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North Sea

The North Sea contains Western Europe's largest oil and natural gas reserves and is one of the world's key non-OPEC producing regions. [Norway](#) and the [United Kingdom](#) hold the majority of the North Sea's reserves and production. Denmark, the Netherlands, and [Germany](#) have smaller North Sea oil and natural gas resources.

Information contained in this report is the best available as of August 2004 and is subject to change.



GENERAL BACKGROUND

North Sea oil and natural gas were first discovered in the 1960s. The North Sea, however, did not emerge immediately as a key non-OPEC oil producing area until the 1980s and 1990s, when major discoveries began coming online. Oil and natural gas extraction in the North Sea's inhospitable climate - cold and windy - and at great depths requires sophisticated offshore technology. Consequently, the region is a relatively high cost producer, but its political stability and proximity to major European consumer markets have allowed it to play a major role in world oil and natural gas markets.

A key feature of North Sea oil is its role as one of the major "benchmark" crude oils, the Brent price marker. Because Brent crude is traded on the International Petroleum Exchange (IPE) in London, fluctuations in the market are reflected in the price of Brent. Therefore, the many other crude oils linked to Brent can be priced according to the latest market conditions.

However, with production in the UK North Sea Brent system declining to only around 350,000-400,000 barrels per day (bbl/d), analysts felt that such low output was too small for a benchmark against which a large portion of the world's internationally traded crude oil was directly or indirectly priced. In order to address the issue of declining Brent production, the industry price assessor, Platts, widened the assessment definition of dated Brent by including two similar North Sea crude oils - North Sea Forties (UK) and Oseberg (Norway), as of July 10, 2002. According to Platts, the new method of calculating dated Brent would more accurately reflect North Sea oil market conditions. The new method initially got off to an uneven start, with Royal-Dutch/Shell (co-operator of the Brent system) opposed to the change, and with BP (operator of the 750,000 bbl/d

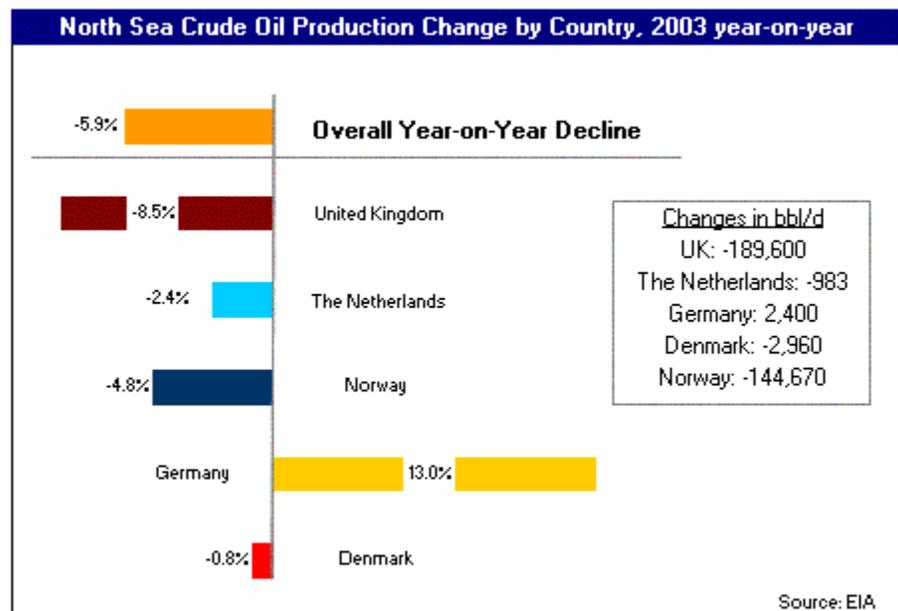
Forties system) in favor. The IPE began using the Platt's Brent formulation (BFO, or Brent-Forties-Oseberg) with its near-month contract on September 13, 2002. On May 1, 2004, Norsk Hydro, the operator of the Oseberg field, introduced a lower-quality crude from its Grane field to the BFO blend. Initially analysts believed that adding Grane crude oil to the BFO crude marker would lessen its value. It appears, however, that the Grane crude has had little impact on the BFO crude marker, at least since its introduction.

OIL OVERVIEW

North Sea offshore crude oil production peaked in 1999, averaging 5.94 million bbl/d. Since then, crude oil production in the North Sea has declined, with an annual rate of decline of 2.8% between 1999 and 2003. In 2003, North Sea offshore crude oil averaged 5.33 million bbl/d, a year-on-year decline of 5.9%, shown in the [chart](#) below. In the first half of 2004, North Sea crude oil production continued to fall, averaging 5.2 million bbl/d. Total offshore oil production in 2003 (including crude oil, condensate, and natural gas liquids) was 5.98 million bbl/d. Norway and the United Kingdom are the largest producers of North Sea oil (including crude, condensates and natural gas liquids), accounting for 54.4% and 38.2% of total output, respectively, in 2003. These two countries also experienced the largest year-on-year declines in crude oil production. Only Germany experienced year-on-year growth, albeit small in absolute terms (see [chart](#)).

Outlook

Although the region will continue to be a sizable producer, crude oil output from its largest producers - the UK and Norway - has essentially plateaued and is projected to begin a long term decline. In the near term, improved oil recovery technologies, continued high oil prices and new projects coming online could temporarily delay declines in North Sea crude oil output. Nonetheless, only new discoveries of sizable volumes could reverse the current downward trend of oil production from the North Sea.



Oil Infrastructure

Ekofisk was the first North Sea oil field to be discovered and developed, in the late 1960s, with production beginning in 1971. The Norpipe pipeline, which connects Ekofisk to Teesside, England, began operation in 1975. Since then, oil companies have built [an extensive network of oil pipelines](#) to transfer oil to the mainland, as well as to connect individual fields. Additional pipeline connections to the UK include a major pipeline from the Nelson/Forties field area to Cruden Bay, north of Aberdeen. The Piper Flotta pipeline connects northern North Sea production to Scotland's Orkney Islands and two pipelines - Brent and Ninian - to the Shetland Islands ([Map](#)).

Norway has two major oil pipeline connections, [Troll I](#) and [II](#), which link the Troll fields to [Mongstad crude oil terminal](#). The Oseberg Transport System connects the Oseberg area to Kollsnes.

Two new pipelines will connect Grane and Kvittebjørn fields to the Norwegian mainland.

Denmark's oil pipeline system, which is controlled by the Danish state-oil company DONG, connects offshore oil fields to an oil terminal located in Frederica. The oil pipeline system was established in the 1980s according to *"The Danish Pipeline Act Concerning the Establishment and Utilization of a Pipeline for Transportation of Crude Oil and Condensate."* The Act requires most oil producers in the Danish section of the North Sea to use the oil pipeline. The Netherlands has two small pipelines connecting to offshore fields to the mainland. Most of Germany's oil production is onshore.

Norway

As of January 2004, Norway's proven crude oil reserves were 10.45 billion barrels, up 1.7% year-on-year, according to the *Oil and Gas Journal*. The increase in proven reserves mainly reflects the incorporation of the Ormen Lange field. Whether Norway eventually develops or discovers new recoverable oil reserves depends on many factors, such as investment, taxes and the opening of new frontier or virgin acreage to exploration and development activities.

Exploration and Production

In 2003, Norway produced about 4.1% of the world's oil and 6.9% of non-OPEC (Organization of Petroleum Exporting Countries) crude oil. The country's low domestic oil consumption allows the country to export nearly all of its production, making Norway the world's third-largest oil exporter. Most of Norway's crude exports go to neighboring countries, with the UK accounting for nearly a quarter, but only 5% of its natural gas liquids (NGLs)/condensate exports. The United States was the largest importer of Norway's NGLs/condensates exports in 2003, according to the Norwegian Petroleum Directorate (NPD).

In 2003, Norway's total oil production (including crude, condensate, NGLs and refinery gain) was an estimated 3.27 million bbl/d, a 1.8% decrease year-on-year, marking the fourth consecutive year of decline. Crude oil production (including lease condensate) actually fell 4.6% year-on-year, but increased production of NGLs offset the decline slightly. During the first half of 2004, total oil production was up nearly 1% over the same period in 2003, despite an oil-worker strike in June 2004, which shut in some production for about a week. In 2003, there were five new fields that came onstream -- Grane, Fram West, the Mikkel condensate field, and two satellites at BP's Valhall field (the north satellite field actually began production on January 7, 2004). Fields under development include Statoil's Svale and Staer fields, located near the Norne field, with first oil targeted for the third quarter of 2005, as well as the company's Asgard Q project, due online in January 2005.

The NPD reported in June 2004 that exploration activity was proceeding, with seven wildcats and five appraisal wells being spudded. In the Norwegian North Sea, two discoveries were reportedly made by Esso and Norsk Hydro, while U.S.-based Marathon appraised reserves that had already been discovered in the early 1990s. In the Norwegian Sea, Statoil discovered oil at its Linerle prospect and delimited its Alve discovery well. In fall 2004, Norsk Hydro and Statoil plan to begin drilling in the Barents Sea. These wells are significant as they mark the resumption of exploration activities in the Barents Sea which had been suspended in 2001 in order to conduct an environmental impact study.

Transformation of the Norwegian Oil Sector

There are currently two main trends taking place in the Norwegian sector: 1) smaller independent oil companies are slowly entering the Norwegian oil sector; and 2) recent licensing rounds are

offering blocks near current infrastructure to take advantage of economies of scale and in areas considered virgin or frontier regions.

Entrance of Oil Independents

The Norwegian Continental Shelf (NCS) is not known as a region that is readily accessible for smaller independent companies, as project development requires large upfront costs, and high tax rates favor larger fields which produce more, and therefore compensate for Norway's high tax rates (a 28% tax on corporations and a 50% tax on petroleum production). In addition, stringent environmental and safety regulations and the presence of strong unions further increase offshore operation costs. Unlike the UK offshore oil sector, the NCS is dominated by two majority state-owned companies, Statoil and Norsk Hydro, and one wholly-state owned company Petoro. Other oil companies on the NCS mainly participate in joint-ventures or hold exploration and production stakes in fields. In recent years, Statoil and Hydro have begun to look at other regions in the world to expand exploration and production activities. The two companies are not alone in relinquishing some their assets on the NCS, notably BP, traditionally a large player in the Norwegian oil sector, sold its 61% operator license share in the Gyda field to Talisman Energy Norge in 2003. BP even declined to bid in Norway's 18th Licensing round. UK-based Paladin Resources is another example of a new entrant into the NCS, acquiring not only assets from Statoil, but also interests in the Veslefrikk, Huldra and Njord fields through its purchase of Petro-Canada Norway in 2001. Other new entrants include Energy, Revus, Petra, a wholly-owned subsidiary of U.S.-based Petroleum Geo-Services and now operator of Varg field from Norsk Hydro. Some outside observers have noted that the entrance of smaller firms will benefit Norway's oil sector as they are interested in developing mature fields and smaller undeveloped oil pools, in which larger companies are no longer interested.

Licensing Rounds

On June 8, 2004, the Norwegian government offered licenses to 16 companies, covering 46 blocks or part blocks, in its 18th licensing round. Operatorships have been offered to Statoil (4), Hydro (2), Shell (2), Eni (2), Total (2), Petra (1), Paladin (1), ExxonMobil (1), ChevronTexaco (1), and RWE (1). The Norwegian government offered 39 licenses for participation interests in blocks. Blocks offered in the round were a mix of completely unexplored areas and established areas with confirmed reserves. Two companies were new entrants to the Norwegian oil sector -- Idemitsu (Japan) and Revus (Norway) (blocks awarded in the 18th round -- [North Sea](#) and [Norwegian Sea](#)).

In January 2004, the Norwegian government announced blocks for the 19th licensing round. The upcoming round will again include blocks in the [North](#) and [Norwegian](#) Seas. New to this round will be acreage in the southern section of the [Barents Sea](#). In December 2003, the government decided to allow resumption of exploration and production activities in the area, with some exceptions. Nordland VI and VII areas (near the Lofoten islands), Troms I and III areas, and a section of Finnmark West will remain closed to oil companies due to environmental concerns (see [map](#) defining areas allowed for exploration). The Snøhvit development is located partly in Tromsøflaket, which has a moratorium on further petroleum activities. The government decided, however, that in order to improve the economics of the Snøhvit project, it was important to tie in additional hydrocarbon reserves to the project. In line with this decision, the Norwegian government included blocks near the Snøhvit project in the 19th round.

United Kingdom

The UK is one of the European Union's (EU) largest energy exporters. Unlike non-EU member Norway, the UK also has some onshore oil production and is one of the world's largest oil consumers, ranking in the top 15. UK net oil exports, at about 690,000 bbl/d in 2003, were a little less than one quarter of Norway's exports. Waters in the central North Sea off the east coast of

Scotland contain nearly half of the UK's remaining oil reserves, with about a quarter of reserves located in the northern North Sea near the Shetland Islands. As of January 2004, the UK had proven crude oil reserves of 4.7 billion barrels (including onshore reserves), according to the *Oil and Gas Journal*.

Exploration and Production

In 2003, total UK offshore oil production (including crude and NGLs) was 2.29 million bbl/d, a 6.5% decrease year-on-year, and significantly lower than record level of offshore oil production achieved in 1999 -- 2.84 million bbl/d. During the first half of 2004, total offshore oil production continued to slip, averaging 2.04 million bbl/d. Offshore crude oil production averaged only 1.86 million bbl/d. Seasonal offshore rig maintenance accounted for some of this decline, but the first half of 2004 offshore oil production numbers were lower than the same period in 2003. According to reports, new field start-ups for 2004 and 2005 are few and of small production volumes and will likely not be sufficient to stabilize the country's current oil production. The only large field development on the horizon remains EnCana's Buzzard field, projected to produce up to 200,000 bbl/d from 2006. According to the Department of Trade and Industry's (DTI) most recent forecasts, oil production (including crude, condensate and NGLs for both onshore and offshore), is projected to decline to a level ranging between 1.38 million bbl/d and 1.59 million bbl/d by 2009.

Despite declining production and pessimistic forecasts, there have been some recent indications that petroleum activity on the United Kingdom Continental Shelf (UKCS) will remain strong, at least in the near term. First, the UK government experienced one of the more successful licensing rounds in recent years in regards to number of applicants (more information [below](#)). Second, the DTI reported that 11 new oil and gas projects had been started on the UKCS as of July 2004. Of the projects, 8 were associated with oil production. Only one of the projects, known as Callanish (operator ConocoPhillips), is a new oil development, while the others are considered second phase developments of fields already in production. In all of 2003, there were only five oil field projects. Finally, recent high crude oil prices have increased incentives for companies to develop fields which were previously considered borderline in terms of commercial viability.

New Trends

As the UK's oil fields mature, the industry's focus has been shifting from searching for new oil discoveries to continuing the productivity of mature fields, as well as to developing smaller fields that previously were not considered commercially viable. Within the industry, such as BP and Royal Dutch/Shell, have begun selling some of their mature UKCS assets in favor of better prospects in other regions of the world. Smaller, independent oil companies have been acquiring these assets. Most notable was U.S.-based Apache's \$630 million acquisition of BP's Forties fields in early February 2003. Other independents, such as Talisman Energy, Perenco, and Paladin Resources, have acquired production blocks on the UKCS from oil majors. Many analysts point out that these mature and smaller fields are more economically viable for smaller oil companies as, for example, they have less overhead costs in comparison to the larger companies. Furthermore, these companies not only bring new investment to the UKCS but also new technologies, which are needed to help prolong hydrocarbon extraction from the region. The entrance of smaller companies has already paid dividends -- small Canadian-based Oilexco reported that its appraisal drilling of the Brenda field revealed that it could hold more than 150 million barrels of oil, the largest find since 2001.

Government Promotional Program

Government programs have been significant in attracting new oil independents to the UKCS. In January 2000, the government created the [Pilot](#) program to help secure long-term production of oil and natural gas from the UKCS. The program seeks to achieve the following goals by 2010: 1)

maintain production at or above 3 million bbl/d oil equivalent; 2) attract \$4.8 billion investment to the industry per year; 3) create 100,000 more jobs; 4) create \$1.6 billion in additional revenue for new business per year; 5) make the UK the safest place to work in the worldwide oil and natural gas industry; and 6) increase in the value of industry-related exports (by 2005) by 50%.

The [Promote License](#) and the [Fallow Initiative](#) are two important initiatives of the Pilot Program. The Promote License program allows companies to assess the value of a field before committing to it. The rental fee is also cut 90% for the first two years compared to the rate for a traditional production license, thereby providing more opportunity for smaller companies to enter the North Sea market. This two-year period is intended to give companies a chance to explore for oil and natural gas before promoting the licensed area to investors to acquire funding for drilling and other work.

The Fallow Initiative seeks to rejuvenate activity in dormant acreage and assets by inviting third parties to propose technical ideas that would stimulate new exploration and development. In January 2004, the Pilot program released its listing of Fallow blocks and discoveries. The new release added 17 Fallow discoveries and 109 new Fallow blocks to the list, for a total of 83 Fallow discoveries and 151 Fallow blocks. The [License Information For Trading \(LIFT\)](#) lists blocks which are made available under the Fallow Initiative.

Licensing Rounds

On March 4, 2004, UK Energy Minister Stephen Timms announced the opening of the [22nd Offshore and 12th Onshore Licensing Rounds](#). The Minister also introduced a new license, known as Frontier, which seeks to attract more exploration activity to the offshore area west of the Shetland Islands. This region has not been offered up for bidding for many years. Similar to the Promote License, the rental fee is reduced 90% for the first two years. The 22nd round opened all of the UK onshore area and 1,039 blocks and part blocks in the offshore area for oil and natural gas licensing opportunities

It appears that the UK government's initiatives to attract companies to the UKCS have paid off. As of June 2004, the government reported that 68 companies applied for offshore licenses of which 4 were frontier, 30 traditional and 42 promote. Furthermore, of the 68 companies, 20 were new entrants. In regards to the 12th offshore licensing round, the government reported 30 applicants, more than three times the number of the previous round ([link to companies which have submitted applications for the 22nd and 12th rounds](#)).

Other North Sea Oil Producers - Denmark, the Netherlands and Germany

The other North Sea oil producers have much smaller outputs in comparison to Norway and the UK, with only Denmark being a net oil exporter (an estimated 181,685 bbl/d in 2003). In 2003, Denmark's total oil production declined slightly, a year after the country achieved its highest annual output to date, with 372,640 bbl/d. New fields - Halfdan, Siri, and Syd Anre - which came on stream in 1999, have helped bolster Denmark's oil production. In 2003, three new fields, Nina, Cecilie and Nif, came onstream. In July 2004, Danish oil and gas company (DONG) announced that after completing the CA-3 appraisal well in the [Cecilie](#) field, the company found commercial volumes of oil and will proceed with the wells development. Other future fields include Adda (2005) and Boje (2007).

The Netherlands also experienced a 2.4% year-on-year decrease in offshore oil production in 2003, after offshore production more than doubled from 2001 to 2002. Overall, the Netherlands' offshore oil production has been in decline since 1986, when it peaked at about 77,000 bbl/d. The Hanze

field (F2a) in the Dutch North Sea, which came online in August 2001, contributed to the jump in Dutch production output for 2002, producing about 31,000 bbl/d.

In 2003, Germany was the only the North Sea oil producer to experience an increase in offshore oil production, albeit small in absolute terms. Germany operates one offshore oil field, Mittelplate, which is located of the coast of the German state, Schleswig-Holstein. Most of Germany's oil production and reserves are located onshore.

Major North Sea Oil Production Fields*			
Country	Field	Est. 2003 Production	Operator
Norway	Troll (I & II)	380,869	Norsk Hydro
Norway	Ekofisk	298,860	ConocoPhillips
Norway, 85.5%; UK, 14.5%	Statfjord	225,140	Statoil
Norway	Snorre	218,213	Norsk Hydro
Norway	Draugen	190,710	Shell
Norway	Oseberg	190,951	Norsk Hydro
Norway	Norne	176,942	Statoil
Norway	Heidrun	176,853	Statoil
Norway	Gullfaks	158,779	Statoil
Norway	Åsgard	141,839	Statoil
UK	Foinaven	110,830	BP
Denmark	Dan	109,100	Mærsk Oil
UK	Schiehallion	104,686	BP

**Source: Oil and Gas Journal; includes all fields with more than 90,000 bbl/d of oil production in 2003.
Note: Some "fields" actually are systems including multiple adjacent fields.*

NATURAL GAS

Unlike oil, natural gas production from the North Sea countries remains on the upswing, up 3.2% year-on-year in 2002. This increase, however, was largely due to Norway, where natural gas production jumped 24% year-on-year, to 2.41 trillion cubic feet (Tcf) from 1.95 Tcf in 2001. The other large North Sea natural gas producers – the UK and the Netherlands – saw decreases in output. In the case of the Netherlands, government imposed production ceilings was mainly responsible for decreased natural gas output. Natural gas production remained flat in Denmark and Germany, increasing 0.02% and 0.28% respectively.

Overall, the North Sea's importance as a key supplier of natural gas will continue to rise, with Norway, the Netherlands and the UK holding an estimated 84% of Europe's proven natural gas reserves (Europe refers to the EU-25 plus Norway) of 190 Tcf, as of January 2004. The North Sea, however, is regarded as mature, with only natural gas production in Norway expected to increase in the near term. Moreover, the UK is projected to become a net-importer of gas in the 2005-2006 timeframe. As natural gas consumption in the EU is projected to increase, imports from outside sources, such as Africa, the Middle East and Russia, will likely have to increase in order to compensate for supply shortfalls.

The Netherlands

For years, the Netherlands, along with Russia, has been one of the top natural gas suppliers for Western Europe. Most of the country's natural gas reserves are located onshore in the giant Groningen field, from which over half of Dutch natural gas is produced. In 2002, natural gas production decreased 3.2% year-on-year. This decline, however, does not necessarily reflect a loss in production capacity, but rather intentional production cuts. According to the country's Natural Gas Law, natural gas production is limited to an estimated 2.68 Tcf per year between 2003-2007, with this ceiling dropping to 2.47 Tcf between 2008-2013. The government made this policy decision to cut back production in order to maintain reserves for future use. Nederlandse Aardolie Maatschappij (NAM) is the country's largest producer of natural gas.

The United Kingdom

The UK produces the most natural gas in the North Sea region. In 2000, UK natural gas production peaked at 3.83 Tcf. Since then, output has declined, with the UK producing an estimated 3.69 Tcf in 2002. Similar to oil, UK is expected to become net importer of natural gas, beginning in the 2005-2006 timeframe.

Though most of the UK's natural gas production is located in the North Sea, there is a small amount of production onshore and

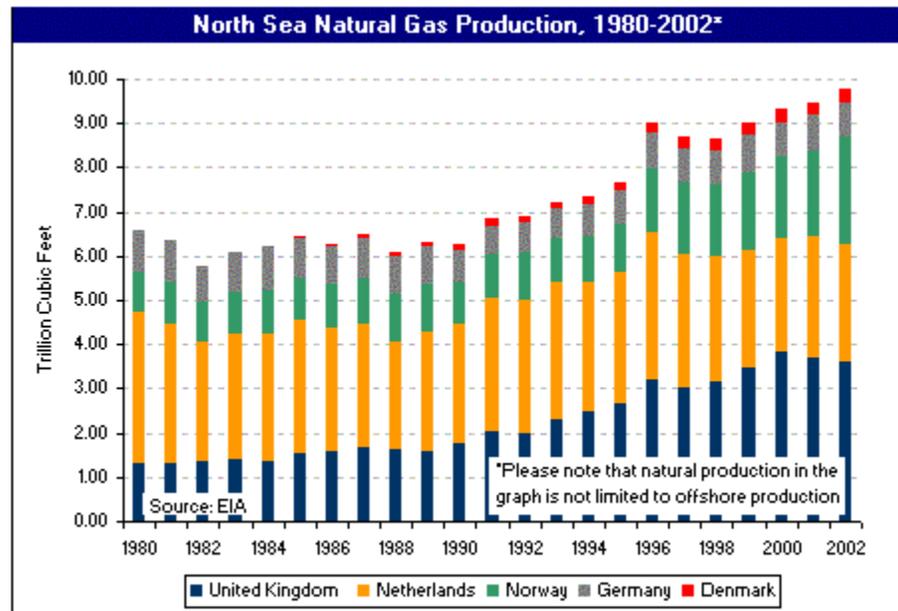
several large fields producing in the Irish Sea. The largest number of non-associated gas fields is located off the English Coast in the Southern Gas Basin, adjacent to the Dutch North Sea sector. However, the three largest sources of natural gas are the Scottish Area Gas Evacuation (SAGE) system, the Central Area Transmission System (CATS), and the Far North Liquids and Associated Gases System (FLAGS), all of which are composed of fields in the central and northern British Sector.

Norway

Natural gas production reached 2.41 Tcf in 2002, an increase of 24% over the previous year. Along with the Netherlands, Norway is a key European supplier of natural gas, accounting for a reported 14% of Europe's imports in 2003. Most of those exports went to Germany -- 34.2% in 2003 according to NPD. The Norwegian government has forecast that natural gas exports could reach 3.85 Tcf annually in coming years. Along with exports, a portion of Norway's natural gas is reinjected in oil fields to increase oil recovery or used in petrochemical industries, while domestic consumption is currently small (Norway generates nearly all its power from hydro). Some of the older, larger fields in the Norwegian North Sea are in decline. For example, the Frigg field, which is located in both the Norwegian and UK North Sea sectors, has declined to the point that certain associated fields have been shut down. Frigg is expected to cease production this year.

New Fields

A project currently under development is Halten Bank West, which contains Kristin and the



Lavrans, Erlend, Morvin and Ragnfrid fields, with estimated combined reserves of 1.2 Tcf. Natural gas production from Halten Bank West is anticipated to begin in October 2005. Another development is the 1.8 Tcf Kvitebjørn field expected to begin natural gas production in October 2004.

Norway's two flagship projects currently under development are Ormen Lange and Snøhvit. The Ormen Lange field in the Norwegian Sea is the country's second largest natural gas discovery, with estimated recoverable reserves of about 14 Tcf. Norsk Hydro (18.07%) is the operator in the development phase, and Shell (17.04%) will be the operator in the production phase. Natural gas production is scheduled to start in October 2007, at an annual rate of 706 Bcf. Other shareholders include BP (10.34%), ExxonMobil (7.23%) and Statoil (10.84%).

The UK is expected to be the main recipient of the natural gas from Ormen Lange. Critical to the realization of this project is the construction of a 750-mile pipeline (Langeled), linking the Ormen Lange field to the Easington terminal in the UK. The entire project includes building a short line from the field to the Norwegian shore at Nyhamna, from where the main line, via the Sleipner complex, will connect to the United Kingdom. The field is due to begin production in October 2007, delivering 2.5 billion cubic feet per day (Bcf/d)

In early 2004, the Ormen Lange's proven reserves came under scrutiny when Royal/Dutch Shell revised downward its proved reserves volumes at Ormen Lange from 60% of its share in the project to 20%. In contrast, BP booked a reported 80% of its share and Norsk Hydro 75%, while ExxonMobil and Statoil reported 35% and 25%, respectively. Some observers felt that BP and Norsk Hydro may have overbooked their reserves and possibly were not in compliance with U.S. Securities and Exchanges Commission (SEC) guidelines. In July 2004, under pressure from the SEC, Norsk Hydro revised its booked reserves at Ormen Lange down about one-third. BP, however, continues to book 80%. The companies have not disagreed on the volume of reserves - 14 Tcf, but appear to have used different approaches in booking reserves, despite having the same appraisal and seismic data.

Norway's other major natural gas project, Snøhvit, is significant not only for its reserves (5.7 Tcf) but also for the fact that it will Europe's first liquefied natural gas (LNG) export terminal. The project was expected to begin operations in 2005, but cost overruns have pushed back the start-up date until 2007. For that reason, the Norwegian government opened additional blocks around Snøhvit in the hope of finding more natural gas to be processed and thus improve the economics of the project. Some of the LNG produced is destined to the United States. The Snøhvit partners are Statoil (33.53%), Petoro (30%), Total (18.4%), Gaz de France (12%), Amerada Hess (3.26%) and RWE Dea (2.81%).

Denmark and Germany

Denmark and Germany are smallest producers of natural gas in the North Sea region. Danish natural gas production has steadily increased over the last three decades, peaking in 2002 at 296 Bcf. Similar to Norway, more than a quarter of the country's production in 2002 was re-injected to boost oil production, according to the Danish Energy Authority (DEA). However, a recent report from DEA has shown that net natural gas production in Denmark declined in 2003 by 5% year-on-year.

Germany, in contrast, produces more natural gas than Denmark -- an estimated 787 Bcf in 2002. Nearly all of Germany's natural gas production, however, is located onshore. Germany has only one offshore natural gas field ([A6-B4](#)) located in the German North Sea. Natural gas production from

the field began in September 2000. The Deutsches Nordseekonsortium (German North Sea Consortium), comprising Wintershall (operator) (49.95%), BEB Erdgas und Erdöl (40.45%), RWE Dea (7.1%) and EWE (2.5%), operate the field. The field produces both natural gas and condensate, which are transported via two pipelines to a platform in the Dutch North Sea. From there, the condensate is loaded onto ships while the natural gas pipeline continues until it connects to the main Dutch offshore pipeline - NOGAT.

Natural Gas Infrastructure

The already substantial North Sea natural gas infrastructure continues to grow. The Netherlands and the UK have the most extensive pipeline networks in place, while Norwegian export routes connect its giant natural gas fields to the European Continent.

The United Kingdom

The UK has many pipeline connections to the southern North Sea, bordering on the Dutch North Sea sector. The major receiving ports for these pipelines include Bacton, Theddlethorpe, and Easington, all located in the middle of England's North Sea coast. One pipeline also connects to Teesside, further north on the English coast. There are many connections from the northern North Sea to Scotland which come onshore at St. Fergus (Vesterland), just north of Aberdeen. The UK is currently a small natural gas exporter and has a pipeline connection to Zeebrugge, Belgium (known as Interconnector) that can be reversed so that the UK is also able to import natural gas. With the UK expected to become a net natural gas importer in a couple of years, the operators of the Interconnector have been expanding the pipeline's reverse-flow capacity. By December 2005, reverse-flow capacity will reach 583 Bcf per year and by December 2006, it will reach 830 Bcf per year. There is currently one pipeline connecting Scotland to Northern Ireland. Scotland also is linked to the Republic of Ireland via two parallel pipelines.

New UK Import Pipelines

There are three major import pipeline projects under development, with only two to be realized in the near term. The first project – the Balgzand to Bacton pipeline – received the green light to proceed in May 2004. The new pipeline will link Balgzand in the Netherlands to the Bacton terminal on the UK's east coast. The capacity of the proposed 147-mile pipeline will depend on commitments received from shippers and on subsequent negotiations. The BBL Company will own and operate the pipeline. Gastransport Services, a subsidiary of Gasunie will hold a 60% stake, whereas other stakeholders, E.ON Ruhrgas and Fluxys, will each hold 20% respectively. The other project is Langede, which will link Norway's Ormen Lange field to the UK. The development of this pipeline depends, however, on whether Norway and the UK can come to an agreement on a cross-border treaty. The final project - the North European Pipeline – could potentially link Russia's vast natural gas reserves to the UK. Although the Russian government approved construction of the \$5.7 billion North European Gas pipeline in January 2004, it remains unclear whether the project will materialize.

Norway

Norway has a number of natural gas trunklines connecting to Europe: the Europipe I and Norpipe systems to Emden, Germany; the Zeepipe trunkline to Zeebrugge, Belgium; the Franpipe line to Dunkerque, France; and the Europipe II line from Kårstø, Norway to Dornum, Germany. These Norwegian trunklines provide an estimated combined gas transport capacity of 3.3 Tcf per year. The Vesterled pipeline transports natural gas from Norway's Frigg field and Heimdal Riser platform, as well as Britain's Galley, Bruce and Alwyn fields to St Fergus in Scotland.

In June 2004, the Gassled partnership, which owns Norway's offshore natural gas pipeline network,

accepted a recommendation from pipeline operator Gassco to increase the transport capacity of the Zeepipe IIA and IIB lines in order to transport additional natural gas to Belgium. The capacity of Zeepipe IIB will be boosted to 2.5 Bcf/d from 2.1 Bcf/d by October 2005, and Zeepipe IIA will be increased to 2.54 Bcf/d from 1.96 Bcf/d by October 2006. Both of these pipes funnel into the Zeepipe I.

The Netherlands and Denmark

The Netherlands has natural gas pipelines connecting to terminals located at Uithuizen, Callantssoog, Wijk aan Zee, and Maasvlakte, as well as offshore pipelines which link the many small offshore fields. By fall 2004, Denmark will begin natural gas exports to countries on mainland Europe via the Dutch natural gas grid. A new 63-mile pipeline will connect the Tyra West platform on the Danish continental shelf to the NAM-operated F3-FB platform in the Dutch North Sea. From there, natural gas will be fed into the NOGAT system. Shareholders of the new pipeline are A.P. Møller – Mærsk (19.5%) Shell (23.0%), Texaco Denmark Inc. (7.5%) and Dong Naturgas (50.0%). Dong will reportedly supply Dutch utility Essent with 48 million cubic feet per day, beginning on October 1, 2004. Denmark already exports natural gas to Germany at Ellund (onshore connection) and to Sweden at Dragør.

On a regional basis, Norway, Denmark and Sweden could become more integrated if a natural gas pipeline project proposed by three distribution companies -- Gastra (Denmark), Statnett (Norway) and Nova Naturgas (Sweden) -- is realized. In May 2004, the companies announced a three-stage plan to extend existing pipelines, as well as to construct new pipelines. Phase I would extend an existing pipeline between Malmö and Göteborg, Sweden to Norwegian capital Oslo. The second phase would see a new line constructed from Oslo to Jutland in western Denmark, the first interconnection between the two countries. The final phase would connect the west coast of Norway to Oslo and Stockholm to Göteborg. The companies are currently seeking financial support from the EU in order to conduct a feasibility study.

Summary of Oil and Natural Gas Reserves, Production and Export by Country						
	Proven Oil Reserves, 1/1/04*	Total Offshore Oil Production, 2003*	Net Oil Exports, 2003	Proven Natural Gas Reserves, 1/1/04*	Total Natural Gas Production, 2002†	Net Natural Gas Exports, 2002
Norway	10.4 billion barrels	3.26 million bbl/d	3.0 million bbl/d	74.8 Tcf	2.41 Tcf	2.2 Tcf
UK*	4.7 billion barrels	2.29 million bbl/d	802,000 bbl/d	22.2 Tcf	3.61 Tcf	300 Bcf
Denmark	1.3 billion barrels	367,794 bbl/d	181,685 bbl/d	2.6 Tcf	300 Bcf	120 Bcf
Netherlands	106 million barrels	47,233 bbl/d	-825,100 bbl/d (net importer)	62.0 Tcf	2.66 Tcf	895 Bcf
Germany	442 million barrels	21,000 bbl/d	-2.5 million bbl/d (net importer)	10.8 Tcf	790 Bcf	-2.4 Tcf (net importer)
Total	16.9 million barrels	5.98 million bbl/d	658,585 bbl/d	172.4 Tcf	9.7 Tcf	1.1 Tcf

* Oil and natural gas reserves include both onshore and offshore reserves.
** Total offshore production includes crude, condensate and natural gas liquids.
† Natural gas production includes both onshore and offshore output.

Sources for this report include: British Petroleum (BP); CIA World Factbook; Danish Energy Authority; Dutch Ministry of Economic Affairs; Dutch State Supervision of Mines; Economist Intelligence Unit ViewsWire; Financial Times; Gassled; Gastra; International Energy Agency; International Oil Daily; Nederlandse Aardolie Maatschappij (NAM); Netherlands Institute of Applied Geoscience; Nordic Business Report; Norsk Hydro; Norwegian Ministry of Petroleum and Energy; Norwegian Petroleum Directorate; OER Oil; Oil and Gas Journal; Paladin Resources; Petroleum Economist; Petroleum Intelligence Weekly; Platts EU Energy; Platts International Gas Report; Platts North Sea Letter; Platts Oilgram News; Revus Energy; Royal Dutch/Shell; Statoil; Talisman Energy; The Scotsman; UK Department of Trade and Industry; UK Offshore Operators Association; U.S. Energy Information Administration; Global Insight; Wintershall; World Gas Intelligence; World Markets Online.

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Denmark:

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