

Annex F

United Kingdom oil and gas resources

Introduction

F.1 This section provides background information on the United Kingdom's crude oil, natural gas liquids and natural gas production, disposal and operations. This information is intended as a supplement to that in the commodity balances included in Chapter 3. Most of the data (including those on gas) are obtained from the Oil and Gas Authority's (OGA) Petroleum Production Reporting System (PPRS). Further information can be obtained from OGA's website at www.ogauthority.co.uk/. Oil tables F.1, F.3 & F.4 are available at: www.gov.uk/government/statistics/petroleum-chapter-3-digest-of-united-kingdom-energy-statistics-dukes, and gas table F.2 is available at: www.gov.uk/government/statistics/natural-gas-chapter-4-digest-of-united-kingdom-energy-statistics-dukes

F.2 The annual statistics relate to calendar years, or the ends of calendar years, and the data cover the United Kingdom Continental Shelf [UKCS] (both onshore and offshore). Annual data for production, imports and exports of crude oil during the period 1970 to 2017 are given in Chapter 3, long term trends, Table 3.1.1 (www.gov.uk/government/statistics/petroleum-chapter-3-digest-of-united-kingdom-energy-statistics-dukes). The equivalent for natural gas production is Chapter 4, long term trends, Table 4.1.1 (www.gov.uk/government/statistics/natural-gas-chapter-4-digest-of-united-kingdom-energy-statistics-dukes).

Oil and gas reserves

F.3 Information on oil and gas reserves can be found on the Oil and Gas Authority's (OGA) data section of their website at: www.ogauthority.co.uk/data-centre/data-downloads-and-publications/reserves-and-resources/.

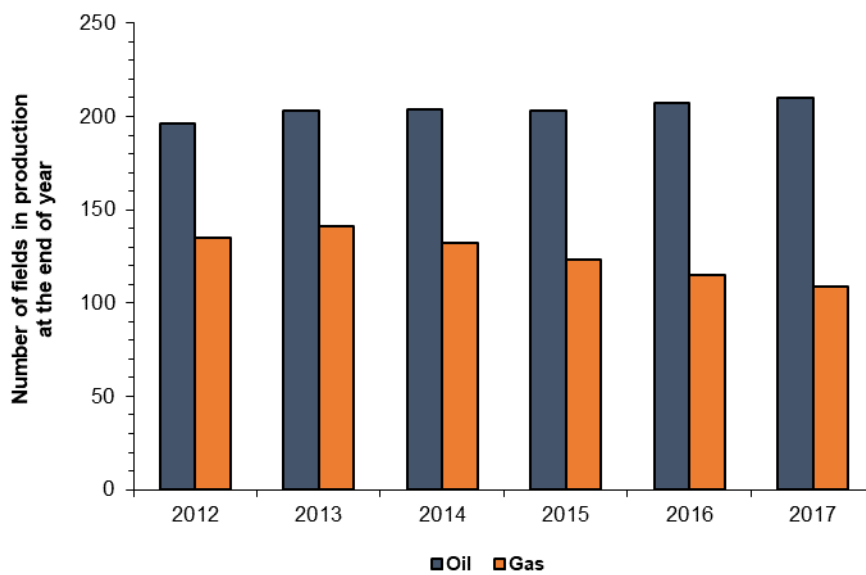
Offshore oil and gas fields and associated facilities

F.4 Table F.A below shows that the number of offshore oil fields in production or under development rose from 198 at the end of 2010 to 225 at the end of 2017. For offshore gas fields the equivalent change between the end of 2010 and 2016 was from 137 to 115 with a few older gas fields closing and not many being added into production. Most oil fields also produce gas: these are not double-counted. The changes in the number of fields in production are shown in Chart F.1 (offshore fields in production). Throughout the period since 2010 there have been 5 onshore oil terminals. In 2007 there were 5 onshore associated sub-gas terminals and 9 other (dry) sub-gas terminals. However, during 2010 the three (dry) sub terminals at Easington were combined into a single terminal. In 2011 two (dry) sub-gas terminals at Bacton were combined into a single sub-gas terminal. While there are significant numbers of oil and gas fields onshore, total onshore production is less than 2 per cent of the UK total.

Table F.A: Offshore oil and gas fields and facilities

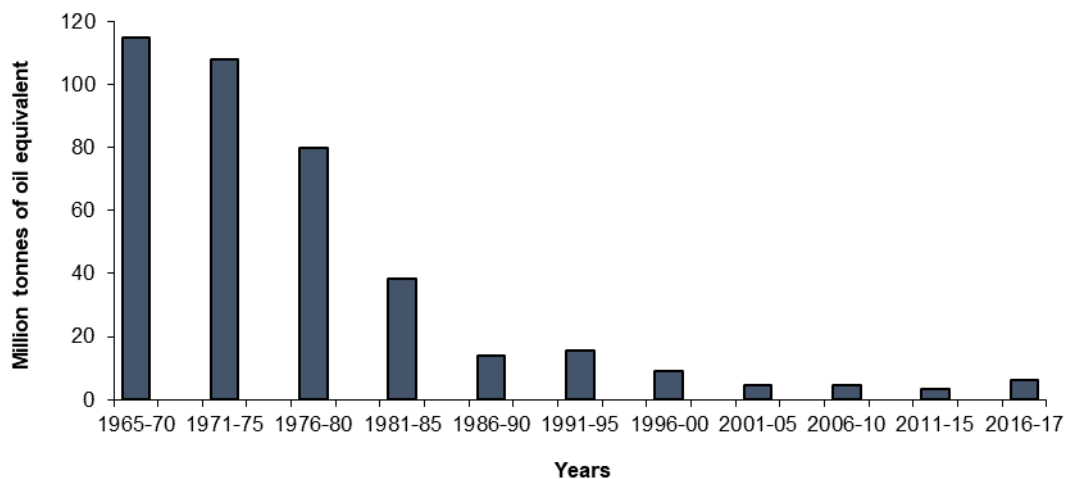
	2012	2013	2014	2015	2016	2017
Offshore oil fields in production	196	203	204	203	207	210
Offshore oil fields under development	23	25	30	27	22	15
Offshore gas fields in production	135	141	132	123	115	109
Offshore gas fields under development	8	3	2	2	0	0

Chart F.1: Number of offshore oil and gas fields in production, 2012 to 2017



The average size of fields commencing production in the years 2016 was 6.3 million tonnes of oil equivalent (see Chart F.2). The general fall in average field size reflects a decline in the size of fields discovered compared with the early period of the development of the North Sea and the effect of improved technology providing cost-effective means of extracting oil and gas from smaller fields and hitherto unpromising locations. The industry continues to face a range of challenges in order to realise fully the North Sea's potential. Alongside other initiatives, government and industry are tackling these challenges via a number of working boards reporting to the MER UK Forum.

Chart F.2: Average size⁽¹⁾ of offshore oil and gas fields commencing production



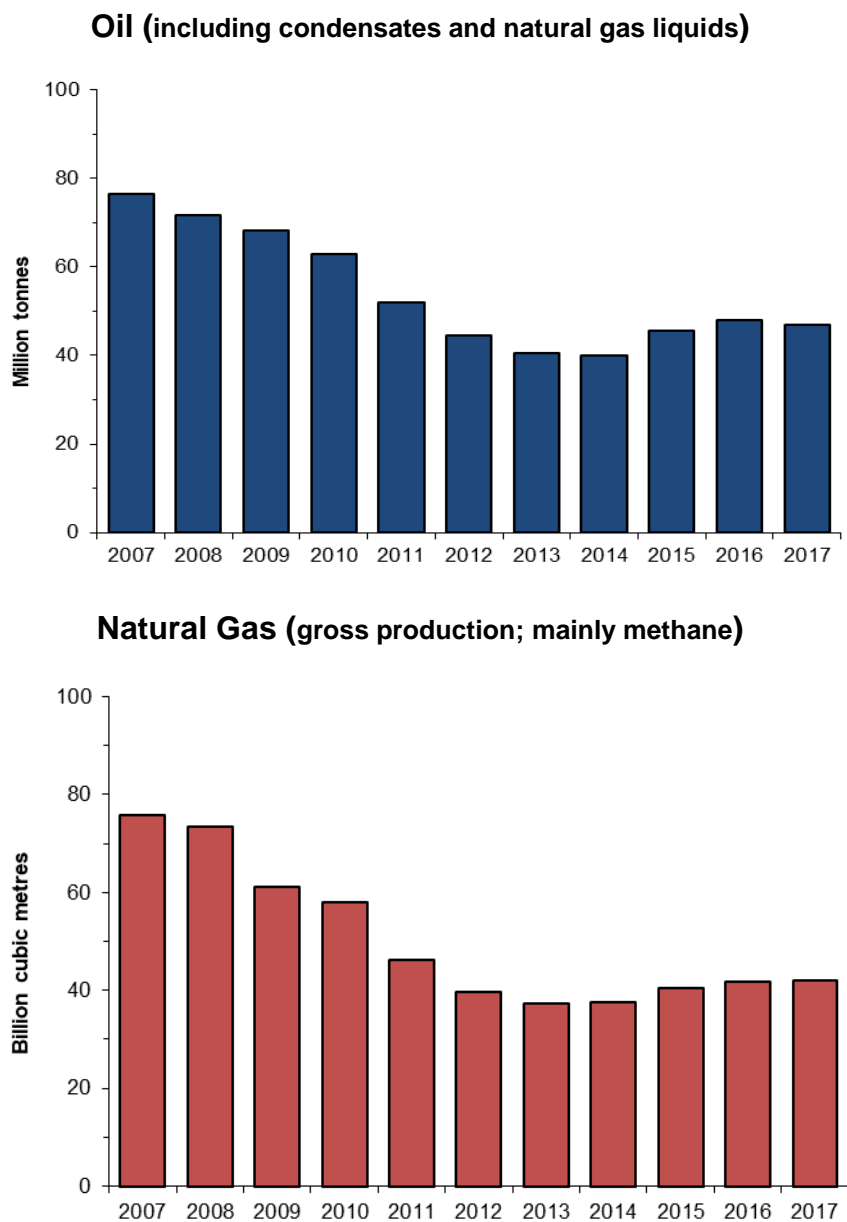
(1) Recoverable reserves originally present based on the operators' best estimate at the time production commenced. Please note that the start-up of the very large Buzzard field in 2007 does not stand out in this table because of the start-up of a significant number of fields with much smaller reserves.

Production of oil and gas (Tables F.1, F.2 and F.3)

F.6 These tables show production of crude oil, natural gas (mainly methane) and natural gas liquids. Before 2001, oil and gas production were reported based on field level data on well-head production, but aggregate figures are now based on terminal receipts following the introduction in January 2001 of a simplified Petroleum Production Reporting System and subsequent in-house changes to the data collection system. These new data are more accurate measures of production because the oil that leaves a terminal has been stabilised (that is any water, natural gas liquids or other organic compounds have been removed from the crude oil). Gross gas production includes gas used at terminals but excludes any flaring or venting at the terminals (not available before 2001). Field level data can still be found at OGA's data section of their website at: www.ogauthority.co.uk/data-centre/data-downloads-and-publications/production-data/

F.7 Chart F.3 shows the trend in total oil production from 2005 to 2017. After reaching a record level of 137 million tonnes in 1999, production has generally declined each year with the exception of 2015 and 2016. In 2017 production reached 46.9 million tonnes, 34 per cent of the peak level. Gross natural gas production (mainly methane) peaked in 2000 at 115 billion cubic metres, similarly to oil production this has been on a steady decline with the exception of the last three years with production at 42 billion cubic metres in 2017, 36 per cent of the peak level.

Chart F.3: Production of oil and gas, 2007 to 2017

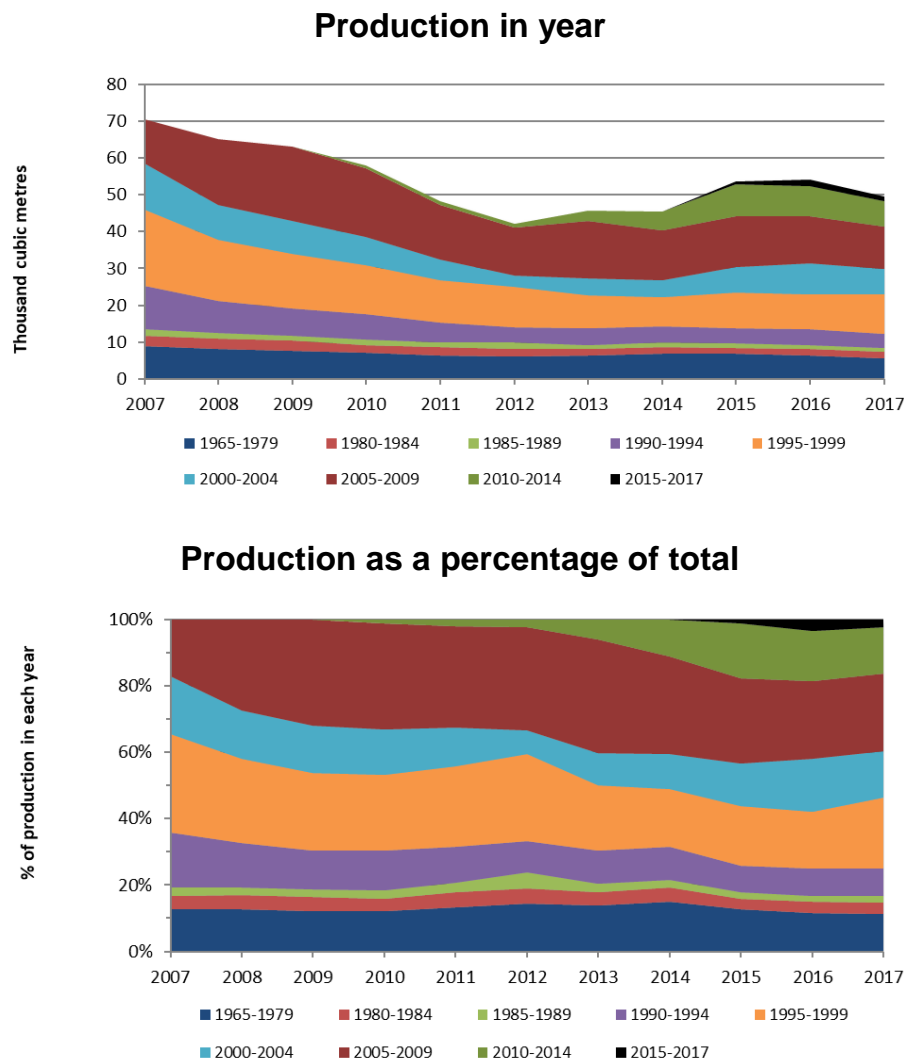


Production of crude oil

F.8 Production from established oil fields has been dropping in recent years. This is illustrated in Chart F.4 below, where oil production in each year from 2007 to 2017 is broken down by the age group of the fields in production during that year. Two charts are shown, the first with the actual amounts of crude oil produced during the year for each age group and the second with the same data transformed to show what percentage of total production each year comes from each field age group. The data used to produce these charts can be found in OGA's data section of their website at: www.ogaauthority.co.uk/data-centre/data-downloads-and-publications/production-data/.

F.9 It can be seen from the production chart that during the 2000s the amount of oil produced from older established fields was in general decline. It is also noticeable that the decline for 1995-1999 as well as 2000-2004 developments is greater than for earlier development beginning in the 60s, 70s and 80s. This is because later technology meant crude oil could be extracted at a relatively greater rate leading to a quicker exhaustion of the reserves. Production for fields starting up between 2005-2009 have remained stable since 2011. Production from 2010 to 2014 reached a peak 2015 with some minor decreases in the years since. In 2017, newer (post 1994) fields accounted for 75 per cent of the UK's oil production, with an increase in production in 2015 due to the resolution of maintenance issues affecting the Buzzard field in late 2014 and the new discovery of the current second largest North Sea oil field Golden Eagle reaching full production in 2015. The charts also clearly reflect the start up and prolonged plateau of the very large Buzzard field at the beginning of 2007. The suspension of production from the Elgin/Franklin area because of a gas leak in March 2012 can be seen in chart F.4 with production rising from 2014 following field developments.

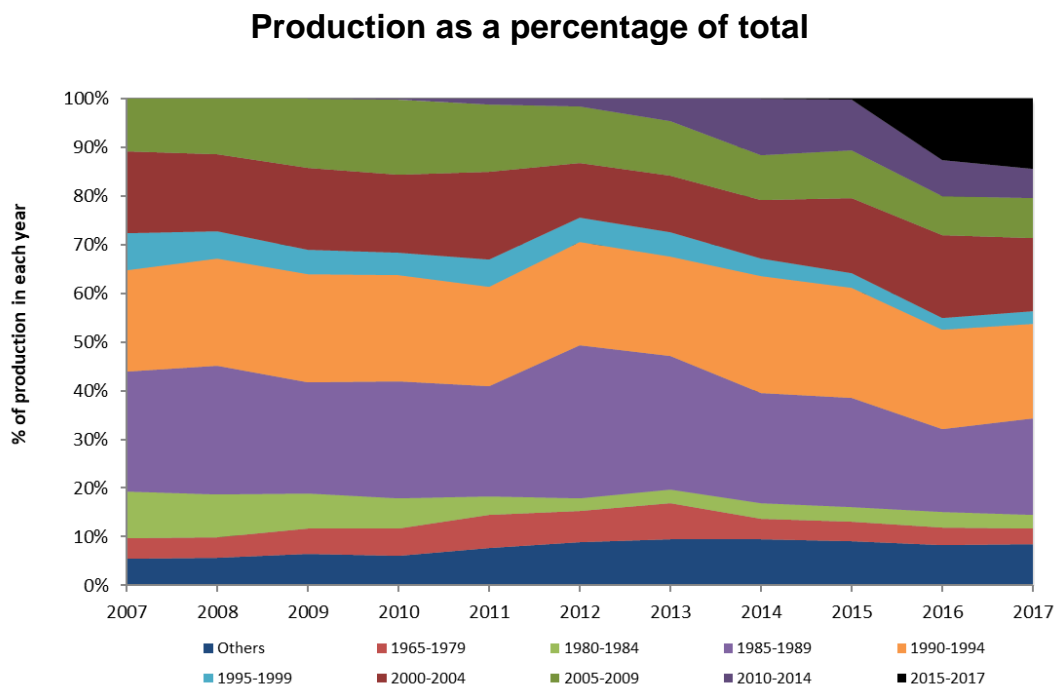
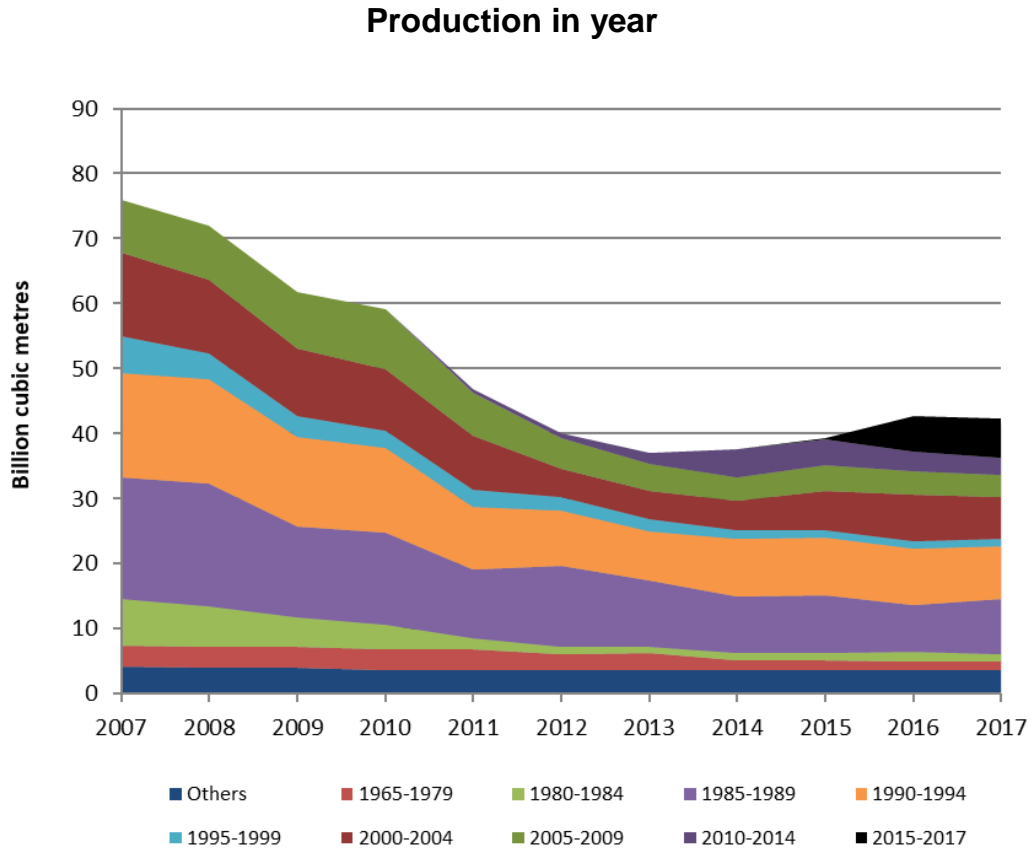
Chart F.4: Age profile of UK crude oil production



Production of gas

F.10 The charts below present gross gas production reported at field/system level and include gas used for drilling, production and pumping operations, but exclude gas flared, vented and re-injected. The data used to produce these charts can be found in OGA's data section of their website at: www.ogauthority.co.uk/data-centre/data-downloads-and-publications/production-data/.

Chart F.5: Age profile of gross UK gas production

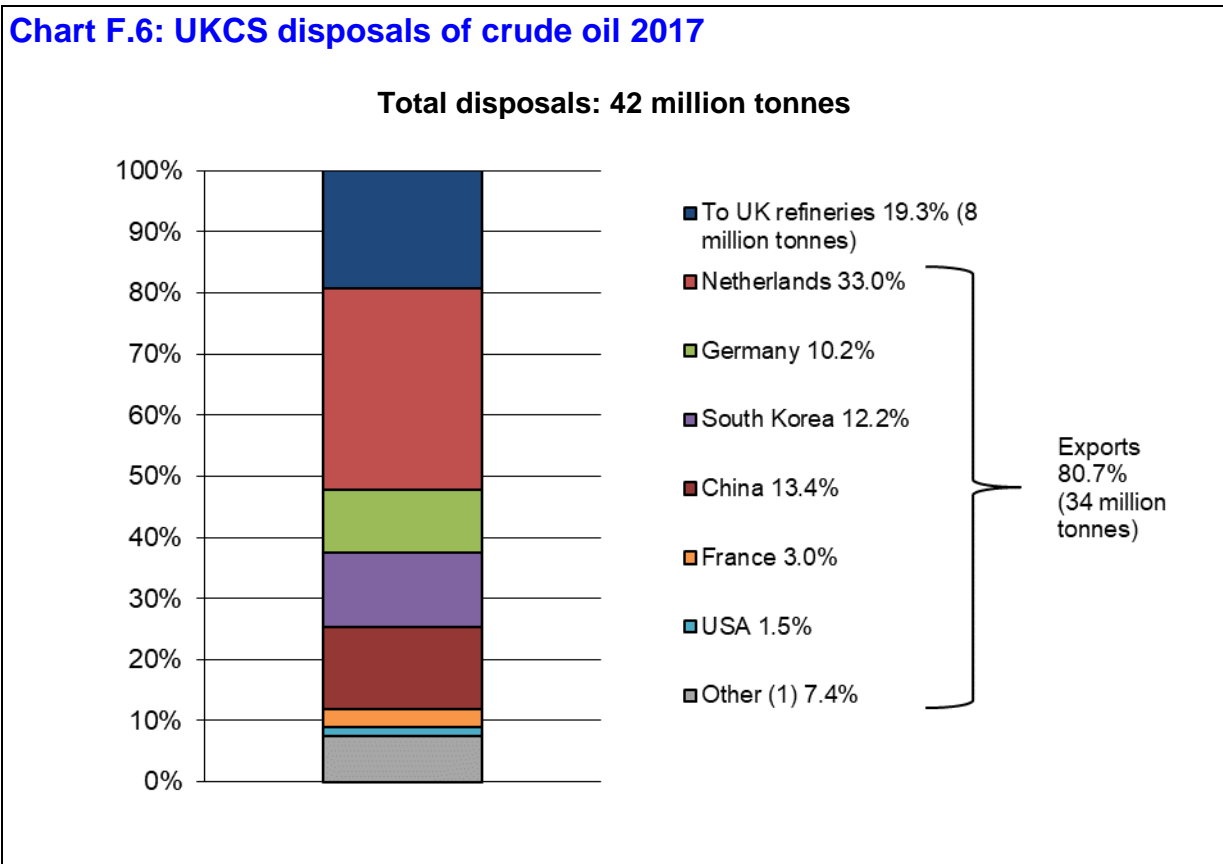


F.11 Gross gas production reached a peak in 2000. Since then production has fallen to 37 per cent of peak production with slight rises in production in 2014, 2015 and 2016 (Chart F.5). As mentioned above (in paragraph F.8) for older oil fields, production from the older gas fields that were discovered in the Southern North Sea has reduced in recent years as the reserves originally present in the fields become depleted. Chart F.5 illustrates this. The apparent extent of the decline in gas production from older fields is not as significant as that shown for oil fields (Chart F.4). This is partly because most associated gas production is not back allocated to individual fields and, therefore, the associated gas is based on terminal start date rather than field start date. However, it should be noted, as mentioned above (in paragraph F.9), for fields that commenced production in 2000 to 2004, the impact of the suspension of production from the Elgin/Franklin area in March 2012 because of a gas leak is clearly reflected.

Disposals of crude oil (Table F.4)

F.12 Table F.4 and Chart F.6 show the destination of crude oil split between amounts to UK refineries and exports (see technical notes, paragraphs F.14 to F.21) by country of destination (from which it may be transhipped elsewhere). The figures are obtained from returns made to the Oil and Gas Authority by operators of oil fields and onshore terminals under the Petroleum Production Reporting System (see paragraphs F.16 to F.18).

Chart F.6: UKCS disposals of crude oil 2017



(1) Of which: Spain 24%, Republic of Ireland 17%, Canada 10%, Singapore 10%, Sweden 7%, Denmark 6% and Norway 5% (for remainder see table F.4).

F.13 The exports figures in Table F.4 may differ from those compiled by the United Kingdom Petroleum Industry Association (UKPIA) and published in Chapter 3. UKPIA figures also include re-exports. These are products that have been imported into the UK and stored before being exported from the UK, and were never part of UK production.

Technical notes and definitions

Petroleum Production Reporting System

F.14 Licensees operating on the UK Continental Shelf are required to make monthly returns on their production of hydrocarbons to the Oil and Gas Authority (OGA). OGA compiles this information in the Petroleum Production Reporting System (PPRS). The PPRS is used to report flows, stocks and uses of hydrocarbon from the well-head through to final disposals from a pipeline or terminal and is the major source of the information presented in this chapter.

F.15 Returns are collected covering field and terminal data compiled by relevant reporting units. Each type of return is provided by a single operator, but usually covers the production of a number of companies, since frequently operations carried out on the Continental Shelf involve several companies working together in joint ventures.

F.16 Every production system has one or more sets of certified meters to measure oil, gas or condensate production. The flows measured by the meters are used to check the consistency of returns and are therefore used to assure the accuracy of the PPRS.

Exports

F.17 The term exports used in Table F.4 refers to figures recorded by producers of oil and gas for their exports. These figures may differ from the figures for exports compiled by HM Revenue and Customs (HMRC) and given in Annex G. In addition, HMRC now differentiate between EU and non-EU trade by using the term dispatches for trade going to other EU countries, with exports retained for trade going to non-EU countries. The differences can occur between results from the two sources of information because, whilst the trader's figures are a record of actual shipments in the period, for non-EU trade HMRC figures show the trade as declared by exporters on documents received during the period stated.

F.18 In addition, trade in oil frequently involves a "string" of transactions, which can result in the actual destination of the exports changing several times even after the goods have been dispatched. As such, differences can arise between the final country of destination of the exports as recorded by the producers themselves and in the HMRC figures. The HMRC figures also include re-exports. These are products that might originally have been imported into the UK and stored before being exported back out of the UK, as opposed to actually having been produced in the UK.

F.19 In editions of the Digest before 1997, these exports were called "shipments" in an attempt to highlight their difference from the other sources of trade data.

Units of measurement for gas

F.20 The basic unit of measurement for quantities of flows and stocks is volume in cubic metres at a temperature of 15°C and a pressure of 1.01325 bar.

Monthly and Quarterly data

F.21 Monthly and quarterly data on the production of crude oil and natural gas from the UKCS, along with details of imports and exports of oil, oil products and gas, are available. This information can be obtained free of charge by following the links given at the BEIS Energy Statistics section of the GOV.UK website at:

www.gov.uk/government/organisations/department-for-business-energy-and-industrial-strategy/about/statistics

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