | | 2.703r | 2.713r | 2.772r | 2.675r | 2.449 |
| Hydro (natural flow) (7) | | 0.074r | 0.093r | 0.096 | 0.094 | 0.108 |
| Wind, wave and solar photovoltaics | | 0.180r | 0.263r | 0.349r | 0.555r | 0.800 |
| Other renewables (7) | | 3.273 | 3.362 | 3.169r | 3.142r | 3.378 |
| Other fuels (9) | | 0.802 | 1.024 | 1.112 | 1.435r | 1.525 |
| **Total other generators *(2)*** | | **8.359r** | **8.687r** | **8.479r** | **8.381r** | **8.723** |
| **All generating companies** | | | | | | |
| Coal (4) | | 25.562 | 26.026 | 34.327 | 31.434r | 24.115 |
| Oil (3)(5) | | 1.178 | 0.783 | 0.727 | 0.593r | 0.530 |
| Gas (6) | | 32.428r | 26.577r | 18.620r | 17.741r | 18.779 |
| Nuclear | | 13.926 | 15.626 | 15.206 | 15.443 | 13.850 |
| Hydro (natural flow) (7) | | 0.307r | 0.488r | 0.454 | 0.404 | 0.506 |
| Wind, wave and solar photovoltaics | | 0.885r | 1.367r | 1.822r | 2.615r | 3.101 |
| Other renewables (7) | | 4.286 | 4.625 | 4.934r | 5.546r | 6.534 |
| Other fuels (9) | | 0.802 | 1.024 | 1.112 | 1.435r | 1.525 |
| Net imports | | 0.229 | 0.535 | 1.021 | 1.241 | 1.764 |
| **Total all generating companies** | | **79.604r** | **77.050r** | **78.224r** | **76.452r** | **70.704** |

*(1) A monthly update of fuel used in electricity generation by major power producers is given in Table 5.1 of Energy Trends, and a quarterly update of fuel used in electricity generation by all generating companies is given in Table 5.4 of Energy Trends.*
*(2) See paragraphs 5.66 to 5.72 for information on companies covered.*
*(3) Includes orimulsion, oil used in gas turbine and diesel plant, and oil used for lighting up coal fired boilers.*
*(4) Includes coke oven coke.*
*(5) Includes refinery gas.*
*(6) Includes colliery methane.*
*(7) Renewable sources which are included under hydro and other renewables in this table are shown separately in Table 6.6 of Chapter 6.*
*(8) Includes electricity supplied by gas turbines and oil engines. From 1988 also includes electricity produced by plants using renewable sources.*
*(9) Main fuels included are coke oven gas, blast furnace gas, and waste products from chemical processes*
*(10) Includes gas turbines and oil engines and plants producing electricity from renewable sources other than hydro*

# 5.4 Electricity supply, electricity supplied (net), electricity available, electricity consumption and electricity sales

GWh

| | 2010 | 2011 | 2012 | 2013 | 2014 |
|---|---|---|---|---|---|
| **Total supply** | | | | | |
| (as given in Tables 5.1 and 5.2) | 384,435r | 373,644r | 375,450r | 373,597r | 359,437 |
| **less** imports of electricity | -7,144 | -8,689 | -13,742 | -17,533 | -23,230 |
| **plus** exports of electricity | +4,481 | +2,467 | +1,871 | +3,103 | +2,720 |
| **less** electricity used in pumped storage | -4,212 | -3,843 | -3,978 | -3,930 | -3,884 |
| **less** electricity used on works | -16,112r | -16,430r | -17,968r | -17,891r | -16,520 |
| **equals** | | | | | |
| **Electricity supplied (net)** | 361,448r | 347,149r | 341,633r | 337,348r | 318,522 |
| (as given in Tables 5.5, 5.1.2 and 5.1.3) | | | | | |
| **Total supply** | | | | | |
| (as given in Tables 5.1 and 5.2) | 384,435r | 373,644r | 375,450r | 373,597r | 359,437 |
| **less** electricity used in pumped storage | -4,212 | -3,843 | -3,978 | -3,930 | -3,884 |
| **less** electricity used on works | -16,112r | -16,430r | -17,968r | -17,891r | -16,520 |
| **equals** | | | | | |
| **Electricity available** | 364,111r | 353,371r | 353,504r | 351,777r | 339,032 |
| (as given in Table 5.1.2) | | | | | |
| **Final consumption** | | | | | |
| (as given in Tables 5.1 and 5.2) | 328,825r | 317,827r | 317,959r | 316,978r | 303,409 |
| **plus** Iron and steel consumption counted as energy industry use | +421 | +380 | +485 | +572r | +561 |
| **equals** | | | | | |
| **Final users** | 329,246r | 318,207r | 318,445r | 317,550r | 303,970 |
| (as given in Table 5.1.2) | | | | | |
| **Final consumption** | | | | | |
| Public distribution system | | | | | |
| (as given in Table 5.2) | 315,392 | 303,765 | 304,221 | 302,690r | 287,547 |
| **plus** Oil and gas extraction use | +563 | +576 | +565 | +570 | +524 |
| **plus** Petroleum refineries use | +1,407 | +1,357 | +1,338 | +1,291 | +1,149 |
| **plus** Coal and coke use | +950 | +847 | +825 | +796 | +700 |
| **plus** Other fuel industries use | +1,608 | +1,489 | +1,460 | +1,402 | +1,181 |
| **equals** | | | | | |
| **UK Electricity sales** *(1)* | 319,919 | 308,033 | 308,408 | 306,748r | 291,101 |

*(1) A calendar year estimate of the Renewables Obligation percentage can be calculated using the "total generation from sources eligible for the Renewable Obligation" figure from Table 6.4 as the numerator, and this figure as the denominator. Separate electricity sales data for public electricity suppliers are given for England and Wales, Scotland and Northern Ireland in Table 5.5 of Energy Trends on the DECC website at: www.gov.uk/government/publications/electricity-section-5-energy-trends*

# 5.5 Electricity fuel use, generation and supply

GWh

| | Thermal sources | | | | | | | Non-thermal sources | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Coal | Oil | Gas | Nuclear | Renew-ables (1) | Other (3) | Total | Hydro-natural flow | Hydro-pumped storage | Wind and solar (4) | Total All sources |
| **2010** | | | | | | | | | | | |
| **Major power producers** *(2) (5)* | | | | | | | | | | | |
| Fuel used | 288,195 | 7,377 | 345,685r | 161,959 | 11,778 | - | 814,995r | 2,703 | 3,150 | 8,208r | 829,056r |
| Generation | 103,941 | 2,271 | 161,748 | 62,140 | 3,685r | - | 333,784r | 2,703 | 3,150 | 8,208r | 347,846r |
| Used on works | 5,233 | 311 | 2,770 | 5,698 | 370r | - | 14,382r | 9 | 11 | - | 14,403 |
| Supplied (gross) | 98,708 | 1,960 | 158,977 | 56,442 | 3,315r | - | 319,402r | 2,694 | 3,139 | 8,208r | 333,443r |
| Used in pumping | | | | | | | | | | | 4,212 |
| Supplied (net) | | | | | | | | | | | 329,231r |
| **Other generators** *(2) (5)* | | | | | | | | | | | |
| Fuel used | 9,095 | 6,328 | 31,436 | - | 37,533r | 9,322 | 93,714r | 862r | - | 2,090r | 96,665r |
| Generation | 3,753 | 2,532 | 13,908 | - | 8,236r | 2,545r | 30,975r | 862r | - | 2,090r | 33,926r |
| Used on works | 195 | 186 | 431 | - | 741r | 142r | 1,695r | 15 | - | - | 1,710r |
| Supplied | 3,558 | 2,346 | 13,478 | - | 7,495r | 2,403r | 29,280r | 847r | - | 2,090r | 32,216r |
| **All generating companies** | | | | | | | | | | | |
| Fuel used | 297,290 | 13,705 | 377,121r | 161,959 | 49,312r | 9,322 | 908,709r | 3,565r | 3,150r | 10,297r | 925,722r |
| Generation | 107,694 | 4,803 | 175,656 | 62,140 | 11,921r | 2,545r | 364,759r | 3,565r | 3,150r | 10,297r | 381,772r |
| Used on works | 5,428 | 497 | 3,201 | 5,698 | 1,111 | 142r | 16,077r | 24 | 11r | - | 16,112r |
| Supplied (gross) | 102,266 | 4,306 | 172,455 | 56,442 | 10,810r | 2,403r | 348,682r | 3,541r | 3,139r | 10,297r | 365,660r |
| Used in pumping | | | | | | | | | | | 4,212 |
| Supplied (net) | | | | | | | | | | | 361,448r |
| **2011** | | | | | | | | | | | |
| **Major power producers** *(2) (5)* | | | | | | | | | | | |
| Fuel used | 293,444 | 4,023 | 277,527r | 181,732 | 14,685 | - | 771,411r | 4,594 | 2,906 | 12,840r | 791,751r |
| Generation | 104,797 | 1,074 | 132,753 | 68,980 | 4,518r | - | 312,122r | 4,594 | 2,906 | 12,840r | 332,461r |
| Used on works | 5,245 | 161 | 2,268 | 6,325 | 454r | - | 14,453r | 16 | 10 | - | 14,479r |
| Supplied (gross) | 99,552 | 913 | 130,485 | 62,655 | 4,064r | - | 297,669r | 4,578 | 2,895 | 12,840r | 317,983r |
| Used in pumping | | | | | | | | | | | 3,843 |
| Supplied (net) | | | | | | | | | | | 314,140r |
| **Other generators** *(2) (5)* | | | | | | | | | | | |
| Fuel used | 9,234 | 5,081 | 31,548 | - | 38,021r | 11,910 | 95,795r | 1,086r | - | 3,056r | 99,937r |
| Generation | 3,774 | 2,043 | 13,767 | - | 8,435r | 2,799r | 30,818r | 1,086r | - | 3,056r | 34,960r |
| Used on works | 204 | 151 | 426 | - | 989r | 161r | 1,931r | 21 | - | - | 1,951r |
| Supplied | 3,570 | 1,892 | 13,341 | - | 7,446r | 2,638r | 28,888r | 1,066r | - | 3,056r | 33,009r |
| **All generating companies** | | | | | | | | | | | |
| Fuel used | 302,677 | 9,105 | 309,076r | 181,732 | 52,706r | 11,910 | 867,206r | 5,680r | 2,906 | 15,896r | 891,688r |
| Generation | 108,571 | 3,117 | 146,520 | 68,980 | 12,953r | 2,799r | 342,940r | 5,680r | 2,906 | 15,896r | 367,422r |
| Used on works | 5,449 | 311 | 2,694 | 6,325 | 1,442r | 161r | 16,383r | 37 | 10 | - | 16,430r |
| Supplied (gross) | 103,122 | 2,805 | 143,826 | 62,655 | 11,510r | 2,638r | 326,557r | 5,643r | 2,895 | 15,896r | 350,992r |
| Used in pumping | | | | | | | | | | | 3,843 |
| Supplied (net) | | | | | | | | | | | 347,149r |
| **2012** | | | | | | | | | | | |
| **Major power producers** *(2) (5)* | | | | | | | | | | | |
| Fuel used | 391,530 | 4,736 | 184,307 | 176,846 | 20,535 | - | 777,954 | 4,169 | 2,966 | 17,137r | 802,226r |
| Generation | 140,164 | 1,132 | 86,229 | 70,405 | 6,067r | - | 303,998r | 4,169 | 2,966 | 17,137r | 328,270r |
| Used on works | 7,121 | 187 | 1,474 | 6,456 | 609r | - | 15,848r | 1 | 10 | - | 15,859r |
| Supplied (gross) | 133,043 | 944 | 84,755 | 63,949 | 5,458r | - | 288,150r | 4,168 | 2,956 | 17,137r | 312,411r |
| Used in pumping | | | | | | | | | | | 3,978 |
| Supplied (net) | | | | | | | | | | | 308,433r |
| **Other generators** *(2) (5)* | | | | | | | | | | | |
| Fuel used | 7,687 | 3,720 | 32,236r | - | 36,853r | 12,932 | 93,428r | 1,116r | - | 4,054r | 98,598r |
| Generation | 2,992 | 1,439 | 13,931r | - | 8,581r | 3,196r | 30,139r | 1,116r | - | 4,054r | 35,309r |
| Used on works | 170 | 106 | 431 | - | 1,183r | 197r | 2,088r | 20 | - | - | 2,108r |
| Supplied | 2,822 | 1,333 | 13,500r | - | 7,398r | 2,999r | 28,051r | 1,095 | - | 4,054r | 33,200r |
| **All generating companies** | | | | | | | | | | | |
| Fuel used | 399,217 | 8,456 | 216,543r | 176,846 | 57,388r | 12,932 | 871,382r | 5,285 | 2,966 | 21,191r | 900,824r |
| Generation | 143,156 | 2,571 | 100,160r | 70,405 | 14,648r | 3,196r | 334,137r | 5,285 | 2,966 | 21,191r | 363,579r |
| Used on works | 7,291 | 293 | 1,905 | 6,456 | 1,792r | 197r | 17,935r | 22 | 10 | - | 17,967r |
| Supplied (gross) | 135,865 | 2,277 | 98,255r | 63,949 | 12,856r | 2,999r | 316,201r | 5,263 | 2,956 | 21,191r | 345,611r |
| Used in pumping | | | | | | | | | | | 3,978 |
| Supplied (net) | | | | | | | | | | | 341,633r |

# 5.5 Electricity fuel use, generation and supply (continued)

GWh

| | Thermal sources | | | | | | | Non-thermal sources | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Coal | Oil | Gas | Nuclear | Renew-ables (1) | Other (3) | Total | Hydro-natural flow | Hydro-pumped storage | Wind and solar (4) | Total All sources |
| **2013** | | | | | | | | | | | |
| **Major power producers** *(2) (5)* | | | | | | | | | | | |
| Fuel used | 364,141 | 2,775 | 175,210 | 179,601 | 25,832 | 2,119 | 749,678 | 3,609 | 2,904r | 23,958r | 780,149r |
| Generation | 130,204 | 745 | 82,891r | 70,607r | 9,285r | 522 | 294,254r | 3,609 | 2,904r | 23,958r | 324,725r |
| Used on works | 6,681 | 97 | 1,409r | 6,474 | 932r | 52 | 15,646r | 13 | 10r | - | 15,669r |
| Supplied (gross) | 123,523 | 648 | 81,482r | 64,133r | 8,353r | 470 | 278,608r | 3,596 | 2,894 | 23,958r | 309,056r |
| Used in pumping | | | | | | | | | | | 3,930 |
| Supplied (net) | | | | | | | | | | | 305,127r |
| **Other generators** *(2) (5)* | | | | | | | | | | | |
| Fuel used | 1,434r | 4,127r | 31,112r | - | 32,698r | 16,686r | 86,056r | 1,093r | - | 6,459r | 93,607r |
| Generation | 564 | 1,346r | 13,137r | - | 8,873r | 2,971r | 26,892r | 1,093r | - | 6,459r | 34,443r |
| Used on works | 27 | 99r | 407r | - | 1,496r | 170r | 2,200r | 22 | - | - | 2,222r |
| Supplied | 537 | 1,247r | 12,730r | - | 7,377r | 2,801r | 24,692r | 1,071r | - | 6,459r | 32,221r |
| **All generating companies** | | | - | | | | | | | | |
| Fuel used | 365,575r | 6,902r | 206,322r | 179,601 | 58,530r | 18,805r | 835,734r | 4,702r | 2,904r | 30,417r | 873,756r |
| Generation | 130,768 | 2,091r | 96,028r | 70,607r | 18,159r | 3,493r | 321,146r | 4,702r | 2,904r | 30,417r | 359,168r |
| Used on works | 6,708 | 196r | 1,816r | 6,474 | 2,429r | 222r | 17,846r | 35 | 10r | - | 17,891r |
| Supplied (gross) | 124,060 | 1,894r | 94,212r | 64,133r | 15,730r | 3,270r | 303,300r | 4,667r | 2,894 | 30,417r | 341,277r |
| Used in pumping | | | | | | | | | | | 3,930 |
| Supplied (net) | | | | | | | | | | | 337,348r |
| **2014** | | | | | | | | | | | |
| **Major power producers** *(2) (5)* | | | | | | | | | | | |
| Fuel used | 279,117 | 2,112 | 189,919 | 161,079 | 34,503 | 2,204 | 668,934 | 4,635 | 2,883 | 26,763 | 703,215 |
| Generation | 100,158 | 530 | 88,871 | 63,748 | 12,707 | 528 | 266,542 | 4,635 | 2,883 | 26,763 | 300,823 |
| Used on works | 5,153 | 72 | 1,519 | 5,845 | 1,276 | 53 | 13,919 | 29 | 10 | - | 13,957 |
| Supplied (gross) | 95,005 | 458 | 87,352 | 57,903 | 11,431 | 475 | 252,623 | 4,606 | 2,873 | 26,763 | 286,865 |
| Used in pumping | | | | | | | | | | | 3,884 |
| Supplied (net) | | | | | | | | | | | 282,981 |
| **Other generators** *(2) (5)* | | | | | | | | | | | |
| Fuel used | 1,335 | 4,055 | 28,476 | - | 35,007 | 17,731 | 86,604 | 1,250 | - | 9,304 | 97,158 |
| Generation | 549 | 1,351 | 12,057 | - | 9,995 | 3,597 | 27,549 | 1,250 | - | 9,304 | 38,104 |
| Used on works | 26 | 100 | 374 | - | 1,818 | 217 | 2,535 | 28 | - | - | 2,563 |
| Supplied | 523 | 1,252 | 11,683 | - | 8,176 | 3,380 | 25,014 | 1,223 | - | 9,304 | 35,541 |
| **All generating companies** | | | | | | | | | | | |
| Fuel used | 280,452 | 6,167 | 218,395 | 161,079 | 69,510 | 19,934 | 755,538 | 5,885 | 2,883 | 36,068 | 800,374 |
| Generation | 100,707 | 1,881 | 100,928 | 63,748 | 22,702 | 4,125 | 294,091 | 5,885 | 2,883 | 36,068 | 338,927 |
| Used on works | 5,179 | 172 | 1,893 | 5,845 | 3,094 | 270 | 16,454 | 56 | 10 | - | 16,520 |
| Supplied (gross) | 95,528 | 1,710 | 99,035 | 57,903 | 19,607 | 3,855 | 277,637 | 5,829 | 2,873 | 36,068 | 322,407 |
| Used in pumping | | | | | | | | | | | 3,884 |
| Supplied (net) | | | | | | | | | | | 318,522 |

| | 2010 | | 2011 | | 2012 | | 2013 | | 2014 | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Conv-entional thermal (6) | CCGT | Conv-entional thermal (6) | CCGT | Conv-entional thermal (6) | CCGT | Conv-entional thermal (6) | CCGT | Conv-entional thermal (6) | CCGT |
| **Major power producers** *(2)* | | | | | | | | | | |
| Generated | 111,127r | 160,518 | 111,255r | 131,886 | 147,946r | 85,647 | 141,114 | 82,533 | 114,534 | 88,259 |
| Supplied (gross) | 105,142r | 157,818 | 105,345r | 129,669 | 139,994r | 84,207 | 133,330r | 81,145 | 107,945 | 86,775 |
| **Other generators** | | | | | | | | | | |
| Generated | 18,862r | 12,113r | 20,258r | 10,560 | 20,065r | 10,074 | 17,813r | 9,078r | 19,592 | 7,957 |
| Supplied (gross) | 17,771r | 11,509r | 18,854r | 10,033 | 18,480r | 9,571 | 16,066r | 8,625r | 17,454 | 7,560 |
| **All generating companies** | | | | | | | | | | |
| Generated | 129,989r | 172,631r | 131,513r | 142,447 | 168,011r | 95,721 | 158,927r | 91,612r | 134,126 | 96,217 |
| Supplied (gross) | 122,914r | 169,327r | 124,200r | 139,702 | 158,474r | 93,778 | 149,396r | 89,771r | 125,399 | 94,336 |

*(1) Thermal renewable sources are those included under bioenergy in Chapter 6. Prior to 2007, non-biodegradable wastes are also included.*
*(2) See paragraphs 5.66 to 5.72 on companies covered.*
*(3) Other thermal sources include coke oven gas, blast furnace gas and waste products from chemical processes. From 2007, non-biodegradable wastes are also included.*
*(4) For Major Power Producers, this is wind only; for other generators, this includes solar photovoltaics as well as wave and tidal.*
*(5) From 2007, major wind farm companies are included under Major Power Producers, see paragraph 5.68.*
*(6) Includes gas turbines, oil engines and plants producing electricity from thermal renewable sources; also stations with some CCGT capacity but mainly operate in conventional thermal mode.*

# 5.6 Plant capacity - United Kingdom

MW

| | 2010 | 2011 | 2012 | 2013 | 2014 |
|---|---|---|---|---|---|
| | | | | | end December |
| **Major power producers** *(1)* | | | | | |
| **Total transmission entry capacity** *(2)* | **83,438r** | **81,789r** | **81,879r** | **78,508r** | **76,970** |
| Of which: | | | | | |
| Conventional steam stations: | 32,839 | 31,763 | 28,523 | 24,337r | 22,478 |
| Coal fired | 23,085 | 23,072 | 23,072 | 21,787r | 19,928 |
| Oil fired | 3,638 | 3,638 | 2,338 | 1,370 | 1,370 |
| Mixed or dual fired *(3)* | 6,116 | 5,053 | 3,113 | 1,180 | 1,180 |
| Combined cycle gas turbine stations | 31,724 | 30,183 | 33,113 | 32,967 | 31,994 |
| Nuclear stations | 10,865 | 10,663 | 9,946 | 9,906 | 9,937 |
| Gas turbines and oil engines | 1,779 | 1,706 | 1,651 | 1,783 | 1,787 |
| Hydro-electric stations: | | | | | |
| Natural flow *(4)* | 1,397r | 1,397r | 1,398r | 1,399r | 1,400 |
| Pumped storage | 2,744 | 2,744 | 2,744 | 2,744 | 2,744 |
| Wind *(4) (5)* | 1,867 | 2,240 | 3,276 | 3,947 | 4,527 |
| Renewables other than hydro and wind *(6)* | 223 | 1,092 | 1,228 | 1,426r | 2,103 |
| **Other generators** *(1)* | | | | | |
| **Total capacity of own generating plant** ***(7)*** | **7,035r** | **7,241r** | **7,420r** | **7,692r** | **8,017** |
| Of which: | | | | | |
| Conventional steam stations *(8)* | 2,475 | 2,401r | 2,464 | 2,095r | 2,360 |
| Combined cycle gas turbine stations | 2,302r | 2,212r | 2,244 | 2,162 | 1,790 |
| Hydro-electric stations (natural flow) *(4)* | 129 | 153 | 158r | 162r | 167 |
| Wind *(4) (9)* | 456r | 541r | 550r | 876r | 1,057 |
| Renewables other than hydro and wind *(4) (6)* | 1,673r | 1,934r | 2,003r | 2,397r | 2,644 |
| **All generating companies** | | | | | |
| **Total capacity** | **90,473r** | **89,031r** | **89,299r** | **86,200r** | **84,987** |
| Of which: | | | | | |
| Conventional steam stations *(8)* | 35,315r | 34,164r | 30,988r | 26,432r | 24,838 |
| Combined cycle gas turbine stations | 34,026r | 32,395r | 35,357 | 35,129 | 33,784 |
| Nuclear stations | 10,865 | 10,663 | 9,946 | 9,906 | 9,937 |
| Gas turbines and oil engines | 1,779 | 1,706 | 1,651 | 1,783r | 1,787 |
| Hydro-electric stations: | | | | | |
| Natural flow *(4)* | 1,526r | 1,550r | 1,556r | 1,561r | 1,567 |
| Pumped storage | 2,744 | 2,744 | 2,744 | 2,744 | 2,744 |
| Wind *(4)* | 2,323r | 2,781r | 3,827r | 4,822r | 5,585 |
| Renewables other than hydro and wind *(4)* | 1,896r | 3,027r | 3,231r | 3,823r | 4,747 |

*(1) See paragraphs 5.66 to 5.72 for information on companies covered.*
*(2) See paragraph 5.79 for definition. Data before 2006 are based on declared net capacity.*
*(3) Includes gas fired stations that are not Combined Cycle Gas Turbines, or have some CCGT capability but mainly operate as conventional thermal stations.*
*(4) Small-scale hydro, wind and solar photovoltaics capacity are shown on declared net capability basis, and are de-rated to account for intermittency, by factors of 0.365, 0.43 and 0.17 respectively. See paragraph 5.80.*
*(5) From 2007, major wind farm companies are included under Major Power Producers, see paragraph 5.68*
*(6) For Major Power Producers, this includes bioenergy; for other generators, this includes bioenergy, solar photovoltaics, wave and tidal.*
*(7) "Other generators" capacities are given in declared net capacity terms, see paragraph 5.80.*
*(8) For other generators, conventional steam stations include combined heat and power plants (electrical capacity only) but exclude combined cycle gas turbine plants, hydro-electric stations and plants using renewable sources.*
*(9) Falls in capacity in 2007, 2010 and 2012 due to re-classification of capacity to Major Power Producers.*

# 5.7 Major Power Producers Plant capacity - England and Wales, Scotland, and Northern Ireland

MW

| | 2010 | 2011 | 2012 | 2013 | 2014 (end December) |
|---|---|---|---|---|---|
| **Major power producers in England and Wales** *(1)* | | | | | |
| **Total transmission entry capacity** *(2)* | **70,715r** | **69,057r** | **68,712r** | **65,640r** | **63,620** |
| Of which: | | | | | |
| Conventional steam stations: | 28,323 | 27,247 | 24,007 | 19,821r | 17,962 |
| Coal fired | 19,629 | 19,616 | 19,616 | 18,331r | 16,472 |
| Oil fired | 3,638 | 3,638 | 2,338 | 1,370 | 1,370 |
| Mixed or dual fired *(3)* | 5,056 | 3,993 | 2,053 | 120 | 120 |
| Combined cycle gas turbine stations | 29,404 | 27,985 | 30,915 | 30,765 | 29,792 |
| Nuclear stations | 8,576 | 8,374 | 7,657 | 7,617 | 7,648 |
| Gas turbines and oil engines | 1,256 | 1,187 | 1,132 | 1,206 | 1,210 |
| Hydro-electric stations: | | | | | |
| Natural flow | 141r | 141r | 141r | 141r | 141 |
| Pumped storage | 2,004 | 2,004 | 2,004 | 2,004 | 2,004 |
| Wind *(4)* | 843r | 1,080 | 1,682 | 2,110r | 2,526 |
| Renewables other than hydro and wind *(5)* | 169 | 1,039 | 1,174 | 1,976 | 2,337 |
| **Major power producers in Scotland** *(1)* | | | | | |
| **Total transmission entry capacity** *(2)* | **10,291r** | **10,297r** | **10,731r** | **10,954r** | **11,152** |
| Of which: | | | | | |
| Conventional steam and combined cycle gas turbine stations | 4,752 | 4,638 | 4,638 | 4,638r | 4,638 |
| Nuclear stations | 2,289 | 2,289 | 2,289 | 2,289r | 2,289 |
| Gas turbines and oil engines | 265 | 260 | 260 | 260 | 260 |
| Hydro-electric stations: | | | | | |
| Natural flow | 1,256r | 1,257r | 1,257r | 1,258r | 1,259 |
| Pumped storage | 740 | 740 | 740 | 740 | 740 |
| Wind *(4)* | 935r | 1,059 | 1,493r | 1,716r | 1,881 |
| Renewables other than hydro and wind *(5)* | 54 | 54 | 54 | 54r | 86 |
| **Major power producers in Northern Ireland** *(1)* | | | | | |
| **Total transmission entry capacity** *(2)* | **2,432** | **2,436** | **2,436** | **2,518r** | **2,518** |

*(1) See paragraphs 5.66 to 5.72 for information on companies covered.*
*(2) See paragraph 5.79 for definition. Data before 2006 are based on declared net capacity.*
*(3) Includes gas fired stations that are not Combined Cycle Gas Turbines, or have some CCGT capability but mainly operate as conventional thermal stations.*
*(4) From 2007, major wind farm companies are included under Major Power Producers, see paragraph 5.68.*
*(5) Bioenergy only.*

# 5.8 Capacity of other generators

MW

| | 2010 | 2011 | 2012 | 2013 | 2014 (end December) |
|---|---|---|---|---|---|
| **Capacity of own generating plant** *(1) (2)* | | | | | |
| Undertakings in industrial and commercial sector: | | | | | |
| Oil and gas terminals and oil refineries | 1,045 | 1,050 | 1,019 | 1,019r | 917 |
| Iron and steel | 316 | 315 | 314 | 314 | 314 |
| Chemicals | 1,104 | 1,018 | 1,061 | 1,042r | 980 |
| Engineering and other metal trades | 626 | 644 | 644 | 230 | 230 |
| Food, drink and tobacco | 411 | 428 | 442r | 438r | 448 |
| Paper, printing and publishing | 491 | 420 | 467 | 470r | 503 |
| Other *(3)* | 2,938r | 3,261r | 3,371r | 4,076r | 4,521 |
| Total industrial, commercial and domestic sector | 6,932r | 7,138r | 7,317r | 7,589r | 7,914 |
| Undertakings in transport sector | 103 | 103 | 103 | 103 | 103 |
| **Total other generators** | **7,035r** | **7,241r** | **7,420r** | **7,692r** | **8,017** |

*(1) For combined heat and power plants the electrical capacity only is included. Further CHP capacity is included under major power producers in Table 5.6. A detailed analysis of CHP capacity is given in the tables of Chapter 7. Figures may not sum to 5.6 due to rounding.*
*(2) From 2007, major wind farm companies are included under Major Power Producers, see paragraph 5.68.*
*(3) Includes companies in the commercial sector, and domestic installations.*

# 5.9 Plant loads, demand and efficiency

Major power producers [1]

| | Unit | 2010 | 2011 | 2012 | 2013 | 2014 |
|---|---|---|---|---|---|---|
| **Simultaneous maximum load met** *(2) (3)* | MW | 60,893 | 57,086 | 57,490 | 53,420 | 53,858 |
| *of which* England and Wales | MW | | | | | |
| Scotland | MW | | | | | |
| Great Britain | MW | 59,130 | 55,505 | 55,765 | 51,811 | 52,516 |
| Northern Ireland | MW | 1,763 | 1,581 | 1,725 | 1,609 | 1,342 |
| **Maximum demand as a percentage of UK Major Power Producers' capacity** | Per cent | 73.0 | 69.8 | 70.2 | 68.0r | 70.0 |
| **Plant load factor** *(2) (4)* | | | | | | |
| Combined cycle gas turbine stations | Per cent | 61.6 | 47.8 | 30.3 | 28.0 | 30.5 |
| Nuclear stations | " | 65.3r | 66.4 | 70.7 | 73.8 | 66.6 |
| Pumped storage hydro | " | 13.1 | 12.0 | 12.3 | 12.0 | 12.0 |
| Conventional thermal and other stations *(5)* | " | 46.6r | 34.7 | 48.3 | 51.5r | 45.5 |
| of which coal-fired stations *(6)* | " | 40.2 | 40.8 | 56.9 | 56.7r | 47.9 |
| **All plant** *(7)* | " | **52.6r** | **42.5** | **42.0** | **42.2r** | **45.4** |
| **System load factor** *(8)* | " | **64.6** | **66.7** | **66.2** | **70.8** | **66.9** |
| **Thermal efficiency** *(9)* **(gross calorific value basis)** | | | | | | |
| Combined cycle gas turbine stations | " | 47.1 | 48.1 | 47.2 | 48.0 | 47.0 |
| Coal fired stations | " | 36.1 | 35.7 | 35.8 | 35.8 | 35.9 |
| Nuclear stations | " | 38.4 | 38.0 | 39.8 | 39.3 | 39.6 |

*(1) See paragraphs 5.66 to 5.72 for information on companies covered.*
*(2) Load met by transmission network, net of demand met by embedded generation. See paragraph 5.81 for definitions.*
*(3) Data cover the 12 months ending March of the following year, e.g. 2014 data are for the year ending March 2015.*
*(4) Load factors for renewable sources, including wind and hydro, can be found in Table 6.5.*
*(5) Conventional steam plants, gas turbines and oil engines and plants producing electricity from thermal renewable sources.*
*(6) Includes both coal-fired stations, and dual/mixed fired stations that mainly use coal.*
*(7) Includes wind (from 2008) and natural flow hydro, using capacity that has not been de-rated for intermittency.*
*(8) Average electricity available as percentage of maximum demand. See paragraph 5.81.*
*(9) See paragraph 5.82 for definition of thermal efficiency.*

# 5.10 Power Stations in the United Kingdom

## (operational at the end of May 2015)[1]

| Company Name | Station Name | Fuel | Installed Capacity (MW) | Year of commission or year generation began | Location Scotland, Wales Northern Ireland, or English region |
|---|---|---|---|---|---|
| A7 Energy *(2)* | Greendykeside | Wind | 4 | 2007 | Scotland |
| | Lochhead | Wind | 6 | 2009 | Scotland |
| AES | Ballylumford C | CCGT | 616 | 2003 | Northern Ireland |
| | Kilroot | Coal / oil | 520 | 1981 | Northern Ireland |
| | Ballylumford B | Gas | 540 | 1968 | Northern Ireland |
| | Ballylumford B OCGT | Gas oil | 116 | 1968 | Northern Ireland |
| | Kilroot OCGT | Gas oil | 142 | 1981 | Northern Ireland |
| Beaufort Wind Ltd *(4)* | Beinn Ghlas | Wind | 8 | 1999 | Scotland |
| | Bryn Titli | Wind | 10 | 1994 | Wales |
| | Carno | Wind | 34 | 1996 | Wales |
| | Kirkby Moor | Wind | 5 | 1993 | North West |
| | Lambrigg | Wind | 7 | 2000 | North West |
| | Llyn Alaw | Wind | 20 | 1997 | Wales |
| | Lochelbank | Wind | 10 | 2010 | Scotland |
| | Mynydd Gorddu | Wind | 10 | 1996 | Wales |
| | Novar | Wind | 17 | 1997 | Scotland |
| | Taff Ely | Wind | 9 | 1993 | Wales |
| | Tow Law | Wind | 2 | 2001 | North East |
| | Trysglwyn | Wind | 6 | 1996 | Wales |
| | Bears Down | Wind | 10 | 2001 | South West |
| | Farr | Wind | 92 | 2006 | Scotland |
| | Ffynnon Oer | Wind | 32 | 2006 | Wales |
| | Windy Standard | Wind | 22 | 1996 | Scotland |
| | Causeymire | Wind | 48 | 2004 | Scotland |
| | North Hoyle | Wind (offshore) | 60 | 2003 | Wales |
| BIIF LP | Black Hill | Wind | 29 | 2006 | Scotland |
| | Wadlow | Wind | 26 | 2012 | East |
| Braes of Doune Windfarm *(5)* | Braes of Doune | Wind | 72 | 2007 | Scotland |
| British Energy *(6)* | Dungeness B | Nuclear | 1050 | 1983 | South East |
| | Hartlepool | Nuclear | 1180 | 1984 | North East |
| | Heysham 1 | Nuclear | 1155 | 1984 | North West |
| | Heysham 2 | Nuclear | 1230 | 1988 | North West |
| | Hinkley Point B | Nuclear | 955 | 1976 | South West |
| | Hunterston B | Nuclear | 965 | 1976 | Scotland |
| | Sizewell B | Nuclear | 1198 | 1995 | East |
| | Torness | Nuclear | 1185 | 1988 | Scotland |
| Cemmaes Windfarm Ltd *(7)* | Cemmaes | Wind | 15 | 2002 *(8)* | Wales |
| Centrica | Barry *(9)* | CCGT | 235 | 1998 | Wales |
| | Glanford Brigg *(9)* | CCGT | 150 | 1993 | Yorkshire and the Humber |
| | Killingholme | CCGT | 665 | 1994 | Yorkshire and the Humber |
| | Langage | CCGT | 905 | 2010 | South West |
| | Peterborough *(9)* | CCGT | 240 | 1993 | East |
| | South Humber Bank | CCGT | 1310 | 1996 | Yorkshire and the Humber |
| | Glens of Foudland | Wind | 26 | 2005 | Scotland |
| | Inner Dowsing | Wind (offshore) | 97 | 2009 | East Midlands |
| | Lynn | Wind (offshore) | 97 | 2009 | East Midlands |
| CEP Wind 2 Ltd *(10)* | Gruig | Wind | 25 | 2009 | Northern Ireland |
| CEP Wind 3 Ltd | Todmorden | Wind | 13 | 2014 | Yorkshire and the Humber |
| Cold Northcott Windfarm Ltd *(7)* | Cold Northcott | Wind | 7 | 1993 | South West |
| Coolkeeragh ESB Ltd | Coolkeeragh | CCGT | 408 | 2005 | Northern Ireland |
| | Coolkeeragh OCGT | Gas oil | 53 | 2005 | Northern Ireland |
| Corby Power Ltd | Corby | CCGT | 401 | 1993 | East Midlands |
| Dong Energy | Barrow *(11)* | Wind (offshore) | 90 | 2006 | North West |
| | Burbo Bank | Wind (offshore) | 90 | 2009 | North West |
| | Gunfleet Sands 1 | Wind (offshore) | 108 | 2010 | South East |
| | Gunfleet Sands 2 | Wind (offshore) | 65 | 2010 | South East |
| | Gunfleet Sands 3 | Wind (offshore) | 12 | 2013 | South East |
| | Lincs *(11)* | Wind (offshore) | 270 | 2012 | East |

*For footnotes see page 152*

# 5.10 Power Stations in the United Kingdom
## (operational at the end of May 2015)[1] (continued)

| Company Name | Station Name | Fuel | Installed Capacity (MW) | Year of commission or year generation began | Location Scotland, Wales Northern Ireland, or English region |
|---|---|---|---|---|---|
| Dong Energy (continued) | Walney 1 *(3)* | Wind (offshore) | 184 | 2011 | North West |
| | Walney 2 *(3)* | Wind (offshore) | 184 | 2011 | North West |
| | West of Duddon Sands | Wind (offshore) | 389 | 2014 | North West |
| | Westermost Rough | Wind (offshore) | 210 | 2015 | South East |
| Drax Power Ltd | Drax | Coal / biomass | 3870 | 1974 | Yorkshire and the Humber |
| | Drax GT | Gas oil | 75 | 1971 | Yorkshire and the Humber |
| E.On UK | Ironbridge | Biomass | 360 | 1970 | West Midlands |
| | Steven's Croft * | Biomass | 50 | 2007 | Scotland |
| | Blackburn Meadows | Biomass | 33 | 2015 | Yorkshire and the Humber |
| | Castleford | CCGT | 56 | 2002 | Yorkshire and the Humber |
| | Connahs Quay | CCGT | 1380 | 1996 | Wales |
| | Cottam Development Centre | CCGT | 395 | 1999 | East Midlands |
| | Enfield | CCGT | 408 | 1999 | London |
| | Grain CHP * | CCGT | 1365 | 2010 | South East |
| | Killingholme | CCGT | 900 | 1993 | Yorkshire and the Humber |
| | Sandbach | CCGT | 56 | 1999 | North West |
| | Thornhill | CCGT | 50 | 1998 | Yorkshire and the Humber |
| | Ratcliffe | Coal | 2000 | 1968 | East Midlands |
| | Grain GT | Gas oil | 55 | 1978 | South East |
| | Ratcliffe GT | Gas oil | 34 | 1966 | East Midlands |
| | Taylor's Lane GT | Gas oil | 144 | 1979 | London |
| | Askam *(28)* | Wind | 5 | 1999 | North West |
| | Bowbeat (Emly Bank) | Wind | 16 | 2002 | Scotland |
| | Bowbeat (Roughside) | Wind | 16 | 2002 | Scotland |
| | Butterwick Moor Circuit 1 | Wind | 10 | 2011 | North East |
| | Butterwick Moor Circuit 2 | Wind | 10 | 2011 | North East |
| | Camster | Wind | 50 | 2012 | Scotland |
| | Deucheran Hill | Wind | 16 | 2001 | Scotland |
| | Great Eppleton (ex NFFO) | Wind | 4 | 2010 | North East |
| | Great Eppleton RO | Wind | 4 | 2010 | North East |
| | Hare Hill | Wind | 6 | 2004 | North East |
| | Haswell Moor Circuit 1 | Wind | 5 | 2010 | North East |
| | Haswell Moor Circuit 2 | Wind | 5 | 2010 | North East |
| | High Volts | Wind | 3 | 2004 | North East |
| | High Volts RO | Wind | 6 | 2004 | North East |
| | Holmside | Wind | 3 | 2004 | North East |
| | Holmside RO | Wind | 3 | 2004 | North East |
| | Lowca *(29)* | Wind | 5 | 2000 | North West |
| | Oldside *(30)* | Wind | 5 | 1996 | North West |
| | Out Newton | Wind | 9 | 2002 | Yorkshire and the Humber |
| | Rhyd y Groes *(31)* | Wind | 7 | 1992 | Wales |
| | Rosehall | Wind | 25 | 2012 | Scotland |
| | Siddick *(30)* | Wind | 4 | 1996 | North West |
| | Stags Holt | Wind | 20 | 2007 | East |
| | Tween Bridge | Wind | 44 | 2012 | North East |
| | Blyth T1 | Wind (offshore) | 2 | 2000 | North East |
| | Blyth T2 | Wind (offshore) | 2 | 2000 | North East |
| | Robin Rigg East | Wind (offshore) | 90 | 2010 | Scotland |
| | Robin Rigg West | Wind (offshore) | 90 | 2010 | Scotland |
| | Scroby Sands | Wind (offshore) | 60 | 2004 | East |
| EDF Energy | West Burton CCGT | CCGT | 1332 | 2012 | East Midlands |
| | Cottam | Coal | 2008 | 1969 | East Midlands |
| | West Burton | coal | 2012 | 1967 | East Midlands |
| | Barkantine Heat & Power Company * | Gas | 1 | 2000 | London |
| | London Heat & Power Company * | Gas | 9 | 2000 | London |
| | West Burton GT | Gas oil | 40 | 1967 | East Midlands |
| EDF Energy Renewables | Bicker Fen | Wind | 26 | 2008 | East Midlands |
| | Boundary Lane | Wind | 6 | 2013 | North East |
| | Burnfoot Hill | Wind | 30 | 2010 | Scotland |
| | Fairfield | Wind | 7 | 2011 | North West |
| | Fallago Rig | Wind | 144 | 2013 | Scotland |
| | Glass Moor 2 | Wind | 12 | 2013 | East Midlands |
| | Green Rigg | Wind | 36 | 2012 | North East |
| | Longpark | Wind | 38 | 2009 | Scotland |
| | Roade | Wind | 7 | 2014 | East Midlands |
| | Rusholme | Wind | 24 | 2010 | Yorkshire and the Humber |
| | Walkway | Wind | 14 | 2008 | North East |
| | Barmoor | Wind | 12 | 2014 | North East |
| | Teeside | Wind (offshore) | 62 | 2014 | North East |

*For footnotes see page 152*

# 5.10 Power Stations in the United Kingdom
## (operational at the end of May 2015)[1] (continued)

| Company Name | Station Name | Fuel | Installed Capacity (MW) | Year of commission or year generation began | Location Scotland, Wales Northern Ireland, or English region |
|---|---|---|---|---|---|
| Eggborough Power Ltd | Eggborough | Coal | 1960 | 1967 | Yorkshire and the Humber |
| EPR Ely Limited | Elean | Straw | 38 | 2001 | East |
| | Eye Suffolk | Biomass | 13 | 1992 | East |
| EPR Glanford Ltd | Glanford | Meat & bone meal | 13 | 1993 | East |
| EPR Scotland Ltd | Westfield | Biomass | 12 | 2000 | Scotland |
| EPR Thetford Ltd | Thetford | Biomass | 39 | 1998 | East |
| Falck Renewables Wind Ltd | Ben Aketil | Wind | 28 | 2007 | Scotland |
| | Boyndie | Wind | 16 | 2006 | Scotland |
| | Cefn Croes | Wind | 59 | 2006 | Wales |
| | Earlsburn | Wind | 38 | 2007 | Scotland |
| | Kilbraur | Wind | 68 | 2008 | Scotland |
| | Millennium | Wind | 65 | 2008 | Scotland |
| | Nutberry | Wind | 15 | 2013 | Scotland |
| | West Browncastle | Wind | 30 | 2014 | Scotland |
| Fenland Windfarms Ltd *(7)* | Deeping | Wind | 16 | 2006 | East Midlands |
| | Glass Moor | Wind | 16 | 2006 | East Midlands |
| | Red House | Wind | 12 | 2006 | East Midlands |
| | Red Tile | Wind | 24 | 2007 | East Midlands |
| Fred Olsen | Crystal Rig 2 | Wind | 138 | 2010 | Scotland |
| | Crystal Rig | Wind | 63 | 2003 | Scotland |
| | Mid Hill | Wind | 76 | 2014 | Scotland |
| | Paul's Hill | Wind | 64 | 2005 | Scotland |
| | Rothes | Wind | 51 | 2004 | Scotland |
| | Rothes 2 | Wind | 41 | 2013 | Scotland |
| ENGIE | Blantyre | Wind | 17 | 2014 | Scotland |
| | Crimp | Wind | 2 | 2011 | South West |
| | Carsington | Wind | 8 | 2014 | East Midlands |
| | Flimby | Wind | 6 | 2013 | North West |
| | Scotia | Wind | 20 | 2010 | Scotland |
| | Barlockhart Moor | Wind | 8 | 2013 | Scotland |
| | Sober Hill | Wind | 12 | 2013 | Yorkshire and the Humber |
| Great Orton Windfarm Ltd *(6)(7)* | Great Orton | Wind | 4 | 1999 | North West |
| Greencoat UK Wind | Kildrummy | Wind | 18 | 2013 | Scotland |
| | Cotton Farm | Wind | 16 | 2013 | East |
| | Earls Hall Farm | Wind | 10 | 2013 | East |
| High Hedley Hope Wind Ltd *(7)* | Broomhill | Wind | 8 | 2008 | North East |
| | High Hedley 1 | Wind | 2 | 2001 | North East |
| | High Hedley 2 | Wind | 5 | 2008 | North East |
| | Langley Park | Wind | 8 | 2008 | North East |
| | Trimdon Grange | Wind | 5 | 2008 | North East |
| Infinis | Ardrossan | Wind | 24 | 2004 | Scotland |
| | Ardrossan Extension | Wind | 6 | 2008 | Scotland |
| | Blackstone Edge | Wind | 6 | 2013 | Yorkshire and the Humber |
| | Dalswinton | Wind | 30 | 2008 | Scotland |
| | Glenkerie | Wind | 20 | 2012 | Scotland |
| | Gordonstown | Wind | 6 | 2013 | Scotland |
| | Hill of Fiddes | Wind | 7 | 2010 | Scotland |
| | Lissett | Wind | 30 | 2007 | Yorkshire and the Humber |
| | Low Spinney | Wind | 8 | 2011 | East Midlands |
| | Minsca | Wind | 37 | 2008 | Scotland |
| | Mynydd Clogau | Wind | 14 | 2004 | Wales |
| | Rheidol | Wind | 2 | 1997 | Wales |
| | Seamer | Wind | 10 | 2012 | North East |
| | Slieve Divena | Wind | 30 | 2009 | Northern Ireland |
| | Westfield | Wind | 10 | 2013 | Scotland |
| | Wingates | Wind | 15 | 2013 | North East |
| Intergen | Coryton | CCGT | 800 | 2001 | East |
| | Rocksavage | CCGT | 810 | 1998 | North West |
| | Spalding | CCGT | 880 | 2004 | East Midlands |

*For footnotes see page 152*

# 5.10 Power Stations in the United Kingdom
## (operational at the end of May 2015)[1] (continued)

| Company Name | Station Name | Fuel | Installed Capacity (MW) | Year of commission or year generation began | Location Scotland, Wales Northern Ireland, or English region |
|---|---|---|---|---|---|
| ENGIE | Deeside | CCGT | 515 | 1994 | Wales |
| | Saltend * | CCGT | 1200 | 2000 | Yorkshire and the Humber |
| | Rugeley | Coal | 1006 | 1972 | West Midlands |
| | Rugeley GT | Gas oil | 50 | 1972 | West Midlands |
| | Indian Queens | Gas oil / kerosene | 140 | 1996 | South West |
| | Dinorwig | Pumped storage | 1728 | 1983 | Wales |
| | Ffestiniog | Pumped storage | 360 | 1961 | Wales |
| K/S Winscales *(7)* | Winscales 1 | Wind | 2 | 1999 | North West |
| | Winscales 2 | Wind | 7 | 2005 | North West |
| Kirkheaton Wind Ltd *(7)* | Kirkheaton | Wind | 2 | 2000 | North East |
| Llangwyryfon Windfarm Ltd *(7)* | Llangwyryfon | Wind | 9 | 2003 | Wales |
| London Array Ltd *(13)* | London Array | Wind (offshore) | 630 | 2012 | South East |
| Londonwaste Limited | Edmonton | Waste | 60 | 1970 | South East |
| Lynemouth Power Ltd *(14)* | Lynemouth | Coal | 420 | 1972 | North East |
| Magnox Ltd *(15)* | Maentwrog | Hydro | 35 | 1928 | Wales |
| | Wylfa | Nuclear | 490 | 1971 | Wales |
| Marchwood Power Limited *(16)* | Marchwood | CCGT | 842 | 2009 | South West |
| MEAG *(17)* | Bagmoor | Wind | 16 | 2009 | East Midlands |
| | Scout Moor *(3)* | Wind | 65 | 2009 | North West |
| | Tir Mostyn & Foel Goch | Wind | 21 | 2005 | Wales |
| | Newton of Fortrie | Wind | 7 | 2013 | Scotland |
| | Middlewick | Wind | 21 | 2014 | South East |
| | GV March | Wind | 2 | 2012 | East Midlands |
| MPF Operations Limited | Severn Power | CCGT | 850 | 2010 | Wales |
| | Baglan Bay CCGT | CCGT | 520 | 2002 | Wales |
| | Baglan Bay OCGT | OCGT | 32 | 2002 | Wales |
| | Sutton Bridge | CCGT | 819 | 1999 | East |
| Peel Energy Ltd | Seaforth | Wind | 3 | 1999 | North West |
| Prime Renewables Gmbh | Port of Liverpool | Wind | 10 | 2008 | North West |
| Px Limited *(18)* | Fellside CHP * | Gas | 180 | 1995 | North West |
| Resonance *(17)* | Arnish Moor | Wind | 4 | 2006 | Scotland |
| | Betty Hill | Wind | 6 | 2013 | Scotland |
| | Dewlay Cheese | Wind | 2 | 2010 | North West |
| | Solutia | Wind | 5 | 2009 | Wales |
| | Strath of Brydock | Wind | 7 | 2009 | Scotland |
| | Workington (Eastman) | Wind | 4 | 2005 | North West |
| RES-UK & Ireland Ltd | Dyffryn Brodyn | Wind | 5 | 1994 | Wales |
| | Four Burrows | Wind | 5 | 1995 | South West |
| | Woolley Hill | Wind | 10 | 2014 | East |
| | Jacks Lane | Wind | 15 | 2014 | East |
| Riverside Resource Recovery Limited | Belvedere | Waste | 80 | 2011 | South East |
| RWE Npower Plc | Didcot B | CCGT | 1470 | 1998 | South East |
| | Great Yarmouth | CCGT | 420 | 2001 | East |
| | Little Barford | CCGT | 720 | 1995 | East |
| | Pembroke | CCGT | 2180 | 2012 | Wales |
| | Staythorpe C | CCGT | 1772 | 2010 | East Midlands |
| | Aberthaw B | Coal | 1586 | 1971 | Wales |
| | Aberthaw GT | Gas oil | 51 | 1971 | Wales |
| | Cowes | Gas oil | 140 | 1982 | South East |
| | Didcot GT | Gas oil | 100 | 1972 | South East |
| | Little Barford GT | Gas oil | 17 | 2006 | East |
| | Littlebrook GT | Gas oil | 105 | 1982 | South East |
| | Littlebrook D | Oil | 1370 | 1982 | South East |

*For footnotes see page 152*

# 5.10 Power Stations in the United Kingdom

## (operational at the end of May 2015)[1] (continued)

| Company Name | Station Name | Fuel | Installed Capacity (MW) | Year of commission or year generation began | Location Scotland, Wales Northern Ireland, or English region |
|---|---|---|---|---|---|
| RWE Innogy UK Ltd | Black Rock | Hydro | 4 | 2012 | Scotland |
| (Part of RWE Npower) | Braevallich | Hydro | 2 | 2005 | Scotland |
| | Carnoch | Hydro | 1 | 2009 | Scotland |
| | Cwm Dyli | Hydro | 10 | 2002 *(8)* | Wales |
| | Dolgarrog High Head | Hydro | 17 | 2002 *(8)* | Wales |
| | Dolgarrog Low Head | Hydro | 15 | 1926/2002 | Wales |
| | Douglas Water | Hydro | 3 | 2008 | Scotland |
| | Garrogie | Hydro | 2 | 2005 | Scotland |
| | Inverbain | Hydro | 1 | 2006 | Scotland |
| | Inverlael | Hydro | 3 | 2009 | Scotland |
| | Kielder | Hydro | 6 | 2006 *(8)* | North East |
| | Maldie | Hydro | 4 | 2013 | Scotland |
| | River E | Hydro | 3 | 2008 | Scotland |
| | An Suidhe | Wind | 22 | 2005 | Scotland |
| | Bilbster | Wind | 4 | 2008 | Scotland |
| | Bradwell | Wind | 21 | 2013 | North East |
| | Burgar Hill | Wind | 5 | 2007 | Scotland |
| | Goole Fields | Wind | 4 | 2013 | North East |
| | Hameldon Hill | Wind | 6 | 2007 | North West |
| | Hameldon Hill Extension | Wind | 6 | 2014 | North West |
| RWE Innogy Ltd (continued) | Hellrigg | Wind | 9 | 2012 | North West |
| | Hollies | Wind | 3 | 2008 | East |
| | Kiln Pit Hill | Wind | 14 | 2012 | North East |
| | Knabs Ridge | Wind | 16 | 2008 | North East |
| | Lindhurst | Wind | 9 | 2010 | East Midlands |
| | Little Cheyne Court | Wind | 60 | 2008 | South East |
| | Middlemoor | Wind | 54 | 2013 | North East |
| | Novar 2 | Wind | 37 | 2012 | Scotland |
| | Rhyl Flats | Wind (offshore) | 90 | 2009 | Wales |
| | Gwynt y Mor | Wind (offshore) | 576 | 2013 | Wales |
| RWE Innogy UK Ltd | Markinch CHP | Biomass | 65 | 2014 | Scotland |
| Scottish and Southern | | | | | |
| Hydro Schemes: | | | | | |
| Affric/Beauly | Aigas | Hydro | 20 | 1962 | Scotland |
| | Culligran | Hydro | 17 | 1962 | Scotland |
| | Culligran Compensation Set | Hydro | 2 | 1962 | Scotland |
| | Deanie | Hydro | 38 | 1963 | Scotland |
| | Fasnakyle | Hydro | 69 | 1951 | Scotland |
| | Fasnakyle Compensation Set | Hydro | 8 | 2006 | Scotland |
| | Kilmorack | Hydro | 20 | 1962 | Scotland |
| | Mullardoch Tunnel | Hydro | 2 | 1955 | Scotland |
| Breadalbane | Cashlie | Hydro | 11 | 1959 | Scotland |
| | Dalchonzie | Hydro | 4 | 1958 | Scotland |
| | Finlarig | Hydro | 17 | 1955 | Scotland |
| | Lednock | Hydro | 3 | 1961 | Scotland |
| | Lochay | Hydro | 46 | 1958 | Scotland |
| | Lochay Compensation Set | Hydro | 2 | 1959 | Scotland |
| | Lubreoch | Hydro | 4 | 1958 | Scotland |
| | St. Fillans | Hydro | 17 | 1957 | Scotland |
| Conon | Achanalt | Hydro | 3 | 1956 | Scotland |
| | Cuileg | Hydro | 3 | 2002 | Scotland |
| | Grudie Bridge | Hydro | 19 | 1950 | Scotland |
| | Luichart | Hydro | 34 | 1954 | Scotland |
| | Loch Dubh | Hydro | 1 | 1954 | Scotland |
| | Mossford | Hydro | 19 | 1957 | Scotland |
| | Orrin | Hydro | 18 | 1959 | Scotland |
| | Torr Achilty | Hydro | 15 | 1954 | Scotland |
| Foyers | Foyers | Hydro / pumped storage | 300 | 1974 | Scotland |
| Great Glen | Ceannacroc | Hydro | 20 | 1956 | Scotland |
| | Foyers Falls | Hydro | 5 | 1968 | Scotland |
| | Glendoe | Hydro | 100 | 2008 | Scotland |
| | Glenmoriston | Hydro | 40 | 1957 | Scotland |
| | Invergarry | Hydro | 20 | 1956 | Scotland |
| | Kingairloch | Hydro | 4 | 2005 | Scotland |
| | Livishie | Hydro | 17 | 1962 | Scotland |
| | Mucomir | Hydro | 2 | 1962 | Scotland |
| | Quoich | Hydro | 18 | 1955 | Scotland |

*For footnotes see page 152*

# 5.10 Power Stations in the United Kingdom

## (operational at the end of May 2015)[1] (continued)

| Company Name | Station Name | Fuel | Installed Capacity (MW) | Year of commission or year generation began | Location Scotland, Wales Northern Ireland, or English region |
|---|---|---|---|---|---|
| Shin | Cassley | Hydro | 10 | 1959 | Scotland |
| | Lairg | Hydro | 4 | 1959 | Scotland |
| | Shin | Hydro | 19 | 1958 | Scotland |
| Sloy/Awe | Allt-na-Lairige | Hydro | 7 | 1956 | Scotland |
| | Clachan | Hydro | 40 | 1955 | Scotland |
| | Inverawe | Hydro | 25 | 1963 | Scotland |
| | Kilmelfort | Hydro | 2 | 1956 | Scotland |
| | Loch Gair | Hydro | 6 | 1961 | Scotland |
| | Lussa | Hydro | 2 | 1952 | Scotland |
| | Nant | Hydro | 15 | 1963 | Scotland |
| | Sloy | Hydro | 153 | 1950 | Scotland |
| | Sron Mor | Hydro | 4 | 1957 | Scotland |
| | Striven | Hydro | 8 | 1951 | Scotland |
| Tummel | Clunie | Hydro | 61 | 1950 | Scotland |
| | Cuaich | Hydro | 3 | 1959 | Scotland |
| | Errochty | Hydro | 75 | 1955 | Scotland |
| | Gaur | Hydro | 8 | 1953 | Scotland |
| | Loch Ericht | Hydro | 2 | 1962 | Scotland |
| | Pitlochry | Hydro | 15 | 1950 | Scotland |
| | Rannoch | Hydro | 45 | 1930 | Scotland |
| | Tummel | Hydro | 34 | 1933 | Scotland |
| Wind | Achany | Wind | 38 | 2010 | Scotland |
| | Artfield Fell | Wind | 20 | 2005 | Scotland |
| | Balmurrie Fell | Wind | 9 | 2012 | Scotland |
| | Bessy Bell 1 | Wind | 5 | 1995 | Northern Ireland |
| | Bessy Bell 2 | Wind | 9 | 2008 | Northern Ireland |
| Bin Mountain Windfarm (NI) Limited *(19)* | Bin Mountain *(19)* | Wind | 9 | 2007 | Northern Ireland |
| Carcant Windfarm (Scotland) Limited *(19)* | Carcant *(19)* | Wind | 7 | 2010 | Scotland |
| | Cathkin Braes | Wind | 3 | 2013 | Scotland |
| Clyde Windfarm (Scotland) Limited * | Clyde Central | Wind | 113 | 2011 | Scotland |
| Clyde Windfarm (Scotland) Limited * | Clyde North | Wind | 108 | 2012 | Scotland |
| Clyde Windfarm (Scotland) Limited * | Clyde South | Wind | 129 | 2011 | Scotland |
| | Drumderg | Wind | 37 | 2008 | Scotland |
| | Fairburn | Wind | 40 | 2009 | Scotland |
| | Gordonbush | Wind | 70 | 2011 | Scotland |
| Griffin Windfarm Limited | Griffin | Wind | 189 | 2011 | Scotland |
| | Hadyard Hill | Wind | 120 | 2005 | Scotland |
| Keadby Wind Farm Limited * | Keadby | Wind | 68 | 2013 | Yorkshire and the Humber |
| | National Offshore Wind Turbine Test Facility (NOWTTF) | Wind | 13 | 2014 | Scotland |
| | Port of Tilbury | Wind | 9 | 2013 | East |
| | Slieve Kirk | Wind | 74 | 2011 | Northern Ireland |
| | Spurness Extension *(20)* | Wind | 10 | 2012 | Scotland |
| | Tangy | Wind | 19 | 2002 | Scotland |
| Tappaghan Windfarm (NI) Limited *(19)* | Tappaghan *(19)* | Wind | 29 | 2005 | Northern Ireland |
| SSE Toddleburn Limited * | Toddleburn | Wind | 28 | 2010 | Scotland |
| Small Hydros: | Chliostair | Hydro | 1 | 1960 | Scotland |
| | Kerry Falls | Hydro | 1 | 1951 | Scotland |
| | Nostie Bridge | Hydro | 1 | 1950 | Scotland |
| | Storr Lochs | Hydro | 2 | 1952 | Scotland |
| Thermal: | | | | | |
| | Medway | CCGT | 700 | 1995 | South East |
| | Peterhead *(22)* | CCGT | 1180 | 1980 | Scotland |
| | Ferrybridge C | Coal / biomass | 980 | 1966 | Yorkshire and the Humber |
| | Fiddler's Ferry | Coal / biomass | 1961 | 1971 | North West |
| | Slough * | Coal / biomass / gas / waste derived fuel | 35 | 1918 | South East |
| | Chippenham | Gas | 10 | 2002 | South West |
| | Ferrybridge GT | Gas oil | 34 | 1966 | Yorkshire and the Humber |
| | Fiddler's Ferry GT | Gas oil | 34 | 1969 | North West |
| | Keadby GT | Gas oil | 25 | 1994 | Yorkshire and the Humber |
| | Burghfield | Gas / oil | 45 | 1998 | South East |
| | Chickerell | Gas / oil | 45 | 1998 | South West |
| | Five Oaks | Light oil | 9 | 1995 | South East |
| | Thatcham | Light oil | 9 | 1994 | South East |
| Island Generation | Arnish | Diesel | 10 | 2001 | Scotland |
| | Barra | Diesel | 3 | 1990 | Scotland |
| | Bowmore | Diesel | 6 | 1946 | Scotland |
| | Kirkwall | Diesel | 16 | 1953 | Scotland |

*For footnotes see page 152*

# 5.10 Power Stations in the United Kingdom
## (operational at the end of May 2015)[1] (continued)

| Company Name | Station Name | Fuel | Installed Capacity (MW) | Year of commission or year generation began | Location Scotland, Wales Northern Ireland, or English region |
|---|---|---|---|---|---|
| Island Generation (continued) | Lerwick | Diesel | 67 | 1953 | Scotland |
| | Loch Carnan, South Uist | Diesel | 9 | 1971 | Scotland |
| | Stornoway | Diesel | 24 | 1950 | Scotland |
| | Tiree | Diesel | 3 | 1945 | Scotland |
| Greater Gabbard Offshore Winds Limited | Greater Gabbard *(21)* | Wind (offshore) | 504 | 2011 | East |
| Scottish Power | | | | | |
| Hydro schemes: | | | | | |
| Galloway | Carsfad | Hydro | 12 | 1936 | Scotland |
| | Drumjohn | Hydro | 2 | 1985 | Scotland |
| | Earlstoun | Hydro | 14 | 1936 | Scotland |
| | Glenlee | Hydro | 24 | 1935 | Scotland |
| | Kendoon | Hydro | 24 | 1936 | Scotland |
| | Tongland | Hydro | 33 | 1935 | Scotland |
| Lanark | Bonnington | Hydro | 11 | 1927 | Scotland |
| | Stonebyres | Hydro | 6 | 1927 | Scotland |
| Cruachan | Cruachan | Pumped storage | 440 | 1966 | Scotland |
| Thermal: | Damhead Creek | CCGT | 805 | 2000 | South East |
| | Rye House | CCGT | 715 | 1993 | East |
| | Shoreham | CCGT | 420 | 2000 | South East |
| | Longannet | Coal | 2260 | 1970 | Scotland |
| | Blackburn | CCGT | 59 | 2011 | North West |
| | Pilkington - Greengate * | Gas | 10 | 1998 | North West |
| Wind: | Arecleoch | Wind | 120 | 2010 | Scotland |
| | Beinn an Tuirc 1 | Wind | 30 | 2001 | Scotland |
| | Beinn an Tuirc 2 | Wind | 44 | 2012 | Scotland |
| | Beinn Tharsuinn | Wind | 30 | 2007 | Scotland |
| | Black Law | Wind | 124 | 2005 | Scotland |
| | Callagheen | Wind | 17 | 2006 | Northern Ireland |
| | Carland Cross RP | Wind | 20 | 2013 (23) | South West |
| | Clachan Flats | Wind | 15 | 2009 | Scotland |
| | Coal Clough RP *(32)* | Wind | 16 | 2014 | North West |
| | Coldham | Wind | 16 | 2006 | East |
| | Corkey | Wind | 5 | 1994 | Northern Ireland |
| | Cruach Mhor | Wind | 30 | 2004 | Scotland |
| | Dun Law 1 | Wind | 17 | 2000 | Scotland |
| | Dun Law 2 | Wind | 30 | 2009 | Scotland |
| | Elliot's Hill | Wind | 5 | 1995 | Northern Ireland |
| | Green Knowes | Wind | 27 | 2008 | Scotland |
| | Hagshaw Hill 1 | Wind | 16 | 1995 | Scotland |
| | Hagshaw Hill 2 | Wind | 26 | 2009 | Scotland |
| | Hare Hill | Wind | 13 | 2000 | Scotland |
| | Harestanes | Wind | 136 | 2013 | Scotland |
| | Lynemouth | Wind | 26 | 2012 | North East |
| | Mark Hill | Wind | 56 | 2011 | Scotland |
| | Middleton | Wind | 12 | 2013 | Scotland |
| | Penryddian & Llidiartywaun | Wind | 31 | 1992 | Wales |
| | Rigged Hill | Wind | 5 | 1994 | Northern Ireland |
| | Wether Hill | Wind | 18 | 2007 | Scotland |
| | Whitelee | Wind | 322 | 2007 | Scotland |
| | Whitelee II | Wind | 217 | 2012 | Scotland |
| | Wolf Bog | Wind | 10 | 2008 | Northern Ireland |
| Seabank Power Limited *(24)* | Seabank 1 | CCGT | 812 | 1998 | South West |
| | Seabank 2 | CCGT | 410 | 2000 | South West |
| Sembcorp Utilities (UK) Ltd | Wilton 10 * | Biomass | 38 | 2007 | North East |
| | Wilton GT2 * | Gas | 42 | 2005 | North East |
| | Wilton GT1 * | Gas | 42 | 1952 | North East |
| South East London | South East London | | | | |
| Combined Heat & Power Ltd | SELCHP ERF | Waste | 32 | 1994 | London |
| Statkraft Energy Ltd | Rheidol | Hydro | 49 | 1961 | Wales |
| Statkraft Wind UK Ltd | Alltwalis | Wind | 23 | 2009 | Wales |
| | Baillie | Wind | 53 | 2013 | Scotland |
| | Berry Burn | Wind | 67 | 2013 | Scotland |
| | Scira (Sheringham Shoal BMU 1) | Wind (offshore) | 158 | 2012 | East |
| | Scira (Sheringham Shoal BMU 2) | Wind (offshore) | 158 | 2012 | East |

*For footnotes see page 152*

# 5.10 Power Stations in the United Kingdom
## (operational at the end of May 2015)[1] (continued)

| Company Name | Station Name | Fuel | Installed Capacity (MW) | Year of commission or year generation began | Location Scotland, Wales Northern Ireland, or English region |
|---|---|---|---|---|---|
| SYND Holdco | Sixpenny Wood | Wind | 21 | 2013 | Yorkshire and the Humber |
| | Yelvertoft | Wind | 16 | 2013 | East Midlands |
| | North Rhins | Wind | 22 | 2010 | Scotland |
| | Drone Hill | Wind | 29 | 2012 | Scotland |
| Talisman Energy | Beatrice *(3)* | Wind (offshore) | 10 | 2007 | Scotland |
| The Renewables Infrastructure Group (UK) Ltd | Altahullion | Wind | 26 | 2003 | Northern Ireland |
| | Altahullion Extension | Wind | 12 | 2007 | Northern Ireland |
| | Earlseat | Wind | 16 | 2014 | Scotland |
| | Forss | Wind | 2 | 2003 | Scotland |
| | Forss Extension | Wind | 5 | 2007 | Scotland |
| | Grange | Wind | 14 | 2013 | North West |
| | Hill of Towie | Wind | 48 | 2012 | Scotland |
| | Kelburn | Wind | 28 | 2011 | Scotland |
| | Meikle Carewe | Wind | 10 | 2013 | Scotland |
| | Tallentire | Wind | 12 | 2013 | North West |
| | Lendrum's Bridge | Wind | 13 | 2000 | Northern Ireland |
| | Lough Hill | Wind | 8 | 2007 | Northern Ireland |
| | Roos | Wind | 17 | 2012 | Yorkshire and the Humber |
| Third Energy Trading Ltd (Formerly RGS) | Knapton | Gas | 40 | 1994 | Yorkshire and the Humber |
| Triodos *(17)* | Dunfermline (FMC) | Wind | 2 | 2012 | Scotland |
| | Eye Airfield | Wind | 5 | 2013 | England |
| Vattenfall Wind Power | Clashindarroch | Wind | 37 | 2015 | Scotland |
| | Edinbane | Wind | 41 | 2010 | Scotland |
| | Swinford | Wind | 22 | 2012 | East Midlands |
| | Kentish Flats | Wind (offshore) | 90 | 2005 | South East |
| | Ormonde | Wind (offshore) | 150 | 2011 | North West |
| | Thanet | Wind (offshore) | 300 | 2010 | South East |
| Velocita *(17)* | Maerdy | Wind | 24 | 2013 | Wales |
| VPI Immingham LLP | VPI Immingham * | Gas | 1240 | 2004 | Yorkshire and the Humber |
| Windcluster | Haverigg 3 *(2)* | Wind | 3 | 2005 | North West |
| Yorkshire Windpower Ltd *(25)* | Ovenden Moor | Wind | 9 | 1993 | Yorkshire and the Humber |
| | Royd Moor | Wind | 7 | 1993 | Yorkshire and the Humber |
| Total | | | **80,946** | | |

## Other power stations[26]

| | | |
|---|---|---|
| Renewable sources | wind | 2,459 |
| and combustible wastes | landfill gas | 1,051 |
| | sewage gas | 208 |
| | hydro | 266 |
| | biomass and waste | 1,135 |
| | solar photovoltaics and wave/tidal | 5,386 |
| CHP schemes listed in Table 5.11 | various fuels | 2,221 |
| CHP schemes other than major power producers and renewables and those listed in Table 5.11 | mainly gas | 1,756 |

*For footnotes see page 152*

# 5.10 Power Stations in the United Kingdom
## (operational at the end of May 2015)[1] (continued)

## Interconnectors

| | Capacity (MW) |
|---|---|
| England - France | 2,000 |
| England - Netherlands | 1,000 |
| Scotland - Northern Ireland | 500 |
| Wales - Irish Republic | 500 |
| Northern Ireland - Irish Republic | 600 |

Footnotes

*(1)* This list covers stations owned or operated by Major Power Producers; other power stations (including many renewable sites and auto-generators) are included in the sub table on page 151.

*(2)* Operated by HG Capital.

*(3)* Joint venture with Scottish and Southern Energy (25.1%), OPW (24.8%) and DONG Energy (50.1%).

*(4)* Managed by RWE.

*(5)* Joint venture between Green Coat Capital and Hermes, but operated by SSE.

*(6)* Now owned by EDF.

*(7)* Managed by EDF Energy Renewables Ltd.

*(8)* Recommissioning dates.

*(9)* Capacity reduced in 2013, with these stations typically now operating as Open Cycle Gas Turbines.

*(10)* Operated by RES-UK & Ireland Ltd.

(11) Barrow owned 100% by Dong Energy.

(11b) Lincs Co-owned by Centrica (50%), DONG Energy (25%) and Siemens (25%).

*(12)* Animal Waste Derived Fuel, i.e. meat and bone meal, poultry litter, feathers and small quantities of other material such as wood chips.

*(13)* Co-owned by EON (30%), Dong (25%), La caisse de dépôt et placement du Québec (25%) and Masdar 20%.

*(14)* Owned by RWE.

*(15)* Owned by NDA but operated by Magnox Ltd.

*(16)* Joint venture between SSE and ESB.

*(17)* Operated by Wind Prospect Operations.

*(18)* Owned by NDA but operated by Px Limited.

*(19)* Owned by Green Coat Capital, but continues to be operated by SSE.

*(20)* Spurness re-powered in December 2012 with a capacity of 10MW.

*(21)* Joint venture with Green Coat Capital, but operated by SSE.

*(22)* Total capacity is 1,840 MW but because of transmission constraints only 1,180 MW can be used at any one time.

*(23)* Carland Cross re-powered in 2013 (originally commissioned in 1992).

*(24)* Joint venture with Scottish and Southern Energy and Electricity First Limited.

*(25)* Owned by E.On and EPR.

*(26)* As at end December 2012.

(27) SYND Holdco is a joint venture between Greencoat and Swiss Life where Greencoat owns 51.6% and Swiss Life owns 48.4%.

(28) Site no longer owned by E.ON. Site sold to Cannock Renewables in December 2014.

(29) Site no longer owned by E.ON. Site sold to Cumbria Wind Ltd in December 2014.

(30) Site no longer owned by E.ON. Site sold to Curlew Power Ltd in December 2014.

(31) Site owned by TPG Wind Ltd, a joint venture between E.ON and Eurus Energy UK Ltd.

(32) Re-powering of the original Coal Clough that was decommissioned.

# 5.11 Large scale CHP schemes in the United Kingdom
## (operational at the end of December 2014)[1]

| Company Name | Scheme Location | Installed Capacity (MWe) (2) |
|---|---|---|
| A. Pearson And Sons (1949) Ltd | Woodhouse Nurseries | 3 |
| A. Pearson Growers Ltd | Europa Nursery - Ash | 15 |
| Adm Erith Ltd | Erith Oil Works | 14 |
| Agrivert Ltd | Cassington Ad | 2 |
| Anglian Water Services Limited | Tilbury Sewage Treatment Works | 2 |
| Arjo Wiggins Chartham Ltd | Chartham Paper Mill, Arjo Wiggins Chartham Ltd | 6 |
| Atkins Power | Yorkshire Grown Produce Limited - Burstwick | 10 |
| Atkins Power | Yorkshire Grown Produce Limited - Newport | 4 |
| Balcas Limited | Balcas Limited | 3 |
| Balcas Timber Ltd | Balcas Invergordon | 9 |
| Barkantine Heat & Power Company | Barkantine, Barkantine Heat & Power Company | 1 |
| Basf Performance Products | Water Treatments, Basf Plc | 16 |
| Briar Chemicals Limited | Briar Chemicals Ltd | 4 |
| British Sugar Plc | Bury St Edmunds Sugar Factory | 77 |
| British Sugar Plc | Cantley Sugar Factory | 15 |
| British Sugar Plc | Wissington Sugar Factory, British Sugar Plc (CHP 2) | 93 |
| Cambridge University Hospitals Foundation Trust | Addenbrookes Hospital | 4 |
| Cantelo Nurseries | Bradon Farm | 10 |
| Cargill Plc | Cargill Manchester CHP 2 | 28 |
| Carillion Services Ltd, Ta Carillion Health | Queen Alexandra Hospital | 3 |
| Celts Ltd | Levenmouth Waste Water Treatment Works | 3 |
| Citywest Homes | Pump House | 3 |
| Cleveland Potash Limited | Boulby Mine. Cleveland Potash Limited | 13 |
| Cofely District Energy Ltd | The Heat Station (CHP 2) | 7 |
| Cofely District Energy Ltd | Mod Main Building, Cofely Limited | 5 |
| Cofely District Energy Ltd | Soas Chp, The Boiler House | 1 |
| Cofely District Energy Ltd | Icc Energy Centre | 2 |
| Cofely District Energy Ltd | Aston University Energy Centre, Aston University | 3 |
| Cofely District Energy Ltd | Birmingham Childrens Hospital | 2 |
| Cofely District Energy Ltd | Ldec-City Centre And Leicester East | 3 |
| Cofely District Energy Ltd | Ldec-Leicester North | 2 |
| Cofely IES | Cofely Humber Energy | 46 |
| Cofely Ltd | Trafford Park, Kellogg Company Of Great Britain | 5 |
| Cofely Ltd | Hillhouse International | 5 |
| Contourglobal Solutions (Northern Ireland) Ltd | Knockmore Hill CHP, Contour Global Solutions (Northern Ireland) | 15 |
| Crisp Maltings Group Ltd | Crisp Maltings Ryburgh | 1 |
| Cyclerval Uk Ltd | Newlincs Efw, Newlincs Development Ltd | 3 |
| Dalkia | Freeman Hospital | 4 |
| Dalkia | Royal Victoria Infirmary | 4 |
| Dalkia Plc | Lincoln County Hospital | 1 |
| Dalkia Utilities Services | Eli Lilly & Co Ltd | 10 |
| De La Rue Overton | Overton Mill, De La Rue International Ltd | 7 |
| Doncaster And Bassetlaw Hospitals NHS Foundation Trust | Doncaster Royal Infirmary | 1 |
| Dow Corning Ltd | Dow Corning Chp | 27 |
| Ds Smith Paper Ltd | Kemsley CHP | 81 |
| Dsm Nutritional Products (Uk) Ltd | Dsm Dalry | 46 |
| Eon | Nufarm Uk Limited | 5 |
| Eon Uk Cogeneration Ltd | Stoke Chp, Michelin Tyre Plc | 61 |
| East Sussex Healthcare Trust | Eastbourne District General Hospital | 1 |
| Esso Petroleum Company Limited | Fawley Cogen | 316 |
| Energen Biogas | Energen Biogas | 2 |
| Enviroenergy | London Road Heat Station | 11 |
| Eon | Queens Medical Centre NHS Trust | 5 |
| Eon Uk | Citigen CHP, Citigen (London) Limited | 16 |
| Fec Services | Arreton Valley Nurseries, Wight Salads | 16 |
| Fine Organics Limited | Fine Organics Limited | 4 |
| Frimley Park Hospital Nhs Foundation Trust | Frimley Park Hospital | 1 |
| G4 Power Grid Ltd | Brookenby Power Station | 4 |
| Genzyme Ltd | Genzyme Ltd | 1 |
| Glaxosmithkline | Glaxosmithkline Ulverston | 2 |
| Glaxosmithkline | Glaxosmithkline Montrose | 1 |
| Glaxosmithkline | Glaxosmithkline Irvine | 4 |
| Glaxosmithkline | Barnard Castle | 2 |
| Glaxosmithkline | Glaxosmithkline, Ware | 2 |
| Glaxosmithkline Research & Development Ltd | GSK R & D Ware | 4 |
| Great Ormond Street Hospital For Children NHS Trust | Great Ormond Street Hospital | 1 |

*For footnotes see page 155*

## 5.11 Large scale CHP schemes in the United Kingdom
### (operational at the end of December 2014)[1] *(continued)*

| Company Name | Scheme Location | Installed Capacity (MWe) *(2)* |
|---|---|---|
| Heathcoat Fabrics Ltd | Heathcoat Fabrics Limited | 1 |
| Helix Agencies Limited | Natural History Museum | 2 |
| Helix Agencies Limited | Blackpool Victoria Hospital | 1 |
| Iggesund Paperboard (Workington) Ltd | Iggesund Paperboard (Workington) Ltd | 50 |
| Imperial College London | South Kensington Campus CHP Plant | 9 |
| Inbev Uk Ltd | Samlesbury Brewery, Inbev Uk Ltd | 7 |
| Inbev Uk Ltd | Magor Brewery, Inbev Uk Ltd | 7 |
| Ineos Chlorvinyls Limited | Ineos Chlorvinyls Limited | 10 |
| Ineos Chlorvinyls Limited | Gas Engine Chp | 2 |
| Integrated Energy Utilities Ltd | Seaton Energy Centre, Aberdeen Heat & Power | 2 |
| Integrated Energy Utilities Ltd | Callendar Park Energy Centre, Falkirk Council | 1 |
| Jaguar Land Rover Limited | Castle Bromwich, Jaguar Land Rover Ltd | 6 |
| Jaguar Landrover | Landrover - Solihull Paint Shop 21 | 3 |
| James Cropper Plc | James Cropper Plc | 7 |
| John Thompson And Son Ltd | John Thompson & Sons Limited | 4 |
| Johnson Matthey | Johnson Matthey Enfield | 3 |
| Johnson Matthey | Johnson Matthey - Royston | 6 |
| London Borough Of Islington | Bunhill Heat And Power | 2 |
| Loughborough University | Central Park | 2 |
| Medway NHS Foundation Trust | Medway Hospital, Medway Maritime Hospital | 1 |
| Milford Haven Refinery | Milford Haven Refinery | 24 |
| Mill Nurseries Ltd | Mill Chp, Mill Nurseries | 14 |
| Nestle Uk Limited | Nestle York | 10 |
| Nhs Grampian | Aberdeen Royal Infirmary | 5 |
| North Tees & Hartlepool NHS Foundation Trust | University Hospital Of North Tees | 2 |
| Northumbrian Water Ltd | Bran Sands (Biogas) | 5 |
| Northumbrian Water Ltd | Howdon Stw | 6 |
| Northwood & Wepa Ltd | Bridgend CHP | 9 |
| Novartis Grimsby Limited | Novartis Grimsby Limited | 8 |
| Peel Utilities Holdings Limited | Media City, Utilities (Media City Uk) Ltd | 2 |
| Powell Energy | St. Georges Hospital | 4 |
| Preston Board And Packaging Ltd | Romiley Board | 1 |
| Reckitt Benckister | Kwe Hull | 2 |
| Reg Bio Power Ltd | Bentwaters CHP | 6 |
| Rotherham General Hospital NHS Trust | Rotherham District General Hospital | 1 |
| Rwe Npower | Basf CHP | 98 |
| Rwe Npower | Aylesford CHP | 100 |
| Rwe Npower | Hythe CHP, Npower Cogen (Hythe) Ltd | 53 |
| RWE Npower Cogen Ltd | Markinch CHP | 65 |
| Ryobi Aluminium Casting (UK) Ltd | Ryobi | 1 |
| Scottish And Southern Energy | Slough Nurseries, G & C Properties | 2 |
| Sellafield Ltd | Combined Heat And Power Plant F238 | 193 |
| Shanks Waste Management Limited | Westcott Biogas Generating Plant | 3 |
| Slough Heat & Power Ltd | Slough Power Station | 51 |
| Smurfit Kappa Ssk | Smurfit Kappa Ssk Limited | 9 |
| Southern Water Services | Ashford Stc | 2 |
| Southern Water Services | Millbrook Wtw, Southern Water | 1 |
| Southern Water Services | Budds Farm Wtw, Southern Water | 2 |
| Springfields Fuels Ltd | Springfields | 12 |
| Swansea University | Swansea University | 2 |
| Tata Chemicals Europe | Winnington CHP | 146 |
| Tate & Lyle Sugars Ltd | Thames Refinery, Tate and Lyle New Scheme | 28 |
| Thames Water Utilities Ltd | Maple Lodge Stw | 4 |
| Thames Water Utilities Ltd | Long Reach Stw | 3 |
| Thames Water Utilities Ltd | Beckton STW Bio Diesel CHP | 4 |
| Thames Water Utilities Ltd | Mogden Stw | 8 |
| Thames Water Utilities Ltd | Beddington Stw | 4 |
| Thames Water Utilities Ltd | Deephams Stw | 3 |
| Thames Water Utilities Ltd | Ryemeads Stw | 1 |
| Thames Water Utilities Ltd | Oxford Stw | 2 |
| Thames Water Utilities Ltd | Crawley Stw | 1 |
| Thames Water Utilities Ltd | Reading (Island Road) Stw | 1 |
| Thames Water Utilities Ltd | Chertsey STW | 1 |
| Thameswey Central Milton Keynes Ltd | Woking Town Centre Phase I | 1 |

*For footnotes see page 155*

## 5.11 Large scale CHP schemes in the United Kingdom (operational at the end of December 2014)[1] *(continued)*

| Company Name | Scheme Location | Installed Capacity (MWe) *(2)* |
|---|---|---|
| Thameswey Central Milton Keynes Ltd | Tcmk Phase 1 CHP No 2 Gas Engine | 6 |
| Transport For London | Palestra, Transport for London | 1 |
| University of Aberdeen | Old Aberdeen Campus | 2 |
| University of Birmingham ALTA Estate Services CHP Energy Centre | The University Of Birmingham Scheme Ref 740A | 6 |
| University of Bristol | University Of Bristol CHP 2 | 1 |
| University Of Dundee | University Of Dundee, Main CHP Boilerhouse | 3 |
| University Of East Anglia | University Of East Anglia | 5 |
| University of Edinburgh Utilities Supply Company | Kings Buildings | 3 |
| University of Edinburgh Utilities Supply Company | George Square Energy Centre | 2 |
| University Of Liverpool | University Of Liverpool CHP 2 | 7 |
| University of Southampton | University of Southampton | 3 |
| University of Surrey | University Of Surrey | 1 |
| University of Sussex | University of Sussex | 1 |
| University of Warwick | CHP Boilerhouse (CHP 2), University Of Warwick | 4 |
| University of Warwick | Cryfield Energy Centre | 4 |
| University Of York | University Of York | 4 |
| University of Edinburgh Utilities Supply Company | Holyrood Energy Centre | 1 |
| Upm-Kymmene (Uk) | Upm Shotton | 22 |
| Utilicom Ltd | University College London, Gower Street Heat And Power Ltd | 3 |
| Veolia Environmental Services Plc | Sheffield ERF | 22 |
| Vital Energi | Cheltenham General Hospital | 1 |
| Weetabix Ltd | Weetabix Limited | 6 |
| Wessex Water Services Ltd | Bristol Waste Water Treatment Works Scheme A | 6 |
| Total *(2)* | | 2,221 |
| Electrical capacity of good quality CHP for these sites in total | | 1,985 |

*(1) These are sites of 1 MW installed electrical capacity or more that either have agreed to be listed in the Ofgem register of CHP plants or whose details are publicly available elsewhere, or who have provided the information directly to DECC. It excludes CHP sites that have been listed as major power producers in Table 5.10.*

*(2) This is the total power capacity from these sites and includes all the capacity at that site, not just that classed as good quality CHP under CHPQA.*

# Chapter 6
# Renewable sources of energy

## Key points

- Electricity generation in the UK from renewable sources increased by 21 per cent between 2013 and 2014, to reach 64.7 TWh. Capacity grew by 24 per cent (to 24.6 GW) over the same period (paragraphs 6.9 and 6.14; table 6.4).
- Generation from bioenergy sources was 25 per cent higher in 2014 compared to 2013, mainly due to the conversion of a second unit at Drax power station to dedicated biomass. Generation from hydro sources also increased by 25 per cent to 5.9 TWh, a record, due to high rainfall (paragraphs 6.09 and 6.11; table 6.4).
- Solar photovoltaic generation more than doubled in 2014 to 4.1 TWh due to an increase in capacity, particularly from the Renewable Obligation scheme. Capacity is now 5.4 GW, up from 2.9 GW in 2013, an increase of 89 per cent (paragraphs 6.11 and 6.14, and table 6.4).
- Offshore wind generation was 17 per cent higher than in 2013, with capacity up 22 per cent. Onshore wind generation was 10 per cent higher, with capacity up 13 per cent. Overall wind generation was 13 per cent higher and capacity 16 per cent higher (paragraphs 6.10 and 6.15; table 6.4).
- 762 MW of renewable electricity capacity was added via Feed-in Tariffs during 2014, following the introduction of the FiT scheme in April 2010, taking total commissioned FiT capacity to 3,253 MW (paragraph 6.18).
- The contribution of all renewables to UK electricity generation was 19.1 per cent in 2014, 4.2 percentage points higher than in 2013. However, using normalised load factors to take account of fluctuations in wind and hydro, the contribution of renewables to gross electricity consumption reduced to 17.8 per cent, up 4.0 percentage points on 2013 (table 6A).
- Heat from renewable sources increased by 4.6 per cent during 2014 (to 2,730 ktoe); and renewable biofuels for transport rose by 14 per cent (to 1,243 ktoe) (paragraphs 6.31 and 6.41; table 6.6).
- Progress has been made against the UK's 15 per cent target introduced in the 2009 EU Renewable Directive. Using the methodology set out in the Directive, provisional calculations show that 7.0 per cent of energy consumption in 2014 came from renewable sources; this is up from 5.6 per cent in 2013. There was a significant growth in the contribution of renewable electricity, while the renewable heating and transport contributions also rose. Averaged over 2013 and 2014, the UK has provisionally achieved 6.3 per cent renewable energy, 0.9 percentage points in excess of the interim target which was set at 5.4 per cent (paragraph 6.44; table 6.7).

# Introduction

6.1 This chapter provides information on the contribution of renewable energy sources to the United Kingdom's (UK) energy requirements. It covers;

- the use of renewables to generate electricity,
- the burning of renewable fuels to produce heat,
- heat obtained from other renewable sources, and
- the use of liquid biofuels for transport.

The chapter includes some sources that under international definitions are not counted as renewable sources or are counted only in part. This is to ensure that this Digest covers all sources of energy available in the UK. However, within this chapter the international definition of total renewables is used and this excludes non-biodegradable wastes. The energy uses of these wastes are still shown in the tables of this chapter but as "below the line" items.

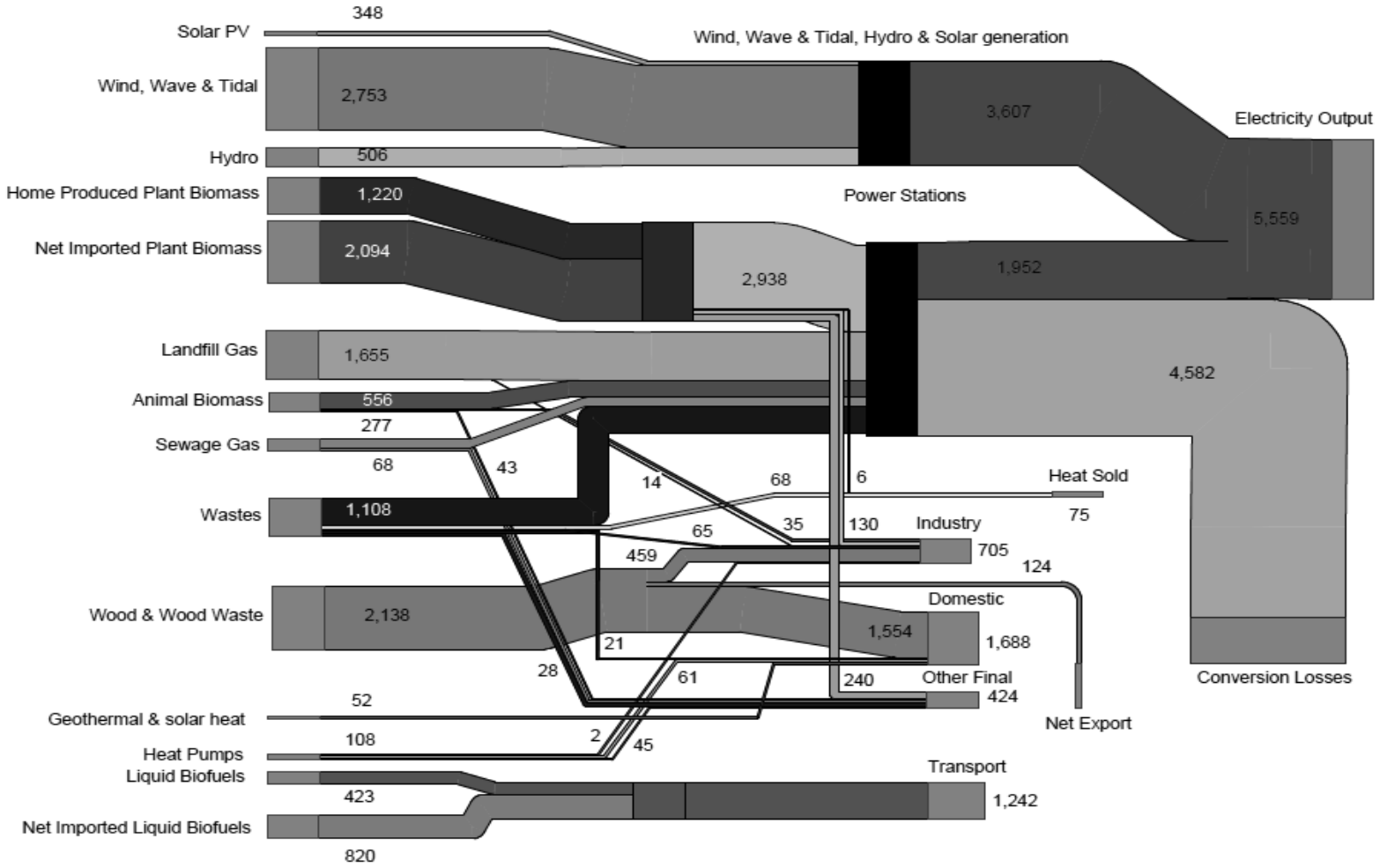
6.2 The data presented in this Chapter is drawn from the results of DECC surveys of electricity generators, information from Combined Heat and Power (CHP) schemes, and The Renewable Energy STATisticS database (RESTATS) which is an on-going study undertaken by Ricardo-AEA on behalf of DECC to update a database containing information on all relevant renewable energy sources in the UK.

6.3 The renewable energy flow chart on page 159 summarises the flows of renewables from fuel inputs through to consumption for 2014. This is a way of simplifying the figures that can be found in the commodity balance for renewable energy sources in Table 6.1 and the renewable electricity output that can be derived from Table 6.4. The flow diagram illustrates the flow of primary fuels from the point at which they become available from home production or imports (on the left) to their eventual final uses (on the right) as well as the energy lost in conversion.

6.4 Commodity balances for renewable energy sources covering each of the last three years form the first three tables in this chapter (Tables 6.1 to 6.3). Unlike the commodity balance tables in other chapters of the Digest, Tables 6.1 to 6.3 have zero statistical differences. This is because the data for each category of fuel are, in the main, taken from a single source where there is less likelihood of differences due to timing, measurement, or differences between supply and demand. These balance tables are followed by 5-year tables showing capacity of, and electricity generation from, renewable sources (Table 6.4). Table 6.5 focuses on load factors for electricity generation. Table 6.6 shows renewable sources used to generate electricity, to generate heat, and for transport purposes in each of the last five years. Finally, Table 6.7 shows the UK's progress against the 2009 EU Renewable Energy Directive target.

6.5 In addition to the tables and commentary contained within this Digest, a long-term trends commentary and table (Table 6.1.1) covering the use of renewables to generate electricity, to generate heat, and as a transport fuel is available on the DECC section of the GOV.UK website, accessible from the Digest of UK Energy Statistics home page:
www.gov.uk/government/collections/digest-of-uk-energy-statistics-dukes.
Quarterly table ET 6.1, showing renewable electricity generation and capacity by UK country, can be found at: www.gov.uk/government/statistics/energy-trends-section-6-renewables

# Renewables flow chart 2014 (thousand tonnes of oil equivalent)



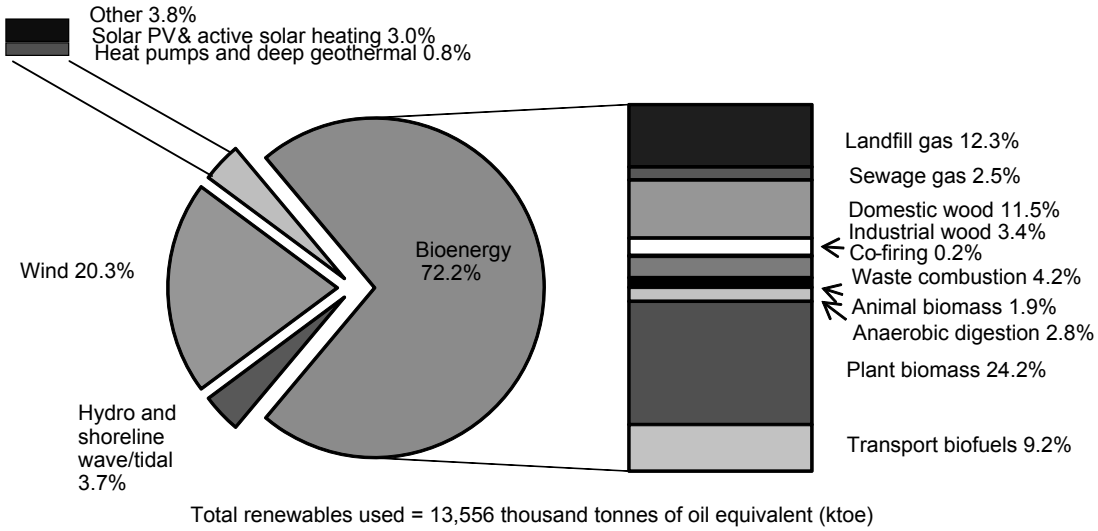

Note: This flow chart is based on data that appear in Tables 6.1 and 6.4

## Commodity balances for renewables and waste in 2014 (Table 6.1), 2013 (Table 6.2) and 2012 (Table 6.3)

6.6 Twelve different categories of renewable fuels are identified in the commodity balances. Some of these categories are themselves groups of renewables because a more detailed disaggregation could disclose data for individual companies. In the commodity balance tables the distinction between biodegradable and non-biodegradable wastes cannot be maintained for this reason. The largest contribution to renewables and waste energy in input terms (around 72 per cent) is from bioenergy (excluding non-biodegradable wastes), with wind generation and hydro electricity production contributing the majority of the remainder as Chart 6.1 shows. Just 3.8 per cent of renewable energy comes from renewable sources other than biomass, wind and hydro. These include solar, heat pumps, and deep geothermal.

6.7 Of the 13,556 ktoe of renewable energy (excluding non-biodegradable wastes) consumed in 2014, 71 per cent was transformed into electricity. While bioenergy appears to dominate the picture when fuel inputs are being measured, hydroelectricity, wind power and solar together provide a larger contribution when the **output** of electricity is being measured as Table 6.4 shows. This is because on an energy supplied basis the inputs are deemed to be equal to the electricity produced for hydro, wind, wave and solar (see Chapter 5, paragraph 5.74). However for landfill gas, sewage sludge, municipal solid waste and other bioenergy sources a substantial proportion of the energy content of the input is lost in the process of conversion to electricity as the renewables flow chart (page 159) illustrates.

### Chart 6.1: Renewable energy fuel use 2014 (1)




*(1) Excludes all passive use of solar energy and all non-biodegradable wastes (717 ktoe). In this chart renewables are measured in primary input terms.*
*(2) Biomass co-fired with fossil fuels in power stations.*
*(3) 'Animal biomass' includes farm waste, poultry litter, and meat and bone combustion.*
*(4) 'Plant biomass' includes straw and energy crops.*

## Capacity of, and electricity generated from, renewable sources (Table 6.4)

6.8 Table 6.4 shows the capacity of, and the amounts of electricity generated from, each renewable source. Total electricity generation from renewables in 2014 amounted to 64,654 GWh, an increase of 11,377 GWh (21 per cent) on 2013. The largest absolute increase in generation came from bioenergy, rising by 4,543 GWh to 22,702 GWh, largely due to an increase in biomass generation.

6.9 Generation from plant biomass rose by 4,176 GWh, to 13,105 GWh, a similar increase to the previous year. This was largely due to the conversion of a second unit at Drax Power Station from coal to dedicated biomass and several new smaller installations though there was also a reduction in capacity at Ironbridge. Correspondingly, co-firing from fossil fuels has decreased by 175 GWh to just 133 GWh.

6.10 Overall, wind generation increased by 13 per cent to 32,016 GWh from 28,421 GWh in 2013. This was due to an increase in capacity; wind speeds were the same as in 2013. Offshore wind increased more than onshore, 1,933 GWh (17 per cent) compared to onshore which increased by 1,662 GWh (10 per cent). The increase in offshore wind generation was mainly due to a 22 per cent increase in capacity.

6.11 Greater uptake of solar photovoltaics, particularly from larger schemes supported by the Renewables Obligation (RO), as well as smaller schemes under the Feed in Tariff (FiT) scheme, led to generation more than doubling in 2014, from 1,989 GWh to 4,050 GWh. Generation from hydro increased by 25 per cent to 5,885 GWh due to higher than average rainfall (in the main hydro catchment areas), the highest since 2008. Other technologies showing increases during the year included anaerobic digestion (an increase of 287 GWh, 40 per cent higher), sewage gas (85 GWh, 11 per cent higher), and municipal solid waste combustion (301 GWh, 18 per cent). Generation from landfill gas fell by 115 GWh, (2.2 per cent), and animal biomass fell by 15 GWh (2.4 per cent).

6.12 Onshore wind continued to be the leading individual technology for the generation of electricity from renewable sources during 2014, although its share of renewables generation decreased from 32 percent in 2013 to 29 per cent. This is despite a 13 per cent increase in capacity. Offshore wind's share of renewables generation remained broadly similar to 2013 at 21 percent. Hydro generation represented 9.1 per cent of renewable generation, mostly large scale. However the combined generation from the variety of different bioenergy sources accounted for 35 per cent of renewable generation, with plant biomass accounting for 58 per cent of bioenergy generation and landfill gas accounting for 22 per cent. Despite the large annual increase in capacity, just 6.3 per cent of renewable generation came from solar photovoltaics though this increased from 3.7 per cent in 2013.

6.13 Renewable sources provided 19.1 per cent of the electricity generated in the UK in 2014 (measured using the "international basis", i.e. electricity generated from all renewables except non-biodegradable wastes as a percentage of all electricity generated in the UK), 4.2 percentage points higher than the proportion recorded during 2013. Table 6A and Chart 6.2 show the growth in the proportion of electricity produced from renewable sources. The table also includes the progress towards the electricity renewables target set under the RO (see paragraphs 6.57 to 6.59), and progress towards the 2009 Renewable Energy Directive (see paragraph 6.53).

**Table 6A: Percentages of electricity derived from renewable sources**

| | 2010 | 2011 | 2012 | 2013 | 2014 |
|---|---|---|---|---|---|
| Overall renewables percentage (international basis) | 6.8 | 9.4 | 11.3 | 14.8 | 19.1 |
| Percentage on a Renewables Obligation basis | 7.0 | 9.8 | 11.9 | 15.5 | 19.8 |
| Percentage on a 2009 Renewable Energy Directive basis (normalised) | 7.4 | 8.8 | 10.7 | 13.8 | 17.8 |

6.14 Installed generation capacity reached 24,623 MW at the end of 2014, an increase of 4,822 MW (24 per cent) during the year; this excludes the capacity within conventional generation stations that was used for co-firing (a further 16 MW). The largest contributor towards the increase was 2,526 MW from solar photovoltaics with further 968 MW and 805 MW increases from onshore and offshore wind respectively, and 505 MW from bioenergy.

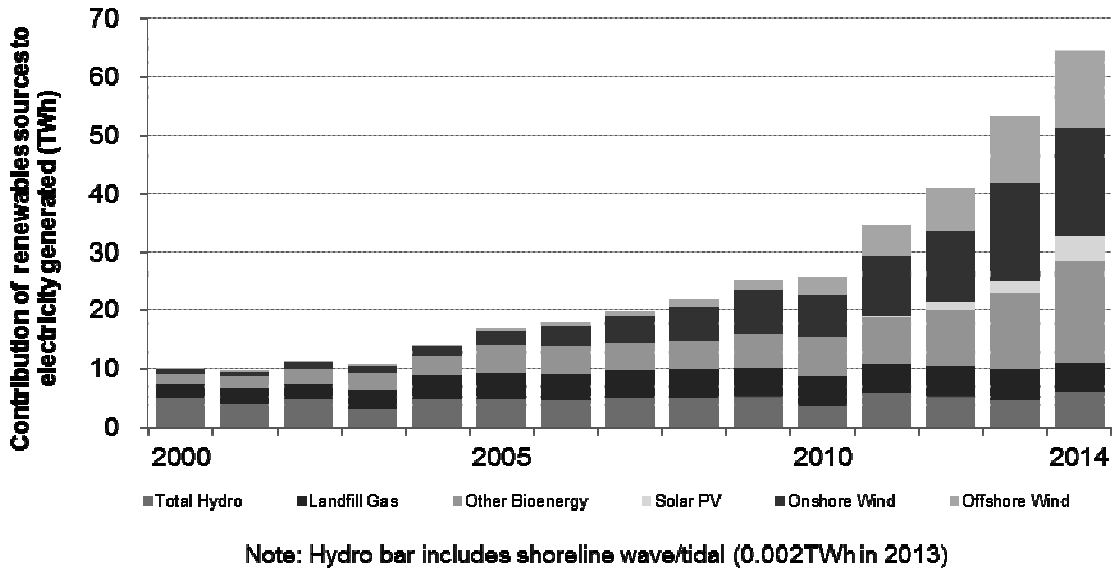
6.15 Onshore wind capacity grew from 7,519 MW in 2013 to 8,486 MW in 2014, with increases in capacity at several large sites, the biggest being an 84 MW increase at Harestanes and 69 MW at Lochluichart. Additionally, there were several new sites opening the biggest of which was Dunbeg wind farm in Northern Ireland. Solar PV capacity increased from 2,851 MW to 5,377 MW (89 per cent), with the majority from large scale sites accredited on or awaiting accreditation on, the RO.

6.16 Capacity from the variety of bioenergy technologies increased from 4,021 MW in 2013 to 4,526 MW in 2014, with the extra capacity from an additional conversion to plant biomass at Drax and

also several small scale new installations. These increases more than compensated for the drop in capacity at Ironbridge which was due to a fire early in 2014. Offshore wind capacity increased from 3,696 MW to 4,501 MW, partly a result of the expansion of the Gwynt-y-Mor site following its opening in 2013. The West of Duddon Sands offshore farm also came on line and reached full capacity in October 2014.

6.17 In capacity terms, onshore wind was the leading technology at the end of 2014, accounting for 35 per cent of capacity, followed by solar photovoltaics (22 per cent), offshore wind (18 per cent), and hydro (7 per cent). Bioenergy represented 18.4 per cent of capacity, with the main components being plant biomass (9.1 per cent) and landfill gas (4.3 per cent).

**Chart 6.2: Electricity generation by main renewable sources since 2000**




6.18 During the first nine months (April and December 2010) of the FiT scheme, a total of 69 MW of renewable capacity was installed and subsequently confirmed on it. During 2011, a further 953 MW of FiT supported renewable capacity was installed. For 2012, 840 MW of capacity was added and in 2013, 581 MW. In 2014, a further 762 MW of capacity was installed, with 74 per cent of this new capacity coming from solar photovoltaics (PV). A further 74 MW of solar PV capacity was installed in 2014 and awaiting accreditation on FiTs.

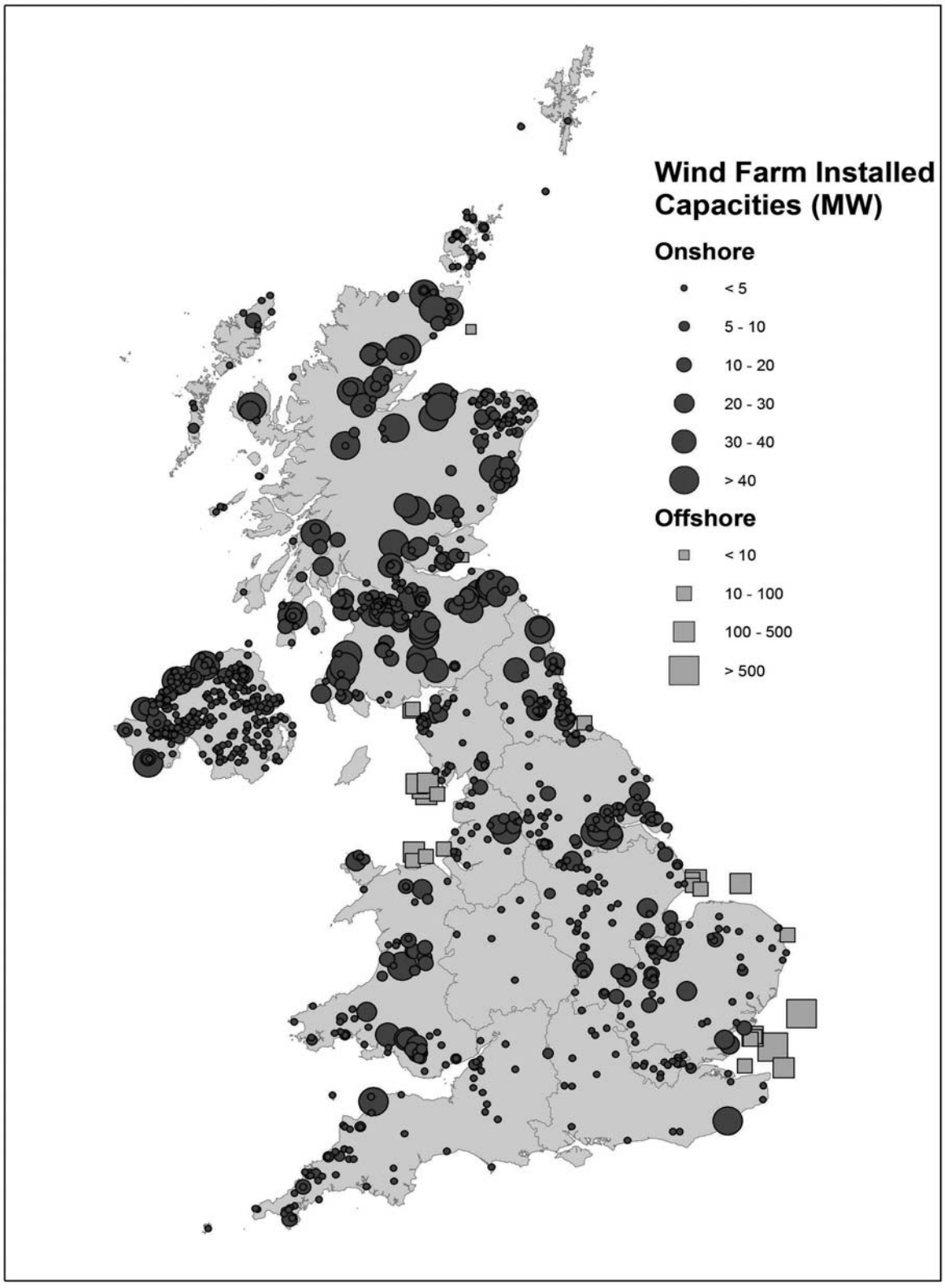
6.19 The greatest increase in FiT capacity in percentage terms in 2014 was from solar photovoltaics, from 2,120 MW at the end of 2013 to 2,685 MW at the end of 2014. Onshore wind also showed strong growth from 230 MW at the end of 2013 to 372 MW at the end of 2014, while hydro capacity increased from 56 MW to 71 MW, and anaerobic digestion from 86 MW to 124 MW. At the end of 2014, solar PV represented 83 per cent of commissioned FiTs capacity (down from 85 per cent at the end of 2013), with onshore wind 11 per cent (up from 9 per cent), and anaerobic digestion 3.8 per cent (up from 3.4 per cent) and hydro remained at 2.2 per cent. It should be noted that, due to administrative lags of around three months, much capacity installed towards the end of 2014 was not confirmed until the first quarter of 2015 (so the amount of capacity installed under FiTs at the end of 2014 will not equal the amount actually confirmed on the Central FiTs Register).[1]

6.20 Table 6B shows the number of sites generating renewable electricity at the end of 2014. There were 660,614 sites, although this figure is dominated by small-scale solar PV installations confirmed on FiTs. Table 6C shows the number of turbines in operation at these sites at the end of December 2014.

[1] At the end of 2014, 3,253 MW of renewable capacity was commissioned and subsequently confirmed on the Central FiTs Register. This includes 37 MW commissioned prior to the start of FiTs on 1 April 2010.

6.21 Chart 6.3 illustrates the continuing increase in the electricity generation capacity from all significant renewable sources since 2000. This upward trend in the capacity of renewable sources should continue as recently consented onshore and offshore wind farms and other projects come on stream. The map, shown below, shows the location of wind farms in operation at the end of December 2014, together with an indication of the capacity.

## The Location of Wind Farms in the United Kingdom as at 31 December 2014



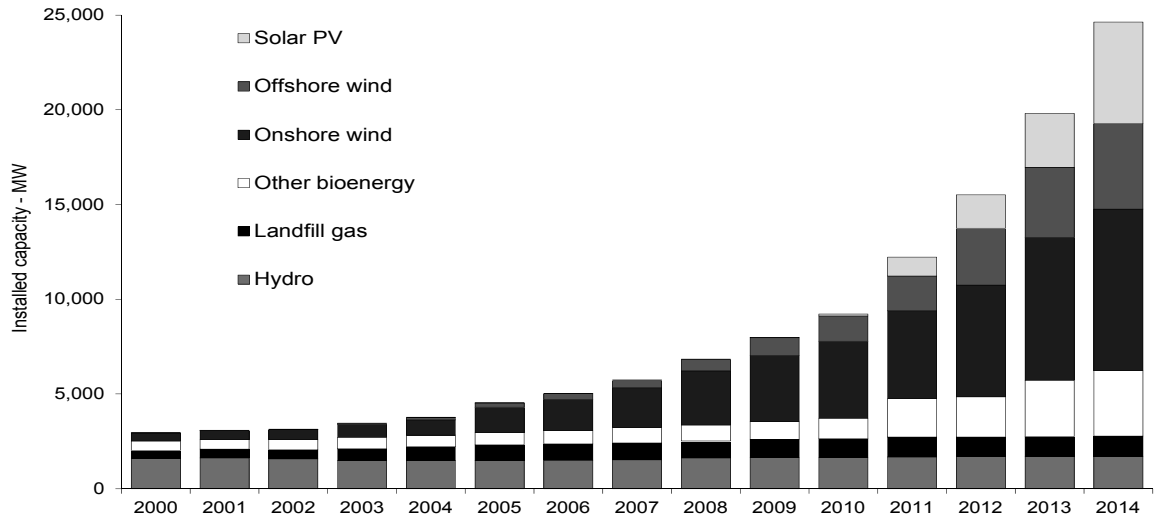
## Table 6B: Number of sites generating renewable electricity, as at end of December 2014 (excluding co-firing)[2]

| | FiTs confirmed | Other sites | TOTAL |
|---|---|---|---|
| Onshore Wind | 6,359 | 1,467 | 7,826 |
| Offshore Wind | - | 28 | 28 |
| Marine energy | - | 12 | 12 |
| Solar PV | 577,544 | 73,258 | 650,802 |
| Hydro | 569 | 345 | 914 |
| Landfill gas | - | 442 | 442 |
| Sewage sludge digestion | - | 186 | 186 |
| Energy from waste | - | 32 | 32 |
| Animal biomass (non-AD) | - | 6 | 6 |
| Anaerobic digestion | 167 | 69 | 236 |
| Plant biomass | - | 130 | 130 |
| TOTAL | 584,639 | 75,975 | 660,614 |

## Table 6C: Number of operational wind turbines split by FiTs and non FiTs accredited sites, as at end of December 2014[3]

| | FiTs confirmed | Other sites | TOTAL |
|---|---|---|---|
| Onshore Wind | 6,359 | 4,521 | 10,880 |
| Offshore Wind | - | 1,184 | 1,184 |
| TOTAL | 6,359 | 5,705 | 12,064 |

## Chart 6.3: Electrical generating capacity of renewable energy plant since 2000




*(1) All waste combustion plant is included because both biodegradable and non-biodegradable wastes are burned together in the same plant.*
*(2) Hydro includes both large scale and small scale, and shoreline wave and tidal (8.7 MW in 2014).*

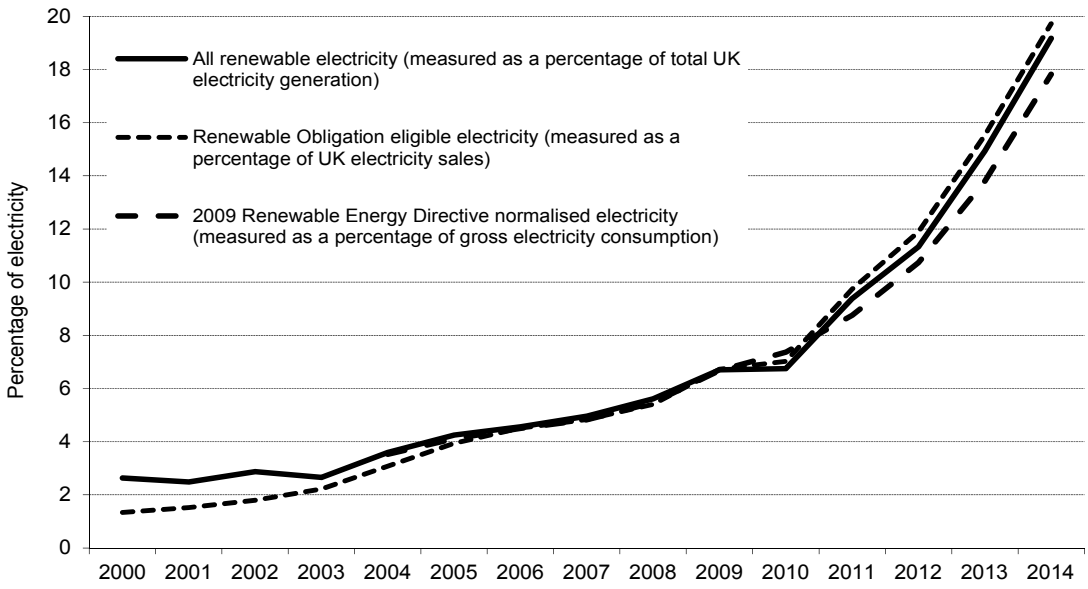
6.22 Electricity generated in the UK from renewable sources eligible for the RO, and claiming Renewable Obligation Certificates (ROCs) in 2014, at 53 TWh, was 17 per cent greater than in 2013;

[2] The number of sites (as with overall capacity) is subject to revision, due to lags in data sources. This particularly affects solar PV, where more sites may have come online since compiling this edition of DUKES.
[3] For FiTs schemes, turbine information is not available, so it is assumed that each site consists of one turbine. For other sites, any sites that *could* be eligible for FiTs have been excluded, to avoid any double-counting; therefore, this may be an under-estimate. Additionally, the number of turbines for other sites is that given in the site's planning application, which may vary from the outturn.

this compares with 35 per cent growth in 2013 which was due to biomass conversions, and high wind speeds. The growth in 2014 is mainly due to the increased capacity at Drax following the conversion of a second unit to dedicated biomass and also increased wind and solar photovoltaic capacity. Chart 6.4 includes a line showing the growth in the proportion of electricity produced from renewable sources claiming ROCs in addition to the International definition and the definition used to monitor the electricity component of the 2009 Renewable Energy Directive. Table 6A shows electricity eligible for and claiming ROCs as a percentage of electricity sales. RO supported generation has increased by 52 TWh since its introduction in 2002, an increase of over 8 times [4]. This compares with an all-renewable electricity generation figure that has increased by 54 TWh, five times over the same period, but from a higher starting level.

6.23 As shown in Table 6A, during 2014 renewable generation measured using the RO basis (i.e. as a proportion of electricity sales by licensed suppliers) increased to 19.7 per cent. Since the introduction of the RO in 2002, generation from wind has increased on average by around one-third each year, with year-on-year increases ranging from 2 per cent to 53 per cent.

**Chart 6.4: Growth in electricity generation from renewable sources since 2000**




## Load factors for electricity generated from renewable sources (Table 6.5)

6.24 Plant load factors in Table 6.5 have been calculated in terms of installed capacity and express the average hourly quantity of electricity generated as a percentage of the average capacity at the beginning and end of the year. The method can be expressed as:

$$\frac{E}{\frac{(C_b + C_e)}{2} \times h}$$

Where;

E Electricity generated during the year (kWh)
$C_b$ Installed capacity at the beginning of the year (kW)
$C_e$ Installed capacity at the end of the year (kW)
h Hours in year

6.25 A key influence on load factors of renewable technologies is the weather, with rainfall being the key driver behind the availability of hydro. In 2014, average rainfall levels (in hydro catchment

[4] A small amount is due to existing hydro stations being refurbished and thus becoming within the scope of the RO definition, as opposed to new capacity being installed.

areas) were 7.6 percentage points higher than in 2013; as a consequence, the load factor of hydro schemes increased to 39.2 per cent, the highest since at least 1997. This was the first year since 2011 that the load factor for hydro had increased; 2013 saw a decrease of 4.1 percentage points from 2012, and 2012 saw a fall of 3.4 percentage points from 2011.

6.26 Average wind speeds during 2014 (at 8.6 knots) were the same as for 2013 and broadly similar to the average over the last five years. February saw the highest wind speeds since 2002 and August, October and December were also higher than the 10 year average. However, June, September, and November were the lowest in the last 14 years. Despite the similar wind speeds for 2013 and 2014, the load factor decreased to 30.2 per cent in 20014 from 32.3 per cent in 2013. This is indicative of the particularly higher wind speeds during February, the highest for the month since 2002. Other factors, such as improved design can also impact on load factors. Load factors for all non-renewable generating plant in the UK are shown in Chapter 5, Table 5.9.

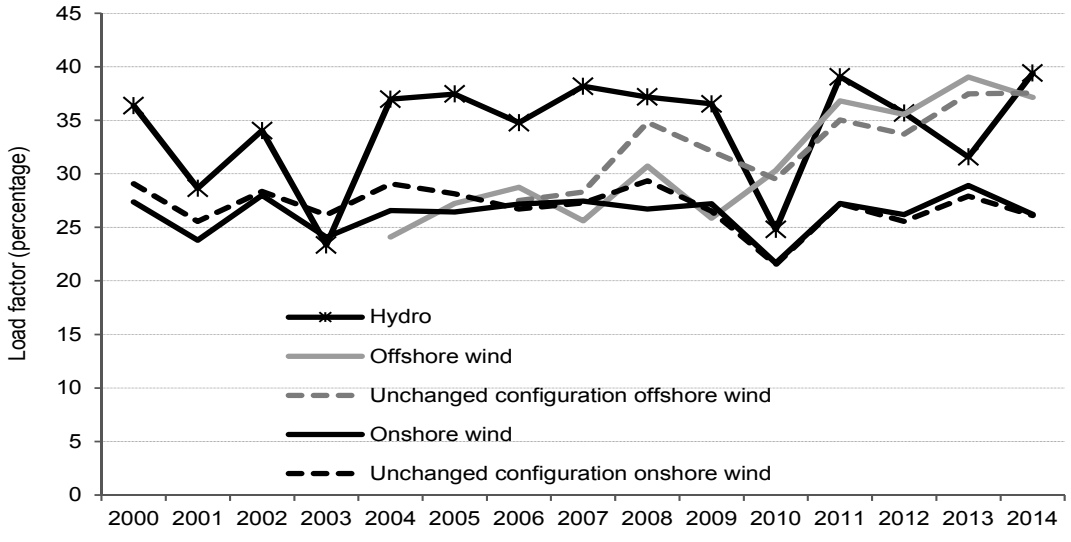
6.27 Change in capacity during the year can also affect load factors calculated using this methodology. Over recent years, this has particularly impacted on wind technologies. As an indication of the impact that new capacity can have on load factors, the first half of operational offshore wind capacity at London Array (313 MW) that was on line at the end of 2012 had the impact of reducing the offshore wind load factor by 0.6 percentage points in 2012, since not all of this would have generated, and only over the final three months of the year, but its capacity has an impact on the denominator of the calculation for the whole year. During 2011, the conversion of Tilbury B's previously coal-fired power station to dedicated biomass in December 2011 reduced the plant biomass load factor by around one half as the 750 MW capacity only contributed to renewable generation for less than one month. Similarly the large increase in solar PV capacity towards the end of 2010 and 2011 reduced the load factors for this technology.

6.28 To compensate for these factors, a second "unchanged configuration" set of statistics have been calculated for many technologies and included in Table 6.5. These statistics use the same methodology as the other load factor statistics, but are restricted to those schemes that have operated continuously throughout the year without a change in capacity. One of the inputs to the unchanged configuration calculation is data on issued ROCs, and a site is included in the calculation only if it has been issued ROCs for each month during the calendar year. The formula for calculating the unchanged configuration load factors is:

$$\frac{\text{Electricity generated during the year (kWh)}}{\text{Installed capacity operating throughout the year with unchanged configuration (kW)} \times \text{hours in year}}$$

6.29 Chart 6.5 shows load factors for wind and hydro. The impacts of new capacity and changes in weather conditions – referred to in the preceding paragraphs - can be identified.

**Chart 6.5: Load factors for renewable electricity generation since 2000**



# Renewable sources used to generate electricity, heat, and for transport fuels (Table 6.6)

## Renewable electricity

6.30 Between 2013 and 2014, there was an increase of 19 per cent in the **input** of renewable sources into electricity generation, to 9,584 ktoe. Solar photovoltaics increased by 104 per cent, and plant biomass by 45 per cent. Anaerobic digestion increased by 40 per cent and hydro by 25 per cent. Shoreline, wave and tidal (Marine Energy) fell by 62 per cent although its overall contribution to renewable electricity is very small and generation intermittent due to test rigs not being continuously on line. Co-firing with fossil fuels also fell by 53 per cent reflecting an additional conversion at Drax power station to dedicated biomass. A change in the methodology to estimate the biodegradable content of municipal solid waste (see paragraph 6.114 for details) has resulted in a revision to historic generation figures from 2009 to 2013. This has reduced the generation figure for 2013 from 1,297 ktoe to 1,072 ktoe.

## Renewable heat

6.31 Since the previous publication in the 2014 edition of the Digest, several changes in methodologies have resulted in revisions to renewable heat statistics from 2008 to 2013. Overall, renewable heat for 2013 has been revised up to 2,609 ktoe from 1,729 ktoe, an increase of 880 ktoe. The most substantial revision was to domestic wood combustion which was an upwards revision of 1,027 ktoe (see paragraph 6.101 for further details). Offsetting this were downwards revisions to active solar heat (see paragraph 6.72), and heat pumps (see paragraph 6.91). Overall the revision to heat pump energy was a downwards revision of just 2.4 ktoe due to the effects of two new data sources largely offsetting each other.

6.32 Around 20 per cent of renewable sources were used to generate heat in 2014, 2 percentage points less than in 2013. It should be noted however, that the corresponding figure reported in the 2014 edition of the Digest was around 15 percent. This reflects the upward revision of domestic wood used for heat generation, (see paragraph 6.101 for further details). Energy used for all renewable heat sources increased by 4.6 per cent during 2014, from 2,609 ktoe to 2,730 ktoe. Around 4.6 per cent of renewable heat was supported by the Renewable Heat Incentive (RHI) or Renewable Heat Premium Payment (RHPP) during 2014 (127 ktoe, or 1,476 GWh)[5]. Further information on the RHI and RHPP schemes can be found in paragraphs 6.69 to 6.70.

6.33 Of the 120 ktoe increase in renewables used for heat in 2014, the largest contributor was industrial use of wood, which increased by 117 ktoe (34 per cent). This increase is also reflected in increased deployment under the non-domestic RHI.

6.34 Plant biomass used for heat was the next largest contributor to the increase in renewables used for heat, increasing by 32 ktoe (9.5 per cent), mainly due to increased capacity of biomass with CHP plant in 2014. Between 2013 and 2014, bioenergy use as a whole increased by 4.0 per cent, from 2,470 ktoe to 2,569 ktoe (and a four and a half times increase since 2005). Renewable heat from active solar thermal increased by 3.9 per cent, from 50 ktoe in 2013, to 52 ktoe in 2014.

6.35 Renewable energy from heat pumps increased by 22 per cent in 2014, from 88 ktoe to 108 ktoe, with 46 per cent of this heat coming from air source heat pumps. The total installed capacity of ground source heat pumps, ambient air to water heat pumps, and exhaust air heat pumps performing at the seasonal performance factor (SPF) required to meet the Renewable Energy Directive, was estimated to be 1,037 MW at the end of 2014. The capacity installed during 2014 was assumed to be installed at a steady rate throughout the year. Note that only the net gain in energy from heat pumps (i.e. total heat energy minus the electricity used to power the pump) is counted as renewable energy (see paragraph 6.91 for details on the methods used).

6.36 Domestic wood use was 72 ktoe (4.4 per cent) lower in 2014 compared to 2013 reflecting a lower average number of heating degree days from 6.2 to 4.9 per day. Domestic use of wood is the main contributor to renewables used for heat – comprising around 57 per cent of the renewable heat total. Following historic revisions to domestic wood use (see paragraph 6.101 for details), the 2013

[5] Note RHI and RHPP data is by date of payment as opposed to when the heat was generated

share has been revised from 35 per cent to 62 per cent. Non-domestic use of wood and wood waste, and plant biomass formed the next largest components, at around 17 per cent and 14 per cent respectively. Non-bioenergy renewable heat sources include solar thermal, deep geothermal and heat pumps, and combined these accounted for 5.9 per cent of renewable heat in 2014. This compares to 16 per cent in 2013, reflecting the upwards revision to domestic wood use and hence bioenergy's higher share of the heat generation total.

### Liquid biofuels for transport

6.37 Biodiesel and bioethanol consumption figures have been obtained from data published by HM Revenue and Customs (HMRC) derived from road fuel taxation statistics, available in the Hydrocarbon Oils Duties bulletin, at: www.uktradeinfo.com/Statistics/Pages/TaxAndDutybulletins.aspx

6.38 The HMRC figures show that 955 million litres of biodiesel were consumed in 2014, around 25 per cent higher than in 2013.[6]. It is estimated that 160 million litres of biodiesel were produced in the UK in 2014, around 47 per cent less than in 2013. Of this, about 6 million litres are known to have been used for non-transport applications or exported. Therefore, at least 801 million litres of biodiesel were imported in 2014. The total annual capacity for biodiesel production in the UK in 2014 is estimated to be around 493 million litres.

6.39 HMRC data also shows that 812 million litres of bioethanol was consumed in the UK in 2014, a decrease of 0.9 per cent on 2013. The UK capacity for bioethanol production at the end of 2014 was estimated to be around 905 million litres, although actual production was estimated to be 516 million litres, 57 per cent of capacity. Of UK production, 267 million litres was known to be used for non-transport applications, or exported, so at least 562 million litres was imported.

6.40 During 2014, biodiesel accounted for 3.4 per cent of diesel, and bioethanol 4.6 per cent of motor spirit. The combined contribution of liquid biofuels for transport was 3.9 per cent, an increase of 0.4 percentage points on 2013.

6.41 The HMRC data have been converted from litres to tonnes of oil equivalent and the data are shown in both the commodity balances (Tables 6.1 to 6.3) and in Table 6.6. In addition these data are also included in the aggregate energy balances (Tables 1.1 to 1.3). The tables show the contribution that liquid biofuels are making towards total renewable sourced energy. Renewable biofuels used for transport rose by 14 per cent (to 1,243 ktoe) between 2013 and 2014, accounting for 3.9 per cent by volume of road transport fuels in 2014. In 2014, liquid biofuels for transport comprised around 9.2 per cent of total renewable sources, similar to the contribution in 2013, although down from a high of 14.8 per cent in 2010.

6.42 When measuring the contribution of transport biofuels for the Renewable Energy Directive, only those meeting sustainability criteria count. The HMRC data referred to above do not contain sustainability information, so data from the RTFO are used to identify the quantity of sustainable biofuels – including those which carry a higher weighting in the transport-specific measure. However, for the latest year, as complete RTFO sustainability data are not yet available, HMRC data are used; this will be replaced with RTFO data when the complete dataset becomes available later in the year. During RTFO obligation period 6, from April 2013 to April 2014, almost 100 percent of transport biofuel consumption was demonstrated to be sustainable, similar to levels reported for period 5 (2012/13) (99.6%). Under the RTFO, 1,798 million litres of transport biofuels were consumed in 2013 (although, as at May 2014, only 85 per cent of this had been awarded with Renewable Transport Fuel Certificates (RTFCs)) as suppliers have until August to apply for RTFCs. Further information on the RTFO is given in paragraphs 6.66 to 6.68.

## Renewable sources data used to indicate progress under the 2009 EU Renewable Energy Directive (RED) (Table 6.7)

6.43 The 2009 Renewable Energy Directive (RED) has a target for the UK to obtain 15 per cent of its energy from renewable sources by 2020. The target uses a slightly different definition of renewable and total energy than is used in the rest of the Digest, including the use of 'normalised' wind and hydro

[6] The most usual way for biodiesel to be sold is for it to be blended with ultra-low sulphur diesel fuel.

generated electricity. Further details on the RED methodology can be found in paragraphs 6.55 and 6.56.

6.44 Table 6.7 brings together the relevant renewable energy and final energy consumption data to show progress towards the target of 15 per cent of UK energy consumption to be sourced from renewables by 2020, and also shows the proportions of electricity, heat and transport energy coming from renewable sources. These provisional figures indicate that during 2014, 7.0 per cent of final energy consumption was from renewable sources. This is an increase from the 2013 figure of 5.6 per cent which was revised upwards from 5.2 per cent largely due to the upwards revision to domestic wood use (see paragraph 6.101). The RED introduced interim targets for member states to achieve on their route to attaining the 2020 proportion. The second interim target, averaged across 2013 and 2014, was set at 5.4 per cent, which has now been exceeded at 6.3 per cent. The third interim target is 7.5 per cent averaged across 2015 and 2016.

6.45 Overall renewable sources, excluding non-biodegradable wastes and passive solar design (see paragraph 6.71), provided 7.2 per cent of the UK's total primary energy requirements in 2014 (excluding energy products used for non-energy purposes). This is a different measure to that reported in the RED. The primary energy demand basis typically produces higher percentages because thermal renewables are measured including the energy that is lost in transformation. The thermal renewables used in the UK are less efficient in transformation than fossil fuels, so as non-thermal renewables such as wind (which by convention are 100 per cent efficient in transformation) grow as a proportion of UK renewables use, then the gross final energy consumption percentage will overtake the primary energy demand percentage. Both of these percentage measures are directly influenced by overall energy use: for instance, whilst the renewable energy component (the numerator in the RED calculation) increased by 17 per cent, the final consumption denominator fell by 5.8 per cent. Table 6D shows both measures.

**Table 6D: Percentages of energy derived from renewable sources since 2010**

| | 2010 | 2011 | 2012 | 2013 | 2014 |
|---|---|---|---|---|---|
| Eligible renewable energy sources as a percentage of capped gross final energy consumption (ie the basis for the Renewable Energy Directive) | 3.8 | 4.2 | 4.7 | 5.6 | 7.0 |
| Renewable energy as a percentage of primary energy demand | 3.9 | 4.5 | 5.0 | 5.9 | 7.2 |

6.46 Eurostat publishes data on how all countries are progressing towards their RED (final and interim) targets. The latest comparative data relates to 2013. The 2013 RED percentage for all EU countries combined was 15.0 per cent, but with wide variation amongst member states, from 3.6 per cent in Luxembourg to 65.5 per cent in Norway.

6.47 Since 2004, the share of renewable energy in final energy consumption grew in all Member States though Estonia fell slightly from 25.8 in 2012 to 25.6 in 2013 and Slovakia fell from 10.4 to 9.8 per cent. Compared to 2012, the UK went from being the third lowest to the fourth lowest in 2013 with The Netherlands, Luxembourg, and Malta having lower percentages. The largest increases during this period were recorded in Sweden (from 38.7 per cent in 2004 to 52.1 per cent in 2013), Denmark (from 14.5 per cent to 27.2 per cent), Italy (from 5.6 per cent to 16.7 per cent), Austria (22.7 per cent to 32.6 per cent), and Bulgaria (from 9.5 per cent to 19.0 per cent). The UK showed a 3.9 percentage point increase over the same time period.

6.48 The UK is now challenged to increase its share of renewable energy by a further 9.9 per cent to meet its 2020 target of 15 per cent. In 2011, Estonia became the first country to exceed its (25 per cent) 2020 target, and was joined in 2012 by Sweden and Bulgaria (exceeding their 2020 targets of 49 per cent and 16 per cent). Further details of progress for all member states can be found at: http://epp.eurostat.ec.europa.eu/cache/ITY_PUBLIC/8-10032014-AP/EN/8-10032014-AP-EN.PDF

## Technical notes, definitions, and policy context

6.49 The Renewable Energy STATisticS database (RESTATS) study started in 1989 and, where possible, information was collected on the amounts of energy derived from each renewable source. Additional technologies have been included for more recent years, such as the inclusion of energy from heat pumps from 2008 onwards and the recording of technology types such as anaerobic digestion. This technical notes section defines these renewable energy sources. The database now contains 26 years of data from 1989 to 2014. Information within RESTATS is also combined with supplementary data obtained from monitoring the planning process for new renewable electricity and heat installations to ensure that it is more comprehensive.

6.50 The information contained in the database is collected by a number of methods. For larger projects, an annual survey is carried out in which questionnaires are sent to project managers. For technologies in which there are large numbers of small projects, the values given in this chapter are estimates based on information collected from a sub-sample of the projects. Some data are also collected via other methods, such as desk research and data from the administration of renewable energy policies. Further details about the data collection methodologies used in RESTATS are also contained in a guidance note on the DECC section of the GOV.UK website at:
www.gov.uk/government/collections/renewables-statistics#methodology

6.51 Energy derived from renewable sources is included in the aggregate energy tables in Chapter 1 of this Digest. The main commodity balance tables (Tables 6.1 to 6.3) present figures in the common unit of energy, the tonne of oil equivalent, which is defined in Chapter 1 paragraph 1.29. The gross calorific values and conversion factors used to convert the data from original units are given in Annex A and inside the back cover flap. The statistical methodologies and conversion factors are in line with those used by the International Energy Agency and the Statistical Office of the European Communities (Eurostat). Primary electricity contributions from hydro and wind are expressed in terms of an electricity supplied model (see Chapter 5, paragraph 5.74). Electrical capacities in this chapter are quoted as Installed capacities. However, in Chapter 5, Declared Net Capacity (DNC) or Transmission Entry Capacity of renewables are used when calculating the overall UK generating capacity. These measures take into account the intermittent nature of the power output from some renewable sources (see paragraph 6.128).

6.52 The various renewable energy Directives, policies and technologies are described in the following paragraphs. This section also provides details of the quality of information provided within each renewables area, and the methods used to collect and improve the quality of this information. While the data in the printed and bound copy of this Digest cover only the most recent five years, these notes also cover data for earlier years that are available on the DECC section of the gov.uk website.

## European and UK Renewable Energy Policy Context

### EU Renewable Energy Directive

6.53 In March 2007 the European Council agreed to a common strategy for energy security and tackling climate change. An element of this was establishing a target of 20 per cent of EU's energy to come from renewable sources. In 2009 a new Renewable Energy Directive (Directive 2009/29/EC) ('RED') was implemented on this basis and resulted in agreement of country "shares" of this target. For the UK, its share is that 15 per cent of final energy consumption - calculated on a net calorific value basis, and with a cap on fuel used for air transport - should be accounted for by energy from renewable sources by 2020. The RED included interim targets, and required each Member State to produce a National Renewable Energy Action Plan (which contains a progress trajectory and identifies measures which will enable countries to meet their targets). The Directive also requires each Member State to submit a report to the Commission on progress in the promotion and use of energy sources every two years. The UK's action plan and the first two progress reports (covering performance during 2009-2010 and 2011-12) are available at:
www.gov.uk/government/uploads/system/uploads/attachment_data/file/47871/25-nat-ren-energy-action-plan.pdf, www.gov.uk/government/publications/first-progress-report-on-the-promotion-and-use-of-energy-from-renewable-sources-for-the-uk, and

www.gov.uk/government/publications/second-progress-report-on-the-promotion-and-use-of-energy-from-renewable-sources-for-the-united-kingdom

The third progress report will report on performance covering 2012-13 and 2013-14 and will be published in January 2016.

6.54 The RED uses different measures of both renewables and overall energy from those elsewhere in the Digest. The renewable numerator in the calculation uses 'normalised' wind and hydro generated electricity – combined with other actual electricity generated from other sources, energy for heating and cooling by final consumers, as well as the use of energy for transport purposes. Gross final energy consumption (which is calculated on a net calorific value basis) also includes consumption of electricity by electricity generators, consumption of heat by heat generators, transmission and distribution losses for electricity, and transmission and distribution losses for distributed heat. The normalisation process is carried out by calculating generation by applying an average load factor to current capacity. For wind, the load factor is calculated as the average of the past five years (including the present one), with current capacity taken as an average of the start and end of year capacity. For hydro, the load factor is the average of the past 15 years, applied to capacity at the end of the current year. The generation figures obtained from this procedure replace the actual generation figures for wind and hydro in the Directive calculation. Additionally, the Directive includes a cap on the proportion that air transport can contribute to the total; this cap is currently 6.18 per cent; certain fuels also receive a higher weighting in the calculation, with full details being set out in the Directive, which is available at:
http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2009:140:0016:0062:EN:PDF.

6.55 In the UK, energy balances are usually published on a gross calorific value basis, but in order to facilitate comparisons with EU statistics the balances for 2004 to 2014 have been calculated on a net calorific value basis and are available in Table I.1 at:
www.gov.uk/government/statistics/energy-chapter-1-digest-of-united-kingdom-energy-statistics-dukes

## UK Renewables Policy

6.56 The UK's progress report details the key policies and measures undertaken or in planning, to further increase renewables deployment. These include:

- Putting in place appropriate financial incentives to bring forward and support the take-up of renewable energy, including the "banded" Renewables Obligation (closing on 31st March 2017), Feed-in Tariffs (FiTs) for small scale (under 5 MW) electricity generation, the Renewable Transport Fuel Obligation, the Renewable Heat Incentive tariff scheme (for industry, commercial premises, the public sector, and, since April 2014, households), and the (now closed) Renewable Heat Premium Payment Scheme (for households); and, Contracts for Differences under Electricity Market Reform.
- Identifying and removing the most significant non-financial barriers to renewables deployment, including measures to improve existing grid connection arrangements; and
- Overcoming supply chain blockages and promoting business opportunities in the renewables sector in the UK.

More details of the main renewable technologies that either have the greatest potential to help the UK meet the 2020 RED target in a cost effective and sustainable way, or offer the greatest potential for the decades that follow, can be found in the UK Renewable Energy Roadmap, which was first published in July 2011, and updated in 2012 and 2013, available at:

www.gov.uk/government/publications/renewable-energy-roadmap
www.gov.uk/government/publications/uk-renewable-energy-roadmap-update
www.gov.uk/government/publications/uk-renewable-energy-roadmap-second-update

## Renewables Obligation (RO)

6.57 In April 2002 the Renewables Obligation (RO) came into effect[7]. It is an obligation on electricity suppliers to source a specific and annually increasing proportion of electricity from eligible renewable sources or pay a penalty. The proportion is measured against total electricity sales (as shown in Table 5.5 contained in the electricity chapter of this Digest). The Obligation is intended to incentivise an increase in the level of renewable generating capacity and so contribute to our climate change targets. Examples of RO eligible sources include wind energy, wave and tidal energy, landfill gas, sewage gas, deep geothermal, hydro, photovoltaics, energy from waste, biomass, energy crops and anaerobic digestion. Ofgem (which administers the RO) issues Renewables Obligation Certificates (ROCs) to qualifying renewable generators. These certificates may be sold by generators directly to licensed electricity suppliers or traders. Suppliers present ROCs to Ofgem to demonstrate their compliance with the obligation.

6.58 When the Obligation was first introduced, 1 ROC was awarded for each MWh of renewable electricity generated. In 2009, 'banding' was introduced into the RO, meaning different technologies now receive different numbers of ROCs depending on their costs and potential for large scale deployment; for example offshore wind receives 2 ROCs/MWh while onshore wind receives 0.9 ROCs/MWh. The more established renewable technologies such as sewage gas receive 0.5 ROCs/MWh. A review of the bands across the UK concluded in 2012 and set the level of support under the RO from 1 April 2013 – 31 March 2017. Banding reviews ensure that, as market conditions and innovation within sectors change and evolve; renewables developers continue to receive the appropriate level of support necessary to maintain investments within available resources. The RO closed to large-scale solar PV (>5MW) on 31 March 2015 and the Government has announced its intention to close it to onshore wind on 31 March 2016. The scheme will close to other technologies on 31 March 2017, although existing generating stations will continue to receive support until 2037. A list of technologies eligible for the RO, details of the RO banding review, and the level of ROCs received, is available: Calculating Renewable Obligation Certificates (ROCs) - Detailed guidance - GOV.UK

6.59 Table 6.4 contains a row showing the total electricity eligible for the RO. Prior to 2002 the main instruments for pursuing the development of renewables capacity were the Non Fossil Fuel Obligation (NFFO).

### Electricity Market Reform (EMR)

6.60 EMR will replace the RO for new schemes from April 2017 (although new renewable schemes will have a choice between support mechanisms from 2014 to the RO's closure at the end of March 2017). The reforms tackle the risks and uncertainties of the underlying economics of different forms of electricity generation by offering long term contracts for low carbon energy (Contracts for Differences).

6.61 Companies will get, in effect, a fixed and secure price at which they can sell their electricity to consumers. This will allow investors to be confident about the returns of their capital in advance of investing billions into new infrastructure schemes. It will also encourage banks to lend at cheaper rates because the projects are less risky. Further details of the reforms are available at: www.gov.uk/government/policies/maintaining-uk-energy-security--2/supporting-pages/electricity-market-reform

## Feed-in Tariffs (FiTs)

6.62 Feed-in tariffs are a financial support scheme for eligible low-carbon electricity technologies, aimed at small-scale installations with a capacity of less than 5 Megawatts (MW). FiTs support new anaerobic digestion (AD), solar photovoltaic (PV), small hydro and wind, by requiring electricity suppliers to make payments (generation tariffs) to these generators based on the number of kilowatt hours (kWh) they generate. An additional guaranteed export tariff is paid for electricity generated that is not used on site and exported to the grid. The scheme also supports micro combined heat and power installations with an electrical capacity of 2kW or less, as a pilot programme.

[7] Parliamentary approval of the Renewables Obligation Orders under The Utilities Act 2000 was given in March 2002. The Renewables Obligation covering England and Wales and the analogous Renewables (Scotland) Obligation came into effect in April 2002. Northern Ireland introduced a similar Renewables Obligation in April 2005. Strictly speaking until 2005, the RO covers only Great Britain, but in these UK based statistics Northern Ireland renewable sources have been treated as if they were also part of the RO.

6.63 The number of PV installations, particularly on domestic properties, increased rapidly at the start of the FIT scheme. The rate of increase slowed significantly after August 2012 following tariff reductions introduced to reflect the rapidly falling costs of solar modules. A cost control mechanism (contingent degression) was also introduced, following a comprehensive review in 2011/12. This cost control mechanism allows solar PV tariffs to decrease every 3 months (depending on deployment levels). Tariffs for Non-PV technologies (wind, hydro, AD) degress annually (with a six-month contingent degression in October, if deployment is higher than expected in the first half of the year).

6.64 Tariff changes implemented as a result of the review only affect new entrants to the scheme. Policy information and statistical reports relating to FiTs can be found at: www.gov.uk/government/policies/increasing-the-use-of-low-carbon-technologies/supporting-pages/feed-in-tariffs-scheme and www.gov.uk/government/organisations/department-of-energy-climate-change/series/feed-in-tariff-statistics

6.65 In the first five years of FITs (April 2010 – March 2015) over 680,000 installations, totalling over 3.5GW of installed capacity has been registered under the scheme. This is significantly ahead of original projections (750,000 installations by 2020), and has resulted in an annual spend considerably above the original budget estimates.

## Renewable Transport Fuel Obligation (RTFO)

6.66 The Renewable Transport Fuel Obligation, introduced in April 2008, placed a legal requirement on road transport fuel suppliers (who supply more than 450,000 litres of fossil petrol, diesel or renewable fuel per annum to the UK market) to ensure that 4.75 per cent (by volume) of their overall fuel sales are from a renewable source by 2013/14 and all subsequent years, with incremental levels of 2.5 per cent (by volume) for 2008/09, 3.25 per cent (by volume) in 2009/10, 3.5 per cent (by volume) in 2010/11, 4.0 per cent (by volume) in 2011/12, and 4.5 per cent (by volume) in 2012/13. Under the RTFO all obligated companies are required to submit data to the RTFO administrator on volumes of fossil and renewable fuels they supply. Renewable Transport Fuel certificates are issued in proportion to the quantity of biofuels registered.

6.67 The RTFO (amendment) Order, made in 2011, introduced mandatory carbon and sustainability criteria for all renewable fuels and double rewards for some fuel types, including those made from waste and residue materials. From April 2013 the end uses covered by the RTFO were amended to include non-road mobile machinery, agriculture and forestry tractors and recreational craft when not at sea. Further information on the RTFO policy can be found at: www.gov.uk/government/publications/rtfo-guidance

6.68 The verified RTFO biofuels statistics, including information on origin and sustainability from 2008 onwards can be found at: www.gov.uk/government/collections/biofuels-statistics

## Renewable Heat Incentive and Premium Payment

6.69 The Renewable Heat Incentive (RHI) scheme is a government financial incentive scheme introduced to encourage a switch to renewable heating systems in place of fossil fuels. The tariff based scheme is split into two parts:

- The non-domestic RHI scheme which has been open to commercial, industrial, public sector, not for profit and community generators of renewable heat since November 2011.
- The domestic RHI scheme which opened on 9 April 2014 and is available to homeowners, private and social landlords and people who build their own homes.

Further information on this scheme, including details of the technologies, can be found at: www.gov.uk/government/policies/increasing-the-use-of-low-carbon-technologies/supporting-pages/renewable-heat-incentive-rhi.

6.70 The Renewable Heat Premium Payment (RHPP) voucher scheme, launched in August 2011, made one-off payments to householders to help them buy renewable heating technologies. This scheme closed on the 31 March 2014 prior to the introduction of the domestic RHI scheme. Further information on the RHPP can be found at: www.gov.uk/renewable-heat-premium-payment-scheme, with further data available at www.gov.uk/government/collections/renewable-heat-incentive-renewable-heat-premium-payment-statistics.

Table 6E below shows the breakdown of technologies accredited to the domestic scheme, over the period 9 April 2014 (launch date) to 31 December 2014, with average installed capacity and heat paid out for under the scheme. In total there were 19,309 installations, with 48,545 MWh of heat generated and paid for. Further data and information relating to the RHI can be found at: www.gov.uk/government/collections/renewable-heat-incentive-statistics.

### Table 6E: Domestic Renewable Heat Incentive accreditations, average capacity installed and estimated heat generation

| Technology | Number of accreditations | Average (mean) capacity installed (kW) | Heat paid out under the scheme (MWh) |
|---|---|---|---|
| Air source heat pump | 7,007 | 10.9 | 15,214 |
| Ground source heat pump | 2,922 | 11.6 | 9,481 |
| Biomass systems | 5,187 | 26.3 | 22,452 |
| Solar thermal | 4,193 | - | 1,398 |
| **Total** | **19,309** | **-** | **48,545** |

## Sources of Renewable Energy

### Use of passive solar energy

6.71 Nearly all buildings make use of some existing (passive) solar energy because they have windows or roof lights, which allow in natural light and provide a view of the surroundings. This existing use of passive solar energy is making a substantial contribution to the energy demand in the UK building stock. Passive solar design (PSD), in which buildings are designed to enhance solar energy use, results in additional savings in energy. The installed capacity of PSD in the UK and other countries can only be estimated and is dependent on how the technology is defined. The unplanned benefit of solar energy for heating and lighting in UK buildings is estimated to be 145 TWh per year. The figure is very approximate and, as in previous years, has therefore not been included in the tables in this chapter. Only a few thousand buildings have been deliberately designed to exploit solar energy – a very small proportion of the total UK building stock. It has been estimated that the benefit of deploying PSD in these buildings is equivalent to a saving of about 10 GWh per year.

### Active solar heating

6.72 Active solar heating employs solar collectors to heat water mainly for domestic hot water systems but also for swimming pools and other applications. There are primarily two key designs: flat-plate, comprising a dark absorbing material with a cover to reduce heat loss and a liquid – usually water with antifreeze – to extract the heat from the absorber, and evacuated-tube collectors that use heat pipes for their core to extract the energy instead of passing liquid directly through them. Planning permission is required for free-standing domestic solar panels of more than 9m2, but the more common form of installation is the roof mounted scheme which does not require planning permission.

6.73 Updated figures on the contribution of active solar heating have been obtained by Ricardo-AEA (on behalf of DECC) based on sales figures from the Solar Trade Association (STA) and the European Solar Thermal Industry Foundation (ESTIF) using a conversion methodology as recommended by the IEA Solar heat and cooling program and ESTIF which can be found at: www.estif.org/area_to_energy_conversion_method/

The figures reported are currently made up of two inputs:

- STA sales data, recently revised by applying a scaling factor of 1.2 (as ESTIF does) to take into account that not the whole market is represented/reported by the STA
- An estimate of active solar for some designs for swimming pools not covered by the STA.

The model has recently been updated to correct the fact that the growth rates applied to swimming pools had been too generous for some years.

6.74 For 2014, an estimated 269 GWh for domestic hot water generation replaces gas and electricity heating; for swimming pools, an estimated 145 GWh generation replaces gas (45 per cent), oil (45 per cent) or electricity (10 per cent).

## Solar photovoltaics (PV)

6.75 Photovoltaics is the direct conversion of solar radiation into direct current electricity by the interaction of light with the electrons in a semiconductor device or cell. Support for small scale (less than 5 MW) solar PV and other micro-generation technologies in Great Britain has, since April 2010, been provided by FiTs (see paragraph 6.62), resulting in a rapid expansion in solar PV capacity. Larger-scale (> 50 kW) solar PV, as well as all Northern Irish installations, are supported by the Renewables Obligation (RO) (see paragraph 6.57)[8]. The level of support for solar PV within the Renewable Obligation from April 2013 forms part of the banding review. Whilst generation data are available for sites accredited under the RO (via ROCs issued), it is not currently available for other schemes, including those supported by FiTs so this has to be estimated. The methodology used for estimating generation from schemes supported by FiTs can be found at: www.gov.uk/government/statistics/energy-trends-december-2013-special-feature-article-estimating-generation-from-feed-in-tariff-installations

## Onshore wind power

6.76 Onshore wind is one of the most mature renewable energy technologies. The UK has a good onshore wind resource with wind speeds particularly good in Scotland, Northern Ireland and Wales, (less so in England, particularly the South East). A wind turbine extracts energy from the wind by means of a rotor (usually a three-bladed horizontal-axis rotor) that can be pitched to control the rotational speed of a shaft linked via a gearbox to a generator.

6.77 Following the introduction of the Renewables Obligation (RO) in April 2002 the rate of installation of new wind farms has increased year on year. Turbine size has steadily increased over the years and the average new turbine size for operational schemes over the last 5 years is around 2.5 MW. For those schemes under construction, however, this is moving towards 3 MW. The increased tower height associated with the increased turbine size has increased wind capture (wind speed generally increases with height above ground level) and turbine design has improved and become more sophisticated – both of these leading to improvements in efficiency over the early models, prompting some of the early projects which were installed around 20 years ago, to re-power (replacing ageing turbines with more efficient ones). The figures included for generation from wind turbines are based on actual metered exports from the turbines and, where these data are unavailable, are based on estimates using regional load factors (see paragraphs 6.24 to 6.29 regarding load factors) and the wind farm installed capacity.

6.78 In the small-medium wind market (15–100 kW), generated energy is predominantly used to satisfy on-site demand. Small wind system technology can be subdivided into three categories: micro wind turbines (0–1.5 kW), small wind turbines (1.5–15 kW) and small–medium wind turbines (15–100 kW). The two main designs are the horizontal axis wind turbines (HAWT) and vertical axis wind turbines (VAWT).

6.79 In terms of operational characteristics, siting considerations and the value and nature of the market, small-scale wind systems vary markedly from large-scale units. They can be off-grid or on-grid, mobile or fixed, free-standing or building-mounted, and can form part of combined installations, most commonly with photovoltaic systems. As a result, they have a greater range of applications

[8] Eligible GB schemes between 50 kW and 5 MW capacity can currently choose between the RO and FiTs.

compared to large-scale wind turbines and can be sited on board boats, in commercial, public and domestic settings or as single or multiple installations providing power to communities. With the arrival of FiTs it is anticipated that the main growth market will be for those applications connecting to the grid, with free-standing turbines continuing to make up the greatest share of installations.

## Offshore wind power

6.80 The UK has some of the best wind resource in Europe, with relatively shallow waters and strong winds. The Renewable Energy Roadmap – referred to in paragraph 6.56 – highlights offshore wind as a key technology that will help the UK meet the 2020 RED target, with a central range of up to 18 GW for deployment by 2020 subject to cost reduction. This would correspond to around 17 per cent of the UK's net electricity production.

6.81 Offshore winds tend to blow at higher speeds and are more consistent than on land, thus allowing turbines to produce more electricity (because the potential energy produced from the wind is directly proportional to the cube of the wind speed, increased wind speeds of only a few miles per hour can produce a significantly larger amount of electricity). As a result, offshore turbines are generally larger than their onshore counterparts with the current commercially available turbines having a rated capacity of between 3 MW and 6 MW, although a number of larger, offshore specific, turbines are currently being developed. Floating concepts are also being developed as they are considered by many to be more viable (both economically and environmentally) in deeper waters. In addition, on-shore constraints such as planning, noise effects and visual impact and transportation of large components are reduced offshore.

6.82 In the development of the UK's offshore wind capacity, the Crown Estate have run a number of leasing rounds under which areas of the seabed have been made available for the development of offshore wind farms. Round 1 started in December 2000 and Round 2 in July 2003. In January 2010, the Crown Estate announced the successful development partners for each of nine new Round 3 offshore wind zones, with a potential installed capacity of up to 33 GW. The Round 3 zones were identified through a combination of consultation with key national stakeholders and the Crown Estate's marine asset planning expertise. The Round 3 capacity is in addition to the 7.2 GW already enabled across Rounds 1 and 2, with construction expected to begin at sites in the next few years. Though not all projects will be constructed and all projects will be subject to the relevant planning process.

## Marine energy (wave and tidal stream power)

6.83 Ocean waves are created by the interaction of winds with the surface of the sea. Because of the UK's position on the north eastern rim of the Atlantic it has some of the highest wave power levels in the world. Tidal currents are created by the movement of the tides, often magnified by local topographical features such as headlands, and channels. Tidal current energy is the extraction of energy from this flow, analogous to the extraction of energy from moving air by wind turbines. The UK is currently seen as the world leader in wave and tidal stream technology. Many of the leading device concepts were developed in the UK. The European Marine Energy Centre in the Orkney Islands is the world's leading test centre for both wave and tidal technology prototypes.

6.84 In April 2012, DECC launched the Marine Energy Array Demonstrator scheme (MEAD), to support the development and testing of pre-commercial marine devices in array formations out at sea. Two companies won funding under this: MeyGen Ltd, in the Pentland Firth in Inner Sound, Scotland; and SeaGeneration (Wales) Ltd, in Anglesey, Wales. SeaGeneration (Wales) Ltd failed to secure matched funding for their project, but MeyGen Ltd are on track to install their first turbine in Spring 2016.

6.85 Tidal range power can be extracted from tidal barrage and tidal lagoon systems. With a tidal barrage across an estuary, water is collected during the flood tide, creating a head of water. During the ebb tide the water flows out of the pool through low-head hydro turbines thus generating electricity. Some technologies also allow generation on ebb and flood. A tidal lagoon works in a similar manner, but an artificial pool is used to collect the water. A tidal barrage has been in operation at La Rance on the northern French coast for more than 40 years, and schemes have previously been proposed in the UK, notably in the Severn Estuary and Swansea Bay. The environmental impacts in the Severn Estuary mean it will be difficult to secure planning permission for this site. However at Swansea Bay, planning permission has been granted for a 320MW tidal generating station. Current estimates suggest first generation before 2020.

## Large scale hydro

6.86 In hydro schemes the turbines that drive the electricity generators are powered by the direct action of water either from a reservoir or from the run of the river. Large-scale hydro covers plants with a capacity of 5 MW and over. Most of the plants are located in Scotland and Wales and mainly draw their water from high-level reservoirs with their own natural catchment areas. Major Power Producers (MPPs) report their output to DECC in regular electricity surveys. Prior to 2004 these data were submitted in aggregate form and not split down by size of scheme. This meant that some small-scale schemes were hidden within the generation data for the large-scale schemes. Since 2004 MPPs have provided a more detailed breakdown of their data and some smaller sites included under "large scale" before 2004 are now under "small scale". The data in this Chapter exclude pumped storage stations (see paragraph 5.73). The UK has one mixed pump storage and natural flow hydro station, at Foyers in Scotland. Whilst it is primarily a pumped storage site, the generation attributed to the natural flow component of this station can be calculated, and is included in the large-scale hydro generation figures in this Chapter. However, the natural flow share of the capacity cannot be separated, and is therefore not included.

## Small scale hydro

6.87 Electricity generation schemes with a hydro capacity below 5 MW are classified as small scale. These are schemes being used for either domestic/farm purposes or for local sale to electricity supply companies. Currently there are 246 MW of installed small-scale hydro schemes. Of this, 63 per cent is owned by small-scale energy producers with the remainder owned by major power producers. There are 569 FITs and 263 non-FITs schemes in operation; 86 per cent of these non-FITs schemes claim ROCs, with 7 schemes having current NFFO contracts.

## Deep geothermal energy

6.88 There are two broad types of deep geothermal technology – for direct heat use (where temperatures are above 60$^{o}$C) and those for power generation (though normally as combined heat and power plants) usually where the resource temperature is above 120$^{o}$C. The UK's deep geothermal resources include hot aquifers (i.e. subterranean bodies of water) in the North East, Wessex and Cheshire. The 'hot dry rocks' in Cornwall are likely to have the greatest potential (at 5km depth) for power generation. There are two simple models for deep geothermal projects. Where a hot aquifer has been identified, it is possible to simply pump the hot water to the surface and use it directly, for example in a heat network. The water then needs to be either disposed of or re-injected into the ground via a second borehole. An alternative model is to pump cold water from the surface down into a volume of hot rock, exploiting existing fractures in the rock or creating these through Enhanced Geothermal System techniques, and then recovering it to the surface once it has been heated.

6.89 Deep geothermal electricity generation is eligible for support under the Renewables Obligation. Deep geothermal energy for direct heat use is eligible for support under the Renewable Heat Incentive. The Government has also provided grant support for the sector. At present there are no deep geothermal power plants in the UK. The UK's only existing geothermal heat generating station is at Southampton, where an 1800m borehole taps into the edge of the aquifer under Wessex and provides heat to the Southampton district heat network, although this borehole is currently being refurbished.

6.90 Up to December 2013 geothermal was supported in the non-domestic RHI under the ground source heat pump tariff but a separate bespoke tariff for deep geothermal heat was introduced after this. The tariff is set at 5.08p/kWh from 1 April 2015, and deep geothermal heat is defined as coming from a drilling depth of a minimum of 500m.

## Heat pumps

6.91 A ground source heat pump (GSHP) uses electricity to power a vapour compression cycle to pump heat from underground heat exchange coils and boreholes to a target heating system. An air source heat pump (ASHP) uses a vapour compression cycle to pump heat from ambient air to the target heating system. The ASHP data included in the Digest are air to water heat pumps extracting heat from external air only, and the renewable energy component of exhaust air systems. Information on GSHP and ASHP installations in the UK has been obtained from an annual market survey conducted by the research organisation BSRIA.

6.92 Ground source heat pumps are currently supported in heating mode in the non-domestic RHI. A two tier tariff system was introduced in January 2013 with a tier 1 tariff of 8.84p/kWh from 1 April 2015 (for the first 1,314 hours of operation) and a tier 2 tariff of 2.64p/kWh (for additional hours of operation). Air to water heat pumps utilising ambient air source have been supported under the non-domestic RHI since December 2013. The tariff available is 2.54p/kWh for all sizes of air source heat pump. Heat pumps utilising exhaust/ waste heat are excluded. Reversible and heat only air to air source heat pumps are not currently supported. From April 2014 both ASHP and GSHP became eligible for the domestic RHI and can claim tariffs of 7.42p/kWh and 19.1p/kWh renewable energy generated respectively, provided they meet the eligibility criteria.

6.93 Heat pumps use electricity to operate the compression cycle. The ratio of the heating output of a heat pump over the amount of electricity it uses gives the coefficient of performance (COP) of the heat pump. The seasonal performance factor (SPF), is the average COP for a heat pump over a whole year and reflects the efficiency a heat pump achieves when installed. The Renewable Energy Directive (Annex VII) sets out the equation for calculating how much of the energy generated by heat pumps should be considered renewable and a minimum SPF is part of that equation. The SPF is dependent on pan-EU average electricity generation efficiency. Heat pumps which do not meet the minimum SPF are not counted as renewable under the Directive. The latest available guidance from the European Commission gives a minimum SPF of 2.5. Guidance on measuring the contribution of heat pumps for the RED was produced by the European Commission in March 2013, and data in this edition of the Digest continues to use this methodology.

6.94 There have been a number of changes to values used in calculation of renewable heat contribution this year. This is due to the availability of information on actual performance of domestic heat pumps installed in the UK under the RHPP. This is in line with advice from the European Commission to utilise country specific information where available and to opt for conservative estimates.

6.95 Estimates on number of heat pumps installed since 2008 continue to be based on sales information from BSRIA, a research organisation. It is assumed that there was no significant contribution from heat pumps installed before 2008. The proportion of subsequently installed domestic heat pumps meeting the minimum SPF has been changed to 60% for ASHP and 76% for GSHP. All commercial and industrial heat pumps are assumed to meet the minimum SPF. The average SPF for qualifying heat pumps have been estimated based on the UK data.

6.96 Default values for hours of operation have been applied to information on the installed heat pump capacity. The UK is split into two climate zones which use different default values. The “cold” climate zone covers the North East, North West, Yorkshire and the Humber, and Scotland, with the “average” climate zone covering the remaining regions. The allocation of heat pumps to climatic zones is based on the regional data available for schemes installed under the RHI and Eurostat NUTS4 temperature analysis. The average installed capacity for small and large domestic installations are also based on RHI data. For the commercial and industrial GSHP installations, there are now sufficient RHI installations to base average capacity estimates on these data. However, sector specific average capacities estimated by DECC were used for commercial/ industrial ASHP due to the low number of installations under the Renewable Heat Incentive (RHI).

6.97 Since December 2013 all new heat pumps must meet a minimum COP of 2.9, and a minimum design SPF of 2.5 to be able to claim the non-domestic RHI. Data must be collected to enable calculation of the SPF in situ. This requires mandatory electricity consumption measurement and reporting in addition to metering of the heat produced for all heat pumps.

6.98 The contribution of energy from heat pumps is included in the Digest for 2008 onwards, in tables 6.1-6.3 and 6.6. For example, the output (less the electricity used to run the pump) is included in the production line in table 6.1, with the amount of this consumed by sector detailed within the final consumption sector below.

## Bioenergy and wastes

### (a) Landfill gas

6.99 Landfill gas is a methane-rich gas formed from the natural decomposition of organic material in landfill sites. The gas can be used to fuel reciprocating engines or turbines to generate electricity or used directly in kilns and boilers. In other countries, the gas is cleaned to pipeline quality or used as a vehicle fuel. Landfill gas exploitation benefited considerably from NFFO and resulted in a large rise in electricity generation from 1992. Information on generation comes from Renewables Obligation Certificates (ROCs), supplemented by a RESTATS survey carried out by Ricardo-AEA in 2008 on behalf of DECC.

### (b) Sewage sludge digestion

6.100 Sewage sludge digestion is the break down of the solid part of sewage by natural bacteria in a sealed tank in the absence of oxygen to produce a methane rich sewage gas. Some plants only use the sewage gas to generate heat but many use combined heat and power (CHP) systems, with the electricity generated being used on site or sold under the NFFO. Information on the projects was provided from the CHAPSTATS Database, which is compiled and maintained by Ricardo-AEA on behalf of DECC (see Chapter 7). The majority of the information in the database is gathered through the CHP Quality Assurance (CHPQA) Programme. However, many sewage treatment works are not part of the CHPQA Programme and information on these plants comes from ROCs data. Estimates of electrical efficiencies and heat to power ratios typical of the technology and capacity are used to determine fuel inputs and heat outputs. In this year's statistics, data for 89 per cent of the schemes (98 per cent of the capacity) were from RESTATS (i.e. ROCs) with the remainder from CHPQA; all schemes, however, were vetted by CHPQA before being accepted by RESTATS.

### (c) Domestic wood combustion

6.101 Domestic wood use includes the use of wood fuel in open fires, "AGA"-type cooker boilers, modern biomass boilers and other wood burning stoves. Statistics on domestic wood use is one of a few cases where good data have not been available. Domestic wood use was for a long time estimated based on the historic survey results of 1989.

6.102 During the survey of 2003, Ricardo-AEA were asked to examine an accumulating body of anecdotal evidence that implied that there was considerable growth in this area, suggesting that the use of this resource might start to be underestimated. This was based on the amount that was being burnt on open fires rather than dedicated wood-burning stoves, which has previously been overlooked. A revision in 2003 to subsequent domestic wood use figures was based on a 50 per cent growth rate in sales/installations of wood-burning stoves for each 2-3 year period since 2000, supported with anecdotal information from the sources listed below:

- HETAS, the official body recognised by Government to approve solid fuel domestic heating appliances, fuels and services;
- the National Association of Chimney Sweeps; and
- Discussions with a risk assessor acting on behalf of insurance companies.

6.103 Estimates from 2003 to 2013 were based on annual discussions with representatives of these associations, using 2002 baseline data that were extrapolated forward, that were independently peer reviewed by the Forestry Commission prior to publication. Degree-day corrections were added, based on that used for seasonally adjusted and temperature corrected final energy consumption figures for gas to model increased fuel use during colder weather[9]. These degree-day normalisation factors are based on monthly correction data and are weighted differently to those calculated using annual degree days. A degree day change in summer is unlikely to result in increased use of fuel for heating whereas it is during the colder months. The accuracy of these estimates was, however, dependent on the accuracy of the base level figures for domestic wood use in 2002.

6.104 In 2014 DECC commissioned a one- off large scale user survey of domestic wood fuel consumption in the UK. The purpose of the survey was to provide a new baseline for domestic wood fuel use in the UK. The survey was part of a weekly face to face omnibus survey and was conducted in England, Wales and Scotland. A separate dedicated survey was commissioned in Northern Ireland. A total of 16,046 households were surveyed, with 1,206 (7.5 per cent) confirmed as wood fuel users,

[9] www.gov.uk/government/uploads/system/uploads/attachment_data/file/295406/et1_3.xls

which is lower than the recent estimate of 12 per cent from the smaller scale Forestry Commission Public Opinion of Forestry 2013 survey. Information was collected on number, type and frequency of use of domestic wood fuel appliances and on types and quantities of wood fuels purchased over the previous year.

6.105 Wood fuel use was estimated by two independent methods. Firstly the appliance data was used to estimate total hours operation in the year and wood fuel use was then calculated using standard data for appliance wood fuel use per hour. Secondly, the total wood fuel use was calculated from respondent estimates of quantities of wood fuel they had purchased in the past year.

6.106 There are uncertainties associated with each method. The appliance method is indirect in that respondents had to estimate how many hours per week they operated their appliances in winter and summer, and a standard factor for wood use per hour for each appliance type was required. For the second method respondents had to estimate the amount of wood fuel they had delivered in the past year, which many found challenging. It was also assumed that the wood used equalled the delivered wood.

6.107 Although both methodologies confirmed the anecdotal evidence (see paragraph 6.102) that domestic wood fuel use has been consistently underestimated, the two estimates differed by a factor of almost two, with the estimate from wood fuel purchased being higher. This can be partially explained by timing issues; wood is purchased in anticipation of a heating season and if winter proves warmer than expected, then not all wood purchased would necessarily be burned. Average heating degree days[10] for 2014 were 21 per cent lower than in 2013, and 19 per cent lower than the long term mean (1981 to 2010). This compares to questions relating to appliance usage where the responses relate directly to the period being considered.
The lower estimate of 1,554 ktoe is used in the current statistics as feedback from the survey confirmed that providing an accurate response to the appliance usage approach proved to be considerably less challenging compared to estimating actual wood fuel use. In addition, previous surveys have also indicated that the appliance method is more reliable because it is notoriously difficult to obtain reliable estimates from the general public for energy derived from burning wood which can vary depending on the species, volume or weight, and moisture content. The survey data will be analysed further over the next year, and the baseline to be used will be reviewed again for 2015 statistics.
The new baseline leads to a substantial increase in estimated domestic wood fuel use, by a factor of 2.6 from the estimate using the previous baseline. The new baseline will be used in future years, with annual uplifts based on industry sales figures, and applying a weather correction methodology.

**(d) Non-domestic wood combustion**

6.108 In 1997, the industrial wood figure (which includes sawmill residues, furniture manufacturing waste etc.) was included as a separate category for the first time. Surveys in 2000 and 2006 highlighted that the in-house use of wood wastes had declined due to the imposition of more stringent emissions controls. Since these surveys, there has been increased interest in the use of wood, usually from forestry and woodland management but also in-house and recycled by-products. Typically these are being used for space heating and hot water in commercial and public sector properties such as hotels, schools, hospitals, nursing homes, poultry farms, horticulture and government buildings. This has been almost exclusively in response to incentives, most notably the Renewable Heat Incentive which has supported some 1,943 GWh of heat from biomass, mostly wood, to December 2014 since its inception in November 2011. This is equivalent to some 457 thousand tonnes of commercial wood pellets.

**(e) Energy crops and forestry residues**

6.109 Miscanthus and Short Rotation Coppice (SRC) are grown in the UK as energy crops intended for the heat and electricity energy markets. To date they have been burnt in power stations, CHP units and heating systems. Official area estimates of Miscanthus and SRC grown in England are available from 2008 in the Defra June survey of Agricultural statistics, and have been summarised by Defra[11] These show that only small areas of these crops are currently planted in England, with estimates of about 7,100ha of Miscanthus and 2,700ha of SRC in 2014. Based on Renewables Obligation

[10] Area of crops grown for bioenergy in England and the UK:2008-2013. Defra experimental statistics, 25 November 2014.
[11] Details of heating degree days can be accesed at; www.gov.uk/government/statistics/energy-trends-section-7-weather

sustainability reporting data, Defra estimate that about 47,000 tonnes of UK Miscanthus and 9,000 tonnes of UK SRC was used in UK power stations.

**(f) Straw combustion**

6.110 Straw can be burnt in high temperature boilers, designed for the efficient and controlled combustion of solid fuels and biomass to supply heat, hot water and hot air systems. There are large numbers of these small-scale batch-fed whole bale boilers.

6.111 Historically, the figures given were estimates based partly on 1990 information and partly on a survey of straw-fired boilers carried out in 1993-94 but these have always been considered to be a particularly weak estimate. A DECC/Defra initiative to investigate opportunities to improve these data has resulted in questions on the end use of straw being introduced to the Cereal and Oilseed Production survey in 2014[12]. The total straw used for energy in 2014 was estimated to be 551.2 ktoe. Excluding straw that was used for co-firing and in dedicated straw power stations leaves a remainder of **206.5 kte (77.8 ktoe)** assumed to have been used for heat production in 2014, not dissimilar to 200 ktoe (75.3 ktoe) reported in previous editions of the Digest. As no time series data are available to amend historic time series data or estimate growth rates, a linear growth rate has been assumed to back-correct to 2008.

6.112 A 40 MW straw-fired power station near Ely, Cambridgeshire and the 38MW Sleaford straw-fired power station, which went operational in 2014, are currently the only electricity generation schemes in operation.

**(g) Waste combustion**

6.113 Domestic, industrial and commercial wastes represent a significant resource for materials and energy recovery. Unprocessed wastes may be combusted in purpose built incinerators or the waste can be processed into a range of refuse derived fuels (RDF) for both on-site and off-site use. RDF can be partially processed to produce coarse RDF that can then be burnt in a variety of ways. By further processing the refuse, including separating off the fuel fraction, compacting, drying and densifying, it is possible to produce an RDF pellet. This pellet has around 60 per cent of the gross calorific value of British coal. Only the biodegradable portion of waste is counted in renewables statistics although non-biodegradable wastes are included in this chapter as “below the line” items. The paragraphs below describe various categories of waste combustion in greater detail.

6.114 **Municipal solid waste (MSW) combustion:** MSW comprises domestic waste plus other feedstocks, such as, general industrial waste, building demolition waste and tree clippings from civil amenities. Sample areas for the analysis of household collected waste are selected using ACORN socio-economic profiles (ACORN stands for A Classification Of Residential Neighbourhoods). This is based on the premise that households of similar socio-economic characteristics are likely to have similar behavioural, purchasing and lifestyle characteristics; this will be reflected in the quantity and composition of waste that those households produce. For several years, the analysis calculated that UK domestic waste had a biodegradable content of 67.5 per cent $\pm$ 1 per cent and this accounted for about 62.5 per cent of the energy generated from its combustion but work in 2009 revised this upwards to 63.5 per cent. The success of recycling strategies, however, has gradually changed the composition of waste available for combustion and the biodegradable content is now considered to be about 50 per cent which has been used for this years’ survey but will continue to be reviewed periodically. As no time series data are available to amend historic time series data, a linear change in composition over this period has been assumed to back-correct to 2009. Information on the direct combustion of unprocessed MSW and the combustion of RDF was provided via a RESTATS questionnaire.

6.115 **General industrial waste (GIW) combustion:** Certain wastes produced by industry and commerce can be used as a source of energy for industrial processes or space heating. These wastes include general waste from factories such as paper, cardboard, wood and plastics. A survey conducted in 2001 noted that GIW was now burnt in MSW waste-to-energy facilities. As no sites are solely burning GIW for heat or electricity generation, this feedstock is being handled under the MSW category.

[12] www.gov.uk/government/statistics/area-of-crops-grown-for-bioenergy-in-england-and-the-uk-2008-2013

6.116 In 2014, 38 energy from waste plants were in operation, burning municipal solid waste (MSW), refuse derived fuel (RDF) and general industrial waste (GIW).

6.117 **Specialised waste combustion:** Specialised wastes arise as a result of a particular activity or process. Materials in this category include scrap tyres, hospital wastes, poultry litter, meal and bone and farm waste digestion.

6.118 **Specialist non-biodegradable waste**. Although the large tyre incineration plant with energy recovery has not generated since 2000, the cement industry has burned some waste tyres in its cement and lime kilns. Although part of waste tyre combustion is of biodegradable waste, because there is no agreed method of calculating the small biodegradable content, all of the generation from waste tyres has been included under non-biodegradable wastes in this chapter.

6.119 **Hospital waste**. Information is based on a RESTATS survey undertaken in 2007, repeated in 2010 and reviewed again in 2013. Additional information on sites that reclaim energy was obtained from the Environment Agency's clinical waste incineration database. Sites were contacted to confirm their operational status and verify the electrical installed capacity and generation. The results continue to show an ongoing process of centralisation and consolidation, in response to changes in pollution emissions and clinical waste regulations. Generation is focusing on larger plants and many smaller facilities have closed as they were no longer viable due to the cost of compliance with regulations.

6.120 **Animal biomass**. One poultry litter combustion project started generating electricity in 1992; a second began in 1993. Both of these are NFFO projects. In addition, a small-scale CHP scheme began generating towards the end of 1990. However, this has now closed due to new emissions regulations. A further NFFO scheme started generating in 1998, and during 2000 a SRO scheme began to generate. A further poultry litter scheme became fully operational in 2001. One of the earlier poultry litter projects was modified to be fuelled mainly by meat and bone; two additional schemes fuelled primarily by meat and bone have also been built.

**(h) Anaerobic digestion (AD)**

6.121 Anaerobic Digestion uses natural bacteria to break down biomass in a sealed tank in the absence of oxygen to produce a methane rich biogas. The biomass fuel includes wet wastes such as animal manures and slurries, crop residues and food waste and/ or purpose grown crops such as maize. The biogas can be used for process heat, or for heat and electricity generation using a combined heat and power unit. Alternatively, the biogas can be upgraded to biomethane for use in transport applications or injection into the gas grid. The leftover indigestible material is called digestate; this is rich in nutrients and can be used as a fertiliser. Digestate can be used whole and spread on land. Alternatively, it can be separated into liquor and fibres. Separated fibre can be used fresh as a soil conditioner or, after further aerobic composting to stabilise it, the material is suitable for making into a compost product.

6.122 Information on operational AD sites in the UK was obtained from a number of sources including; the CHPQA database, information from previous AD surveys conducted for RESTATS, the AD portal run by NNFCC, the REA, the Renewable Energy Planning Database, ROC, FiT and RHI returns and Ricardo-AEA internal information. Electricity and heat production was estimated using survey information, where available, or information from ROC, FiT and RHI if no survey information existed. Where neither of these sources was available the energy production was calculated from the capacity an estimated load factor. The load factor was based on ROC data from operating schemes and date of commissioning where applicable for electricity schemes, and on historic load factors for heat only schemes. Of the 207 electricity-generating AD plants operating at the end of 2014, 67 (70.5 MW) qualified as CHP plant under CHAPSTATS. An additional 18 were heat only and 8 were producing bio-methane for grid injection. The majority of the heat-only schemes were small on-farm installations.

**(i) Co-firing of biomass with fossil fuels**

6.123 Compared with some other renewables, co-firing has a relatively low capital cost and is quick to implement. Biomass fuel is usually fed into a conventional power station boiler by means of the existing firing mechanism as a partial substitute for fossil fuel. The pulverised fuel preparation, transport and combustion system of a modern power plant may cope with approximately 5 - 10 per cent substitution without any major mechanical changes. The boiler design and airflows however may

permit much higher percentages if the burner systems are modified. Specially designed burners have been introduced on some installations in the UK.

**(j) Biodiesel and bioethanol (Liquid Biofuels for Transport)**

6.124 In the UK biodiesel is defined for taxation purposes as diesel quality liquid fuel produced from biomass or waste vegetable and animal oils and fats, the ester content of which is not less than 96.5 per cent by weight and the sulphur content of which does not exceed 0.005 per cent by weight or is nil. Bioethanol is defined for taxation purposes as a liquid fuel consisting of ethanol produced from biomass and capable of being used for the same purposes as light oil. For further information, see HMRC Notice 179E: Biofuels and other fuel substitutes, available at: www.gov.uk/government/publications/excise-notice-179e-biofuels-and-other-fuel-substitutes/excise-notice-179e-biofuels-and-other-fuel-substitutes

6.125 Diesel fuel currently sold at retail outlets in the UK can contain up to 7 per cent biodiesel. Petrol currently sold in at retail outlets in the UK can contain up to 5% bioethanol. Since March 2013 a revised petrol standard (EN228) allows retailers to sell petrol containing up to 10% ethanol by volume (E10), if appropriately labelled[13].

## Combined Heat and Power (CHP)

6.126 A CHP plant is an installation where useful heat and power (usually electricity) are supplied from a single generation process. Some CHP installations are fuelled either wholly or partially by renewable fuels. The main renewable fuel currently used in CHP is sewage gas, closely followed by other biomass.

6.127 Chapter 7 of this Digest summarises information on the contribution made by CHP to the UK's energy requirements in 2009 to 2014 using the results of annual studies undertaken to identify all CHP schemes (CHAPSTATS). Included in Tables 7.1 to 7.9 of that chapter is information on the contribution of renewable sources to CHP generation in each year from 2009 to 2014. Corresponding data for 1996 to 2008 are available on the DECC section of the gov.uk website. The information contained in those tables is therefore a subset of the data contained within the tables presented in this chapter. There are occasionally differences in the numbers reported by CHAPSTATS compared with RESTATS that are primarily attributed to whether the electricity is considered to come from 'good quality' CHP; further details on 'good quality' CHP are to be found in Chapter 7. In addition, there are oddities with some CHP facilities where biomass and fossil fuels are both burnt (though not always as co-firing). The total installed capacity recorded for the site under CHAPSTATS can cover multiple generators, some of which only handle fossil fuels (e.g., gas turbines). As it would be misleading to record the entire capacity reported in RESTATS as being potentially available for renewables generation, only the appropriate capacity figures are recorded.

## Generating capacity and load factor

6.128 The electrical capacities are given in Table 6.4 as installed capacities i.e. the maximum continuous rating of the generating sets in the stations. In Chapter 5 Declared Net Capacity (DNC) is used, i.e. the maximum continuous rating of the generating sets in the stations, less the power consumed by the plant itself, and reduced by a specified factor to take into account the intermittent nature of the energy source e.g. 0.43 for wind, 0.365 for small hydro, 0.33 for shoreline wave, and 0.17 for solar photovoltaics. DNC represents the nominal maximum capability of a generating set to supply electricity to consumers. For electrical capacities of generation using renewables in DNC terms see Table 6.1.1 on the DECC section of the gov.uk website.

6.129 Plant load factors shown in Table 6.5 have been calculated in terms of installed capacity (i.e. the maximum continuous rating of the generating sets in the stations) and express the average hourly quantity of electricity generated as a percentage of the average of the capacities at the beginning and end of the year. Additionally, the unchanged configuration load factor has now been used for a number of years, which calculates the amount of electricity generated from wind farms compared with the amount that such turbines would have generated had they been available for the whole of the calendar year and running continually and at maximum output throughout the calendar year.

[13] www.gov.uk/government/uploads/system/uploads/attachment_data/file/232126/petrol-protection-extention-ia.pdf

6.130 It is recognised that one of the shortcomings of the data contained in the Digest (end of calendar year) is that finalised ROCs data are often not available for several months following the compilation process for the Digest. In particular this can have an impact on the schemes included in the unchanged configuration definition as new data could include or remove particular schemes. This should be kept in mind if users wish to reanalyse these results.

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# 6.1 Commodity balances 2014

Renewables and waste

Thousand tonnes of oil equivalent

| | Wood waste | Wood | Poultry litter, meat and bone, and farm waste | Straw, SRC, and other plant-based biomass (4) | Sewage gas | Landfill gas |
|---|---|---|---|---|---|---|
| **Supply** | | | | | | |
| Production | 514 | 1,623 | 633 | 1,217 | 345 | 1,668 |
| Other sources | - | - | - | - | - | - |
| Imports | 24 | 14 | - | 2,138 | - | - |
| Exports | -79 | -83 | - | -44 | - | - |
| Marine bunkers | - | - | - | - | - | - |
| Stock change *(1)* | - | - | - | - | - | - |
| Transfers | - | - | - | - | - | - |
| **Total supply (2)** | **459** | **1,554** | **633** | **3,311** | **345** | **1,668** |
| **Statistical difference** *(3)* | - | - | - | - | - | - |
| **Total demand** | **459** | **1,554** | **633** | **3,311** | **345** | **1,668** |
| **Transformation** | **-** | **-** | **556** | **2,944** | **277** | **1,655** |
| Electricity generation | - | - | 556 | 2,938 | 277 | 1,655 |
| Major power producers | - | - | 195 | 2,583 | - | - |
| Autogenerators | - | - | 361 | 355 | 277 | 1,655 |
| Heat generation | - | - | - | 6 | - | - |
| Petroleum refineries | - | - | - | - | - | - |
| Coke manufacture | - | - | - | - | - | - |
| Blast furnaces | - | - | - | - | - | - |
| Patent fuel manufacture | - | - | - | - | - | - |
| Other | - | - | - | - | - | - |
| **Energy industry use** | **-** | **-** | **-** | **-** | **-** | **-** |
| Electricity generation | - | - | - | - | - | - |
| Oil and gas extraction | - | - | - | - | - | - |
| Petroleum refineries | - | - | - | - | - | - |
| Coal extraction | - | - | - | - | - | - |
| Coke manufacture | - | - | - | - | - | - |
| Blast furnaces | - | - | - | - | - | - |
| Patent fuel manufacture | - | - | - | - | - | - |
| Pumped storage | - | - | - | - | - | - |
| Other | - | - | - | - | - | - |
| **Losses** | **-** | **-** | **-** | **-** | **-** | **-** |
| **Final consumption** | **459** | **1,554** | **78** | **367** | **68** | **14** |
| **Industry** | **459** | **-** | **35** | **127** | **-** | **14** |
| Unclassified | 459 | - | 35 | 127 | - | 14 |
| Iron and steel | - | - | - | - | - | - |
| Non-ferrous metals | - | - | - | - | - | - |
| Mineral products | - | - | - | - | - | - |
| Chemicals | - | - | - | - | - | - |
| Mechanical engineering, etc | - | - | - | - | - | - |
| Electrical engineering, etc | - | - | - | - | - | - |
| Vehicles | - | - | - | - | - | - |
| Food, beverages, etc | - | - | - | - | - | - |
| Textiles, leather, etc | - | - | - | - | - | - |
| Paper, printing, etc | - | - | - | - | - | - |
| Other industries | - | - | - | - | - | - |
| Construction | - | - | - | - | - | - |
| **Transport** | **-** | **-** | **-** | **-** | **-** | **-** |
| Air | - | - | - | - | - | - |
| Rail | - | - | - | - | - | - |
| Road | - | - | - | - | - | - |
| National navigation | - | - | - | - | - | - |
| Pipelines | - | - | - | - | - | - |
| **Other** | **-** | **1,554** | **43** | **240** | **68** | **-** |
| Domestic | - | 1,554 | - | - | - | - |
| Public administration | - | - | - | - | 68 | - |
| Commercial | - | - | - | - | - | - |
| Agriculture | - | - | 43 | 240 | - | - |
| Miscellaneous | - | - | - | - | - | - |
| **Non energy use** | **-** | **-** | **-** | **-** | **-** | **-** |

*(1) Stock fall (+), stock rise (-).*
*(2) Including non-biodegradable wastes, which accounted for 717 ktoe.*
*(3) Total supply minus total demand.*
*(4) SRC is short rotation coppice.*
*(5) Municipal solid waste, general industrial waste and hospital waste.*
*(6) The amount of marine energy included is 0.2 ktoe.*

# 6.1 Commodity balances 2014 (continued)

Renewables and waste

Thousand tonnes of oil equivalent

| Waste *(5)* and tyres | Geothermal, active solar heat and PV | Heat pumps | Hydro | Wind and marine energy *(6)* | Liquid biofuels | Total renewables | |
|---|---|---|---|---|---|---|---|
| | | | | | | | **Supply** |
| 1,291 | 401 | 108 | 506 | 2,753 | 423 | 11,483 | Production |
| - | - | - | - | - | - | - | Other sources |
| - | - | - | - | - | 975 | 3,151 | Imports |
| - | - | - | - | - | -155 | -361 | Exports |
| - | - | - | - | - | - | - | Marine bunkers |
| - | - | - | - | - | - | - | Stock change *(1)* |
| - | - | - | - | - | - | - | Transfers |
| **1,291** | **401** | **108** | **506** | **2,753** | **1,243** | **14,273** | **Total supply** *(2)* |
| - | - | - | - | - | - | - | **Statistical difference** *(3)* |
| **1,291** | **401** | **108** | **506** | **2,753** | **1,243** | **14,273** | **Total demand** |
| **1,177** | **348** | **-** | **506** | **2,753** | **-** | **10,216** | **Transformation** |
| 1,108 | 348 | - | 506 | 2,753 | - | 10,141 | Electricity generation |
| 379 | - | - | 398 | 2,301 | - | 5,856 | Major power producers |
| 729 | 348 | - | 108 | 452 | - | 4,286 | Autogenerators |
| 68 | - | - | - | - | - | 75 | Heat generation |
| - | - | - | - | - | - | - | Petroleum refineries |
| - | - | - | - | - | - | - | Coke manufacture |
| - | - | - | - | - | - | - | Blast furnaces |
| - | - | - | - | - | - | - | Patent fuel manufacture |
| - | - | - | - | - | - | - | Other |
| - | - | - | - | - | - | - | **Energy industry use** |
| - | - | - | - | - | - | - | Electricity generation |
| - | - | - | - | - | - | - | Oil and gas extraction |
| - | - | - | - | - | - | - | Petroleum refineries |
| - | - | - | - | - | - | - | Coal extraction |
| - | - | - | - | - | - | - | Coke manufacture |
| - | - | - | - | - | - | - | Blast furnaces |
| - | - | - | - | - | - | - | Patent fuel manufacture |
| - | - | - | - | - | - | - | Pumped storage |
| - | - | - | - | - | - | - | Other |
| - | - | - | - | - | - | - | **Losses** |
| **115** | **53** | **108** | **-** | **-** | **1,243** | **4,057** | **Final consumption** |
| **65** | **-** | **2** | **-** | **-** | **-** | **702** | **Industry** |
| 65 | - | 2 | - | - | - | 702 | Unclassified |
| - | - | - | - | - | - | - | Iron and steel |
| - | - | - | - | - | - | - | Non-ferrous metals |
| - | - | - | - | - | - | - | Mineral products |
| - | - | - | - | - | - | - | Chemicals |
| - | - | - | - | - | - | - | Mechanical engineering, etc |
| - | - | - | - | - | - | - | Electrical engineering, etc |
| - | - | - | - | - | - | - | Vehicles |
| - | - | - | - | - | - | - | Food, beverages, etc |
| - | - | - | - | - | - | - | Textiles, leather, etc |
| - | - | - | - | - | - | - | Paper, printing, etc |
| - | - | - | - | - | - | - | Other industries |
| - | - | - | - | - | - | - | Construction |
| - | - | - | - | - | **1,243** | **1,243** | **Transport** |
| - | - | - | - | - | - | - | Air |
| - | - | - | - | - | - | - | Rail |
| - | - | - | - | - | 1,243 | 1,243 | Road |
| - | - | - | - | - | - | - | National navigation |
| - | - | - | - | - | - | - | Pipelines |
| **49** | **53** | **105** | **-** | **-** | **-** | **2,112** | **Other** |
| 21 | 52 | 61 | - | - | - | 1,688 | Domestic |
| 17 | 0 | - | - | - | - | 85 | Public administration |
| 12 | 0 | 45 | - | - | - | 57 | Commercial |
| - | - | - | - | - | - | 283 | Agriculture |
| - | - | - | - | - | - | - | Miscellaneous |
| **-** | **-** | **-** | **-** | **-** | **-** | **-** | **Non energy use** |

# 6.2 Commodity balances 2013

Renewables and waste

Thousand tonnes of oil equivalent

| | Wood waste | Wood | Poultry litter, meat and bone, and farm waste | Straw, SRC, and other plant-based biomass (4) | Sewage gas | Landfill gas |
|---|---|---|---|---|---|---|
| **Supply** | | | | | | |
| Production | 367 | 1,726 | 511r | 909r | 318 | 1,706r |
| Other sources | - | - | - | - | - | - |
| Imports | 32 | 5 | - | 1,540 | - | - |
| Exports | -56 | -104 | - | -46 | - | - |
| Marine bunkers | - | - | - | - | - | - |
| Stock change *(1)* | - | - | - | - | - | - |
| Transfers | - | - | - | - | - | - |
| **Total supply (2)** | **343** | **1,627r** | **511r** | **2,404r** | **318** | **1,706r** |
| **Statistical difference** *(3)* | - | - | - | - | - | - |
| **Total demand** | **343** | **1,627r** | **511r** | **2,404r** | **318** | **1,706r** |
| **Transformation** | 1r | - | 463r | 2,070r | **250** | 1,692r |
| Electricity generation | - | - | 463r | 2,063r | 250 | 1,692r |
| Major power producers | - | - | 199r | 1,819 | - | - |
| Autogenerators | - | - | 264r | 244r | 250 | 1,692r |
| Heat generation | 1r | - | - | 8r | - | - |
| Petroleum refineries | - | - | - | - | - | - |
| Coke manufacture | - | - | - | - | - | - |
| Blast furnaces | - | - | - | - | - | - |
| Patent fuel manufacture | - | - | - | - | - | - |
| Other | - | - | - | - | - | - |
| **Energy industry use** | - | - | - | - | - | - |
| Electricity generation | - | - | - | - | - | - |
| Oil and gas extraction | - | - | - | - | - | - |
| Petroleum refineries | - | - | - | - | - | - |
| Coal extraction | - | - | - | - | - | - |
| Coke manufacture | - | - | - | - | - | - |
| Blast furnaces | - | - | - | - | - | - |
| Patent fuel manufacture | - | - | - | - | - | - |
| Pumped storage | - | - | - | - | - | - |
| Other | - | - | - | - | - | - |
| **Losses** | - | - | - | - | - | - |
| **Final consumption** | **342** | **1,627r** | **48** | **333r** | **68** | **14** |
| **Industry** | **342** | - | **29** | 127r | - | **14** |
| Unclassified | 342 | - | 29 | 127r | - | 14 |
| Iron and steel | - | - | - | - | - | - |
| Non-ferrous metals | - | - | - | - | - | - |
| Mineral products | - | - | - | - | - | - |
| Chemicals | - | - | - | - | - | - |
| Mechanical engineering, etc | - | - | - | - | - | - |
| Electrical engineering, etc | - | - | - | - | - | - |
| Vehicles | - | - | - | - | - | - |
| Food, beverages, etc | - | - | - | - | - | - |
| Textiles, leather, etc | - | - | - | - | - | - |
| Paper, printing, etc | - | - | - | - | - | - |
| Other industries | - | - | - | - | - | - |
| Construction | - | - | - | - | - | - |
| **Transport** | - | - | - | - | - | - |
| Air | - | - | - | - | - | - |
| Rail | - | - | - | - | - | - |
| Road | - | - | - | - | - | - |
| National navigation | - | - | - | - | - | - |
| Pipelines | - | - | - | - | - | - |
| **Other** | - | **1,627r** | **19** | 206r | **68** | - |
| Domestic | - | 1,627r | - | - | - | - |
| Public administration | - | - | - | - | 68 | - |
| Commercial | - | - | - | - | - | - |
| Agriculture | - | - | 19 | 206r | - | - |
| Miscellaneous | - | - | - | - | - | - |
| **Non energy use** | - | - | - | - | - | - |

*(1) Stock fall (+), stock rise (-).*
*(2) Including non-biodegradable wastes, which accounted for 668 ktoe.*
*(3) Total supply minus total demand.*
*(4) SRC is short rotation coppice.*
*(5) Municipal solid waste, general industrial waste and hospital waste.*
*(6) The amount of marine energy included is 0.5 ktoe.*

# 6.2 Commodity balances 2013 (continued)

Renewables and waste

Thousand tonnes of oil equivalent

| Waste *(5)* and tyres | Geothermal, active solar heat and PV | Heat pumps | Hydro | Wind and marine *energy (6)* | Liquid biofuels | Total renewables | |
|---|---|---|---|---|---|---|---|
| | | | | | | | **Supply** |
| 1,263r | 222r | 88r | 404 | 2,444r | 543 | 10,502r | Production |
| - | - | - | - | - | - | - | Other sources |
| - | - | - | - | - | 590 | 2,167 | Imports |
| - | - | - | - | - | -41 | -247 | Exports |
| - | - | - | - | - | - | - | Marine bunkers |
| - | - | - | - | - | - | - | Stock change *(1)* |
| - | - | - | - | - | - | - | Transfers |
| **1,263r** | **222r** | **88r** | **404** | **2,444r** | **1,092** | **12,421r** | **Total supply** *(2)* |
| - | - | - | - | - | - | - | **Statistical difference** *(3)* |
| **1,263r** | **222r** | **88r** | **404** | **2,444r** | **1,092** | **12,421r** | **Total demand** |
| 1,131r | 171r | - | **404** | 2,444r | - | 8,626r | **Transformation** |
| 1,078r | 171r | - | 404 | 2,444r | - | 8,565r | Electricity generation |
| 385r | - | - | 310 | 2,060r | - | 4,774r | Major power producers |
| 693r | 171r | - | 94 | 384r | - | 3,792r | Autogenerators |
| 53r | - | - | - | - | - | 61r | Heat generation |
| - | - | - | - | - | - | - | Petroleum refineries |
| - | - | - | - | - | - | - | Coke manufacture |
| - | - | - | - | - | - | - | Blast furnaces |
| - | - | - | - | - | - | - | Patent fuel manufacture |
| - | - | - | - | - | - | - | Other |
| - | - | - | - | - | - | - | **Energy industry use** |
| - | - | - | - | - | - | - | Electricity generation |
| - | - | - | - | - | - | - | Oil and gas extraction |
| - | - | - | - | - | - | - | Petroleum refineries |
| - | - | - | - | - | - | - | Coal extraction |
| - | - | - | - | - | - | - | Coke manufacture |
| - | - | - | - | - | - | - | Blast furnaces |
| - | - | - | - | - | - | - | Patent fuel manufacture |
| - | - | - | - | - | - | - | Pumped storage |
| - | - | - | - | - | - | - | Other |
| - | - | - | - | - | - | - | **Losses** |
| **132r** | **51r** | **88r** | **-** | **-** | **1,092** | **3,795r** | **Final consumption** |
| 59r | - | 2r | - | - | - | 573r | **Industry** |
| 59r | - | 2r | - | - | - | 573r | Unclassified |
| - | - | - | - | - | - | - | Iron and steel |
| - | - | - | - | - | - | - | Non-ferrous metals |
| - | - | - | - | - | - | - | Mineral products |
| - | - | - | - | - | - | - | Chemicals |
| - | - | - | - | - | - | - | Mechanical engineering, etc |
| - | - | - | - | - | - | - | Electrical engineering, etc |
| - | - | - | - | - | - | - | Vehicles |
| - | - | - | - | - | - | - | Food, beverages, etc |
| - | - | - | - | - | - | - | Textiles, leather, etc |
| - | - | - | - | - | - | - | Paper, printing, etc |
| - | - | - | - | - | - | - | Other industries |
| - | - | - | - | - | - | - | Construction |
| - | - | - | - | - | **1,092** | **1,092** | **Transport** |
| - | - | - | - | - | - | - | Air |
| - | - | - | - | - | - | - | Rail |
| - | - | - | - | - | 1,092 | 1,092 | Road |
| - | - | - | - | - | - | - | National navigation |
| - | - | - | - | - | - | - | Pipelines |
| 73r | 51r | 86r | - | - | - | 2,130r | **Other** |
| 22 | 50r | 49r | - | - | - | 1,748r | Domestic |
| 35r | 0 | - | - | - | - | 104r | Public administration |
| 16 | 0 | 37r | - | - | - | 53r | Commercial |
| - | - | - | - | - | - | 225r | Agriculture |
| - | - | - | - | - | - | - | Miscellaneous |
| - | - | - | - | - | - | - | **Non energy use** |

# 6.3 Commodity balances 2012

Renewables and waste

Thousand tonnes of oil equivalent

| | Wood waste | Wood | Poultry litter, meat and bone, and farm waste | Straw, SRC, and other plant-based biomass (4) | Sewage gas | Landfill gas |
|---|---|---|---|---|---|---|
| **Supply** | | | | | | |
| Production | 389 | 1,509r | 435 | 746r | 300 | 1,701r |
| Other sources | - | - | - | - | - | - |
| Imports | 32 | 3r | - | 1,016 | - | - |
| Exports | -131 | -119 | - | -22 | - | - |
| Marine bunkers | - | - | - | - | - | - |
| Stock change *(1)* | - | - | - | - | - | - |
| Transfers | - | - | - | - | - | - |
| **Total supply (2)** | **289** | **1,392r** | **435** | **1,739r** | **300** | **1,701r** |
| **Statistical difference** *(3)* | - | - | - | - | - | - |
| **Total demand** | **289** | **1,392r** | **435** | **1,739r** | **300** | **1,701r** |
| **Transformation** | **27** | **-** | **389** | **1,498** | **236** | 1,688r |
| Electricity generation | - | - | 389 | 1,463 | 236 | 1,688r |
| Major power producers | - | - | 188 | 1,177 | - | - |
| Autogenerators | - | - | 201 | 286 | 236 | 1,688r |
| Heat generation | 27 | - | - | 35 | - | - |
| Petroleum refineries | - | - | - | - | - | - |
| Coke manufacture | - | - | - | - | - | - |
| Blast furnaces | - | - | - | - | - | - |
| Patent fuel manufacture | - | - | - | - | - | - |
| Other | - | - | - | - | - | - |
| **Energy industry use** | **-** | **-** | **-** | **-** | **-** | **-** |
| Electricity generation | - | - | - | - | - | - |
| Oil and gas extraction | - | - | - | - | - | - |
| Petroleum refineries | - | - | - | - | - | - |
| Coal extraction | - | - | - | - | - | - |
| Coke manufacture | - | - | - | - | - | - |
| Blast furnaces | - | - | - | - | - | - |
| Patent fuel manufacture | - | - | - | - | - | - |
| Pumped storage | - | - | - | - | - | - |
| Other | - | - | - | - | - | - |
| **Losses** | **-** | **-** | **-** | **-** | **-** | **-** |
| **Final consumption** | **263** | **1,392r** | **46** | **241r** | **64** | **14** |
| **Industry** | **263** | **-** | **32** | **97** | **-** | **14** |
| Unclassified | 263 | - | 32 | 97 | - | 14 |
| Iron and steel | - | - | - | - | - | - |
| Non-ferrous metals | - | - | - | - | - | - |
| Mineral products | - | - | - | - | - | - |
| Chemicals | - | - | - | - | - | - |
| Mechanical engineering, etc | - | - | - | - | - | - |
| Electrical engineering, etc | - | - | - | - | - | - |
| Vehicles | - | - | - | - | - | - |
| Food, beverages, etc | - | - | - | - | - | - |
| Textiles, leather, etc | - | - | - | - | - | - |
| Paper, printing, etc | - | - | - | - | - | - |
| Other industries | - | - | - | - | - | - |
| Construction | - | - | - | - | - | - |
| **Transport** | **-** | **-** | **-** | **-** | **-** | **-** |
| Air | - | - | - | - | - | - |
| Rail | - | - | - | - | - | - |
| Road | - | - | - | - | - | - |
| National navigation | - | - | - | - | - | - |
| Pipelines | - | - | - | - | - | - |
| **Other** | **-** | 1,392r | **15** | 144r | **64** | **-** |
| Domestic | - | 1,392r | - | - | - | - |
| Public administration | - | - | - | - | 64 | - |
| Commercial | - | - | - | - | - | - |
| Agriculture | - | - | 15 | 144r | - | - |
| Miscellaneous | - | - | - | - | - | - |
| **Non energy use** | **-** | **-** | **-** | **-** | **-** | **-** |

*(1) Stock fall (+), stock rise (-).*
*(2) Including non-biodegradable wastes, which accounted for 664 ktoe.*
*(3) Total supply minus total demand.*
*(4) SRC is short rotation coppice.*
*(5) Municipal solid waste, general industrial waste and hospital waste.*
*(6) The amount of marine energy included is 0.3 ktoe.*

# 6.3 Commodity balances 2012 (continued)

Renewables and waste

Thousand tonnes of oil equivalent

| Waste *(5)* and tyres | Geothermal, active solar heat and PV | Heat pumps | Hydro | Wind and marine energy *(6)* | Liquid biofuels | Total renewables | |
|---|---|---|---|---|---|---|---|
| | | | | | | | **Supply** |
| 1,333r | 165r | 68 | 454 | 1,705r | 317 | 9,122r | Production |
| - | - | - | - | - | - | - | Other sources |
| - | - | - | - | - | 674 | 1,725 | Imports |
| - | - | - | - | - | -33 | -306 | Exports |
| - | - | - | - | - | - | - | Marine bunkers |
| - | - | - | - | - | - | - | Stock change *(1)* |
| - | - | - | - | - | - | - | Transfers |
| **1,333r** | **165r** | **68** | **454** | **1,705r** | **958** | **10,541r** | **Total supply** *(2)* |
| - | - | - | - | - | - | - | **Statistical difference** *(3)* |
| **1,333r** | **165r** | **68** | **454** | **1,705r** | **958** | **10,541r** | **Total demand** |
| 1,222r | **116** | **-** | **454** | 1,705r | **-** | 7,335r | **Transformation** |
| 1,159r | 116 | - | 454 | 1,705r | - | 7,211r | Electricity generation |
| 401 | - | - | 359 | 1,473r | - | 3,598 | Major power producers |
| 758r | 116 | - | 96 | 232 | - | 3,613r | Autogenerators |
| 63 | - | - | - | - | - | 125 | Heat generation |
| - | - | - | - | - | - | - | Petroleum refineries |
| - | - | - | - | - | - | - | Coke manufacture |
| - | - | - | - | - | - | - | Blast furnaces |
| - | - | - | - | - | - | - | Patent fuel manufacture |
| - | - | - | - | - | - | - | Other |
| - | - | - | - | - | - | - | **Energy industry use** |
| - | - | - | - | - | - | - | Electricity generation |
| - | - | - | - | - | - | - | Oil and gas extraction |
| - | - | - | - | - | - | - | Petroleum refineries |
| - | - | - | - | - | - | - | Coal extraction |
| - | - | - | - | - | - | - | Coke manufacture |
| - | - | - | - | - | - | - | Blast furnaces |
| - | - | - | - | - | - | - | Patent fuel manufacture |
| - | - | - | - | - | - | - | Pumped storage |
| - | - | - | - | - | - | - | Other |
| - | - | - | - | - | - | - | **Losses** |
| **111** | **49r** | **68** | **-** | **-** | **958** | **3,206r** | **Final consumption** |
| **52** | **-** | 2r | **-** | **-** | **-** | 459r | **Industry** |
| 52 | - | 2r | - | - | - | 459r | Unclassified |
| - | - | - | - | - | - | - | Iron and steel |
| - | - | - | - | - | - | - | Non-ferrous metals |
| - | - | - | - | - | - | - | Mineral products |
| - | - | - | - | - | - | - | Chemicals |
| - | - | - | - | - | - | - | Mechanical engineering, etc |
| - | - | - | - | - | - | - | Electrical engineering, etc |
| - | - | - | - | - | - | - | Vehicles |
| - | - | - | - | - | - | - | Food, beverages, etc |
| - | - | - | - | - | - | - | Textiles, leather, etc |
| - | - | - | - | - | - | - | Paper, printing, etc |
| - | - | - | - | - | - | - | Other industries |
| - | - | - | - | - | - | - | Construction |
| - | - | - | - | - | **958** | **958** | **Transport** |
| - | - | - | - | - | - | - | Air |
| - | - | - | - | - | - | - | Rail |
| - | - | - | - | - | 958 | 958 | Road |
| - | - | - | - | - | - | - | National navigation |
| - | - | - | - | - | - | - | Pipelines |
| **59** | 49r | 67r | **-** | **-** | **-** | 1,789r | **Other** |
| 18 | 48r | 37r | - | - | - | 1,495r | Domestic |
| 24 | 0 | - | - | - | - | 89 | Public administration |
| 16 | 0 | 30r | - | - | - | 46r | Commercial |
| - | - | - | - | - | - | 158r | Agriculture |
| - | - | - | - | - | - | - | Miscellaneous |
| **-** | **-** | **-** | **-** | **-** | **-** | **-** | **Non energy use** |

# 6.4 Capacity of, and electricity generated from, renewable sources

| | 2010 | 2011 | 2012 | 2013 | 2014 |
|---|---|---|---|---|---|
| **Installed Capacity (MW)** *(1)* | | | | | |
| Wind: | | | | | |
| Onshore | 4,060r | 4,629r | 5,904r | 7,519r | 8,486 |
| Offshore | 1,341 | 1,838 | 2,995 | 3,696 | 4,501 |
| Marine energy (wave and tidal stream) | 3 | 3 | 7 | 7 | 9 |
| Solar photovoltaics | 96r | 995r | 1,756r | 2,851r | 5,377 |
| Hydro: | | | | | |
| Small scale | 184 | 202 | 218r | 231r | 246 |
| Large scale *(2)* | 1,459r | 1,477r | 1,477r | 1,477r | 1,477 |
| Bioenergy: | | | | | |
| Landfill gas | 1,009r | 1,052r | 1,037r | 1,043r | 1,051 |
| Sewage sludge digestion | 193 | 198 | 204 | 198 | 208 |
| Energy from waste *(3)* | 424r | 505r | 517r | 550r | 696 |
| Animal Biomass (non-AD)*(4)* | 111 | 111 | 111 | 111 | 111 |
| Anaerobic digestion | 30 | 71 | 119 | 164 | 216 |
| Plant Biomass *(5)* | 315 | 1,149 | 1,171r | 1,955r | 2,244 |
| Total bioenergy and wastes | 2,083r | 3,085r | 3,159r | 4,021r | 4,526 |
| **Total** | 9,225r | 12,230r | 15,515r | 19,801r | 24,623 |
| Co-firing (6) | 266 | 338 | 204 | 35r | 16 |
| | | | | | |
| **Generation (GWh)** | | | | | |
| Wind: | | | | | |
| Onshore *(7)* | 7,182r | 10,503r | 12,232r | 16,950r | 18,611 |
| Offshore | 3,073r | 5,149r | 7,603r | 11,472r | 13,404 |
| Marine energy (wave and tidal stream) *(8)* | 2 | 1 | 4 | 6 | 2 |
| Solar photovoltaics | 41 | 244 | 1,352r | 1,989r | 4,050 |
| Hydro: | | | | | |
| Small scale *(7)* | 473r | 691r | 654r | 676r | 832 |
| Large scale *(2)* | 3,092 | 4,989 | 4,631 | 4,026 | 5,053 |
| Bioenergy: | | | | | |
| Landfill gas | 5,031r | 5,085r | 5,145r | 5,160r | 5,045 |
| Sewage sludge digestion | 697 | 764 | 719 | 761 | 846 |
| Biodegradable energy from waste *(9)* | 1,530r | 1,503r | 1,774r | 1,649r | 1,950 |
| Co-firing with fossil fuels | 2,332 | 2,964 | 1,783 | 309 | 133 |
| Animal Biomass *(4)* | 627 | 615 | 643 | 628 | 614 |
| Anaerobic digestion | 111 | 273r | 501r | 722r | 1,009 |
| Plant Biomass *(5)* | 1,593 | 1,749 | 4,083 | 8,929r | 13,105 |
| Total bioenergy | 11,921r | 12,953r | 14,648r | 18,159r | 22,702 |
| **Total generation** | 25,783r | 34,529r | 41,124r | 53,277r | 64,654 |
| Non-biodegradable wastes *(10)* | 987r | 1,085r | 1,429r | 1,481r | 1,951 |
| | | | | | |
| **Total generation from sources eligible for the Renewable Obligation** *(11)* | 21,830r | 28,919r | 33,406r | 44,948r | 52,745 |

*(1) Capacity on a DNC basis is shown in Long Term Trends Table 6.1.1 available on the DECC web site - see paragraph 6.5.*
*(2) Excluding pumped storage stations. Capacities are as at the end of December.*
*(3) Includes waste tyres and hospital waste.*
*(4) Includes the use of poultry litter and meat & bone.*
*(5) Includes the use of straw combustion and short rotation coppice energy crops.*
*(6) This is the proportion of fossil fuelled capacity used for co-firing of renewables based on the proportion of generation accounted for by the renewable source.*
*(7) Actual generation figures are given where available, but otherwise are estimated using a typical load factor or the design load factor, where known.*
*(8) Includes electricity from the EMEC test facility.*
*(9) Biodegradable part only.*
*(10) Non-biodegradable part of municipal solid waste plus waste tyres, hosptal waste and general industrial waste.*
*(11) See paragraphs 6.56 to 6.58 for definition and coverage.*

# 6.5 Load factors for renewable electricity generation

Per cent

| | 2010 | 2011 | 2012 | 2013 | 2014 |
|---|---|---|---|---|---|
| **Load factors - based on average beginning and end of year capacity (1)** | | | | | |
| Wind | 23.8r | 30.1r | 29.4r | 32.3 | 30.2 |
| Onshore wind | 21.8r | 27.6r | 26.4r | 28.8r | 26.5 |
| Offshore wind | 30.6r | 37.0r | 35.8r | 39.1r | 37.3 |
| Marine energy (wave and tidal stream) | 8.4 | 3.8 | 8.3 | 9.6r | 3.2 |
| Solar photovoltaics | 7.7r | 5.1 | 11.2 | 9.9r | 11.2 |
| Hydro | 24.8r | 39.0r | 35.7r | 31.6r | 39.2 |
| Hydro (small scale) | 30.1r | 40.9r | 35.5r | 34.4r | 39.8 |
| Hydro (large scale) | 24.1r | 38.8r | 35.7r | 31.1r | 39.1 |
| Bioenergy (excludes cofiring and non-biodegradable wastes) | 54.8r | 44.1r | 46.9r | 56.8 | 60.3 |
| Landfill gas | 58.1r | 56.3 | 56.1r | 56.6r | 55.0 |
| Sewage sludge digestion | 45.5 | 44.6 | 40.7 | 43.2 | 47.5 |
| Energy from waste (3) | 43.4r | 36.9r | 39.5r | 35.3r | 35.8 |
| Animal Biomass (4) | 64.8r | 63.5 | 66.2 | 64.9 | 63.4 |
| Anaerobic Digestion | 59.9 | 61.6 | 60.3r | 58.3r | 60.5 |
| Plant Biomass (5) | 60.5r | 27.3 | 40.1r | 65.2r | 71.2 |
| **All renewable technologies (excluding cofiring and non-biodegradable wastes)** | 31.1 | 33.6 | 32.3r | 34.2r | 33.1 |
| **Load factors - for schemes operating on an unchanged configuration basis (2)** | | | | | |
| Wind | 23.4r | 29.4 | 28.1r | 31.0 | 30.2 |
| Onshore wind | 21.6r | 27.2 | 25.6 | 27.9 | 26.4 |
| Offshore wind | 29.9 | 35.1r | 34.1r | 37.6r | 37.7 |
| Hydro | 26.4r | 41.5r | 35.3 | 31.5r | 38.8 |
| Hydro (small scale) | 29.8r | 43.2 | 36.7r | 35.2 | 39.6 |
| Hydro (large scale) | 26.1r | 41.4r | 35.1r | 31.2r | 38.8 |
| Bioenergy (excludes cofiring and non-biodegradable wastes) | 60.8r | 60.9r | 63.5r | 59.9r | 65.2 |
| Landfill gas | 57.3r | 59.4r | 58.8r | 57.0 | 55.3 |
| Sewage sludge digestion | 53.1 | 53.5 | 48.0 | 50.2 | 49.9 |
| Energy from waste (3) | 41.4r | 36.5r | 40.1r | 34.7r | 34.8 |
| Animal Biomass (4) | 64.8 | 69.0 | 66.2 | 70.4 | 63.4 |
| Anaerobic Digestion | 58.8 | 57.6 | 60.6r | 60.7 | 59.3 |
| Plant Biomass (5) | 66.4r | 60.9 | 67.2 | 61.6r | 70.6 |
| **All renewable technologies (excluding cofiring and non-biodegradable wastes)** | 32.3 | 37.2 | 36.2r | 35.5r | 39.3 |

*(1) See paragraph 6.24 for details of the calculation.*

*(2) See paragraph 6.28 for details of the calculation.*

*(3) Calculation is based on biodegradable waste generation but all waste capacity; this reduces the load factor.*

*(4) Includes the use of poultry litter and meat & bone.*

*(5) Includes the use of straw combustion and short rotation coppice energy crops.*

# 6.6 Renewable sources used to generate electricity and heat and for transport fuels*(1)(2)*

**Thousand tonnes of oil equivalent**

| | 2010 | 2011 | 2012 | 2013 | 2014 |
|---|---|---|---|---|---|
| **Used to generate electricity** *(3)* | | | | | |
| Wind: | | | | | |
| Onshore | 617.5r | 903.1r | 1051.8r | 1457.4r | 1,600.3 |
| Offshore | 264.2r | 442.7r | 653.8r | 986.4r | 1,152.6 |
| Marine energy (wave and tidal stream) (4) | 0.2 | 0.1 | 0.3 | 0.5 | 0.2 |
| Solar photovoltaics | 3.5 | 20.9r | 116.3 | 171.1r | 348.2 |
| Hydro: | | | | | |
| Small scale | 40.7r | 59.4r | 56.2 | 58.1r | 71.5 |
| Large scale *(5)* | 265.9 | 429.0 | 398.2 | 346.2 | 434.5 |
| Bioenergy: | | | | | |
| Landfill gas | 1649.9r | 1667.9r | 1687.6r | 1692.4r | 1,654.6 |
| Sewage sludge digestion | 228.5 | 250.4 | 235.9r | 249.6 | 277.4 |
| Biodegradable energy from waste | 604.1r | 567.4r | 638.5r | 564.7r | 551.1 |
| Co-firing with fossil fuels | 625.2 | 763.5 | 400.5 | 53.7 | 25.1 |
| Animal Biomass *(6)* | 238.9 | 224.0 | 225.0 | 226.4 | 224.8 |
| Anaerobic digestion | 36.4 | 89.4r | 164.3r | 236.8r | 330.8 |
| Plant Biomass *(7)* | 461.2 | 553.7 | 1,062.3 | 2009.1r | 2,912.9 |
| Total bioenergy | 3844.3r | 4116.4r | 4414.1r | 5032.7r | 5,976.8 |
| **Total** | 5036.2r | 5971.7r | 6690.6r | 8052.3r | 9,584.1 |
| Non-biodegradable wastes *(8)* | 395.8r | 415.5r | 520.3r | 513.1r | 557.4 |
| **Used to generate heat** | | | | | |
| Active solar heating | 39.2r | 44.4r | 47.8r | 50.1r | 52.1 |
| Bioenergy: | | | | | |
| Landfill gas | 13.6 | 13.6 | 13.6 | 13.6 | 13.6 |
| Sewage sludge digestion | 57.7 | 64.3 | 63.7 | 68.3 | 67.7 |
| Wood combustion - domestic | 1258.0r | 1096.7r | 1392.3r | 1626.7r | 1,554.4 |
| Wood combustion - industrial | 255.7 | 281.9 | 289.5 | 342.9 | 459.4 |
| Animal Biomass *(9)* | 40.3 | 35.8 | 31.5 | 29.1 | 34.5 |
| Anaerobic digestion | 4.7r | 9.7 | 14.5r | 18.7 | 43.0 |
| Plant Biomass *(10)* | 270.8r | 289.6r | 276.6r | 340.9r | 373.1 |
| Biodegradable energy from waste *(6)* | 27.8r | 33.1r | 29.8r | 30.1r | 23.3 |
| Total bioenergy | 1928.6r | 1824.6r | 2111.5r | 2470.2r | 2,569.1 |
| Deep geothermal | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 |
| Heat Pumps | 30.6r | 48.6r | 68.4r | 88.2r | 107.6 |
| **Total** | 1999.2r | 1918.4r | 2228.4r | 2609.3r | 2,729.6 |
| Non-biodegradable wastes *(8)* | 138.1r | 152.6r | 144.1r | 155.0r | 159.3 |
| **Renewable sources used as transport fuels** | | | | | |
| as Bioethanol | 355.4 | 367.5 | 436.9 | 462.2r | 458.8 |
| as Biodiesel | 861.9 | 760.0 | 520.9 | 629.4 | 783.8 |
| **Total** | 1,217.3 | 1,127.5 | 957.8 | 1091.6r | 1,242.7 |
| **Total use of renewable sources and wastes** | | | | | |
| Solar heating and photovoltaics | 42.7r | 65.3r | 164.0r | 221.2r | 400.3 |
| Onshore wind | 617.5r | 903.1r | 1051.8r | 1457.4r | 1,600.3 |
| Offshore wind | 264.2r | 442.7r | 653.8r | 986.4r | 1,152.6 |
| Marine energy (wave and tidal stream) | 0.2 | 0.1 | 0.3 | 0.5 | 0.2 |
| Hydro | 306.5r | 488.4r | 454.4 | 404.3r | 506.0 |
| Bioenergy | 5772.9r | 5941.1r | 6525.6r | 7502.8r | 8,545.9 |
| Deep geothermal | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 |
| Heat Pumps | 30.6r | 48.6r | 68.4r | 88.2r | 107.6 |
| Transport biofuels | 1,217.3 | 1,127.5 | 957.8 | 1091.6r | 1,242.7 |
| **Total** | 8252.7r | 9017.6r | 9876.9r | 11753.2r | 13,556.4 |
| Non-biodegradable wastes *(8)* | 533.9r | 568.1r | 664.4r | 668.1r | 716.7 |
| **All renewables and wastes** *(11)* | 8786.6r | 9585.8r | 10541.2r | 12421.3r | 14,273.1 |

*(1) Includes some waste of fossil fuel origin.*
*(2) See the Digest of UK Energy Statistics for technical notes and definitions of the categories used in this table.*
*(3) For wind, solar PV and hydro, the figures represent the energy content of the electricity supplied but for bioenergy the figures represent the energy content of the fuel used.*
*(4) Includes the EMEC test facility.*
*(5) Excluding pumped storage stations.*
*(6) Includes electricity from poultry litter combustion and meat & bone combustion.*
*(7) Includes electricity from straw and energy crops.*
*(8) Non-biodegradable part of municipal solid waste plus waste tyres, hospital waste, and general industrial waste.*
*(9) Includes heat from farm waste digestion, and meat and bone combustion.*
*(10) Includes heat from straw, energy crops, paper and packaging.*
*(11) The figures in this row correspond to the total demand and total supply figures in Tables 6.1, 6.2 and 6.3.*

# 6.7 Renewable sources data used to indicate progress under the 2009 EU Renewable Energy Directive (measured using net calorific values)

Thousand tonnes of oil equivalent

| | 2010 | 2011 | 2012 | 2013 | 2014 |
|---|---|---|---|---|---|
| **Electricity generation component:** | | | | | |
| Normalised hydro generation *(1) (2)* | 421r | 440r | 447r | 444r | 446 |
| Normalised wind generation *(3)* | 967r | 1,217r | 1,615r | 2,219r | 2,715 |
| Electricity generation from renewables other than wind, hydro, and compliant biofuels | 1,029r | 1,135r | 1,376r | 1,733r | 2,300 |
| Electricity generation from compliant biofuels | - | - | - | - | - |
| Total renewable generation from all compliant sources | 2,417r | 2,791r | 3,438r | 4,395r | 5,461 |
| Total Gross Electricity Consumption *(2)* | 32,785r | 31,878r | 32,028r | 31,874r | 30,658 |
| Percentage of electricity from renewable sources | 7.4% | 8.8% | 10.7%r | 13.8%r | 17.8% |
| **Heat component:** | | | | | |
| Renewable energy for heating and cooling | 2,095r | 2,016r | 2,333r | 2,681r | 2,804 |
| Total Gross energy consumption for heating and cooling | 70,005r | 58,698r | 63,623r | 65,338r | 57,869 |
| Percentage of heating and cooling energy from renewable sources | 3.0%r | 3.4%r | 3.7%r | 4.1%r | 4.8% |
| **Transport component (excluding air transport):** | | | | | |
| Road transport renewable electricity | 0 | 0 | 0 | 1 | 1 |
| Non-road transport renewable electricity | 58 | 66 | 69 | 77r | 38 |
| Biofuels (restricted to those meeting sustainability criteria from 2011) | 1,150 | 968 | 882 | 1,014 | 1,167 |
| Total electricity consumption in transport | 365r | 366r | 367r | 367r | 366 |
| Total petrol and diesel consumption in transport | 37,719 | 37,195r | 37,046r | 36,749r | 37,215 |
| Total transport component numerator (including weighted components) *(4)* | 1,215r | 1,034r | 1,405r | 1,667r | 1,865 |
| Total transport component denominator (including weighted components) (4) | 39,239r | 38,624r | 38,309r | 38,139r | 38,750 |
| Percentage of transport energy from renewable sources *(4)* | 3.1% | 2.7% | 3.7% | 4.4% | 4.8% |
| **Overall directive target:** | | | | | |
| Renewables used for: | | | | | |
| Electricity generation | 2,417r | 2,791r | 3,438r | 4,395r | 5,461 |
| Heating and Cooling | 2,095r | 2,016r | 2,333r | 2,681r | 2,804 |
| Transport biofuels (restricted to those meeting sustainability criteria from 2011) | 1,150 | 968 | 882 | 1,014 | 1,167 |
| Total Final Consumption of Renewable Energy ["Row A"] | 5,662r | 5,775r | 6,653r | 8,090r | 9,433 |
| Final Electricity Consumption *(5)* | 28,258r | 27,313r | 27,325r | 27,241r | 26,075 |
| Transport Final Energy Consumption (including air transport) *(6)* | 51,481r | 51,180r | 50,433r | 50,294r | 51,094 |
| Heating and Cooling Final Energy Consumption | 70,005r | 58,698r | 63,623r | 65,338r | 57,869 |
| Total Final Energy Consumption *(7)* | 149,745r | 137,190r | 141,381r | 142,873r | 135,038 |
| *plus* Distribution losses for electricity | 2,288r | 2,364r | 2,436r | 2,295r | 2,408 |
| *plus* Distribution losses for heat | - | - | - | - | - |
| *plus* Consumption of electricity in the electricity and heat generation sectors | 1,385 | 1,413r | 1,545r | 1,538 | 1,420 |
| *plus* Consumption of heat in the electricity and heat generation sectors | - | - | - | - | - |
| Gross Final Energy Consumption (GFEC) | 153,418r | 140,967r | 145,362r | 146,706r | 138,866 |
| *of which* Air transport | 12,288r | 12,802r | 12,408r | 12,434r | 12,419 |
| Air transport as a proportion of GFEC | 8.01%r | 9.08%r | 8.54%r | 8.48%r | 8.94% |
| Air transport cap specificed in Directive | 6.18% | 6.18% | 6.18% | 6.18% | 6.18% |
| *Capped air transport* | 9,481r | 8,712r | 8,983r | 9,066r | 8,582 |
| Capped Gross Final Energy Consumption (CGFEC) ["Row B"] *(8)* | 150,612r | 136,877r | 141,938r | 143,339r | 135,029 |
| Headline Directive percentage : Renewable Energy Consumption as a percentage of Capped Gross Final Energy Consumption ["Row A" divided by "Row B"] | 3.8%r | 4.2%r | 4.7%r | 5.6%r | 7.0% |

*(1) Based on a 15 year average hydro load factor.*
*(2) Excludes generation from pumped storage.*
*(3) Based on a 5 year average wind load factor.*
*(4) Some sustainable biofuels are double weighted in the numerator of this calculation, as specified by the Directive.*
*(5) Final Electricity Consumption is Gross Electricity Consumption minus generators' own use of electricity and losses.*
*(6) Includes consumption of petrol and diesel, biofuels, other oil products, and coal.*
*(7) Total final consumption less non-energy use, as shown in Annex I, Table I.1, available on the DECC website.*
*(8) This row includes adjustments for loses, and generators own use of electricity, combined with the capping mechanism for air transport as specified in the Directive.*

# Chapter 7
# Combined heat and power

## Key Points

- Good Quality CHP capacity marginally fell by 72 MWe between 2013 and 2014 from 6,190 MWe to 6,118 MWe. (Table 7A) (see paragraph 7.5).
- The amount of good quality electricity produced in 2014 was 20.3 TWh, which is 0.6 per cent lower than in 2013. The good quality electricity generated by CHP in 2014 corresponds to 6.0 per cent of all electricity produced in the UK.
- Sixty-seven percent of the fuel used in CHP schemes was natural gas. This is 1.6 percentage points lower than in 2013. The use of renewable fuel has again increased and now stands at over 11 per cent of total CHP fuel reported in this Chapter, compared with 9.5 per cent in 2013.
- The Oil and Gas sector has the largest Good Quality CHP capacity, followed by the Chemicals sector (table 7.8).
- The $CO_2$ savings delivered by CHP in 2014 were lower than in 2013. This is mainly due to lower provisional values of $CO_2$ intensity of electricity displaced by CHP generated electricity.

## Introduction

7.1 This chapter sets out the contribution made by Combined Heat and Power (CHP) to the United Kingdom's energy requirements. The data presented in this chapter have been derived from information submitted to the CHP Quality Assurance programme (CHPQA) or by following the CHPQA methodology in respect of data obtained from other sources. The CHPQA programme was introduced by the Government to provide the methods and procedures to assess and certify the quality of the full range of CHP schemes. It is a rigorous system for the Government to ensure that the incentives on offer are targeted fairly and benefit schemes in relation to their environmental performance.

7.2 CHP is the simultaneous generation of usable heat and power (usually electricity) in a single process. The term CHP is synonymous with cogeneration, which is commonly used in other Member States of the European Community and the United States. CHP uses a variety of fuels and technologies across a wide range of sizes and applications. The basic elements of a CHP plant comprise one or more prime movers (a reciprocating engine, gas turbine, or steam turbine) driving electrical generators, with the heat generated in the process captured and put to further productive use, such as for industrial processes, hot water and space heating or cooling.

7.3 CHP is typically sized to make use of the available heat[1], and connected to the lower voltage distribution system (i.e. embedded). This means that unlike conventional power stations, CHP can provide efficiency gains by avoiding significant transmission and distribution losses. These gains are reflected in the calculation of $CO_2$ savings delivered by CHP (see 7.27-7.28) CHP can also provide important network services such as improvements to power quality, and black start, the capability to operate in island mode if the grid goes down. There are four principal types of CHP system: steam turbine, gas turbine, combined cycle systems and reciprocating engines. Each of these is defined in paragraph 7.35 later in this chapter.

[1] *But not always, see paragraph 7.5. In such cases there is an impact upon the electrical capacity and electrical output classified as CHP.*

## UK energy markets, and their effect on CHP

7.4 Two major factors affecting the economics of CHP are the relative cost of fuel (principally natural gas) and the value that can be realised for electricity both for own use and export. This is known as the spark gap (i.e. the difference between the price of electricity and the price of the gas required to generate that electricity). Energy price trends that are applicable to CHP schemes differ depending upon the size and sector of the scheme. The volatility of energy prices continues to have an impact on the viability of CHP. Due to the long term nature of CHP investments long term trends in the spark gap need to be taken into account.

## Use of CHPQA in producing CHP statistics

7.5 The CHPQA programme is the major source for CHP statistics. The following factors need to be kept in mind when using the statistics produced:

- Through CHPQA, scheme operators have been given guidance on how to determine the boundary of a CHP scheme (what is regarded as part of the CHP installation and what is not). A scheme can include multiple CHP prime movers[2], along with supplementary boilers and generating plant, subject to appropriate metering being installed to support the CHP scheme boundaries proposed, and subject to appropriate metering and threshold criteria. (See CHPQA Guidance Note 11 available at www.gov.uk/chpqa-guidance-notes). This point is relevant when considering the figures in Table 7D, where the power efficiencies, heat efficiencies and heat to power ratios stated in that table for 2014 are those of the scheme, which may not be just the prime mover.
- The output of a scheme is based on gross power output. This means that power consumed by parasitic plant such as pumps and fans is included in the power output of the scheme.
- The main purpose of a number of CHP schemes is the generation of electricity including export to other businesses and the grid. Such schemes may not be sized to use all of the available heat. In such cases, the schemes' total electrical capacity and electrical output have been scaled back using the methodologies outlined in CHPQA (see www.gov.uk/chpqa-guidance-notes). Only the output from highly-efficient or "Good Quality" schemes is counted in this chapter. Chapter 5 includes all CHP capacity, fuel inputs and power outputs, for both highly-efficient or "Good Quality" and less efficient, under the categories "Other generators".
- For year of operation 2011 onwards, new scale back criteria came into force in order to be consistent with the EU Cogeneration Directive. This results in a more severe scale back than was previously the case. This has contributed to some of the decrease in Good Quality electricity output and associated fuel consumption seen after 2010.
- There are two load factors presented in Table 7A. Load Factor (CHPQA) is based on the Good Quality Power Output and Good Quality Power Capacity reported in this Chapter. Load Factor (Actual) is based on the Total Power Capacity and the Total Power Output. The Load Factor (CHPQA) is lower than the Load Factor (Actual) for schemes that have been scaled back on the power outputs. The load factor gives an indication of the degree to which the power generating capacity is utilized. Since 2007, Load Factor (CHPQA) had declined in the Chemicals, Oil Refining and Paper sectors.

*2 The CHP prime mover is the heart of a CHP system and is a mechanical machine which drives the electricity generator or develops mechanical power for direct use*

## Table 7A: A summary of the recent development of CHP[1]

| | Unit | 2010 | 2011 | 2012 | 2013 | 2014 |
|---|---|---|---|---|---|---|
| Number of schemes | | 1,459 | 1,791 | 1,955 | 2,054 | 2,066 |
| *Net No. of schemes added during year* | | 80 | 332 | 164 | 99 | 12 |
| Electrical capacity ($CHP_{QPC}$) | MWe | 5,950 | 5,969 | 6,175 | 6,190 | 6,118 |
| *Net capacity added during year* | | 458 | 19 | 206 | 15 | -72 |
| *Capacity added in percentage terms* | Per cent | 8.3 | 0.3 | 3.5 | 0.3 | -1.1 |
| Heat capacity | MWth | 22,204 | 22,167 | 22,970 | 22,750 | 22,539 |
| Heat to power ratio *(3)* | | 1.8 | 2.1 | 2.1 | 2.3 | 2.1 |
| Fuel input *(4)* | GWh | 112,559 | 98,195 | 99,421 | 93,658 | 90,707 |
| Electricity generation ($CHP_{QPO}$) | GWh | 26,768 | 22,767 | 22,950 | 20,400 | 20,281 |
| Heat generation ($CHP_{QHO}$) | GWh | 48,267 | 48,184 | 48,244 | 46,076 | 43,306 |
| Overall efficiency *(5)* | Per cent | 67 | 72 | 72 | 71 | 70 |
| Load factor (CHPQA) *(4)* | Per cent | 51 | 44 | 42 | 38 | 38 |
| Load factor (Actual) *(6)* | Per cent | 55 | 58 | 53 | 53 | 52 |

*(1) Data in this table for 2012 and 2013 have been revised since last year's Digest (see text for explanation).*
*(2) Net number of schemes added = New schemes – Decommissioned existing schemes*
*(3) Heat to power ratios are calculated from the qualifying heat output (QHO) and the qualifying power output (QPO).*
*(4) The load factor (CHPQA) is based on the qualifying power generation and capacity and does not correspond exactly to the number of hours run by the prime movers in a year*
*(5) Overall efficiencies are calculated using gross calorific values. Net efficiencies will be higher.*
*(6) The load factor (Actual) is based on the total power generated and total capacity*

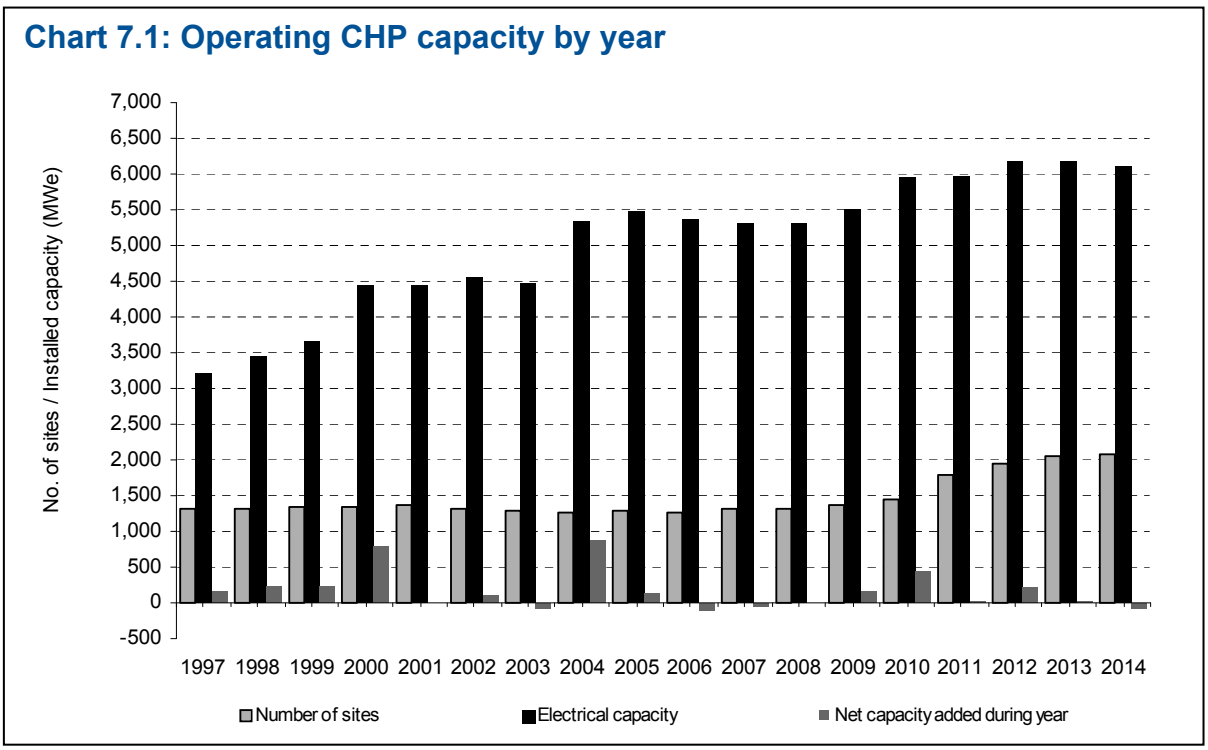
## Efficiency of CHP schemes

7.6 Good Quality CHP denotes schemes that have been certified as being highly efficient through the UK's CHP Quality Assurance (CHPQA) programme. The criteria used are in line with the requirements for high efficiency CHP set down in the Energy Efficiency Directive (2012/27/EU). A Good Quality CHP scheme, with installed capacity >1 MWe, must achieve 10 per cent primary energy savings compared with the EU reference values for separate generation of heat and power i.e. via a boiler and power station.

## Changes in CHP capacity

7.7 Chart 7.1 shows the change in installed CHP capacity since 1997. Installed capacity at the end of 2014 stood at 6,118 MWe, a decrease of 72 MWe compared to 2013. In spite of this capacity decrease, there was a net increase of 12 schemes between 2013 and 2014. Overall, between 2013 and 2014, there were 54 new schemes included in the database and a removal of 42 schemes.

### Chart 7.1: Operating CHP capacity by year



7.8 Table 7A gives a summary of the overall CHP market. CHP schemes generated 20,281 GWh in 2014 of Good Quality electricity, a figure broadly the same as for 2013. This generated electricity represents 6.0 per cent of the total electricity generated in the UK. Good Quality electricity generated increased in all sectors apart from Chemicals and Metal Products. There was a significant decrease (10.4 per cent) in Good Quality electricity generated in Chemicals compared to 2013 and this more than off-set the gains in all other sectors.

7.9 Table 7A shows that in 2014 CHP schemes supplied a total of 43,306 GWh of heat, this was a decrease of 6.0 per cent compared to 2013. There were decreases in heat supplied in a number of industrial sectors, with the largest fall in both absolute and relative terms occurring in the Chemicals sector. These falls in output for the Chemicals sector occurred against a background of much more modest falls in the generating capacity. The largest increase in heat output in relative terms was in Sewage, with a 9.3 per cent increase compared to 2013.

7.10 In terms of electrical capacity by size of scheme, schemes larger than 10 MWe represent about 79 per cent of the total electrical capacity of CHP schemes as shown in Table 7B. However, schemes less than 1 MWe constitute the majority (83 per cent) in terms of the number of schemes but only about 5 per cent of the capacity. A time series of schemes and capacity by size band is shown in table 7.1, and table 7.5 provides data on electrical capacity for each type of CHP installation.

## Table 7B: CHP schemes by capacity size ranges in 2014

| **Electrical capacity size range** | Number of schemes | Share of total (per cent) | Total electricity capacity (MWe) | Share of total (per cent) |
|---|---|---|---|---|
| Less then100 kWe | 603 | 29.2 | 39 | 0.6 |
| 100 kWe - 1 MWe | 1,103 | 53.4 | 277 | 4.5 |
| 1 MWe - 2 MWe | 124 | 6.0 | 179 | 2.9 |
| 2 MWe - 10 MWe | 169 | 8.2 | 783 | 12.8 |
| > 10 MWe + | 67 | 3.2 | 4,841 | 79.1 |
| **Total** | **2,066** | **100** | **6,118** | **100** |

7.11 Table 7.5 shows 64 per cent of total electrical capacity is in combined cycle gas turbine (CCGT) plant. Reciprocating engines contribute 17% followed by pass-out condensing steam turbines at 11%.

7.12 Excluded from the statistics tables presented in this Chapter are a number of very small CHP schemes installed since 2010 in response to the Feed-in Tariff (FiT) scheme. The overwhelming majority of these schemes are domestic. At the end of 2014 there were 485 such schemes registered with Ofgem for FiTs with a total installed capacity of 496 kWe. There are no data on electricity generation or fuel consumption and, consequently, these schemes have been left out of the statistics tables. However, if included, there would have a negligible impact upon the capacity and generation figures presented in the statistics tables.

7.13 Table 7.7 provides data on heat capacity for each type of CHP installation. Starting in the 2013 edition of the Digest, there has been a change implemented in how the heat capacity has been derived for each scheme. Prior to this, for a number of schemes, the data held on heat capacity were either not complete or were not a true reflection of the capacity of the scheme to generate heat in CHP operating mode. To allow for this, a standard methodology was developed and applied for the first time in the 2013 edition of the Digest for the determination of the heat capacity of each CHP scheme. Details of this methodology may be found in paragraph 7.39.

## Fuel used by types of CHP installation

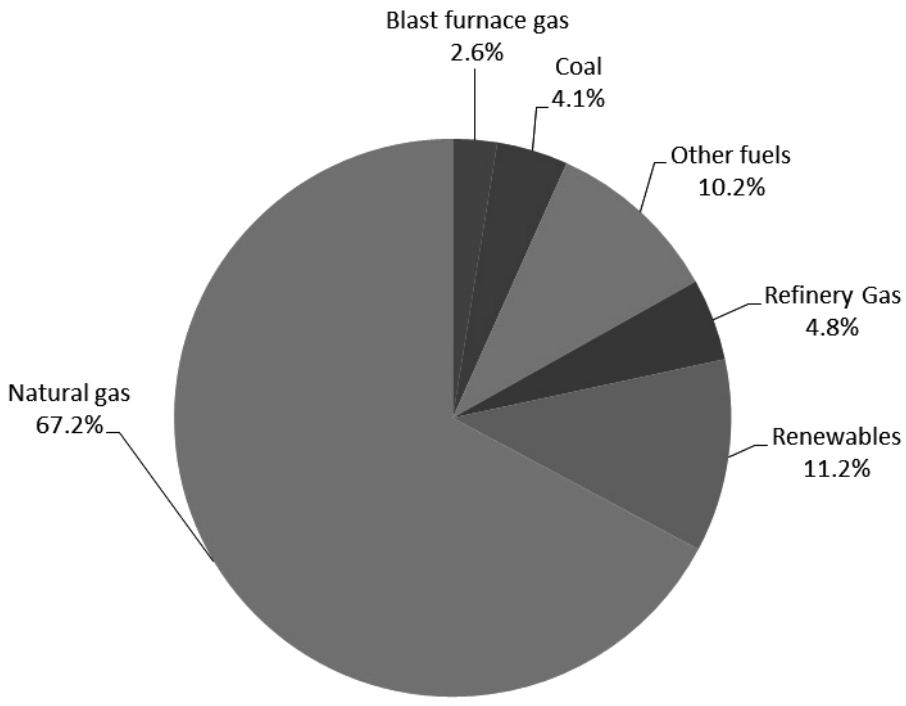
7.14 Table 7.2 shows the fuel used to generate electricity and heat in CHP schemes (see paragraphs 7.36 to 7.38, below for an explanation of the convention for dividing fuel between

electricity and heat production). Table 7.3 gives the overall fuel used by types of CHP installation (which are explained in paragraph 7.35). Total fuel use is summarised in Chart 7.2. In 2014, 67 per cent of the total fuel use was natural gas. This is a decrease of 1.6 percentage points compared with 2013. The proportion of total fuel consumption taken up by renewables increased again. CHP schemes accounted for 8.5 per cent of UK gas demand in 2014 (see Table 4.3).

7.15 The proportion of renewable fuels increased from 9.5 per cent in 2013 (revised) to 11.2 per cent in 2014, as shown in Chart 7.2. The increase was mainly due to an increase in the use of biomass fuels.

7.16 Fuels which are liquids, solids or gases that are by-products or waste products from industrial processes, or are renewable fuels, accounted for 27.2 per cent of all fuel used in CHP in 2014. These fuels represented about 25.1 per cent of total fuel consumption in 2013 (revised). Between 2013 and 2014 the proportion of total fuel that was renewable and the proportion of total fuel that was by-products or waste products of industrial processes both increased. Some of these by-product fuels are not commonly used by the mainstream electricity generating industry, and some would otherwise be flared or disposed of by some means. These fuels, with the exception of some waste gases, will generally be utilised in steam turbines being fed by boilers. In almost all cases, the technical nature of the combustion process, and the lower fuel quality (lower calorific value of the fuel, high moisture content of the fuel and the need to maintain certain combustion conditions to ensure complete disposal etc.) will generally result in a lower efficiency. However, given that the use of such fuels avoids the use of fossil fuels, and since they need to be disposed of in some way, the use of these fuels in CHP provides environmental benefits.

## Chart 7.2: Types of fuel used by CHP schemes in 2014



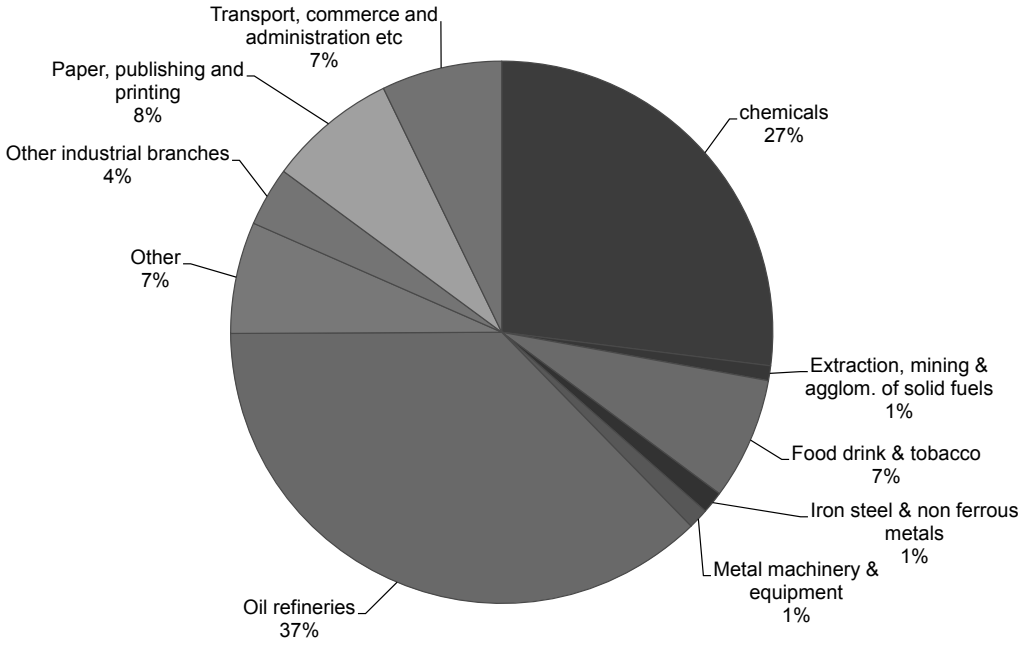

## CHP capacity, output and fuel use by sector

7.17 In this chapter of the Digest CHP is analysed by the sector using the heat or, where the heat is used by more than one sector, by the sector using the majority of the heat. This method of assigning a CHP scheme to a sector was rigorously applied for the first time in the 2008 edition of the Digest and resulted in the movement of CHP schemes between sectors. One consequence of this was the removal of all schemes once allocated to the “electricity supply” sector and their distribution to other sectors. Full details of this reassignment are provided in paragraph 6.33 and Table 6J of the 2008 edition of the Digest.

7.18 Table 7.8 gives data on all operational schemes by economic sector. A definition of the sectors used in this table can be found in Chapter 1, paragraph 1.59 and Table 1H.

- 383 schemes (86 per cent of electrical capacity) are in the industrial sector and 1,683 schemes (14 per cent of capacity) are in the agricultural, commercial, public administration, residential and transport sectors.
- Installed Good Quality capacity by sector is shown in Chart 7.3. Four industrial sectors account for about 79 per cent of the CHP electrical capacity – oil refineries (37 per cent), chemicals (27 per cent), paper and publishing and printing (8 per cent) and food, beverages and tobacco (7 per cent). The capacity attributable to oil refineries and chemicals fell between 2013 and 2014 due to scheme closures or schemes ceasing to operate as CHP. There were increases in capacity in paper publishing and printing and food, beverages and tobacco. Between 2013 and 2014 there were increases in capacity in sewage treatment, transport, commerce and administration and other sectors.

**Chart 7.3: CHP electrical capacity by sector in 2014**




*(1) Other sectors include agriculture, community heating, leisure, landfill and incineration*
*(2) Other industry includes textiles, clothing and footware and sewage treatment*

7.19 Table 7C gives a summary of the 1,488 schemes installed in the commercial sector, public sector and residential buildings. These schemes form a major part of the "Transport, commerce and administration" and "Other" sectors in Tables 7.8 and 7.9. The vast majority of these schemes are based on spark ignition reciprocating engines fuelled with natural gas, though the larger schemes use compression ignition reciprocating engines or gas turbines. The largest proportion of the capacity is in the health sector (34 per cent), mainly hospitals. Leisure and hotels account for about half of all schemes associated with buildings but only 20 per cent of the capacity. Table 7.9 gives details of the quantities of fuels used in each sector.

## Table 7C: Number and capacity of CHP schemes installed in buildings by sector in 2014

| | Number of schemes | Electrical capacity (MWe) | Heat capacity (MWth) |
|---|---|---|---|
| Leisure | 478 | 64 | 109 |
| Hotels | 257 | 37 | 62 |
| Health | 207 | 170 | 935 |
| Residential Group Heating | 98 | 48 | 110 |
| Universities | 90 | 89 | 474 |
| Offices | 39 | 15 | 19 |
| Education | 59 | 15 | 50 |
| Government Estate | 31 | 14 | 48 |
| Retail | 226 | 46 | 73 |
| Other *(1)* | 3 | 0.7 | 1.1 |
| **Total** | **1,488** | **498** | **1,881** |

*(1) All schemes under Other are at airports*

7.20 District heating and cooling, according to the Energy Performance in Buildings Directive, is the distribution of thermal energy in the form of steam, hot water or chilled products from a centralised place of production through a network to multiple buildings or sites for space or process heating or cooling. Observing this definition, research has been undertaken to identify the number, capacity and outputs of CHP schemes serving district heating and cooling. In 2014 there were considered to be 88 CHP schemes serving district heating and cooling, with a Good Quality CHP capacity of 2,076 MWe and Good Quality power outputs and heat outputs of 5,575 GWh and 11,686 MWh, respectively. CHP serving communal heating and cooling schemes are not included in this figure, where 'communal' is taken to mean serving a number of customers in the same building. These data were gathered as part of a district heating and cooling survey carried out for DECC.

## CHP performance by main prime mover

7.21 Table 7D gives a summary of the performance of schemes in 2014 by main prime mover type. In 2014 the prime mover type with the highest average operating hours was gas turbines followed by back pressure steam turbines. The operating hours of back pressure steam turbines is now higher than in previous years owing to the reclassification of some schemes. Combined cycle schemes have historically had among the highest average operating hours. However, after 2009 this ceased to be the case. After this year additional combined cycle capacity was installed which has since been under-utilised. This has a distorting effect on the average operating hours for this technology type in the statistics. The average operating hours of the cohort of combined cycle schemes has declined steadily since 2008.

7.22 In 2014, the average operating hours were 3,315 hours (9 hours per day). The average operating hours in 2013 was 3,296 hours (revised), indicating that the load factors were much the same between the two years. The revision to 2013 figures was the result of the submission of data for this year of operation too late to be incorporated in 2014 edition of the Digest. Between 2012 and 2013 there was a decrease in load factor of over 11 per cent, which was driven by noticeable falls in load factor in the Chemicals and Refineries sectors.

7.23 In 2014, the average electrical efficiency was 22 per cent and the heat efficiency 48 per cent, giving an overall average of 70 per cent, which is slightly lower than the revised figure for 2013 (71 per cent). Overall efficiency is simply the sum of the individual electrical and heat efficiencies.

## Table 7D: A summary of scheme performance in 2014

| | Average operating hours per annum (Full load equivalent) | Average electrical efficiency (% GCV) | Average heat efficiency (% GCV) | Average overall efficiency (% GCV) | Average heat to power ratio |
|---|---|---|---|---|---|
| **Main prime mover in CHP plant** | | | | | |
| Back pressure steam turbine | 4,260 | 13 | 65 | 78 | 5.2 |
| Pass out condensing steam turbine | 2,325 | 13 | 56 | 69 | 4.4 |
| Gas turbine | 5,382 | 23 | 51 | 74 | 2.2 |
| Combined cycle | 3,208 | 24 | 47 | 71 | 2.0 |
| Reciprocating engine | 3,515 | 26 | 37 | 62 | 1.4 |
| **All schemes** | **3,315** | **22** | **48** | **70** | **2.1** |

## CHP schemes which export and schemes with mechanical power output

7.24 Table 7E shows the electrical exports from CHP schemes between 2012 and 2014. In this year's Digest for the first time we are presenting rigorous values for both total power exported and the Qualifying Power Output (QPO) exported. In previous editions of the Digest, power export figures have been based upon information voluntarily supplied by scheme operators. For this year's Digest, and going forward, power export figures are based upon export meter data. The total power exported given below is therefore the value registered on the power export meter, with one adjustment made for some schemes. Where the value registered on a scheme's power export meter is greater than the Total Power Output (TPO) for the scheme, the total power exported is capped at the TPO of the scheme. This adjustment is necessary in some situations where schemes import power from another place and onward supply this power, with the onward supplied power passing through the power export meter. Mathematically, this is shown as:

TPO Exported = Value registered on power export meter

If Value registered on power export meter > TPO, then TPO Exported is set to equal TPO.

The QPO exported is the TPO exported that is deemed good quality. This is calculated by assuming that any power consumed by the scheme is good quality power (QPO), since this is incentivised by the Carbon Price Support cost exemption. This means that only if the scheme's consumption of power is less than the QPO will QPO become available for export. Mathematically, the QPO exported is:

QPO Exported = QPO for the scheme – Electricity consumed by the scheme, where

Electricity consumed by the scheme = Total Power Output – TPO Exported

If QPO for the scheme < Electricity consumed by the scheme, then QPO Exported is set to zero.

Table 7E also sets out the recipients of exported power. In this year's Digest for the first time we have rigorously followed up with Schemes to obtain data on recipients of exported power. This follow-up was only possible for year of operation 2014. For the previous years presented in Table 7E (2013 and 2012) the same distribution of exported power across recipient types in 2014 has been assumed for 2012 and 2013. Going forward, actual distribution of exported power across recipient types will be obtained for each added year. Table 7F shows the qualifying electrical exports.

## Table 7E: Electrical exports from CHP (TPO)

GWh

| | 2012 | 2013 | 2014 |
|---|---|---|---|
| To part of same qualifying group *(1)* | 389 | 342 | 237 |
| To a firm NOT part of same qualifying group | 16,513 | 13,636 | 14,391 |
| To an electricity supplier | 10,716 | 10,188 | 9,317 |
| **Total** | **27,617** | **24,166** | **23,944** |

*(1) A qualifying group is a group of two or more corporate consumers that are connected or related to each other, for example, as a subsidiary, or via a parent or holding company, or in terms of share capital.*

| Table 7F: Electrical exports from CHP (QPO) | | | GWh |
|---|---|---|---|
| | 2012 | 2013 | 2014 |
| To part of same qualifying group *(1)* | 259 | 243 | 232 |
| To a firm NOT part of same qualifying group | 5,445 | 4,400 | 4,833 |
| To an electricity supplier | 4,474 | 3,155 | 2,542 |
| **Total** | **10,178** | **7,797** | **7,607** |

7.25 In 2014, 44 large schemes also exported heat, with some exporting to more than one customer. In 2013 there were 47 (revised) schemes exporting heat. As Table 7G shows, together they supplied 10,779 GWh of heat in 2014. These data on heat exports remain reliant upon voluntary data supplied by schemes, and so may be an underestimate of the true heat exports.

| Table 7G: Heat exports from CHP | | | GWh |
|---|---|---|---|
| | 2012 | 2013 | 2014 |
| To part of same qualifying group *(1)* | 1,515 | 1,755 | 544 |
| To a firm NOT part of same qualifying group | 6,907 | 8,866 | 10,236 |
| **Total** | **8,422** | **10,612** | **10,779** |

*(1) A qualifying group is a group of two or more corporate consumers that are connected or related to each other, for example, as a subsidiary, or via a parent or holding company, or in terms of share capital.*

7.26 There are an estimated 12 schemes with mechanical power output. For those schemes, mechanical power accounts for over 9 per cent of their total power capacity (Table 7H). These schemes are predominantly on petro-chemicals or steel sites, using by-product fuels in boilers to drive steam turbines. The steam turbine is used to provide mechanical rather than electrical power, driving compressors, blowers or fans, rather than an alternator.

| Table 7H: CHP schemes with mechanical power output in 2014 | | |
|---|---|---|
| | Unit | |
| Number of schemes | | 12 |
| Total Power Capacity of these schemes ($CHP_{TPC}$) | MWe | 2,451 |
| Mechanical power capacity of these schemes | MWe | 231 |

## Emissions savings

7.27 The calculation of carbon emissions savings from CHP is complex because CHP displaces a variety of fuels, technologies and sizes of plant. The figures compare CHP with the UK fossil fuel basket carbon intensity and the UK total basket carbon intensity, which includes nuclear and renewable generation. The carbon emission savings from CHP in 2014 as compared to the fossil fuel basket were 12.99 $MtCO_2$, which equates to 2.12 Mt $CO_2$ per 1,000 MWe installed capacity. Against the total basket, CHP saved 7.55 Mt $CO_2$ which equates to 1.23 Mt $CO_2$ per 1,000 MWe installed capacity.

7.28 Corresponding figures for 2012 and 2013 are shown in Table 7I. The 2012 and 2013 $CO_2$ savings are revised based on revisions to the relevant data for these years in Tables 7.1, 7.4, 7.6 and 7.9 and revisions to the $CO_2$ intensity of grid electricity. Absolute savings (MtCO2) are sensitive to both the levels of CHP heat and power output and the $CO_2$ factor attributed to grid electricity that CHP electricity displaces. The lower absolute savings for 2014 compared to 2013 are mainly attributable to the lower $CO_2$ intensity attributed to grid electricity for 2014 compared to 2013, especially in the case of all fuels (i.e. including renewables and nuclear). The relative savings ($MtCO_2$/MWe) in 2014 was also lower than in 2013 and this is again mainly due to the lower CO2 intensities of grid electricity in 2014 compared to 2013, since the load factors in 2014 were similar to those in 2013 on CHPQA basis.

## Table 7I: Carbon dioxide savings due to CHP, absolute and per 1,000 MWe of installed good quality CHP capacity

| | 2012 | | 2013 | | 2014 | |
|---|---|---|---|---|---|---|
| | $MtCO_2$ | $MtCO_2$/1000 MWe | $MtCO_2$ | $MtCO_2$/1000 MWe | $MtCO_2$ | $MtCO_2$/1000 MWe |
| Carbon savings against all fossil fuels | 15.61 | 2.53 | 14.03 | 2.27 | 12.99 | 2.12 |
| Carbon savings against all fuels ( including nuclear and renewables) | 10.23 | 1.66 | 8.70 | 1.40 | 7.55 | 1.23 |

*Note: (1) The $CO_2$ savings in Table 7I assume that CHP generated electricity avoids the transmission and distribution losses associated with its conventionally generated equivalent. These losses are assumed to be 1.5% in the case of transmission losses and 6.0% in the case of distribution losses.*

*(2) The $CO_2$ savings quoted above for 2014 are based on preliminary $CO_2$ intensities, for that year, for the fossil fuel basket and the total fuel basket of conventional electricity generation. As such, they are subject to revision at a later date. The $CO_2$ savings quoted above for 2012 and 2013 have also been revised in response to changes in the $CO_2$ intensity factors for electricity for these years since reporting in DUKES 2014.The figures have also been revised to reflect revisions to CHP electricity and heat output and fuel consumption.*

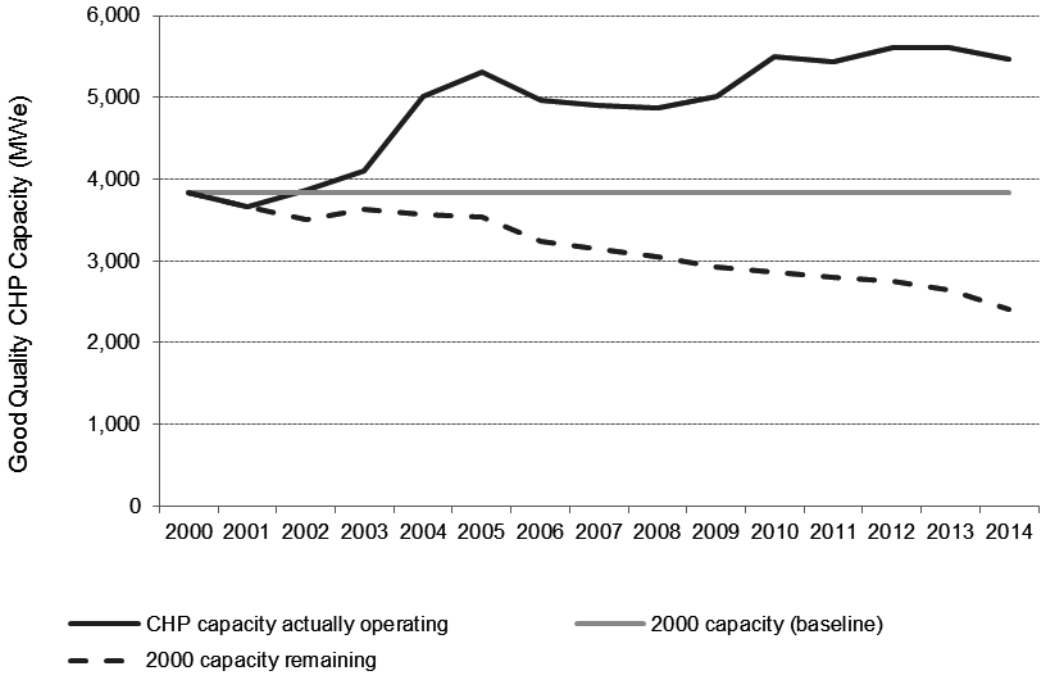
## Government policy towards CHP

7.29 There are a range of support measures to incentivise the growth of Good Quality CHP in the UK. These include:

- Exemption from the Climate Change Levy (CCL) of all fuel inputs to, and electricity outputs from, Good Quality CHP.
- From April 2013, exemption from Carbon Price Support (CPS) on fuel to CHP consumed for the generation of heat
- From April 2015, exemption from Carbon Price Support (CPS) on fuel to CHP consumed for the generation of Good Quality CHP electricity which is consumed on site
- Eligibility to Enhanced Capital Allowances for Good Quality CHP plant and machinery.
- Business Rates exemption for CHP power generation plant and machinery.
- Reduction of VAT (from 20 to 5 per cent) on domestic micro-CHP installations.
- Renewable Obligation Certificates (ROCs) for Good Quality energy from waste CHP plants and Good Quality biomass CHP.
- Specific Renewable Heat Incentive (RHI) for biomass fuelled Good Quality CHP.
- Contract for Difference (CFD) for Good Quality energy from waste CHP and Good Quality biomass fuelled CHP
- The zero-rating of heat under the Carbon Reduction Commitment Energy Efficiency Scheme (CRC), this means that allowances do not have to be purchased by a site covered by CRC for heat that it imports. This incentivises the use of CHP heat outputs.

7.30 Table 7.1 shows the installed Good Quality CHP capacity in each year. However, this table hides the underlying market activity that replaces older capacity as it is taken out of service over time. Chart 7.4 gives an idea of the scale of this activity since 2000 for CHP schemes certified under CHPQA. The dotted line shows how much of the Good Quality CHPQA capacity that was in place in 2000 remained in place in subsequent years, while the upper line shows the actual Good Quality CHPQA capacity in place in each year. For any year since 2000, the gap between these two lines represents the new Good Quality CHPQA capacity installed between 2000 and that year. By 2014 there had been just over 3.0 GWe of new Good Quality CHPQA capacity installed since 2000.

**Chart 7.4: Underlying market activity – operating Good Quality CHP versus retained Good Quality CHP**




## International context

7.31 Phase III of EU ETS runs from 2013 until 2027. Under this Phase there is no free allocation of ETS allowances made in respect of $CO_2$ emissions associated with the generation of electricity, including electricity generated by CHP. However, there is some free allocation made in respect of $CO_2$ emissions associated with the generation of heat. The allocation is based upon harmonised benchmarks for heat production, and in 2013 a heat generating installation will have received 80% of the allocations determined using this benchmark, declining linearly to 30% by 2020 and then to 0% by 2027. The benchmark for heat adopted by the European Commission is based on the use of natural gas with a conversion efficiency of 90% (N.C.V.). An allocation is only made in respect of measurable heat consumed. This means that the benchmark allocation made for each MWh of heat generated by a CHP scheme and subsequently consumed is 0.224 tCO2[3].

*[3] Where the CHP supplies heat to an EU ETS Phase III sub-installation or installation and the sub-installation or installation produces a product that is product benchmarked, then an allocation is not made in respect of the heat supplied but in respect of the product produced.*

## Technical notes and definitions

7.32 These notes and definitions are in addition to the technical notes and definitions covering all fuels and energy as a whole in Chapter 1, paragraphs 1.29 to 1.60.

### Data for 2014

7.33 The data are summarised from the results of a long-term project undertaken by Ricardo-AEA on behalf of the Department of Energy & Climate Change (DECC). Data are included for CHP schemes installed in all sectors of the UK economy.

7.34 Data for 2014 were based on data supplied to the CHPQA programme, information from the Iron and Steel Statistics Bureau (ISSB), information from Ofgem in respect of "Renewables Obligation Certificates" (ROCs), information from the CHP Sales database maintained by the Associated for Decentralised Energy (ADE) and from a survey of anaerobic Digestion (AD) sites. Over 95 per cent of the total capacity is from schemes that have been certified under the CHPQA programme. Sewage Treatment Works and other AD schemes that do not provide returns to CHPQA have been included based on ROCs information from Ofgem returns. The data from these sources accounts for approximately 1.8 per cent of total electrical capacity. The balance of the capacity is for schemes covered by ISSB sources (1 per cent), CHPA Sales Database (<1 per cent) and for schemes not covered by the above sources which were interpolated from historical data (<1 per cent).

### Definitions of schemes

7.35 There are four principal types of CHP system:

- **Steam turbine,** where steam at high pressure is generated in a boiler. In **back pressure steam turbine systems**, the steam is wholly or partly used in a turbine before being exhausted from the turbine at the required pressure for the site. In **pass-out condensing steam turbine systems**, a proportion of the steam used by the turbine is extracted at an intermediate pressure from the turbine with the remainder being fully condensed before it is exhausted at the exit. (Condensing steam turbines without passout and which do not utilise steam are not included in these statistics as they are not CHP). The boilers used in such schemes can burn a wide variety of fuels including coal, gas, oil, and waste-derived fuels. With the exception of waste-fired schemes, a steam turbine plant has often been in service for several decades. Steam turbine schemes capable of supplying useful steam have electrical efficiencies of between 10 and 20 per cent, depending on size, and thus between 70 per cent and 30 per cent of the fuel input is available as useful heat. Steam turbines used in CHP applications typically range in size from a few MWe to over 100 MWe.

- **Gas turbine systems**, often aero-engine derivatives, where fuel (gas or gas-oil) is combusted in the gas turbine and the exhaust gases are normally used in a waste heat boiler to produce usable steam, though the exhaust gases may be used directly in some process applications. Gas turbines range from 30 kWe upwards, achieving electrical efficiency of 23 to 30 per cent (depending on size) and with the potential to recover up to 50 per cent of the fuel input as useful heat. They have been common in CHP since the mid 1980s. The waste heat boiler can include supplementary or auxiliary firing using a wide range of fuels, and thus the heat to power ratio of the scheme can vary.

- **Combined cycle systems**, where the plant comprises more than one prime mover. These are usually gas turbines where the exhaust gases are utilised in a steam generator, the steam from which is passed wholly or in part into one or more steam turbines. In rare cases reciprocating engines may be linked with steam turbines. Combined cycle is suited to larger installations of 7 MWe and over. They achieve higher electrical efficiency and a lower heat to power ratio than steam turbines or gas turbines. Recently installed combined cycle gas turbine (CCGT) schemes have achieved an electrical efficiency approaching 50 per cent, with 20 per cent heat recovery, and a heat to power ratio of less than 1:1.

- **Reciprocating engine systems** range from less than 100 kWe up to around 5 MWe, and are found in applications where production of hot water (rather than steam) is the main requirement, for example, on smaller industrial sites as well as in buildings. They are based on auto engine or

marine engine derivatives converted to run on gas. Both compression ignition and spark ignition firing is used. Reciprocating engines operate at around 28 to 33 per cent electrical efficiency with around 50 per cent to 33 per cent of the fuel input available as useful heat. Reciprocating engines produce two grades of waste heat: high grade heat from the engine exhaust and low grade heat from the engine cooling circuits.

## Determining fuel consumption for heat and electricity

7.36 In order to provide a comprehensive picture of electricity generation in the United Kingdom and the fuels used to generate that electricity, the energy input to CHP schemes has to be allocated between heat and electricity production. This allocation is notional and is not determinate.

7.37 The convention used to allocate the fuels to heat and electricity relates the split of fuels to the relative efficiency of heat and electricity supply. The efficiency of utility plant varies widely: electricity generation from as little as 25 per cent to more than 50 per cent and boilers from 50 per cent to more than 90 per cent Thus it is around twice as hard to generate a unit of electricity as it is to generate a unit of heat. Accordingly a simple convention can be implemented whereby twice as many units of fuel are allocated to each unit of electricity generated, as to each unit of heat supplied. This approach is consistent with the Defra Guidelines for Company Reporting on greenhouse gas emissions and for Negotiated Agreements on energy efficiency agreed between Government and industry as part of the Climate Change Levy (CCL) package. It recognises that, in developing a CHP scheme, both the heat customer(s) and the electricity generator share in the savings.

7.38 The assumption in this convention that it is twice as hard to generate a unit of electricity as heat, is appropriate for the majority of CHP schemes. However, for some types of scheme (for example in the iron and steel sector) this allocation is less appropriate and can result in very high apparent heat efficiencies. These, however, are only notional efficiencies.

## Determining heat capacity of CHP schemes

7.39 The heat capacity figures presented in this edition of the Digest and the 2013 edition of the Digest were determined as follows, where:

- THC = Total Heat Capacity of Scheme (as presented in this Chapter)
- THC(FB) = Total Heat Capacity of Fired Boilers within the Scheme
- THC(HRB) = Total Heat Capacity of Heat Recovery Boilers within the Scheme
- $THC(FB)_{to\ ST}$ = Total Heat Capacity of Fired Boilers supplying steam to Scheme Steam Turbines
- $THC(HRB)_{to\ ST}$ = Total Heat Capacity of Heat Recovery Boilers supplying steam to Scheme Steam Turbines
- THC(GT or HRB) = Total Heat Capacity for the Gas Turbines or associated Heat Recovery Boilers within the Scheme
- THC(RE) = Total Heat Capacity for the engine cooling circuits of the Reciprocating Engines within the Scheme
- TPC = Total Power Capacity of the Scheme
- $TPC_{ST}$ = Total Power Capacity of Steam Turbines within the Scheme

**Back-pressure and Pass-out Condensing Steam Turbine Systems** – For schemes certified under CHPQA, the Total Heat Capacity (THC) is given by:

$$THC = THC(FB) + THC(HRB) – TPC_{ST}$$

For schemes not certified under CHPQA, the THC is given by:

$$THC = TPC \times 2.22$$

Where 2.22 is the standard heat to power ratio for steam turbines given in Annex I of the EU Directive on energy efficiency (2012/27/EU).

**Combined Cycle Systems** – For schemes certified under CHPQA, the Total Heat Capacity (THC) is given by:

$THC = THC(FB)_{to\ ST} + THC(HRB)_{to\ ST} - TPC_{ST}$
For schemes not certified under CHPQA, the THC is given by:

THC = TPC x 1.052

Where 1.052 is the standard heat to power ratio for combined cycle gas turbines given in Annex I of the EU Directive on energy efficiency (2012/27/EU).

**Gas Turbine Systems** - For schemes certified under CHPQA, the Total Heat Capacity (THC) is given by:

THC = THC(GT or HRB) + THC(FB)

For schemes not certified under CHPQA, the THC is given by:

THC = TPC x 1.81

Where 1.81 is the standard heat to power ratio for gas turbines given in Annex I of the EU Directive on energy efficiency (2012/27/EU).

**Reciprocating Engine Systems** – For schemes certified under CHPQA, the Total Heat Capacity (THC) is given by:

THC = THC(RE) + THC(FB) + THC(HRB)

For schemes not certified under CHPQA, the THC is given by:

THC = TPC x 1.33

Where 1.33 is the standard heat to power ratio for reciprocating engines given in Annex I of the EU Directive on energy efficiency (2012/27/EU).

## The effects on the statistics of using CHPQA

7.40 Paragraph 7.5 described how schemes were scaled back so that only $CHP_{QPC}$ and $CHP_{QPO}$ are included in the CHP statistics presented in this Chapter. This is illustrated in Table 7J where it is seen that 288 schemes were scaled back. For information, in 2013, 301 (revised) schemes were scaled back.

7.41 In 2014, the power output from these schemes was scaled back from a total of 31,894 GWh to 11,928 GWh. The total fuel input to these schemes was 107,193 GWh of which 51,900 GWh was regarded as being for power only. For 2013, the total power output was scaled back from 32,217 GWh (revised) to 12,465 GWh (revised).

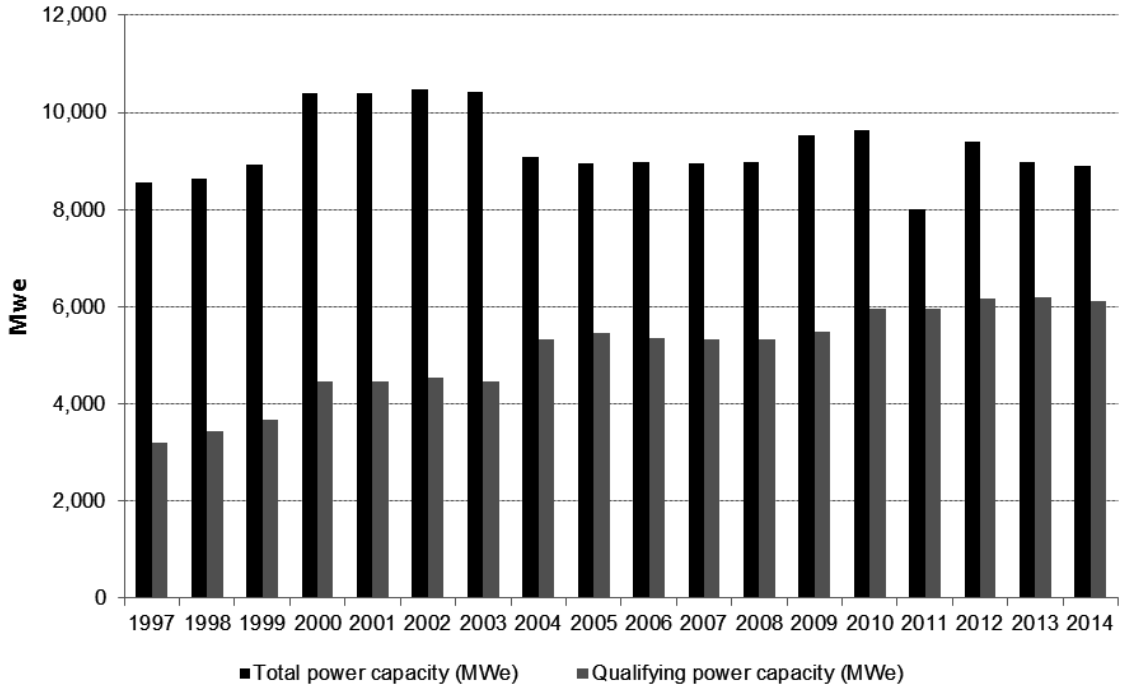
### Table 7J: CHP capacity, output and fuel use which has been scaled back in 2014

| | Units | |
|---|---|---|
| Number of schemes requiring scaling back | | 288 |
| Total Power Capacity of these schemes ($CHP_{TPC}$) | MWe | 6,992 |
| Qualifying Power Capacity of these schemes ($CHP_{QPC}$) | MWe | 4,202 |
| Total power output of these schemes ($CHP_{TPO}$) | GWh | 31,894 |
| Qualifying Power Output of these schemes ($CHP_{QPO}$) | GWh | 11,928 |
| Electricity regarded as "Power only" not from CHP ($CHP_{TPO}$ - $CHP_{QPO}$) | GWh | 19,966 |
| Total Fuel Input of these schemes ($CHP_{TFI}$) | GWh | 107,193 |
| Fuel input regarded as being for "Power only" use i.e. not for CHP | GWh | 51,900 |

**This figure includes generation from major power producers*

7.42 The evolution of Total Power Capacity (TPC) and Qualifying Power Capacity (QPC) over time is shown in Chart 7.5.

**Chart 7.5: Installed CHP capacity by year**




## Exports of heat

7.43 The figures quoted in Table 7G for exports of heat are based on voluntary returns from schemes. As such, there is the potential for these figures to underestimate the true situation. There is an ongoing exercise to improve the quality of these heat export data.

## Typical Power and Heat Efficiencies and Heat to Power Ratios of Prime Movers

7.44 The figures quoted above in Table 6D are for CHP schemes. These schemes may contain supplementary boilers, supplementary firing and auxiliary firing. The figures are, therefore, not reflective of the power and heat efficiencies and the heat to power ratios of the prime mover when it is considered in isolation.

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# 7.1 CHP installations by capacity and size range

| | 2010 | 2011 | 2012 | 2013 | 2014 |
|---|---|---|---|---|---|
| **Number of schemes** *(1,2)* | **1,459** | **1,791** | **1,955** | **2,054r** | **2,066** |
| <= 100 kWe | 407 | 519 | 575 | 607r | 603 |
| > 100 kWe to 1 MWe | 765 | 960 | 1,053 | 1,098r | 1,103 |
| >1 MWe to 2 MWe | 83 | 98 | 105 | 115r | 124 |
| > 2 MWe to 10 MWe | 138 | 149 | 154 | 166r | 169 |
| > 10 MWe + | 66 | 65 | 68 | 68 | 67 |
| | | | | | **MWe** |
| **Total capacity** | **5,950** | **5,969** | **6,175** | **6,190r** | **6,118** |
| <= 100 kWe | 26 | 33 | 37 | 39 | 39 |
| > 100 kWe to 1 MWe | 196 | 237 | 263 | 277r | 277 |
| >1 MWe to 2 MWe | 116 | 138 | 149 | 165r | 179 |
| > 2 MWe to 10 MWe | 669 | 694 | 723 | 762r | 783 |
| > 10 MWe + | 4,943 | 4,867 | 5,004 | 4,947r | 4,841 |

*(1) A site may contain more than one CHP scheme; the capacity categories have changed since publication in the 2013 Digest.*

*(2) MicroCHP schemes installed under FIT are not included in these figures (or any subsequent figures in chapter 7). At the end of 2013 477 such schemes were registered on Ofgems Central FIT Register totalling 0.49MWe*

# 7.2 Fuel used to generate electricity and heat in CHP installations

**GWh**

| | 2010 | 2011 | 2012 | 2013 | 2014 |
|---|---|---|---|---|---|
| **Fuel used to generate electricity** *(1)* | | | | | |
| Coal *(2)* | 1,484 | 1,616 | 1,738 | 1,615r | 1,628 |
| Fuel oil | 694 | 530 | 586 | 206r | 182 |
| Natural gas | 43,244 | 35,009 | 36,495 | 31,769r | 30,736 |
| Renewable fuels *(3)* | 3,418 | 3,638 | 3,966 | 5,181r | 6,179 |
| Other fuels *(4)* | 9,674 | 6,086 | 5,329 | 4,980r | 4,968 |
| **Total all fuels** | **58,513** | **46,877** | **48,115** | **43,753r** | **43,693** |
| **Fuel used to generate heat** | | | | | |
| Coal *(2)* | 2,061 | 2,685 | 2,776 | 2,876r | 2,130 |
| Fuel oil | 887 | 682 | 789 | 271r | 208 |
| Natural gas | 35,261 | 33,454 | 33,954 | 32,630r | 30,213 |
| Renewable fuels *(3)* | 3,114 | 3,215 | 3,301 | 3,740r | 3,961 |
| Other fuels *(4)* | 12,723 | 11,281 | 10,487 | 10,388r | 10,502 |
| **Total all fuels** | **54,046** | **51,318** | **51,306** | **49,905r** | **47,013** |
| **Overall fuel use** | | | | | |
| Coal *(2)* | 3,544 | 4,301 | 4,514 | 4,491r | 3,758 |
| Fuel oil | 1,581 | 1,212 | 1,375 | 478r | 390 |
| Natural gas | 78,505 | 68,463 | 70,449 | 64,400r | 60,949 |
| Renewable fuels *(3)* | 6,532 | 6,853 | 7,268 | 8,921r | 10,139 |
| Other fuels *(4)* | 22,396 | 17,367 | 15,816 | 15,369r | 15,470 |
| **Total all fuels** | **112,559** | **98,195** | **99,421** | **93,658r** | **90,707** |

*(1) See paragraphs 7.37 to 7.39 for an explanation of the method used to allocate fuel use between heat generation and electricity generation.*
*(2) Includes coke.*
*(3) Renewable fuels include: Biomass; sewage gas; other biogases; municipal waste and refuse derived fuels*
*(4) Other fuels include: process by-products, coke oven gas, blast furnace gas, gas oil and refinery gas.*

# 7.3 Fuel used by types of CHP installation

GWh

| | 2010 | 2011 | 2012 | 2013 | 2014 |
|---|---|---|---|---|---|
| **Coal** | | | | | |
| Back pressure steam turbine | 549 | 542 | 518 | 550 | 572 |
| Gas turbine | - | - | - | - | - |
| Combined cycle | 2,672 | 3,468 | 3,851 | 3,837 | 2,479 |
| Reciprocating engine | - | 4 | 6 | 1r | 0 |
| Pass out condensing steam turbine | 323 | 286 | 139 | 102r | 706 |
| **Total coal** | **3,544** | **4,301** | **4,514** | **4,491** | **3,758** |
| **Fuel Oil** | | | | | |
| Back pressure steam turbine | 142 | 158 | 117 | 145 | 100 |
| Gas turbine | 5 | 2 | 0 | 5r | 3 |
| Combined cycle | 1,268 | 916 | 1,114 | 183 | 143 |
| Reciprocating engine | 119 | 118 | 122 | 123 | 124 |
| Pass out condensing steam turbine | 47 | 18 | 22 | 21 | 20 |
| **Total fuel oil** | **1,581** | **1,212** | **1,375** | **478r** | **390** |
| **Natural Gas** | | | | | |
| Back pressure steam turbine | 1,659 | 1,549 | 1,305 | 2,544r | 1,053 |
| Gas turbine | 9,023 | 9,176 | 9,411 | 8,683r | 8,725 |
| Combined cycle | 58,833 | 48,640 | 49,957 | 43,148r | 39,385 |
| Reciprocating engine | 8,599 | 8,767 | 9,402 | 9,638r | 9,759 |
| Pass out condensing steam turbine | 391 | 330 | 374 | 388r | 2,028 |
| **Total natural gas** | **78,505** | **68,463** | **70,449** | **64,400r** | **60,949** |
| **Renewable Fuels** *(1)* | | | | | |
| Back pressure steam turbine | 1,507 | 1,413 | 1,527 | 1,484r | 1,074 |
| Gas turbine | 5 | 11 | 6 | 11 | 12 |
| Combined cycle | 584 | 514 | 344 | 87r | 60 |
| Reciprocating engine | 2,120 | 2,609 | 2,815 | 4,290r | 4,773 |
| Pass out condensing steam turbine | 2,315 | 2,306 | 2,576 | 3,049r | 4,222 |
| **Total renewable fuels** | **6,532** | **6,853** | **7,268** | **8,921r** | **10,139** |
| **Other Fuels** *(2)* | | | | | |
| Back pressure steam turbine | 4,564 | 3,409 | 3,175 | 1,581r | 0 |
| Gas turbine | 537 | 222 | 209 | 155r | 153 |
| Combined cycle | 13,910 | 11,596 | 9,751 | 10,815r | 10,236 |
| Reciprocating engine | 98 | 93 | 69 | 47r | 59 |
| Pass out condensing steam turbine | 3,288 | 2,047 | 2,613 | 2,771r | 5,022 |
| **Total other fuels** | **22,396** | **17,367** | **15,816** | **15,369r** | **15,470** |
| **Total - all fuels** | | | | | |
| Back pressure steam turbine | 8,421 | 7,072 | 6,642 | 6,303r | 2,800 |
| Gas turbine | 9,570 | 9,410 | 9,626 | 8,854r | 8,891 |
| Combined cycle | 77,267 | 65,134 | 65,016 | 58,071r | 52,303 |
| Reciprocating engine | 10,936 | 11,592 | 12,413 | 14,099r | 14,715 |
| Pass out condensing steam turbine | 6,364 | 4,986 | 5,724 | 6,331r | 11,998 |
| **Total all fuels** | **112,559** | **98,195** | **99,421** | **93,658r** | **90,707** |

*(1) Renewable fuels include: Biomass; sewage gas, other biogases, municipal solid waste and refuse derived fuels.*

*(2) Other fuels include: process by-products, coke oven gas, blast furnace gas, gas oil and refinery gas.*

# 7.4 CHP - electricity generated by fuel and type of installation

GWh

| | 2010 | 2011 | 2012 | 2013 | 2014 |
|---|---|---|---|---|---|
| **Coal** | | | | | |
| Back pressure steam turbine | 64 | 60 | 62 | 63 | 67 |
| Gas turbine | - | - | - | - | - |
| Combined cycle | 513 | 577 | 647 | 582 | 482 |
| Reciprocating engine | - | 1 | 1 | 0r | 0 |
| Pass out condensing steam turbine | 28 | 20 | 1 | 9r | 137 |
| **Total coal** | **604** | **659** | **710** | **654r** | **686** |
| **Fuel oil** | | | | | |
| Back pressure steam turbine | 18 | 19 | 14 | 17 | 13 |
| Gas turbine | 1 | 0 | 0 | 1r | 0 |
| Combined cycle | 260 | 194 | 224 | 37 | 28 |
| Reciprocating engine | 41 | 41 | 41 | 42 | 42 |
| Pass out condensing steam turbine | 6 | 1 | 1 | 1 | 1 |
| **Total fuel oil** | **325** | **255** | **282** | **97r** | **84** |
| **Natural gas** | | | | | |
| Back pressure steam turbine | 126 | 121 | 126 | 167r | 106 |
| Gas turbine | 2,096 | 2,169 | 2,262 | 2,034r | 2,007 |
| Combined cycle | 15,797 | 12,776 | 12,894 | 10,640r | 10,053 |
| Reciprocating engine | 2,194 | 2,357 | 2,560 | 2,642r | 2,654 |
| Pass out condensing steam turbine | 40 | 24 | 8 | 34r | 228 |
| **Total natural gas** | **20,253** | **17,447** | **17,850** | **15,517r** | **15,048** |
| **Renewable fuels** *(1)* | | | | | |
| Back pressure steam turbine | 214 | 218 | 214 | 213r | 168 |
| Gas turbine | 1 | 2 | 1 | 2r | 2 |
| Combined cycle | 11 | 4 | 10 | 15r | 16 |
| Reciprocating engine | 601 | 760 | 839 | 988r | 1,052 |
| Pass out condensing steam turbine | 442 | 419 | 441 | 599r | 881 |
| **Total renewable fuels** | **1,269** | **1,402** | **1,506** | **1,817r** | **2,119** |
| **Other fuels** *(2)* | | | | | |
| Back pressure steam turbine | 556 | 226 | 214 | 82r | 0 |
| Gas turbine | 102 | 41 | 38 | 29r | 21 |
| Combined cycle | 3,244 | 2,612 | 2,159 | 2,066r | 2,027 |
| Reciprocating engine | 25 | 25 | 18 | 11r | 14 |
| Pass out condensing steam turbine | 389 | 100 | 174 | 127r | 282 |
| **Total other fuels** | **4,317** | **3,004** | **2,604** | **2,314r** | **2,343** |
| **Total - all fuels** | | | | | |
| Back pressure steam turbine | 978 | 643 | 630 | 543r | 353 |
| Gas turbine | 2,201 | 2,212 | 2,301 | 2,066r | 2,031 |
| Combined cycle | 19,824 | 16,163 | 15,934 | 13,340r | 12,606 |
| Reciprocating engine | 2,862 | 3,184 | 3,459 | 3,682r | 3,761 |
| Pass out condensing steam turbine | 903 | 564 | 626 | 770r | 1,529 |
| **Total all fuels** | **26,768** | **22,767** | **22,950** | **20,400r** | **20,281** |

*(1) Renewable fuels include: Biomass; sewage gas, other biogases, municipal solid waste and refuse derived fuels.*
*(2) Other fuels include: process by-products, coke oven gas, blast furnace gas, gas oil and refinery gas.*

# 7.5 CHP - electrical capacity by fuel and type of installation

MWe

| | 2010 | 2011 | 2012 | 2013 | 2014 |
|---|---|---|---|---|---|
| **Coal** | | | | | |
| Back pressure steam turbine | 20 | 20 | 20 | 20 | 21 |
| Gas turbine | - | - | - | - | - |
| Combined cycle | 152 | 282 | 314 | 336 | 139 |
| Reciprocating engine | - | 0 | 1 | 0r | 0 |
| Pass out condensing steam turbine | 4 | 4 | 3r | 2 | 123 |
| **Total coal** | **176** | **306** | **338** | **359r** | **283** |
| **Fuel oil** | | | | | |
| Back pressure steam turbine | 6 | 6 | 6 | 6 | 5 |
| Gas turbine | 0 | 0 | 0 | 0 | 0 |
| Combined cycle | 55 | 41 | 53 | 11 | 8 |
| Reciprocating engine | 7 | 7 | 6 | 7 | 7 |
| Pass out condensing steam turbine | 1 | 1 | 1 | 1 | 1 |
| **Total fuel oil** | **70** | **55** | **65** | **24r** | **20** |
| **Natural gas** | | | | | |
| Back pressure steam turbine | 36 | 31 | 39 | 79r | 29 |
| Gas turbine | 390 | 401 | 412 | 422 | 373 |
| Combined cycle | 3,509 | 3,308 | 3,428 | 3,198r | 3,151 |
| Reciprocating engine | 619 | 676 | 719 | 769r | 809 |
| Pass out condensing steam turbine | 6 | 6 | 7r | 9 | 188 |
| **Total natural gas** | **4,560** | **4,423** | **4,605** | **4,477r** | **4,549** |
| **Renewable fuels** *(1)* | | | | | |
| Back pressure steam turbine | 37 | 38 | 39 | 37 | 28 |
| Gas turbine | 0 | 1 | 0 | 1 | 1 |
| Combined cycle | 3 | 3 | 4 | 2r | 2 |
| Reciprocating engine | 131 | 175 | 195 | 232r | 237 |
| Pass out condensing steam turbine | 85 | 88 | 105 | 162r | 177 |
| **Total renewable fuels** | **257** | **306** | **344** | **434r** | **445** |
| **Other fuels** *(2)* | | | | | |
| Back pressure steam turbine | 109 | 109 | 107 | 67r | 0 |
| Gas turbine | 28 | 13 | 12 | 9 | 4 |
| Combined cycle | 653 | 659 | 605 | 729r | 630 |
| Reciprocating engine | 24 | 23 | 22 | 16r | 18 |
| Pass out condensing steam turbine | 74 | 76 | 77 | 77r | 170 |
| **Total other fuels** | **888** | **880** | **823** | **897r** | **821** |
| **Total - all fuels** | | | | | |
| Back pressure steam turbine | 209 | 205 | 211 | 210 | 83 |
| Gas turbine | 418 | 415 | 425 | 431 | 377 |
| Combined cycle | 4,372 | 4,293 | 4,403 | 4,275r | 3,930 |
| Reciprocating engine | 781 | 881 | 943 | 1,023r | 1,070 |
| Pass out condensing steam turbine | 170 | 175 | 193 | 251r | 658 |
| **Total all fuels** | **5,950** | **5,969** | **6,175** | **6,190r** | **6,118** |

*(1) Renewable fuels include: Biomass; sewage gas, other biogases, municipal solid waste and refuse derived fuels.*
*(2) Other fuels include: process by-products, coke oven gas, blast furnace gas, gas oil and refinery gas.*

# 7.6 CHP - heat generated by fuel and type of installation

GWh

| | 2010 | 2011 | 2012 | 2013 | 2014 |
|---|---|---|---|---|---|
| **Coal** | | | | | |
| Back pressure steam turbine | 421 | 421 | 405 | 434 | 432 |
| Gas turbine | - | - | - | - | - |
| Combined cycle | 1,080 | 1,558 | 1,780 | 1,811 | 1,035 |
| Reciprocating engine | - | 2 | 3 | 1r | 0 |
| Pass out condensing steam turbine | 275 | 274 | 111 | 92r | 375 |
| **Total coal** | **1,777** | **2,255** | **2,299** | **2,338r** | **1,842** |
| **Fuel oil** | | | | | |
| Back pressure steam turbine | 117 | 134 | 98 | 121 | 78 |
| Gas turbine | 2 | 1 | 0 | 3r | 2 |
| Combined cycle | 660 | 481 | 615 | 84 | 61 |
| Reciprocating engine | 36 | 35 | 35 | 36 | 36 |
| Pass out condensing steam turbine | 21 | 10 | 14 | 13 | 13 |
| **Total fuel oil** | **835** | **660** | **761** | **257r** | **190** |
| **Natural gas** | | | | | |
| Back pressure steam turbine | 945 | 1,139 | 1,183 | 2,082r | 763 |
| Gas turbine | 4,426 | 4,773 | 4,689 | 4,506r | 4,480 |
| Combined cycle | 23,313 | 22,684 | 22,773 | 20,339r | 18,275 |
| Reciprocating engine | 3,858 | 3,775 | 4,249 | 4,482r | 4,414 |
| Pass out condensing steam turbine | 277 | 278 | 268 | 291r | 1,479 |
| **Total natural gas** | **32,819** | **32,649** | **33,162** | **31,700r** | **29,410** |
| **Renewable fuels** *(1)* | | | | | |
| Back pressure steam turbine | 728 | 718 | 712 | 758r | 551 |
| Gas turbine | 3 | 2 | 3 | 2 | 2 |
| Combined cycle | 79 | 57 | 70 | 34r | 30 |
| Reciprocating engine | 612 | 727 | 779 | 881r | 956 |
| Pass out condensing steam turbine | 701 | 688 | 757 | 1,113r | 1,395 |
| **Total renewable fuels** | **2,122** | **2,193** | **2,321** | **2,787r** | **2,933** |
| **Other fuels** *(2)* | | | | | |
| Back pressure steam turbine | 2,754 | 3,023 | 2,820 | 1,458r | 0 |
| Gas turbine | 271 | 127 | 108 | 83r | 62 |
| Combined cycle | 6,147 | 6,044 | 5,052 | 5,777r | 5,379 |
| Reciprocating engine | 23 | 17 | 17 | 15r | 19 |
| Pass out condensing steam turbine | 1,518 | 1,216 | 1,704 | 1,660r | 3,472 |
| **Total other fuels** | **10,714** | **10,426** | **9,700** | **8,993r** | **8,931** |
| **Total - all fuels** | | | | | |
| Back pressure steam turbine | 4,966 | 5,434 | 5,218 | 4,853r | 1,823 |
| Gas turbine | 4,702 | 4,903 | 4,800 | 4,595r | 4,545 |
| Combined cycle | 31,278 | 30,825 | 30,289 | 28,045r | 24,780 |
| Reciprocating engine | 4,529 | 4,556 | 5,083 | 5,415r | 5,425 |
| Pass out condensing steam turbine | 2,792 | 2,466 | 2,854 | 3,168r | 6,733 |
| **Total all fuels** | **48,267** | **48,184** | **48,244** | **46,076r** | **43,306** |

*(1) Renewable fuels include: Biomass; sewage gas, other biogases, municipal solid waste and refuse derived fuels.*
*(2) Other fuels include: process by-products, coke oven gas, blast furnace gas, gas oil and refinery gas.*

# 7.7 CHP - heat capacity by fuel and type of installation

MWth

| | 2010 | 2011 | 2012 | 2013 | 2014 |
|---|---|---|---|---|---|
| **Coal** | | | | | |
| Back pressure steam turbine | 125 | 122 | 125 | 124 | 134 |
| Gas turbine | - | - | - | - | - |
| Combined cycle | 351 | 595 | 565 | 583 | 282 |
| Reciprocating engine | - | 3 | 5 | 2r | 1 |
| Pass out condensing steam turbine | 93 | 90 | 57 | 48r | 182 |
| **Total coal** | **569** | **809** | **752** | **757r** | **599** |
| **Fuel oil** | | | | | |
| Back pressure steam turbine | 44 | 43 | 40 | 42 | 32 |
| Gas turbine | 1 | 0 | 0 | 1r | 1 |
| Combined cycle | 201 | 145 | 194 | 29 | 20 |
| Reciprocating engine | 8 | 7 | 12 | 8r | 8 |
| Pass out condensing steam turbine | 10 | 7 | 5 | 5 | 5 |
| **Total fuel oil** | **263** | **203** | **250** | **84r** | **66** |
| **Natural gas** | | | | | |
| Back pressure steam turbine | 447 | 446 | 465 | 829r | 379 |
| Gas turbine | 1,682 | 1,717 | 1,763 | 1,781r | 1,690 |
| Combined cycle | 10,427 | 9,973 | 10,829 | 9,947r | 9,730 |
| Reciprocating engine | 2,432 | 2,530 | 2,597 | 2,788r | 2,942 |
| Pass out condensing steam turbine | 101 | 99 | 133 | 145r | 802 |
| **Total natural gas** | **15,088** | **14,764** | **15,787** | **15,489r** | **15,544** |
| **Renewable fuels** *(1)* | | | | | |
| Back pressure steam turbine | 134 | 137 | 161r | 155r | 129 |
| Gas turbine | 1 | 3 | 2 | 4 | 4 |
| Combined cycle | 1,525 | 1,598 | 1,627r | 258r | 12 |
| Reciprocating engine | 184 | 237r | 230r | 305r | 310 |
| Pass out condensing steam turbine | 407 | 519 | 546r | 737r | 819 |
| **Total renewable fuels** | **2,252** | **2,495r** | **2,566r** | **1,457r** | **1,273** |
| **Other fuels** *(2)* | | | | | |
| Back pressure steam turbine | 964 | 964 | 944 | 586r | 0 |
| Gas turbine | 165 | 54 | 48 | 32r | 7 |
| Combined cycle | 2,204 | 2,171 | 1,914r | 3,636r | 2,049 |
| Reciprocating engine | 21 | 18 | 17 | 15r | 17 |
| Pass out condensing steam turbine | 678 | 687 | 691r | 694r | 2,983 |
| **Total other fuels** | **4,031** | **3,895** | **3,614r** | **4,963r** | **5,057** |
| **Total - all fuels** | | | | | |
| Back pressure steam turbine | 1,713 | 1,713 | 1,735r | 1,735r | 674 |
| Gas turbine | 1,849 | 1,774 | 1,813r | 1,818r | 1,701 |
| Combined cycle | 14,709 | 14,483 | 15,129r | 14,451r | 12,094 |
| Reciprocating engine | 2,644 | 2,795r | 2,860r | 3,117r | 3,278 |
| Pass out condensing steam turbine | 1,289 | 1,402 | 1,432r | 1,628r | 4,791 |
| **Total all fuels** | **22,204** | **22,167r** | **22,970r** | **22,750r** | **22,539** |

*(1) Renewable fuels include: Biomass; sewage gas, other biogases, municipal solid waste and refuse derived fuels.*
*(2) Other fuels include: process by-products, coke oven gas, blast furnace gas, gas oil and refinery gas.*

# 7.8 CHP capacity, output and total fuel use[1] by sector

| | Unit | 2010 | 2011 | 2012 | 2013 | 2014 |
|---|---|---|---|---|---|---|
| **Iron and steel and non ferrous metals** | | | | | | |
| Number of sites | | 6 | 6 | 6 | 6 | 6 |
| Electrical capacity | MWe | 80 | 81 | 81 | 81 | 81 |
| Heat capacity | MWth | 674 | 674 | 674 | 674 | 674 |
| Electrical output | GWh | 438 | 144 | 212 | 163r | 164 |
| Heat output | GWh | 1,571 | 1,263 | 1,764 | 1,701r | 1,783 |
| Fuel use | GWh | 3,451 | 2,197 | 2,766 | 2,885r | 3,027 |
| of which : for electricity | GWh | 1,196 | 369 | 484 | 435r | 438 |
| for heat | GWh | 2,255 | 1,828 | 2,282 | 2,450r | 2,589 |
| **Chemicals** | | | | | | |
| Number of sites | | 50r | 54r | 54r | 54r | 53 |
| Electrical capacity | MWe | 1,772 | 1,756r | 1,747r | 1,687r | 1,651 |
| Heat capacity | MWth | 5,657r | 5,679r | 5,561r | 5,339r | 5,276 |
| Electrical output | GWh | 7,488r | 6,691r | 6,503r | 5,990r | 5,363 |
| Heat output | GWh | 14,949r | 15,292r | 14,883r | 13,958r | 12,543 |
| Fuel use | GWh | 34,742r | 32,004r | 31,353r | 29,149r | 26,445 |
| of which : for electricity | GWh | 17,575r | 14,945r | 14,747r | 13,450r | 12,128 |
| for heat | GWh | 17,167r | 17,059r | 16,606r | 15,699r | 14,317 |
| **Oil and gas terminals and oil refineries** | | | | | | |
| Number of sites | | 11 | 11 | 11 | 11 | 10 |
| Electrical capacity | MWe | 2,293 | 2,298 | 2,380 | 2,380r | 2,278 |
| Heat capacity | MWth | 7,039 | 7,039 | 7,600 | 7,600 | 7,255 |
| Electrical output | GWh | 10,999 | 8,239 | 8,105 | 6,184r | 6,337 |
| Heat output | GWh | 16,903 | 16,786 | 16,211 | 14,446r | 13,452 |
| Fuel use | GWh | 40,536 | 30,964 | 31,340 | 26,634r | 25,465 |
| of which : for electricity | GWh | 22,501 | 14,998 | 15,486 | 12,218r | 12,259 |
| for heat | GWh | 18,035 | 15,965 | 15,854 | 14,416r | 13,206 |
| **Paper, publishing and printing** | | | | | | |
| Number of sites | | 22 | 21 | 23 | 22r | 21 |
| Electrical capacity | MWe | 476 | 407 | 453 | 451r | 471 |
| Heat capacity | MWth | 2,072 | 1,857 | 2,060r | 1,776r | 1,764 |
| Electrical output | GWh | 2,255 | 2,020 | 2,170 | 1,948r | 2,022 |
| Heat output | GWh | 5,102 | 4,806 | 4,875 | 4,849r | 4,373 |
| Fuel use | GWh | 10,417 | 9,299 | 9,448 | 9,221r | 8,827 |
| of which : for electricity | GWh | 4,871 | 4,250 | 4,553 | 4,138r | 4,297 |
| for heat | GWh | 5,546 | 5,049 | 4,895 | 5,082r | 4,530 |
| **Food, beverages and tobacco** | | | | | | |
| Number of sites | | 39 | 46r | 49r | 54r | 55 |
| Electrical capacity | MWe | 407 | 429r | 439r | 436r | 446 |
| Heat capacity | MWth | 1,718 | 1,681r | 1,712r | 1,743r | 1,780 |
| Electrical output | GWh | 2,105 | 2,124r | 2,146r | 2,117r | 2,226 |
| Heat output | GWh | 3,765 | 4,112r | 4,046r | 4,277r | 4,277 |
| Fuel use | GWh | 8,289 | 8,308r | 8,129r | 8,362r | 8,623 |
| of which : for electricity | GWh | 4,394 | 4,220r | 4,177r | 4,172r | 4,407 |
| for heat | GWh | 3,895 | 4,087r | 3,952r | 4,190r | 4,216 |
| **Metal products, machinery and equipment** | | | | | | |
| Number of sites | | 16 | 19 | 19 | 20 | 20 |
| Electrical capacity | MWe | 67 | 69 | 68 | 75 | 75 |
| Heat capacity | MWth | 287 | 288 | 288 | 293r | 293 |
| Electrical output | GWh | 174 | 94 | 106 | 119r | 112 |
| Heat output | GWh | 206 | 149 | 159 | 196r | 180 |
| Fuel use | GWh | 634 | 581 | 603 | 601r | 584 |
| of which : for electricity | GWh | 383 | 250 | 270 | 275r | 264 |
| for heat | GWh | 251 | 331 | 332 | 327r | 320 |

*For footnotes see page 219*

# 7.8 CHP capacity, output and total fuel use[1] by sector (continued)

| | Unit | 2010 | 2011 | 2012 | 2013 | 2014 |
|---|---|---|---|---|---|---|
| **Mineral products, extraction, mining and agglomeration of solid fuels** | | | | | | |
| Number of sites | | 8 | 8 | 8 | 8 | 8 |
| Electrical capacity | MWe | 57 | 57 | 54 | 54 | 54 |
| Heat capacity | MWth | 183 | 183 | 183 | 183 | 183 |
| Electrical output | GWh | 134 | 111 | 102 | 104 | 105 |
| Heat output | GWh | 577 | 544 | 494 | 526 | 528 |
| Fuel use | GWh | 971 | 892 | 816 | 836r | 849 |
| of which : for electricity | GWh | 318 | 258 | 236 | 230 | 234 |
| for heat | GWh | 653 | 634 | 580 | 605 | 615 |
| **Sewage treatment** | | | | | | |
| Number of sites | | 170r | 192r | 199r | 197r | 198 |
| Electrical capacity | MWe | 149r | 165r | 173r | 164 | 166 |
| Heat capacity | MWth | 212r | 233r | 241 | 240r | 242 |
| Electrical output | GWh | 644r | 690r | 688r | 665r | 725 |
| Heat output | GWh | 672r | 742r | 740r | 747r | 816 |
| Fuel use | GWh | 2,295r | 2,494r | 2,458r | 3,432r | 3,909 |
| of which : for electricity | GWh | 1,522r | 1,628r | 1,605r | 2,271r | 2,595 |
| for heat | GWh | 773r | 866r | 853r | 1,161r | 1,315 |
| **Other industrial branches** *(2)* | | | | | | |
| Number of sites | | 10 | 12 | 11 | 12r | 12 |
| Electrical capacity | MWe | 42 | 45 | 46 | 50r | 50 |
| Heat capacity | MWth | 155 | 254 | 254 | 274r | 274 |
| Electrical output | GWh | 223 | 224 | 213 | 225r | 243 |
| Heat output | GWh | 358 | 384 | 374 | 409r | 422 |
| Fuel use | GWh | 836 | 1,000 | 1,182 | 812r | 846 |
| of which : for electricity | GWh | 469 | 547 | 621 | 423r | 453 |
| for heat | GWh | 367 | 453 | 562 | 389r | 393 |
| **Total industry** | | | | | | |
| Number of sites | | 332 | 369r | 380r | 384r | 383 |
| Electrical capacity | MWe | 5,345 | 5,308r | 5,441r | 5,377r | 5,271 |
| Heat capacity | MWth | 17,997 | 17,888r | 18,574r | 18,122r | 17,741 |
| Electrical output | GWh | 24,461 | 20,338r | 20,244r | 17,515r | 17,297 |
| Heat output | GWh | 44,103 | 44,078r | 43,546r | 41,108r | 38,375 |
| Fuel use | GWh | 102,171 | 87,738r | 88,095r | 81,932r | 78,575 |
| of which : for electricity | GWh | 53,230 | 41,464r | 42,179r | 37,612r | 37,075 |
| for heat | GWh | 48,941 | 46,274r | 45,916r | 44,319r | 41,500 |
| **Transport, commerce and administration** | | | | | | |
| Number of sites | | 653 | 839 | 936 | 966r | 971 |
| Electrical capacity | MWe | 319 | 345 | 400 | 422r | 440 |
| Heat capacity | MWth | 1,541 | 1,555 | 1,675r | 1,741r | 1,798 |
| Electrical output | GWh | 1,328 | 1,399 | 1,698 | 1,746r | 1,829 |
| Heat output | GWh | 2,590 | 2,573 | 2,986 | 3,140r | 3,082 |
| Fuel use | GWh | 5,715 | 5,811 | 6,933 | 6,969r | 7,379 |
| of which : for electricity | GWh | 2,877 | 2,990 | 3,695 | 3,574r | 4,042 |
| for heat | GWh | 2,838 | 2,822 | 3,238 | 3,394r | 3,337 |
| **Other** *(3)* | | | | | | |
| Number of sites | | 474 | 583r | 639r | 704r | 712 |
| Electrical capacity | MWe | 287 | 316r | 334r | 392r | 407 |
| Heat capacity | MWth | 2,666 | 2,724r | 2,721r | 2,887r | 3,000 |
| Electrical output | GWh | 979 | 1,030r | 1,008r | 1,139r | 1,155 |
| Heat output | GWh | 1,574 | 1,533r | 1,711r | 1,827 | 1,850 |
| Fuel use | GWh | 4,674 | 4,645r | 4,392r | 4,758r | 4,752 |
| of which : for electricity | GWh | 2,407 | 2,423r | 2,240r | 2,566r | 2,576 |
| for heat | GWh | 2,267r | 2,222r | 2,152r | 2,192r | 2,176 |
| **Total CHP usage by all sectors** | | | | | | |
| Number of sites | | 1,459 | 1,791 | 1,955 | 2,054r | 2,066 |
| Electrical capacity | MWe | 5,950 | 5,969 | 6,175 | 6,190r | 6,118 |
| Heat capacity | MWth | 22,204 | 22,167r | 22,970r | 22,750r | 22,539 |
| Electrical output | GWh | 26,768 | 22,767 | 22,950 | 20,400r | 20,281 |
| Heat output | GWh | 48,267 | 48,184 | 48,244 | 46,076r | 43,306 |
| Fuel use | GWh | 112,559 | 98,195 | 99,421 | 93,658r | 90,707 |
| of which : for electricity | GWh | 58,513 | 46,877 | 48,115 | 43,753r | 43,693 |
| for heat | GWh | 54,046 | 51,318 | 51,306 | 49,905r | 47,013 |

*(1) The allocation of fuel use between electricity and heat is largely notional and the methodology is outlined in paragraphs 7.37 to 7.39.*
*(2) Other industry includes Textiles, clothing and footwear sector.*
*(3) Sectors included under Other are agriculture, community heating, leisure, landfill and incineration.*

# 7.9 CHP - use of fuels by sector

GWh

| | 2010 | 2011 | 2012 | 2013 | 2014 |
|---|---|---|---|---|---|
| **Iron and steel and non ferrous metals** | | | | | |
| Coal | - | - | - | - | - |
| Fuel oil | 47 | 18 | 22 | 21 | 20 |
| Natural gas | 263 | 221 | 225 | 204r | 205 |
| Blast furnace gas | 1,920 | 1,397 | 1,892 | 2,169 | 2,329 |
| Coke oven gas | 1,221 | 486 | 599 | 489 | 473 |
| Other fuels *(1)* | - | 75 | 29 | 2 | - |
| **Total iron and steel and non ferrous metals** | **3,451** | **2,197** | **2,766** | **2,885r** | **3,027** |
| **Chemicals** | | | | | |
| Coal | 3,016 | 3,783 | 4,178 | 4,176 | 3,542 |
| Fuel oil | 132 | 131 | 133 | 137 | 139 |
| Gas oil | 189 | 43 | 5 | 4 | 6 |
| Natural gas | 27,230 | 23,779r | 23,341r | 20,963r | 18,784 |
| Refinery gas | 1,181 | 1,181 | 556 | 646 | 653 |
| Renewable fuels *(2)* | 106r | 58r | 52r | 90r | 92 |
| Other fuels *(1)* | 2,888 | 3,029 | 3,089 | 3,133r | 3,229 |
| **Total chemical industry** | **34,742r** | **32,004r** | **31,353r** | **29,149r** | **26,445** |
| **Oil and gas terminals and oil refineries** | | | | | |
| Fuel oil | 1,140 | 789 | 983 | 48 | 7 |
| Gas oil | 141 | 106 | 52 | 763r | 838 |
| Natural gas | 25,008 | 19,520 | 21,260 | 18,484r | 17,832 |
| Refinery gas | 7,335 | 5,618 | 3,774 | 3,872r | 3,658 |
| Other fuels *(1)* | 6,912 | 4,931 | 5,272 | 3,466r | 3,129 |
| **Total oil refineries** | **40,536** | **30,964** | **31,340** | **26,634r** | **25,465** |
| **Paper, publishing and printing** | | | | | |
| Coal | 323 | 286 | 139 | 102r | - |
| Fuel oil | - | 0 | 0 | - | - |
| Gas oil | 13 | 2 | 6 | 7r | 2 |
| Natural gas | 8,024 | 7,227 | 7,455 | 6,298r | 5,394 |
| Renewable fuels *(2)* | 1,905 | 1,620 | 1,643 | 2,516r | 2,790 |
| Other fuels *(1)* | 151 | 164 | 204 | 298r | 641 |
| **Total paper, publishing and printing** | **10,417** | **9,299** | **9,448** | **9,221r** | **8,827** |
| **Food, beverages and tobacco** | | | | | |
| Coal | 186 | 209 | 181 | 205 | 214 |
| Fuel oil | 142 | 157 | 116 | 148r | 100 |
| Gas oil | 93 | 32 | 19 | 3r | 4 |
| Natural gas | 7,803 | 7,785 | 7,642 | 7,653 | 7,793 |
| Renewable fuels *(2)* | 66 | 123r | 171r | 354r | 512 |
| Other fuels *(1)* | 0 | 2 | - | - | - |
| **Total food, beverages and tobacco** | **8,289** | **8,308r** | **8,129r** | **8,362r** | **8,623** |
| **Metal products, machinery and equipment** | | | | | |
| Coal | - | - | - | - | |
| Fuel oil | 89 | 89 | 89 | 89 | 89 |
| Gas oil | 0 | 0 | 0 | 0 | 0 |
| Natural gas | 478 | 412 | 439 | 471r | 454 |
| Renewable fuels *(2)* | 67 | 80 | 75 | 41 | 41 |
| Other fuels *(1)* | - | - | - | - | - |
| **Total metal products, machinery and equipment** | **634** | **581** | **603** | **601r** | **584** |

*For footnotes see page 221*

# 7.9 CHP - use of fuels by sector (continued)

GWh

| | 2010 | 2011 | 2012 | 2013 | 2014 |
|---|---|---|---|---|---|
| **Mineral products, extraction, mining and agglomeration of solid fuels** | | | | | |
| Coal | - | - | - | - | - |
| Fuel oil | - | - | - | - | - |
| Gas oil | 1 | - | - | - | - |
| Natural gas | 707 | 663 | 586 | 606r | 619 |
| Coke oven gas | 264 | 229 | 230 | 230 | 230 |
| **Total mineral products, extraction, mining and agglomeration of solid fuels** | **971** | **892** | **816** | **836r** | **849** |
| **Sewage treatment** | | | | | |
| Fuel oil | 29 | 29 | 32 | 32 | 33 |
| Gas oil | 40 | 37 | 32 | 17r | 17 |
| Natural gas | 189r | 197 | 181 | 36 | 42 |
| Renewable fuels *(2)* | 2,037r | 2,231r | 2,213r | 3,346r | 3,818 |
| **Total sewage treatment** | **2,295r** | **2,494r** | **2,458r** | **3,432r** | **3,909** |
| **Other industrial branches** | | | | | |
| Fuel oil | - | - | - | - | - |
| Gas oil | 0 | 1 | 14 | 0r | 0 |
| Natural gas | 836 | 817 | 762 | 803r | 839 |
| Renewable fuels *(2)* | - | 183 | 406 | 9r | 7 |
| **Total other industrial branches** | **836** | **1,000** | **1,182** | **812r** | **846** |
| **Transport, commerce and administration** | | | | | |
| Coal | - | - | - | - | - |
| Fuel oil | 1 | 0 | 0 | 0 | 0 |
| Gas oil | 18 | 2 | 17 | 12r | 33 |
| Natural gas | 5,268 | 5,332 | 6,028 | 6,300r | 6,262 |
| Refinery gas | - | - | - | - | - |
| Renewable fuels *(2)* | 421 | 471 | 884 | 657r | 1,085 |
| Other fuels *(1)* | 7 | 6 | 5 | -r | 0 |
| **Total transport, commerce and administration** | **5,715** | **5,811** | **6,933** | **6,969r** | **7,379** |
| **Other** *(3)* | | | | | |
| Coal | 19 | 23 | 16 | 7r | 3 |
| Fuel oil | 1 | - | 0 | 2 | 2 |
| Gas oil | 18 | 15 | 10 | 14 | 13 |
| Natural gas | 2,699 | 2,510 | 2,531 | 2,582r | 2,726 |
| Renewable fuels *(2)* | 1,930 | 2,087r | 1,824r | 1,909r | 1,795 |
| Other fuels *(1)* | 5 | 11 | 10 | 244r | 213 |
| **Total other** | **4,674r** | **4,645r** | **4,392r** | **4,758r** | **4,752** |
| **Total - all sectors** | | | | | |
| Coal | 3,544 | 4,301 | 4,514 | 4,491r | 3,758 |
| Fuel oil | 1,581 | 1,212 | 1,375 | 478r | 390 |
| Gas oil | 514 | 238 | 156 | 820r | 913 |
| Natural gas | 78,505 | 68,463 | 70,449 | 64,400r | 60,949 |
| Blast furnace gas | 1,920 | 1,397 | 1,892 | 2,169 | 2,329 |
| Coke oven gas | 1,484 | 715 | 829 | 719 | 703 |
| Refinery gas | 8,515 | 6,798 | 4,329 | 4,519r | 4,312 |
| Renewable fuels *(2)* | 6,532 | 6,853 | 7,268 | 8,921r | 10,139 |
| Other fuels *(1)* | 9,963 | 8,217 | 8,609 | 7,143r | 7,213 |
| **Total CHP fuel use** | **112,559** | **98,195** | **99,421** | **93,658r** | **90,707** |

*(1) Other fuels include: process by-products.*

*(2) Renewable fuels include: sewage gas, other biogases, municipal solid waste and refuse derived fuels.*

*(3) Sectors included under Other are agriculture, community heating, leisure, landfill and incineration.*

Digest of United Kingdom Energy Statistics 2015

# Annexes

## Annex A: Energy and commodity balances, conversion factors and calorific values

## Annex B: Glossary and acronyms

## Annex C: Further sources of UK energy publications

## Annex D: Major events in the Energy Industry, 2013-2015

Department of Energy and Climate Change

# Annex A
# Energy and commodity balances, conversion factors and calorific values

## Balance principles

A.1 This Annex outlines the principles behind the balance presentation of energy statistics. It covers these in general terms. Fuel specific details are given in the appropriate chapters of this publication.

A.2 Balances are divided into two types, each of which performs a different function.

a) *commodity balance* – a balance for each energy commodity that uses the units usually associated with that commodity. By using a single column of figures, it shows the flow of the commodity from its sources of supply through to its final use. Commodity balances are presented in the individual fuel chapters of this publication.

*b) energy balance* - presents the commodity balances in a common unit and places them alongside one another in a manner that shows the dependence of the supply of one commodity on another. This is useful as some commodities are manufactured from others. The layout of the energy balance also differs slightly from the commodity balance. The energy balance format is used in Chapter 1.

A.3 Energy commodities can be either primary or secondary. Primary energy commodities are drawn (extracted or captured) from natural reserves or flows, whereas secondary commodities are produced from primary energy commodities. Crude oil and coal are examples of primary commodities, whilst petrol and coke are secondary commodities manufactured from them. For balance purposes, electricity may be considered to be both primary electricity (for example, hydro, wind) or secondary (produced from steam turbines using steam from the combustion of fuels).

A.4 Both commodity and energy balances show the flow of the commodity from its production, extraction or import through to its final use.

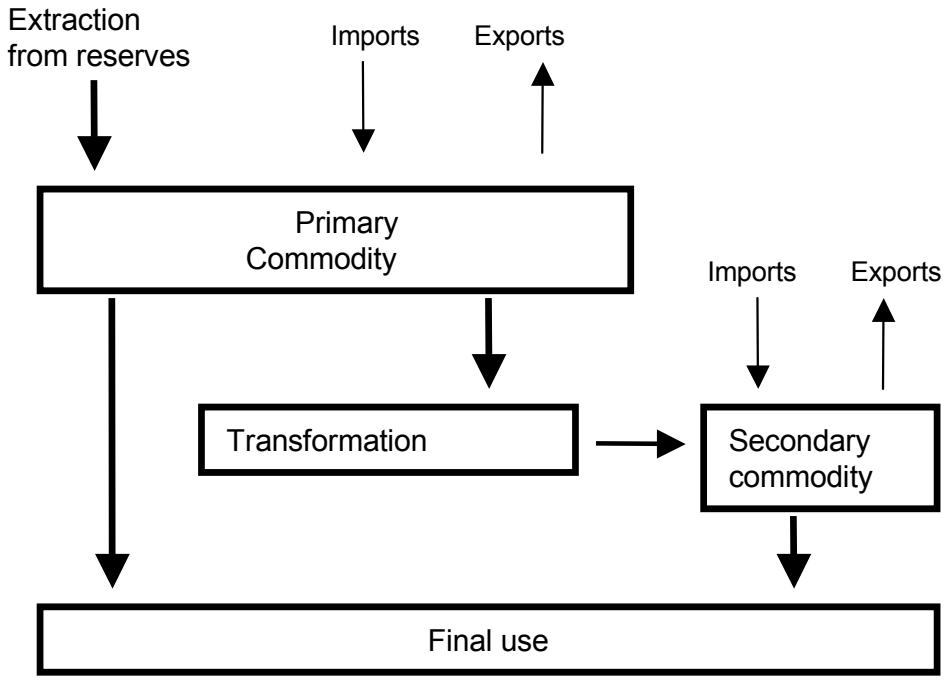
A.5 A simplified model of the commodity flow underlying the balance structure is given in Chart A.1. It illustrates how primary commodities may be used directly and/or be transformed into secondary commodities. The secondary fuels then enter final consumption or may also be transformed into another energy commodity (for example, electricity produced from fuel oil). To keep the diagram simple these “second generation” flows have not been shown.

A.6 The arrows at the top of the chart represent flows to and from the “pools” of primary and secondary commodities, from imports and exports and, in the case of the primary pool, extraction from reserves (eg the production of coal, gas and crude oil).

### Commodity balances (Tables 2.1 to 2.3, 3.1 to 3.4, 4.1, 5.1, 5.2 and 6.1 to 6.3)

A.7 A commodity balance comprises a supply section and a demand section. The supply section gives available sources of supply (ie exports are subtracted). The demand section is divided into a transformation section, a section showing uses in the energy industries (other than for transformation) and a section covering uses by final consumers for energy or non-energy purposes. Final consumption for energy purposes is divided into use by sector of economic activity. The section breakdowns are described below.

**Chart A.1: Energy flows**




# Supply

## Production

A.8 Production, within the commodity balance, covers indigenous production (extraction or capture of primary commodities) and generation or manufacture of secondary commodities. Production is always gross, that is, it includes the quantities used during the extraction or manufacturing process.

## Other sources

A.9 Production from other sources covers sources of supply that do not represent "new" supply. These may be recycled products, recovered fuels (slurry or waste coal), or electricity from pumped storage plants. The production of these quantities will have been reported in an earlier accounting period or have already been reported in the current period of account. Exceptionally, the *Other sources* row in the commodity balances for ethane, propane and butane is used to receive transfers of these hydrocarbons from gas stabilisation plants at North Sea terminals. In this manner, the supplies of primary ethane, propane and butane from the North Sea are combined with the production of these gases in refineries, so that the disposals may be presented together in the balances.

## Imports and exports

A.10 The figures for imports and exports relate to energy commodities moving into or out of the United Kingdom as part of transactions involving United Kingdom companies. Exported commodities are produced in the United Kingdom and imported commodities are for use within the United Kingdom (although some may be re-exported before or after transformation). The figures thus exclude commodities either exported from or imported into HM Revenue and Customs bonded areas or warehouses. These areas, although part of the United Kingdom, are regarded as being outside of the normal United Kingdom's customs boundary, and so goods entering into or leaving them are not counted as part of the statistics on trade used in the balances.

A.11 Similarly, commodities that only pass through the United Kingdom on their way to a final destination in another country are also excluded. However, for gas these transit flows are included because it is difficult to identify this quantity separately, without detailed knowledge of the contract information covering the trade. This means that for gas, there is some over statement of the level of imports and exports, but the net flows are correct.

A.12 The convention in these balances is that exports are shown with a negative sign.

## Marine bunkers

A.13 These are deliveries of fuels (usually fuel oil or gas oil) to ships of any flag (including the United Kingdom) for consumption during their voyage to other countries. Marine bunkers are treated rather like exports and shown with a negative sign.

## Stock changes

A.14 Additions to (- sign) and withdrawals from stocks (+ sign) held by producers and transformation industries correspond to withdrawals from and additions to supply, respectively.

## Transfers

A.15 There are several reasons why quantities may be transferred from one commodity balance to another:

- a commodity may no longer meet the original specification and be reclassified;
- the name of the commodity may change through a change in use;
- to show quantities returned to supply from consumers. These may be by-products of the use of commodities as raw materials rather than fuels.

A.16 A quantity transferred from a balance is shown with a negative sign to represent a withdrawal from supply and with a positive sign in the receiving commodity balance representing an addition to its supply.

## Total supply

A.17 The total supply available for national use is obtained by summing the flows above this entry in the balance.

## Total demand

A.18 The various figures for the disposals and/or consumption of the commodities are summed to provide a measure of the demand for them. The main categories or sectors of demand are described in paragraphs A.31 to A.42.

## Statistical difference

A.19 Any excess of supply over demand is shown as a statistical difference. A negative figure indicates that demand exceeds supply. Statistical differences arise when figures are gathered from a variety of independent sources and reflect differences in timing, in definition of coverage of the activity, or in commodity definition. Differences also arise for methodological reasons in the measurement of the flow of the commodity eg if there are differences between the volumes recorded by the gas producing companies and the gas transporting companies. A non-zero statistical difference is normal and, provided that it is not too large, is preferable to a statistical difference of zero as this suggests that a data provider has adjusted a figure to balance the account.

## Transformation

A.20 The transformation section of the balance covers those processes and activities that transform the original primary (and sometimes secondary) commodity into a form which is better suited for specific uses than the original form. Most of the transformation activities correspond to particular energy industries whose main business is to manufacture the product associated with them. Certain activities involving transformation take place to make products that are only partly used for energy needs (coke oven coke) or are by-products of other manufacturing processes (coke oven and blast furnace gases). However, as these products and by-products are then used, at least in part, for their energy content they are included in the balance system.

A.21 The figures given under the activity headings of this section represent the quantities used for transformation. The production of the secondary commodities will be shown in the *Production* row of the corresponding commodity balances.

## Electricity generation

A.22 The quantities of fuels burned for the generation of electricity are shown in their commodity balances under this heading. The activity is divided into two parts, covering the major power producer

(for whom the main business is the generation of electricity for sale) and autogenerators (whose main business is not electricity generation but who produce electricity for their own needs and may also sell surplus quantities). The amounts of fuels shown in the balance represent the quantities consumed for the gross generation of electricity. Where a generator uses combined heat and power plant, the figures include only the part of the fuel use corresponding to the electricity generated.

A.23 In relation to autogenerators' data, the figures for quantities of fuel used for electricity generation appear under the appropriate fuel headings in the *Transformation* section heading for *Autogenerators,* whilst the electricity generated appears in the *Electricity* column under *Production*. A breakdown of the information according to the branch of industry in which the generation occurs is not shown in the balance but is given in Chapter 1, Table 1.9. The figures for energy commodities consumed by the industry branches shown under final consumption include all use of electricity, but exclude the fuels combusted by the industry branches to generate the electricity.

## Heat generation

A.24 The quantities of fuel burned to generate heat that is sold under the provision of a contract to a third party are shown in their commodity balances under this heading. It includes heat that is generated and sold by combined heat and power plants and by community heating schemes (also called district heating).

## Petroleum refineries

A.25 Crude oil, natural gas liquids and other oils needed by refineries for the manufacture of finished petroleum products are shown under this heading.

## Coke manufacture and blast furnaces

A.26 Quantities of coal for coke ovens and all fuels used within blast furnaces are shown under this heading. The consumption of fuels for heating coke ovens and the blast air for blast furnaces are shown under *Energy industry use*.

## Patent fuel manufacture

A.27 The coals and other solid fuels used for the manufacture of solid patent fuels are reported under this heading.

## Other

A.28 Any minor transformation activities not specified elsewhere are captured under this heading.

## Energy industry use

A.29 Consumption by both extraction and transformation industries to support the transformation process (but not for transformation itself) are included here according to the energy industry concerned. Typical examples are the consumption of electricity in power plants (eg for lighting, compressors and cooling systems) and the use of extracted gases on oil and gas platforms for compressors, pumps and other uses. The headings in this section are identical to those used in the transformation section with the exception of *Pumped storage*. In this case, the electricity used to pump the water to the reservoir is reported.

## Losses

A.30 This heading covers the intrinsic losses that occur during the transmission and distribution of electricity and gas (including manufactured gases). Other metering and accounting differences for gas and electricity are within the statistical difference, as are undeclared losses in other commodities.

## Final consumption

A.31 *Final consumption* covers both final energy consumption (by different consuming sectors) and the use of energy commodities for non-energy purposes, that is *Non energy use*. Final consumption occurs when the commodities used are not for transformation into secondary commodities. The energy concerned disappears from the account after use. Any fuel used for electricity generation by final consumers is identified and reported separately within the transformation section. When an enterprise generates electricity, the figure for final consumption of the industrial sector to which the enterprise belongs includes its use of the electricity it generates itself (as well as supplies of electricity it purchases from others) but does not include the fuel used to generate that electricity.

A.32 The classification of consumers according to their main business follows, as far as practicable, the *Standard Industrial Classification (SIC2007).* The qualifications to, and constraints on, the classification are described in the technical notes to Chapter 1. Table 1G in Chapter 1 shows the breakdown of final consumers used, and how this corresponds to the SIC2007.

## Industry

A.33 Two sectors of industry (iron and steel and chemicals) require special mention because the activities they undertake fall across the transformation, final consumption and non-energy classifications used for the balances. Also, the data permitting an accurate allocation of fuel use within each of these major divisions are not readily available.

## Iron and steel

A.34 The iron and steel industry is a heavy energy user for transformation and final consumption activities. Figures shown under final consumption for this industry branch reflect the amounts that remain after quantities used for transformation and energy sector own use have been subtracted from the industry's total energy requirements. Use of fuels for transformation by the industry may be identified within the transformation section of the commodity balances.

A.35 The amounts of coal used for coke manufacture by the iron and steel industry are in the transformation section of the coal balance. Included in this figure is the amount of coal used for coke manufacture by the companies outside of the iron and steel industry, ie solid fuel manufacturers. The corresponding production of coke and coke oven gas may be found in the commodity balances for these products. The use of coke in blast furnaces is shown in the commodity balance for coke, and the gases produced from blast furnaces and the associated basic oxygen steel furnaces are shown in the production row of the commodity balance for blast furnace gas.

A.36 Fuels used for electricity generation by the industry are included in the figures for electricity generation by autogenerators and are not distinguishable as being used by the iron and steel sector in the balances. Electricity generation and fuel used for this by broad industry group are given in Table 1.9.

A.37 Fuels used to support coke manufacture and blast furnace gas production are included in the quantities shown under *Energy industry use.* These gases and other fuels do not enter coke ovens or blast furnaces, but are used to heat the ovens and the blast air supplied to furnaces.

## Chemicals

A.38 The petro-chemical industry uses hydrocarbon fuels (mostly oil products and gases) as feedstock for the manufacture of its products. Distinguishing the energy use of delivered fuels from their non-energy use is complicated by the absence of detailed information. The procedures adopted to estimate the use are described in paragraphs A.41 and A.42 under *Non energy use*.

## Transport

A.39 Figures under this heading are almost entirely quantities used strictly for transport purposes. However, the figures recorded against road transport may include some fuel that is actually consumed in some "off-road" activities. Similarly, figures for railway fuels may include some amounts of burning oil not used directly for transport purposes. Transport sector use of electricity includes electricity used by rail companies (both over and underground) for traction purposes, and electricity used by electric road vehicles. The electricity used for non-traction purposes in industries classified to SIC2007 Groups 49 to 51 is included within the commercial sector. Fuels supplied to cargo and passenger ships undertaking international voyages are reported as *Marine bunkers* (see paragraph A.13). Supplies to fishing vessels are included under "agriculture".

## Other sectors

A.40 The classification of all consumers groups under this heading, except *domestic and transport*, follows *SIC2007* and is described in Table 1G in Chapter 1. The consistency of the classification across different commodities cannot be guaranteed because the figures reported are dependent on what the data suppliers can provide.

### Non energy use

A.41 The non energy use of fuels may be divided into two types. They may be used directly for their physical properties eg lubricants or bitumen used for road surfaces, or by the petro-chemical industry as raw materials for the manufacture of goods such as plastics. In their use by the petro-chemical industry, relatively little combustion of the fuels takes place and the carbon and/or hydrogen they contain are largely transferred into the finished product. However, in some cases heat from the manufacturing process or from combustion of by-products may be used. Data for this energy use are rarely available. Depending on the feedstock, non energy consumption is either estimated or taken to be the deliveries to the chemicals sector.

A.42 Both types of non energy use are shown under the *Non energy use* heading at the foot of the balances.

## The energy balance (Tables 1.1 to 1.3)

### Principles

A.43 The energy balance conveniently presents:

- an overall view of the United Kingdom's energy supplies;
- the relative importance of each energy commodity;
- dependence on imports;
- the contribution of our own fossil and renewable resources;
- the interdependence of commodities on one another.

A.44 The energy balance is constructed directly from the commodity balances by expressing the data in a common unit, placing them beside one another and adding appropriate totals. Heat sold is also included as a fuel. However, some rearrangements of the commodity balance format is required to show transformation of primary into secondary commodities in an easily understood manner.

A.45 Energy units are widely used as the common unit, and the current practice for the United Kingdom and the international organisations which prepare balances is to use the tonne of oil equivalent or a larger multiple of this unit, commonly thousands. One tonne of oil equivalent is defined as $10^7$ kilocalories (41.868 gigajoules). The tonne of oil equivalent is another unit of energy like the gigajoule, kilocalorie or kilowatt hour, rather than a physical quantity. It has been chosen as it is easier to visualise than the other units. Due to the natural variations in heating value of primary fuels such as crude oil, it is rare that one tonne of oil has an energy content equivalent to one tonne of oil equivalent, however it is generally within a few per cent of the heating value of a tonne of oil equivalent. The energy figures are calculated from the natural units of the commodity balances by multiplying by the factors representing the calorific (heating) value of the fuel. The gross calorific values of fuels are used for this purpose. When the natural unit of the commodity is already an energy unit (electricity in kilowatt hours, for example) the factors are just constants, converting one energy unit to another.

A.46 Most of the underlying definitions and ideas of commodity balances can be taken directly over into the energy balance. However, production of secondary commodities and, in particular, electricity are treated differently and need some explanation. The components of the energy balance are described below, drawing out the differences of treatment compared with the commodity balances.

### Primary supply

A.47 Within the energy balance, the production row covers only extraction of primary fuels and the generation of primary energy (hydro, nuclear, wind, solar photovoltaics). Note the change of row heading from *Production* in the commodity balances to *Indigenous production* in the energy balance. Production of secondary fuels and secondary electricity are shown in the transformation section and not in the indigenous production row at the top of the balance.

A.48 For fossil fuels, indigenous production represents the marketable quantity extracted from the reserves. Indigenous production of *Primary electricity* comprises hydro-electricity, wind, photovoltaics and nuclear energy. The energy value for hydro-electricity is taken to be the energy content of the electricity produced from the hydro power plant and not the energy available in the water driving the turbines. A similar approach is adopted for electricity from wind generators and photovoltaics. The

electricity is regarded as the primary energy form because there are currently no other uses of the energy resource "upstream" of the generation. The energy value attached to nuclear electricity is discussed in paragraph A.52.

A.49 The other elements of the supply part of the balance are identical to those in the commodity balances. In particular, the sign convention is identical, so that figures for exports and international marine bunkers carry negative signs. A stock build carries a negative sign to denote it as a withdrawal from supply whilst a stock draw carries a positive sign to show it as an addition to supply.

A.50 The *Primary supply* is the sum of the figures above it in the table, taking account of the signs, and expresses the national requirement for primary energy commodities from all sources and foreign supplies of secondary commodities. It is an indicator of the use of indigenous resources and external energy supplies. Both the amount and mixture of fuels in final consumption of energy commodities in the United Kingdom will differ from the primary supply. The "mix" of commodities in final consumption will be much more dependent on the manufacture of secondary commodities, in particular electricity.

## Transformation

A.51 Within an energy balance the presentation of the inputs to and outputs from transformation activities requires special mention, as it is carried out using a compact format. The transformation section also plays a key role in moving primary electricity from its own column in the balance into the electricity column, so that it can be combined with electricity from fossil fuelled power stations and the total disposals shown.

A.52 Indigenous production of primary electricity comprises nuclear electricity, hydro electricity, electricity from wind generation and from solar photovoltaics. Nuclear electricity is obtained by passing steam from nuclear reactors through conventional steam turbine sets. The heat in the steam is considered to be the primary energy available and its value is calculated from the electricity generated using the average thermal efficiency of nuclear stations, currently 39.6 in the United Kingdom. The electrical energy from hydro and wind is transferred from the *Primary electricity* column to the *Electricity* column using the *transfers* row because this electricity is in the form of primary energy and no transformation takes place. However, because the form of the nuclear energy is the steam from the nuclear reactors, the energy it contains is shown entering electricity generation and the corresponding electricity produced is included with all electricity generation in the figure, in the same row, under the *Electricity* column.

A.53 Quantities of fuels entering transformation activities (fuels into electricity generation and heat generation, crude oil into petroleum product manufacture (refineries), or coal into coke ovens) are shown with a negative sign to represent the input and the resulting production is shown as a positive number.

A.54 For electricity generated by Major power producers, the inputs are shown in the *Major power producers'* row of the *coal, manufactured fuel, primary oils, petroleum products, gas, bioenergy and waste* and *primary electricity* columns. The total energy input to electricity generation is the sum of the values in these first seven columns. The *Electricity* column shows total electricity generated from these inputs and the transformation loss is the sum of these two figures, given in the *Total* column.

A.55 Within the transformation section, the negative figures in the *Total* column represent the losses in the various transformation activities. This is a convenient consequence of the sign convention chosen for the inputs and outputs from transformation. Any positive figures represent a transformation gain and, as such, are an indication of incorrect data.

A.56 In the energy balance, the columns containing the input commodities for electricity generation, heat generation and oil refining are separate from the columns for the outputs. However, for the transformation activities involving solid fuels this is only partly the case. Coal used for the manufacture of coke is shown in the coke manufacture row of the transformation section in the coal column, but the related coke and coke oven gas production are shown combined in the *Manufactured fuels* column. Similarly, the input of coke to blast furnaces and the resulting production of blast furnace gas are not identifiable and have been combined in the *Manufactured fuels* column in the *Blast furnace* row. As a result, only the net loss from blast furnace transformation activity appears in the column.

A.57 The share of each commodity or commodity group in primary supply can be calculated from the table. This table also shows the demand for primary as well as foreign supplies. Shares of primary supplies may be taken from the *Primary supply* row of the balance. Shares of fuels in final consumption may be calculated from the final consumption row.

## Energy industry use and final consumption

A.58 The figures for final consumption and energy industry use follow, in general, the principles and definitions described under commodity balances in paragraphs A.29 to A.42.

## Standard conversion factors

| | |
|---|---|
| 1 tonne of oil equivalent (toe) | = $10^7$ kilocalories<br>= 396.83 therms<br>= 41.868 GJ<br>= 11,630 kWh |
| 100,000 British thermal units (Btu) | = 1 therm |

This Digest follows UK statistical practice and uses the term "billion" to refer to one thousand million or $10^9$

The following prefixes are used for multiples of joules, watts and watt hours:

| | | |
|---|---|---|
| kilo (k) | = 1,000 | or $10^3$ |
| mega (M) | = 1,000,000 | or $10^6$ |
| giga (G) | = 1,000,000,000 | or $10^9$ |
| tera (T) | = 1,000,000,000,000 | or $10^{12}$ |
| peta (P) | = 1,000,000,000,000,000 | or $10^{15}$ |

**WEIGHT**

| | |
|---|---|
| 1 kilogramme (kg) | = 2.2046 pounds (lb) |
| 1 pound (lb) | = 0.4536 kg |
| 1 tonne (t) | = 1,000kg<br>= 0.9842 long ton<br>= 1.102 short ton (sh tn) |
| 1 Statute or long ton | = 2,240 lb<br>= 1.016 t<br>= 1.120 sh tn |

**VOLUME**

| | |
|---|---|
| 1 cubic metre (cu m) | = 35.31 cu ft |
| 1 cubic foot (cu ft) | = 0.02832 cu m |
| 1 litre | = 0.22 Imperial gallons (UK gal) |
| 1 UK gallon | = 8 UK pints<br>= 1.201 US gallons (US gal)<br>= 4.54609 litres |
| 1 barrel | = 159.0 litres<br>= 34.97 UK gal<br>= 42 US gal |

**LENGTH**

| | |
|---|---|
| 1 mile | = 1.6093 kilometres |
| 1 kilometre (km) | = 0.62137 miles |

**TEMPERATURE**

| | |
|---|---|
| 1 scale degree Celsius (C) | = 1.8 scale degrees Fahrenheit (F) |

For conversion of temperatures: $^oC = 5/9 (^oF - 32)$; $^oF = 9/5\ ^oC + 32$

## Average conversion factors for petroleum 2014

| | Litres per tonne |
|---|---|
| Crude oil: | |
| Indigenous | 1,199 |
| Imported | 1,181 |
| Average of refining throughput | 1,192 |
| Ethane | 2,730 |
| Propane | 1,966 |
| Butane | 1,739 |
| Naphtha | 1,461 |
| Aviation gasoline | 1,408 |
| Motor spirit: | |
| All grades | 1,368 |
| Super | 1,359 |
| Premium | 1,369 |
| Middle distillate feedstock | .. |
| Kerosene: | |
| Aviation turbine fuel | 1,256 |
| Burning oil | 1,250 |

| | Litres per tonne |
|---|---|
| DERV fuel: | |
| 0.005% or less sulphur | 1,192 |
| Gas /Marine diesel oil | 1,172 |
| Fuel oil (1% or less sulphur) | |
| All grades: | 1,014 |
| Light: | .. |
| Medium | .. |
| Heavy: | .. |
| Lubricating oils: | |
| White | 1,143 |
| Greases | .. |
| Bitumen | 987 |
| Petroleum coke | .. |
| Petroleum waxes | 1,184 |
| Industrial spirit | 1,247 |
| White spirit | 1,282 |

Note: The above conversion factors, which for refined products have been compiled by DECC using data from UK Petroleum Industry Association companies, apply to the year 2014. The litres to tonnes conversions are made at a standard temperature of 15°C.

.. Denotes commercially sensitive as too few companies are producting this to be able to report it.

# Fuel conversion factors for converting fossil fuels to carbon dioxide, 2014

| | kg $CO_2$ per tonne | kg $CO_2$ per kWh | kg $CO_2$ per litre |
|---|---|---|---|
| **Gases** | | | |
| Natural Gas | | 0.184 | |
| LPG | | 0.214 | 1.506 |
| | | | |
| **Liquid fuels** | | | |
| Gas oil | 3190 | 0.254 | 2.722 |
| Fuel oil | 3211 | 0.267 | |
| Burning oil | 3150 | 0.245 | 2.520 |
| Naptha | 3131 | 0.236 | |
| Petrol | 3135 | 0.239 | 2.292 |
| Diesel | 3164 | 0.250 | 2.655 |
| Aviation spirit | 3128 | 0.238 | 2.225 |
| Aviation turbine fuel | 3150 | 0.245 | 2.514 |
| | | | |
| **Solid fuels** | | | |
| Industrial coal | 2410 | 0.321 | |
| Domestic coal | 2637 | 0.315 | |
| Coking coal | 3151 | 0.356 | |

All emission factors are based on a Gross Calorific Value basis

The information above is based on the 2015 Greenhouse gas conversion factors for company reporting, available at: www.ukconversionfactorscarbonsmart.co.uk/. The information on this website also provide emission factors on a Net Calorific Basis.

The figures are derived by AEA based on data contained in the 2014 edition of this Digest, available at: www.gov.uk/government/collections/digest-of-uk-energy-statistics-dukes together with information from the National Atmospheric Emissions Inventory. More information on the Inventory is available at: http://naei.defra.gov.uk/reports/. For liquid fuels, the "kg $CO_2$ per tonne" figure remains fairly constant on a year to year basis, so it is possible to derive "kg $CO_2$ per kWh" and "kg $CO_2$ per litre" figures for other years using the average conversion factors for petroleum data contained annually in Annex A of the Digest.

# A.1 Estimated average calorific values of fuels 2014

| | GJ per tonne net | GJ per tonne gross |
|---|---|---|
| Coal: | | |
| All consumers (weighted average) *(1)* | 25.6 | 27.0 |
| Power stations *(2)* | 23.9 | 25.1 |
| Coke ovens *(1)* | 30.2 | 31.8 |
| Low temperature carbonisation plants and manufactured fuel plants | 27.1 | 28.5 |
| Collieries | 27.5 | 29.0 |
| Agriculture | 28.1 | 29.5 |
| Iron and steel | 28.9 | 30.4 |
| Other industries (weighted average) | 25.4 | 26.7 |
| Non-ferrous metals | 23.8 | 25.1 |
| Food, beverages and tobacco | 28.0 | 29.4 |
| Chemicals | 25.2 | 26.5 |
| Textiles, clothing, leather etc. | 28.1 | 29.5 |
| Pulp, paper, printing etc. | 23.0 | 24.2 |
| Mineral products | 26.5 | 27.9 |
| Engineering (mechanical and electrical engineering and vehicles) | 28.0 | 29.5 |
| Other industries | 31.1 | 32.7 |
| Domestic | | |
| House coal | 28.6 | 30.1 |
| Anthracite and dry steam coal | 32.6 | 34.3 |
| Other consumers | 25.1 | 26.4 |
| Imported coal (weighted average) | 26.0 | 27.4 |
| Exports (weighted average) | 30.6 | 32.2 |
| Coke (including low temperature carbonisation cokes) | 29.8 | 29.8 |
| Coke breeze | 29.8 | 29.8 |
| Other manufactured solid fuel | 28.3 | 29.8 |

| | GJ per tonne net | GJ per tonne gross | Moisture content |
|---|---|---|---|
| Renewable sources: | | | |
| Domestic wood *(3)* | 13.3 | 14.9 | 20% |
| Industrial wood *(4)* | 17.3 | 18.6 | 0% |
| Straw | 13.4 | 15.8 | 15% |
| Poultry litter (5) | 7.6 | 9.1 | 16% |
| Meat and bone | 16.8 | 20.0 | 16% |
| General industrial waste | 15.2 | 16.0 | 5% |
| Hospital waste | 13.3 | 14.0 | 5% |
| Municipal solid waste *(6)* | 6.5 | 9.2 | 30% |
| Refuse derived waste *(6)* | 13.0 | 18.5 | 30% |
| Short rotation coppice *(7)* | 11.4 | 13.0 | 30% |
| Tyres | 30.4 | 32.0 | 5% |
| Wood pellets | 15.3 | 16.7 | 10% |
| Biodiesel | 37.2 | 38.7 | 4% |
| Bioethanol | 26.8 | 29.7 | 10% |
| Petroleum: | | | |
| Crude oil (weighted average) | 43.4 | 45.7 | |
| Petroleum products (weighted average) | 44.1 | 46.4 | |
| Ethane | 46.6 | 50.7 | |
| Butane and propane (LPG) | 46.0 | 49.4 | |
| Light distillate feedstock for gasworks | 45.3 | 47.7 | |
| Aviation spirit and wide cut gasoline | 45.0 | 47.4 | |
| Aviation turbine fuel | 44.0 | 46.3 | |
| Motor spirit | 44.8 | 47.1 | |
| Burning oil | 43.9 | 46.2 | |
| Gas/diesel oil | 42.6 | 45.3 | |
| DERV | 42.9 | 45.7 | |
| Fuel oil | 40.7 | 43.4 | |
| Power station oil | 40.7 | 43.4 | |
| Non-fuel products (notional value) | 40.9 | 43.2 | |

| | MJ per cubic metre net | MJ per cubic metre gross |
|---|---|---|
| Natural gas produced *(8)* | 35.7 | 39.7 |
| Natural gas consumed *(9)* | 35.3 | 39.3 |
| Coke oven gas | 16.2 | 18.0 |
| Blast furnace gas | 3.0 | 3.0 |
| Landfill gas *(10)* | 19-23 | 21-25 |
| Sewage gas *(10)* | 19-23 | 21-25 |
| Anaerobic Digestion - farm/food food *(7)* | 19-24 | 21-26 |

*(1) Applicable to UK consumption - based on calorific value for home produced coal plus imports and, for "All consumers" net of exports.*

*(2) Home produced plus imports*

*(3) On an "as received" basis; seasoned logs at 20% moisture content. On a "dry" basis 18.6 GJ per tonne.*

*(4) Data reported on an oven dry basis of 18.6 GJ per tonne.*

*(5) The calorific value of poultry litter typically ranges on a net basis from 5 GJ/tonne to 10 GJ/tonne depending upon the moisture content of the fuel. For poultry manure, much lower calorific values should be used.*

*(6) Average figure based on survey returns.*

*(7) On an "as received" basis; at 30% moisture content. On a "dry" basis 18.6 GJ per tonne.*

*(8) The gross calorific value of natural gas can also be expressed as 11.031 kWh per cubic metre. This value represents the average calorific value seen for gas when extracted. At this point it contains not just methane, but also some other hydrocarbon gases (ethane, butane, propane). These gases are removed before the gas enters the National Transmission System for sale to final consumers.*

*(9) UK produced and imported gas. This weighted average of calorific values will approximate the average for the year of gas entering the National Transmission System. It can also be expressed as 10.908 kWh per cubic metre.*

*(10) Calorific value varies depending on the methane content of the gas.*

Note: The above estimated average calorific values apply only to the year 2014. For calorific values of fuels in earlier years see Tables A.2 and A.3 and previous issues of this Digest. See the notes in Chapter 1, paragraph 1.54 regarding net calorific values. The difference between the net and gross thermal content is the amount of energy necessary to evaporate the water present in the fuel or formed during the combustion process.

The calorific values for coal other than imported coal are based on estimates provided by the main coal producers, but with some exceptions as noted on Table A.2. The calorific values for petroleum products have been calculated using the method described in Chapter 1, paragraph 1.31. Data reported in this Digest in 'thousand tonnes of oil equivalent' have been prepared on the basis of 1 tonne of oil equivalent having an energy content of 41.868 gigajoules (GJ), (1 GJ = 9.478 therms) - see notes in Chapter 1, paragraph 1.29.

# A.2 Estimated average gross calorific values of fuels 1980, 1990, 2000, 2010 and 2012 to 2014

GJ per tonne (gross)

| | 1980 | 1990 | 2000 | 2010 | 2012 | 2013 | 2014 |
|---|---|---|---|---|---|---|---|
| **Coal** | | | | | | | |
| All consumers *(1)(2)* | 25.6 | 25.5 | 26.2 | 25.8 | 26.0 | 26.0 | 26.0 |
| All consumers - home produced plus imports minus exports *(1)* | .. | .. | 27.0 | 27.1 | 26.9 | 27.0 | 27.0 |
| Power stations *(2)* | 23.8 | 24.8 | 25.6 | 24.9 | 25.3 | 25.2 | 25.1 |
| Power stations - home produced plus imports *(1)* | .. | .. | 26.0 | 25.8 | 26.2 | 26.3 | 26.2 |
| Coke ovens *(2)* | 30.5 | 30.2 | 31.2 | 30.5 | 31.8 | 31.8 | 31.8 |
| Coke ovens - home produced plus imports *(1)* | .. | .. | 30.4 | 30.5 | 31.8 | 31.8 | 31.8 |
| Low temperature carbonisation plants and manufactured fuel plants | 19.1 | 29.2 | 30.3 | 30.2 | 28.4 | 28.5 | 28.5 |
| Collieries | 27.0 | 28.6 | 29.6 | 29.3 | 29.0 | 29.0 | 29.0 |
| Agriculture | 30.1 | 28.9 | 29.2 | 28.0 | 29.5 | 29.5 | 29.5 |
| Iron and steel industry *(3)* | 29.1 | 28.9 | 30.7 | 30.4 | 30.4 | 30.4 | 30.4 |
| Other industries *(1)* | 27.1 | 27.8 | 26.7 | 27.7 | 26.8 | 26.8 | 26.7 |
| Non-ferrous metals | .. | 23.1 | 25.1 | 25.4 | 25.1 | 25.1 | 25.1 |
| Food, beverages and tobacco | 28.6 | 28.1 | 29.5 | 28.6 | 29.4 | 29.4 | 29.4 |
| Chemicals | 25.8 | 27.3 | 28.7 | 26.7 | 26.6 | 26.5 | 26.5 |
| Textiles, clothing, leather and footwear | 27.5 | 27.7 | 30.4 | 29.5 | 29.5 | 29.5 | 29.5 |
| Pulp, paper, printing, etc. | 26.5 | 27.9 | 28.7 | 24.1 | 24.2 | 24.2 | 24.2 |
| Mineral products *(4)* | .. | 28.2 | 27.0 | 27.6 | 27.7 | 27.8 | 27.9 |
| Engineering *(5)* | 27.7 | 28.3 | 29.3 | 29.5 | 29.5 | 29.5 | 29.5 |
| Other industry *(6)* | 28.4 | 28.5 | 30.2 | 32.6 | 32.5 | 32.6 | 32.7 |
| Domestic | | | | | | | |
| House coal | 30.1 | 30.2 | 30.9 | 29.8 | 30.2 | 30.2 | 30.1 |
| Anthracite and dry steam coal | 33.3 | 33.6 | 33.5 | 34.7 | 34.5 | 34.3 | 34.3 |
| Other consumers | 27.5 | 27.5 | 29.2 | 25.5 | 26.3 | 26.3 | 26.4 |
| Transport - Rail | .. | .. | .. | 30.3 | 30.2 | 30.2 | 30.2 |
| Imported coal *(1)* | .. | 28.3 | 28.0 | 27.9 | 27.4 | 27.4 | 27.4 |
| of which Steam coal | .. | .. | 26.6 | 26.5r | 26.5 | 26.5 | 26.5 |
| Coking coal | .. | .. | 30.4 | 32.1r | 31.8 | 31.8 | 31.8 |
| Anthracite | .. | .. | 31.2 | 31.0 | 31.7 | 31.7 | 31.7 |
| Exports *(1)* | .. | 29.0 | 32.0 | 32.3 | 32.4 | 32.3 | 32.2 |
| of which Steam coal | .. | .. | 31.0 | 31.2 | 31.2 | 31.2 | 31.2 |
| Anthracite | .. | .. | 32.6 | 33.2 | 32.7 | 32.6 | 32.5 |
| **Coke** *(7)* | 28.1 | 28.1 | 29.8 | 29.8 | 29.8 | 29.8 | 29.8 |
| **Coke breeze** | 24.4 | 24.8 | 24.8 | 29.8 | 29.8 | 29.8 | 29.8 |
| **Other manufactured solid fuels** *(1)* | 27.6 | 27.6 | 30.8 | 29.8 | 29.8 | 29.8 | 29.8 |
| | | | | | | | |
| **Petroleum** | | | | | | | |
| Crude oil *(1)* | 45.2 | 45.6 | 45.7 | 45.7 | 45.7 | 45.7 | 45.7 |
| Liquified petroleum gas | 49.6 | 49.3 | 49.1 | 49.2 | 49.3 | 49.3 | 49.4 |
| Ethane | 52.3 | 50.6 | 50.7 | 50.7 | 50.7 | 50.7 | 50.7 |
| LDF for gasworks/Naphtha | 47.8 | 47.9 | 47.6 | 47.8 | 47.8 | 47.8 | 47.7 |
| Aviation spirit and wide-cut gasoline (AVGAS and AVTAG) | 47.2 | 47.3 | 47.3 | 47.4 | 47.4 | 47.4 | 47.4 |
| Aviation turbine fuel (AVTUR) | 46.4 | 46.2 | 46.2 | 46.2 | 46.2 | 46.2 | 46.3 |
| Motor spirit | 47.0 | 47.0 | 47.0 | 47.1 | 47.1 | 47.1 | 47.1 |
| Burning oil | 46.5 | 46.2 | 46.2 | 46.2 | 46.2 | 46.2 | 46.2 |
| Vaporising oil | 45.9 | 45.9 | .. | .. | .. | .. | .. |
| Gas/diesel oil (8) | 45.5 | 45.4 | 45.6 | 45.3 | 45.3 | 45.3 | 45.3 |
| DERV (8) | .. | .. | .. | 45.6 | 45.7 | 45.7 | 45.7 |
| Fuel oil | 42.8 | 43.2 | 43.1 | 43.3 | 43.3 | 43.3 | 43.4 |
| Power station oil | 42.8 | 43.2 | 43.1 | 43.3 | 43.3 | 43.3 | 43.4 |
| Non-fuel products (notional value) | 42.2 | 43.2 | 43.8 | 43.1 | 43.1 | 43.1 | 43.2 |
| Petroleum coke (Power stations) | .. | .. | .. | 30.9 | 31.1 | 30.1 | 30.1 |
| Petroleum coke (Other) | .. | 39.5 | 35.8 | 35.8 | 35.8 | 35.8 | 35.8 |
| Natural Gas *(9)* | .. | 38.4 | 39.4 | 40.1 | 39.6 | 39.7 | 39.7 |

*(1) Weighted averages.*

*(2) Home produced coal only.*

*(3) From 2001 onwards almost entirely sourced from imports.*

*(4) Based on information provided by the British Cement Industry Association; almost all coal used by this sector in the latest 4 years was imported.*

*(5) Mechanical engineering and metal products, electrical and instrument engineering and vehicle manufacture.*

*(6) Includes construction.*

*(7) Since 1995 the source of these figures has been the ISSB.*

*(8) DERV included within gas/diesel oil until 2005.*

*(9) Natural Gas figures are shown in MJ per cubic metre.*

# A.3 Estimated average net calorific values of fuels 1980, 1990, 2000, 2010 and 2012 to 2014

GJ per tonne (net)

| | 1980 | 1990 | 2000 | 2010 | 2012 | 2013 | 2014 |
|---|---|---|---|---|---|---|---|
| **Coal** | | | | | | | |
| All consumers *(1)(2)* | 24.3 | 24.2 | 24.9 | 24.5 | 24.7 | 24.7 | 24.7 |
| All consumers - home produced plus imports minus exports *(1)* | .. | .. | 25.6 | 25.7 | 25.5 | 25.7 | 25.6 |
| Power stations *(2)* | 22.6 | 23.6 | 24.3 | 23.6 | 24.1 | 24.0 | 23.9 |
| Power stations - home produced plus imports *(1)* | .. | .. | 24.7 | 24.5 | 24.9 | 25.0 | 24.9 |
| Coke ovens *(2)* | 29.0 | 28.7 | 29.6 | 29.0 | 30.2 | 30.2 | 30.2 |
| Coke ovens - home produced plus imports *(1)* | .. | .. | 28.9 | 29.0 | 30.2 | 30.2 | 30.2 |
| Low temperature carbonisation plants and manufactured fuel plants | 18.1 | 27.7 | 28.8 | 28.7 | 27.0 | 27.0 | 27.1 |
| Collieries | 25.7 | 27.2 | 28.1 | 27.9 | 27.5 | 27.5 | 27.5 |
| Agriculture | 28.6 | 27.5 | 27.8 | 26.6 | 28.1 | 28.1 | 28.1 |
| Iron and steel industry *(3)* | 27.6 | 27.5 | 29.2 | 28.9 | 28.9 | 28.9 | 28.9 |
| Other industries *(1)* | 25.7 | 26.4 | 25.4 | 26.3 | 25.5 | 25.5 | 25.4 |
| Non-ferrous metals | .. | 21.9 | 23.8 | 24.1 | 23.8 | 23.8 | 23.8 |
| Food, beverages and tobacco | 27.2 | 26.7 | 28.0 | 27.2 | 27.9 | 27.9 | 28.0 |
| Chemicals | 24.5 | 25.9 | 27.2 | 25.4 | 25.3 | 25.2 | 25.2 |
| Textiles, clothing, leather and footwear | 26.1 | 26.3 | 28.9 | 28.0 | 28.1 | 28.1 | 28.1 |
| Pulp, paper, printing, etc. | 25.2 | 26.5 | 27.3 | 22.9 | 23.0 | 23.0 | 23.0 |
| Mineral products *(4)* | .. | 26.8 | 25.7 | 26.3 | 26.3 | 26.4 | 26.5 |
| Engineering *(5)* | 26.3 | 26.9 | 27.8 | 28.0 | 28.0 | 28.0 | 28.0 |
| Other industry *(6)* | 27.0 | 27.1 | 28.7 | 31.0 | 30.9 | 31.0 | 31.1 |
| Domestic | | | | | | | |
| House coal | 28.6 | 28.7 | 29.4 | 28.3 | 28.7 | 28.7 | 28.6 |
| Anthracite and dry steam coal | 31.6 | 31.9 | 31.9 | 32.9 | 32.8 | 32.6 | 32.6 |
| Other consumers | 26.1 | 26.1 | 27.7 | 24.3 | 25.0 | 25.0 | 25.1 |
| Transport - Rail | .. | .. | .. | 28.8 | 28.7 | 28.7 | 28.7 |
| Imported coal *(1)* | .. | 26.9 | 26.6 | 26.5 | 26.1 | 26.0 | 26.0 |
| of which Steam coal | .. | .. | 25.3 | 25.2 | 25.2 | 25.2 | 25.2 |
| Coking coal | .. | .. | 28.9 | 29.0r | 30.2 | 30.2 | 30.2 |
| Anthracite | .. | .. | 29.6 | 29.5 | 30.1 | 30.1 | 30.1 |
| Exports *(1)* | .. | 27.6 | 30.4 | 30.7 | 30.8 | 30.7 | 30.6 |
| of which Steam coal | .. | .. | 29.4 | 29.6 | 29.6 | 29.6 | 29.6 |
| Anthracite | .. | .. | 30.9 | 31.6 | 31.1 | 31.0 | 30.9 |
| **Coke** *(7)* | 28.1 | 28.1 | 29.8 | 29.8 | 29.8 | 29.8 | 29.8 |
| **Coke breeze** | 24.4 | 24.8 | 24.8 | 29.8 | 29.8 | 29.8 | 29.8 |
| **Other manufactured solid fuels** *(1)* | 26.2 | 26.2 | 29.3 | 28.3 | 28.3 | 28.3 | 28.3 |
| **Petroleum** | | | | | | | |
| Crude oil *(1)* | 42.9 | 43.3 | 43.4 | 43.4 | 43.4 | 43.4 | 43.4 |
| Liquified petroleum gas | 46.2 | 46.0 | 46.0 | 46.0 | 46.0 | 46.0 | 46.0 |
| Ethane | 48.1 | 46.6 | 46.6 | 46.6 | 46.6 | 46.6 | 46.6 |
| LDF for gasworks/Naphtha | 45.4 | 45.5 | 45.3 | 45.4 | 45.4 | 45.4 | 45.3 |
| Aviation spirit and wide-cut gasoline (AVGAS and AVTAG) | 44.8 | 44.9 | 44.9 | 45.0 | 45.0 | 45.0 | 45.0 |
| Aviation turbine fuel (AVTUR) | 44.1 | 43.9 | 43.9 | 43.9 | 43.9 | 43.9 | 44.0 |
| Motor spirit | 44.7 | 44.7 | 44.7 | 44.7 | 44.8 | 44.8 | 44.8 |
| Burning oil | 44.2 | 43.9 | 43.9 | 43.9 | 43.9 | 43.9 | 43.9 |
| Vaporising oil | 43.6 | 43.6 | .. | .. | .. | .. | .. |
| Gas/diesel oil (8) | 42.8 | 42.7 | 42.9 | 42.6 | 42.6 | 42.6 | 42.6 |
| DERV (8) | .. | .. | .. | 42.9 | 42.9 | 42.9 | 42.9 |
| Fuel oil | 40.2 | 40.6 | 40.5 | 40.7 | 40.7 | 40.7 | 40.7 |
| Power station oil | 40.2 | 40.6 | 40.5 | 40.7 | 40.7 | 40.7 | 40.7 |
| Non-fuel products (notional value) | 40.1 | 41.0 | 41.6 | 40.9 | 40.9 | 40.9 | 40.9 |
| Petroleum coke (Power stations) | .. | .. | .. | 29.3 | 29.6 | 28.6 | 28.6 |
| Petroleum coke (Other) | .. | 37.5 | 34.0 | 34.0 | 34.0 | 34.0 | 34.0 |
| Natural Gas *(9)* | .. | 34.6 | 35.5 | 36.1 | 35.6 | 35.7 | 35.7 |

*For footnotes see table A.2*

*The net calorific value of natural gas is the gross calorific value x 0.9.*

# Annex B
## Glossary and Acronyms

| | |
|---|---|
| **Anthracite** | Within this publication, anthracite is coal classified as such by UK coal producers and importers of coal. Typically it has a high heat content making it particularly suitable for certain industrial processes and for use as a domestic fuel. |
| **Associated Gas** | Natural gas found in association with crude oil in a reservoir, either dissolved in the oil or as a cap above the oil. |
| **Autogeneration** | Generation of electricity by companies whose main business is not electricity generation, the electricity being produced mainly for that company's own use. |
| **Aviation spirit** | A light hydrocarbon oil product used to power piston-engined aircraft power units. |
| **Aviation turbine fuel** | The main aviation fuel used for powering aviation gas-turbine power units (jet aircraft engine). |
| **Benzole** | A colourless liquid, flammable, aromatic hydrocarbon by-product of the iron and steel making process. It is used as a solvent in the manufacture of styrenes and phenols but is also used as a constituent of motor fuel. |
| **BETTA** | British Electricity Trading and Transmission Arrangements (BETTA) refer to changes to electricity generation, distribution and supply licences. On 1 April 2005, the England and Wales trading arrangements were extended to Scotland by the British Electricity Trading and Transmission Arrangements creating a single GB market for trading of wholesale electricity, with common arrangements for access to and use of GB transmission system. From 1 April 2005, NGC has become the System Operator for the whole of GB. BETTA replaced NETA on 4 April 2005. |
| **Biodiesel** | (FAME - biodiesel produced to BS EN 14214). Produced from vegetable oils or animal fats by mixing them with ethanol or methanol to break them down. |
| **Bioenergy** | Bioenergy is renewable energy made from material of recent biological origin derived from plant or animal matter, known as biomass. |
| **Bioethanol** | Created from crops rich in starch or sugar by fermentation, distillation and finally dehydration. |
| **Biogas** | Energy produced from the anaerobic digestion of sewage and industrial waste. |
| **Biomass** | Renewable organic materials, such as wood, agricultural crops or wastes, and municipal wastes. Biomass can be burned directly or processed into biofuels such as ethanol and methane |
| **Bitumen** | The residue left after the production of lubricating oil distillates and vacuum gas oil for upgrading plant feedstock. Used mainly for road making and construction purposes. |

**Blast furnace gas** Mainly produced and consumed within the iron and steel industry. Obtained as a by-product of iron making in a blast furnace, it is recovered on leaving the furnace and used partly within the plant and partly in other steel industry processes or in power plants equipped to burn it. A similar gas is obtained when steel is made in basic oxygen steel converters; this gas is recovered and used in the same way.

**Breeze** Breeze can generally be described as coke screened below 19 mm (¾ inch) with no fines removed but the screen size may vary in different areas and to meet the requirements of particular markets.

**BG** British Gas

**BOS** Basic Oxygen Steel furnace gas

**BNFL** British Nuclear Fuels plc.

**BRE** Building Research Establishment

**Burning oil** A refined petroleum product, with a volatility in between that of motor spirit and gas diesel oil primarily used for heating and lighting.

**Butane** Hydrocarbon ($C_4H_{10}$), gaseous at normal temperature but generally stored and transported as a liquid. Used as a component in Motor Spirit to improve combustion, and for cooking and heating (see LPG).

**Calorific values (CVs)** The energy content of a fuel can be measured as the heat released on complete combustion. The SI (Système International) derived unit of energy and heat is the Joule. This is the energy in a given quantity of the fuel and is often measured in GJ per tonne. The energy content can be expressed as an upper (or gross) value and a lower (or net) value. The difference between the two values is due to the release of energy from the condensation of water in the products of combustion. Gross calorific values are used throughout this publication.

**Carbon Emission Reduction Target (CERT)** The Carbon Emissions Reduction Target (CERT) follows on from the Energy Efficiency Commitment (EEC). CERT requires gas and electricity suppliers to achieve targets for a reduction in carbon emissions generated by the domestic sector.

**CCA** Climate Change Agreement. Climate Change Agreements allow energy intensive business users to receive a 65 per cent discount from the Climate Change Levy (CCL), in return for meeting energy efficiency or carbon saving targets. The CCL is a tax on the use of energy in industry, commerce and the public sector. The aim of the levy is to encourage users to improve energy efficiency and reduce emissions of greenhouse gases.

**CCL** Climate Change Levy. The Climate Change Levy is a tax on the use of energy in industry, commerce and the public sector, with offsetting cuts in employers' National Insurance Contributions and additional support for energy efficiency schemes and renewable sources of energy. The aim of the levy is to encourage users to improve energy efficiency and reduce emissions of greenhouse gases.

| | |
|---|---|
| **$CO_2$** | Carbon dioxide. Carbon dioxide contributes about 60 per cent of the potential global warming effect of man-made emissions of greenhouse gases. Although this gas is naturally emitted by living organisms, these emissions are offset by the uptake of carbon dioxide by plants during photosynthesis; they therefore tend to have no net effect on atmospheric concentrations. The burning of fossil fuels, however, releases carbon dioxide fixed by plants many millions of years ago, and thus increases its concentration in the atmosphere. |
| **Co-firing** | The burning of biomass products in fossil fuel power stations |
| **Coke oven coke** | The solid product obtained from carbonisation of coal, principally coking coal, at high temperature. It is low in moisture and volatile matter. Used mainly in iron and steel industry. |
| **Coke oven gas** | Gas produced as a by-product of solid fuel carbonisation and gasification in coke ovens, but not from low temperature carbonisation plants. Synthetic coke oven gas is mainly natural gas which is mixed with smaller amounts of blast furnace and basic oxygen steel furnace gas to produce a gas with almost the same qualities as coke oven gas. |
| **Coking coal** | Within this publication, coking coal is coal sold by producers for use in coke ovens and similar carbonising processes. The definition is not therefore determined by the calorific value or caking qualities of each batch of coal sold, although calorific values tend to be higher than for steam coal. Not all coals form cokes. For a coal to coke it must exhibit softening and agglomeration properties, ie the end product must be a coherent solid. |
| **Colliery methane** | Methane released from coal seams in existing and abandoned deep mines and from coal beds which is piped to the surface and consumed at the colliery or transmitted by pipeline to consumers. |
| **Combined Cycle Gas Turbine (CCGT)** | Combined cycle gas turbine power stations combine gas turbines and steam turbines which are connected to one or more electrical generators in the same plant. The gas turbine (usually fuelled by natural gas or oil) produces mechanical power (to drive the generator) and heat in the form of hot exhaust gases. These gases are fed to a boiler, where steam is raised at pressure to drive a conventional steam turbine, which is also connected to an electrical generator. |
| **Combined Heat and Power (CHP)** | CHP is the simultaneous generation of usable heat and power (usually electricity) in a single process. The term CHP is synonymous with cogeneration and total energy, which are terms often used in the United States or other Member States of the European Community. The basic elements of a CHP plant comprise one or more prime movers driving electrical generators, where the steam or hot water generated in the process is utilised via suitable heat recovery equipment for use either in industrial processes or in community heating and space heating. |
| **CHPQA** | Combined Heat and Power Quality Assurance Scheme |
| **Conventional thermal power stations** | These are stations which generate electricity by burning fossil fuels to produce heat to convert water into steam, which then powers steam turbines. |

| | |
|---|---|
| **Cracking/conversion** | A refining process using combinations of temperature, pressure and in some cases a catalyst to produce petroleum products by changing the composition of a fraction of petroleum, either by splitting existing longer carbon chains or combining shorter carbon chain components of crude oil or other refinery feedstocks. Cracking allows refiners to selectively increase the yield of specific fractions from any given input petroleum mix depending on their requirements in terms of output products. |
| **CRC** | Carbon Reduction Commitment. The CRC Energy Efficiency scheme is a mandatory scheme aimed at improving energy efficiency and cutting emissions in large public and private sector organistaions. |
| **Crude oil** | A mineral oil consisting of a mixture of hydrocarbons of natural origins, yellow to black in colour, of variable density and viscosity. |
| **DECC** | Department of Energy and Climate Change |
| **DEFRA** | Department for Environment, Food and Rural Affairs |
| **DERV** | Diesel engined road vehicle fuel used in internal combustion engines that are compression-ignited. |
| **DFT** | Department for Transport |
| **Distillation** | A process of separation of the various components of crude oil and refinery feedstocks using the different temperatures of evaporation and condensation of the different components of the mix received at the refineries. |
| **DNC** | Declared net capacity and capability are used to measure the maximum power available from generating stations at a point in time. |
| **DNO** | Distribution Network Operator |
| **Downstream** | Used in oil and gas processes to cover the part of the industry after the production of the oil and gas. For example, it covers refining, supply and trading, marketing and exporting. |
| **DUKES** | Digest of United Kingdom Energy Statistics, the Digest provides essential information for everyone, from economists to environmentalists and from energy suppliers to energy users. |
| **EHCS** | English House Condition Survey |
| **Embedded Generation** | Embedded generation is electricity generation by plant which has been connected to the distribution networks of the public electricity distributors rather than directly to the National Grid Company's transmission systems. Typically they are either smaller stations located on industrial sites, or combined heat and power plant, or renewable energy plant such as wind farms, or refuse burning generators. The category also includes some domestic generators such as those with electric solar panels. |
| **Energy use** | Energy use of fuel mainly comprises use for lighting, heating or cooling, motive power and power for appliances. See also non-energy use. |
| **ESA** | European System of Accounts. An integrated system of economic accounts which is the European version of the System of National Accounts (SNA). |

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| **Ethane** | A light hydrocarbon gas ($C_2H_6$) in natural gas and refinery gas streams (see LPG). |
| **EU-ETS** | European Union Emissions Trading Scheme. This began on 1st January 2005 and involves the trading of emissions allowances as means of reducing emissions by a fixed amount. |
| **EUROSTAT** | Statistical Office of the European Commission. |
| **Exports** | For some parts of the energy industry, statistics on trade in energy related products can be derived from two separate sources. Firstly, figures can be reported by companies as part of systems for collecting data on specific parts of the energy industry (eg as part of the system for recording the production and disposals of oil from the UK continental shelf). Secondly, figures are also available from the general systems that exist for monitoring trade in all types of products operated by HM Revenue and Customs. |
| **Feed-In Tariffs** | The Feed-in Tariffs (FITs) scheme was introduced on 1 April 2010 to encourage deployment of small-scale (less than 5MW) low-carbon electricity generation. People with a qualifying technology receive a guaranteed payment from an electricity supplier of their choice for the electricity they generate and use, as well as a guaranteed payment for unused surplus electricity they export back to the grid. |
| **Feedstock** | In the refining industry, a product or a combination of products derived from crude oil, destined for further processing other than blending. It is distinguished from use as a chemical feedstock etc. |
| **Final energy consumption** | Energy consumption by final user – ie which is not being used for transformation into other forms of energy. |
| **Fossil fuels** | Coal, natural gas and fuels derived from crude oil (for example petrol and diesel) are called fossil fuels because they have been formed over long periods of time from ancient organic matter. |
| **Fuel oils** | The heavy oils from the refining process; used as fuel in furnaces and boilers of power stations, industry, in domestic and industrial heating, ships, locomotives, metallurgic operation, and industrial power plants etc. |
| **Fuel oil - Light** | Fuel oil made up of heavier straight-run or cracked distillates and used in commercial or industrial burner installations not equipped with pre-heating facilities. |
| **Fuel oil - Medium** | Other fuel oils, sometimes referred to as bunker fuels, which generally require pre-heating before being burned, but in certain climatic conditions do not require pre-heating. |
| **Fuel oil - Heavy** | Other heavier grade fuel oils which in all situations require some form of pre-heating before being burned. |
| **Fuel poverty** | The old definition of a fuel poor household was one needing to spend in excess of 10 per cent of household income to achieve a satisfactory heating regime (21ºC in the living room and 18ºC in the other occupied rooms). The new definition, adopted under the under the Low Income High Costs (LIHC) framework, is that a household is said to be in fuel poverty if they have required fuel costs that are above average (the national median level), and were they to spend that amount they would be left with a residual income below the official poverty line |

**Gas Diesel Oil** — The medium oil from the refinery process; used as a fuel in diesel engines (ie internal combustion engines that are compression-ignited), burned in central heating systems and used as a feedstock for the chemical industry.

**GDP** — Gross Domestic Product.

**GDP deflator** — An index of the ratio of GDP at current prices to GDP at constant prices. It provides a measure of general price inflation within the whole economy.

**Gigajoule (GJ)** — A unit of energy equal to $10^9$ joules.

**Gigawatt (GW)** — A unit of electrical power, equal to $10^9$ watts.

**Green Deal** — A scheme by which energy-saving improvements can be made to a home or business without having to pay all the costs up front; energy-saving improvements include:

- insulation - eg loft or cavity wall insulation
- heating
- draught-proofing
- double glazing
- renewable energy technologies - eg solar panels or wind turbines

**Heat pumps** — Heat pumps use a heat exchanger (much like that installed in fridges and freezers – although running in reverse) to take heat from the ground or air and convert it into heating in the home (either radiators, underfloor heating or warm air heating systems and hot water). Ground source heat pumps use pipes which are buried in the ground to extract heat. Air source heat pumps absorb heat from the outside air. Heat pumps need electricity to run, but the heat they extract from the ground or air is constantly being renewed naturally.

**Heat sold** — Heat (or steam) that is produced and sold under the provision of a contract. Heat sold is derived from heat generated by Combined Heat and Power (CHP) plants and from community heating schemes without CHP plants.

**HMRC** — HM Revenue and Customs.

**Imports** — Before the 1997 edition of the Digest, the term "arrivals" was used to distinguish figures derived from the former source from those import figures derived from the systems operated by HM Revenue and Customs. To make it clearer for users, a single term is now being used for both these sources of figures (the term imports) as this more clearly states what the figures relate to, which is goods entering the UK.

**Indigenous production** — The extraction or capture of primary fuels: for oil this includes production from the UK Continental Shelf, both onshore and offshore.

**Industrial spirit** — Refined petroleum fractions with boiling ranges up to 200ºC dependent on the use to which they are put – e.g. seed extraction, rubber solvents, perfume etc.

**International Energy Agency (IEA)** — The IEA is an autonomous body located in Paris which was established in November 1974 within the framework of the Organisation for Economic Co-operation and Development (OECD) to implement an international energy programme.

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| **ISSB** | International Steel Statistics Bureau |
| **Joules** | A joule is a generic unit of energy in the conventional SI system. It is equal to the energy dissipated by an electrical current of 1 ampere driven by 1 volt for 1 second; it is also equal to twice the energy of motion in a mass of 1 kilogram moving at 1 metre per second. |
| **Kilowatt (kW)** | 1,000 watts |
| **Landfill gas** | The methane-rich biogas formed from the decomposition of organic material in landfill. |
| **LDF** | Light distillate feedstock |
| **LDZ** | Local distribution zone |
| **Liquefied Natural Gas (LNG)** | Natural gas that has been converted to liquid form for ease of storage or transport. |
| **Liquefied Petroleum Gas (LPG)** | Gas, usually propane or butane, derived from oil and put under pressure so that it is in liquid form. Often used to power portable cooking stoves or heaters and to fuel some types of vehicle, eg some specially adapted road vehicles, forklift trucks. |
| **Lead Replacement Petrol (LRP)** | An alternative to Leaded Petrol containing a different additive to lead (in the UK usually potassium based) to perform the lubrication functions of lead additives in reducing engine wear. |
| **Lubricating oils** | Refined heavy distillates obtained from the vacuum distillation of petroleum residues. Includes liquid and solid hydrocarbons sold by the lubricating oil trade, either alone or blended with fixed oils, metallic soaps and other organic and/or inorganic bodies. |
| **Magnox** | A type of gas-cooled nuclear fission reactor developed in the UK, so called because of the magnesium alloy used to clad the uranium fuel. |
| **Major Power Producers** | Companies whose prime purpose is the generation of electricity. |
| **Megawatt (MW)** | 1,000 kilowatts. MWe is used to emphasise when electricity is being measured. MWt is used when heat ("thermal") is being measured. |
| **Micro CHP** | Micro CHP is a new technology that is expected to make a significant contribution to domestic energy efficiency in the future. |
| **Motor spirit** | Blended light petroleum product used as a fuel in spark-ignition internal combustion engines (other than aircraft engines). |
| **NAEI** | National Atmospheric Emissions Inventory |
| **Naphtha** | (Light distillate feedstock) – Petroleum distillate boiling predominantly below 200ºC. |

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| **National Allocation Plan (NAP)** | Under the EU Emissions Trading Scheme (EU-ETS) Directive each EU country must have a National Allocation Plan which lays down the overall contribution of the EU-ETS participants (the "cap") for the country and the allowances that each sector and each individual installation covered under the Directive is allocated, effectively stating how much that sector can emit over the trading period of the scheme. |
| **Natural gas** | Natural gas is a mixture of naturally occurring gases found either in isolation, or associated with crude oil, in underground reservoirs. The main components are methane, ethane, propane and butane. Hydrogen sulphide and carbon dioxide may also be present, but these are mostly removed at or near the well head in gas processing plants. |
| **Natural gas - compressed** | Natural gas that has been compressed to reduce the volume it occupies to make it easier to transport other than in pipelines. Whilst other petroleum gases can be compressed such that they move into liquid form, the volatility of natural gas is such that liquefaction cannot be achieved without very high pressures and low temperatures being used. As such, the compressed form is usually used as a "half-way house". |
| **Natural gas liquids (NGLs)** | A mixture of liquids derived from natural gas and crude oil during the production process, including propane, butane, ethane and gasoline components (pentanes plus). |
| **NDA** | Nuclear Decommissioning Authority |
| **NETA** | New Electricity Trading Arrangements - In England and Wales these arrangements replaced "the pool" from 27 March 2001. The arrangements are based on bi-lateral trading between generators, suppliers, traders and customers and are designed to be more efficient, and provide more market choice. |
| **NFFO** | Non Fossil Fuel Obligation. The 1989 Electricity Act empowers the Secretary of State to make orders requiring the Regional Electricity Companies in England and Wales to secure specified amounts of electricity from renewable sources. |
| **NFPA** | Non Fossil Purchasing Agency |
| **NIE** | Northern Ireland Electricity |
| **NI NFFO** | Northern Ireland Non Fossil Fuel Obligation |
| **Non-energy use** | Includes fuel used for chemical feedstock, solvents, lubricants, and road making material. |
| **$NO_X$** | Nitrogen oxides. A number of nitrogen compounds including nitrogen dioxide are formed in combustion processes when nitrogen in the air or the fuel combines with oxygen. These compounds can add to the natural acidity of rainfall. |
| **NUTS** | Nonmenclature of Units for Territorial Statistics |
| **OFGEM** | The regulatory office for gas and electricity markets |
| **OFT** | Office of Fair Trading |
| **ONS** | Office for National Statistics |

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| **Orimulsion** | An emulsion of bitumen in water that was used as a fuel in some power stations until 1997. |
| **OTS** | Overseas Trade Statistics of the United Kingdom |
| **Patent fuel** | A composition fuel manufactured from coal fines by shaping with the addition of a binding agent (typically pitch). The term manufactured solid fuel is also used. |
| **Petrochemical feedstock** | All petroleum products intended for use in the manufacture of petroleum chemicals. This includes middle distillate feedstock of which there are several grades depending on viscosity. The boiling point ranges between 200°C and 400°C. |
| **Petroleum cokes** | Carbonaceous material derived from hydrocarbon oils, uses for which include metallurgical electrode manufacture and in the manufacture of cement. |
| **Photovoltaics** | The direct conversion of solar radiation into electricity by the interaction of light with the electrons in a semiconductor device or cell. |
| **PILOT** | Phase 2 (PILOT) is the successor body to the Oil & Gas Industry Task Force (OGITF) and was established on 1 January 2000, to secure the long-term future of the oil and gas industry in the UK. A forum that brings together Government and industry to address the challenges facing the oil and gas industry. One outcome of PILOT's work is the published Code of Practice on Supply Chain Relationships. |
| **Plant capacity** | The maximum power available from a power station at a point in time. |
| **Plant loads, demands and efficiency** | Measures of how intensively and efficiently power stations are being used. |
| **PPRS** | Petroleum production reporting system. Licensees operating in the UK Continental Shelf are required to make monthly returns on their production of hydrocarbons (oil and gas) to DECC. This information is recorded in the PPRS, which is used to report flows, stocks and uses of hydrocarbon from the well-head through to final disposal from a pipeline or terminal (see DUKES internet annex F on the DECC energy statistics website for further information). |
| **Primary electricity** | Electricity obtained other than from fossil fuel sources, e.g. nuclear, hydro and other non-thermal renewables. Imports of electricity are also included. |
| **Primary fuels** | Fuels obtained directly from natural sources, e.g. coal, oil and natural gas. |
| **Process oils** | Partially processed feedstocks which require further processing before being classified as a finished product suitable for sale. They can also be used as a reaction medium in the production process. |
| **Propane** | Hydrocarbon containing three carbon atoms ($C_3H_8$), gaseous at normal temperature, but generally stored and transported under pressure as a liquid. |
| **RD** | Renewables Directive – this proposes that EU Member States adopt national targets that are consistent with the overall EU target of 20 per cent of energy from renewables by 2020. |

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| **Refinery fuel** | Petroleum products produced by the refining process that are used as fuel at refineries. |
| **Reforming** | Processes by which the molecular structure of different fractions of petroleum can be modified. It usually involves some form of catalyst, most often platinum, and allows the conversion of lower grades of petroleum product into higher grades, improving their octane rating. It is a generic term for processes such as cracking, cyclization, dehydrogenation and isomerisation. These processes generally led to the production of hydrogen as a by-product, which can be used in the refineries in some desulphurization procedures. |
| **Renewable energy sources** | Renewable energy includes solar power, wind, wave and tide, and hydroelectricity. Solid renewable energy sources consist of wood, straw, short rotation coppice, other biomass and the biodegradable fraction of wastes. Gaseous renewables consist of landfill gas and sewage gas. Non-biodegradable wastes are not counted as a renewables source but appear in the Renewable sources of energy chapter of this Digest for completeness. |
| **Reserves** | With oil and gas these relate to the quantities identified as being present in underground cavities. The actual amounts that can be recovered depend on the level of technology available and existing economic situations. These continually change; hence the level of the UK's reserves can change quite independently of whether or not new reserves have been identified. |
| **RESTATS** | The Renewable Energy Statistics database for the UK. |
| **Ricardo-AEA** | Formerly known as AEA Energy & Environment. |
| **RO** | Renewables Obligation – this is an obligation on all electricity suppliers to supply a specific proportion of electricity from eligible renewable sources. |
| **ROCs** | Renewables Obligation Certificates |
| **Seasonal Performance Factor** | The Seasonal Performance Factor (SPF) of a heat pump is the total useful heat delivered during a year divided by the annual electricity consumption of the pump. The SPF gives an indication of the efficiency of the pump, with values greater than 1 implying that more useful heat is produced than the electricity used to power the pump. |
| **Secondary fuels** | Fuels derived from natural primary sources of energy. For example electricity generated from burning coal, gas or oil is a secondary fuel, as are coke and coke oven gas. |
| **SI (Système International)** | Refers to the agreed conventions for the measurement of physical quantities**.** |

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| **SIC** | The United Kingdom Standard Industrial Classification of Economic Activities (SIC) is used to classify business establishments and other standard units by the type of economic activity in which they are engaged. It provides a framework for the collection, tabulation, presentation and analysis of data and its use promotes uniformity. In addition, it can be used for administrative purposes and by non-government bodies as a convenient way of classifying industrial activities into a common structure.<br><br>The system is identical to the EUROSTAT System NACE at the four digit class level and the United Nations system ISIC at the two digit Divisional level. |
| **$SO_2$** | Sulphur Dioxide. Sulphur dioxide is a gas produced by the combustion of sulphur-containing fuels such as coal and oil. |
| **SRO** | Scottish Renewable Orders |
| **Steam coal** | Within this publication, steam coal is coal classified as such by UK coal producers and by importers of coal. It tends to be coal having lower calorific values; the type of coal that is typically used for steam raising. |
| **Synthetic coke oven gas** | Mainly a natural gas, which is mixed with smaller amounts of blast furnace, and BOS (basic oxygen steel furnace) gas to produce a gas with almost the same quantities as coke oven gas. |
| **Tars** | Viscous materials usually derived from the destructive distillation of coal which are by-products of the coke and iron making processes. |
| **Temperature correction** | The temperature corrected series of total inland fuel consumption indicates what annual consumption might have been if the average temperature during the year had been the same as the average for the years 1971 to 2000. |
| **Terawatt (TW)** | 1,000 gigawatts |
| **Therm** | A common unit of measurement similar to a tonne of oil equivalent which enables different fuels to be compared and aggregated. |
| **Thermal efficiency** | The thermal efficiency of a power station is the efficiency with which heat energy contained in fuel is converted into electrical energy. It is calculated for fossil fuel burning stations by expressing electricity generated as a percentage of the total energy content of the fuel consumed (based on average gross calorific values). For nuclear stations it is calculated using the quantity of heat released as a result of fission of the nuclear fuel inside the reactor. |
| **Thermal Sources of Electricity** | These include coal, oil, natural gas, nuclear, landfill gas, sewage gas, municipal solid waste, farm waste, tyres, poultry litter, short rotation coppice, straw, coke oven gas, blast furnace gas, and waste products from chemical processes. |
| **Tonne of oil equivalent (toe)** | A common unit of measurement which enables different fuels to be compared and aggregated |
| **TWh** | Terawatt hour |
| **UKCS** | United Kingdom Continental Shelf |

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| **UKPIA** | UK Petroleum Industry Association. The trade association for the UK petroleum industry. |
| **UKSA** | UK Statistics Authority |
| **Ultra low sulphur Diesel (ULSD)** | A grade of diesel fuel which has a much lower sulphur content (less than 0.005 per cent or 50 parts per million) and of a slightly higher volatility than ordinary diesel fuels. As a result it produces fewer emissions when burned, and initially enjoyed a lower rate of hydrocarbon oil duty in the UK than ordinary diesel to promote its use, although duty rates on standard diesel and ULSD have since been equalised. Virtually 100 per cent of sales of DERV fuel in the UK are ULSD. |
| **Ultra low sulphur Petrol (ULSP)** | A grade of motor spirit with a similar level of sulphur to ULSD (less than 0.005 per cent or 50 parts per million). ULSP initially enjoyed a lower rate of hydrocarbon oil duty in the UK than ordinary petrol to promote its use, although duty rates on standard petrol and ULSP have since been equalised. It has quickly replaced ordinary premium grade unleaded petrol in the UK market place. |
| **Upstream** | A term to cover the activities related to the exploration, production and delivery to a terminal or other facility of oil or gas for export or onward shipment within the UK. |
| **VAT** | Value added tax |
| **Watt (W)** | The conventional unit to measure a rate of flow of energy. One watt amounts to 1 joule per second. |
| **White spirit** | A highly refined distillate with a boiling range of about 150ºC to 200ºC used as a paint solvent and for dry cleaning purposes etc. |

# Annex C
# Further sources of United Kingdom energy publications

Some of the publications listed below give shorter term statistics, some provide further information about energy production and consumption in the United Kingdom and in other countries, and others provide more detail on a country or fuel industry basis. The list also covers recent publications on energy issues and policy, including statistical information, produced or commissioned by DECC. The list is not exhaustive and the titles of publications and publishers may alter. Unless otherwise stated, all titles are available from

**Publications Orderline**
**Phone: 0845 504 9188**
**Email: deccteam@decc.ecgroup.net**

and can also be found on the DECC section of the GOV.UK website at:
www.gov.uk/government/organisations/department-of-energy-climate-change

## Department of Energy and Climate Change publications on energy statistics

### Energy Statistics
Monthly, quarterly and annual statistics on production and consumption of overall energy and individual fuels in the United Kingdom together with energy prices is available in MS Excel format on the Internet at: www.gov.uk/government/organisations/department-of-energy-climate-change/about/statistics

### Energy Trends
A quarterly publication covering all major aspects of energy. It provides a comprehensive picture of energy production and use and contains analysis of data and articles covering energy issues. Available on the Internet at: www.gov.uk/government/collections/energy-trends.

### Energy Prices
A quarterly publication containing tables, charts and commentary covering energy prices to domestic and industrial consumers for all the major fuels as well as presenting comparisons of fuel prices in the European Union and G7 countries. Available on the Internet at:
www.gov.uk/government/collections/quarterly-energy-prices.

### Energy Flow Chart
An annual publication illustrating the flow of primary fuels from home production and imports to their eventual final uses. They are shown in their original state and after being converted into different kinds of energy by the secondary fuel producers. The 2015 edition of the chart shows the flows for 2014. Available free from DECC, Tel 0300 068 5041 and from the Publications Orderline. It is also available on the Internet at: www.gov.uk/government/collections/energy-flow-charts.

### UK Energy in Brief
An annual publication summarising the latest statistics on energy production, consumption and prices in the United Kingdom. The figures are taken from “Digest of UK Energy Statistics”. Available free from DECC, Tel 0300 068 5041 and from the Publications Orderline. It is also available on the Internet at:
www.gov.uk/government/collections/uk-energy-in-brief

### UK Energy Sector Indicators

An annual publication designed to show the extent to which secure, diverse and sustainable supplies of energy to UK businesses and consumers, at competitive prices, are ensured. It is available on the Internet at: www.gov.uk/government/collections/uk-energy-sector-indicators

### Energy Consumption in the United Kingdom

Energy consumption in the United Kingdom brings together statistics from a variety of sources to produce a comprehensive review of energy consumption and changes in efficiency, intensity and output since the 1970s, with a particular focus on trends since 1990. The information is presented in five sections covering overall energy consumption and energy consumption in the transport, domestic, industrial and service sectors. It is available on the Internet at:
www.gov.uk/government/collections/energy-consumption-in-the-uk

### Sub-National Energy Consumption statistics

Sub-National data are produced by DECC to emphasise the importance of local and regional decision making for energy policy in delivering a number of national energy policy objectives. Data can be accessed on the Internet at:
www.gov.uk/government/organisations/department-of-energy-climate-change/about/statistics#sub-national-energy-consumption-statistics

### National Energy Efficiency Data-framework (NEED)

DECC has constructed a National Energy Efficiency Data-framework (NEED) to enable detailed statistical analysis of energy efficiency. The data framework matches the gas and electricity consumption data collected for DECC sub-national energy consumption statistics and records of energy efficiency measures in the Homes Energy Efficiency Database (HEED) run by the Energy Saving Trust (EST), as well as typographic data about dwellings and households. Data can be accessed on the Internet at:
www.gov.uk/government/collections/national-energy-efficiency-data-need-framework

### Fuel Poverty statistics

An annual report detailing the latest statistics on fuel poverty. It is available on the Internet at: www.gov.uk/government/collections/fuel-poverty-statistics

### Green Deal and Energy Company Obligation Statistics

DECC publishes a range of information relating to the rollout of the Green Deal and ECO policy. This includes number of GD Assessments, number of GD Plans, number of energy efficiency measures installed, data on the amount of GD cashback vouchers issued, data on ECO brokerage, and information on the supply chain. DECC also publishes quarterly statistics on the levels of wall and loft insulation in Great Britain, along with information on the remaining potential for insulation measures. Data can be accessed on the Internet at:
www.gov.uk/government/collections/green-deal-and-energy-company-obligation-eco-statistics

### UK Greenhouse Gas Emissions statistics

Emissions data are produced by DECC to show progress against the UK's goals, both international and domestic, for reducing greenhouse gas emissions. Data can be accessed on the Internet at:
www.gov.uk/government/collections/uk-greenhouse-gas-emissions

### UK Energy and CO2 emissions projections

The Updated Energy Projections (UEP) are published annually by DECC. They provide updated projections and analysis of energy use and carbon dioxide emissions in the UK. The UEP exercise incorporates all firm environmental policy measures and is based on updated assumptions consistent with the most recent UK Budget announcements. The latest report is available on the Internet at:
www.gov.uk/government/collections/energy-and-emissions-projections

## Department of Energy and Climate Change policy publications

### Annual Energy Statement

The Annual Energy Statement fulfils the commitment in the Coalition Programme for the Government to present an annual statement of energy policy to Parliament. The first statement was delivered to Parliament on 27 June 2010, with subsequent statements delivered on 23 November 2011, 29 November 2012 and 31 October 2013. The latest Statement, delivered on 6 November 2014, is available on the Internet at: www.gov.uk/government/publications/annual-energy-statement-2014

### Energy Act 2013

The Energy Act 2013 was given Royal Assent on 18 December 2013. The Act is available on the Internet at: www.legislation.gov.uk/ukpga/2013/32/contents

### Energy Act 2011

The Energy Act 2011 was given Royal Assent on 18 October 2011. The Act is available on the Internet at: www.legislation.gov.uk/ukpga/2011/16/contents

### Electricity Market Reform (EMR) White Paper

On 12 July 2011 the Government published 'Planning our electric future: a White Paper for secure, affordable and low-carbon electricity'. The White Paper sets out key measures to attract investment, reduce the impact on consumer bills, and create a secure mix of electricity sources including gas, new nuclear, renewables, and carbon capture and storage. The White Paper is available on the Internet at: www.gov.uk/government/publications/planning-our-electric-future-a-white-paper-for-secure-affordable-and-low-carbon-energy

### Energy Act 2010

The Energy Act 2010 was given Royal Assent on 8 April 2010. The Act is available on the Internet at: www.legislation.gov.uk/ukpga/2010/27/contents

### UK Low Carbon Transition Plan

The UK Low Carbon Transition Plan was published on 15 July 2009. The Plan is available on the Internet at: www.gov.uk/government/publications/the-uk-low-carbon-transition-plan-national-strategy-for-climate-and-energy

### Energy Act 2008

The Energy Act 2008 was granted Royal Assent on 26 November 2008. The Act is available on the Internet at: www.legislation.gov.uk/ukpga/2008/32/contents

### Climate Change Act 2008

The Climate Change Act 2008 was granted Royal Assent on 26 November 2008. The Act is available on the Internet at: www.legislation.gov.uk/ukpga/2008/27/contents

## Other publications including energy information

### General

Eurostat Yearbook (annual); *Statistical Office of the European Commission - Eurostat*
Eurostatistics (monthly); *Statistical Office of the European Commission – Eurostat*
Index of production (monthly); *Office for National Statistics*
Overseas Trade Statistics (OTS) of the United Kingdom; *H.M. Revenue and Customs*
- OTS trade with EU countries (monthly)
- OTS trade with non EU countries (monthly)

Regional Yearbook (annual); *Statistical Office of the European Commission – Eurostat*
United Kingdom Minerals Yearbook; *British Geological Survey*

### Energy

BP Statistical Review of World Energy (annual); *BP*
Energy - Yearly Statistics; *Statistical Office of the European Commission – Eurostat*
Energy Balance Sheets; *Statistical Office of the European Commission – Eurostat*
Energy Statistics and Balances of Non-OECD Countries (annual); *International Energy Agency*
Energy Statistics and Balances of OECD Countries (annual); *International Energy Agency*
UN Energy Statistics Yearbook (annual); *United Nations Statistical Office*
World Energy Statistics and Balances (annual); *International Energy Agency*

### Coal

Annual Reports and Accounts of The Coal Authority and the private coal companies; (*apply to the Headquarters of the company concerned)*
Coal Information (annual); *International Energy Agency*
Coal Statistics (quarterly); *International Energy Agency*

### Oil and Gas

Annual Reports and Accounts of National Grid, Centrica and the independent oil and gas supply companies; (contact *the Headquarters of the company concerned directly)*
National Grid – Gas Ten Year Statement - (annual); *National Grid*
Oil and Gas Information (annual); *International Energy Agency*
Oil and Gas Statistics (quarterly); *International Energy Agency*
Petroleum Review (monthly); *Energy Institute*

### Electricity

Annual Report of The Office of Gas and Electricity Markets; *OFGEM*
Annual Reports and Accounts of the Electricity Supply Companies, Distributed Companies and Generators; (*apply to the Headquarters of the company concerned)*
Electricity Information (annual); *International Energy Agency*
Electricity Statistics (quarterly); *International Energy Agency*
National Grid – Electricity Ten Year Statement - (annual); *National Grid*

### Renewables

Renewables Information (annual); *International Energy Agency*

### Prices

Energy Prices and Taxes (annual); *International Energy Agency*

# Useful energy related websites

The DECC section of the GOV.UK website can be found at: www.gov.uk/government/organisations/department-of-energy-climate-change, the energy information and statistics section is at: www.gov.uk/government/organisations/department-of-energy-climate-change/about/statistics

## Other Government web sites

| | |
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| Department for Communities and Local Government. | www.gov.uk/government/organisations/department-for-communities-and-local-government |
| Department for Environment, Food and Rural Affairs | www.gov.uk/government/organisations/department-for-environment-food-rural-affairs |
| Department for Transport | www.gov.uk/government/organisations/department-for-transport |
| HM Government Online | www.gov.uk/ |
| HM Revenue & Customs | www.gov.uk/government/organisations/hm-revenue-customs |
| Northern Ireland Executive | www.northernireland.gov.uk |
| Ofgem (The Office of Gas and Electricity Markets) | www.ofgem.gov.uk/ |
| The Scottish Government | www.gov.scot/ |
| The Scottish Parliament | www.scottish.parliament.uk/ |
| UK Parliament | www.parliament.uk/ |
| UK Statistics Authority | www.statisticsauthority.gov.uk/ |
| Welsh Government | http://gov.wales/ |

## Other useful energy related web sites

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| BP | www.bp.com/ |
| British Geological Survey | www.bgs.ac.uk/ |
| BRE (Building Research Establishment) | www.bre.co.uk/ |
| The Coal Authority | www.gov.uk/government/organisations/the-coal-authority |
| Energy Institute | www.energyinst.org/home |
| Energy Networks Association | www.energynetworks.org/ |
| Energy UK | www.energy-uk.org.uk/ |
| Europa (European Union Online) | http://europa.eu/ |
| Eurostat | http://europa.eu/index_en.htm |
| Interconnector | www.interconnector.com/ |
| International Energy Agency (IEA) | www.iea.org/ |
| International Steel Statistics Bureau (ISSB) | www.issb.co.uk/ |
| National Grid | www2.nationalgrid.com/ |
| Oil & Gas UK | www.oilandgasuk.co.uk/ |
| Renewable UK | www.renewableuk.com/ |
| Ricardo - AEA | www.ricardo-aea.com/cms/ |
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| UK-AIR: Air Information Resource | http://uk-air.defra.gov.uk/ |
| UK Petroleum Industry Association | www.ukpia.com/home.aspx |
| United Nations Statistics Division | http://unstats.un.org/unsd/default.htm |
| US Department of Energy | http://energy.gov/ |
| US Energy Information Administration | www.eia.gov/ |

# Annex D

## Major events in the Energy Industry

**2015**

**Electricity**

Planning consent was given in June 2015 for the construction of the world's first tidal lagoon. If built, turbines in the proposed six-mile horseshoe shaped sea wall around Swansea Bay in Wales could generate around 500GWh per year of low carbon electricity.

The Government gave consent to the Dogger Bank Creyke Beck A and B offshore wind project off the coast of Yorkshire in February 2015. Once built it will generate enough electricity to power almost 2 million homes.

**Energy Policy**

A new Energy Bill was proposed in the Queen's Speech in May 2015 which will:

- Ensure there will be affordable and reliable energy for businesses and families;
- Give the Oil and Gas Authority the powers it needs to become a robust, independent and effective regulator, and enable it to maximise the economic recovery of oil and gas from UK waters.
- Change the law to give local communities the final say on wind farm applications.

The Infrastructure Act became law in February 2015 enshrining new measures to make it easier, quicker and simpler to get Britain building. The legislation will give local people the right to buy a stake in renewable energy projects, as well as boosting energy security and economic growth by extracting domestic shale gas, which has the potential to create jobs, making the UK less reliant on imports from abroad and so help tackle climate change.

**Fuel Poverty**

A new Fuel Poverty strategy, the first for over a decade, was launched in March 2015 which outlines the challenges and actions for the next 15 years to ensure Government take the right steps to tackle fuel poverty and to get help to those who need it most. A new legally binding target, in force since December 2014, forms a key part of the new strategy; it requires a minimum standard of energy efficiency (Band C) for as many fuel poor homes as reasonably practicable by 2030.

2014

**Carbon Capture and Storage (CCS)**

In February 2014 the Government agreed a multi-million pound contract for engineering, design and financial work on the Peterhead CCS project in Aberdeenshire with Shell, to take their gas carbon capture and storage (CCS) project into the next stage of development. The world's first planned gas CCS project, Peterhead involves installing carbon capture technology onto SSE's existing Peterhead gas power plant, and transporting the CO2 100km offshore for safe, permanent storage 2km under the North Sea in the old Goldeneye gas field. If built, the project could save 1 million tonnes CO2 each year and provide clean electricity to over 500,000 homes.

**Climate Change**

At a meeting in October 2014 the European Union reached a deal to cut greenhouse gases by at least 40% domestically by 2030. The target is part of a package of measures to make Europe's energy system more secure, sustainable and competitive.

**Electricity**

The Government gave consent to the Hornsea Project One offshore wind farms off the coast of Yorkshire in December 2014. Once built, the wind farms are expected to generate enough electricity to power more than 800.000 homes.

The Government gave consent to the Walney extension offshore wind farm in the Irish Sea in November 2014. Once built, the wind farm is expected to generate enough electricity to power over half a million homes.

In October 2014 the Norwegian Government granted a licence for the longest sub-sea electricity interconnector in the world, to be built between the UK and Norway. The interconnector, known as NSN, will have a capacity of 1400 megawatt (MW), and is planned to be commissioned in 2020.

The Government provided £10 million worth of grant funding to the Meygen project in August 2014. The project will see the world's biggest tidal array be built in North Scotland and will provide enough electricity to power 175,000 homes.

The Government gave consent to the Rampion offshore wind farm off the coast of Sussex in July 2014. Once built it is expected to generate enough electricity to power approximately 450,000 homes.

The Government gave consent to the East Anglia One offshore wind farm in June 2014. Once built it is expected to generate enough electricity to power approximately 820,000 homes.

In April 2014 the Government announced that eight renewable electricity projects were offered under the Final Investment Decision Enabling Programme (launched in advance of the Contracts for Difference (CfD) regime being put in place, which forms part of the Electricity Market Reform programme). They include offshore wind farms, coal to biomass conversions and a dedicated biomass plant with combined heat and power, which could add a further 4.5GW of low-carbon electricity to Britain's energy mix (or around 4% of capacity), generating enough clean electricity to power over three million homes.

**2014 (continued)**

**Energy Efficiency**

The Green Deal Home Improvement Fund (GDHIF) was launched in May 2014 with up to £120m available in 2014-15. The GDHIF is a new, innovative home improvement scheme open for all householders from early June. The scheme means householders could get up to £7,600 back on incentives covering a range of 13 energy efficiency improvements, including solid wall insulation, new heating systems and glazing."

The Government announced proposals for a set of changes to ECO in December 2013. These include: extending through to 2017, with new targets; reducing the ambition of the Carbon Saving Target element; and allowing new measures (loft and standard cavity wall insulation, and district heating) to be eligible under that element. The Government published a consultation on these proposals in March 2014, and intends subject to consultation that revised regulations will come into force later in 2014, but with many changes taking effect as from 1 April 2014.

**Energy Policy**

In March 2014 a range of energy policy measures were announced in the Budget, these include:

- Carbon Price Floor (CPF) - capping the Carbon Price Support (a tax on fossil fuels used to generate electricity) at £18.00 from 2016–17 to 2019–20;

- Energy intensive industries – these industries will continue to be compensated for the costs of the EU Emissions Trading Scheme (ETS) and Carbon Price Floor (CPF) until 2019–20. There will be a new compensation scheme for the price of the Renewables Obligation and small scale feed-in-tariffs from 2016–17.

- CHP - the Government is exempting fuel used to generate good quality electricity by Combined Heat and Power plants from the Carbon Price Floor (CPF), where that electricity is used onsite.

- Competition and small businesses - reaffirming the Government's commitment to make energy markets more competitive for small and very small businesses.

- Oil & Gas industry - investment to the tune of £1.9 million for 2014–15 and £5 million for 2015–16 to fund the establishment of a new body to take stewardship of the UK's oil and gas resources; introducing a new tax allowance to encourage offshore operators to invest further in new and existing ultra-high-pressure, high-temperature fields in the North Sea, and bringing forward a new tax allowance which will encourage further exploration of promising onshore shale gas resources.

- Carbon Capture and Storage innovation - the Government is providing £60m for low carbon energy innovation to Carbon Capture and Storage (CCS) technologies that have significant potential to reduce the cost of low carbon generation to the UK.

**2014 (continued)**

**Oil and Gas**

As part of the Budget announcement in March 2014, details of how the Capacity Market is being designed ahead of the first auction being held in December 2014 were published. The Capacity Market will help drive new investment in gas demand side capacity, and get the best out of the existing generation fleet as the UK moves to a low carbon electricity future. The Capacity Market is designed to ensure:

- 15 year capacity agreements will be available to new capacity providers;
- Existing capacity will be able to access rolling one year agreements;
- Penalties for unreliable capacity will be capped;
- The capacity auction's prices will be capped to protect consumers.

Sir Ian Wood's review into maximising North Sea oil and gas reserves was published in February 2014. The Review announced:

- a joint commitment between government and the industry to ensure production licences are awarded on the basis of recovering the maximum amount of petroleum from UK waters as a whole;
- greater collaboration between industry and government;
- a new independent regulator to supervise licensing and ensure maximum collaboration between companies to explore, develop and produce oil and gas.

**Renewable Heat**

In April 2014 the Government launched the domestic Renewable Heat Incentive to encourage a switch to renewable heating system in the domestic sector. This financial incentive scheme is open to homeowners, private landlords, social landlords and self-builders and is targeted at, but not limited to, homes off the gas grid. The scheme supports air to water heat pumps; biomass only boilers and biomass pellet stoves with integrated boilers; ground to water and water to water source heat pumps; flat plate and evacuated tube solar thermal panels.

**Renewables**

In March 2014, Siemens announced its decision to invest £160 million in wind turbine production and installation facilities in Yorkshire creating more than 1,000 new jobs in the Hull area. The plan will be spread across two sites comprising:

- the Green Port Hull project construction, assembly and service facility, and
- a new rotor blade manufacturing facility in East Riding.

2013

**Carbon Capture and Storage (CCS)**
In December 2013 the Government announced its intention to award a contract for detailed design and planning, known as a FEED study to the White Rose CCS project, based at the Drax site. The White Rose proposal is to build a new state-of-the-art 426 MWe (gross) clean coal power plant with full carbon capture and storage, bringing clean electricity to over 630,000 homes and capturing approximately 2 million tonnes of CO2 per year.

**Coal**
In March 2013 the Daw Mill Colliery in Warwickshire closed following a major fire. The fire, the largest seen in a UK coal mine in over 30 years, brought an end to 47 years of coal production at Daw Mill.

**Electricity**
In July 2013 National Grid announced that T-pylon, the winner of the Pylon Design Competition, is being offered for the first time in the UK for a new electricity connection in Somerset. The Hinkley Point connection which runs between Bridgwater and Avonmouth is needed to carry all the new electricity generation planned for the South West.

The Government gave consent to Galloper Wind Farm Limited in May 2013 to construct a 504MW wind farm off the coast of Suffolk and related infrastructure at Sizewell which will connect the wind farm to the electricity grid system. The 140 turbine development is expected to provide enough electricity to power the equivalent of as many as 500,000 homes a year when completed in 2017.

The Government gave consent to Ecotricity in February 2013, to construct a 66MW wind farm in East Heckington, Lincolnshire. It is estimated that the turbines will provide enough electricity to power the equivalent of as many as 39,700 homes a year.

**Energy Efficiency**
The Green Deal scheme, the Coalition Government's new initiative to transform Britain's homes, was launched in January 2013, giving people the opportunity to transform their homes by paying for energy efficient home improvements with the savings on their energy bills.

At the same time the Energy Company Obligation (ECO) came into force, working alongside the Green Deal, with the aims of saving carbon by supporting energy efficiency measures in harder to treat homes and enabling the installation of efficient boilers and insulation into the homes of vulnerable people across Great Britain.

**2013 (continued)**

**Energy Policy**

The Energy Bill completed its passage through both Houses of Parliament and was granted Royal Assent in December 2013. The Energy Act 2013 will now establish the legislative framework for delivering secure, affordable and low carbon energy. The Act includes provisions on:

- Electricity Market Reform (EMR) - the Act puts in place key measures to attract £110 billion investment needed to replace current generating capacity and to upgrade the grid by 2020, and to cope with the UK's rising demand for electricity;

- Decarbonisation – the Government will set a 2030 decarbonisation target range for the electricity sector in secondary legislation;

- Protecting consumers - the Act includes provisions on setting a limit on the number of energy tariffs offered to domestic consumers; requiring the automatic move of customers from poor value closed tariffs to cheaper deals, and requiring suppliers to provide information to consumers on the best alternative deals available.

In December 2013 the Government announced a series of proposals to reduce the impact of energy company price rises which should make British households on average £50 better off. These include:

- No reduction in help currently available to vulnerable households;

- Safeguarding green jobs;

- For people moving home there will be help in installing energy saving measures in order to cut their bills through improved energy efficiency.

In October 2013 the Government published its Annual Energy Statement, alongside the Statutory Security of Supply Report. The statement detailed a number of new important measures aimed at giving consumers more control including:

- Energy companies must make switching suppliers faster for consumers;

- Energy companies will be required to include a QR (Quick Response) code on energy bills;

- Energy companies should be more open about how they treat credit balances in consumers' accounts, making every effort to return money to customers with closed accounts;

- Ofgem will carry out a market assessment every year, working with the Office of Fair Trading and the new Competition and Market Authority to monitor market participants and ensure the market is working for residential and small business consumers and that all suppliers can compete fairly;

- Ofgem will also carry out a detailed assessment of energy suppliers' financial reporting practices and set out necessary steps to improve transparency – so consumers can see where their money is going.

**2013 (continued)**

In June 2013 the Government announced details of vital reforms for keeping the lights on and emissions and bills down. These reforms also highlighted the potential scale of investment, growth and job opportunities available in the energy economy. The reforms include:

- Government action to unlock up to £110 billion energy infrastructure investment and support up to 250,000 jobs by 2020;
- Capacity Market to be initiated in 2014 to bring on gas and other flexible electricity supply to meet future demand and reduce risks to security of supply from winter 2018;
- Renewable Strike Prices to help renewables contribute more than 30 per cent of total power by 2020.

In April 2013, the carbon price floor - a tax on carbon - came into effect. As part of the scheme, changes were made to the Climate Change Levy (CCL), setting up new carbon price support (CPS) rates of CCL for gas, solid fuels and liquefied petroleum gas (LPG) used in electricity generation.

In March 2013 Ofgem published the final domestic proposals from its Retail Market Review (RMR), proposing a new set of rules for the retail market to allow consumers to make better choices about their gas and electricity supply. The proposals from this review included reducing complexity for consumers when choosing tariffs, and arming consumers with more useful information when choosing their gas or electricity supplier.

In March 2013 the Government published 'The Future of Heating: Meeting the Challenge' setting out an action plan to ensure affordable, secure, low carbon heating plays an important role in the nation's energy mix. The action plan looks at the potential to cut emissions from heat across the whole UK economy and focuses on a number of key actions to spur on the move to low carbon heating alternatives and drive forward green growth.

In January 2013, the Office of Fair Trading reported that on the basis of evidence gathered, that competition is working well in the UK road fuel sector, although it identified an absence of pricing information on motorways as a concern. In response to the report, the Government announced in March 2013 that it would work with motorway service stations and other relevant bodies to improve the availability and visibility of motorway fuel price information for motorway users.

The Government tabled new clauses to the Energy Bill in February 2013, to ensure that consumers get a better deal on their energy bills, and to press ahead with decarbonising the power sector by 2030. The complexity and number of energy tariffs available for consumers will be reduced, and bills simplified, to deliver on the Prime Minister's commitment to help consumers get the cheapest tariff available. Clauses were also tabled to grant Government powers to set a 2030 decarbonisation target range for the electricity sector in 2016, once the Committee on Climate Change has provided advice on the level of the 5th carbon budget, and when the level of this carbon budget is set in law.

**2013 (continued)**

**Fuel Poverty**

Through the Energy Act 2013, the Government has laid the ground for a new legal framework to monitor fuel poverty in England using the Low Income High Costs Indicator (LIHC). This new measure of fuel poverty was first proposed in Professor Hills' review of Fuel Poverty and following consultation, the Government confirmed its intention to adopt the indicator in July 2013. In the strategic framework document, 'Fuel Poverty: a framework for future action' the Government set out how the new indicator will inform the strategic approach to tackling fuel poverty, including setting a new fuel poverty target which will be underpinned by a new fuel poverty strategy.

**Nuclear**

Planning consent was given by the Government in March 2013 for construction of the first new nuclear power station in the UK since 1995. The station at Hinkley Point, Somerset – to be operated by NNB Generation - will generate enough low carbon electricity to power the equivalent of five million households, making it one of the largest power stations in the UK.

**Oil and Gas**

In October 2013 the Government worked closely with the management, union, key stakeholders and the Scottish Government to help resolve the industrial dispute at Grangemouth oil refinery, ensuring that 800 jobs were saved. The Grangemouth complex, Scotland's largest industrial site, produces petrochemicals and supplies fuels primarily to customers in Scotland, northern England and Northern Ireland.

In May 2013, officials from the European Commission carried out unannounced inspections at the premises of several companies active in the crude oil, refined oil products and biofuels sectors. The Commission had concerns that the companies may have colluded in reporting distorted prices to a Price Reporting Agency to manipulate the published prices for a number of oil and biofuel products.

The Government gave consent to Statoil in February 2013, to drill the Mariner heavy oil field. At its peak the field is expected to produce around 55,000 barrels of oil per day, five per cent of UK daily production.

**Renewables**

In December 2013 the Drax coal-to-biomass conversion plant in North Yorkshire was officially opened. The plant will burn wood pellets rather than coal, which will reduce carbon emissions by 80 compared to coal and provide enough low carbon power to supply around 1 million homes

In July 2013 the Government gave approval for a 288 turbine offshore wind farm off the Lincolnshire and Norfolk coast, which will be capable of providing power to 820,000 homes.

In July 2013 the Government gave approval for a 99.9MW biomass power station at Blyth Harbour, Northumberland, which will be capable of providing power to 170,000 homes.

In March 2013 the Government gave approval for a 28 turbine wind power development at Brechfa Forest West, Carmarthenshire, which will be capable of providing power to 39,700 homes.

In February 2013 the Government gave approval for an extension at one of the first offshore wind farms built in the UK. Up to 17 new turbines will be added to Vattenfall's Kentish Flats offshore wind farm, which already hosts 30 turbines. Once extended it is estimated that the wind farm will be capable of providing power to an additional 35,000 homes.

*For major events in earlier years see the DECC website version of this annex at: www.gov.uk/government/collections/digest-of-uk-energy-statistics-dukes*

*DECC news stories including press releases, speeches and statements are available at: www.gov.uk/government/announcements*

## Notes


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## Standard conversion factors

This Digest uses the tonne of oil equivalent (toe) as the common unit of energy for comparing and aggregating fuels. The following table gives factors for converting between this unit and alternative units of energy found in this and other publications. (See Chapter 1, Technical notes and definitions and Annex A).

| | *to:* Thousand toe | Terajoules (TJ) | Gigawatt hours (GWh) | Million therms |
|---|---|---|---|---|
| *from:* | *multiply by* | | | |
| Thousand toe | 1 | 41.868 | 11.630 | 0.39683 |
| Terajoules (TJ) | 0.023885 | 1 | 0.27778 | 0.0094778 |
| Gigawatt hours (GWh) | 0.085985 | 3.6000 | 1 | 0.034121 |
| Million therms | 2.5200 | 105.51 | 29.307 | 1 |

## A selection of estimated average gross calorific values

The following selection of estimated average gross calorific values apply to 2014. (For further information and more detailed calorific values see Annex A).

| **Solid fuels** | **GJ per tonne** |
|---|---|
| Coal | |
| All consumers (weighted average) (1) | 27.0 |
| Power stations (including imports) | 25.1 |
| Iron and steel | 30.4 |
| Other industries (weighted average) | 26.7 |
| Imported coal (weighted average) | 27.4 |
| Exported coal (weighted average) | 32.2 |
| | |
| Coke | 29.8 |
| Coke breeze | 29.8 |
| Other manufactured solid fuel | 29.8 |
| | |
| **Renewable sources** | |
| Domestic wood (2) | 14.9 |
| Industrial wood (3) | 18.6 |
| Municipal solid waste (4) | 9.2 |
| | |
| **Petroleum** | |
| Crude oil (weighted average) | 45.7 |
| Petroleum products (weighted average) | 46.4 |
| Motor spirit | 47.1 |
| Gas/diesel oil | 45.3 |
| DERV | 45.7 |
| Fuel oil | 43.4 |
| | |
| **Gases** | **MJ per cubic metre** |
| Natural gas (produced) | 39.7 |
| Landfill gas | 21-25 |
| Sewage gas | 21-25 |

*(1) All consumers (home produced plus imports minus exports).*

*(2) Based on a moisture content of 20 per cent.*

*(3) Average figure covering a range of possible feedstock.*

*(4) Average figure based on survey returns.*

# DIGEST OF UNITED KINGDOM ENERGY STATISTICS 2015

Energy is a major natural resource and a key factor in the economy and environment of the United Kingdom. Data on energy supply and demand, energy prices and values and trade in energy are vital components of this country's main economic and environmental indicators.

The **DIGEST OF UNITED KINGDOM ENERGY STATISTICS** provides essential information for everyone involved in energy, from economists to environmentalists, and from energy suppliers to energy users.

The 2015 edition of the Digest is the latest in a series which commenced publication 65 years ago. With extensive tables, charts and commentary covering all the major aspects of energy, it provides a detailed and comprehensive picture of energy production and use over the last 5 years. This edition, together with additional annexes and key series back to 1970, is available on the Internet at: www.gov.uk/government/collections/digest-of-uk-energy-statistics-dukes

**Energy Prices and Energy Trends**
www.gov.uk/government/collections/energy-trends
and
www.gov.uk/government/collections/quarterly-energy-prices


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ISBN 978-0-11-515531-4
9 780115 155314