Department for Energy Security & Net Zero

DUKES 2025

Annexes A - J and tables

Department for Energy Security & Net Zero

Annex A
Energy and commodity balances, conversion factors and calorific values

Balance principles

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.

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 DUKES table 1.1.

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).

Both commodity and energy balances show the flow of the commodity from its production, extraction or import through to its final use.

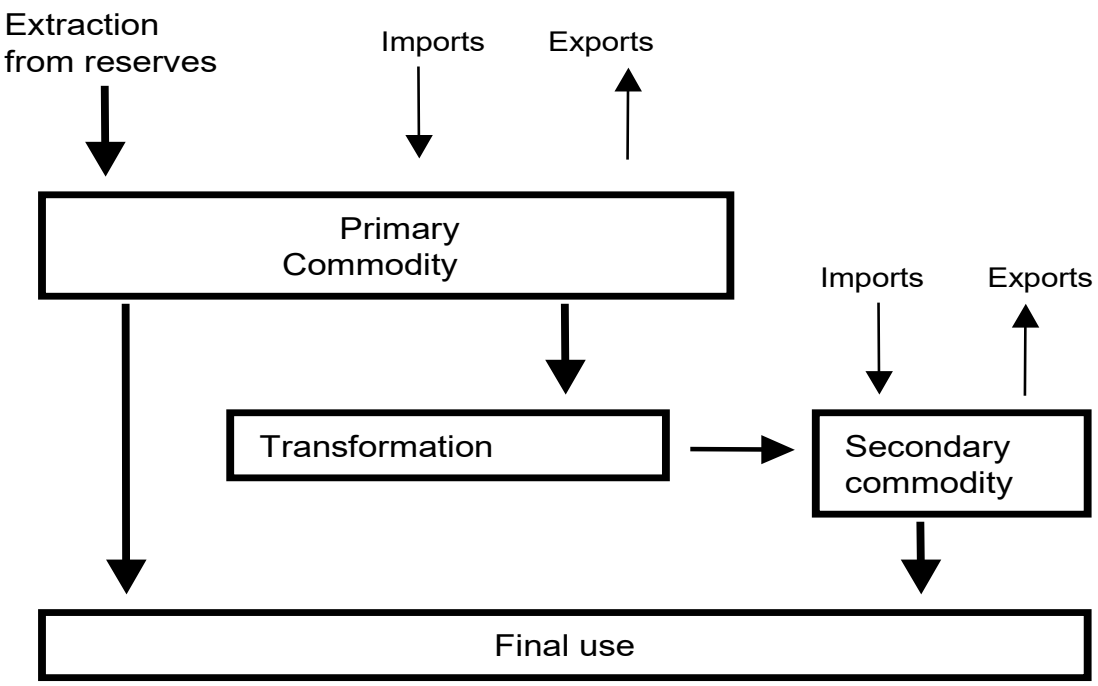
A simplified model of the commodity flow underlying the balance structure is given in Chart A.1. It illustrates how primary commodities may be used directly and/or be transformed into secondary commodities. The secondary fuels then enter final consumption or may also be transformed into another energy commodity (for example, electricity produced from fuel oil). To keep the diagram simple these “second generation” flows have not been shown.

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 (e.g. the production of coal, gas and crude oil).

Commodity balances (Tables 2.1, 3.1, 3.2, 4.1, 5.1, 5.2 and 6.1)

A commodity balance comprises a supply section and a demand section. The supply section gives available sources of supply (i.e., 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



Production

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

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

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.

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.

The convention in these balances is that exports are shown with a negative sign.

Marine bunkers

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

Additions to (- sign) and withdrawals from stocks (+ sign) held by producers and transformation industries correspond to withdrawals from and additions to supply, respectively.

Transfers

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 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. The transfers' row in table 1.1 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.

Total supply

The total supply available for national use is obtained by summing the flows above this entry in the balance.

Total demand

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 the *Final consumption* to *Non energy use* paragraphs.

Statistical difference

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 e.g. 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

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.

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. The transformation section of the energy balance shows, for each fuel, the net inputs for transformation uses.

Electricity generation

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 producers (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.

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 table 5.4. 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

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

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

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

The coals and other solid fuels used for the manufacture of solid patent fuels are reported under this heading.

Other

Any minor transformation activities not specified elsewhere are captured under this heading.

Energy industry use

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 (e.g. 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. 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 *Transformation* paragraphs).

Losses

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

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.

The classification of consumers according to their main business follows, as far as practicable, the *Standard Industrial Classification (SIC2007).*

Industry

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

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.

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, i.e. 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.

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 5.4.

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

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 the *Non energy use* paragraphs.

Transport

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 above). Supplies to fishing vessels are included under "agriculture".

Other sectors

The classification of all consumers groups under this heading, except *domestic and transport*, follows *SIC2007*. 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

The non energy use of fuels may be divided into two types. They may be used directly for their physical properties e.g. 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.

Both types of non energy use are shown under the *Non energy use* heading at the foot of the balances.

The energy balance (Table 1.1)

Principles

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.

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.

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.

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

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.

For fossil fuels, indigenous production represents the marketable quantity extracted from the reserves. Indigenous production of *Primary electricity* comprises hydro-electricity, wind, solar 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 the *Transformation* paragraphs below.

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.

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

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.

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, see DUKES table 5.10. 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.

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.

For electricity generated by major power producers, the inputs are shown in the m*ajor 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.

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.

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.

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

The figures for energy industry use and final consumption follow, in general, the principles and definitions described under commodity balances in the paragraphs above.

Standard conversion factors

1 tonne of oil equivalent (toe) =	10^7 kilocalories	
	396.83 therms	
	41.868 GJ	
	11,630 kWh	
100,000 British thermal units (Btu) =	1 therm	

The Digest of United Kingdom Energy Statistics (DUKES) 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)	=	1,000 kg
	=	0.9842 long ton
	=	1.102 short ton
1 statute or long ton	=	2,240 lb
	=	1.016 t
	=	1.120 short ton

Volume

1 cubic metre	=	35.31 cubic feet
1 cubic foot	=	0.02832 cubic metre
1 litre	=	0.22 imperial gallons
1 UK gallon	=	8 UK pints
	=	1.201 US gallons
	=	4.54609 litres
1 barrel	=	159.0 litres
	=	34.97 UK gallons
	=	42 US gallons

Length

1 mile	=	1.6093 kilometres
1 kilometre	=	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 2024

	Litres per tonne
Crude oil	
Indigenous	1,199
Imported	1,181
Average of refining throughput	1,192
Ethane	2,730
Propane	1,942
Butane	1,728
Naphtha	1,487
Motor spirit	
All grades	1,340
Super (E5)	1,335
Premium (E10)	1,344
Middle distillate feedstock	..
Kerosene	
Aviation turbine fuel	1,255
Burning oil	1,250
White diesel: 0.005% or less sulphur	1,204
Gas/Marine diesel oil	1,190
Fuel oil (1% or less sulphur)	
All grades	1,004
Light	..
Medium	..
Heavy	..
Lubricating oils	1,162
White	..
Greases	..
Bitumen	982
Petroleum coke	..
Petroleum waxes	1,184
Industrial spirit	1,247
White spirit	1,251

Note: The above conversion factors, which for refined products have been compiled by DESNZ using data from UK Petroleum Industry Association companies, apply to the year 2024. The litres to tonnes conversions are made at a standard temperature of 15ºC.

.. Denotes commercially sensitive because too few companies are producing this to be able to report it.

Fuel conversion factors for converting fossil fuels to carbon dioxide

	kg CO_2 per tonne	kg CO_2 per kwh	kg CO_2 per litre
Gases			
Natural gas		0.183	
LPG		0.214	1.555
Liquid fuels			
Gas oil	3190	0.254	2.724
Fuel oil	3216	0.267	
Burning oil	3150	0.246	2.528
Naphtha	3131	0.236	
Petrol	3135	0.240	2.326
Diesel	3164	0.249	2.628
Aviation spirit	3128	0.239	2.283
Aviation turbine fuel	3150	0.245	2.520
Solid fuels			
Industrial coal	2371	0.319	
Domestic coal	2632	0.315	
Coking coal	3144	0.356	

All emission factors are based on a Gross Calorific Value basis.

The information above is based on the 2025 Greenhouse Gas conversion factors for company reporting, available at: https://www.gov.uk/government/collections/government-conversion-factors-for-company-reporting; the information on this website also provide emission factors on a Net Calorific Value basis.

The figures are derived by Ricardobased on data contained in the 2024 edition of this Digest, available at: https://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: https://naei.energysecurity.gov.uk/. 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 (see above) available annually in DUKES.

Department for Energy Security & Net Zero

Annex B
Glossary and Acronyms

Anthracite	Within the Digest, 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).
Backflows	These are finished or semi-finished products, which are returned from final consumers to refineries for processing, blending or sale. They are usually by-products of petrochemical manufacturing.
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.
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.
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.

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 in the Digest, except in Annex I where net calorific values are used.

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 the Digest, 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, i.e. 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 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.
Crude oil	A mineral oil consisting of a mixture of hydrocarbons of natural origins, yellow to black in colour, of variable density and viscosity.
DERV	Diesel Engined Road Vehicle fuel used in internal combustion engines that are compression-ignited. Now referred to as white diesel.
DESNZ	The Department for Energy Security and Net Zero.
DfT	The 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	The Digest of United Kingdom Energy Statistics
Ethane	A light hydrocarbon gas (C_2H_6) in natural gas and refinery gas streams (see LPG).

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 (e.g. 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.
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 – i.e. 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.
Gas diesel oil	The medium oil from the refinery process; used as a fuel in diesel engines (i.e. internal combustion engines that are compression-ignited), burned in central heating systems and used as a feedstock for the chemical industry.
Gigajoule (GJ)	A unit of energy equal to 10^9 joules.
Gigawatt (GW)	A unit of electrical power, equal to 10^9 watts.
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	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.
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.
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.
Liquefied Natural Gas (LNG)	Natural gas that has been converted to liquid form for ease of storage or transport.
Liquefied Petroleum Gas (LPG)	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.
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.
Major Power Producers (MPPs)	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).
Naphtha	(Light distillate feedstock) – Petroleum distillate boiling predominantly below 200ºC.
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 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).
Non-energy use	Includes fuel used for chemical feedstock, solvents, lubricants, and road making material.
OFGEM	The regulatory office for gas and electricity markets.
ONS	Office for National Statistics
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.
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 DESNZ. 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 Annex F 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.
Refinery fuel	Petroleum products produced by the refining process that are used as fuel at refineries.
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	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.
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. 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.
Steam coal	Within the Digest, 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 1991 to 2020.
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
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.
Watt	The conventional unit to measure a rate of flow of energy. One watt amounts to 1 joule per second.
White diesel	Previously referred to as DERV (Diesel Engined Road Vehicle), fuel used in internal combustion engines that are compression-ignited.
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.

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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 DESNZ. The list is not exhaustive and the titles of publications and publishers may alter. All titles can be found on the GOV.UK website.

Department for Energy Security & Net Zero publications on energy and climate change statistics

Energy Statistics

Monthly, quarterly and annual statistics on production, trade and consumption of overall energy and individual fuels in the United Kingdom together with energy prices is available in MS Excel format at: https://www.gov.uk/government/organisations/department-for-energy-security-and-net-zero/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 at: http://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 at: https://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. Available at: https://www.gov.uk/government/collections/energy-flow-charts

UK Energy in Brief

An annual publication summarising the latest statistics on energy production, trade, consumption and prices in the United Kingdom. The figures are taken from “Digest of UK Energy Statistics”. Available at: https://www.gov.uk/government/collections/uk-energy-in-brief

Energy Consumption in the UK

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 intensity and output since the 1970s, with a particular focus on trends since 2000. Available at: https://www.gov.uk/government/collections/energy-consumption-in-the-uk

Sub-National Energy Consumption

Sub-National data are produced by DESNZ to emphasise the importance of local and regional decision making for energy policy in delivering a number of national energy policy objectives. Data is available at: https://www.gov.uk/government/organisations/department-for-energy-security-and-net-zero/about/statistics

Fuel Poverty

An annual report detailing the latest statistics on fuel poverty in England. Available at: http://www.gov.uk/government/collections/fuel-poverty-statistics

Household Energy Efficiency

DESNZ publishes a range of information relating to the Energy Company Obligation (ECO) and Green Deal (GD). The headline release presents monthly updates of ECO measures and quarterly updates of in-depth ECO statistics, carbon savings and the Green Deal schemes. The detailed report presents annual updates on in-depth Green Deal statistics and insulation levels. Data is available at: https://www.gov.uk/government/collections/household-energy-efficiency-national-statistics

National Energy Efficiency Data-framework (NEED)

DESNZ 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 DESNZ 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 is available at: https://www.gov.uk/government/collections/national-energy-efficiency-data-need-framework

Smart Meters

Data produced by DESNZ on the roll-out of smart meters in Great Britain, covering both operating and installed meters. Available at: https://www.gov.uk/government/collections/smart-meters-statistics

UK Greenhouse Gas Emissions

Emissions data are produced by DESNZ to show progress against the UK's goals, both international and domestic, for reducing greenhouse gas emissions. Data is available at: https://www.gov.uk/government/collections/uk-greenhouse-gas-emissions-statistics

UK Energy and Emissions Projections

The energy and emissions projections (EEPs) are published annually by DESNZ. They provide updated projections and analysis of energy use and greenhouse gas emissions in the UK. The projections are based on assumptions of future economic growth, fossil fuel prices, electricity generation costs, UK population and other key variables regularly updated. The latest report is available at: https://www.gov.uk/government/collections/energy-and-emissions-projections

Department for Energy Security & Net Zero policy publications on energy and climate change

Great British Energy Act 2025

The Great British Energy Act 2025 was given Royal Assent on 15 May 2025. The Act is available at: http://www.legislation.gov.uk/ukpga/2016/20/contents/enacted

The Clean Growth Strategy

The Clean Growth Strategy was published on 12 October 2017. The strategy sets out proposals for decarbonising all sectors of the UK economy through the 2020s. It explains how the whole country can benefit from low carbon opportunities, while meeting national and international commitments to tackle climate change. The strategy is available at: https://www.gov.uk/government/publications/clean-growth-strategy

Energy Act 2016

The Energy Act 2016 was given Royal Assent on 12 May 2016. The Act is available at: http://www.legislation.gov.uk/ukpga/2016/20/contents/enacted

Annual Energy Statement

The Annual Energy Statement fulfilled 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 last Statement, delivered on 6 November 2014, is available at: https://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 at: http://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 at: http://www.legislation.gov.uk/ukpga/2011/16/contents

Electricity Market Reform white paper

On 12 July 2011 ‘Planning our electric future: a White Paper for secure, affordable and low-carbon electricity’ was published. 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 at: https://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 at: http://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 at: https://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 at: http://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 at: http://www.legislation.gov.uk/ukpga/2008/27/contents

Other energy publications

General

Overseas Trade Statistics (OTS) of the United Kingdom; HM Revenue and Customs

- OTS trade with EU countries (monthly)
- OTS trade with non-EU countries (monthly)

UK Index of Production (monthly); *Office for National Statistics*
United Kingdom Minerals Yearbook; *British Geological Survey*

Energy

BP Statistical Review of World Energy (annual); *BP*
Energy Balances (annual); *United Nations Statistical Office*
Energy Statistics Yearbook (annual); *United Nations Statistical Office*
Energy Statistics Pocketbook (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*

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*
Petroleum Review (monthly); *Energy Institute*

Electricity

Annual Reports and Accounts of the Electricity Supply Companies, Distributed Companies and Generators; (*apply to the Headquarters of the company concerned)*
Annual Report and Accounts of The Office of Gas and Electricity Markets; *OFGEM*
Electricity Information (annual); *International Energy Agency*
National Grid – Electricity Ten Year Statement - (annual); *National Grid*

Renewables

Renewables Information (annual); *International Energy Agency*

Energy Prices

Energy Prices and Taxes (quarterly); *International Energy Agency*

Useful energy related websites

The DESNZ section of the GOV.UK website can be found at:
https://www.gov.uk/government/organisations/department-for-energy-security-and-net-zero

Other Government web sites

Department for Environment, Food and Rural Affairs
https://www.gov.uk/government/organisations/department-for-environment-food-rural-affairs

Department for Transport
https://www.gov.uk/government/organisations/department-for-transport

HM Government Online (GOV.UK)
http://www.gov.uk/

HM Revenue & Customs
https://www.gov.uk/government/organisations/hm-revenue-customs

Ministry of Housing, Communities & Local Government
https://www.gov.uk/government/organisations/ministry-of-housing-communities-local-government

Northern Ireland Executive
http://www.northernireland.gov.uk/

Office for National Statistics
https://www.ons.gov.uk/

Ofgem (The Office of Gas and Electricity Markets)
http://www.ofgem.gov.uk/

Scottish Government
http://www.gov.scot/

Scottish Parliament
https://www.parliament.scot/index.aspx

UK Parliament
http://www.parliament.uk/

UK Statistical System
http://www.statisticsauthority.gov.uk/

Welsh Government
https://gov.wales

Other useful energy related web sites

BP
http://www.bp.com/

British Geological Survey
http://www.bgs.ac.uk/

BRE (Building Research Establishment)
https://www.bregroup.com/

Energy Institute
http://www.energyinst.org/home

Energy Networks Association
http://www.energynetworks.org/

Energy UK
http://www.energy-uk.org.uk/

Fuels Industry UK (formerly United Kingdom Petroleum Industry Association)
https://www.fuelsindustryuk.org/

Interconnector
http://www.interconnector.com/

International Energy Agency (IEA)
http://www.iea.org/

International Steel Statistics Bureau (ISSB)
http://www.issb.co.uk/

Mining Remediation Authority (formerly Coal Authority)
https://www.gov.uk/government/organisations/mining-remediation-authority

National Grid
https://www.nationalgrid.com/

Oil & Gas UK
https://oeuk.org.uk/

Renewable UK
http://www.renewableuk.com/

Ricardo
https://www.ricardo.com/en

UK-AIR: Air Information Resource
https://uk-air.defra.gov.uk

United Nations Statistics Division
https://unstats.un.org/home

US Department of Energy
https://www.energy.gov/

US Energy Information Administration
http://www.eia.gov/

Department for Energy Security & Net Zero

Annex D

Major events in the energy industry

2025

Energy Policy

In May 2025 the Great British Energy Act 2025 received Royal Assent. This milestone establishes the legal framework needed to support the creation of Great British Energy (GBE), a publicly owned company at the heart of the Government's Clean Energy Superpower Mission.

Electricity

In July 2025 the Government announced that the Mona Offshore Wind Farm in the Irish Sea, with the potential to power the equivalent of more than 1 million homes had been granted planning permission.

In April 2025 the Government announced that Rampion 2, an offshore wind farm off the sussex coast, capable of producing enough clean electricity to power 1 million homes had been granted planning permission.

Energy Prices

In May 2025 the energy price cap for an average household paying by direct debit for dual fuel was set at £1,720 per year, from 1 July for the three-month price cap period of July to September 2025.

In February 2025 the energy price cap for an average household paying by direct debit for dual fuel was set at £1,849 per year, from 1 April for the three-month price cap period of April to June 2025.

2024

Coal

In September 2024 the last coal fired power station in the UK at Ratcliffe-Upon-Soar in Nottinghamshire closed.

Energy Policy

In December 2024 the Government published the Clean Power Action Plan which will:

- deliver on the Prime Minister's Plan for Change to build an energy system that can bring down bills for households and businesses for good.
- ensure British households will be better protected from rollercoaster of fossil fuel markets, with plan to unblock the grid, speed up planning decisions and build more renewables to make Britain energy secure with clean power by 2030.
- use Clean power to unlock £40 billion of investment a year and reindustrialise Britain with thousands of skilled jobs across the country.

In September 2024 it was announced that Great British Energy will be headquartered in Aberdeen, with 2 smaller sites in Edinburgh and Glasgow.

In September 2024 the National Energy System Operator (NESO) was launched to support the UK's energy security, help to keep bills down in the long term, and accelerate the government's clean power mission. NESO will also be responsible for overseeing the strategic planning and design of the country's electricity and gas networks.

Energy Prices

In November 2024 the energy price cap for an average household paying by direct debit for dual fuel was set at £1,738 per year, from 1 January for the three-month price cap period of January to March 2025.

In August 2024 the energy price cap for an average household paying by direct debit for dual fuel was set at £1,717 per year, from 1 October for the three-month price cap period of October to December 2024.

Nuclear

In December 2024 EDF announced that the lifespan of four nuclear power stations are to be extended. Hartlepool and Heysham 1 will continue for an extra year until 2027, whilst Torness and Heysham 2 will continue generating for an extra two years until 2030.

DESNZ news stories including press releases, speeches and statements are available at: https://www.gov.uk/search/news-and-communications?organisations%5B%5D=department-for-energy-security-and-net-zero&parent=department-for-energy-security-and-net-zero

Department for Energy Security & Net Zero

Annex E: Energy and the environment

Emissions statistics greenhousegas.statistics@energysecurity.gov.uk

Oil released and gas flared energy.stats@energysecurity.gov.uk

Carbon dioxide emissions

Provisional 2024 data for UK Greenhouse Gas emissions including progress towards targets were published on 27 March 2025.

Oil pollution and oil released

The total amount of oil released offshore during 2024 was approximately 2.1 tonnes. The amount of oil released around the coast of the United Kingdom and offshore in the North Sea is small in relation to total oil production. The number of oil release reports recorded in 2024 was 105 up from 222 in 2023. There were not any incidents where oil released exceeded one tonne compared to four in 2023.

The average content of oil in water was 15.6 milligrams per litre in 2024, compared to 17.3 in 2023. The Offshore Petroleum Activities (Oil Pollution Prevention and Control) Regulations 2005 (OPPC) came into effect in August 2005. Under OPPC installations are granted a permit for activities discharging oil contaminated water to sea, but the oil content must not exceed 20 milligrams per litre.

Data on oil releases is available via the Environmental and Emissions Monitoring System (EEMS) which is maintained by the Offshore Petroleum Regulator for Environment and Decommissioning (OPRED).

Gas flared and vented

Oil and gas producers can only flare and vent natural gas with the consent of the North Sea Transition Authority (NSTA). In 2024, 658 million cubic meters of gas was flared, and 102 million cubic meters of gas was vented; equivalent to 2.5 per cent of gross gas production. Gas flared and vented was 9.1 per cent lower in 2024 compared to 2023. Gas flared and vented has generally declined in line with production since 2001. Data can be found in Table E.1.

Department for Energy Security & Net Zero

Annex F: Oil and gas resources

Oil | oil.statistics@energysecurity.gov.uk | 0747 135 8008

Gas | gas.stats@energysecurity.gov.uk | 0743 672 9458

Production data are received via the North Sea Transition Authority's (NSTA) Petroleum Production Reporting System (PPRS). Tables supplementary to this annex are:

- Table F.1 Crude oil and natural gas liquids production
- Table F.2 Gas production
- Table F.3 Natural gas liquids net production
- Table F.4 Disposals of crude oil

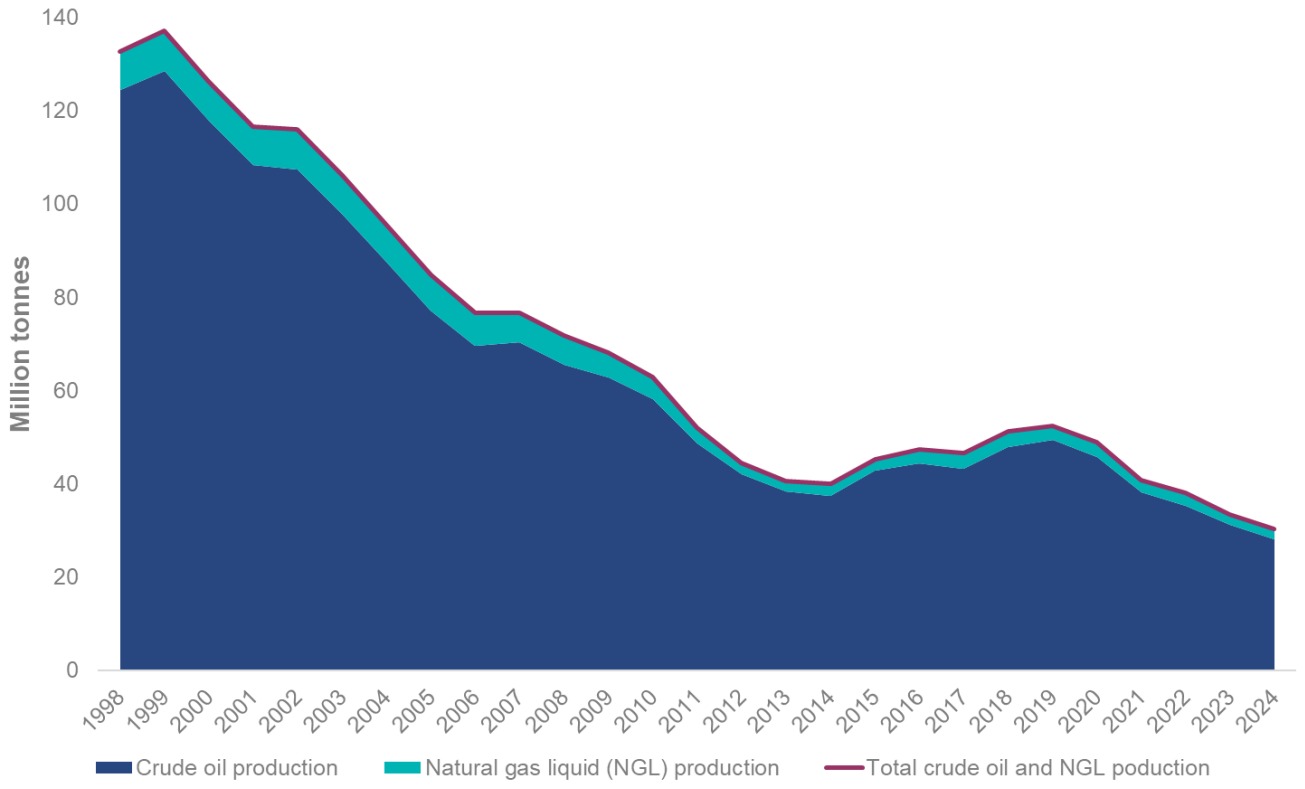
Oil and gas reserves

For more information on oil and gas reserves see Energy in Brief: Oil and gas production and reserves or Reserves and Resources Report as at end 2023

Production

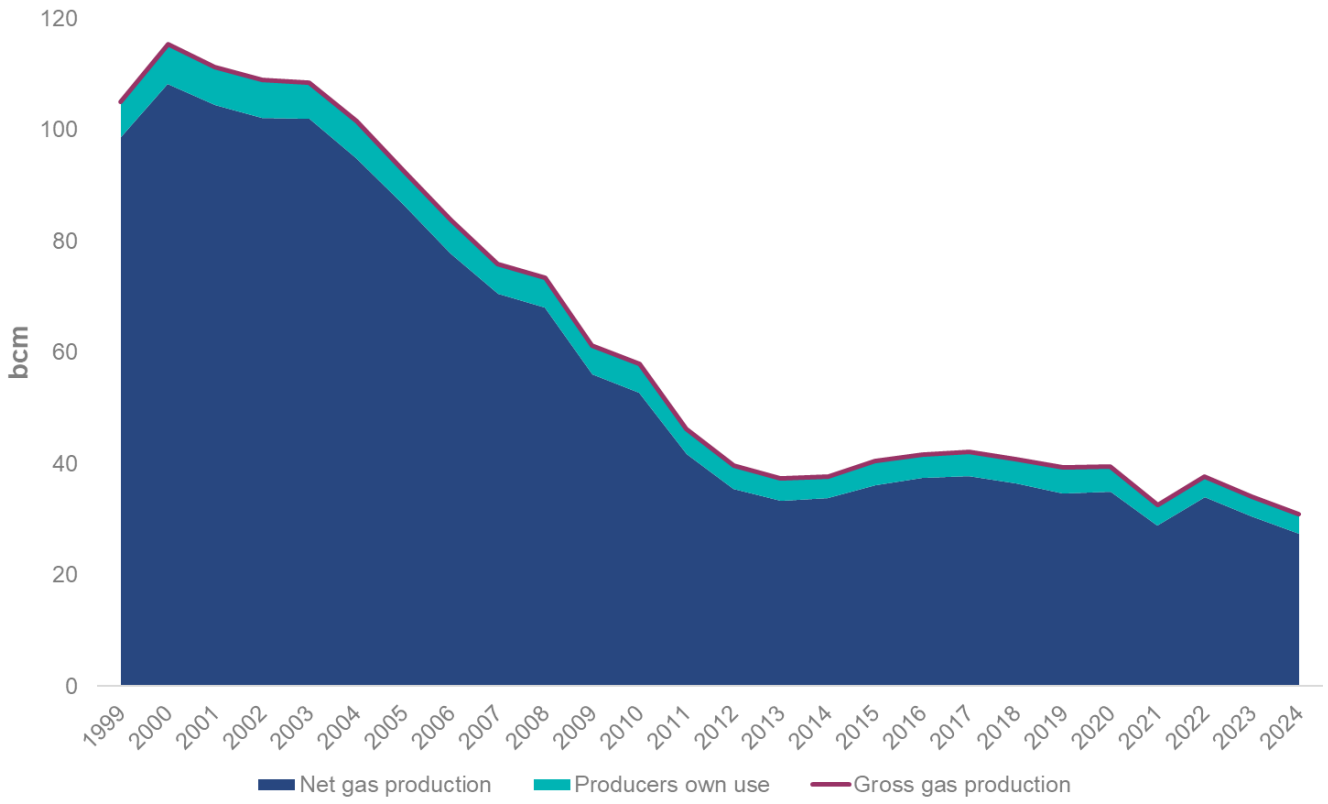
Tables F.1-F.3 show production of crude oil, natural gas and natural gas liquids (NGLs). Following the introduction of PPRS in 2001, aggregate production figures are calculated using mainly terminals level data. Prior to this, aggregate production figures were calculated using field level well-head data. The new method is more accurate because oil that leaves the terminals has been stabilised, meaning that any water, NGLs and other organic compounds have been removed.

Chart F.1 Oil and NGL production, 1998-2024 (DUKES Table F.1)



Crude oil and NGL production peaked in 1999 at 137 million tonnes. Following this peak production declined steadily until 2014 when it increased due to new investment and completion of new projects. Production began to decline again in 2019 reaching 30 million tonnes in 2024 the lowest level since 1976.

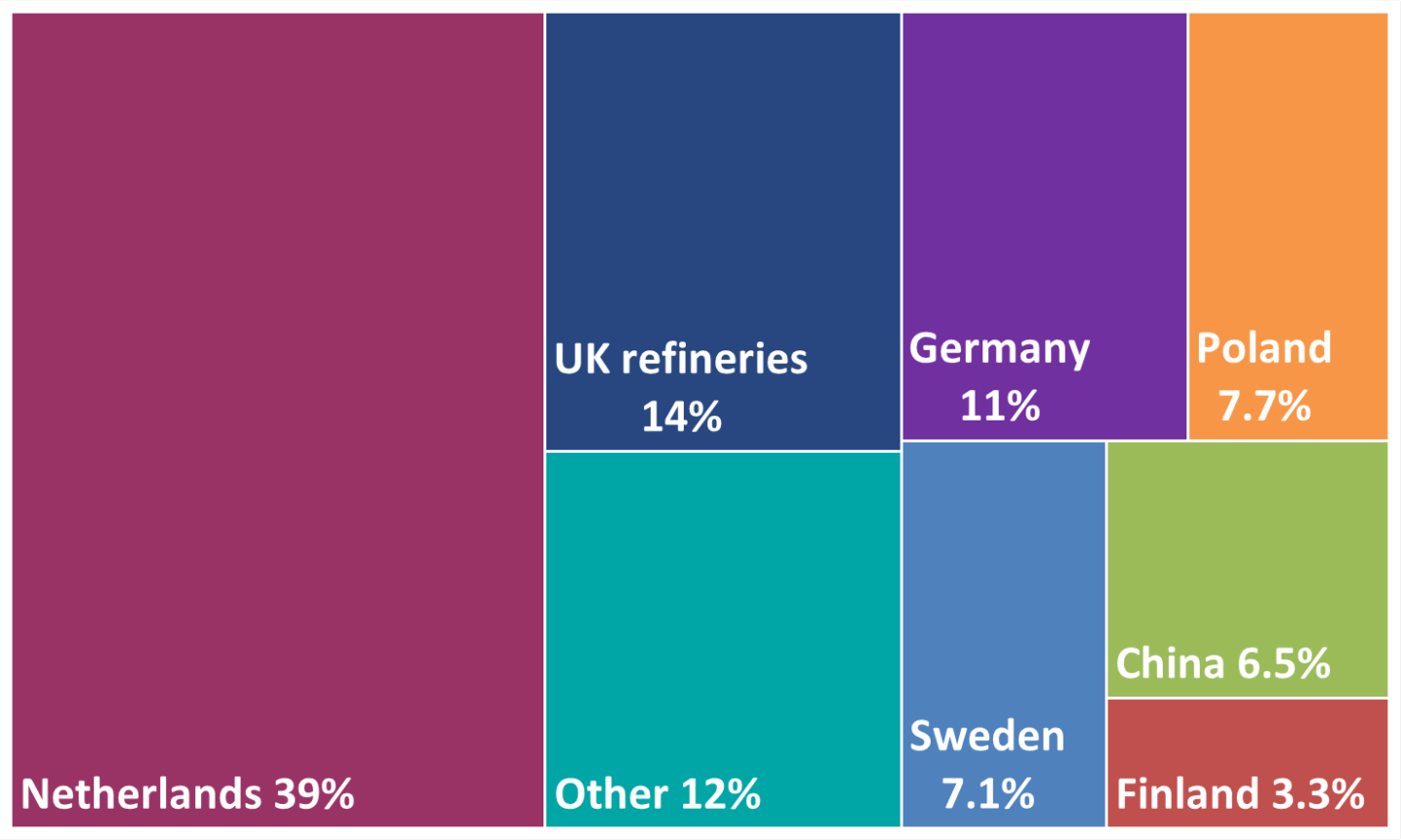
Chart F.2 Gas production, 1999-2024 (DUKES Table F.2)



Natural gas production peaked in 2000 at 115 billion cubic metres. Similar to oil production, this peak was followed by several years of steady decline before rising slightly again. However, unlike oil, since 2017 declines in gas production from well-established fields have outstripped any gains following investment. The sharp drop in production in 2021 was due to extensive planned maintenance of the Forties Pipeline System. In 2024, gas production fell to 31 billion cubic metres the lowest level since 1973.

Disposals of Crude Oil

Chart F.3 Disposals of crude oil, 2024 (DUKES Table F.4)



Oil extracted from the UK Continental Shelf (UKCS) is delivered to UK refineries and exported abroad (disposals). Nearly 40 per cent of crude produced was exported to the Netherlands in 2024. This was followed with disposal to UK refineries which accounted for 14 per cent. The other category includes nine countries each accounting for less than three per cent of the total.

The export figure in Table F.4 and chart F.3 may differ from those published by Fuels Industry UK (FIUK). These figures also include oil that has previously been imported and therefore is not part of UKCS production.

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Annex G: Foreign trade

Volumes 0747 135 8194 energy.stats@energysecurity.gov.uk
Values 0207 215 1445 energyprices.stats@energysecurity.gov.uk

Main points for 2024

- Imports of fuels for energy use to the UK in 2024 at 138.9 million tonnes of oil equivalent (mtoe) rose by 1.8 per cent compared to 2023 (Table G.1).
- Exports of fuels from the UK in 2024 at 64.1 mtoe fell by 5.5 per cent compared to 2023 and were at a record low level this century (Table G.1).
- The energy trade deficit stood at £34 billion (Overseas Trade Statistics basis), the deficit falling by £0.1 billion since 2023 (Table G.2).

By fuel type:

- Coal imports fell by 51 per cent to 1.2 mtoe in 2024 (Table G.1).
- The UK remained a net importer of crude oil in 2024, as imports rose by 7.6 per cent to the highest level since 2019, whilst exports rose by 1.6 per cent compared to 2023 (Table G.1).
- The UK was a net importer of petroleum products in 2024 by 14.3 mtoe, 17 per cent higher than in 2023 (Table G.1).
- Gas imports in 2024 fell by 8.4 per cent to the lowest level since 2008 with pipeline imports rising by 20 per cent but LNG imports falling by 47 per cent, whilst exports fell by 33 per cent. (Table G.1).
- Electricity imports in 2024 rose by 31 per cent to a record high level of 3.8 mtoe, boosted by the Denmark-UK interconnector being in operation for its first full year (Table G.1).
- Renewables net imports rose by 29 per cent to 6.0 mtoe in 2024 (Table G.1).

Introduction

This annex provides an overview of published trade data on energy products in the UK. The data for this annex are presented in Tables G.1 (volumes) and G.2 (values) of DUKES. The first section of this annex covers energy trade volumes and the second covers energy trade values.

Detailed data on imports and exports by fuel, in their original units of measurement, as previously published in this annex are now available in the main DUKES chapters as shown below:

- Coal imports (DUKES table 2.7) and exports (DUKES table 2.8)
- Primary oil and petroleum products imports (DUKES table 3.7)
- Primary oil and petroleum products exports (DUKES table 3.8)
- Natural gas imports and exports (DUKES table 4.5)
- Electricity imports and exports (DUKES table 5.13)
- Renewables imports and exports (DUKES table 6.6)

The value information previously corresponded to that published by ONS energy trade value data but data for 2016 onwards used data direct from source, the HMRC UK Trade Info data. The values presented in table G.2 are based on HMRC and ONS value data and adjusted to these new volumes. This has been back dated to 2000.

Volume

Overview - Import and export of fuels

In the 1970's the UK was a net importer of energy. Following development of oil and gas production in the North Sea, the UK became a net exporter of energy in 1981. Output fell back in the late 1980's following the Piper Alpha disaster, with the UK regaining a position as a net exporter in the mid 1990's. North Sea production peaked in 1999, and the UK returned to being an energy importer in 2004. In 2013 imports of petroleum products exceeded exports following the closure of the Coryton refinery; the UK is now a net importer of all main fuel types, but remains a net exporter of some petroleum products such as petrol and fuel oil.

Chart G.1 shows the UK net import dependency level (net imports compared to supply) from 1970 to 2024. In 2024, net imports at 74.8 mtoe were 8.9 per cent higher than in 2023 and at the highest level recorded since 2015, and accounted for 43.8 per cent of consumption in 2024, up from 40.3 per cent in 2023, and at the highest dependency share since 2014.

Chart G.1: UK import dependency, 1970 – 2024

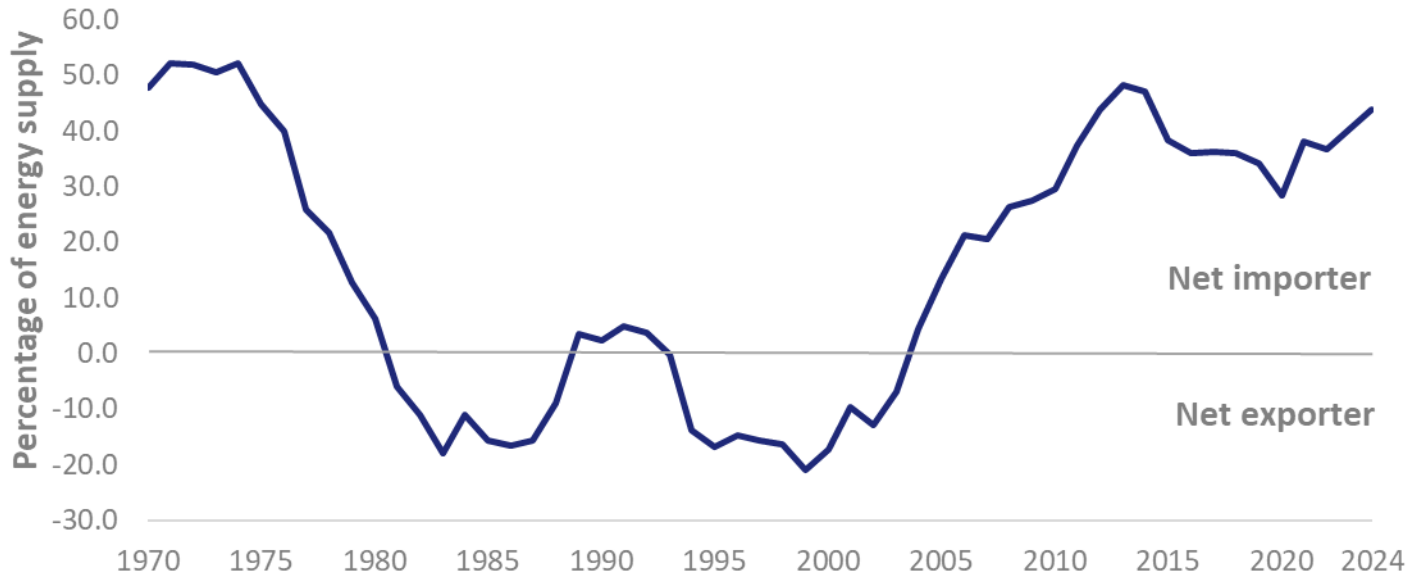
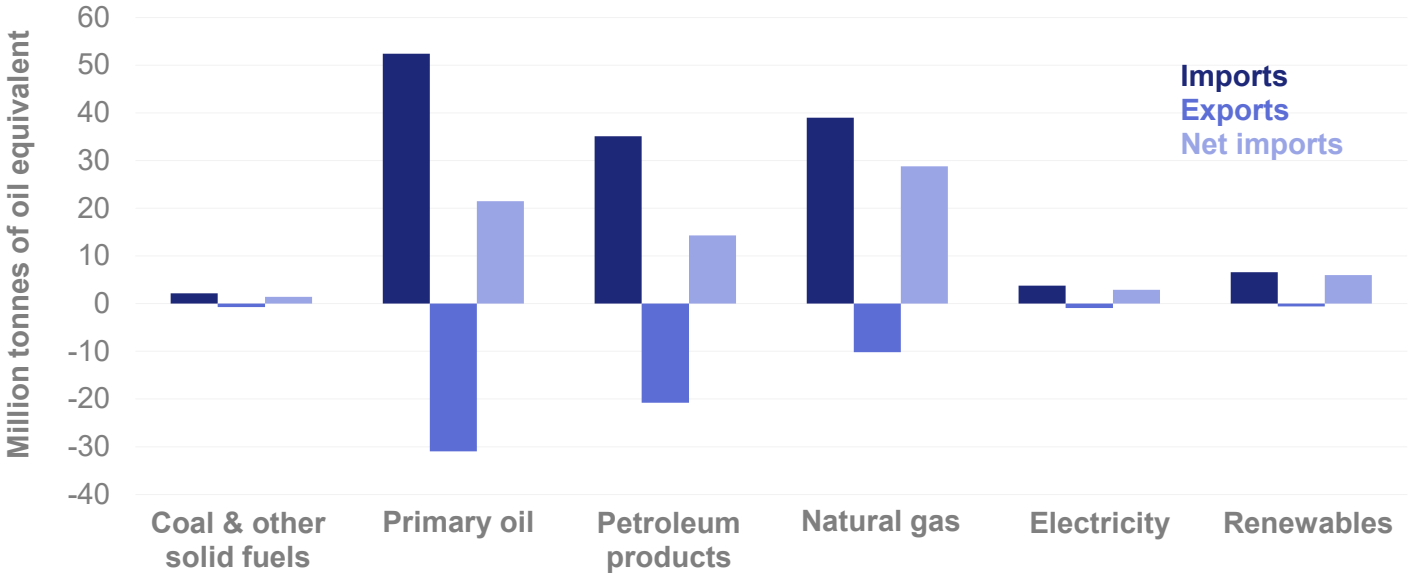


Chart G.2 shows the levels of imports, exports and net imports by fuel type in 2024.

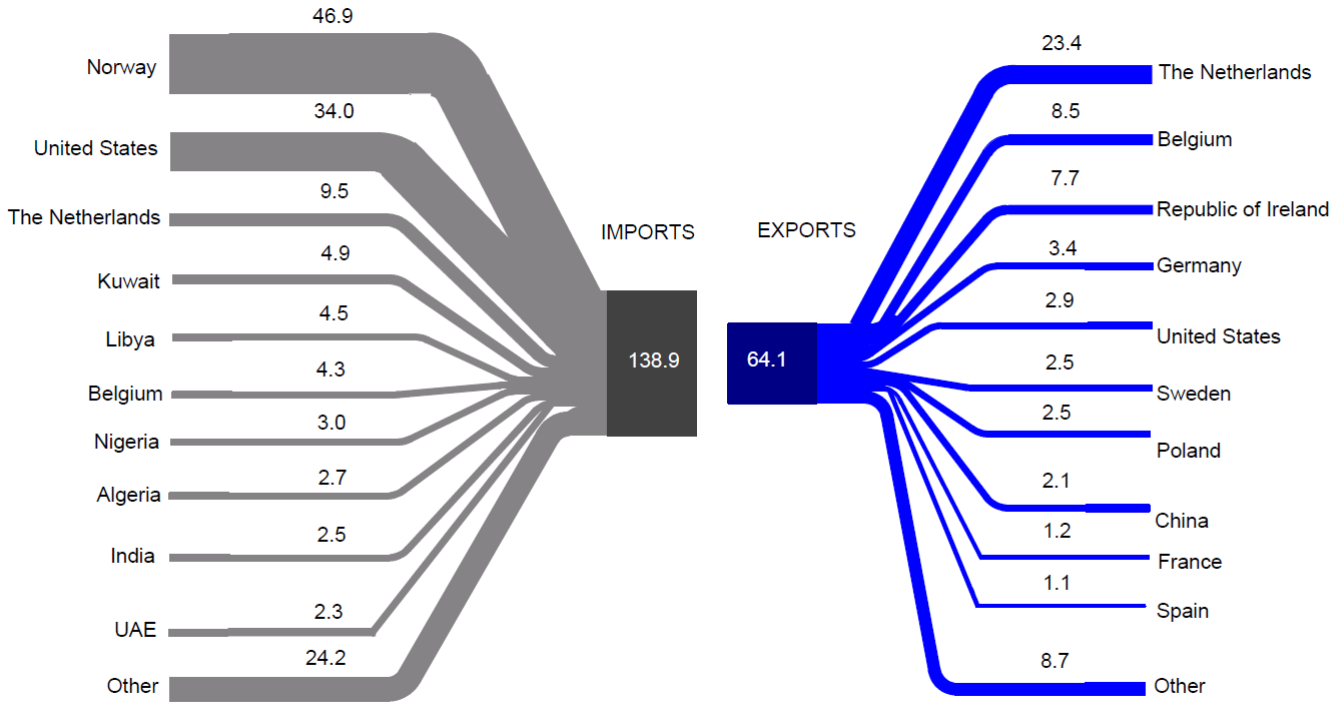
Chart G.2: Imports and exports by fuel type, 2024



UK markets in 2024

Chart G.3 shows the UK's ten largest markets in volume of imports and exports of coal and other solid fuels, primary oil, petroleum products, natural gas, electricity and renewables. In 2024 Norway accounted for 34 per cent of total imports to the UK, followed by 24 per cent from the United States and 7 per cent from The Netherlands. For exports, The Netherlands accounted for 37 per cent of total exports from the UK, followed by 13 per cent to Belgium and 12 per cent to the Irish Republic.

Chart G.3 UK trade by country in 2024 for imports and exports, million tonnes of oil equivalent



Value

Imports and exports of fuels (Overseas Trade Statistics basis)

For statistical purposes, the UK adopts the valuation basis for overseas trade statistics as recommended in the International Merchandise Trade Statistics Concepts & Definitions published by the United Nations. This means that the valuation of exports and dispatches is on a free on board (fob) basis (e.g., costs of goods to the purchaser abroad) while the valuation of imports and arrivals is on a cost, insurance, and freight (cif) basis which includes all the incurred expenses in moving the goods to the point of entry into the UK but excludes any duty or tax chargeable in the UK.

Following the switch from the energy trade surplus of £0.6 billion in 2004, the UK has remained in deficit (Chart G.4). Between 2005 and 2008, the energy trade deficit grew steadily but fell back in 2009 reflecting lower oil prices. It then continued to grow significantly reaching £22 billion in 2012 before falling back again between 2013 and 2016 driven by a fall in the deficit of crude oil and petroleum products (chart G.5). In 2018 the energy trade deficit rose to £12 billion including an increase in deficit in oil and petroleum products and natural gas.

The COVID-19 pandemic affected trade in 2020 and 2021. In 2020 the energy trade deficit at £2 billion, was 72 per cent lower than in the previous year and there was a surplus in crude oil and petroleum products. In 2021 the deficit grew to £20 billion, driven primarily by a deficit in natural gas trade as prices increased. The deficit widened again in 2022 (more than doubling to £43 billion) driven by increases to the deficits in natural gas and crude oil. In 2023 the deficit decreased by 21% to £34 billion, decreasing again in 2024 by 0.4% to remain at £34 billion, in both years mainly due to reduced deficit of natural gas due to the price of it falling.

Chart G.4 Value of net exports of fuel, 2001 – 2024

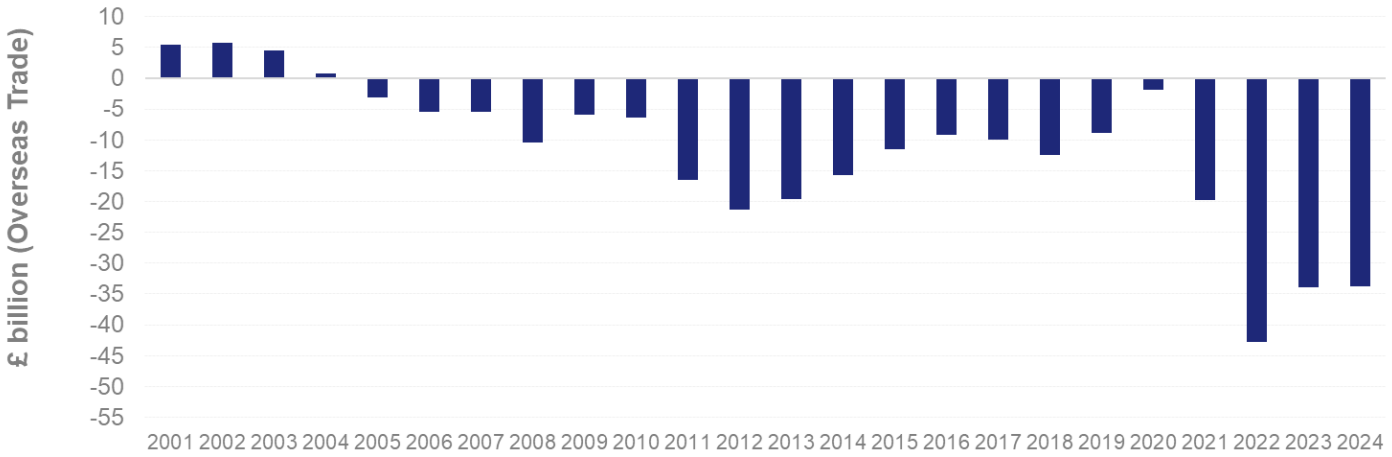
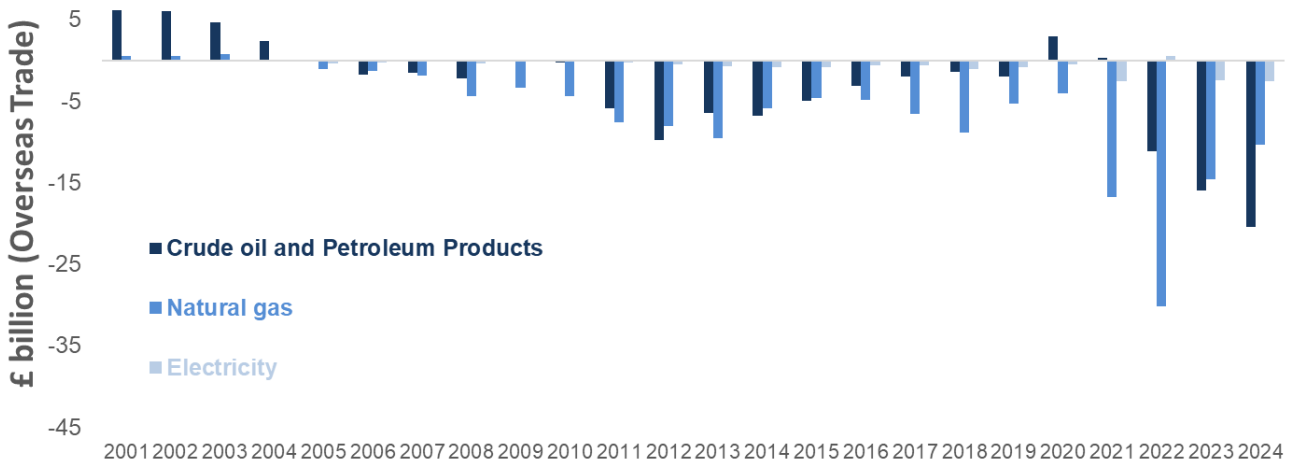


Chart G.5 Value of net exports by fuel, 2001 – 2024



Technical notes and definitions

Except as noted in Table G.2, values of imports are quoted “c.i.f.". Briefly this value is the price that the goods would fetch at that time, on sale in the open market between buyer and seller independent of each other, with delivery to the buyer at the port of importation, the seller bearing freight, insurance, commission, and all other costs, etc, incidental to the sale and delivery of the goods except for any duty or tax chargeable in the United Kingdom. Values of exports are “f.o.b.", which is the cost of the goods to the purchaser abroad, including packing, inland and coastal transport in the United Kingdom, dock dues, loading charges and all other costs, charges and expenses accruing up to the point where the goods are deposited on board the exporting vessel or at the land boundary of Northern Ireland.

Figures correspond to the following items of SITC (Rev 3):

Coal	321.1 and 321.2
Other solid fuels	322 and 325 (part)
Crude oil	333
Petroleum products	334,335,342,344 (plus Orimulsion reclassified to division 278 in 1994)
Natural gas	343
Electricity	351

Department for Energy Security & Net Zero

Annex H: Flow charts

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Introduction

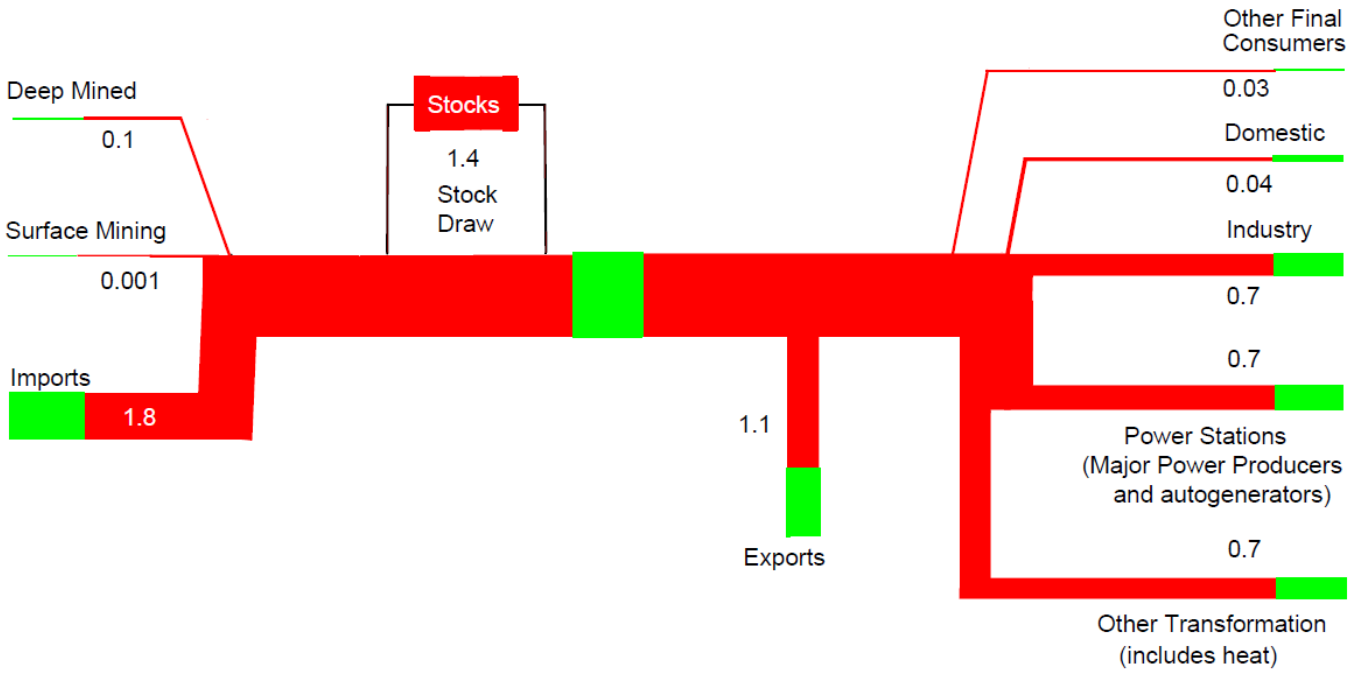
This annex brings together the flow charts for individual fuels contained in the main Digest publication. Chart H.1 is for Coal, Chart H.2 is for Petroleum, Chart H.3 is for Natural Gas, Chart H.4 is for Electricity and Chart H.5 is for Renewables. Annual updates will appear in subsequent editions of the main Digest publication and on the DESNZ section of the GOV.UK website.

Also included within the annex is an additional flow chart for Manufactured Solid Fuels (H.6). Annual updates will appear on the DESNZ section of the GOV.UK website.

Summary flow chart

The summary flow chart updates the last energy flow chart which showed data for 2023. It is based on statistics taken from the main Digest publication, Table 1.1 – Energy Balance 2024. The chart is a simplification of the energy balance figures, illustrating 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). They are shown in their original state and after being converted into different kinds of energy by the secondary fuel producers. The flows are measured in million tonnes of oil equivalent and Terawatt hours, with the widths of the bands approximately proportional to the size of the flow they represent. The flow charts for individual fuels have been produced on a similar basis.

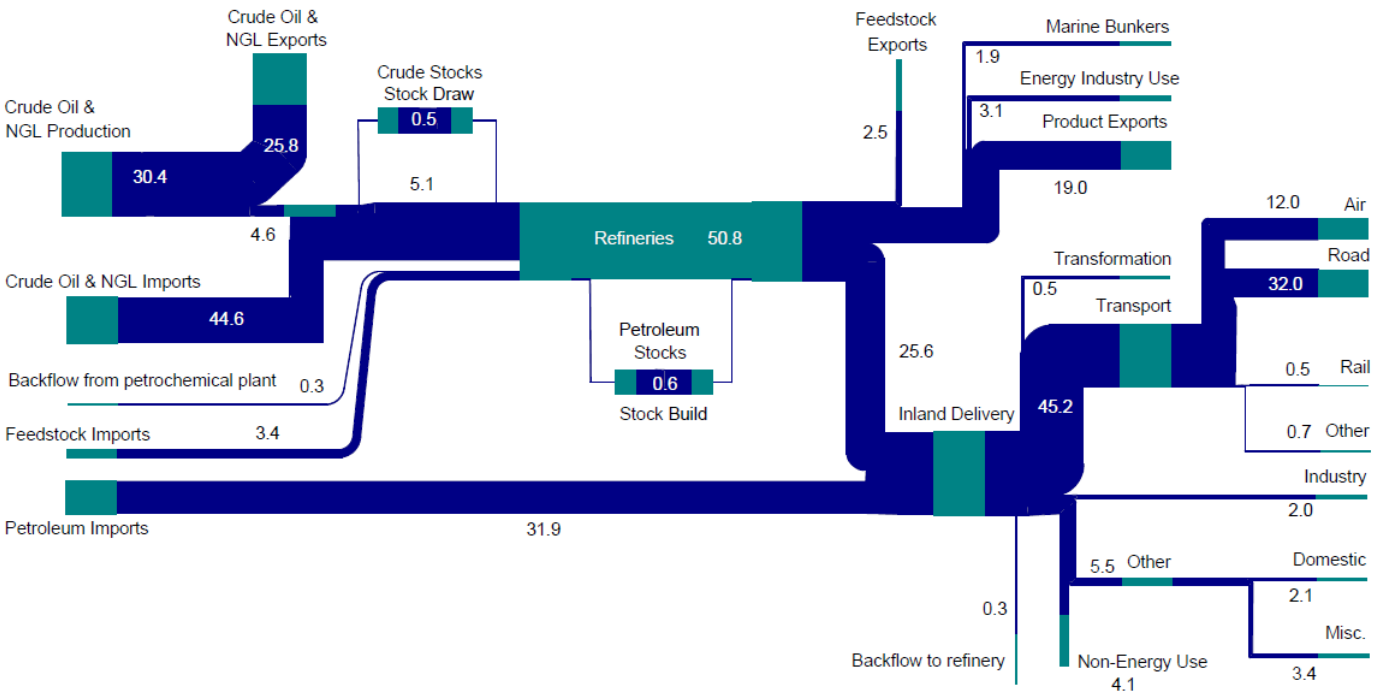
Chart H.1: Coal flow chart 2024 (million tonnes of coal)



Note:

This flow chart is based on the data that appear in DUKES tables 2.1 and 2.2.

Chart H.2: Petroleum flow chart 2024 (million tonnes)

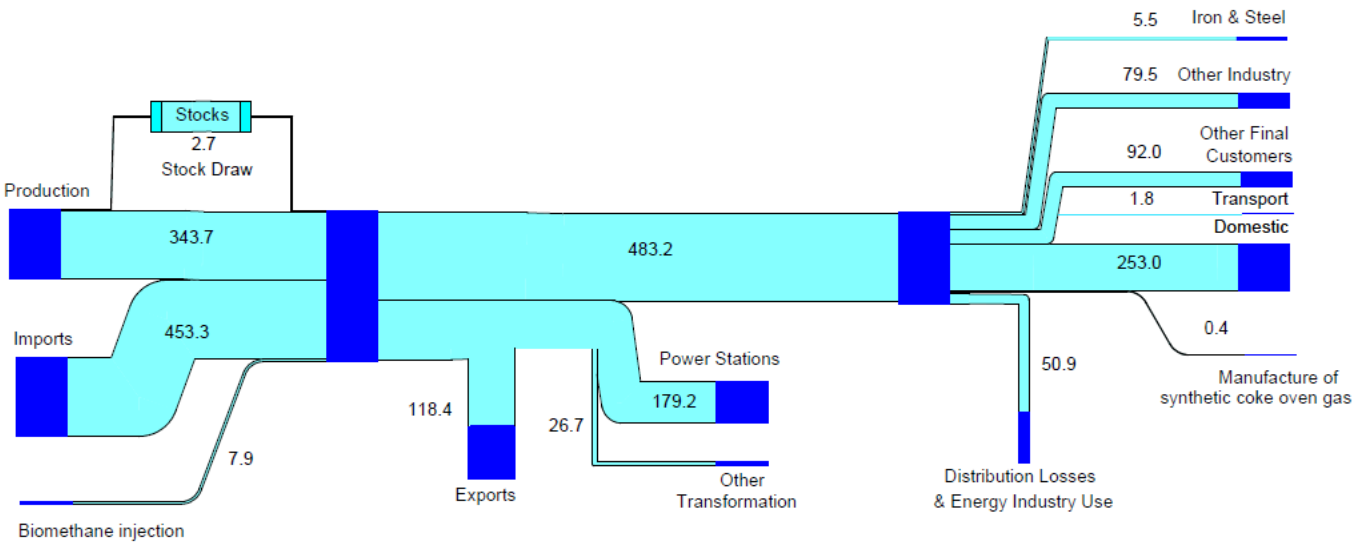


Notes:

This flow chart is based on the data that appear in DUKES tables 3.1 and 3.2.

Biofuels are not included.

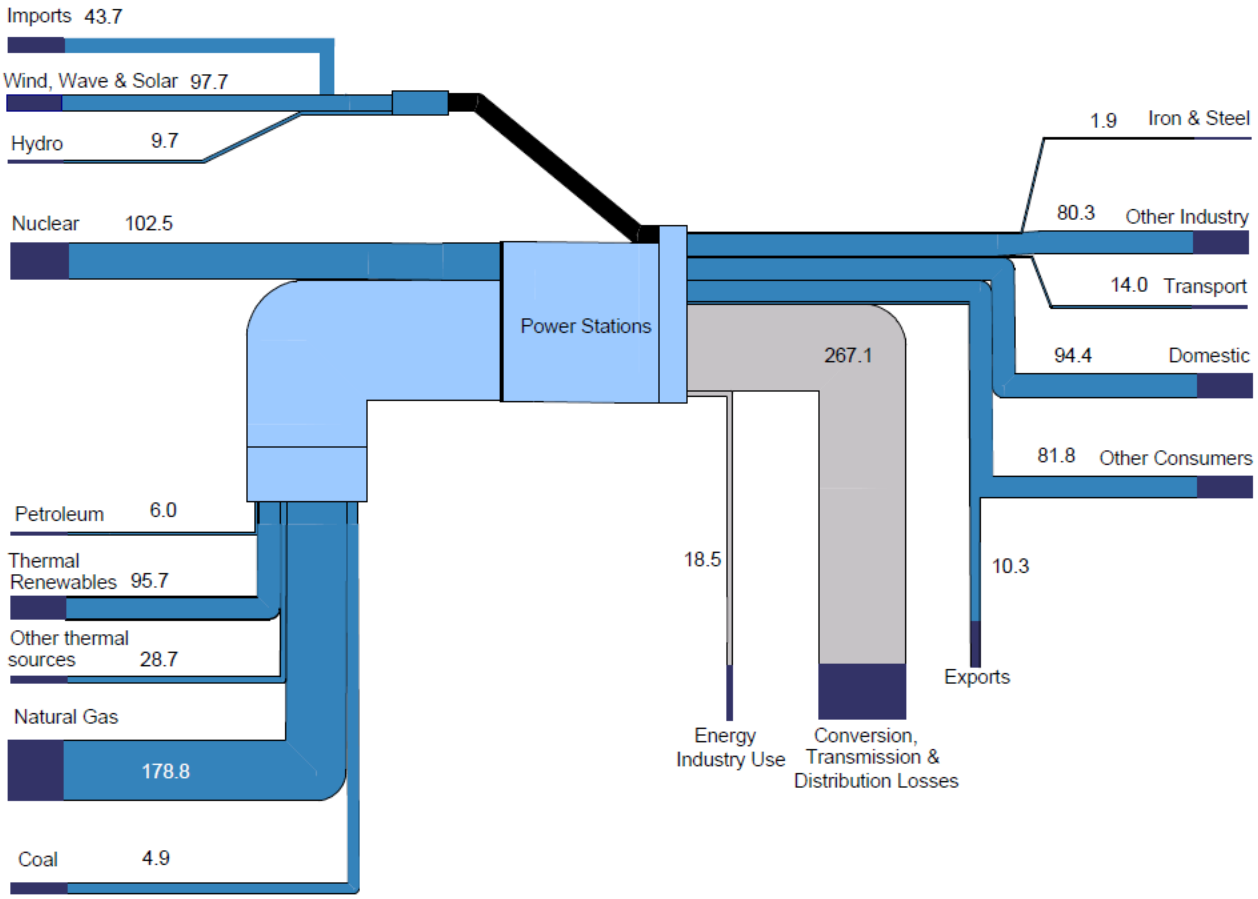
Chart H.3: Natural gas flow chart 2024 (TWh)



Note:

This flow chart is based on the data that appear in DUKES table 4.1; colliery methane is not included.

Chart H.4: Electricity flow chart 2024 (TWh)



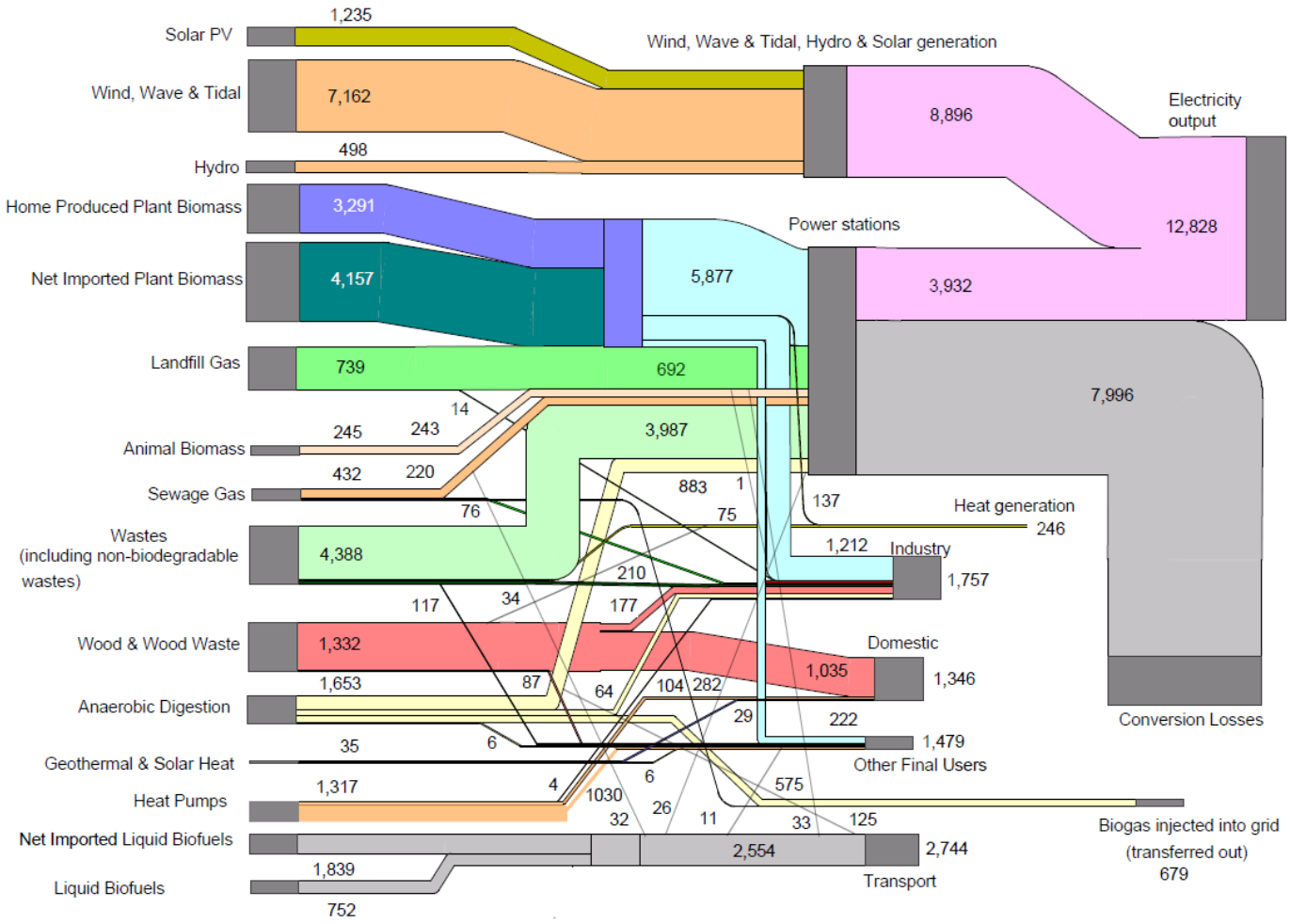
Notes:

This flow chart is based on the data in DUKES tables 5.1 (for imports, exports, use, losses and consumption) and 5.6 (fuel used).

Hydro includes generation from pumped storage while electricity used in pumping is included under Energy Industry Use

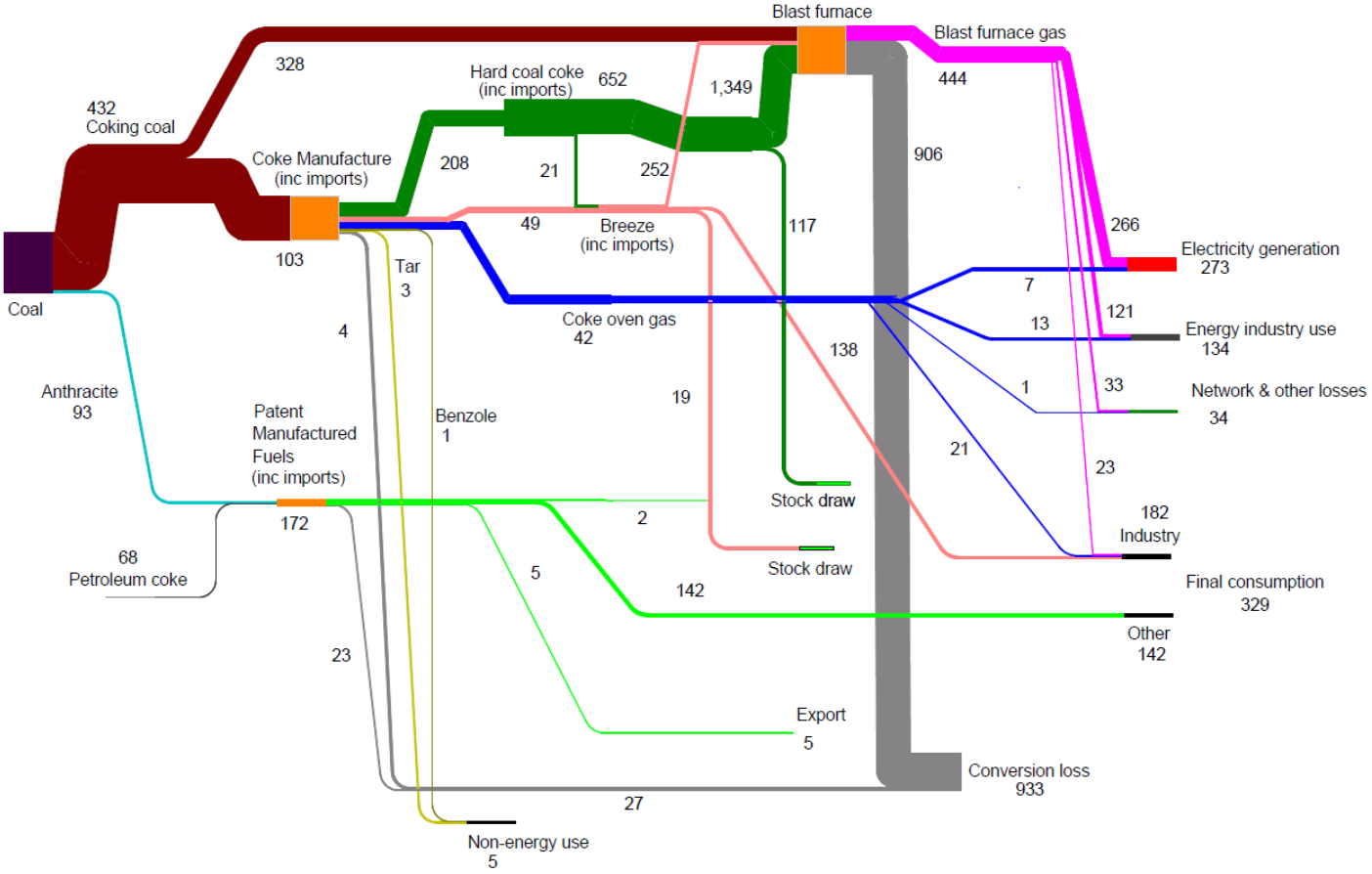
Conversion, Transmission and Distribution Losses is calculated as fuel used (Table 5.6) minus generation (Table 5.6) plus losses (Table 5.1)

Chart H.5: Renewables flow chart 2024 (thousand tonnes of oil equivalent)



Note: This flow chart is based on data that appear in DUKES tables 6.1 and 6.2.

Chart H.6: Manufactured Solid Fuels flow chart 2024 (thousand tonnes of oil equivalent)



Note: This flow chart is based on data from DUKES tables 2.1 and 2.3.

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Annex I: Energy balance net calorific values

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Aggregate energy balance (Table I.1)

These tables show the flows of energy in the United Kingdom from production to final consumption through conversion into secondary fuels such as petroleum products, secondary electricity and heat sold using Net Calorific Values (NCV) from 2004 to 2024. The NCVs used are detailed in table A.2 of DUKES available at: https://www.gov.uk/government/statistics/dukes-calorific-values.

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Annex J: Heat reconciliation

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Introduction

Heat sold has been separately identified in the energy balances since 1999. It is defined as heat that is produced and sold under the provision of a contract. The introduction of heat sold into the energy and commodity balances did not affect the individual fuel totals, since the energy used to generate the heat has been deducted from the final consumption section of the energy balances and transferred to the transformation section. Annex J tables show the detailed analysis of the heat generation row of the main energy balances, by sector generating the heat, and are available at:

www.gov.uk/government/statistics/energy-chapter-1-digest-of-united-kingdom-energy-statistics-dukes

For transparency, data on the quantity of fuel by consuming sector used to produce heat that is subsequently sold are being made available in the tables that accompany this annex.

Methodology

Data sources used to compile heat generation and heat sold are primarily from the Combined Heat and Power Quality Assurance Program (CHPQA) [1]) and also data collected for the Heat Metering and Billing Regulations[2] with some assumptions being carried over from the previous estimates prior to these regulations being in force.

CHPQA data

These data are supplied to DESNZ annually by Ricardo Energy and Environment and form the basis of DUKES Chapter 7; Combined Heat and Power[3] . The data include heat exported and whether it's being exported to an entity declared 'not part of same qualifying group', in which case it is deemed to be sold under a contract thus satisfying the definition set out above.

A sectoral analysis of heat generators has shown that certain suppliers are classified as 'Electricity, gas, steam, and air conditioning supply'. This sector falls within the transformation sector in the energy balances and as such can't be deducted from any sector in final consumption and their main business is deemed to be supplying a heat network. It is therefore included in the heat generation row and for transparency, as an 'of which heat networks' row below this in the annex tables.

Non CHPQA data

Following the publication of experimental statistics collected in respect of the Heat, Metering and Billing Regulations (HMBR) database in the March 2018 edition of Energy Trends[4], the data have been evaluated and incorporated into the heat generation figures presented in this annex. As there are gaps in this data, CHPQA data have been used where possible. For other schemes, various assumptions were applied to the HMBR dataset:

[1] www.gov.uk/guidance/chpqa-guidance-notes
[2] www.gov.uk/guidance/heat-network
[3] www.gov.uk/government/statistics/combined-heat-and-power-chapter-7-digest-of-united-kingdom-energy-statistics-dukes
[4] www.gov.uk/government/publications/energy-trends-march-2018-special-feature-article-experimental-statistics-on-heat-networks

- Heat supplied was assumed to be heat sold
- The fuel input has been estimated by assuming the previous efficiency
- Where the fuel categories are not sufficiently disaggregated, historic proportions have been applied
- For those networks which have mixed final consumers, it is difficult to assign heat supplied to each sector. To address this, the average generation for domestic consumers (residential properties display considerably less variation compared to industrial and commercial consumers) was used with the remainder being allocated across industrial consumers, and the commercial and public sectors.

The decision not to use the HMRB data set for CHP schemes was deemed to be appropriate due to the CHPQA administration data being timely and subject to quality assurance. It also provides the correct level of detail such as fuel type, sector generating heat, and final customer types. In contrast, the previous non-CHP estimates were previously derived from the Building Research Establishment's "National 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; these estimates are now considered less relevant than the more up to date data collected in the HMBR database despite having to use assumptions to achieve the correct estimates across generators and final customers.

This publication is available from: https://www.gov.uk/government/collections/digest-of-uk-energy-statistics-dukes

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