



THE PARTNERSHIP BETWEEN THE NORWEGIAN OIL & GAS INDUSTRY AND THE EU COUNTRIES

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***COMMISSIONED BY
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MANAGEMENT CONSULTING

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0. Executive Summary

ECON Management Consulting has been engaged by the Norwegian Oil & Gas Association to assess the economic value 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 revenues and employment.

The oil and gas industry, comprising the E&P companies (Oil and Gas Exploration & Production) and the supply industry is a key sector in terms of value creation and employment for both Norway and the EU. The strength of the European oil and gas industry, its geographical proximity to Norway and the inclusion of Norway in the European Economic Area have made EU the main partner to Norway's oil and gas activities. The European supply industry has highly benefited from this, both in terms of revenues and development of cutting-edge technology, which is globally competitive.

More than 140 EU companies are active in both the E&P industry and in the supply of products and services to the Norwegian E&P industry. This activity provides large revenues and profits for these companies. The Norwegian E&P industry follow high standards for health, safety and the environment, making the Norwegian Continental Shelf the lowest CO₂ emitter of all oil and gas producing regions.

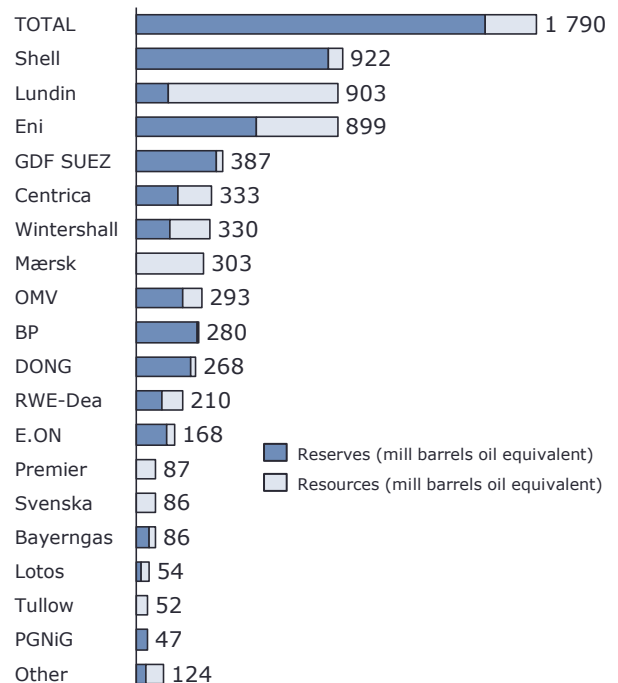
Norway is a stable and secure supplier of oil and gas to the European market. In 2013, 92% of oil exports and more than 98% of gas exports from the Norwegian Continental Shelf (NCS) went to EU countries. Norwegian gas represents one fourth of total EU gas consumption.

EU E&P companies are very active on the NCS where they currently control around 25% of reserves (>4950 mmboe) and more than 40% of discovered resources (>2700 mmboe) (fig. 1). In the years 2010-12 the EU E&P companies had total revenues from the NCS of more than 54.5 billion EURO and after tax profits of more than 9.3 billion EURO. The NCS is an important area for EU E&P companies and Norway benefits from their investments and operations.

ECON Management Consulting 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 4.6 and 7.3 billion EURO (fig. 2).

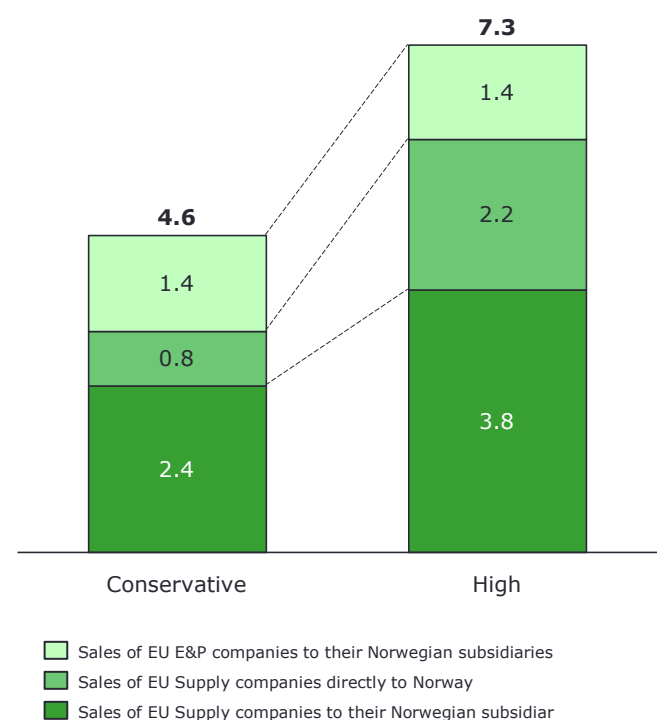
Finally, the strong involvement of EU companies, both in E&P and in supply of goods and services, leads to a value creation in the EU estimated from 4 to 6 billion EURO. The impact on EU employment ranges between 70 000 and 110 000 jobs.

Figure 1: Reserve and resource overview as of 1.1.2014 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 EURO₂₀₁₄)



Source: ECON Management Consulting estimates

1.1. Project introduction

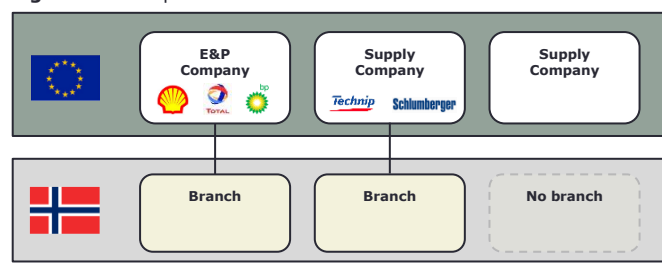
The Norwegian oil & gas industry requires a variety of input to its exploration, field developments and production activities. Goods and services exceeding 30 billion EURO annually are supplied to this industry. The industrial involvement of EU companies in the Norwegian oil & gas industry is substantial. 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:

- EU E&P Companies;
- EU Supply Companies with a branch in Norway;
- 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

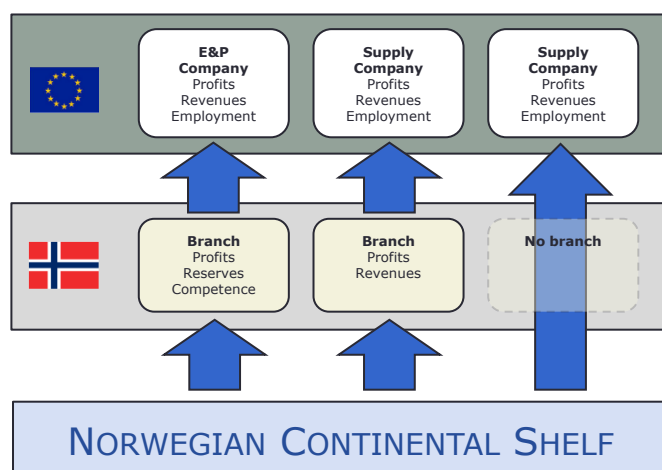


Figure 1.2 shows the various direct value contributions from the Norwegian oil & gas industry. E&P companies gain profits, reserves and build competence through their operations in Norway. The Norwegian subsidiaries of EU Supply Companies provide profits and revenues to their mother company. These Norwegian 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

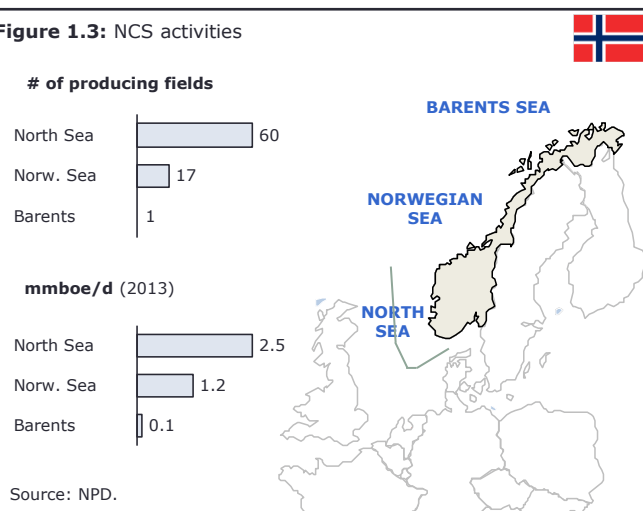
Companies' proprietary data (anonymized)

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

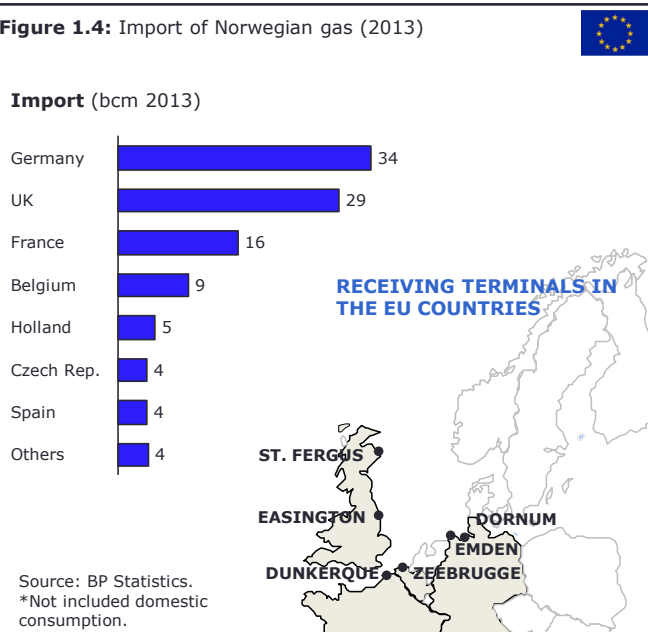
Norway produces oil & gas from its continental shelf (NCS). The first production took place with the discovery and development of the Ekofisk field in 1969 and 1971 respectively. Today, there are fields in production in all Norwegian seas: the North Sea, the Norwegian Sea and the Barents Sea (see Figure 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



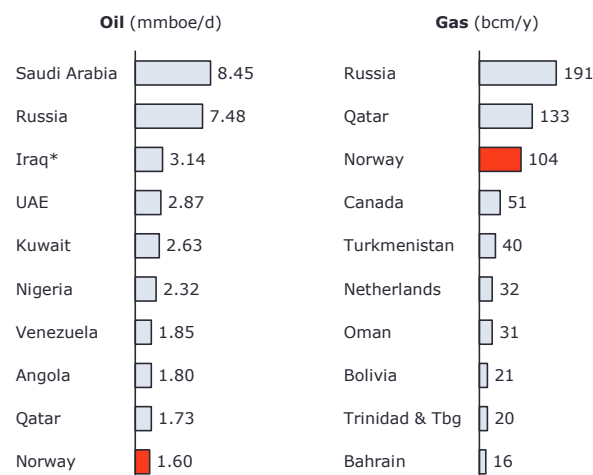
On the NCS, an extensive gas pipeline system has been developed. The gas infrastructure includes six receiving terminals in the EU: St. Fergus and Easington in the UK, Dunkerque in France, Zeebrugge in Belgium, Emden and Dornum in Germany. The maximum export capacity is around 130 bcm/year. In Figure 1.4 the receiving countries are shown. Germany and the UK are the largest importers of Norwegian natural gas.

Figure 1.4: Import of Norwegian gas (2013)



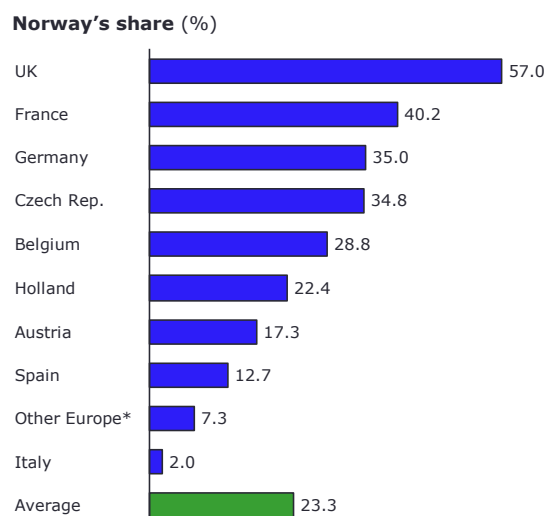
In Figure 1.5 Norway's position among the largest net exporters of petroleum is shown. Norway is the 10th largest oil exporter in the world. At the same time, Norway is the 3rd largest gas exporter. Norway's small domestic consumption of oil & gas production affects the net export relative to the other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

Figure 1.5: Norway's export position (2013)



Norwegian gas plays a major part in the supply of natural gas to the EU member states. In Figure 1.6 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 1.6 is 23 percent. The other main sources to natural gas in NW Europe is domestic supply, North African and Russian natural gas.

Figure 1.6: Share of Norwegian gas in EU countries gas supply (2013)



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

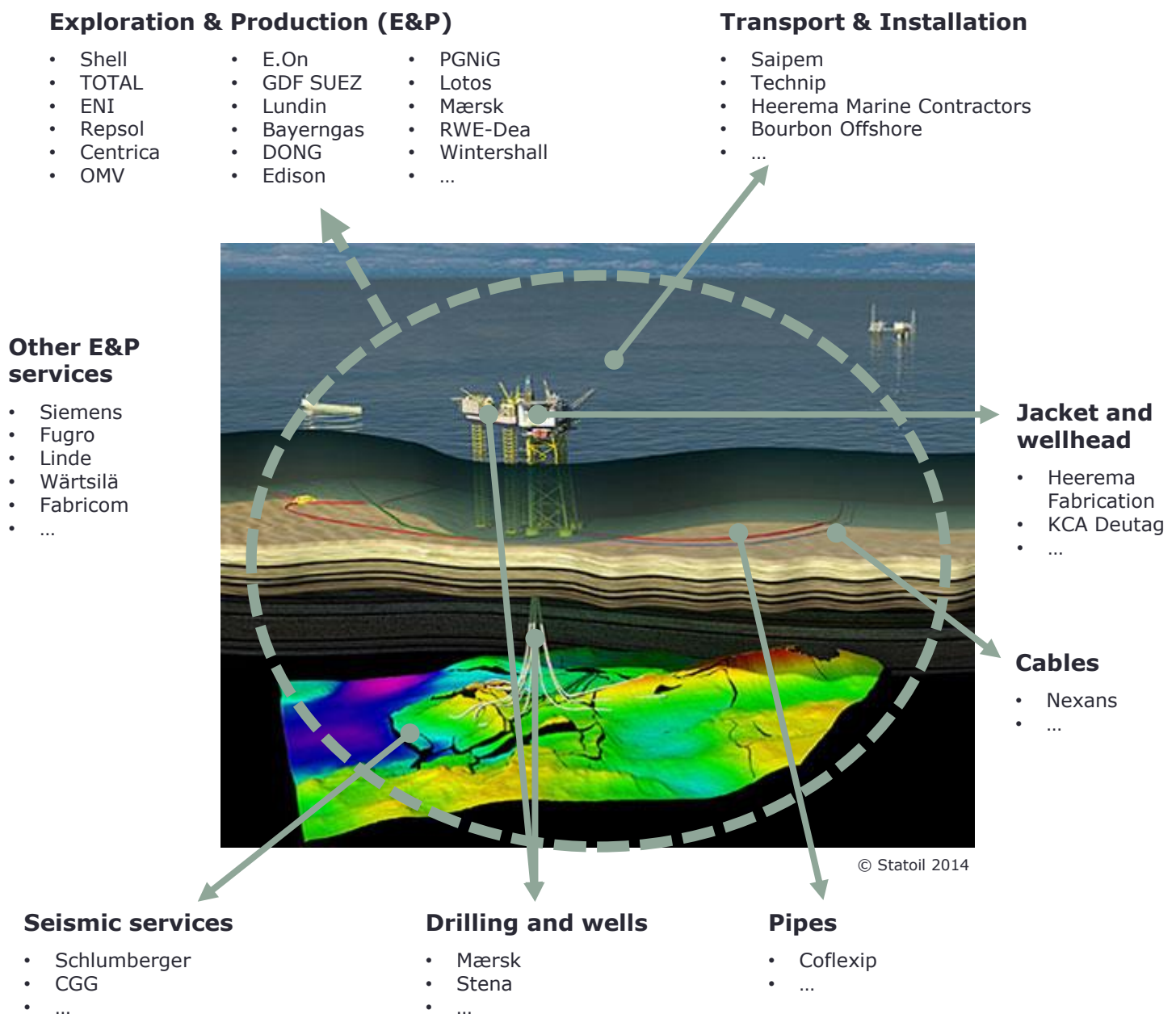
Even minor Norwegian Continental Shelf oil & gas projects can be compared with large industrial investments and significant amounts are invested in exploration, field development, transport infrastructure and onshore facilities. Substantial investments are also being made in existing fields in order 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, technically speaking one of the most advanced in the world, is highly beneficial for both parties. The high standard requirements have led the Norwegian oil & gas industry to develop and adopt innovative solutions that are now used all over the world.

Norwegian regulations have promoted high Health, Security and Environment standards in all industries, and especially in the oil & gas industry. Norwegian authorities and petroleum companies are very strict on the application of HSE rules offshore in collaboration with employees' organizations. That makes the NCS activity a very safe and clean industry.

Figure 1.7: Examples of EU companies participating to the E&P activities on the NCS



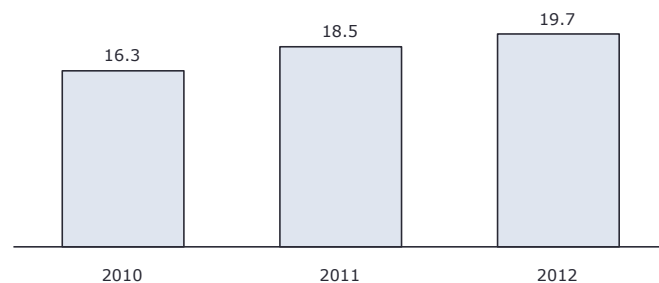
2.1. In 2010-2012 EU E&P Companies' activity on the NCS generated revenues of 54.5 billion EURO and profits of 9.3 billion EURO

The EU E&P Companies have a significant presence on the NCS. The Norwegian subsidiaries generate valuable revenues and cash flow to their mother companies. Additionally, they gain experience that can bring synergies to other parts of their portfolio, in particular competence regarding offshore petroleum activities. On the other hand, Norway benefits heavily from the investments, operations and the international experience the EU E&P Companies bring along.

2.1.1 Revenues of 19.7 billion EURO in 2012

In the years 2010-2012 the EU E&P Companies operating on the NCS had total revenues of approximately 54.5 billion EURO₂₀₁₄.

Figure 2.1: EU E&P Companies annual revenues (billion EURO₂₀₁₄)

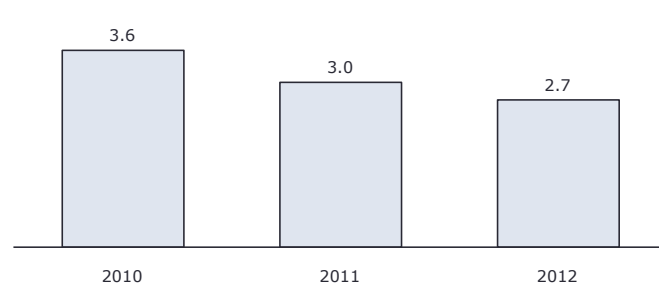


Source: The Brønnøysund Register Centre, RavnInfo

2.1.2 After tax profits of 9.4 billion EURO 2010-12

Figure 2.2 shows that the after tax profits for the EU E&P Companies accumulated to 9.4 billion EURO₂₀₁₄ in the years 2010-2012.

Figure 2.2: Annual after tax profits (billion EURO₂₀₁₄)



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 mid-2014, there are 26 EU E&P Companies operating 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 active 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. The NCS experienced in particular an influx around mid-2000s of EU E&P Companies that traditionally had focused on downstream activities, thereby large corporations like E.ON, Centrica and GDF SUEZ.

Figure 2.3: Largest players by revenues 2010-2012 (billion EURO₂₀₁₄)

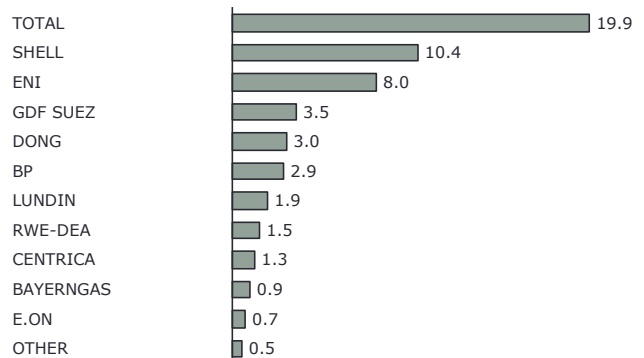
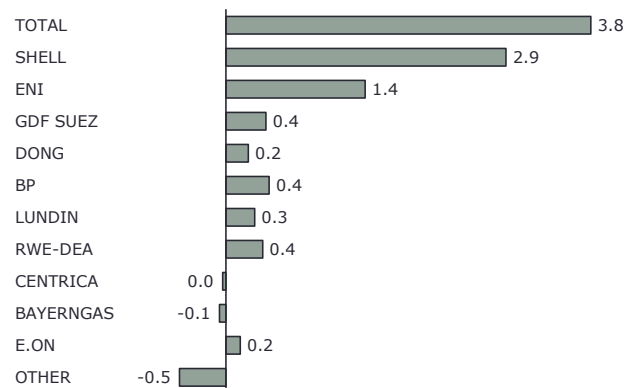


Figure 2.4: Profit among the largest EU companies 2010-2012 (billion EURO₂₀₁₄)

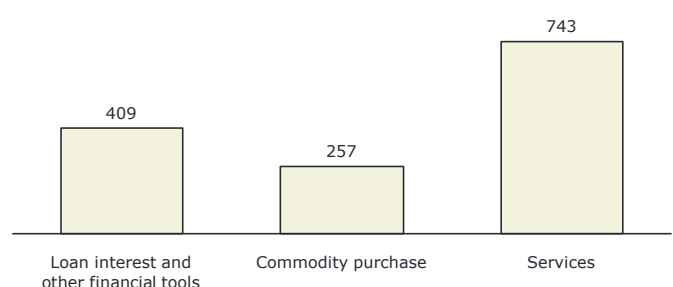


Source: The Brønnøysund Register Centre, RavnInfo

2.1.4 Norwegian E&P subsidiaries spend annually more than 1.4 billion EURO in favour of EU mother companies

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: 2013 flows from Norwegian E&P subsidiaries to mother companies in EU (million EURO₂₀₁₄)



Source: Norwegian E&P subsidiaries of EU E&P companies, annual reports

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 (~4950 mmboe), NPD resource category 1-3, and more than 40% of discovered resources (~2700 mmboe), NPD resource category 4-7, on the NCS.

TOTAL is the most significant EU E&P Company in terms of reserves and resources with Shell, Lundin and ENI taking the next places. These four companies account for 59% 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 all lies in reserves and resources, that represent their 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 revenue flow.

2.2.2 Have shares in 85% of the licenses and are involved in all ongoing developments

As of 1.1.2014, there were 506 active licenses on the NCS and EU E&P Companies had shares in 438 of these licenses (86%). TOTAL is by far the player with most licenses among the companies, with an ownership in 103 (20%) licenses. ENI and Lundin rank number 2 and 3 in terms of licenses, both having interests in more than 10% of the NCS licenses with respectively 58 and 55 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 2.4: Reserve and resource overview 1.1.2014 for the EU E&P Companies (mmboe)

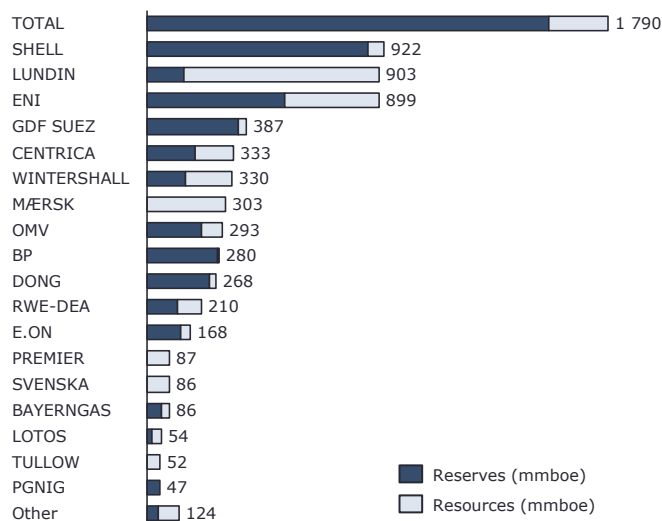


Figure 2.5: Number of licenses held by EU E&P Companies 1.1.2014 and the status of the licenses

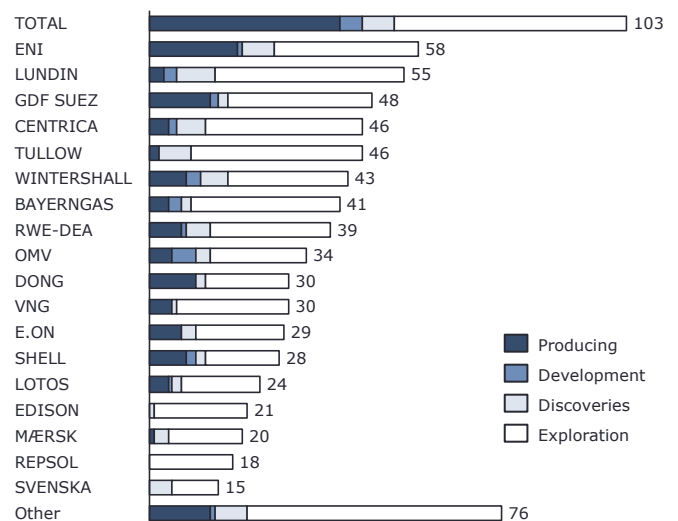
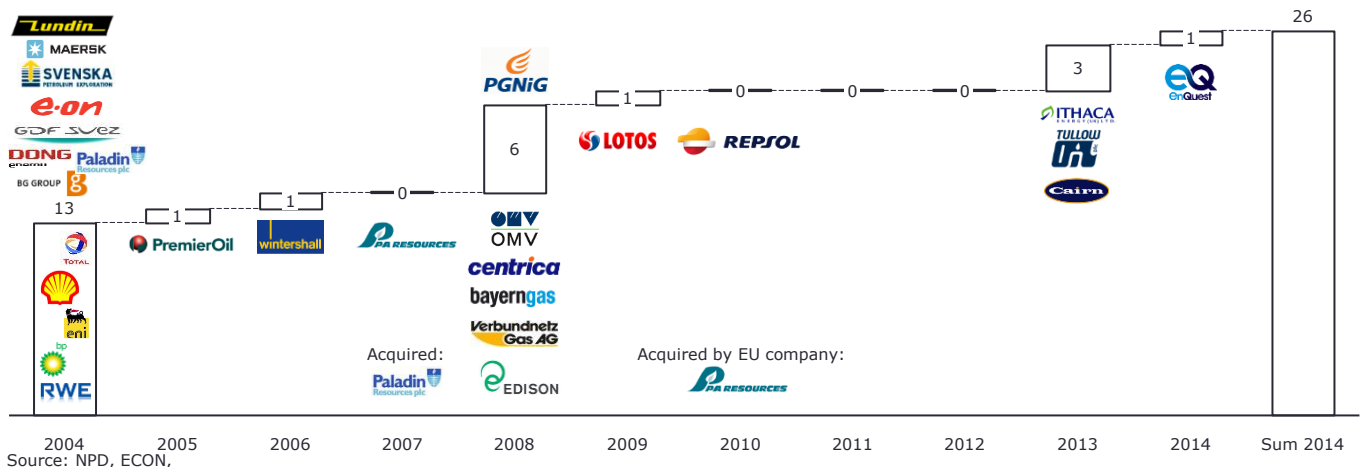


Figure 2.6: The increase in number of EU E&P companies on the NCS since 2004



Source: NPD, ECON,

3.1. The 2010-12 period was characterized by a high activity level in the Norwegian oil & gas industry

The increasing oil prices have 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. 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.

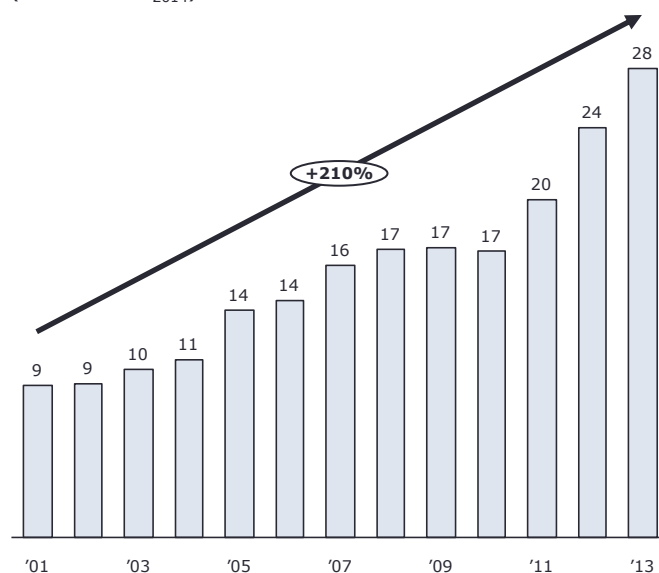
3.1.1. Investments at a high level

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 the investments will be way above 25 billion EURO₂₀₁₄. 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.

Around half of the overall investments on the NCS takes place on producing fields. Work related to maintenance and reparations 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. There are also a number of new field developments, both smaller and larger, exemplified by the large Johan Sverdrup field development.

Figure 3.1: Investments on the NCS, 2000-13 (billion EURO₂₀₁₄)



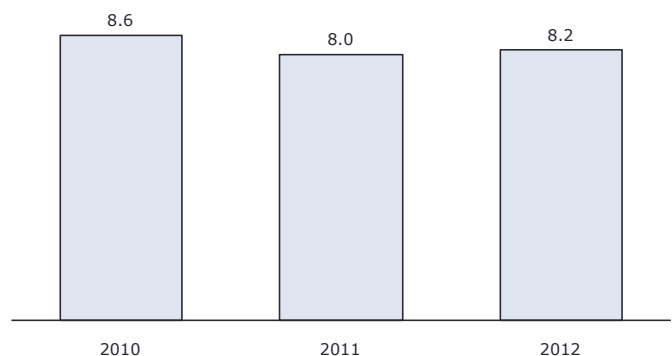
Source: Statistics Norway, ECON.

3.1.2. Operating costs stable around 8 billion EURO annually

The oil & gas industry also needs input for operating 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 operating expenditure will most likely increase also in the future.

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 2010-12 period are shown. The annual costs show some variations, but are rather stable. In the 2010-12 period, the total costs averaged an annual 8.3 billion EURO₂₀₁₄.

Figure 3.2: Operating costs on the NCS, 2010-12 (billion EURO₂₀₁₄)



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 required 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.

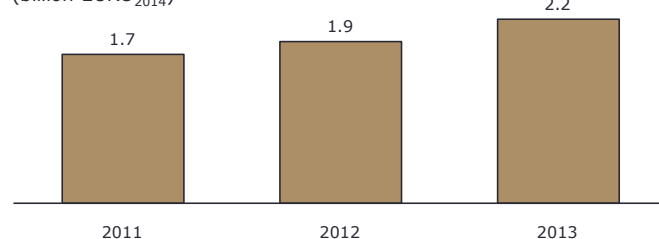
3.2.1. Supply from EU companies to the Norwegian oil & gas industry - methodology

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 available 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 buyer 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 buy from their EU mother companies. The last approach is to look 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 spend and from which countries these suppliers are located. For the years 2011-2013 it is shown that of Statoil's spend in Norway, 6-7% is invoiced from an EU country. If we apply this share to the money spent in the Norwegian oil & gas industry for 2010-12 we see that around 2 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 believes it to be a reasonable assumption that these do to an even higher degree use 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 for this.

Figure 3.3: Estimate of purchase from EU Supply Companies (billion EURO₂₀₁₄)



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 EURO per year. The demand of goods and services to Norwegian subsidiaries is larger however representing over 6 billion EURO in 2012.

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 we visit in the next section.

Figure 3.4: Estimate of purchase from EU Supply Companies (billion EURO₂₀₁₄)

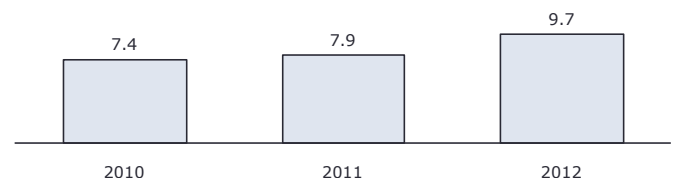


Source: Operator estimate, ECON calculations.

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 2010-12 is shown in Figure 3.5. For 2012 did the EU Supply Companies earn around 10 billion EURO from their petroleum supply operations in Norway. If all of this 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 is neither in line with the data we have received from Statoil for spend 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 most likely because a large share of their total comes from export to other countries globally.

Figure 3.5: Revenues of Norwegian subsidiaries of EU Supply Companies (billion EURO₂₀₁₄)



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 in put 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 4.2 to 5.5 billion EURO₂₀₁₄ during 2010-12.

Figure 3.6: Internal sales to Norwegian subsidiaries from mother EU Supply Company (billion EURO₂₀₁₄)



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 billion EURO in 2012 (Figure 3.3), the results from method 2 (direct purchase) showed an annual purchase of between 0.5 and 1 billion EURO (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

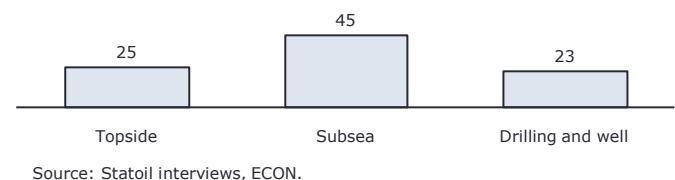
somewhere between these two alternatives. Some companies would easily have built up the competence and knowledge elsewhere. For other companies, however, the presence in Norway has been urgent for the development of a global competitive edge. Early use of new technology, an environment for testing prototypes in a rough offshore environment has led to much 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 mother company. 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 estimate that on topside projects the European share of products and services is around 25 percent of project value, and on subsea developments the European share is more than 45%. The EU share for 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 high however so the overall EU share is around 35 percent. For investment projects therefore the EU share seems higher than the results derived from method 1-3.

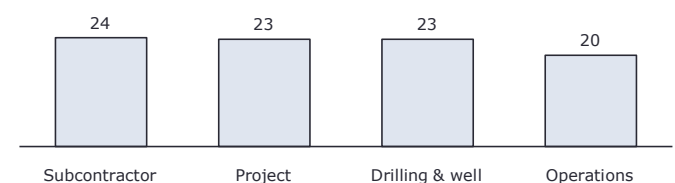
Figure 3.7: Estimated EU companies share in Norwegian E&P investment projects (%)



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 2010-12 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)



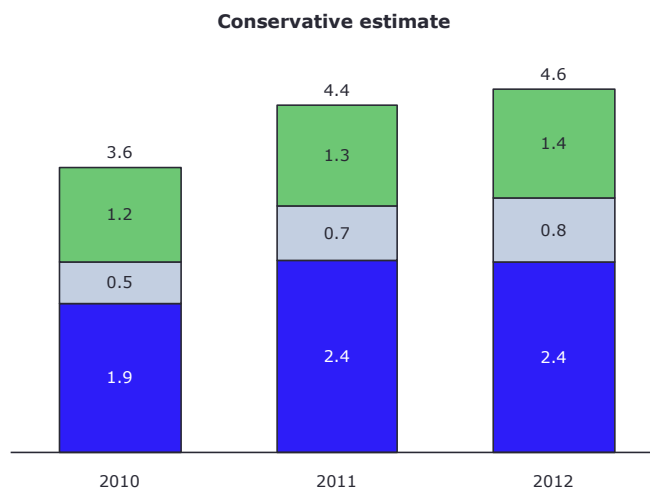
3.3. Summarizing the final results of the estimate of demand for goods and services produced in the EU countries

3.3 Final results – demand for production in EU countries

Chapter 3.2 has 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 where ECON estimates the value creation and employment effects for the EU economies.

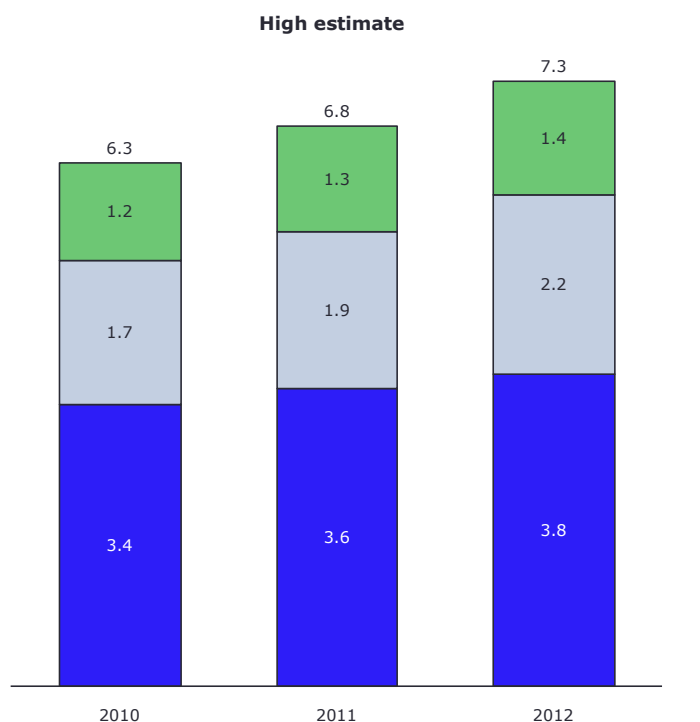
In Figure 3.9, the annual demand from the NCS and Norwegian subsidiaries is shown. The figure is a conservative estimate, in the sense that the supply from Norwegian subsidiaries only include what stems directly from the NCS and that ECON uses method 2 instead of method 1 in identifying demand directly to the EU countries. The purchase of goods and services from EU countries in 2012 was 4.6 billion EURO according to 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. In Figure 3.10, the purchase of goods and services from EU countries is estimated to 7.3 billion EURO.

Figure 3.9: Sales of goods and services from companies within the EU countries to Norway – Conservative estimate (billion EURO₂₀₁₄)



Source: ECON.

Figure 3.10: Sales of goods and services from companies within the EU countries to Norway – High estimate (billion EURO₂₀₁₄)



■ 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 subsidiaries

Source: ECON.

4. The demand for goods and services from the Norwegian oil & gas industry leads to large economic activity and high employment in the EU

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. The ripple effects inside the EU of the demand from Norway is therefore large.

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 and 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 inside the EU.

Figure 4.1 shows a stylized view of how the ripple effects take place inside the EU. 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. 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

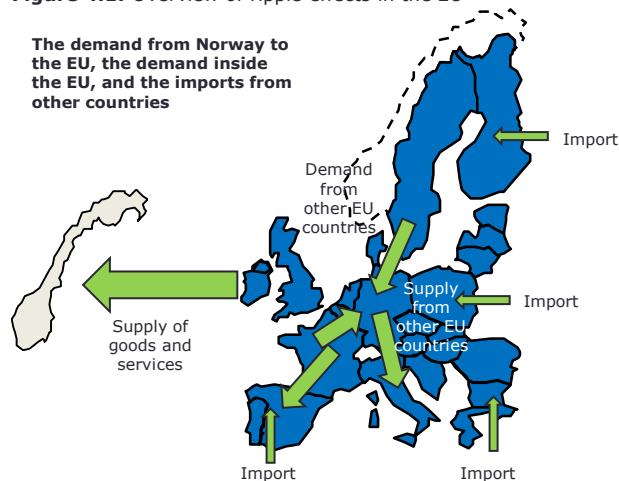
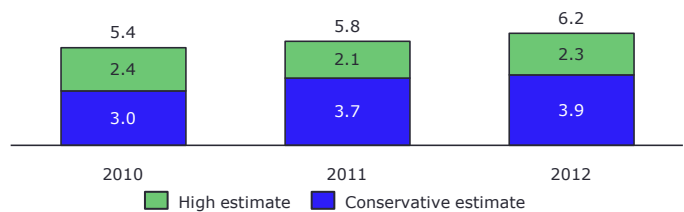


Figure 4.2: Value creation in the EU by year (billion EURO₂₀₁₄)



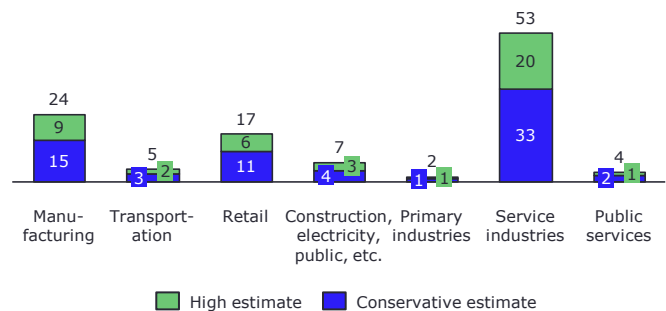
Source: ECON's EUROMOD.

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 around 4 billion EURO, while the high estimate shows 6.2 billion EURO in 2012.

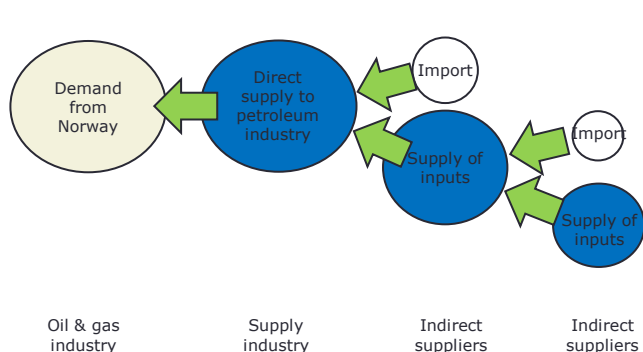
Not only does the Norwegian oil & gas industry lead to substantial value creation ripple effects, but many EU citizens are employed by the demand from the NCS and Norway. In Figure 4.3 the employment effect by industry is presented. The figure shows that the demand from Norway employs around 70 000 people (conservative) or around 110 000 people (high). The service and manufacturing industries experienced the most effect with 33 000 and 15 000 employees respectively (conservative).

Figure 4.3: 2012 employment effects, by sector ('000 jobs)



Source: ECON's EUROMOD.

The supply chain of goods and services to the Norwegian oil & gas industry inside the EU



Appendix 1: Ripple effect methodology

In a study of ripple effects the focus is on how an external demand for goods and services in an economy leads to economic activity not only in the direct suppliers to the initial demand, but also in suppliers to the suppliers and further. In every part of the delivery chain value creation takes place. Input to the production of the supplies are another company's value creation. The more an economy produces of the supplies itself, and thus the less it imports, the higher the value creation for a given amount of direct supplies.

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 analyzed 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 labor demand. The labor is needed in the production in a large variety of companies and is used in a whole range of tasks.

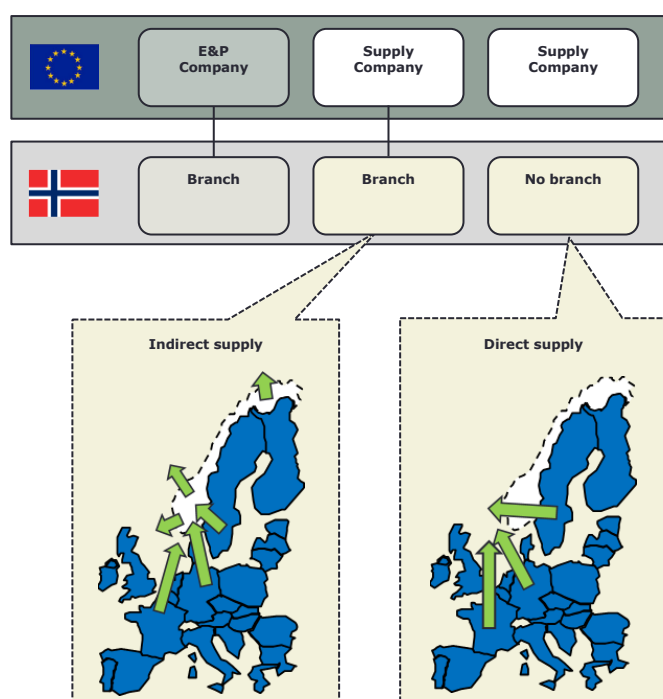
The employment effect of demand from Norway is based on the value creation and number of employees in each industry in the EU. Since the value creation per employee differ significantly between the EU member countries, it has been necessary to use estimates from a core group of highly productive countries. 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.2.1.1 Extracting revenues

Applying a coefficient to the total company revenues, ECON is able to extract the specific revenues due to the oil & gas activity of that company.

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:

- 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 $COGS^{NCS-operations}$.
*Coefficient defined as $(COGS/(COGS+OOE))*0,5$ under 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 $OOE^{NCS-operations}$.
*Coefficient defined as $(OOE/(COGS+OOE))*0,5$ under 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 $COGS^{NCS-operations}$.
*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)
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
OPEX	Operating Expenditures
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

ANALYSIS, STRATEGY AND BUSINESS CONSULTING

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