



[Countries](#)

## United Kingdom

Last Updated: June 3, 2014 ([Notes](#))

[full report](#)

### Overview

*The United Kingdom is the largest producer of oil and the second-largest producer of natural gas in the European Union. Following years of exports of petroleum and natural gas, the UK became a net importer of all fossil fuels for the first time in 2013.*

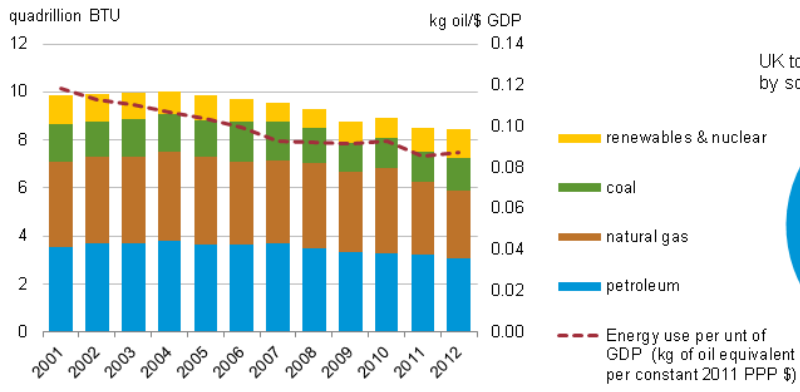
The United Kingdom (UK) is the sixth largest economy in the world, as well as the largest producer of oil and the second-largest producer of natural gas in the European Union (EU). Following years of exports of both fuels, the UK became a net importer of natural gas and crude oil in 2004 and 2005, respectively. Production from UK oil and natural gas fields peaked around the late 1990s and has declined steadily over the past several years as the discovery of new reserves and new production has not kept pace with the maturation of existing fields.

The UK became a net importer of petroleum products in 2013, making it a net importer of all fossil fuels for the first time. The UK government, aware of the country's increasing reliance on imported fuels, has developed key energy policies to address the domestic production declines. These include: using enhanced recovery from current and maturing oil and gas fields, promoting energy efficiency, decreasing the use of fossil fuels and thus reliance on imports, promoting energy trade cooperation with [Norway](#), and decarbonizing the UK economy by investing heavily in renewable energy. However, for the UK to decarbonize its economy, huge investments in the energy infrastructure are needed.

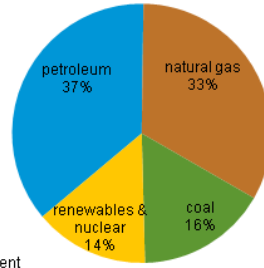
Renewable energy use, particularly in the electric power sector, has more than tripled between 2000 and 2012. However, petroleum and natural gas continue to account for the vast majority of UK's energy consumption. In 2012, petroleum and natural gas accounted for 37 and 33%, respectively, of total energy consumption. Coal also continues to be a significant part of total energy consumption (16% in 2012).

Energy use per unit of gross domestic product (GDP) in the UK is one of the lowest among western economies. The UK has seen total primary energy consumption decline by 16% between 2004 and 2012. This decline resulted from smaller contribution of energy-intensive industry to the economy, economic contraction, and improvements in energy efficiency.

# UK total primary energy consumption by source, 2001-2012



UK total primary energy consumption by source, 2012



Source: U.S. Energy Information Administration, *International Energy Statistics*, World Bank

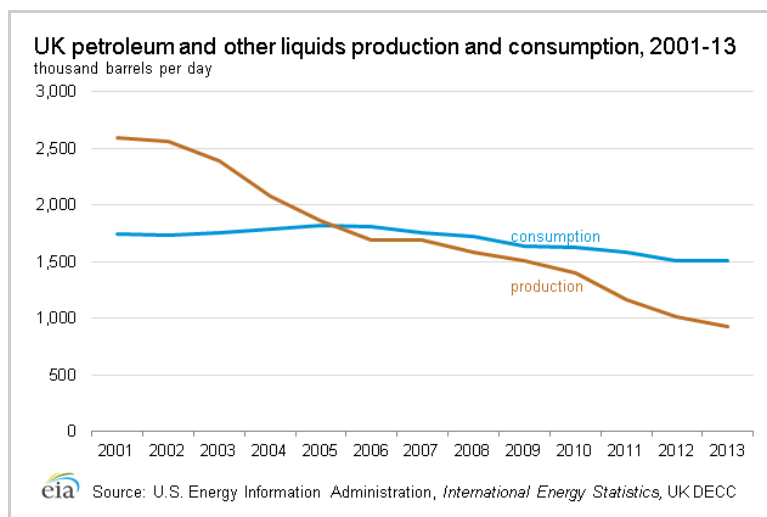


## Petroleum and other liquids

*Although aggressive targets for renewable energy are in place, oil remains important to the UK energy balance and contributed 37% of total energy consumption in 2013.*

Although aggressive targets for renewable energy are in place, oil remains important to the UK energy balance and contributed 37% of total energy consumption in 2013. Once a major producer of oil from the North Sea, aging reservoirs and infrastructure have affected UK's oil production over the past few years with production declines and widespread outages as a

result of technical problems. Falling production has made the UK increasingly reliant on imports of both crude oil and petroleum products, and the UK became a net importer of petroleum products for the first time in 2013.



## Sector organization

*Recent increases in tax rates for the oil and gas sector, coupled with technical issues, have contributed to sharp declines in UK oil production. Higher tax rates have made the UK fields less competitive, which were already strained by high operating and decommissioning costs.*

The UK government does not hold a direct interest in oil production, but this sector remains important to the government because Corporation Tax and Supplementary Tax income from the sector accounts for about 25% of UK corporate tax receipts, according to the offshore industry association Oil & Gas UK.

Since 2011, there have been a number of tax changes that affected production (or investment) in the United Kingdom Continental Shelf (UKCS), including the change in the rate of supplementary charge (an addition to the corporate tax) and the capping of relief for decommissioning costs at 20% of the supplementary charge. In addition, the tax rate for fields that are subject to petroleum revenue tax (PRT) increased to 81% of their profits (from the previous 75-percent rate), and fields that are not subject to PRT now pay a 62-percent tax (compared with the 50-percent rate in the past).

As a result of the significant increases in taxes, the UKCS projects have become even less competitive. Increases in operating costs coupled with higher taxes have resulted in decreased investment in both brownfields and new exploration. Even without the increased taxes, operating costs in the UKCS were prohibitively high, exacerbated by the high decommissioning costs of old facilities, which also discourage investors.

Almost immediately after the new tax rates were implemented, development on several start-ups was suspended, including Statoil's Mariner and Chevron's Bressay fields. In addition, Centrica launched a review of all of its exploration activities, as many projects were deemed uneconomical under the new rates. Given a nearly 16-percent decline in production following the implementation of the new tax rates, the UK government has introduced new incentives for producers to counter some of the increase in taxes.

The sector, which includes the administration of licensing, is regulated and overseen by

UK's Department of Energy and Climate Change (DECC). DECC licensing-related activities are outlined in the 1934 Petroleum Act and the 1964 Continental Shelf Act. Six types of licenses, the so-called "Seaward Production Licenses," can be awarded in the UK, which differ in length of time awarded and cost of license.

In March 2013, the UK government outlined plans to encourage continued development of the oil and gas sectors because the latest trade statistics indicated that net energy imports rose to the highest level since the 1970s. These plans included providing the industry with tax certainty, supply-chain support, and workforce skills development.

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## Exploration and production

*Although a number of new fields are expected to come online in 2013, UK production will continue to decline as new production will not be sufficient to offset the declines.*

UK oil production had peaks in the mid-1980s and late 1990s after oil companies developed a number of oil fields in the North Sea. However, oil production in the United Kingdom has been gradually declining since the 1990s. In 2013, UK produced approximately 0.8 million barrels per day (bbl/d) of crude oil, almost all of it from offshore fields.

EIA's *Short-Term Energy Outlook* expects UK oil production to continue to decline through 2015. The main reason for this decline is the overall maturity of the country's oil fields and diminishing prospects for new substantial discoveries in the future. Although its proximity to major consuming markets makes UK exploration attractive, recent increases in taxes will continue to affect the attractiveness of the UK fields in the longer term.

According to the *Oil & Gas Journal* (OGJ), the UK had 3.0 billion barrels of proven crude oil reserves as of January 2014, the most of any EU member country but 4.6% below the January 2013 level. This drop marks a major downward trend in oil reserves in the UKCS because of cost increases (making some projects uneconomic) and re-appraised key projects, according to Oil & Gas UK. The major project that will offset some of this decline is the Mariner field, which was discovered in 1981. DECC approved development of the field in February 2013, and Statoil expects production to start in 2017, rising to 55,000 bbl/d before 2020.

The vast majority of UK's reserves are located offshore in the UKCS, and most of the oil production occurs in the central and northern sections of the North Sea. Reserves are generally found in smaller fields, with only a third of fields having more than 50 million barrels of oil. Although there is a modest amount of oil produced onshore, in 2013 more than 90% of total UK production took place offshore. However, despite record investments of 14 billion pounds (23 billion USD) in 2013 to new projects, UK Continental Shelf production continues to decrease at a steady rate. Offshore crude oil production decreased by 9% between 2012 and 2013.

In addition to production declines from maturing fields, constant storms and adverse weather conditions also hamper production in the North Sea. A number of oil fields, including the key Buzzard field, had reduced production in 2013 because of maintenance and unplanned outages.

## Oil grades

Three main grades of oil are produced in the UK: Flotta, Forties, and Brent blends. They are generally light and sweet, which makes them attractive to foreign buyers. Flotta is the smallest and lowest quality stream produced in the UK. The stream is made up of very small amounts of oil from the Claymore and Piper fields, as well as production from the North Tartan, Duart, Tweedsmuir, and Tweedsmuir South fields. The Flotta blend total production in 2012 was approximately 50,000 bbl/d. Talisman Energy operates all of the producing fields with the exception of the MacCulloch, which is operated by ConocoPhillips. Flotta crude is loaded at the Talisman Energy-operated Flotta terminal, in the Orkney Islands.

Forties blend is made up of oil from 70 fields spread over a large area of the North Sea, the biggest of which is the Buzzard oil field. Buzzard produced an average of 179,000 bbl/d in 2013, according to DECC. Forties contributes about half of the total UK North Sea production (approximately 425,000 bbl/d in May 2014, according to operator BP), although the output varies significantly because of production volatility in the Buzzard field. These various fields contribute condensate, medium-gravity oil, and moderately sour crude. The Forties system occupies most of the Central North Sea, located south of the Brent complex and east of Flotta. The Forties system has 15 field operators, according to Energy Intelligence Group, including BP, Shell, Talisman Energy, CNOOC, Apache, and Suncor. Once produced, Forties blend is shipped via the 170-kilometer pipeline to Cruden Bay, where it is pumped another 200 kilometers to Hound Point, at the Forties' loading port.

Brent stream is a light, sweet crude. Nearly 40 UK fields contribute to the blend, although very little production comes from the once-prolific Brent field, after which the stream was named. According to Energy Intelligence, at its peak in 1984, the Brent field alone produced 400,000 bbl/d, with the other five major contributing fields (Thistle, Dunlin, Cormorant North, Ninian, and Magnus) peaking at a total of over 100,000 bbl/d in the mid-1980s. In 2012, all of these fields combined produced about 70,000 bbl/d, according to DECC. Despite the declining physical volumes associated with the Brent blend, its importance as a financial benchmark is increasing. The Brent blend is transported to the Sullom Voe terminal via pipelines. This terminal, located in Shetland, is operated by BP on behalf of a consortium of companies.

### **Brent, the global oil benchmark**

Brent, the oil stream, is different from Brent, the price. Brent (the price) serves as a benchmark for many different internationally traded types of crude oil. As a benchmark, Brent is used by producers, refiners, and traders for establishing long- and short-term contracts in both physical and financial markets for oil deliveries around the world.

The Brent crude oil price reflects not only the UK Brent stream, but also three other streams that are included in the trading and pricing at this location: Forties, Oseberg, and Ekofisk streams. The latter two are produced in the Norwegian part of the North Sea. The four streams that make up the Brent benchmark produce a light, sweet crude oil.

Despite declines in physical production volumes, the popularity of the Brent futures contracts has increased as evidenced by its exchange volume. Brent is primarily traded on the Intercontinental Exchange and, more recently, was also listed on the New York Mercantile Exchange. Futures contracts are exchange-traded contracts for the delivery of a specified quantity of a commodity at a specified time and place in the future, allowing crude oil market participants to hedge their risks months or years in advance. Brent does not require physical delivery upon contract expiration, but rather is settled financially.

## UK's oil fields and operators

Nexen was the largest operator in the UK in terms of oil production, with a total of approximately 188,000 bbl/d produced in the five fields it operated in 2013, according to DECC. Nexen-operated fields accounted for about 24% of total UK production in 2013.

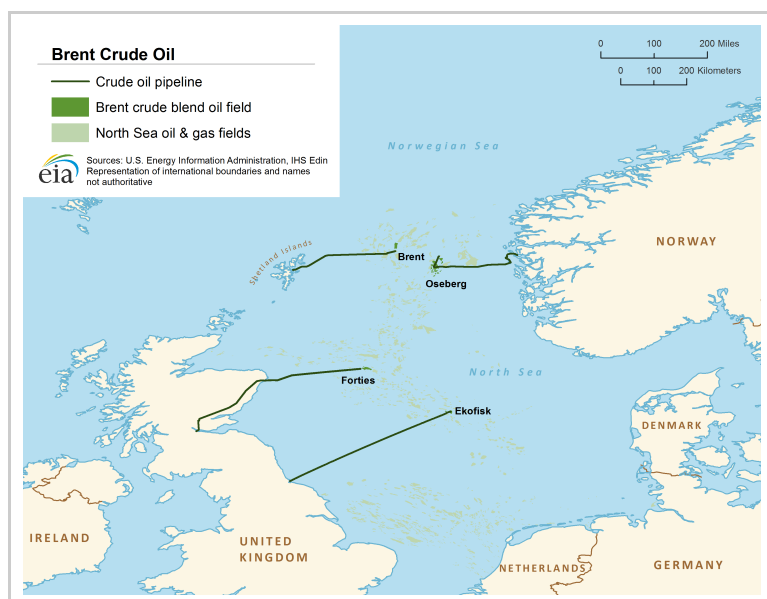
BP is also a significant operator in the UK, although its production has declined over the last few years as the company refocused its exploration and production elsewhere. It operates 18 fields in the UK, which are located offshore with a total output of approximately 72,300 bbl/d in 2013, according to DECC.

The UK's largest producing field in 2013 was the Nexen-operated Buzzard oil field, which produced an average of 178,900 bbl/d during the year. This production volume was short of its production capacity of more than 200,000 bbl/d, as the field continued to experience technical and operational issues during the year. Buzzard field came online in 2007 and reached full capacity in 2008. Average annual production at the field has declined every year until 2013, when Nexen was able to reverse some of the declines.

## UK's top producing oil fields, 2013

Field	Thousand barrels per day
Buzzard	179
Forties	41
Captain	28
Foinhaven	25
Alba	17
Nelson	12
Franklin	12
Machar	11
Telford	11
Ninian	11

Source: UK DECC



## Consumption and imports

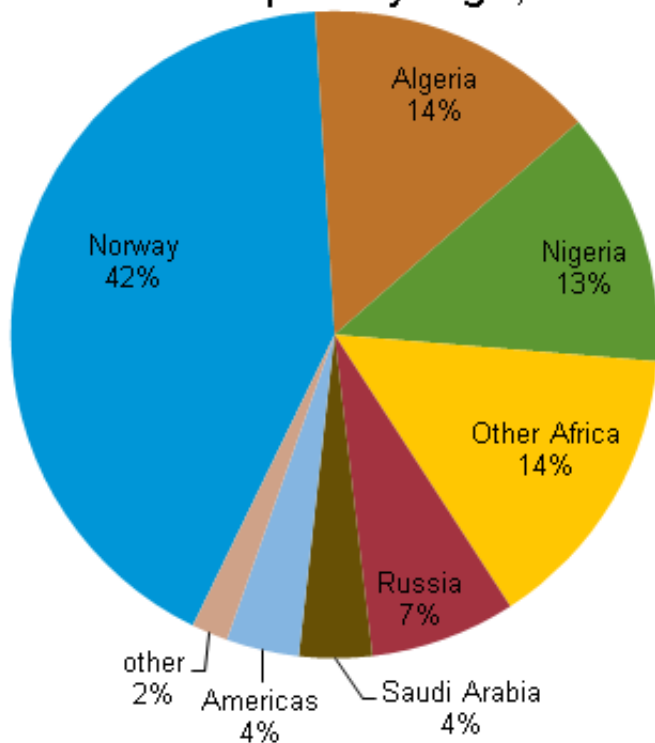
In 2013, the UK consumed 1.5 million bbl/d of petroleum and other liquids. The transportation and industrial sectors account for over 90% of petroleum consumption. Consumption has been declining steadily since a high of 1.8 million bbl/d in 2005, although consumption was roughly flat between 2012 and 2013.


Demand for middle-distillates, in particular diesel and aviation fuel, has steadily increased in the UK. Distillate fuel oil accounted for 36% of UK consumption, and kerosene jet fuel accounted for 19% in 2013. Motor gasoline was another 19%. Demand for motor gasoline has fallen gradually since 1990 as more drivers switched to diesel vehicles and as vehicle efficiency increased.

In 2013 the UK became a net importer of petroleum products by about 40,000 bbl/d. This is the first time the UK had been a net importer since 1984 when demand for petroleum products increased as a result of industrial action in the coal industry. According to DECC, domestic refiners met 61% of demand for oil products in 2012, with imports supplying the remaining 39%.

The United Kingdom is also a significant crude oil importer for its domestic refining sector and received just under 1 million bbl/d in 2013. Norway supplied 42% of the United Kingdom's imports of crude oil in 2012, although most of what the UK classifies as imports from Norway is North Sea production comingled between the UK and Norway. African countries, particularly [Algeria](#) and [Nigeria](#), supplied 41% of crude oil imports. [Russia](#) supplied 7%, and the Middle East (particularly [Saudi Arabia](#)) supplied 4%.

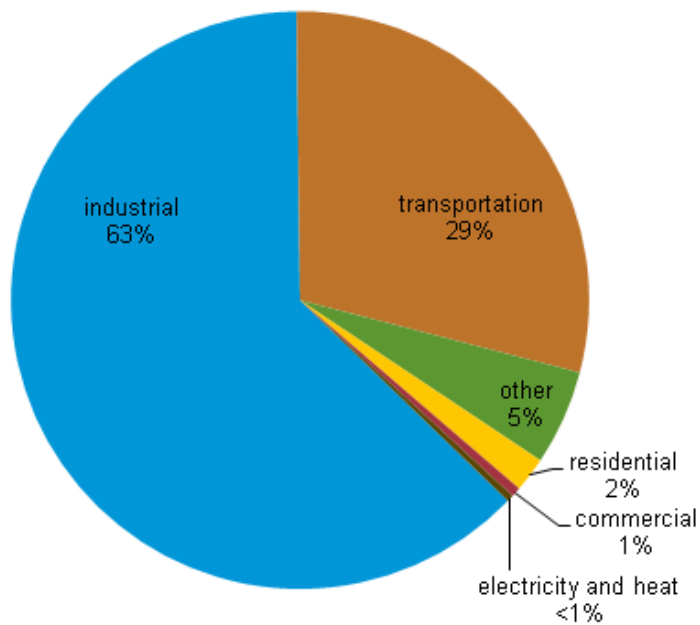
### UK crude oil imports by origin, 2013



 Source: U.S. Energy Information Administration, *International Energy Statistics*, GTIS, UK HMRC



## UK petroleum demand by sector, 2012



Source: U.S. Energy Information Administration,  
International Energy Agency

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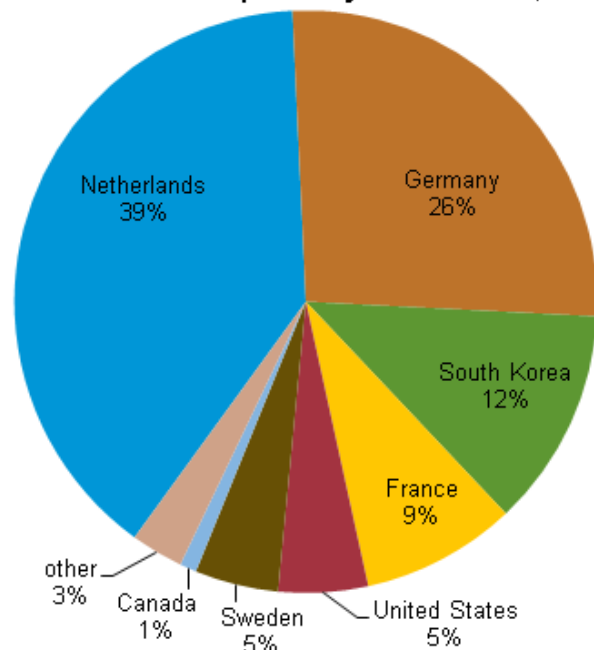
## Exports

*Despite the large declines in oil production over the last few years, the UK is still one of the largest petroleum producers and exporters in Europe and exported 576,000 bbl/d of crude oil in 2012.*

Once a major exporter of oil, the UK exports have dropped in tandem with decreasing domestic production. However, despite being a net importer of crude oil and petroleum products, the UK is still one of the largest petroleum producers and exporters in Europe and exported 576,000 bbl/d of crude oil in 2012.

UK customs export data show that the vast majority of crude oil exports (over 80%) were destined to EU countries, mainly Germany and Netherlands. Most of the non-EU export trade was with South Korea and the United States. The UK's two largest markets in the EU are Germany and the Netherlands; the bulk of the exports to Germany are for refining and consumption there, while the exports to the Netherlands include oil destined for onward trade to other countries.

## UK crude oil exports by destination, 2012



Source: U.S. Energy Information Administration, UK HMRC

## Pipelines

There is an extensive network of pipelines in the UK that carry oil extracted from North Sea platforms to coastal terminals in Scotland and northern England.

- BP operates the 110-mile, 36-inch Forties-Cruden Bay pipeline, linking fields in the Forties system to the oil terminal at Cruden Bay, Scotland. The company also operates a 110-mile, 36-inch pipeline connecting the Ninnian system to the Sullom Voe oil terminal on Shetland Island.
- Britoil Plc operates a 150-mile, 24-inch pipeline linking the Bruce and Forties fields to Cruden Bay and Talisman operates a 130-mile, 30-inch pipeline connecting the Piper system with Flotta on Orkney Island.
- Shell and Esso jointly operate a 93-mile, 36-inch connection between the Cormorant oil field and Sullom Voe. There are also many small pipelines that connect each North Sea oil platform to these major backbone lines.
- The UK has a few onshore crude oil pipelines, including a 90-mile, underground pipeline operated by BP that links the Wyth Farm field to the refinery at Fawley and the nearby oil export terminal at Southampton.
- The UK has a single international crude oil pipeline, the 220-mile, 34-inch Norpipe operated by ConocoPhillips. With a capacity of 900,000 bbl/d, Norpipe connects Norwegian oil fields in the Ekofisk system to the oil terminal and refinery at Teesside.

## Refining sector

The UK had 1.5 million bbl/d of refining capacity at the end of 2013, according to *Oil & Gas*

*Journal*, a decline of 0.2 million bbl/d from the previous year. Essar operates the single-largest refinery in the country, the 272,000-bbl/d Stanlow facility. Other companies with sizeable refining capacity in the UK include ExxonMobil (260,000 bbl/d), Phillips (221,000 bbl/d), and Valero (210,000 bbl/d).

Refinery production in 2013 decreased by 5.2%, partly because the Coryton refinery closed in July 2012, and also because other refineries experienced disruptions. There were large decreases in the production of diesel fuel, gas oil, fuel oil, and aviation fuel and lower exports of petroleum products in 2013.

UK refineries generally produce motor gasoline and residual fuel oil and so cannot meet domestic demand for distillate fuel oil and aviation fuel. According to a 2014 government review of the UK refining sector, imports supplied 44% of diesel and 64% of aviation fuel demand in 2012.

The European Union has suffered from a refining overcapacity, leading to several refinery closures in recent years. As the United States has increased production of light, sweet oil from shale and other tight formations, EU refiners have lost their traditional export market for products like motor gasoline. The review concluded that while investment in UK import capacity is strong, there will continue to be downward pressure on refinery margins in the European Union.

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## Natural gas

*UK's natural gas production has been on a long-term declining trend, although the country continues to produce sizeable natural gas volumes. In 2013, domestic natural gas production accounted for just over a third of the UK's natural gas supply.*

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## Sector organization

The UK natural gas sector is fully privatized, including production, transmission, and distribution. The largest gas distributor in the UK is Centrica, a spin-off of the distribution assets of formally state-owned British Gas. Centrica had a 40% market share in the UK natural gas market in 2013, according to Ofgem. There are five other large suppliers (E. On, NPower, SSE, Scottish Power, and EDF) that each have between 10-16% market share in 2013.

The UK gas distribution sector underwent a major change in 2005, when National Grid Gas sold four of the eight gas distribution networks to Scotia Gas Networks, Wales and West Utilities, and Northern Gas Networks. Prior to this sale, National Grid controlled the domestic gas distribution system.

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## Exploration and production

According to *Oil & Gas Journal*, the UK held an estimated 8.6 trillion cubic feet (Tcf) of proven natural gas reserves as of January 2014. Most of these reserves occur in three distinct areas: 1) associated fields in the UKCS; 2) nonassociated fields in the Southern Gas Basin, located adjacent to the Dutch sector of the North Sea; and 3) nonassociated fields in the Irish Sea. The UK government has encouraged the use of natural gas as a substitute for coal and oil in industrial consumption and electricity production.

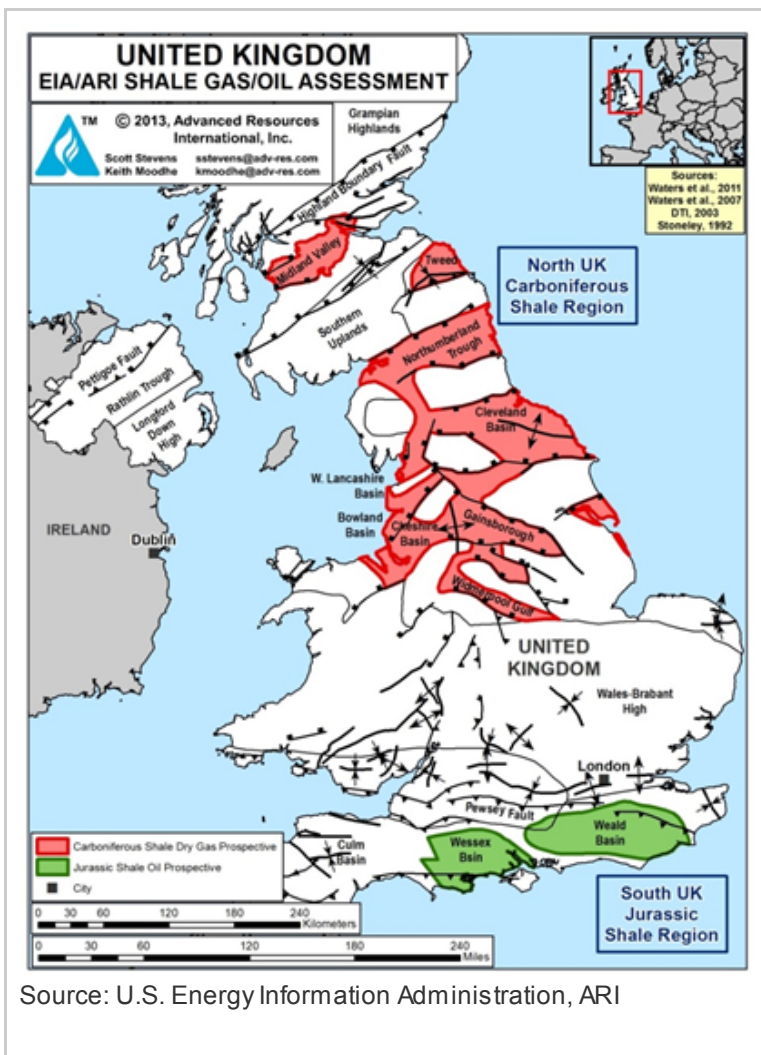
The UK produced 1.3 Tcf of dry natural gas in 2012, and preliminary estimates by DECC show natural gas production falling by 6% in 2013. UK natural gas production has been declining every year since 2000. The largest concentration of natural gas production in the UK is the Shearwater-Elgin area of the Southern Gas Basin. The area contains five gas fields: Elgin, Franklin, Halley, Scoter, and Shearwater. Most of the leading oil companies in the UK are also the leading natural gas producers, including BP, Shell, and ConocoPhillips.

UK's largest share of natural gas production among all fields and gathering systems comes from the Scottish Area Gas Evacuation (SAGE) system, which produced a total of 246 billion cubic feet (Bcf) in 2011. In addition to SAGE, the Shearwater-Elgin Area Line (SEAL) produced more than 200 Bcf of natural gas during the year.

### Shale gas

The United Kingdom has substantial volumes of prospective shale gas and shale oil resources within shale formations distributed broadly in the northern, central and southern portions of the country. The risked, technically recoverable shale resources of the UK are estimated at 26 Tcf of shale gas and 0.7 billion barrels of shale oil and condensate in the two regions assessed by the 2013 EIA/ARI shale gas and oil report.

Compared with North America, the shale geology of the UK is considerably more complex. Shale testing is still at an early phase in the UK. In a temporary setback, the first shale well triggered a series of minor earthquakes related to a nearby fault. Following an 18-month moratorium, the government concluded that the environmental risks of shale exploration are small and manageable. The government allowed shale drilling to resume in December 2012, albeit with stricter monitoring controls. Current shale operators include Cuadrilla Resources, IGAS, Dart Energy, and others.



## Consumption and imports

Natural gas consumption in the UK was 2.6 Tcf in 2013, a 1% decline from the prior year. Natural gas for electricity generation, heat, and the residential sector accounted for 64% of total natural gas consumption. The industrial sector accounted for 24% of natural gas consumption.

In 2004, the UK became a net importer of natural gas. The UK imported about 1.3 trillion cubic feet (Tcf) of natural gas in 2013, with about 84% via pipeline and the rest from liquefied natural gas (LNG). EIA estimates that almost 60% of the UK's pipeline imports in 2013 came from Norway, with additional gas coming from the Netherlands (16%) and Belgium (7%). According to projects from UK's DECC, the UK will have be 76% dependent on natural gas import by 2030.

### Liquefied natural gas (LNG)

In 2011, the UK demand for LNG surpassed that of Spain for the first time, and UK became the largest market for LNG imports in the EU. That year, UK imported a total of 892 Bcf of natural gas. However, in 2012 the UK LNG demand fell behind Spain's at 504 Bcf, according to PFC Energy. LNG imports in 2012 fell as pipeline imports rose, mainly those from Norway, as LNG cargoes were diverted to higher-priced markets in Asia.

LNG imports, particularly from Qatar, fell by 30% between 2012 and 2013 because of declines in UK gas demand and strong competition for LNG in global market, particularly

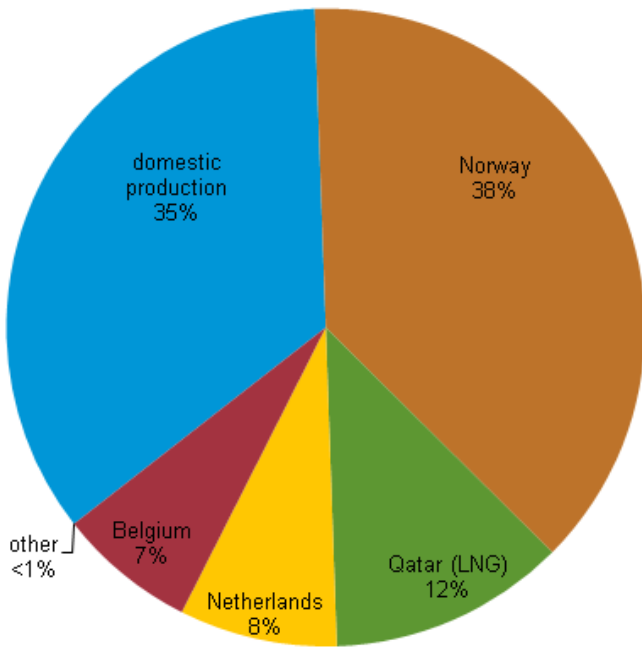
from Japan after the country closed its nuclear facilities following the Fukushima plant meltdown. LNG imports accounted for 18% of the total in 2013, down from 28% in 2012. [Qatar](#) accounted for virtually all LNG imports in 2013.

Currently, the UK has four LNG import terminals:

- The country's longest-operating LNG terminal is National Grid's Grain LNG terminal on the Isle of Grain. The facility originally became operational in 2005, and following a number of expansions, the terminal can receive and process 1.9 Bcf per day of LNG, according to PFC Energy.
- Teesside LNG, operated by the U.S.-based Excelebrate Energy, commenced commercial operation in February 2007. This was the first dockside regasification port and the second operational LNG facility in the UK. Teesside LNG can deliver up to 400 million cubic feet (MMcf) per day of natural gas to the UK market.
- The Dragon LNG terminal, a collaboration of BG, Petronas, and 4Gas, began operating in September 2009. The import, storage, and regasification terminal is located in Milford Haven in South Wales with a regasification capacity of 580 MMcf per day.
- The South Hook LNG terminal, also located in Milford Haven, Wales, is owned and operated by Qatar Petroleum, ExxonMobil, and Total. Europe's largest LNG terminal became commercially operational in October 2009 with an initial capacity of 1.1 Bcf per day. Following the expansion in Phase II, the terminal's capacity has expanded to 2.1 Bcf per day.

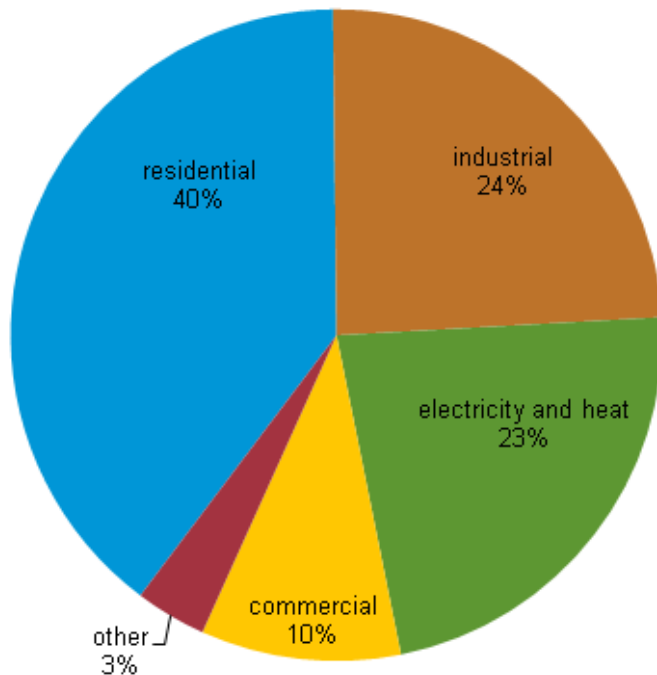
In March 2013, Centrica signed a 20-year agreement with Cheniere to import LNG from the Sabine Pass LNG facility in Louisiana. Although Cheniere still needs to receive necessary approvals for exports, export volumes would total approximately 85 Bcf of LNG per year and would begin in 2018.

UK natural gas supply mix, 2013



Note: Domestic consumption = total UK production - exports  
Source: U.S. Energy Information Administration, International Energy Statistics, Cedigaz, UK DECC

UK natural gas demand by sector, 2012



Source: U.S. Energy Information Administration, International Energy Agency

## Pipelines

### Domestic system

There are four main pipeline systems in the UK that carry natural gas from offshore platforms to coastal landing terminals. The responsibility for transporting natural gas

throughout the country once it is brought onshore belongs to the utilities operating in the UK, including National Grid and Scotia Gas Networks.

- The Shearwater-Elgin Area Line (SEAL), operated by Shell, transports gas from the Shearwater-Elgin area to the landing terminal at Bacton, England.
- ExxonMobil operates the 200-mile, 30-inch Scottish Area Gas Evacuation (SAGE), which transports associated natural gas from UKCS fields to the landing terminal at St. Fergus, Scotland.
- The 250-mile, 36-inch Central Area Transmission System (CATS), operated by BP, links fields in the Central North Sea to Teesside.
- Shell operates the 283-mile Far North Liquids and Gas System (FLAGS) linking associated gas deposits in the Brent oil system with St. Fergus.

### **International pipelines**

A consortium of companies operates the Interconnector pipeline between Bacton, England and Zeebrugge, Belgium. The Interconnector, inaugurated in 1998, is capable of bi-directional operation, meaning either it can export natural gas from the UK to continental Europe ("forward mode"), or it can import natural gas into the UK ("reverse mode"). Since it began operating, the Interconnector has mostly operated in forward mode, however during late fall and winter seasons, the pipeline has tended to operate in reverse mode. The pipeline has undergone three phases of expansion, with additional capacity and compression added between 2005 and 2007. The interconnector is currently capable of transporting 2.0 Bcf per day in forward mode and 2.5 Bcf per day in reverse mode.

The UK also imports natural gas through the Frigg pipeline system, operated by Total. Frigg connects the St. Fergus gas terminal with the Frigg gas field in the Norwegian sector of the North Sea. The UK-Eire Interconnector connects the UK with Ireland, running from Moffat, Scotland to Dublin. On December 1, 2006, the Balgzand-Bacton Line (BBL), the first pipeline to link the Netherlands and the United Kingdom, began operating and supplying the UK with natural gas from the Dutch mainland. The 147-mile pipeline has a capacity of approximately 1.5 Bcf per day.

Three pipelines connect the UK with Norway. The Langeled pipeline, which began operating in 2007, is a 729-mile line that can transport approximately 2.5 Bcf per day. This line links Norway's Ormen Lange gas field and Easington, England via the Sleipner Riser platform in the North Sea. The Vesterled pipeline runs between the Heimdal Riser platform in the North Sea and St. Fergus in Scotland. The pipeline can transport up to approximately 1.3 Bcf per day. Finally, the Tampen pipeline that connects the Stratford field to FLAGS can transport up to 880 MMcf per day, according to PFC Energy.

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## **Coal**

*Coal production in the UK is declining because of falling consumption, relatively cheap natural gas that competes with coal for power generation, and a surge of low-cost imports.*

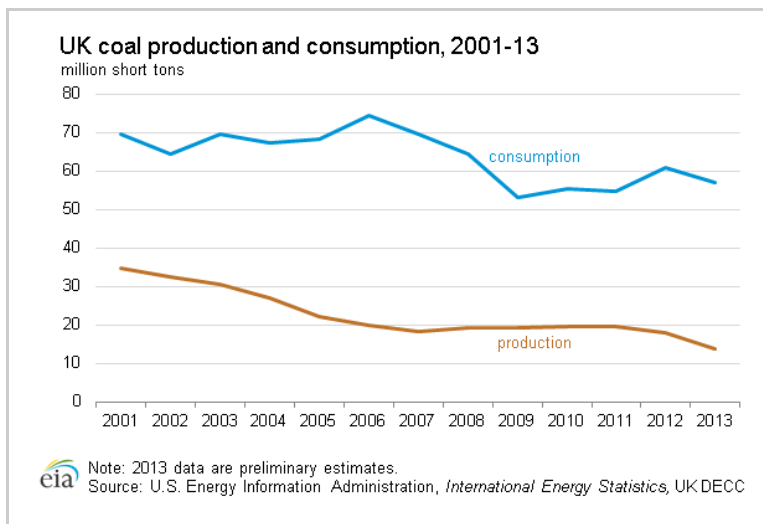
Coal production in the UK has declined steadily and dramatically since the early 1990s, falling to its record low level in 2012 at 18.0 million short tons (MMst) in 2012. Preliminary



data from DECC suggests that coal production fell by 25% in 2013. Decreasing domestic consumption and a surge of low-cost imports have been the principal causes of the production decline, although in 2013 the decline was particularly severe because several mines closed.

UK hard coal consumption has fallen by about one quarter over the last four years because of relatively low natural gas prices and higher CO<sub>2</sub> emission allowance prices, according to Euracoal. Coal use in electricity generation fell 9% in 2013. Meanwhile, total imports increased by 4% to 11.9 MMst in 2013; 41% of imports came from Russia, 25% from the United States, and 23% from Colombia. In 2013, 43.0 million tons of the coal imported (87%) was steam coal, largely for the power stations market.

The UK had an estimated 228 million short tons (MMst) of recoverable coal reserves in 2012, according to BP's Statistical Review of World Energy 2013. The UK's coal mines are mainly located in central and northern England, south Wales, and central and southern Scotland, where there is the highest concentration of surface mines.



## Electricity

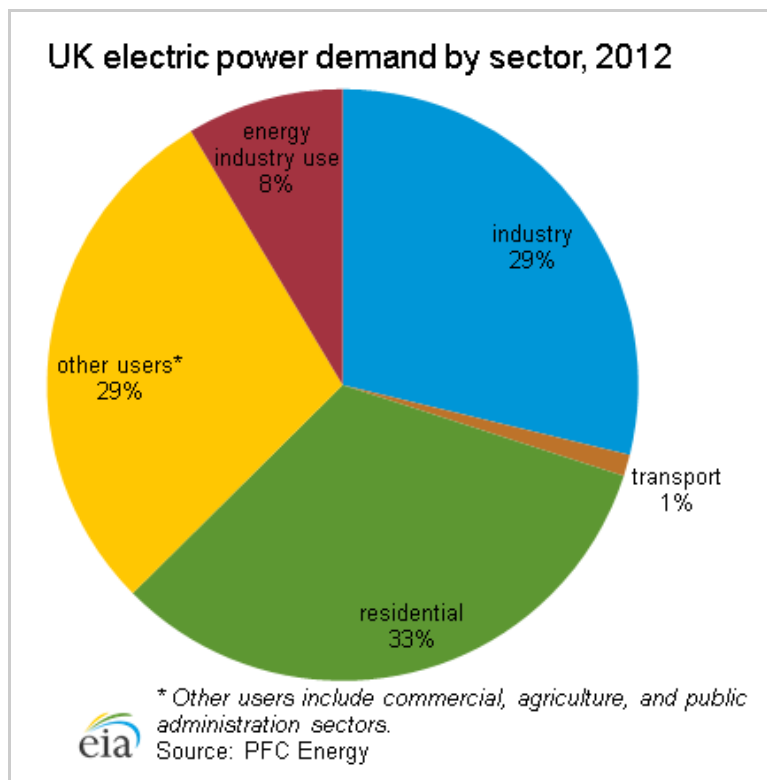
*Electricity generation from fossil fuels accounts for the majority of electricity produced in the UK, with coal occupying the top spot among all sources. Renewable energy, especially wind, continues to grow and reached almost 15% of total generation in 2013.*

The UK has become one of the most competitive electricity markets in Europe after privatizing the sector in 1990, according to IHS Energy. The UK had 89 gigawatts (GW) of installed electricity generation capacity in 2012, according to DECC. Capacity had fallen since 2010 as several plants closed. Preliminary data published by DECC show that in 2013, the UK generated 357 billion kilowatt-hours (kwh) of electricity while consuming 351 billion kwh. This level of consumption was slightly lower than the year before at 354 billion kwh.

Most electricity generation comes from fossil fuels (64%), particularly coal (36% of total generation), followed by nuclear (20%), hydroelectricity (2%), and other renewables (15%). Although coal's share of electricity generation decreased in 2013, it is still high compared to the period between 2008 and 2011, when it contributed about 30% of the UK's electricity

generation.

The industrial sector's share of electricity demand has declined since 2005. This decline was mainly the result of the economy's continued shift toward a service-based economy but also to some extent as a result of improved efficiency. Following the global recession, growth in gross domestic product slowed and contributed to further declines in demand, which dropped by 13% between 2008 and 2012, according to PFC Energy.



## Sector organization

The UK has a privatized electricity sector, where generators and distributors trade electricity in a wholesale power market. The market has six major producers. The largest power producer in the country is Électricité de France (EdF) Energy, which controls all of the nuclear power. Other important generating companies include E.ON UK, RWE, Scottish and Southern Energy (SSE), and ScottishPower (SP). National Grid owns and operates the national transmission system in England and Wales; SSE and SP operate the grid in Scotland; and Northern Ireland Electricity (NIE) operates the grid in Northern Ireland.

## Fossil fuel generation

*Although natural gas-fired power stations were replacing coal as the principle source of the UK power supply for a number of years, this trend seems to have reversed in 2012 because of the relative cost of natural gas in the UK.*

Electricity generation plants using fossil fuels continue to provide the bulk of the electricity supply in the UK. Most of the fossil fuel generation is powered by coal at 36% in 2013, down 3 percentage points from 2012. Coal-fired generation in the UK had experienced somewhat of a comeback, as it overtook natural gas in 2012 following years of declining shares.

In 2013, natural gas generation fell 4.3% to its lowest level since 1996, displaced by cheaper coal because of a relatively high natural gas price in the UK. Oil-fired plants continue to provide only marginal amounts of electricity, accounting for approximately 1% of total generation in 2013. Even at such a low level, oil-fired electricity continues to decline each year as old plants retire and the capacity is replaced by renewable sources.

## Nuclear

*Currently accounting for about one-fifth of total electricity generation, nuclear power plants are central to the UK government plans for future generation. Much of the additional generating capacity will new nuclear units.*

There are 16 nuclear reactors in the UK, providing about 20% of the country's total net generation in 2013, according to DECC. According to World Nuclear Association, all but one of these reactors are scheduled to be retired by 2023.

All of the seven twin-unit plants are operated by EDF Energy, which include seven stations that use advanced, gas-cooled reactors (AGR) and one (Sizewell B) that uses a pressurized-water reactor (PWR). Wylfa, a first-generation magnesium non-oxidizing (Magnox) nuclear power plant, will shut down when its fuel runs out in December 2015.

### Power reactors operating in the UK

Plant	Type	Capacity (MW)	Start	Expected shut-down
Wylfa 1	Magnox	490	1971	Dec-15
Dungeness B 1&2	AGR	2 x 545	1983 & 1985	2018 or 2028
Hartlepool 1&2	AGR	2 x 595	1983 & 1984	2024
Heysham I-1 & I-2	AGR	2 x 580	1983 & 1984	2019
Heysham II-1 & II-2	AGR	2 x 615	1988	2023
Hinkley Point B 1&2	AGR	2 x 610 operating at 70% (430 MWe)	1976	2023
Hunterston B 1&2	AGR	2 x 610 operating at 70% (420 MWe)	1976 & 1977	2023
Torness 1&2	AGR	2 x 625	1988 & 1989	2023
Sizewell B	PWR	1188	1995	2035
Total Capacity (16 units)		10,038		

*Source: World Nuclear Association*

In 2008, the UK government announced its support for additional nuclear power plants to meet projected energy needs. According to a series of papers published since 2009, the UK government projects that an additional 60 GW of net generating capacity will be necessary by 2025. Although 35 GW are expected to come from renewable energy, much of the remainder is expected to be fueled by nuclear power.

Since 2008, several utilities have begun planning construction of new power plants. Current

policy discussions surrounding nuclear power in the UK include wide-ranging incentives for new nuclear plants, such as feed-in tariff and a carbon floor price. Although feed-in tariffs currently are only available to renewable generation, these mechanisms may be extended to nuclear power and would refer to payments to electricity generators that use nuclear power. In June 2011, the government designated eight sites for the development of nuclear power stations. Given the pace of new nuclear plant development, the first of the new units is expected to come online in 2018.

## Nuclear power reactors planned and proposed in the UK

Company	Site	Type	Capacity (MW gross)	Construction start	Expected start-up
EDF Energyn	Hinkley Point C-1	EPR	1,670		2023
	Hinkley Point C-2	EPR	1,670		2024
EDF Energyn	Sizewell C-1	EPR	1,670		-n/a-
	Sizewell C-2	EPR	1,670		-n/a-
Horizonn	Wylfa Newydd 1	ABWR	1380		2025
Horizon	Wylfa Newydd 2	ABWR	1380		2025
Horizon	Oldbury B-1	ABWR	1380		late 2020s
Horizon	Oldbury B-2	ABWR	1380		late 2020s
NuGeneratioin	Moorside	AP1000x3	3400		2024
Total planned & proposed capacity (11 units)			15,800- 18,560		

Source: World Nuclear Association

## Renewables

The UK government has introduced a number of regulations to increase the amount of renewable energy in the country. These regulations call for an increase in the use of renewables to 30% of total electricity generation in 2020. While these plans include hydropower, wind resources are central to the government's plans.

Renewables accounted for nearly 15% of total generation in 2013. Renewable electricity generation increased by 28% from 2012, with wind generation up by 40%. The UK is a world leader in offshore wind capacity, and the government approved plans for the 1.2 GW Triton Knoll offshore wind farm in summer 2013.

## Notes

- Data presented in the text are the most recent available as of June 3, 2014.
- Data are EIA estimates unless otherwise noted.

## Sources

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- UK Offshore Operators Association (UKOOA)
- US Energy Information Administration
- World Nuclear Association