



A REPORT FROM THE NORWEGIAN OIL AND GAS ASSOCIATION

The Partnership between the Norwegian Oil & Gas Industry and the EU Countries

Report: The Partnership between the Norwegian Oil & Gas Industry and the EU Countries

Date published: February 2016

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Comissioned by: Norsk olje og gass

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EXECUTIVE SUMMARY

ECON Consulting Group has been engaged by the Norwegian Oil & Gas Association to assess the economic impact of the partnership between Norway and the European Union in the oil and gas industry and the effects for the EU countries in terms of value creation and employment.

The oil and gas industry, comprising Exploration & Production (E&P) companies and the supply industry, involving more than 140 companies, is a key sector in terms of value creation and employment both for Norway and the EU.

Norway is a stable and secure oil and gas supplier to the European market. In 2014, 98% of oil exports and more than 96% of gas exports from the Norwegian Continental Shelf (NCS) went to EU countries. Norwegian gas represents one fourth of total EU gas consumption.

As a consequence, EU E&P companies are very active on the NCS where they currently control around 25% of reserves (~4600 mmbœ) and more than 40% of discovered resources (~2800 mmbœ) (fig. 1). In the years 2012-14 the EU E&P companies had total revenues from the NCS of 62 billion EURO₁₆ and after tax profits of more than 6.8 billion EURO₁₆.

The European oil and gas supply industry has also highly benefited from the geographic and economic proximity between Norway and the EU, both in terms of revenues and development of cutting-edge technology, which is globally competitive. The Norwegian E&P industry follows high standards for health, safety and environment, making the Norwegian Continental Shelf the lowest CO₂ emitter per volume produced of all oil and gas producing regions.

ECON Consulting Group estimates that the EU-owned E&P and supply companies provide between 15 and 25% of goods and services consumed by the Norwegian oil & gas industry, or in monetary terms between 5.0 and 7.9 billion EURO₁₆ (fig. 2).

Finally, the strong involvement of EU companies, both in E&P and in supply of goods and services, leads to a value creation in the EU estimated from 4 to 7 billion EURO₁₆, adding between 80 000 and 120 000 jobs to the EU economy.

Oil and gas prices are a strong driver for future development decisions, and will in the coming years determine the intensity of the Norwegian petroleum activity. A strong economic and technological effort is ongoing to maintain the current Norwegian oil and gas production level (3.5 mmbœ/d). On the basis of these efforts, value creation in the European Union should vary around 4 to 5 billion EURO₁₆ per year until 2030 with an average employment effect of 80 000 and more jobs.

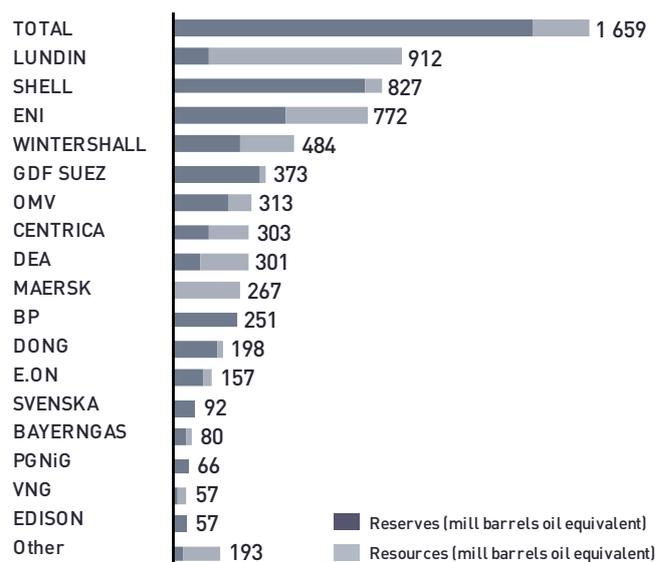


FIGURE 1: RESERVE AND RESOURCE OVERVIEW AS OF 1.1.2015 FOR EU E&P COMPANIES (MILLION BARRELS OIL EQUIVALENT) SOURCE: NPD, ECON MANAGEMENT CONSULTING

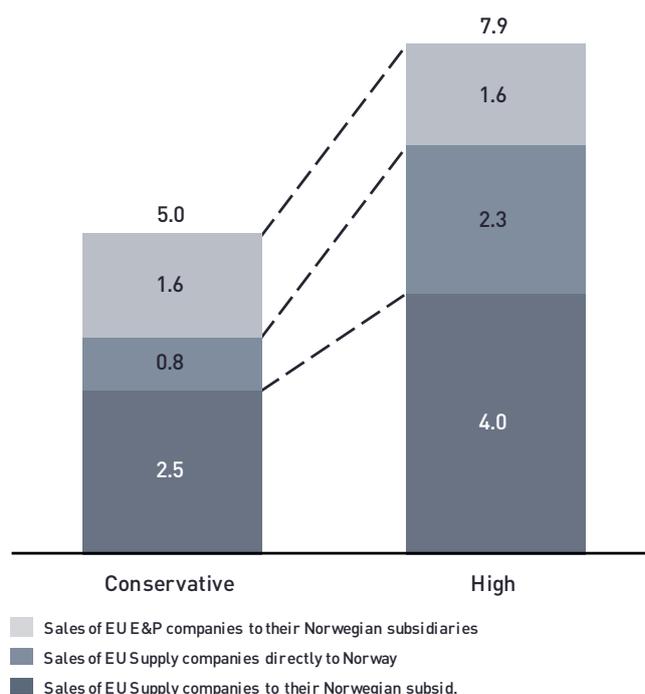


FIGURE 2: SALES OF GOODS AND SERVICES FROM EU COMPANIES TO NORWAY (BILLION EURO2016) SOURCE: ECON MANAGEMENT CONSULTING ESTIMATES



1. INTRODUCTION

The Norwegian oil & gas industry requires a variety of input to its exploration, field developments and production activities. Goods and services exceeding 30 billion EURO annually are supplied to this industry. The industrial involvement of EU companies in the Norwegian oil & gas industry is substantial. E&P companies such as TOTAL, ENI and Shell and Supply companies such as Schlumberger and Siemens have significant revenues and profits from the Norwegian petroleum activities.

1.1.1. This report studies the value and employment effects for the EU countries of the oil & gas industry on the Norwegian Continental Shelf

The value is created in several types of companies. In Figure 1.1, the corporate structure of companies involved directly with the Norwegian oil & gas industry is shown (including some example companies). The companies can be divided into:

- a. EU E&P Companies;
- b. EU Supply Companies with a branch in Norway;
- c. EU Supply Companies supplying directly from the EU to the Norwegian oil & gas industry

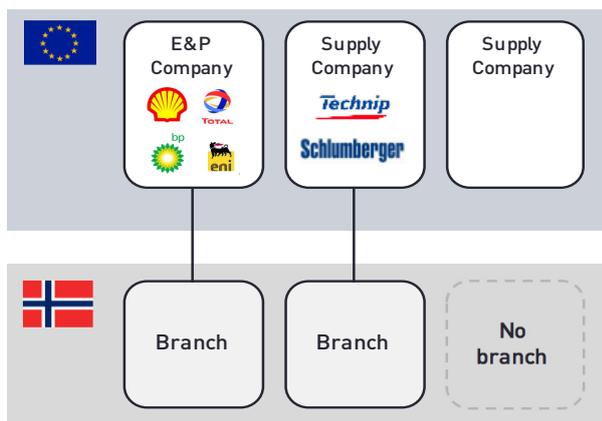


FIGURE 1.1: CORPORATE OVERVIEW

EU companies are in Norway to create revenues and profits. Likewise, goods and services are supplied from EU companies to the Norwegian oil & gas industry to increase profits. The participation in the oil & gas industry or the supply of goods and services contribute to higher revenue and increased employment in the EU countries.

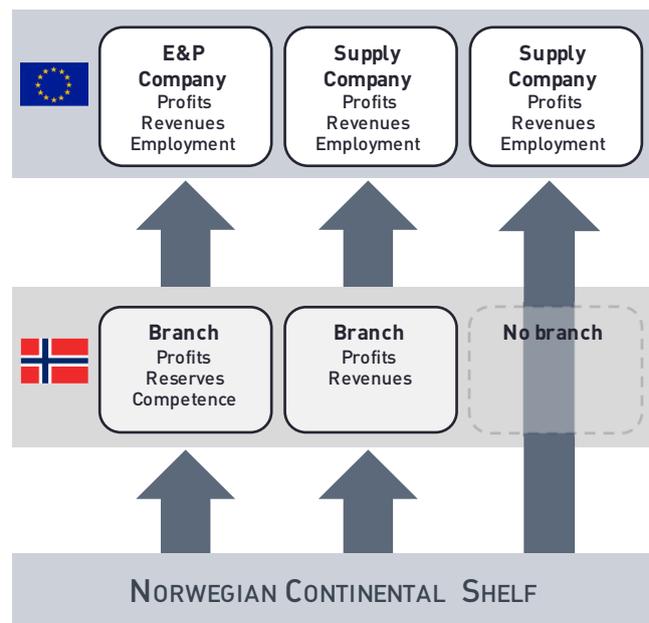


FIGURE 1.2: DIRECT VALUE CREATION FOR THE EU FROM NCS ACTIVITIES

Figure 1.2 shows the various direct value contributions from the Norwegian oil & gas industry. E&P companies gain profits, reserves and build competence through their operations in Norway. The Norwegian subsidiaries of EU Supply Companies provide profits and revenues to their mother company. These Norwegian subsidiaries also secure sales of goods and services that the EU companies often will produce within the EU countries. The E&P companies active in Norway also purchase goods and services directly from EU companies who do not have any Norwegian subsidiary. All production of goods and services in the EU to be supplied to the branch companies or directly to the Norwegian oil & gas industry translate into substantial value creation and employment effects in the EU.

1.1.2. References used in this report

- Norwegian Petroleum Directorate (NPD) database
- Statistics Norway (SSB)
- EUROSTAT statistics
- Annual reports
- BP Statistical Review of World Energy
- Companies' proprietary data (anonymized)
- Hausmann, R., Hidalgo, C. A. et al. (2008): *The Atlas of Economic Complexity. Mapping Paths to Prosperity*. Center for International Development, Harvard University.

1.2. The petroleum activity in Norway and the export to the EU

Norway produces oil & gas from its continental shelf (NCS). The first production took place with the discovery and development of the Ekofisk field in 1969 and 1971 respectively. Today, there are fields in production in all Norwegian seas: the North Sea, the Norwegian Sea and the Barents Sea (see Figure 1.3). The North Sea dominates in terms of the number of producing fields and the annual production. Natural gas from the North Sea and the Norwegian Sea is transported through pipelines to the EU, while natural gas from the Snøhvit field in the Barents Sea is liquefied (LNG) and shipped to destinations in Europe, the Americas and globally.

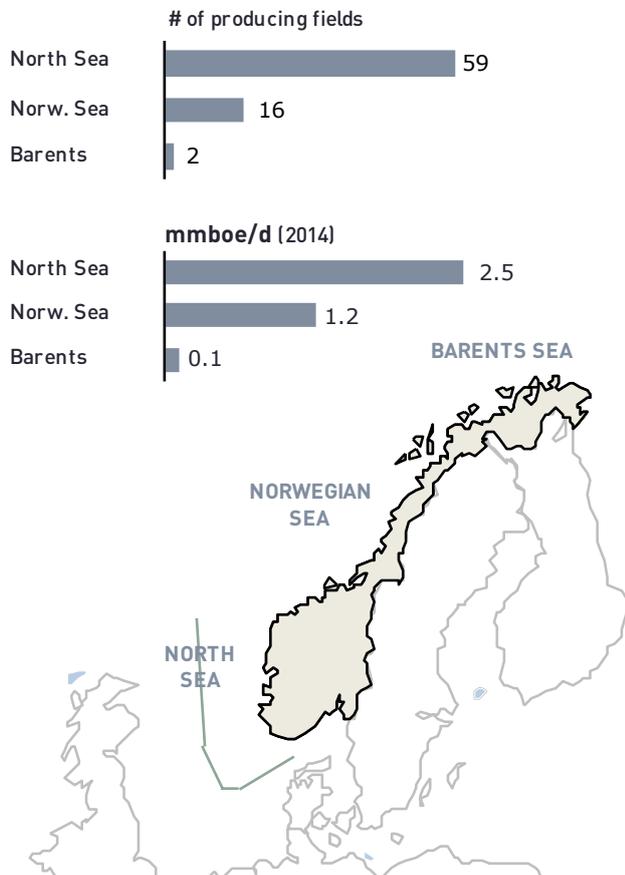


FIGURE 1.3: NCS ACTIVITIES
SOURCE: NPD

In Figure 1.4 Norway's position among the largest net exporters of petroleum is shown. Norway is the 10th largest oil exporter in the world. At the same time, Norway is the 3rd largest gas exporter (Figure 1.5). Norway's small domestic consumption of oil & gas production affects the net export relative to the other larger producers. For instance, Russia's domestic consumption of natural gas constitutes around two third of the total gas production.

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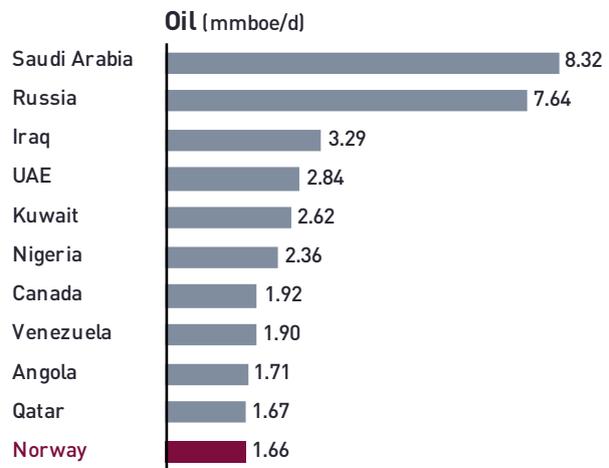


FIGURE 1.4: NORWAY'S OIL EXPORT POSITION (2014)
SOURCE: BP STATISTICS

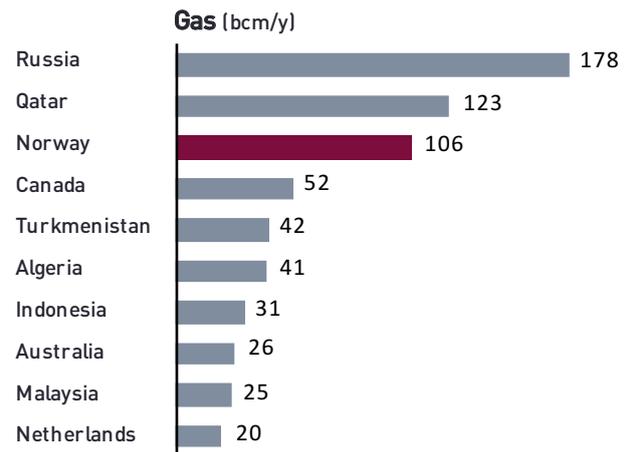


FIGURE 1.5: NORWAY'S GAS EXPORT POSITION (2014)
SOURCE: BP STATISTICS

On the NCS, an extensive gas pipeline system has been developed (Figure 1.6). The gas infrastructure includes six receiving terminals in the EU: St. Fergus and Easington in the UK, Dunkerque in France, Zeebrugge in Belgium, Emden and Dornum in Germany. The maximum gas export capacity is around 130 bcm/year but is only partially used.

Gas delivered by pipe from Norway to Europe reached a all-time record in 2015, with a volume of 108 bcm. In addition, more than 5 bcm of gas were liquefied at the Melkøya terminal, and exported as LNG. In Figure 1.7 the receiving countries are shown. Germany and the UK are the largest importers of Norwegian natural gas, followed by France.

Norwegian gas plays a major part in the supply of natural gas to the EU member states. In Figure 1.8 Norwegian natural gas' share of EU countries is presented. The figure shows that Norway mainly supplies NW Europe. Norwegian natural gas is particularly important for the UK, France, Germany and the Benelux.

The average use of Norwegian gas in the countries shown in Figure 1.8 is 30 percent. The other main sources to natural gas in NW Europe is domestic supply, North African and Russian natural gas.

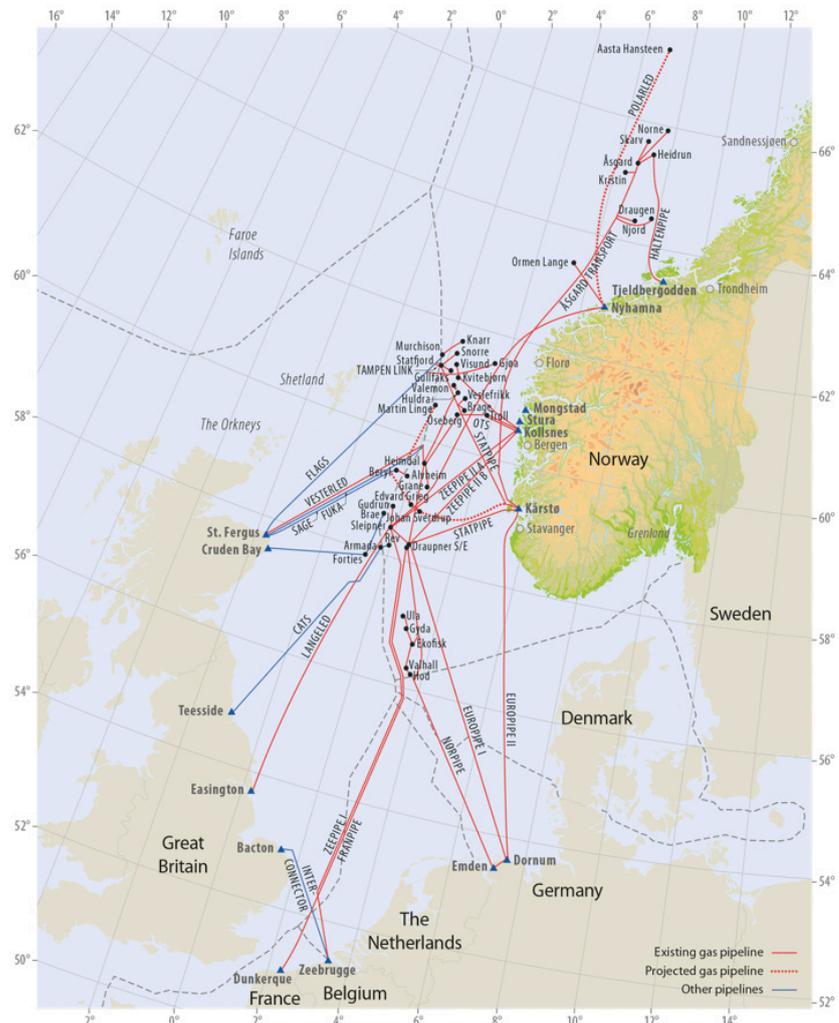


FIGURE 1.6: NORWEGIAN GAS TRANSPORTATION AND EXPORT SYSTEM, INCLUDING GASSLED AND OTHER OWNERS PIPELINES

SOURCE: NPD

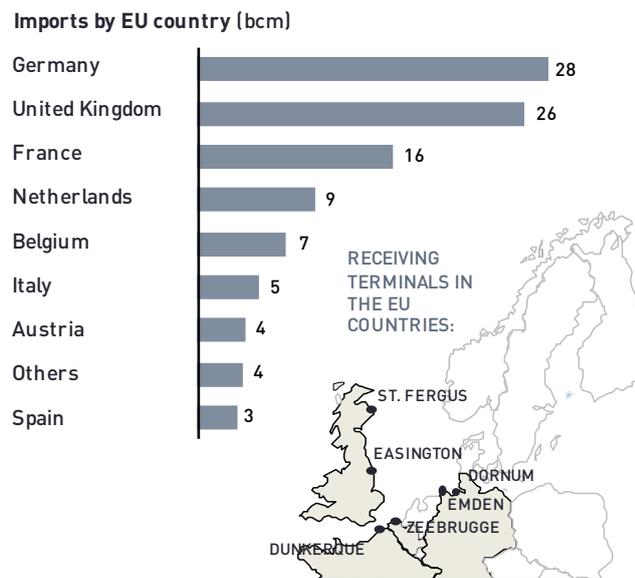


FIGURE 1.7: IMPORT OF NORWEGIAN GAS (2014)

SOURCE: BP STATISTICS

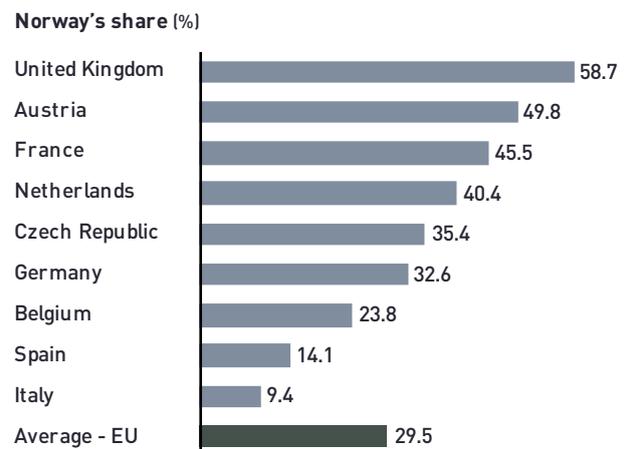


FIGURE 1.8: SHARE OF NORWEGIAN GAS IN EU COUNTRIES GAS SUPPLY (2014)

SOURCE: BP STATISTICS

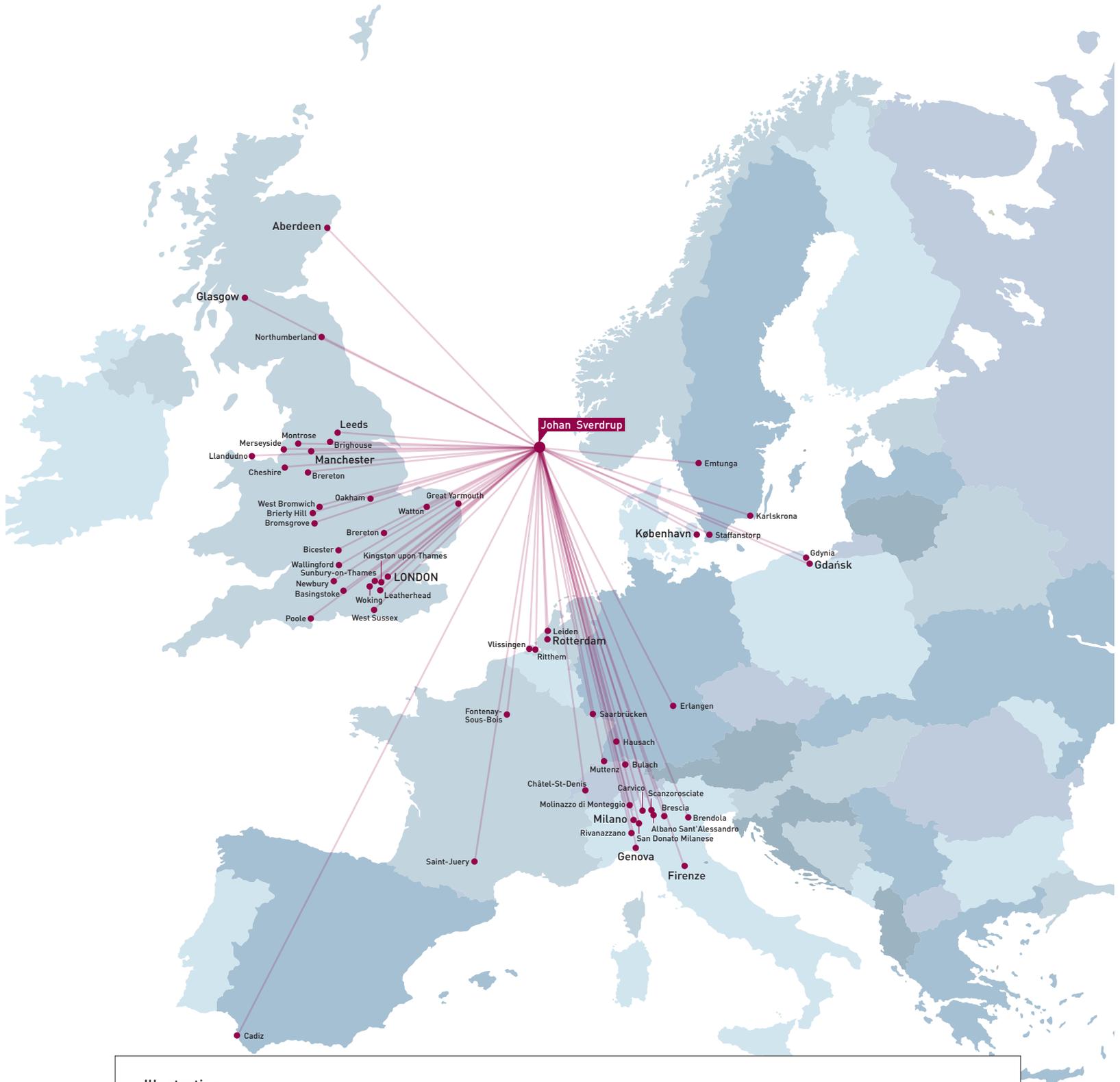


Illustration:

Johan Sverdrup in the EU: Cities with suppliers delivering to the industry project



Johan Sverdrup will be one of the most important industrial projects in Norway over the next 50 years and is hence very important for the Norwegian industry. Per January 2016 contracts worth more than NOK 50 billion have been awarded, over 70 percent of which have been landed by suppliers with Norwegian invoice addresses. As for this illustration we have focused on ripple effects Johan Sverdrup will have in the EU.

- Production start-up is scheduled for end 2019
- In the plan for development and operations first-phase investments were estimated at NOK 117 billion (2015 value)
- Total production revenues of NOK 1,350 billion over 50 years (2069)
- Daily production during first phase estimated at 315 000-380 000 barrels per day
- Peak production estimated at 550 000 – 650 000 barrels per day

1.3. The involvement of EU companies in the oil & gas chain offshore Norway

Even minor Norwegian Continental Shelf oil & gas projects can be compared with large industrial investments and significant amounts are invested in exploration, field development, transport infrastructure and onshore facilities. Substantial investments are also being made in existing fields in order to increase recovery rates and extend fields lifetime. This requires new wells, facility modification and new infrastructure.

EU companies participate substantially to all E&P activities in Norway, either as operators or partners in exploration or production (EU E&P Companies), or as suppliers of a wide range of services (EU Supply Companies), ranging from highly E&P specialized technologies to financing or transportation of goods.

EU companies participation to the Norwegian supply industry, technologically speaking one of the most advanced in the world, is highly beneficial for both parties. The high standard requirements have lead the Norwegian oil & gas industry to develop and adopt innovative solutions that are now used all over the world.

EU E&P Companies such as ENI, Total, Wintershall, Lundin, Edison, Shell, DONG, OMV, Repsol, Engie, Dea, participate to develop innovative and cost-effective solutions for the exploration in the Barents Sea frontier areas (BaSEC initiative: Barents Sea Exploration Collaboration). The purpose of the cooperation is to find common exploration and safe solutions and share data with the authorities and industry. Through more collaboration and increased coordination, they have as an objective to secure high level of safety and emergency response, logistic and preparedness as well as increasing knowledge on metocean and ice in that area, with the possibility to extend this to other regions in the future.

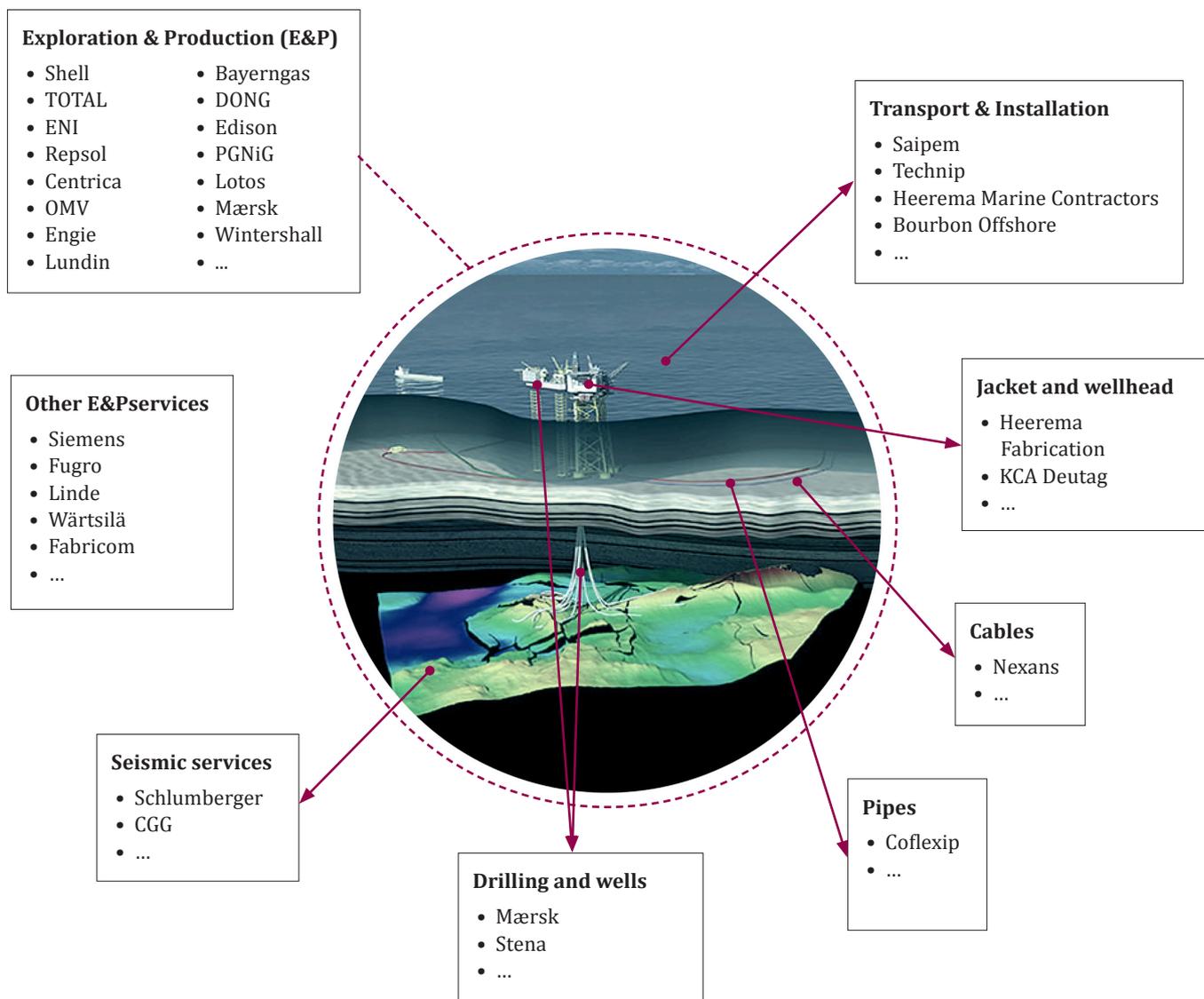


FIGURE 1.9: EXAMPLES OF EU COMPANIES PARTICIPATING TO THE E&P ACTIVITIES ON THE NCS

Image: courtesy Statoil

1.4. The Norwegian Continental Shelf is regulated by strict and demanding standards

The Norwegian Continental Shelf differentiates itself from many other oil and gas producing provinces in the world by a strong cultural sensitivity to Health, Security and Environment (HSE) questions. This is the result of a long-standing and deep coordination between the industry, the Norwegian society, unions and the authorities. In addition, the offshore oil and gas industry has established a productive dialogue with the fisheries organisations to avoid and reduce potential conflicts over acreage.

This has led to the development of regulations promoting high standards. Norwegian authorities and petroleum companies are very strict on the application of HSE rules offshore in collaboration with employees' organizations. That has resulted in very high safety records for the NCS activity.

Promotion of high standards on the NCS have had many positive results. For instance, figure 1.10 shows that in terms of CO₂, NO_x, CH₄ and nmVOC emissions per volume produced, Norway is below global averages in the last available statistics (2013). Ban on gas flaring has been one of the reasons for the low CO₂ emissions offshore.

The marine environment has been carefully monitored by independent scientists since the 1970s. Their findings provide an extensive body of openly available data which present possible effects of discharges to the sea from the oil and gas industry. A summary of environmental monitoring results was published in 2013, and concluded in part that the probability of the petroleum sector's operations causing significant effects is low.

More details can be found in the Norsk Olje og Gass 2015 Environmental Report.

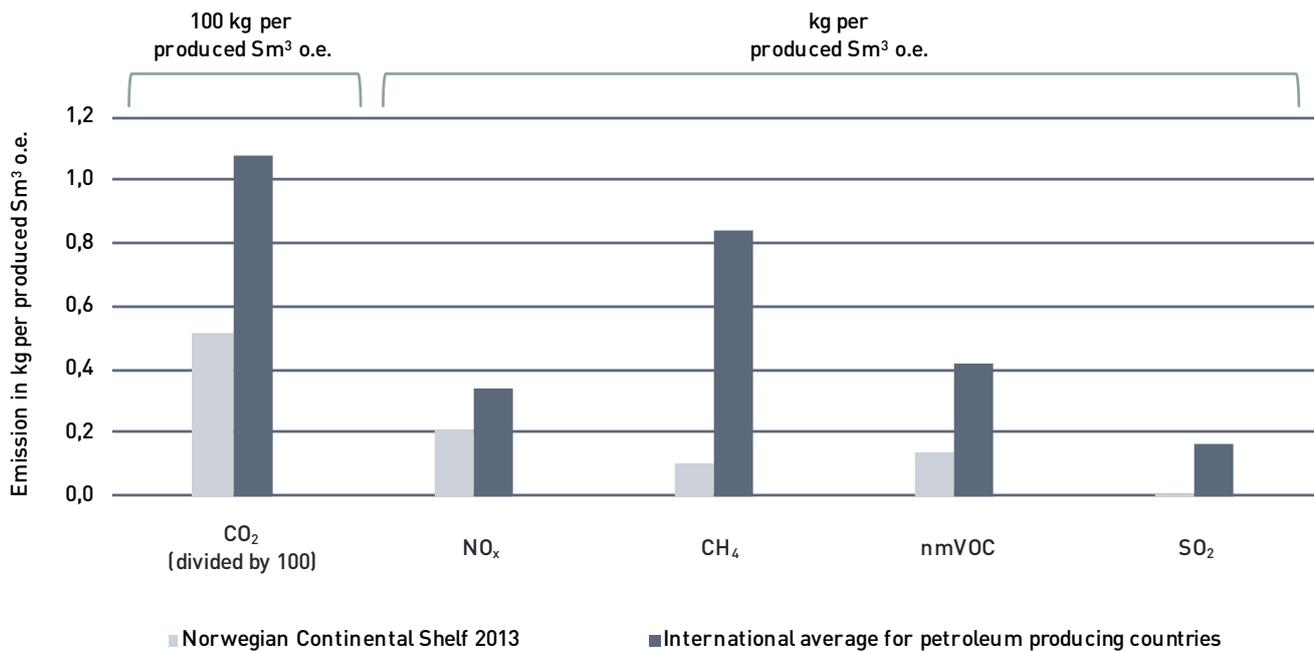


FIGURE 1.10: GREENHOUSE GAS EMISSIONS PER UNIT PRODUCED IN VARIOUS PETROLEUM PROVINCES, 2003-13

SOURCE: NOROG, IOGP, EEH

2. EU E&P COMPANIES

In 2012-2014 EU E&P Companies' activity on the NCS generated revenues of 62.0 billion EURO and profits of 6.8 billion EURO.

The Norwegian oil & gas industry requires a variety of input to its exploration, field developments and production activities. Goods and services exceeding 30 billion EURO annually are supplied to this industry. The industrial involvement of EU companies in the Norwegian oil & gas industry is substantial. E&P companies such as TOTAL, ENI and Shell and Supply companies such as Schlumberger and Siemens have significant revenues and profits from the Norwegian petroleum activities.

2.1.1 Revenues of 20.7 billion EURO in 2014

In the years 2012-2014 the EU E&P Companies operating on the NCS had total revenues of approximately 62 billion EURO₂₀₁₆.



FIGURE 2.1: EU E&P COMPANIES ANNUAL REVENUES
(BILLION EURO₂₀₁₆)

SOURCE: THE BRØNNØYSUND REGISTER CENTRE, RAVNINFO

2.1.2 After tax profits of 1.5 billion EURO, 2014

Figure 2.2 shows that the after tax profits for the EU E&P Companies accumulated to 6.8 billion EURO₂₀₁₆ in the years 2012-2014.



FIGURE 2.2: ANNUAL AFTER TAX PROFITS
(BILLION EURO₂₀₁₆)

SOURCE: THE BRØNNØYSUND REGISTER CENTRE, RAVNINFO

2.1.3 TOTAL, Shell and ENI are the biggest EU E&P Companies on the NCS

As of beginning of 2015, there are 20 EU E&P Companies active on the NCS. There is a big variation among these companies in terms of size, maturity and strategy. Majors like TOTAL, ENI and Shell have been operating on the NCS since 1965 – the very beginning of the petroleum era in Norway. These companies have been able to build a large portfolio and have generated high revenues and profits for many years.

Most of the EU E&P Companies currently on the NCS entered after the year 2000. A first wave consisted in companies with a strong presence in the downstream gas market, while actors like Wintershall, Lundin and Mærsk have later positioned as the new key players.

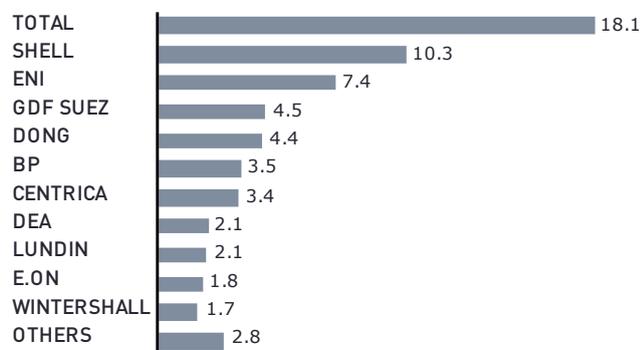


FIGURE 2.3: LARGEST PLAYERS BY REVENUES IN 2012-2014 (BILLION EURO₂₀₁₆)

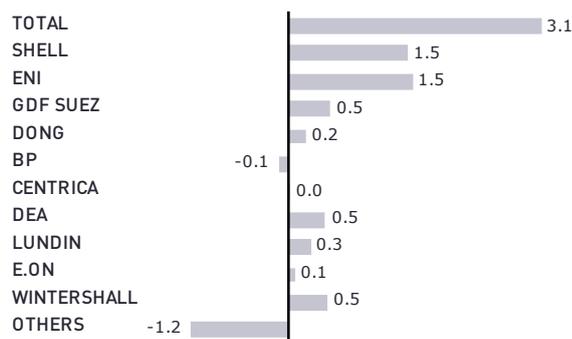


FIGURE 2.4: PROFIT OR LOSS AMONG THE LARGEST EU COMPANIES IN 2012-2014 (BILLION EURO₂₀₁₆)

SOURCE: THE BRØNNØYSUND REGISTER CENTRE, RAVNINFO.
COMMENT: E.ON NORWAY HAS BEEN PURCHASED BY DEA (EFFECTIVE 2016)

2.1.4 Norwegian E&P subsidiaries spend annually more than 1.5 billion EURO in favour of EU mother company

EU E&P Companies provide a number of services to their subsidiaries in Norway. EU E&P Companies benefit from that both in terms of revenues and experience. The financing of Norwegian E&P subsidiaries is also provided by EU mother companies that get in turn steady revenues from such loans. Other financial tools include price hedging, loan guarantees, etc. Some Norwegian E&P subsidiaries have also commodity trading activities, and purchase oil & gas in the European markets to secure their own physical deliveries.

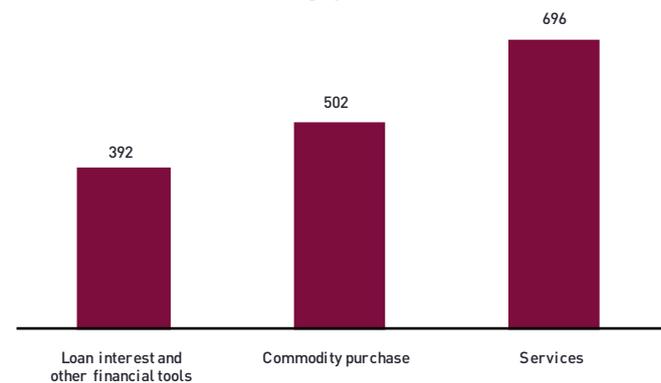
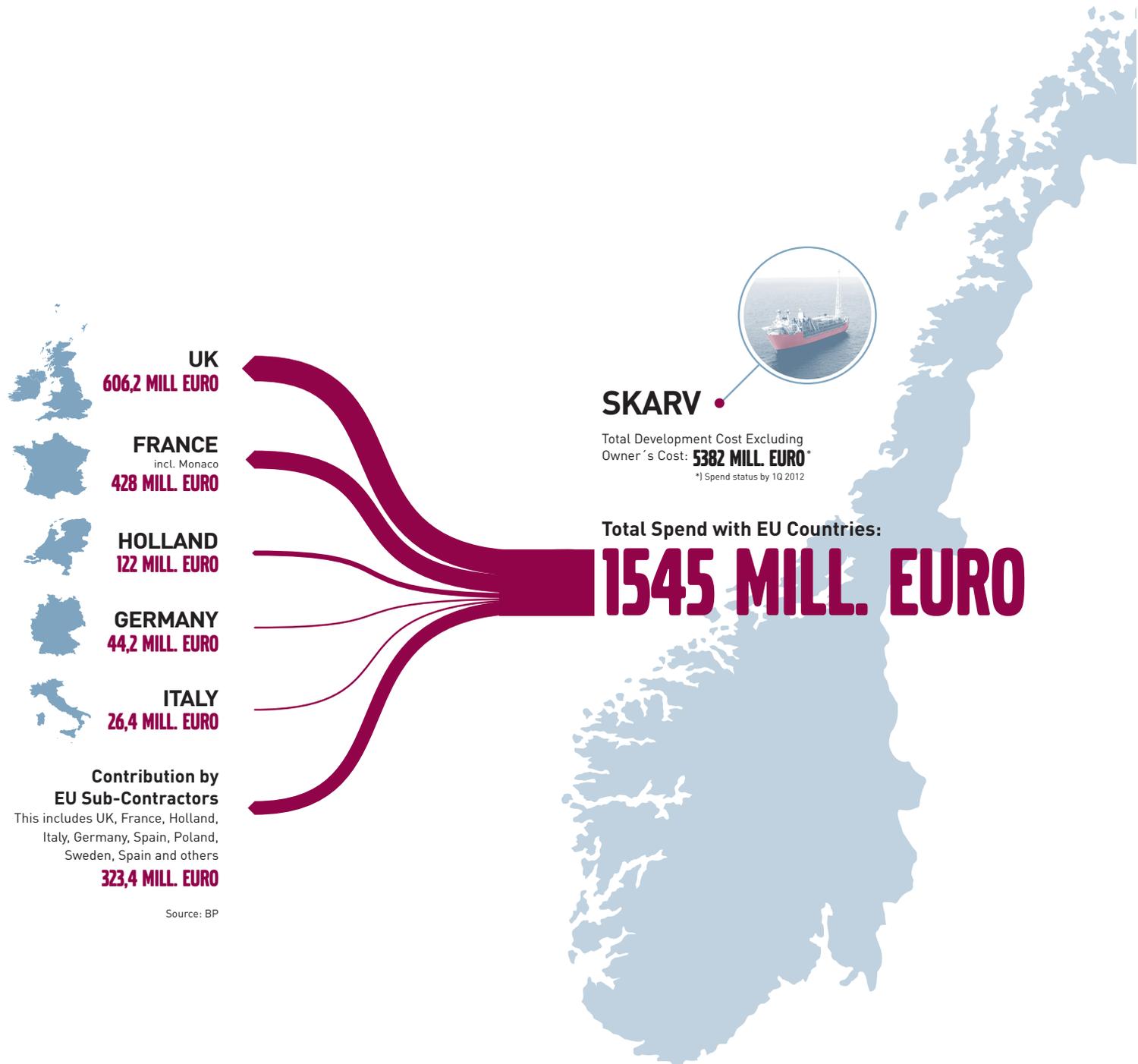


FIGURE 2.5: 2014 FLOWS FROM NORWEGIAN E&P SUBSIDIARIES TO MOTHER COMPANIES IN EU (MILLION EURO₂₀₁₆)

SOURCE: NORWEGIAN E&P SUBSIDIARIES OF EU E&P COMPANIES, ANNUAL REPORTS

Illustration:

SKARV DEVELOPMENT: Spend Contribution by EU Countries



2.2. EU E&P Companies hold 25% of reserves and 40% of resources on the NCS

Discovering resources, obtaining a reserve base by developing discoveries and ensuring production are key activities for E&P companies.

2.2.1 NCS reserves & resources ensure a substantial part of EU E&P Companies' future production

EU E&P Companies are very active on the NCS and many of these companies have over the years grown significant portfolios. In total they currently control around 25% of reserves (~4600 mmbøe), NPD resource category 1-3, and more than 40% of discovered resources (~2800 mmbøe), NPD resource category 4-7, on the NCS.

TOTAL is the most significant EU E&P Company in terms of reserves and resources with Lundin, Shell and ENI taking the next places. These four companies account for 56% of the total reserves and resources among the EU E&P Companies. Capacity of an E&P company to maintain its activity in the long term is determined by its reserves and resources, that represent its potential future production of oil & gas.

Political stability of Norway makes the large amount of reserves and resources currently being controlled by EU E&P Companies a highly secured oil & gas source.

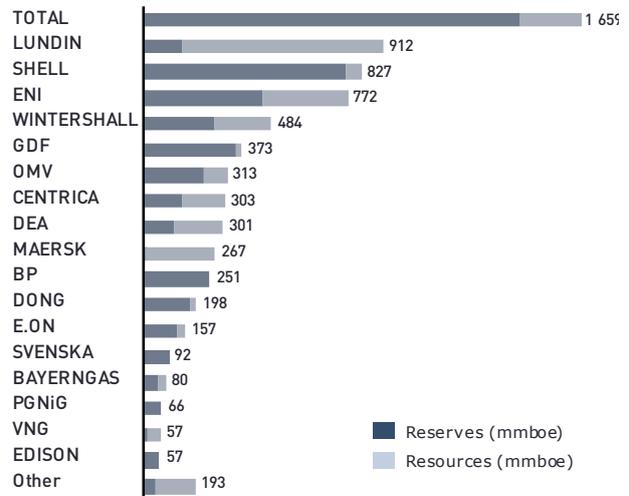
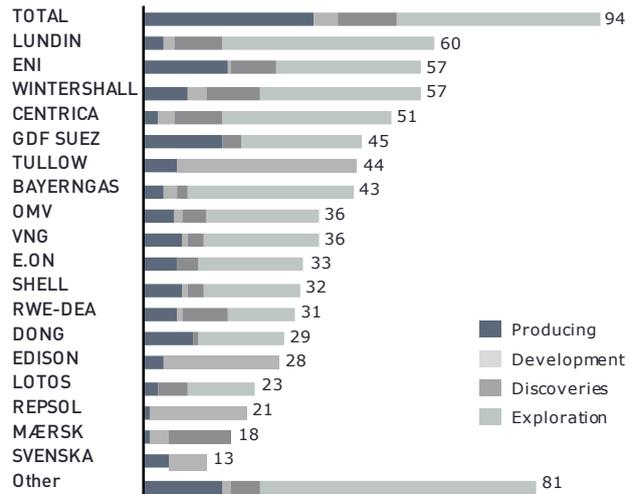


FIGURE 2.6: RESERVE AND RESOURCE OVERVIEW 1.1.2015 FOR THE EU E&P COMPANIES (MMBOE)

SOURCE: NPD



2.7: NUMBER OF LICENSES HELD BY EU E&P COMPANIES 1.1.2015 AND THE STATUS OF THE LICENSES

SOURCE: NPD

2.2.2 EU E&P Companies have shares in 90% of the licenses and are involved in all ongoing developments

As of 1.1.2015, there were 518 active licenses on the NCS and EU E&P Companies had shares in 470 of these licenses (90%). TOTAL is by far the player with most licenses among the companies, with an ownership in 94 licenses. Lundin and ENI rank number 2 and 3 in terms of licenses, both having interests in more than 10% of NCS licenses with respectively 60 and 57 licenses.

Of the companies on the top 10 list, five entered the NCS after 2004: Centrica, Tullow, Wintershall, Bayerngas and OMV. These have been active in building a portfolio and have had success in recent years' licensing rounds for acreage on the NCS. This also shows that the Norwegian State has appreciated and welcomed the newcomers from the EU.

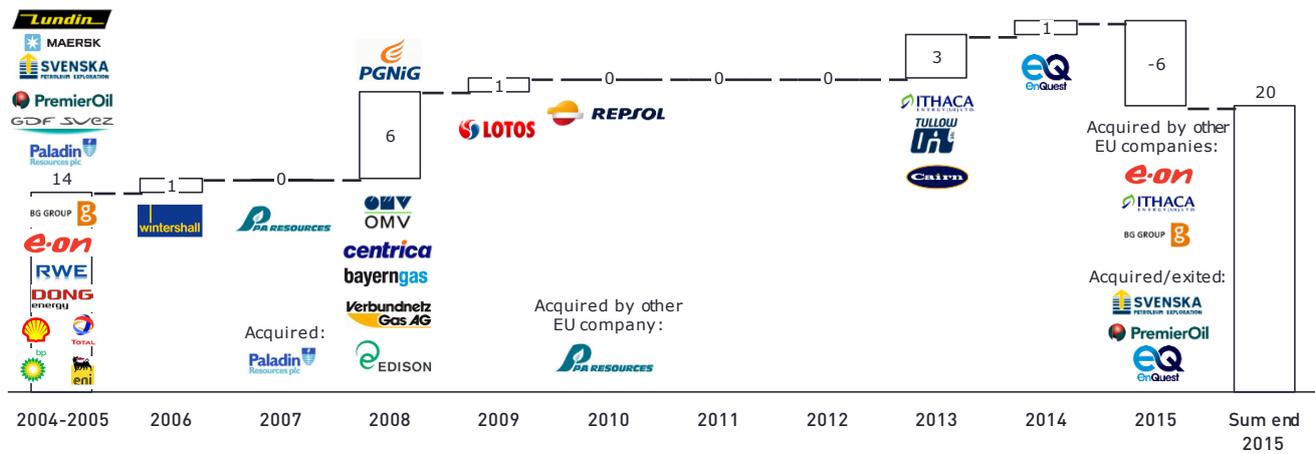


FIGURE 2.8: THE INCREASE IN NUMBER OF EU E&P COMPANIES ON THE NCS SINCE 2004

SOURCE: NPD, ECON



3. EU SUPPLY COMPANIES

The long period with high oil prices has supported the activity in the oil & gas industry globally and in Norway. The exploration activity, the development of fields and the maintenance and redevelopment of existing fields have been at an all-time high the past decade. This activity level has gone hand-in-hand with a major demand for goods and services. Although the world oversupply of oil has resulted in a lower price regime, the activity on the NCS will continue to remain relatively high. The ability to compete with highly qualified suppliers across the world is a prerequisite to become successful in the supply of products and services to the Norwegian oil & gas industry.

3.1.1. Investments at a high level

The Norwegian oil & gas industry demands goods and services from many suppliers across the world. The investments on the NCS have been very high the last few years. In 2014 and 2015, the investments were 26 and 22 billion EURO₂₀₁₆. The last decade's investment history is shown in Figure 3.1. From the early 2000s' to today, the investment level has experienced a significant increase, reflecting the increased difficulty to produce new volumes as the NCS has matured.

Around half of the overall investments on the NCS takes place on producing fields. Work related to maintenance and repairs plays a significant role. In addition, several long-producing fields have been redeveloped with new topsides, subsea installations and pipelines in the later years. Other investments include new topside and subsea field developments and investments at processing facilities, pipelines and cables.

In the years to come ECON still expect substantial investments on the NCS. Ongoing investments within drilling & wells in existing fields are necessary in order to maintain production potential. Despite lower oil price, Norwegian authorities approved in 2015 several fields' development plans. First and foremost Johan Sverdrup field – one of Norway's largest oil fields (>2500 mmbœ) – will require massive investments going forward.

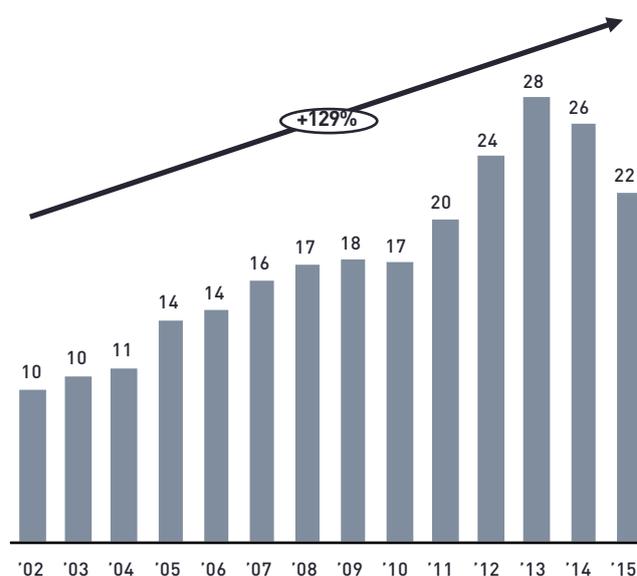


FIGURE 3.1: INVESTMENTS ON THE NCS, 2000-14
(BILLION EURO₂₀₁₆)

SOURCE: STATISTICS NORWAY, ECON.

3.1.2. Operating costs stable around 8-9 billion EURO annually

The oil & gas industry consumes goods and services in order to operate platforms, subsea installations, pipelines and processing facilities. Maintaining and repairing the platforms, the subsea templates, the wells and onshore facilities constitute a major task for E&P companies. Many of the platforms in the North Sea and Norwegian Sea are ageing and thus the volume of repair and maintenance tasks are growing. Few platforms are shut down, while the number of new platforms and FPSOs are increasing on the NCS. Thus, the effort for operating and maintaining the facilities in a shape required for oil & gas production will most likely increase also in the future. At the same time, the lower oil prices will increase the attention on efficiency and cost level in the industry, reducing the overall spending on operating costs.

The operating costs represent a substantial part of the total demand for goods and services. In Figure 3.2 the operating costs per year in the 2010-14 period are shown. The annual costs show some variations, but are rather stable. In the 2010-14 period, the total costs averaged 8.6 billion EURO 2016 per year.

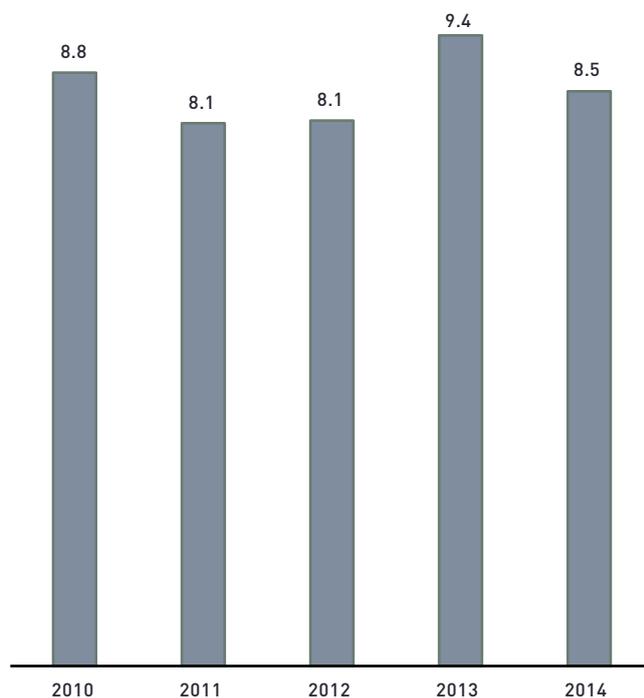


FIGURE 3.2: OPERATING COSTS ON THE NCS, 2010-14
(BILLION EURO₂₀₁₆)

SOURCE: STATISTICS NORWAY, ECON.

3.2. EU Supply Companies provide a significant share of the total goods and services provided to the Norwegian oil & gas industry

EU Supply Companies play an integrated and important role by providing goods and services demanded by the Norwegian oil & gas industry. The main benefits to the member states in the European Union are profits from the Norwegian subsidiaries and production of goods and services in the EU.

3.2.1. Supply from EU companies to the Norwegian oil & gas industry - methodology

The EU Supply Companies provide products and services either directly from the production sites within the EU or through Norwegian subsidiaries. There are no easily available data on the value of products and services supplied from EU to the Norwegian oil & gas industry. ECON has chosen to use 4 different approaches for estimating this. The first approach is to use data from Statoil, the largest purchaser in the Norwegian oil & gas industry, on how much they buy directly from EU countries, and apply this percentage share to the total market. The second approach is to use data from Statoil on all supply companies within their different supply categories and find mother company origin. The third approach is to gather annual accounts for all Norwegian subsidiaries of EU Supply Companies and estimate value of products and services that these companies buy from their EU mother companies. The last approach looks at a number of typical field development projects and estimate the EU share of value for these.

3.2.2. Method 1 - Direct purchase from EU Supply Companies

Statoil publishes each year its Sustainability Report. From this report you will find information on how much Statoil spends in each country it is present. From studies of the EU Supply Companies' share of the spending, it is estimated that around 6-7 percent is invoiced from an EU country*. If we apply this share to the money spent in the Norwegian oil & gas industry for 2010-14 we see that 1.8 to 2.4 billion EURO has been invoiced annually from EU suppliers directly in this time period. Many of the other large operators on the NCS are EU E&P Companies like BP, Shell and ENI. ECON thinks it is a reasonable assumption that these use to an even higher degree direct suppliers in the EU for services and products to the NCS, for historical and other reasons. As such the share that Statoil have for direct supplies to the NCS from EU is most likely a conservative estimate.

*This represents a lower limit of what is supplied from the EU countries, since many EU Supply Companies invoice through subsidiaries in Norway

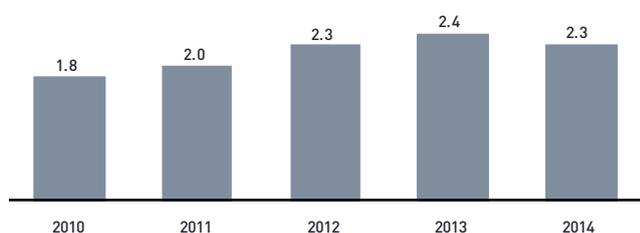


FIGURE 3.3: ESTIMATE OF PURCHASE FROM EU SUPPLY COMPANIES (BILLION EURO₂₀₁₆)

SOURCE: OPERATOR ESTIMATE, ECON CALCULATIONS.

3.2.3. Method 2 – Direct purchase from EU Supply Companies or from their Norwegian subsidiaries

In cooperation with Statoil’s procurement analysts, ECON developed a detailed overview of EU Supply Companies, both with activity in Norway and in the EU. From this list, Statoil compiled the total purchase of goods and services, distributed among purchase to subsidiaries and mother companies. ECON has aggregated the purchase to the NCS level. Figure 3.4. presents the estimate of direct demand to EU Supply Companies in the EU and the indirect purchase of goods and services to their Norwegian subsidiaries. The figure shows that direct supply is between 0.5 and 1 billion EURO₂₀₁₆ per year. The demand of goods and services to Norwegian subsidiaries is larger however, representing 6-7 billion EURO₂₀₁₆ in 2013 and 2014.

To enable a robust estimate of production within the EU we need to calculate the value of demand from Norwegian subsidiaries to their mother companies. This methodology is visited in the next section.

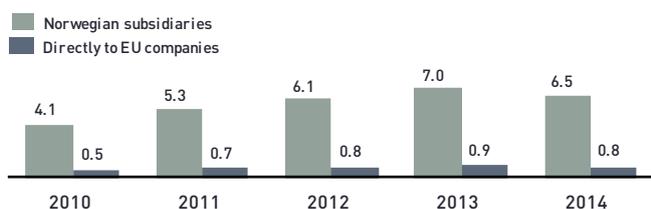


FIGURE 3.4: ESTIMATE OF PURCHASE FROM EU SUPPLY COMPANIES (BILLION EURO₂₀₁₆)

SOURCE: OPERATOR ESTIMATE, ECON CALCULATIONS.

3.2.4. Method 3 – Revenues of Norwegian subsidiaries of EU Supply Companies in Norway and their purchase from EU mother company

ECON’s supply industry database provides an overview of accounting data for all known Norwegian subsidiaries of EU Supply Companies. Data for these companies have been compiled for the years 2010-12. Many of the EU Supply Companies operate in several industries and only the accounting data relevant for the petroleum activity is included. The revenue for these companies in 2010-14 is shown in Figure 3.5. In 2014, the EU Supply Companies earn around 10 billion EURO₂₀₁₆ from their petroleum supply operations in Norway. If all these revenues were supplied to only the Norwegian oil & gas industry, EU Supply Companies would have a very high share of supplies to this industry. These numbers are not aligned with the data we have received from Statoil for spending in different categories. The reason why there is a discrepancy between the revenues of these companies and the value supplied to the Norwegian oil & gas industry, is because a large share of their total stems from export to other countries globally.

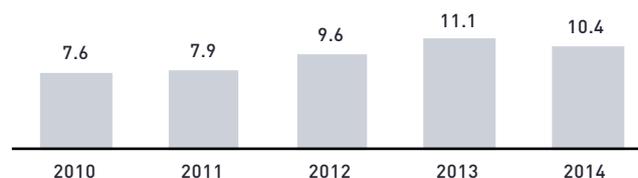


FIGURE 3.5: REVENUES OF NORWEGIAN SUBSIDIARIES OF EU SUPPLY COMPANIES (BILLION EURO₂₀₁₆)

SOURCE: BRØNNØYSUND REGISTER, ECON SUPPLY INDUSTRY DATABASE, ECON CALCULATIONS.

To be able to supply the offshore industry the EU Supply Companies provide products to their Norwegian subsidiaries. Some companies are merely sales offices in Norway and thus need most of their products supplied from outside Norway. Others are very specialized and need less input from their mother companies. Most companies however purchase a significant portion of their inputs internally from other branches of the corporation.

In Figure 3.6 the annual sales from the EU Supply Companies to their Norwegian subsidiaries is presented. The figure shows that the internal sales from the EU to Norway is substantial. Annual sales have been in the range of 3.5 to 4.3 billion EURO2016 during the 2010-14 period.

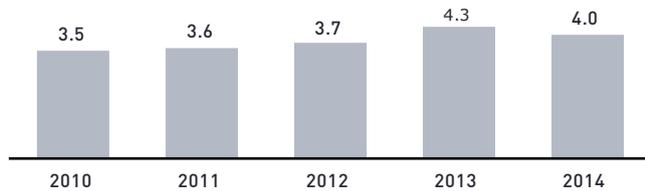


FIGURE 3.6: INTERNAL SALES TO NORWEGIAN SUBSIDIARIES FROM MOTHER EU SUPPLY COMPANY (BILLION EURO₂₀₁₆)

SOURCE: BRØNNØYSUND REGISTER, ECON'S SUPPLY INDUSTRY DATABASE, ECON CALCULATIONS.

3.2.5. Direct purchase to EU Supply Companies – method 1 and method 2

While method 1 resulted in an annual direct demand from EU countries of over 2.3 billion EURO2016 in 2014 (Figure 3.3), the results from method 2 (direct purchase) showed an annual purchase of between 0.5 and 1 billion EURO2016 (Figure 3.4). Why this discrepancy? In the latter method, ECON has together with Statoil made a refined list containing only companies with headquarter and substantial activity in the EU countries. This is done to secure that the list does not contain companies listed in the EU but with only limited activity. Today's corporate structures are complicated and companies may for example for tax reasons be listed in the EU but have all their activity outside the EU. Thus, while method 2 is subject to estimating a too small direct purchase of goods and services from EU Supply Companies, method 1 will probably overestimate the size of this purchase.

ECON will use the results from method 2 in this report, but please notice that these results are characterized by being conservative.

3.2.6. Combining method 2 and method 3 – a synthesis

Method 2 identified the purchase of goods and services directly from EU Supply Companies and through their Norwegian subsidiaries (Figure 3.4). From method 3 ECON identified the total revenue and internal purchase of goods and services from mother EU company by Norwegian subsidiaries (Figure 3.5 and 3.6). Taken together, the two methods provide important knowledge about the size of the demand from the NCS to EU countries.

The difference between Figures 3.4 and 3.5 represents the export of Norwegian subsidiaries. They have higher revenues than they produce to satisfy the demand from the NCS. On average, the export rate is approximately 30-40 percent. This is lower than the average export rate of the supply industry in Norway taken together (50 percent).

If the presence in Norway and the supply to the NCS has contributed to the evolution of specialized products making the EU companies able to compete globally then the internal purchase from Norwegian subsidiaries that are inputs in the export from Norway should be taken into account here. If however the companies could have produced those export goods and services from elsewhere without the demand from the NCS, we should avoid to take into account this demand to EU countries. The answer probably lies somewhere between these two alternatives. Some companies would easily have built up the competence and knowledge elsewhere. For other companies, however, the presence in Norway has been urgent for the development of a global competitive edge. Early use of new technology and an environment for testing prototypes in a rough offshore environment that has led to a focus on innovation in the Norwegian based supply industry speaks for an estimate closer to Figure 3.5 than Figure 3.4.

ECON makes two estimates of internal purchase of goods and services from Norwegian subsidiaries to their mother companies. The first is based on Figure 3.4, with the rate of internal purchase of revenue as derived from the combination of Figure 3.5 and Figure 3.6. This is a very conservative estimate. The second estimate is based on Figure 3.6. This represents a high estimate.

3.2.7. Check 1 - Input to investment projects from EU Supply Companies

ECON has looked at the EU supply, both direct and indirect to some typical field development projects on the NCS. This information is gathered from meetings with Statoil personnel who have been responsible for these projects. Both subsea and topside projects have been analysed. ECON estimates that on topside projects the European share of products and services is around 25% of project value, and on subsea developments the European share is more than 45%. The EU share of subsea developments can even be higher, because ECON is aware that some of the US based subsea equipment suppliers produce some of their equipment for the North Sea in the UK and in other EU countries. The share of drilling and well in a subsea project is also high. From an overall perspective, EU share is around 35%. For investment projects therefore the EU share seems higher than the results derived from method 1-3.

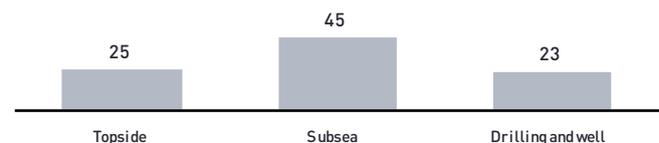


FIGURE 3.7: ESTIMATED EU COMPANIES SHARE IN NORWEGIAN E&P INVESTMENT PROJECTS (%)

SOURCE: STATOIL INTERVIEWS, ECON.

3.2.8. Check 2 – Share of direct and indirect purchases to EU Supply Companies

Statoil has estimated the share of both direct purchase from EU Supply Companies or indirect purchase through their Norwegian subsidiaries. This includes Statoil’s subcontractors purchase, project purchase, drilling and well and operations purchase. Using this method we arrive on that EU companies supply between 20 and 24% within the different segments, see Figure 3.8. A 22% EU supply to the Norwegian oil & gas industry for the years 2010-14 results in a revenue that is very similar to the figures calculated with method 2.

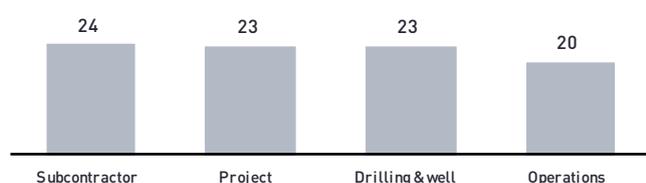


FIGURE 3.8: EU SUPPLY COMPANIES SHARE IN DIFFERENT SEGMENTS (EU % SHARE OF SPEND)

3.3. Summarizing the final results of the estimate of demand for goods and services produced in the EU countries

Final results. demand for production in EU countries.

Chapter 3.2 reviewed the methods, checks and the results from the study of the size of the demand from the Norwegian oil & gas industry to companies in the EU countries. In this section, ECON presents the final results. The final results also includes the purchase of goods and services from Norwegian E&P subsidiaries to their EU mother companies (Figure 2.5). These results will be used in the following chapter (4) where ECON estimates the value creation and employment effects for the EU economies.

In Figure 3.9, the annual demand from the NCS and the Norwegian subsidiaries is shown. The figure is a conservative estimate, in the sense that the supply from Norwegian subsidiaries only include what stems directly from the NCS and that ECON uses method 2 instead of method 1 in identifying demand directly to the EU countries. The purchase of goods and services from EU countries in 2014 was 5 billion EURO (Figure 3.9). Figure 3.10 estimates, on the other hand, a higher demand from the NCS and Norway, due to that method 1 is used for direct purchase from EU companies and that the export out of Norway is included in the effects of NCS activity. The purchase of goods and services from EU countries is estimated to 8 billion EURO (Figure 3.10).

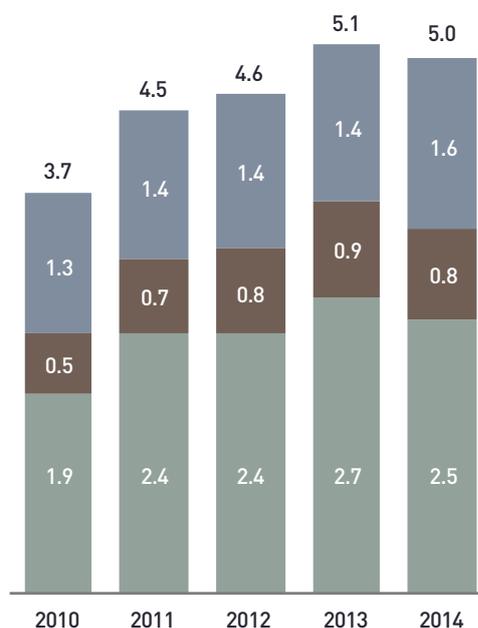


FIGURE 3.9: SALES OF GOODS AND SERVICES FROM COMPANIES WITHIN THE EU COUNTRIES TO NORWAY CONSERVATIVE ESTIMATE (BILLION EURO₂₀₁₆)

SOURCE: ECON

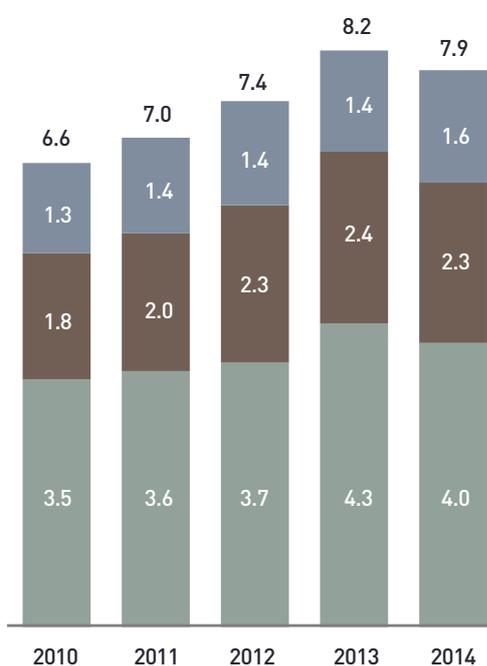


FIGURE 3.10: SALES OF GOODS AND SERVICES FROM COMPANIES WITHIN THE EU COUNTRIES TO NORWAY – HIGH ESTIMATE (BILLION EURO₂₀₁₆)

SOURCE: ECON

- Sales of EU E&P companies to their Norwegian subsidiaries
- Sales of EU Supply companies directly to Norway
- Sales of EU Supply companies to their Norwegian subsidiar

GAS FROM NORWAY

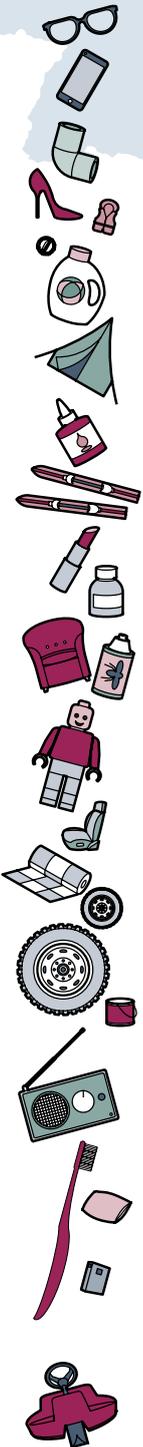
BASF Ludwigshafen, GERMANY

Illustration:
**Chemistry
is created by
european gas
from Norway**

In 2014 **BASF Ludwigshafen** used 28 TWh gas for feedstock and electricity consumption whereas **23% of the gas is supplied by Norway**.

BASF's plant on the banks of the Rhine in Ludwigshafen is BASF's largest production site worldwide. The 10 km² site is also the company's global headquarters and research center. With around 33 000 employees, BASF SE is the largest employer in the Rhine-Neckar metropolitan region.

Source: BASF and Wintershall



4. RIPPLE EFFECTS

The Norwegian oil & gas industry demands a diverse range of goods and services from EU Supply Companies. The producers of these goods and services need also inputs from other companies to satisfy the demand from Norway. The supply chain of goods and services to Norway involves many companies, many more than those companies supplying the Norwegian oil & gas industry directly. The supply of goods and services to Norway leads to larger economic activity and higher employment inside the EU. Therefore Norwegian demand creates large economic ripple effect within EU.

4.1. Ripple effects are an important part of industrial activity

Modern production of goods and services requires the skills of many specialized firms. The complexity of today's economies translates into a long chain of supply of inputs. If one company is to produce a product, it surely involves many more companies than just the original company. A producer of a rig needs obvious goods like steel, drilling equipment, technical components etc. The company may also need construction services and retail goods. In addition, companies may seek advice from lawyers, accountants, economists and political analysts.

This complexity of the value chain means that the demand for goods and services from the Norwegian continental shelf has substantial ripple effects in the EU. The value added from production in the EU is not only the value added in the supplier of goods and services to Norway but also the value

added in all the companies supplying inputs to the direct producer or even companies involved in producing inputs to the indirect producers. It is only imports from countries outside the EU that is not beneficial for the EU. As we know, the EU represents a very large and complex economy able to produce most of the needs for its industry and consumers. This means that most of the products that the EU produces to satisfy the demand from the NCS have inputs originating from EU.

Figure 4.1 shows a stylized illustration of how the ripple effects take place inside the EU (left side). The demand from Norway translates into economic activity across the EU. Some inputs are produced outside the EU, but the great majority stems from inside the EU and leads thus to more value creation than in the direct supplier solely. The value chain is also illustrated (right side). The indirect supply of inputs to goods and services sold to the Norwegian oil & gas industry constitutes an important part of the value chain.

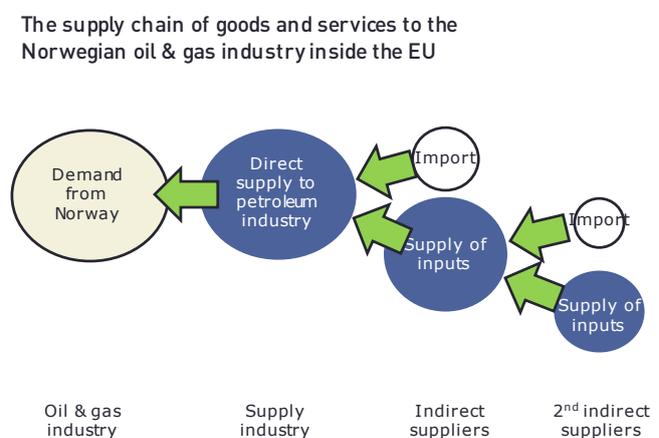
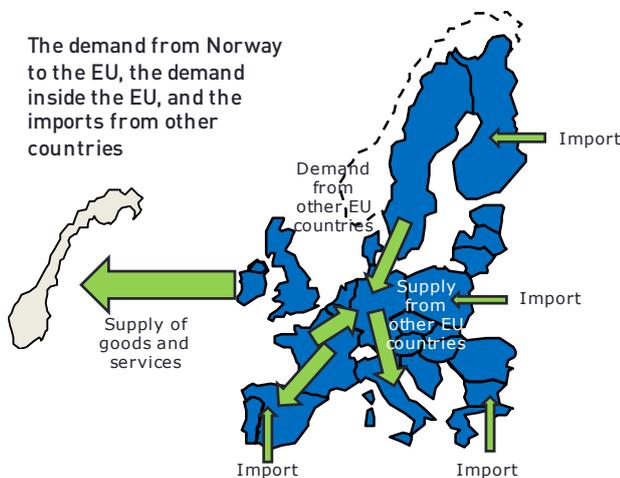


FIGURE 4.1: OVERVIEW OF RIPPLE EFFECTS IN THE EU

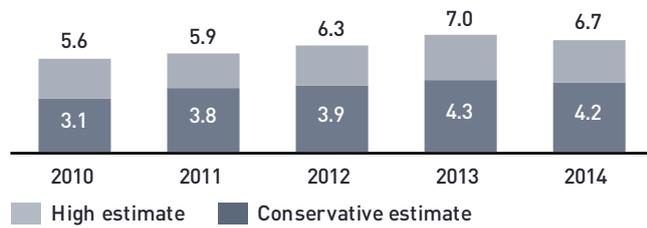


FIGURE 4.2: VALUE CREATION IN THE EU BY YEAR (BILLION EURO₂₀₁₀)
SOURCE: ECON'S EUROMOD

4.2. Value added and employment

The demand for goods and services from the NCS leads to substantial economic activity and value creation in the EU. In Figure 4.2 the total impact on the EU's GDP is seen. The conservative estimate shows that the annual value added is increasing to over 4 billion EURO in the period, while the high estimate shows around 7 billion EURO in 2014.

Not only does the Norwegian oil & gas industry lead to substantial value creation ripple effects, but many EU citizens are employed by the demand from the NCS and Norway. In Figure 4.3 the employment effect by industry is presented. The figure shows that the demand from Norway employs almost 80 000 people (conservative) or around 123 000 people (high). The service and manufacturing industries experienced the most effect with 39 000 and 15 000 employees respectively (conservative).

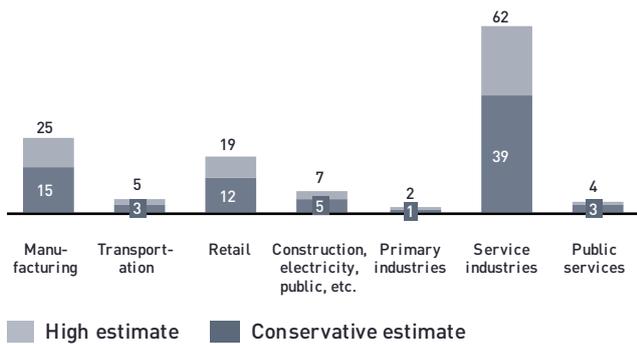


FIGURE 4.3: 2014 EMPLOYMENT EFFECTS, BY SECTOR ('000 JOBS)
SOURCE: ECON'S EUROMOD.



5. FORECAST

The larger oil and gas fields on the NCS will produce oil and gas into the last half of the 21st century. Until now, 47 percent of the total reserves and resources have been produced, while around 20 percent is booked as reserves in producing fields. In addition, 20 percent of the total reserve and resource base is estimated to be yet-to-find resources. The Norwegian oil and gas industry will therefore continue to be a site for EU E&P companies and to demand goods and services from the EU Supply Companies. In this section, ECON analyses how the future looks like for the NCS oil and gas activity.

5.1.1 High NCS production into the 2020s

According to the newest production profiles published by the Norwegian Petroleum Directorate, the shelf will continue to produce oil and gas at a high level into the 2020s. ECON has used three different production profiles (fig. 5.1). In the NPD data, the low scenario corresponds to current fields in production; central scenario has in addition production from proven discoveries, and high scenario, production from yet-to-find resources. ECON assumes that these scenarios reflect a fair estimate of the production range in these years, although each scenario may integrate only part of the expected future production from existing field together with developments of proven and yet-to-find discoveries.

Figure 5.1 shows that in the central scenario, production on the NCS is stable into the mid-2020s, when a smaller decline is expected. In the high scenario, production from yet-to-be discovered resources reduces the decline substantially at the end of the 2020s. In the low scenario, however, production experiences a stable reduction as of 2019, down to a substantially lower production than the central case in 2030.

According to Figure 5.1, production in 2030 is estimated to be around 1000 (central), 1300 (high), and 750 (low) mmbœ. This represents 76%, 94%, and 54% of the 2014 production. The production forecasts signal that the market for providing goods and services to the oil & gas industry on the NCS will continue to be large also in the longer-term.

The oil price has a substantial impact on the willingness and ability to invest in the oil and gas industry. Each of the production scenarios are underpinned by different price forecasts. ECON believes that the levels for long term oil price necessary to justify the different production profiles scenarios is approximately 70 USD/bbl (central), 90 USD/bbl (high), 50 USD/bbl (low).

5.1.2. NCS Investments

In order to continue the stable production on the NCS, investments on fields and discoveries need to remain high. In Figure 5.2, the forecasts for the three production scenarios are shown. The figure shows that although the 2012-14 period signifies a peak in the investments on the NCS, it is likely that the investments will remain at a relatively high level also in the mid- to long-term.

Figure 5.2 shows that in the central case, the investments stay at around 18 billion EURO until the mid-2020s. In the low case, the number of developments will diminish rapidly. Thus, investments required to support the low production scenario are substantially lower than for the central case.

Also, the cost level in the oil and gas industry is partially correlated to the oil price. For instance, a higher oil price goes often with higher unit costs.

For the investments, ECON produces annually bottom-up estimates five years into the future (2016-2020). The 2021-2030 forecasts are based on the NPD expected production profiles.

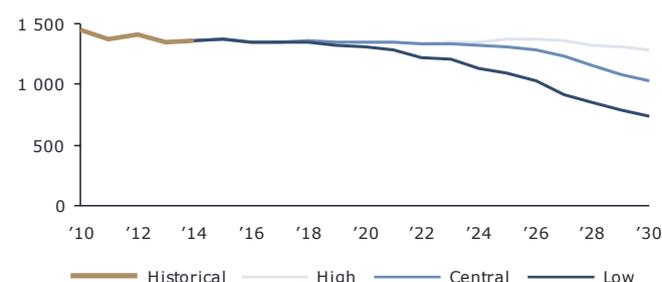
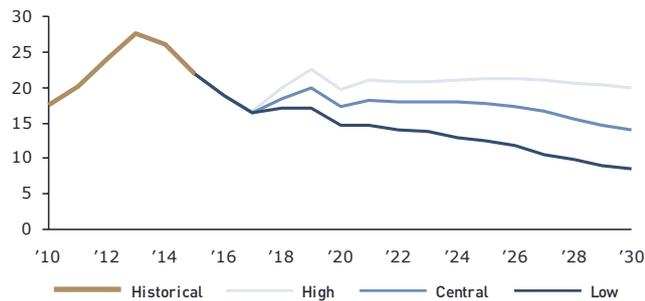


FIGURE 5.1: EXPECTED FUTURE NCS PRODUCTION, 3 SCENARIOS (MMBOE)

SOURCE: NPD



5.2: EXPECTED NCS INVESTMENTS, 3 SCENARIOS (BILLION EURO₂₀₁₆)
SOURCE: ECON.

5.1.3. NCS operational expenses (OPEX)

The operational expenses on the NCS vary with the production scenarios. With more fields (central and high production scenarios), the operational expenses increase, all other factors equal.

In Figure 5.3, three OPEX cases are shown, one per production scenario. For the medium term (2016-2020) we have used NPD's OPEX estimates. After 2020, ECON has estimated the future OPEX on the NCS according to the 3 production scenarios.

The OPEX forecasts are related to the production profiles, meaning that a higher production leads to higher OPEX forecasts. As with investments, ECON believes that the long-term oil price affects the cost level in the oil and gas industry. Thus, the OPEX for the high/low cases is substantially higher/lower than the central case. In 2030, the OPEX is estimated to be 7.5/4 billion Euro.



FIGURE 5.3: EXPECTED FUTURE NCS OPEX (BILLION EURO₂₀₁₆)
SOURCE: NPD, ECON.

5.2. How will the future activity on the NCS translate into economic activity, value creation and employment in the EU countries?

The activity level on the NCS will stay high and vibrant in the long-term. This will have consequences for EU E&P companies and EU Supply Companies on the NCS. In this section, ECON analyses the volumes of goods and services that EU Supply Companies may provide to the NCS provided they are able to keep their market shares going forward. ECON also estimates the ripple effects in terms of value creation and employment in the EU countries.

5.2.1. Sales of goods and services from EU Companies

Investments and operational expenses on the NCS means a large market for EU Supply Companies also in the future. In Figure 5.4, estimates for goods and services provided by EU Supply Companies are shown. The estimates are based on the methodology used in chapter 3. The figures in this section take the middle-ground between the conservative and the high case as the basis for the estimates.

In the central case, the EU Supply Companies provide goods and services valued more than 4 billion Euro₂₀₁₆ per year. In the high case, the value exceeds 5 billion annually. In the low case, the EU countries should still experience around 3 billion Euro in economic activity in 2020, and slightly over 2 billion Euro in 2030.

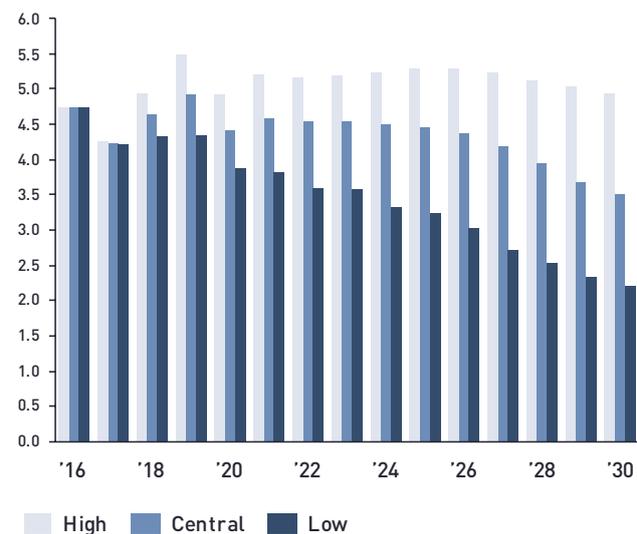


FIGURE 5.4: SALES OF GOODS AND SERVICES FROM COMPANIES WITHIN THE EU COUNTRIES TO NORWAY (BILLION EURO₂₀₁₆)
SOURCE: ECON.

5.2.2. Value creation and employment effects

The value creation in EU countries of the economic activity related to providing goods and services to the NCS by EU Supply Companies is substantial in the longer-term. In addition, the demand from the NCS has significant impact on the employment of EU citizens.

Figure 5.5 shows that the value creation in the EU countries will remain around 4 billion EURO in the mid-term, and be reduced to around 3 billion EURO in 2030 (central case). In the high case, the value creation in the EU countries will be over 4 billion per year in the analysis period.

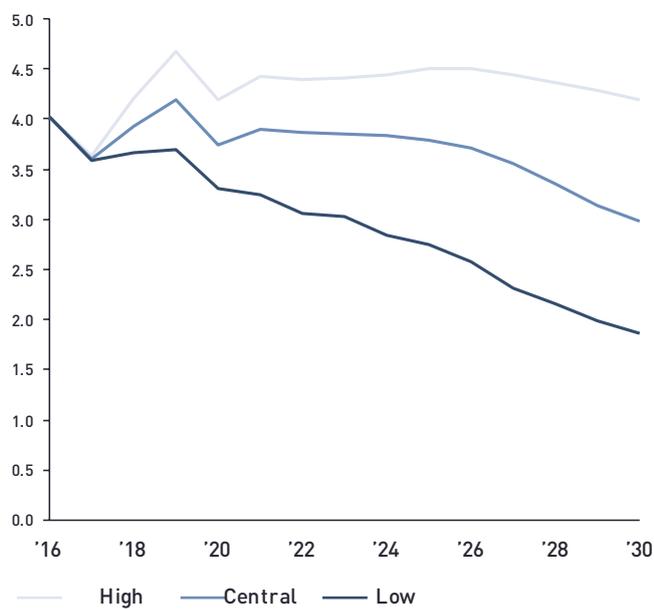


FIGURE 5.5: VALUE CREATION IN THE EU BY YEAR (BILLION EURO₂₀₁₆)
SOURCE: ECON'S EUROMOD

In Figure 5.6, the employment effects of the economic activity in the EU countries is around 70 000 jobs until the mid-2020s. While the economic activity will be somewhat reduced after the mid-2020s, over 50 000 jobs in the EU countries will be related to the NCS oil and gas value chain in 2030 (central case).

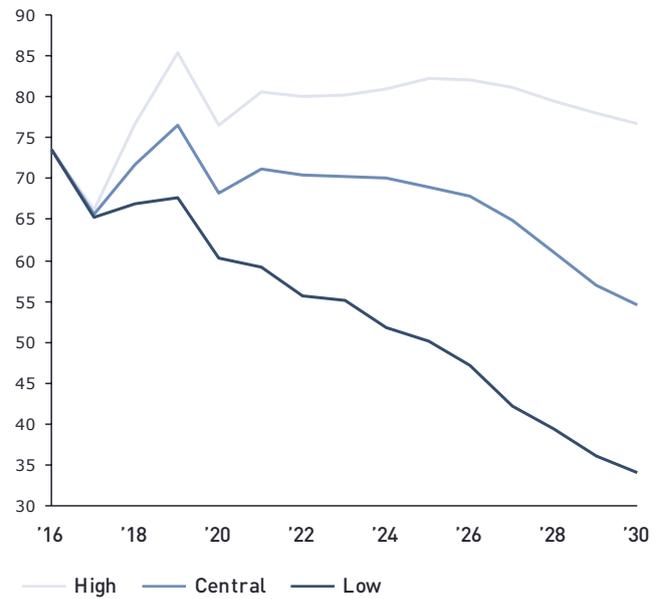


FIGURE 5.6: EXPECTED EMPLOYMENT EFFECT ('000 JOBS)
SOURCE: ECON'S EUROMOD

6. PARTNERSHIPS BEYOND THE OIL AND GAS INDUSTRY

It is important to underline that the partnership between European Union and the Norwegian oil and gas industry is not only limited to EU E&P and Supply Companies. Indeed, several other types of European organisations have a stake in the NCS. In particular, strong links exist between the NCS and European institutions involved in research and academia.

One example of this type of collaboration is IFP Energies nouvelles (IFPEN), a French public-sector research, innovation and training centre active in the fields of energy, transport and the environment. IFPEN has been present since the start of petroleum activities in Norway and is an active partner of the French-Norwegian Foundation established in 1983, which it currently chairs.

Recently, IFPEN entered into a 4-year Framework Agreement with Statoil in research and development related to petroleum activities, in areas such as environmental technologies, petroleum geology and geophysics, enhanced petroleum recovery, drilling and intervention, processing and transport, deep water and subsea production technologies, gas technologies and renewable energies.

Development of polymer flooding EOR, which represents a strategic topic for Statoil, has been the main focus during the last 2 years. Both Statoil and IFPEN consider this collaboration very fruitful and have the objective to explore new topics for R&D cooperation in 2016 .

The R&D agreement was accompanied by an arrangement with IFP School, which guarantees financial support to the school's development and grants to a number of students. Statoil's contribution also includes the provision of real data to the IFP School which is used to develop well documented case studies and contribute to student learning. This agreement is one of several Statoil Academia Agreements, which also includes the Imperial College in London (UK).



APPENDIX 1: RIPPLE EFFECT METHODOLOGY

The Norwegian oil & gas industry demands a diverse range of goods and services from EU Supply Companies. The producers of these goods and services need also inputs from other companies to satisfy the demand from Norway. The supply chain of goods and services to Norway involves many companies, many more than those companies supplying the Norwegian oil & gas industry directly. The supply of goods and services to Norway leads to larger economic activity and higher employment inside the EU. Therefore Norwegian demand creates large economic ripple effect within EU.

A.1.1. Ripple effects

The production of goods and services to the Norwegian oil & gas industry, whether being supported from the mother E&P company (e.g. TOTAL in France), or a supply company producing goods and services in the EU (e.g. Siemens in Germany), contribute to more economic activity in the EU countries. As no businesses produce all inputs to their goods and service delivery in-house, a supply company or an E&P company will demand products from other businesses. This indirect provision of goods and services initiated by the demand from the Norwegian oil & gas industry plays a key role in the total value contribution of NCS activities. Such indirect demand is termed ripple effects.

Ripple effects are the direct and indirect effects on economic activity and value creation from an investment or continued operations in one industry. If, for instance, an E&P company purchases a production installation from an EU company, the ripple effects is substantial as this supplier of the production installations needs inputs like steel, tools, machines, etc. The supplier also needs lawyers, accounting services and cleaning services. In addition, the producers of the inputs to the supply company will also need other inputs to its own production.

EUROSTAT provides input-output tables following standard international rules on national accounting. These input-output tables are for the whole of the EU. The advantage with these are that we then are able to see which industries are producing what type of products, and again what type of products these industries need as inputs for their production. Since EUROSTAT tables are for the EU as a whole, they are actually accounting for imports from countries not part of the EU area. Such imports from outside the EU is not interesting for calculation of value creation and employment effects.

A.1.2. Definition of value creation

In studies of ripple effects, it is normal to take as a starting point the definition of value creation in the international standards of national accounts. Here, national value creation partakes in the equation of what production constitutes:

$$\text{Production} = \text{product (value creation)} + \text{input} + \text{import}.$$

Input is the production of the companies supplying the producing firm:

$$\text{Input} = \text{product (value creation)} + \text{input} + \text{import}.$$

For the EU, import is not the sum of EU nations' import, but the import of goods and services from outside the EU countries. For this study it is not a matter whether Germany imports goods and services from France or the Netherlands, but rather if the products demanded by EU companies are provided from within the EU or imported from outside of the EU.

The EU members states constitute a large economy with a very complex economic structure. This means that the EU countries together are able to produce most products within the EU. The import of goods and services as a share of total GDP is very low. This is supported by studies on economies complexity, where many of the EU member states alone is fairly complex (Hausmann, R., Hidalgo, C. A. et al. (2008)).

When a country is economically complex, it means that the country is able to produce a wide range of products and in many cases rare products that other economies are not able to. Taken together, the EU is therefore a very complex economy, with less need to import from the outside.

The input to suppliers are calculated in 7 segments. This means that we have analysed the production of the initial

goods and services delivered from the EU either directly to the Norwegian oil & gas industry or through Norwegian subsidiaries in addition to 6 more segments in the supply chain of products to the Norwegian oil & gas industry.

Value creation in the EU from the delivery of goods and services to Norway is the sum of product/value creation in each turn of the value chain:

$$\text{Value creation in the EU} = \Sigma \text{Product}$$

In the whole value chain (defined here as maximum 7 segments).

A.1.3. Employment effects

In this section the methodology for the calculation of employment effects is outlined. The production of goods and services to satisfy the initial demand from Norway along the value chain leads in the EU to substantial labour demand. The labour is needed in the production in a large variety of companies and is used in a whole range of tasks.

The employment effect of demand from Norway is based on the value creation and number of employees in each industry in the EU. Since the value creation per employee differ significantly between the EU member countries, it has been necessary to use estimates from a core group of highly productive countries. This means that the employment effects are conservative. Germany, France, Italy and the UK are used to estimate the employment effects.



APPENDIX 2: VALUE CREATION IN THE SUPPLIER INDUSTRY

As noted in Appendix 1, value creation in the EU from the delivery of goods and services to Norway is the sum of product/value creation. In this study, ECON used three main methodologies in order to as accurately as possible identify the value creation, and in turn the number of jobs created, for the EU countries derived from the oil & gas supply industry on the NCS.

EU companies play an integrated and important role by providing goods and services demanded by the Norwegian oil & gas industry. The demand is met either by Norwegian subsidiaries (indirect supply) or by direct supply from Europe. In this study, EU companies are defined as companies with their headquarters located in the EU and/or are stock listed in an EU country.

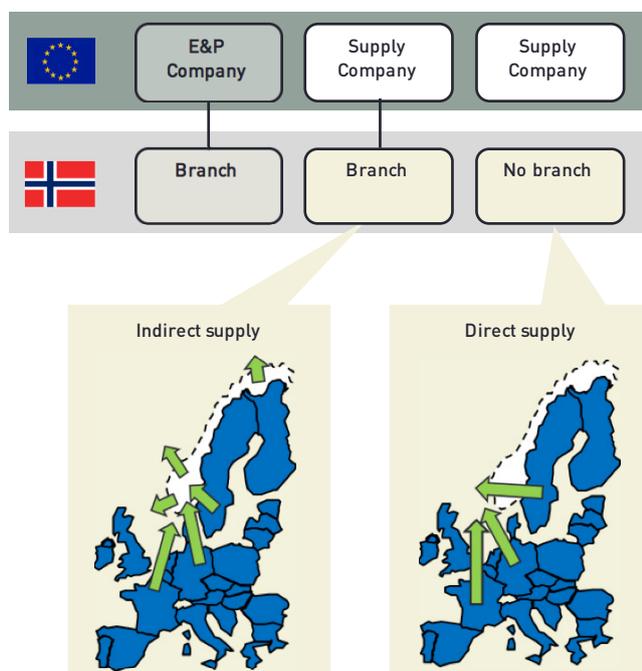


FIGURE A.2.1: INDIRECT & DIRECT SUPPLY OF GOODS AND SERVICES

A.2.1 Quantifying indirect value creation

All companies based in Norway file annual accounts for their year-to-year operations, publicly available through the Brønnøysund Register Centre, a government body under The Ministry of Trade, Industry and Fisheries.

In order to quantify the indirect supply of value creation for EU countries, ECON extracts the 2010-12 annual accounts for all Norwegian subsidiaries of EU companies in order to identify the revenues and the internal supply from the EU companies to their Norwegian subsidiaries. As companies tend to serve more than one industry, a company dependent coefficient is applied in order to extract the data that relates to their oil & gas operations. For the largest companies active on the NCS, this coefficient was identified through direct contact with the different companies.

Please note that given the fact that multinational companies may manipulate the timing and magnitude of taxable profits, after tax profits were not considered a good variable for quantifying indirect value creation.

A.2.1.2 Extracting internal supply

Internal supply of goods and services is a mean of significant value creation for EU companies. However, Norwegian accounting standards does not specify a standardized way for companies on the NCS to post internal supplies. Current bookkeeping principles vary between listing the internal supply under *cost of goods sold (COGS)* or *other operating expenses (OOE)*.

ECON's methodology for extracting the internal supply is based on the relative size to COGS compared to OOE. There was used three different mechanism for extracting the internal supply:

a. If both COGS and OOE are of significant size, COGS are defined as the internal supply. However, a certain proportion* of COGS are subtracted and defined as COGSNCS-operations.

*Coefficient defined as $(COGS/(COGS+OOE))*0,5$ under b)

b. If OOE are significant relative to COGS, OOE are defined as the internal supply. However, a certain proportion* of OOE are subtracted and defined as actual OOENCS-operations.

*Coefficient defined as $(OOE/(COGS+OOE))*0,5$ under c)

c. If COGS are significant relative to OOE, COGS are defined as the internal supply. However, a certain proportion* of COGS are subtracted and defined as actual COGSNCS-operations.

*Coefficient defined as $(OOE/(COGS+OOE))*0,5$ under b)

A.2.2 Quantifying direct supply

There does not exist any official records in which goods and services supplied directly to the NCS from EU are listed. Being able to quantify direct supply from the EU to the NCS, ECON has used Statoil's official procurement data.

Given the procurement figures, it is estimated that STL's share of procurement sourced from the EU is at the same relative size as their OPEX & CAPEX share on the NCS.

APPENDIX 3: ABBREVIATIONS AND DEFINITIONS

bcm	billion cubic meters
bcm/y	billion cubic meters per year
CAPEX	Capital Expenditures
E&P	Exploration and Production (of hydrocarbons)
EEH	Environment Hub
oil & gas industry	Industry involved in identification of, development of and extraction of petroleum
EU	European Union
EU E&P Company	Company or group of companies that is mainly active in Norway in the E&P, being partner or operator of Production Licence on the NCS, and that is headquartered in the EU or controlled by EU shareholders
EU Supply Company	In the context of this report, a company or a group of companies that is mainly active in Norway in the Supply industry and that is headquartered in the EU or controlled by EU shareholders
GDP	Gross Domestic Product
LNG	liquefied natural gas
mmboe	million barrels of oil equivalent
mmboe/d	million barrels of oil equivalent per day
mother company	In the context of this report, company or group of companies that has a direct or indirect control over the company initially mentioned, or that are directly or indirectly controlled by the same ultimate company or group of companies
NCS	Norwegian Continental Shelf
NPD	Norwegian Petroleum Directorate
NOK	Norwegian krone
NOROG	Norwegian Oil & Gas Association
OPEX	Operating Expenditures
NPD resource categories:	
Res. Cat 1	Reserves in production.
Res. Cat 2	Reserves in fields for which a Plan for Development and Operations has been approved by the Norwegian authorities.
Res. Cat 3	Volumes that partners have decided to develop (awaiting authorities approval).
Res. Cat 4	Volumes that partners are assessing for development (planning phase).
Res. Cat 5	Volumes that recovery is likely, but not clarified.
Res. Cat 6	Volumes not economic for development or production at the time of the assessment.
Res. Cat 7	Potential new volumes (discoveries, increased recovery).
SSB	Statistisk Sentralbyrå or Norwegian Central Bureau of Statistics or Statistics Norway
Supply industry	In the context of this report, the industry involved in supplying goods and services to the oil & gas industry



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ECON Consulting Group AS is an independent advisory and consulting group specialized in economics, finance and industry focusing on oil & gas, with offices in Stavanger and Oslo. We provide advisory, analysis and models for extractive industries and extractive industry investors, as well as strategy and market design for governments within the extractive sectors.

With roots back to 2005, ECON Consulting Group AS is a consultancy that delivers quantitative and qualitative insights into the commercial and regulatory aspects of the oil and gas and mining industries. Having extensive expertise originating from processes and projects on the Norwegian Continental Shelf, ECON benefits from a close collaboration with E&P players, financial institutions and government entities in Norway and internationally.

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TECHNOLOGY TRANSFER FROM THE NORWEGIAN OIL AND GAS INDUSTRY

FUTURE POTENTIAL FOR EUROPEAN INDUSTRY DEVELOPMENT



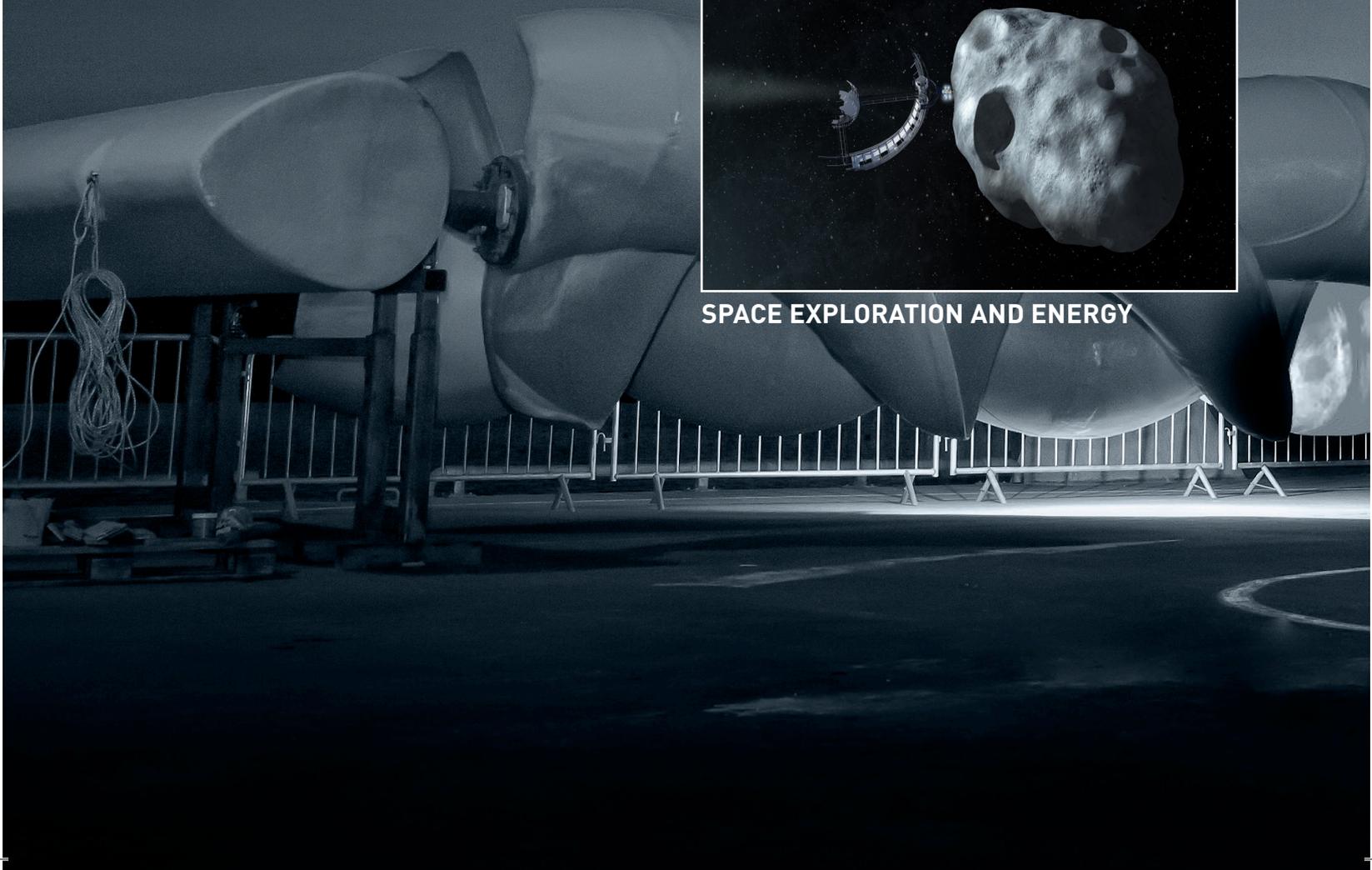
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