

COUNTRY ANALYSIS BRIEFS

United Kingdom

Last Updated: September 2011

Background

Over the past decade, U.K.'s oil and natural gas consumption have remained relatively stable while domestic production of both has declined, making the country a net energy importer.

The United Kingdom (U.K.) is the largest producer of oil and second-largest producer of natural gas in the European Union (E.U.). After years of being a net exporter of both fuels, the U.K. became a net importer of natural gas and crude oil in 2004 and 2005, respectively. Production from U.K. oil and natural gas fields peaked in the late 1990s and has declined steadily over the past several years, as the discovery of new reserves has not kept pace with the maturation of existing fields. The U.K. government, aware of the country's increasing reliance on imported fuels, has developed key energy policies to address the domestic production declines. These include: enhanced recovery from current and maturing oil and gas fields, ensuring energy security, promoting cooperation with Norway, and decarbonizing the U.K. economy by investing heavily in renewable energy.



Oil

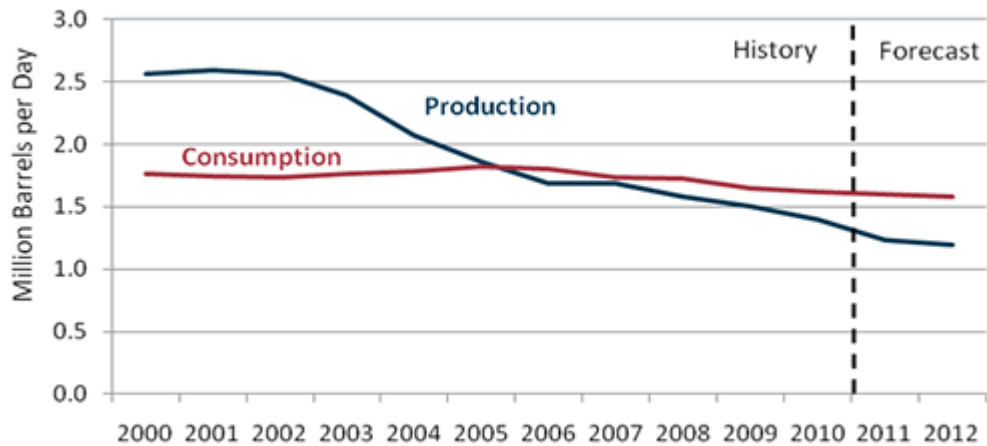
Oil remains important to the U.K. energy balance, with oil's contribution to total energy consumption accounting for 37 percent.

According to *Oil and Gas Journal (OGJ)*, the U.K. had 2.9 billion barrels of proven crude oil reserves in 2011, the most of any E.U. member country. In 2010, the U.K. produced 1.4 million barrels per day (bbl/d) and consumed 1.6 million bbl/d of oil.

Exploration and Production

The UK Continental Shelf (UKCS), located in the North Sea off the eastern coast of the U.K., contains the bulk of the country's oil reserves. There are also sizable reserves in the North Sea north and west of the Shetland Islands. Besides these offshore assets, the U.K. also has the Wytch Farm field located in the Wessex Basin, the largest onshore oil field in Europe, which has produced more than 400 million barrels of oil over its 35-year life.

U.K. Oil Production and Consumption, 2000-2012



Source: U.S. Energy Information Administration

Total oil production (including condensates, natural gas liquids, and refinery gain) in the U.K. was 1.4 million bbl/d in 2010, a 7 percent decline compared with the 2009 production levels. EIA's *Short-Term Energy Outlook* expects U.K. oil production to continue to decline, falling to 1.2 million bbl/d by the end of 2012. 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. Still, exploration interest in U.K. remains strong, undoubtedly driven by higher oil prices and the North Sea's proximity to major consuming markets. However, recent increases in the Supplementary Corporate Tax for oil and gas companies by 12 percent may affect the attractiveness of the U.K. fields in the longer term.

A total of seven oil fields started production in 2010 and 2011. Two of those, Loirston (ExxonMobil) and Falcon (Taqa) began production in March and July 2011, respectively. Loirston is located in the Viking Graben basin and has 1.79 million boe of reserves. Falcon, located in the East Shetland basin has 3.07 million boe of reserves.

Exports

Most of the U.K. crude oil grades are light (30° to 40° API) and sweet (relatively small amounts of sulfur), which generally makes them attractive to foreign buyers. The U.K. was a net exporter of crude oil between 1981 and 2005 and has since become a net importer.

The U.K. is still one of the largest petroleum producers and exporters in the E.U and is home to the Brent benchmark. In 2010, the U.K. exported 832 thousand bbl/d, more than half of its total production. Nearly 80 percent of its crude was shipped to E.U. countries. Significant volumes of crude oil were destined for the Netherlands (38 percent of the total), Germany (22 percent), and the United States (17 percent). The remaining 23 percent of crude oil exports were sent to a number of other countries, including France, Sweden, Chile, and Denmark.

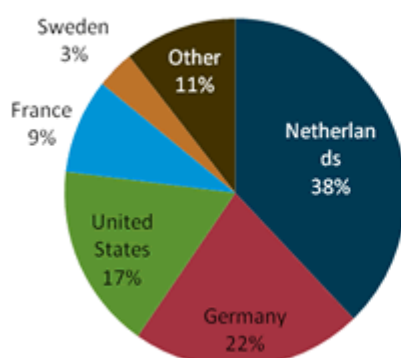
The United Kingdom is also a significant oil importer, receiving about 1 million bbl/d in 2010. Considering a slowing decline rate in oil exports accompanied by declining domestic consumption and increasing imports, it appears that the U.K. is once again becoming an oil transit country.

According to Global Trade Atlas, about 72.8 percent of all crude oil imports originated in Norway (which is not part of EU-27) with another 6.5 percent arriving from Russia.

U.K. Crude Oil Imports and Exports, by Region, 2010 (Barrels per Day)		
	Imports	Exports
European Union (EU 27)	13,330	655,295
Other Europe (excl. EU 27)	807,881	6,879
America	30,845	169,652
North America	5,449	154,640
Other America	25,396	15,012
Mid-East and North Africa	104,629	-
Sub-Saharan Africa	45,048	-
Asia and Oceania	7,206	1
Total	1,008,939	831,827

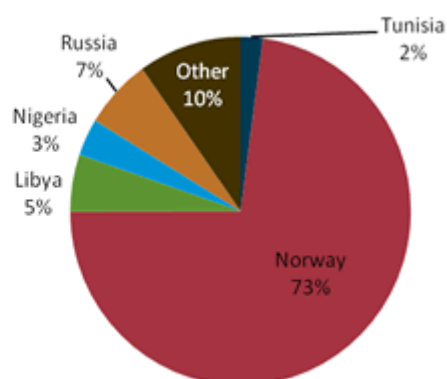
Source: Global Trade Atlas

U.K. Crude Oil Exports by Country, 2010



Source: Global Trade Atlas

U.K. Crude Oil Imports by Country, 2010



Pipelines

There is an extensive network of pipelines in the U.K. to 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 numerous, small pipelines that connect each North Sea oil platform to these major backbones. Finally, the U.K. does have a few onshore crude oil pipelines, including a 90-mile, underground pipeline operated by BP that links the Wytch Farm field to the refinery at Fawley and the nearby oil export terminal at Southampton.

The U.K. 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.

Downstream

The U.K. had 1.8 million bbl/d of refining capacity in 2011, according to *OGJ*. ExxonMobil operates the single-largest refinery in the country, the 329,500-bbl/d Fawley facility in southern England. Other companies with sizeable refining capacity in the U.K. include Shell (272,000 bbl/d), Petroplus (272,000 bbl/d), ConocoPhillips (221,000 bbl/d) and Total (221,000 bbl/d).

Sector Organization

BP is the largest oil producer in the U.K., with 27 fields, according to Wood Mackenzie. Other large oil producers in the UK include Nexen, Shell, and Total. The Canada-based Nexen operates Buzzard, U.K.'s largest oil field, which accounted for close to 12 percent of total U.K. oil production in 2010.

As U.K. oil fields mature, the industry has shifted focus from discovering new reserves to increasing the productivity of existing fields and developing smaller fields that were previously considered non-commercial. This trend has prompted oil majors such as BP and Shell to begin selling their U.K. assets in order to focus on high growth, international opportunities. The result has been the entry into the UK oil sector of many smaller operators. In 2003, U.S.-based Apache purchased BP's Forties field for \$630 million, and other smaller operators, such as Talisman and Nexen have acquired significant production assets in the country.

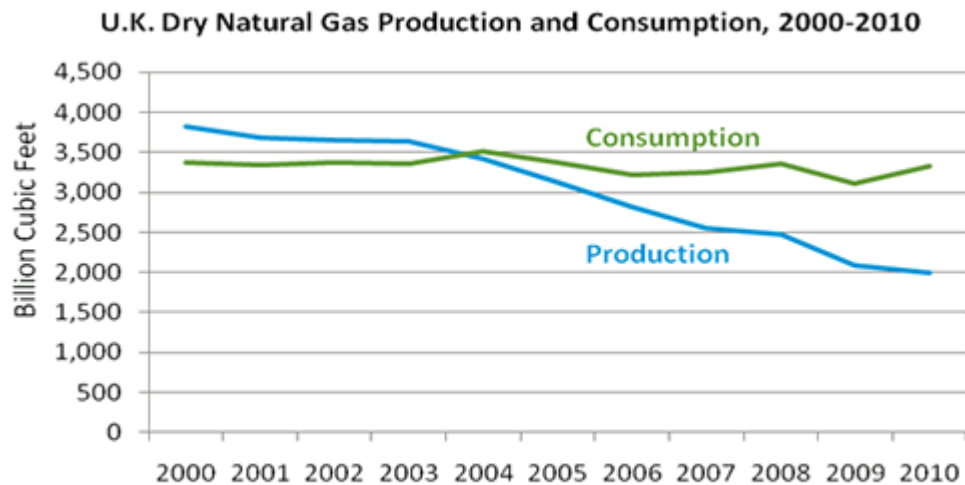
Natural Gas

The U.K. is a significant producer of natural gas and meets much of its own demand. However, the country increasingly relies on imports of natural gas.

According to OGJ, the U.K. held an estimated 9 trillion cubic feet (Tcf) of proven natural gas reserves in 2011, a 12 percent decline from the previous year. Most of these reserves occur in three distinct areas: 1) associated fields in the U.K. continental shelf (UKCS); 2) non-associated fields in the Southern Gas Basin, located adjacent to the Dutch sector of the North Sea; and 3) non-associated fields in the Irish Sea. The U.K. government has encouraged the use of natural gas as a substitute for coal and oil in industrial consumption and electricity production. Natural gas consumption in the U.K. reached 3.3 Tcf in 2010, increasing about 7 percent compared with the prior year.

Exploration and Production

The U.K. produced 2.0 Tcf of natural gas in 2010, falling about 5 percent compared with the previous year, which was a significantly smaller decrease than last year's 15 percent. At 2.0 Tcf, U.K.'s production reached its lowest level since 1992.



Source: U.S. Energy Information Administration

The largest concentration of natural gas production in the U.K. 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 U.K. are also the leading natural gas producers, including BP, Shell, and ConocoPhillips. The major gas distribution companies in the U.K., such as BG Group and E.ON Ruhrgas, also have a presence in the production sector.

Sector Organization

Private companies control the U.K. natural gas sector, including production, distribution, and transmission. The largest gas distributor in the UK is Centrica, a spin-off of the distribution assets of formally state-owned British Gas. The British 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 transmission system.

Pipelines

Domestic System

There are four main pipeline systems in the U.K. that carry natural gas from offshore platforms to coastal landing terminals. The Shearwater-Elgin 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. Finally, Shell operates the 283-mile Far North Liquids and Gas System (FLAGS) linking associated gas deposits in the Brent oil system with St. Fergus. Once brought onshore, the responsibility for transporting natural gas throughout the country belongs to the utilities operating in the U.K., including National Grid and Scotia Gas Networks.

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 U.K. ("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 to it between 2005 and 2007. Interconnector is currently capable of transporting 2.0 Bcf/d in Forward Mode and 2.6 Bcf/d in Reverse Mode.

The U.K. 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. Finally, the U.K.-Eire Interconnector connects the U.K. with the Republic of Ireland, running from Moffat, Scotland to Dublin.

Liquefied Natural Gas (LNG)

Currently, the U.K. has four LNG import terminals and the country was the eighth-largest importer of LNG in 2010. The longest-operating LNG terminal in the U.K. is National Grid's Grain LNG terminal on the Isle of Grain. The facility originally became operational in 2005, and with a number of expansions, the terminal can receive and process 160 Bcf per year of LNG.

Teesport LNG, operated by the U.S.-based Exceleerate Energy, commenced commercial operation in February 2007. This was the first dockside regasification port and the second operational LNG facility in the U.K. Teesport LNG can deliver up to 600 MMcf/d of natural gas to the UK market

The Dragon LNG terminal, a collaboration of BG, Petronas, and 4Gas, commenced operation in September 2009. The import, storage, and regasification terminal is located in Milford Haven in South Wales and has a sendout capacity of 1.1 Bcf/d.

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/d. When fully commissioned (following the Phase II completion), the terminal's capacity is expected to reach 2.1 Bcf/d.

U.K. received 55 percent of its LNG imports from Qatar in 2009, with the remaining volumes arriving from Trinidad and Tobago, Algeria, Egypt, and Australia. In addition, a tanker carrying the first-ever shipment of LNG from the U.S. to the U.K. arrived on the U.K. shores in November 2010.

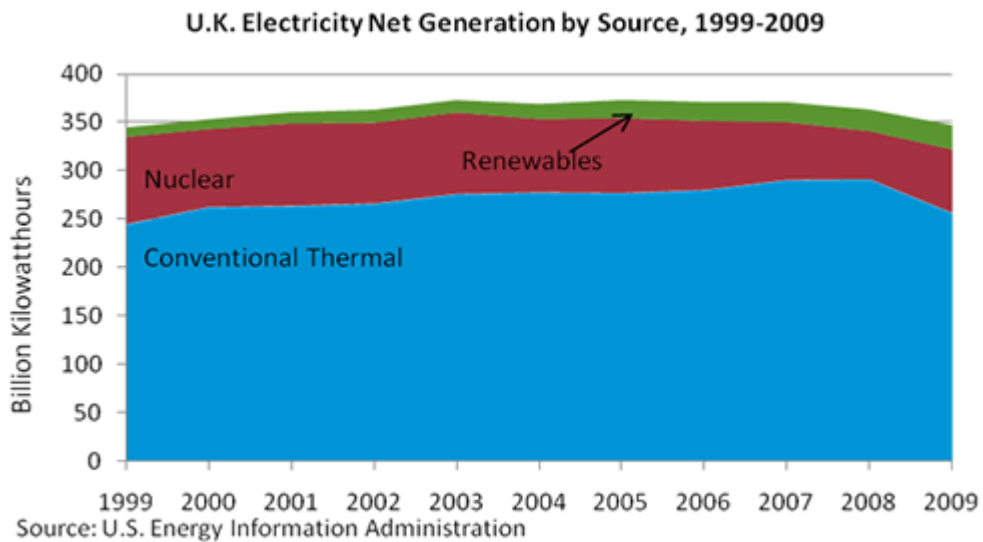
Electricity

Natural gas-fired power stations are replacing coal as the principle source of the U.K. power supply.

The U.K. had installed electricity generation capacity of 86 gigawatts (GW) in 2008. Also in 2008, the U.K. generated 362 billion kilowatthours (Bkwh) of electricity while consuming 345 Bkwh. Most electricity generation comes from conventional thermal sources (80 percent), followed by nuclear (13 percent), other renewables (6 percent), and hydroelectricity (1 percent).

Sector Organization

The U.K. has a privatized electricity sector, where generators and distributors trade electricity on a wholesale market. The largest power producer in the country is Electricité de France (EDF) Energy, which controls most of the nuclear power capacity and generates one sixth of the total electricity supply. Other important generating companies include E.ON U.K., RWE-npower, Scottish and Southern Energy (SSE), and ScottishPower (SP). National Grid owns and operates the national transmission system in England and Wales, whereas SSE and SP operate the grid in Scotland, and Northern Ireland Electricity (NIE), operates the grid in Northern Ireland.



The U.K. has slowly integrated the formally-separate electricity markets of its component parts (England, Northern Ireland, Scotland, and Wales). The British government formed the New Electricity Trading Arrangements (NETA) in 2001 to integrate the electricity markets of England and Wales. In 2005, the British government extended NETA to Scotland as the British Energy Transmission and Trading Arrangements (BETTA). There are plans eventually to incorporate Northern Ireland into the BETTA. In addition, SP and SSE have increased the transmission capacity between England and Scotland to allow them to sell more electricity to English and Welsh customers.

Conventional Thermal

Conventional thermal plants continue to provide the bulk of the electricity supply in the U.K. According to U.K.'s Department of Energy and Climate Change (DECC), conventional thermal generation in 2010 consisted of natural gas (46 percent), coal (28 percent), oil (1 percent), and other (1 percent). The long-term trend in U.K. power generation has been a move from coal-fired plants to combined-cycle, gas-fired turbines (CCGFT). As a result, DECC data show that electricity generation from CCGFTs accounted for 38 percent of total in 2010.

Nuclear

Currently, there are 10 nuclear power plants in the U.K., with a combined capacity of more than 22 megawatts. Eight of these plants are operated by EDF Energy, which acquired BE in September 2008. These eight plants include seven stations that use advanced, gas-cooled reactors (AGR) and one (Sizewell B) using a pressurized-water reactor (PWR). All of the AGR reactors will reach the end of their designed lifetime by 2023. Reactor 2 of the Oldbury Nuclear Power Plant, a first generation, magnesium-oxide (Magnox) plant, was permanently shut down on June 30, 2011 after operating for 43 years. The plant's Reactor 1 will continue to operate until the end of 2012. Wylfa, also a first-generation nuclear power plant, was slated to be shut down this year. However, in January 2011 the Nuclear Decommissioning Authority announced that the plant will continue to operate until 2012.

In 2008, the U.K. government announced its support for additional nuclear power plants to meet projected energy needs. The government issued a series of national policy statements (NPSs) in 2009, identifying potential sites for new plants and outlining its policy that promotes building of new nuclear power plants by 2025. Following the announcement and the NPSs, a number of companies proposed nuclear power plant projects. Among those, EDF proposed four new European pressurized reactors (EPR) totaling 6,400 MW, the first one of which would start up in 2017.

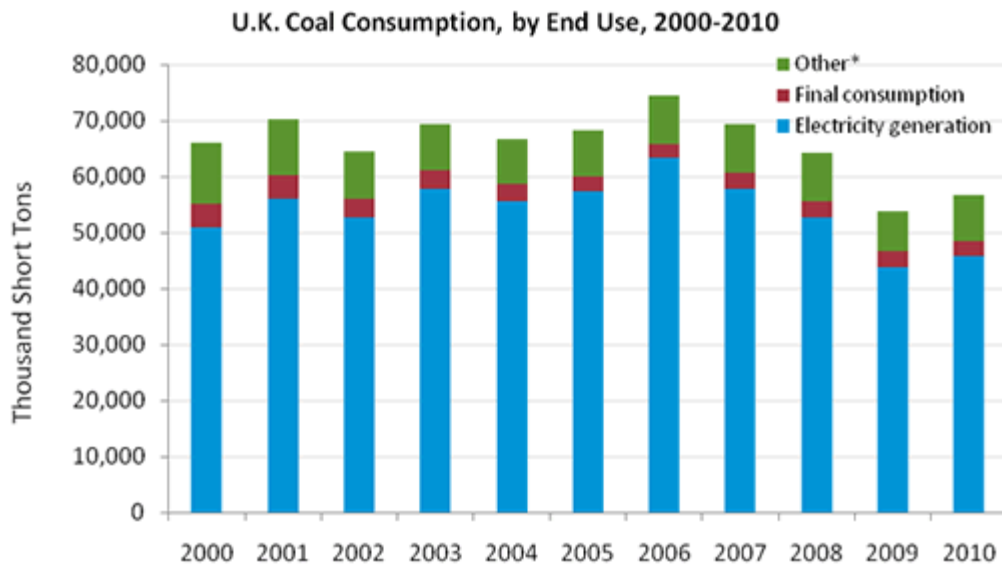
The government elected in 2010 continues to support expansion of nuclear power in the U.K., despite the global reactions in the aftermath of the Fukushima Daiichi meltdown in Japan. Current policy discussions surrounding nuclear power in the U.K. include wide-ranging incentives for new nuclear plants, feed-in tariff, and carbon floor price. However, tighter safety regulations as a result of the Fukushima incident are widely expected and could affect investment in the nuclear industry.

Renewables

The U.K. government has introduced regulations that require electricity distributors to source a portion of their electricity supply from renewables (including hydroelectricity), which totaled 25.3 billion kilowatthours in 2010. Investments in wind power have increased substantially, aiming to take advantage of the natural geographic advantage that the U.K. has in this regard. Wind is the single-largest contributor of electric power generation among the renewable fuels, followed by hydroelectricity and biomass.

Coal

The U.K. had an estimated 251 million short tons (MMst) of recoverable coal reserves in 2008. The country produced 19.4 MMst in 2008, remaining one of the top ten coal producers in the E.U. Coal production in the U.K. has declined steadily and dramatically since the early 1990s, but has stabilized over the last couple of years. Decreasing domestic consumption and a surge of low-cost imports have been the principle causes of the production decline. The U.K. imported 42 MMst in 2009, accounting for more than 60 percent of its total coal supply.



Source: UK Department of Energy and Climate Change

* includes blast furnaces and cooking ovens

Links

EIA Links

[Electricity Restructuring and Privatization in the United Kingdom](#)

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Associations and Institutions

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[The British Wind Energy Association](#)

[The Gas Forum](#)

[UK Offshore Operators Association \(UKOOA\)](#)

[UK Petroleum Industry Association](#)

Foreign Government Agencies

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