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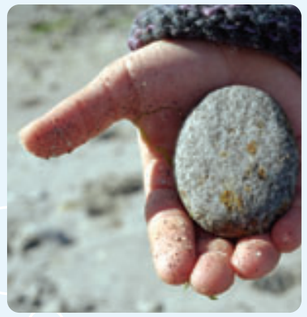
Melvær&Lien The Idea Entrepreneur. Photo: Evy Andersen/Imagent.com, Kjell Inge Sørvide, BP, Ocean Rig, Hydro and Nofo. Illustration: Lars Rønnberg. Published July 2005

Global industry with regional significance

Social Perspectives

OLF The Norwegian Oil Industry Association



OLF is a professional body and employer's association for oil companies and supplier firms involved in exploration for and production of oil and gas on the Norwegian Continental Shelf.

Content

Preface

The development from when the first drilling rig started exploration for oil and gas on the Norwegian Shelf in 1966 and up to today's rapid build-up of the petroleum fund must largely be credited to a willingness and ability to make a commitment to pursuing knowledge and innovation.

The oil and gas industry is a driving force for development of technology and business and industry. Where the oil industry sets up operations, other businesses often experience a substantial and long-term stimulant which gives them a more diversified foundation and a basis for establishing new businesses. The Snøhvit development in Hammerfest is a good example of a project which yields considerable positive ripple effects in the local community.

Both the Snøhvit development and Ormen Lange, which are being developed off the coast of Mid-Norway, are projects that are being realized due to the utilization of new technology. These projects would not have been feasible a few years ago.

As the world's third largest exporter of oil, Norway is an energy superpower in an international context. 2004 was a record-breaking year on the Norwegian Shelf. Never before did production reach such heights. The oil and gas industry is Norway's largest and most important industry. It is responsible for one-third of the State's revenues, and nearly half of Norway's total export revenues.

The Norwegian Oil Industry Association (OLF) is concerned with facilitating value creation for many, many years to come, so that the resources under the seabed can also benefit future generations.

The oil industry has a strong focus on health, safety and the environment. Environmental considerations are part of the industry's framework conditions. Together with the industry's efforts to develop good solutions for the environment, this has resulted in the Norwegian petroleum sector being in the forefront in this area.

With this backdrop, Rogaland Research has prepared this report on social perspectives, commissioned by OLF. Head of research Martin Gjelsvik and Senior adviser Christian Quale have shared primary responsibility for the work on this report.

This is the second year that OLF publishes a report on social perspectives, to provide a picture of the importance of the oil and gas industry.

July 2005
OLF The Norwegian Oil Industry Association

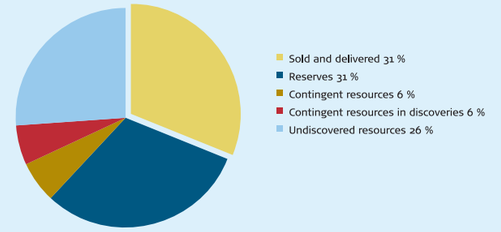
OLF SOCIAL PERSPECTIVES

THE NORWEGIAN SHELF TODAY

Resources

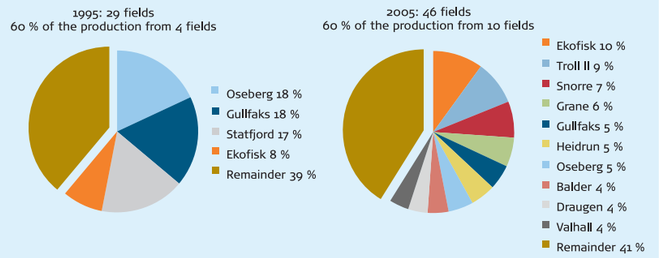
After more than 40 years of oil and gas activities in Norway, about 30 percent of the anticipated petroleum resources have been produced. There are still considerable remaining recoverable resources, which can provide a basis for Norwegian oil and gas activities in a very long-term perspective. Existing and new developments have been approved which will lead to production of an equivalent volume of resources as have already been produced. Moreover, it is assumed that a further six percent can be recovered in the form of new discoveries in known prospects and that an additional six percent can be produced if methods and technology are developed to increase the recovery rate in existing fields. The Norwegian Petroleum Directorate projects that 26 percent of the remaining resources on the Norwegian Shelf have not yet been discovered.

TOTAL RESOURCES ON THE NORWEGIAN CONTINENTAL SHELF



Source: NPD

OIL PRODUCTION 1995–2005



Source: NPD

RESOURCE ACCOUNTS FOR 2004

- Estimate of recoverable resources is 12.9 billion Sm^3 o.e.
- Remaining recoverable resources are 8.9 billion Sm^3 o.e.
  - Reduction of remaining recoverable resources: 3 % as compared with 31 December 2003
  - Production 263 million Sm^3 o.e. in 2004
  - 36 million Sm^3 o.e. approved in the course of 2004
  - Alvheim, Urd and Vilje approved for development in 2004
  - Greatest increase in reserves on the Ekofisk, Gullfaks Sør, Njord and Åsgard fields

Source: NPD

The numbers speak for themselves

The numbers speak for themselves, and draw a picture of a heavy-weight player in the Norwegian economy. The oil and gas industry accounts for:

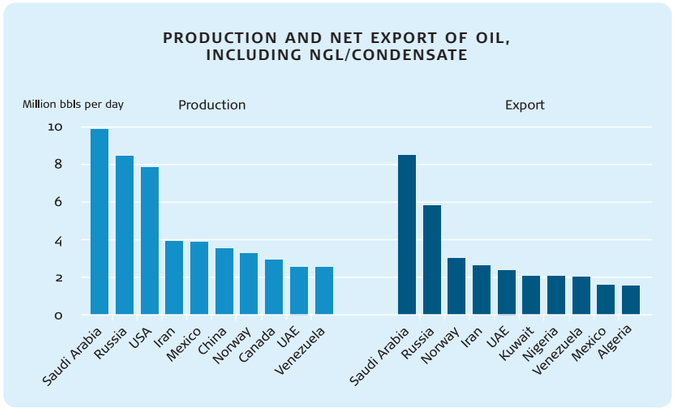
- 1/5 of the gross national product
- 1/4 of the total investments
- 1/3 of the State's revenues nearly one-half of the total export revenues (46 %)

To date, sales of oil and gas have provided NOK 1700 billion in revenues to the State, measured in current money value, and the remaining resources constitute a huge potential for future value-creation. Norway is the world's seventh largest oil producer and the world's third largest exporter of oil, exceeded only by Saudi Arabia and Russia. In addition to the oil, Norway's exports of gas are rising, and currently meet 15 percent of the need in Europe.

OLF SOCIAL PERSPECTIVES

Three perspectives

Some regard oil and gas exclusively as a potential financial resource that becomes valuable in the moment the resources are converted into a financial asset. If we view the petroleum resources from a financial perspective, the main task is to convert the values on the Norwegian Shelf into liquid assets.



Source: Petroleum Economics Ltd 2003

Others have chosen a different perspective: The oil and gas industry as one of the country's most important knowledge industries. The natural resources off the coast have no value until expertise and technological solutions enable us to bring the resources to a market that is willing to pay for them. In this perspective, the reserves are not viewed as volumes of assets provided by nature, but as a result of the knowledge and technological solutions that are developed and allow us to find and exploit the resources. It is the knowledge base that is the most important source of value creation. Furthermore, value creation can be reinforced if the expertise is further developed and transferred to related industries such as ICT, finance and research.

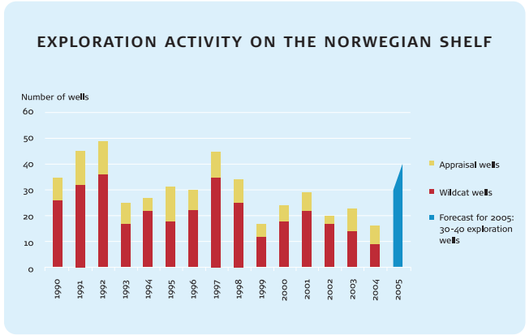
The petroleum industry and its suppliers are also regarded in a third perspective as powerful driving forces in regional development. This is expressed in part in the recommendation from the District Commission. Regional industrial clusters are the pillars of Norwegian value creation. As large demanders of goods and services and as a driving force for new solutions, the oil and gas industry is an engine in an innovation-driven, regional industrial policy. In this perspective, it is natural that the petroleum activities connect with and stimulate regional suppliers, research and education communities and the regional authorities. This creates innovative and vital industrial clusters that both further develop the petroleum industry and regional business and industry.

The three perspectives provide complementary insight that must be used as a basis in order to maximize the potential value creation associated with the oil and gas resources.

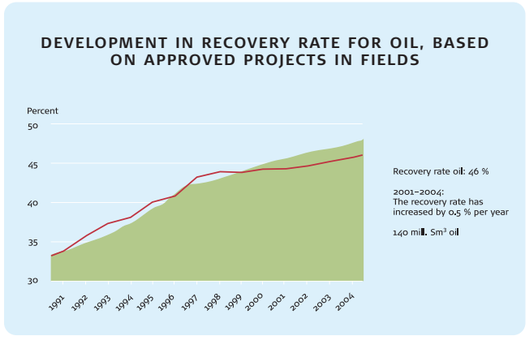
Framework conditions and competition

In order to realize the values, the framework conditions must facilitate a Norwegian Shelf that continues to be competitive. Some have reacted to the fact that the industry is demanding better framework conditions in a period of record-breaking oil prices. However, a high oil price does not change the relative competitive conditions between the Norwegian Shelf and foreign oil provinces. Increased cash flows are not automatically invested on the Norwegian Shelf. OLF is of the opinion that goal-oriented framework conditions must ensure:

- Opportunities and incentives for increased exploration to make new discoveries
- Incentives for increased and extended production from existing fields
- That necessary expertise and technology are developed
- A tax and fee level that makes investment attractive



Source: NPD



Source: NPD

Exploration activity has been low in recent years, but is now on the rise. The recovery rate for oil has increased by about 0.5 percentage points per year in the last four years, and has now reached 46 percent. Costs are on the way down, but are nevertheless well above what is the case on the British side of the Shelf.

Exploitation of the resources on the Norwegian Continental Shelf takes place only as a result of a deliberate policy. The global operators' demands on return are, in principle, the same regardless of where in the world they operate. Their presence on the Norwegian Shelf is still important. OLF has invested considerable efforts in ensuring that the activities on the Norwegian Shelf remain competitive in a global market, where the Norwegian authorities cannot define the rules of the game.

Employment and value creation

About 77,000 people are directly employed in petroleum-related activities, and the ripple effects to other industries are considerable. Value creation per employee in the oil and gas activities was approximately. NOK 4.3 million in 2004. This is about five times as much as in service industries.

Energy needs

Today's global market economy has an increasing need for reasonable energy. Oil and gas cover about 60 percent of the world's need for energy. In spite of more efficient use of energy, consumption has doubled over the past 35 years. For example, the efficiency of the United States' fleet of automobiles increased from 13 miles per gallon in 1973 to 21 miles per gallon in 2000, while the number of vehicles grew from 120 million to 210 million in the same period. Nevertheless, the largest growth in energy need comes from the rapidly growing economies in Asia. Forecasts from the International Energy Agency (IEA) indicate an increase of 50 percent in global energy consumption over the next 20 years.

The global energy market will require annual investments of 550 billion dollars up to 2030 in order to maintain and expand existing production capacity in the energy markets. Of this, approx. NOK 1200 billion is related to oil and gas. The figures illustrate the enormous market potential for Norwegian oil companies and the supplier industry.

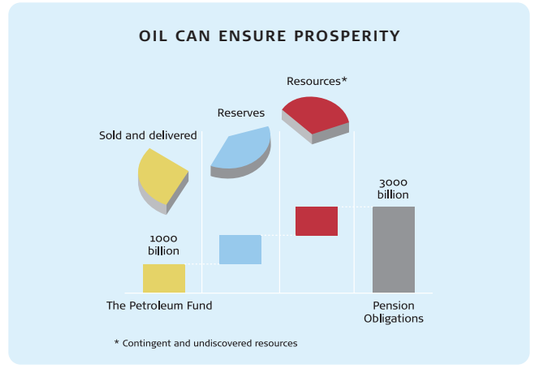
NORWAY ON TOP – ECONOMY AND STANDARD OF LIVING

The petroleum industry has developed world-leading technology and solutions that have been crucial in order to produce oil and gas on the Norwegian Shelf. A demanding and close collaboration between industry, universities and research institutions has given Norwegian operators and suppliers competitive technological advantages in many areas. For example, the shipyard industry recreated itself from ship-welders to builders of steel and concrete platforms by applying land-based technology offshore. Creative engineering communities have developed world-leading subsea and deep-water technology in order to meet the unique challenges on the Norwegian Shelf.

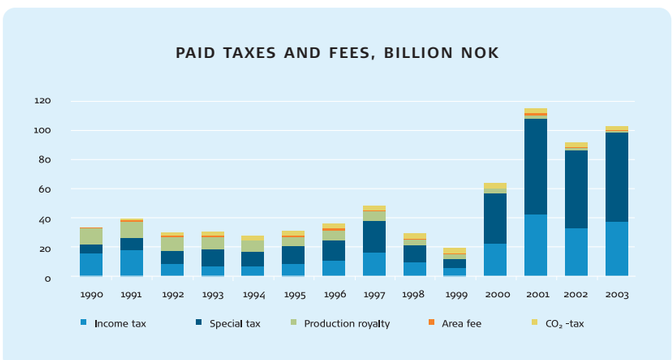
This development tells us something about how good Norwegian companies are at adapting. Moreover, universities and colleges have developed petroleum-related educational programs that have increased expertise in the oil and gas cluster.

The oil revenues ensure prosperity

Value creation on the Shelf will form the basis for securing a high level of prosperity in Norway in the years to come. This can be illustrated through a topical example, specifically the financing of future retirement pensions. If the next third of proven reserves and the last third of contingent and undiscovered petroleum resources contribute the same value to the Petroleum Fund as the first one-third that has been produced, then the value of the Petroleum Fund will probably reach the estimate for the total pension commitments in the amount of NOK 3000 billion. This is partially substantiated by the national budget for 2005 in which the value of the State's oil assets outside of the Petroleum Fund are estimated at approx. NOK 2700 billion, whereof we must assume that a portion will be used in the national budgets to come. However, it cannot be assumed that the oil and gas resources will be automatically realized and the values added to the Petroleum Fund. There must be profitable exploration, discovery and production. Correct and long-term framework conditions and continued willingness to invest are crucial.



Source: OLF



Source: National accounts and state budget

"For the third year in a row, the United Nations Development Program has named Norway the world's best country to live in. The survey is based on life expectancy, average income and degree of schooling. The oil revenues are an important explanation for this. The oil and gas activities also have great significance for our international reputation and we are regarded as an interesting and stable suppler and partner in the petroleum sector."

Prime Minister Kjell Magne Bondevik
Jazzgas Conference in Molde, 13 July 2004

So far – and on into the future

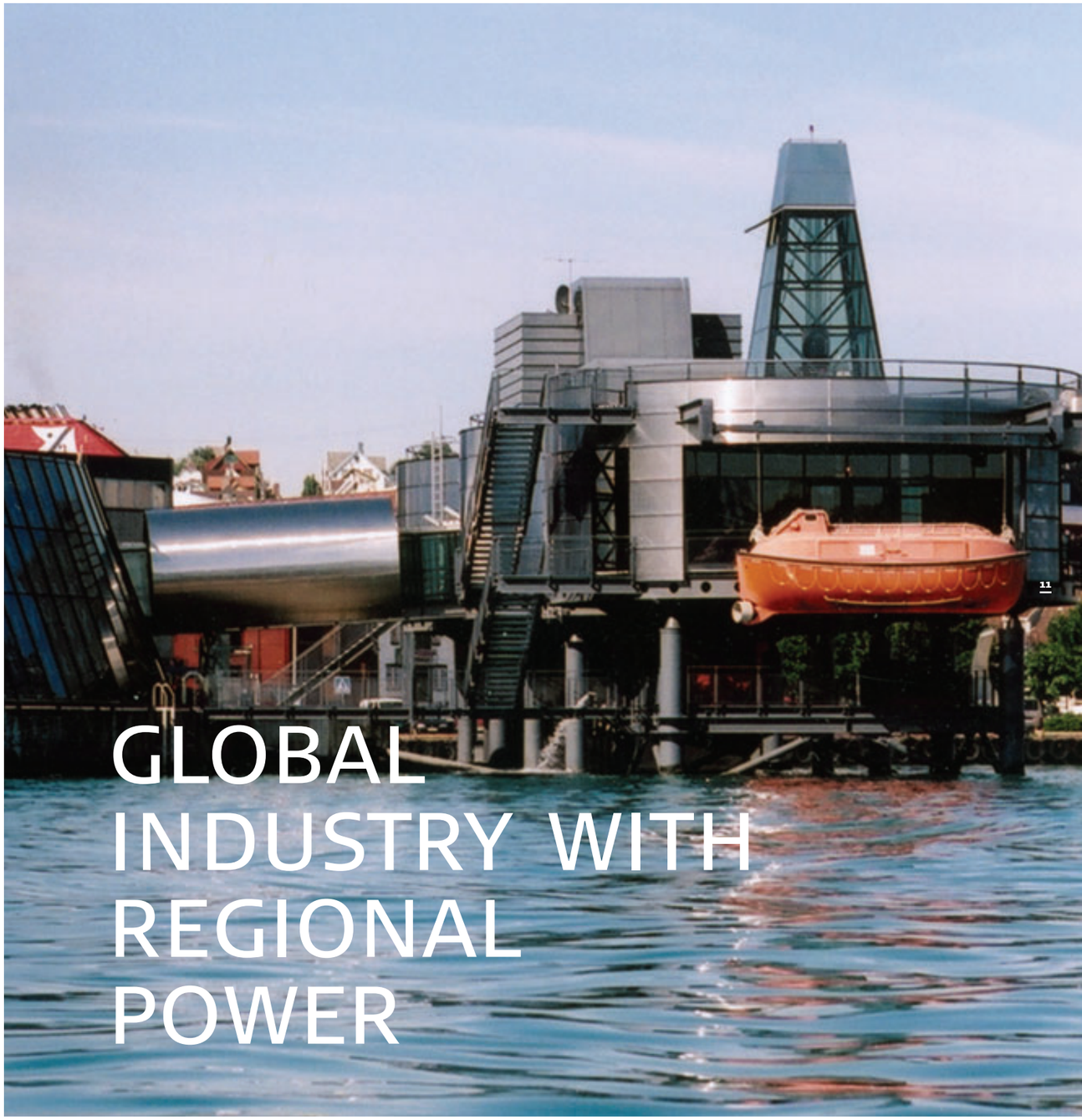
The most important functions of the oil and gas industry in the Norwegian society can be summarized as follows:

- Ensure future generations of a welfare state in Norway through conversion of natural and expertise resources into financial results
- Make up the most powerful industrial engine through implementing new methods, new technology and stimulating innovation in Norwegian industry
- Contribute to the development of related, complementary industries such as ICT, research, finance and culture
- Be a model for an innovation-driven, regional business development through close cooperation with teaching and research communities
- Safeguard the most important economic relations vis-à-vis Europe through Norway's role as a critical gas supplier with a high environmental standard
- Be a central player in exploring the great opportunities that lie in broad-based cooperation with Russia in the northern areas

FUTURE ACTIVITY

- Investments are expected to be higher in 2005 than in 2004
- High activity level due to development of Ormen Lange and Snøhvit
- Substantial activity is also due to many development projects on fields in production as a consequence of factors such as high oil price
- Future developments: Mostly smaller discoveries
- Greater percentage of investment in wells, subsea facilities, pipelines and land share
- Investments on fields in operation: Modifications and wells to increase/maintain production
- Investments on fields in operation to reduce operating costs
- Operating costs are expected to remain at the same level as in 2004 in the coming years

Source: MPE



A broad strategic perspective is important in order to achieve a good development on the Norwegian Shelf in the years to come. Focus must be placed on why and how the expertise on the Shelf can contribute to stimulate new activities both on and outside the Shelf. In this broad strategic perspective, it is important that we maintain two parallel and mutually reinforcing courses:

- The oil and gas activities must be regarded as a platform for developing lasting competitive advantages in a global perspective
- The oil and gas activities must be regarded as a platform for an innovation-driven regional business and industry development in Norway

An expanded strategic role for the oil and gas industry will not happen by itself. It will require new initiatives, both nationally and regionally.

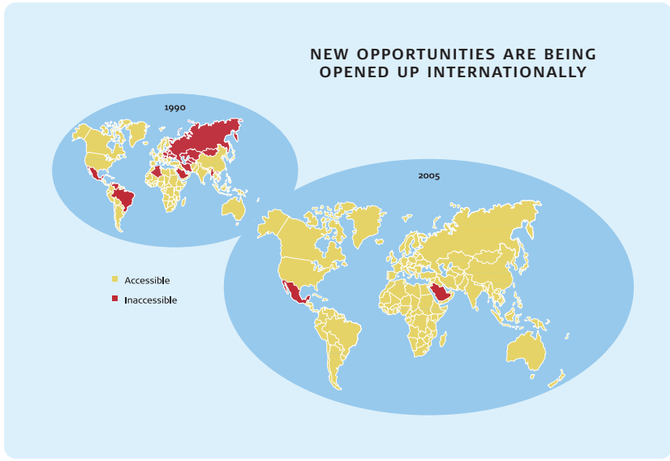
Industrial development

From the Shelf, we have learned expressions such as "weather windows" and "time-critical resources". Development of global and regional competitive advantages cannot be put on hold. It is during the next few years that the Norwegian Shelf can function as a catalyst for industrial and business development in a national and global context. Many projects aimed at improved recovery and extended lifetime are of a time-critical nature. OLF has emphasized that continued interest and presence of the global companies must be ensured in order for us to meet the challenges on the Norwegian Shelf. This requires that the Norwegian Continental Shelf is attractive and competitive compared with other oil provinces in the world.

The innovative, inspiring and dynamic expertise community in the oil industry can be deliberately utilized as a bridge to the next phase of industrial development. This requires far more research and education of young people who can contribute to further development and expanding the industry in new directions.

This topic is made even more interesting by the Urban White Paper, the District Commission's recommendation and the coming Regional White Paper. Through the oil and gas industry, the regional-based supplier industry encounters a business climate in Norway that enables them to compete abroad.

The supplier industry is spread across large portions of the country. In a dialogue with demanding oil companies, the suppliers encounter needs that provide them with a potential for export of goods and services also to other oil provinces. If the activities on the Shelf disappear as a result of a lack of willingness to make decisions and deficient commitment, then it is not just the oil and gas industry that will deteriorate. It is then very likely that Norway will have to find other bridges into an innovation and expertise-driven business development, both globally and regionally.

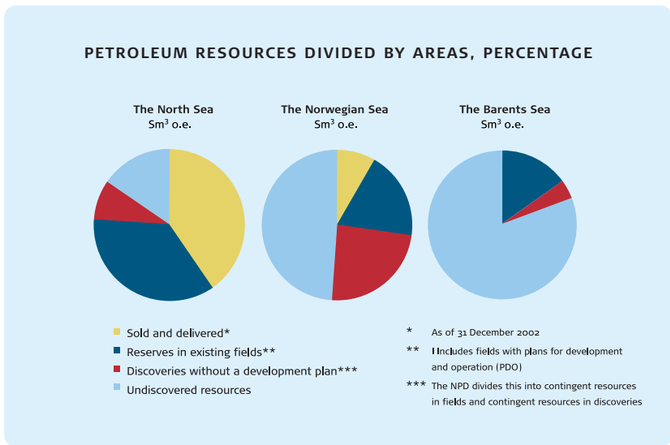


Accessible and inaccessible areas for petroleum activities in 2005 compared with 1990. Source: OLF

New areas

The development in most of the petroleum provinces in the world is running in the direction of greater openness to the international oil companies, but there is considerable variation in the degree of accessibility, business culture and institutional framework conditions. Moreover, there is often a long-term process for the oil companies to establish activities in new areas. In the same manner as Norwegian authorities have aimed to attract the best international players to the Norwegian Shelf, other oil provinces are now doing the same thing. This means that the players gain access to more investment opportunities, and that the projects on the Shelf are facing stronger competition for investment and organizational resources than was previously the case.

The largest international players are still active on the Norwegian Shelf. They have substantial, ongoing commitments in today's producing fields. At the same time, the Norwegian Shelf has attracted a number of medium-sized and smaller oil companies. During the course of the last four years, 22 new companies from a number of countries have been pre-qualified, and eight more companies are being considered. It is also interesting that new companies have been established with a base in Norway and with Norwegian owners.



Source: NPD

A greater diversity of players means a greater wealth of ideas and solutions. This can lead to an increase in the recovery rate, because the new companies have specialized in smaller fields and tail production, and have business and organizational models that are cheaper to operate. Together with the larger companies' efforts to upgrade and further develop existing fields, this will contribute to an extension of the economic lifetime for the Norwegian Shelf.

Internationalization

The INTSOK foundation was established in 1997 to reinforce the basis for value creation and employment in petroleum-related industry through internationalization. INTSOK has more than 100 member companies and markets Norwegian petroleum expertise and the supplier industry in selected markets through various joint efforts to increase international effect. INTSOK's goal is for Norwegian supplier firms to increase sales from the current approx. NOK 35 billion to NOK 80 billion by 2010. Complete development concepts can also be marketed internationally.

NORWEGIAN TECHNOLOGY TO RUSSIA

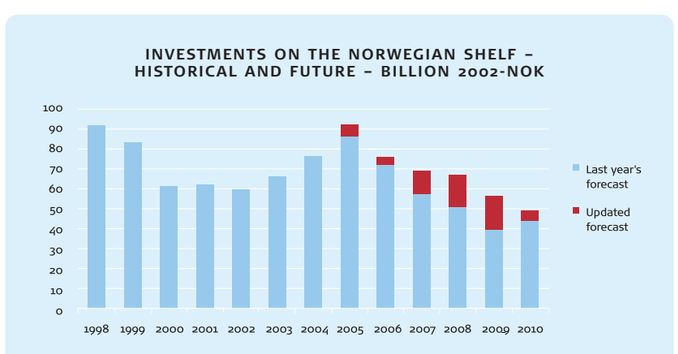
In the early summer of 2004, Gazprom signaled that it plans to develop the Shtokmanovskoje field according to the Snøhvit model, with unmanned subsea production, landing through pipelines, land-based process facilities for cooling the natural gas and shipping of LNG to international markets. At the same time, Gazprom started discussions with Hydro regarding partnership on Shtokmanovskoje. The Russian gas giant wants access to the technology and development concept Hydro is using on Ormen Lange.

Petrad

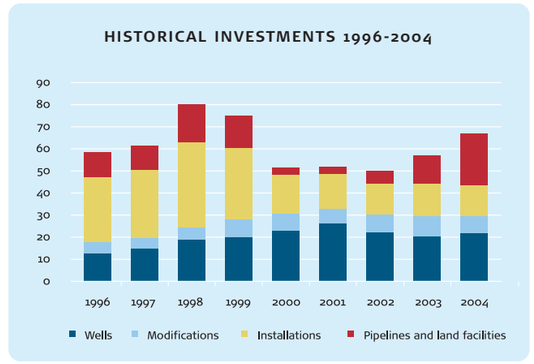
Norway does not just export products and services on a purely commercial basis. Over a number of decades, Petrad has systematically transferred experience from the organization of the Norwegian Shelf to other countries. Petrad is an agency in Norwegian development assistance work that carries out transfer of expertise and build-up of capacity linked to management in the petroleum sector. The target group is managers in State-owned oil companies and public administration/management in Africa, Asia, Latin America and the former Soviet Union. Among other things, Petrad offers courses and seminars with lecturers from the Norwegian petroleum industry, academia and public administration. The purpose is to demonstrate how the petroleum resources can best be managed and distributed for the benefit of the entire population.

Regional business development

The oil and gas industry provides powerful growth and innovation impulses to Norwegian industry. With the exception of the public sector, the oil industry has, for most of its nearly 40 years in Norway, been the largest purchaser of goods and services from Norwegian suppliers. The scope is illustrated by annual investments and operating costs of 70 billion and 30 billion kroner respectively. About 60 percent of the investment needs are covered by Norwegian suppliers, and the paramount operating tasks are carried out by Norwegian-based companies. In addition, large parts of economic life have acquired a more deliberate approach in the way they work and ongoing processes through the offshore activity's roles as demanding customers and demanding employers, as well as through the authorities' requirements for the exercise of the activities. The oil and gas industry is central in many industry clusters.



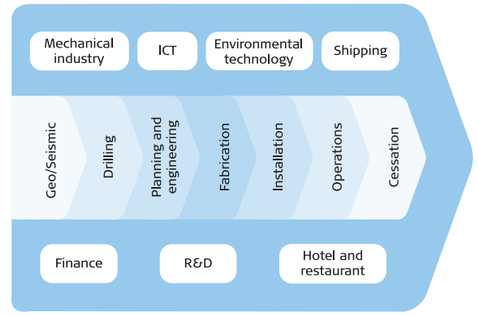
Source: NPD



Source: NPD

Upgrading and development

The oil and gas industry has an important function as an industrial engine in Norwegian business development, through the considerable investments and operating tasks carried out each year. At the same time, demanding customers in the oil industry constitute an important and comprehensive upgrade mechanism for the supplier industry and related industries. Through the oil and gas industry's need for new solutions, the quality of the suppliers' technology, expertise and processes is upgraded.
The oil industry has another function that is not very recognized in the Norwegian debate on business development.



The oil industry is Norway's industrial engine, playing an important role for large portions of Norwegian business and industry. Source: OLF

The engineering workshop and service companies are not just significant suppliers to the oil and gas industry. They deliver production equipment, tools, machines, motors, valves and other products to many industrial clusters, including to the production of electricity, wind and wave power, the maritime sector, as well as the seafood and food cluster. As such, the firms that supply goods and services to the oil industry – also on an equal basis with ICT and finance – are a key part of the infrastructure for developing more industries.

Innovations and mutations

Regional petroleum clusters can be regarded as plants that are grafted together with other branches of industry. Physical proximity makes this grafting easier and provides greater opportunities for diversity and new mutations. Innovations consist of new, original combinations.

An innovation-driven regional business development receives increased impetus and nourishment through mutations between the petroleum industry and other industries. The use of gas can serve as an example. Lyse Energi is routing gas from Kårstø to Ryfylke and the Stavanger region through separate pipelines. This effort represents a new infrastructure that leads to innovations in other industries, such as a new brickworks in Sandnes. The same reasoning lies behind the Government's commitment to environmentally-friendly gas power technologies in Grenland. Increased domestic use of gas can provide better conditions for innovation-driven value creation and energy supply, as well as being positive for the environment. These chains of thought are completely in line with the District Commission's recommendations, as shown in the text box on the next page.

Good framework conditions should be formulated for use of gas in Norway. Gas infrastructure and transport pricing should therefore be organized so that proximity becomes a comparative advantage for new development of jobs in the districts.

The research and development programs should to a greater extent be aimed at:

- How to promote regional and industrial ripple effects of petroleum activities
- The technological and environmental challenges in the northern areas

Future development concepts should emphasize environmental considerations and regional ripple effects, including land-based production facilities.

Source: The District Commission 2004

Regional opportunities and threats

The Stavanger region has deliberately utilized the oil and gas industry as an engine in the region's strategy for innovation-driven regional business development.

A decline in investment and development activity in the oil and gas industry can rapidly have significant consequences for a number of regions and local communities. The more specialized an industry, the harder it will be to find alternative applications. So far, this has not been a real problem, but there is a definite chance that this will crop up in the future. Good adaptations are possible through deliberate work towards:

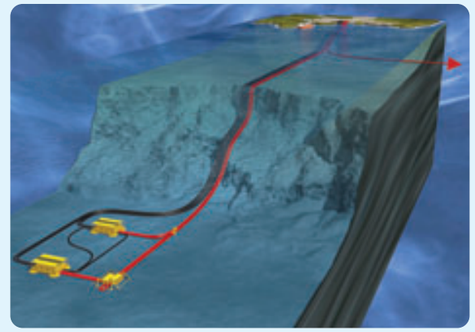
- A stronger internationalization of the Norwegian supplier industry, which reduces dependence on the Norwegian Shelf
- Increased research on new or alternative applications of oil and gas-related technology
- Greater mobility between the petroleum industry and other activities
- Deliberate development of expertise in industries where the oil and gas industry is an important driving force, such as within finance and ICT

ARNE
When the price of oil fell to 10 dollars a barrel in 1999, there was an atmosphere of crisis in the Stavanger region. Rogaland Research presented a perspective survey with various development scenarios based on different development paths for the oil and gas industry. The description of these opportunities and threats led to the establishment of ARNE (Arena for Industrial Development and Contractor Activities), a regional tool for coordinating and accelerating regional industrial development. A strategic industry plan for the entire Northern Jæren area was put together, and actions were taken both to further develop the oil and gas industry and to exploit it for new activities. In the strategic regional industry plan, the energy cluster, along with the food industry community, emerges as the region's priority business clusters.

First class regional grafting

Investments linked to new field developments are the most visible proof of the petroleum industry's function as an energy injection for regional business and industry. Ormen Lange and Snøhvit are illustrative examples.

ORMEN LANGE
The development of the land facility at Nyhamna in Aukra municipality will require more than 6000 man-years over a period of four years. Preliminary estimates show that operation of Ormen Lange will require manning amounting to about 100 man-years, with about 75 persons at the terminal facility at Nyhamna and about 25 in the operations organization in Kristiansund. Aukra municipality will receive revenues, both through property taxes and the activities generated by Ormen Lange. There will be more jobs, more business development, as well as recreational and cultural opportunities that will benefit all age groups.



"Aukra will receive more revenues that can be used to develop expertise, infrastructure and cultural and social services programs."

Mayor Aud Mork.

LANGELED PIPELINE TO BE READIED IN FARSUND
100,000 pipes are needed in order to build the world's longest subsea pipeline, which will carry the Ormen Lange gas from Norway to the United Kingdom. In order to prevent corrosion, the pipes must first be treated for rust on the inside and weight-treated with asphalt and concrete. This work will take place in Farsund. Heavily laden ships arrive from the suppliers in Japan and Europe, and the assignment provides work for 300–400 people in the Farsund region.

Snøhvit

The geographical location far from the markets, as well as the lack of infrastructure in Finnmark, constituted previous and important limitations with regard to development of the gas discovery. However, technological development has meant that long distances and lack of infrastructure are not the challenges they once were.

Snøhvit

MANNING
As of 1 June 2004, 5590 persons had been employed on Melkøya, of which 1178 came from Northern Norway and 734 from Hammerfest/Alta. While employment within the primary industries/fisheries has declined significantly in recent years, employment in the County of Finnmark has generally increased. The Snøhvit development is the most important single cause of this.

EXPERTISE AND EDUCATION
The education sector has started to offer various programs in petroleum-related subjects. The development so far shows:

- As a direct consequence of the Snøhvit development, Hammerfest Upper Secondary School has cooperated with Statoil to establish upper secondary education in the fields of chemical and process subjects
- The University College in Tromsø has implemented the course of study entitled "Delivering to the oil and gas industry" as a continuing education program consisting of two gatherings in the fall of 2004
- The University College in Finnmark established a bachelor program in 2003 in resource management with focus on coastal industries, reindeer husbandry and petroleum activity

DELIVERIES FROM LOCAL BUSINESS AND INDUSTRY
In the impact assessment, provision of Norwegian goods and services in the development phase was estimated at NOK 10 billion. Of this amount, it was assumed that approx. NOK 600 million would go to regional business and industry. As of 1 June 2004, goods and services worth approx. NOK 12 billion kroner were supplied from Norwegian business and industry, of which about NOK 1.8 billion from companies in Northern Norway. At the half-way mark in the development phase, Northern Norwegian business and industry have delivered goods and services worth about three times as much as estimated for the entire development phase.

BUSINESS DEVELOPMENT
The new businesses are predominantly in services/trade in goods and the construction sector, with 12–15 new businesses in each of these two categories.

The establishment of Hammerfest Industrial Park has helped gather a number of expertise and innovation companies under a single roof. Some of these businesses would never have been established in Hammerfest without the Snøhvit development.

Several of the approximately 50 new businesses work on developing products and services linked to oil, gas and other energy solutions, and work is proceeding on exploitation of the new industry in Finnmark, in combination with more traditional businesses linked to the marine and maritime industries. Examples include:

- Exploitation of new energy sources and new input factors in production
- Cooling water from industrial gas plants to land-based aquaculture facilities
- Gas as a basis for production of proteins, as a basis for fish feed
- Fishery and maritime service enterprises develop new products and services to offer to the petroleum industry
- The business/industrial park is shared by marine, maritime and offshore-related industry and industry service, with establishment of joint logistics systems, etc.

Source: Bedriftskompetanse A/S, memo for OLF, July 2004

Oil industry in every third municipality

People whose livelihoods are directly or indirectly linked to oil and gas reside in nearly all municipalities in Norway, and three of ten municipalities have companies who provide goods or services to the Norwegian offshore activities.

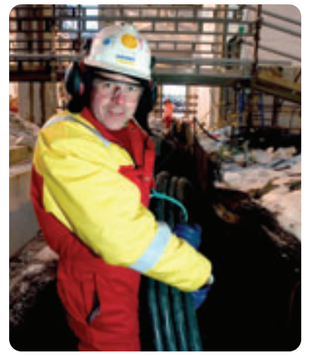
In 2003, the Norwegian School of Management (BI) presented a comprehensive survey of the importance of the oil and gas industry for Norwegian regions. The report from BI shows:

We find companies that deliver to the Norwegian offshore activities in 134 of 434 municipalities, and in all counties.

- 43,800 people are employed in the supplier firms
- 16,700 are employed in the oil companies
- A total of 5.4 percent of employees in Norwegian business and industry are employed within the offshore activities

With ripple effects and indirect employment, more than 220,000 people are employed in the oil and gas industry.

Source: BI Center for Value Creation



There are substantial regional differences in the importance the petroleum industry has in the various locations in the country. Most of the oil workers live along the coast, but an ocean view is not a requirement for working in the petroleum industry. The trend over time shows that metropolitan areas are losing oil-related jobs, while the northern part of Western Norway and Northern Norway come out as winners. The inland municipalities are also home to a significant number of oil workers.

THE SUPPLIER COMMUNITY IN KONGSBERG
Industrial activities in Kongsberg started with the discovery of silver mines in 1614, and subsequently developed via weapons factories into a technology-driven industrial community in the fields of manufacture of weapons, IT and maritime/offshore products. The origin of today's FMC Kongsberg Subsea was Kongsberg Våpenfabrikk's offshore division. Today, the company has American owners and specializes in subsea solutions for producing oil.

Kongsberg Simrad represents the Kongsberg Group's offshore activities and supplies advanced maritime automation and instrumentation systems. The company has 950 employees and a turnover of NOK 1.8 billion.

The Kongsberg companies are world leading in offshore and subsea technology. Important preconditions centered around high R&D intensity, a highly-educated workforce and a very long engineering tradition. Moreover, there were strong links and synergies between related sectors, as well as stabile and relatively cheap labor.

Source: BI Center for Value Creation

EXPERTISE AND TECHNOLOGICAL DEVELOPMENT

Developments on the Norwegian Shelf have to a great extent been driven by innovation. The particular challenges posed by the natural environment have helped develop a technologically advanced and internationally competitive industry in all phases of the petroleum activities. The industry has world-leading companies within the fields of concrete, seismic and seabed solutions. The oil industry has also helped renew established industries. Examples here are the shipping industries' investment in rigs and supply boats and the shipbuilding industry's conversion from ships to platforms. Discoveries on the Norwegian Shelf have over the years represented new opportunities for a sometimes ailing shipbuilding industry.

At a time where low-cost countries offer increasing competition, the challenges from the growing oil industry provide strong incentives for innovation. This pressure to innovate has been maintained, partly due to the requirements posed because the activities are spreading to greater depths and colder waters, and partly due to globalization, with international benchmarking forcing more efficient work processes.

The oil industry has made use of experts from a number of disciplines, for instance in technological development, environmental research and HSE projects. This way of working has spread to other industries.

Norway has benefited from a variety of players on the Norwegian Shelf. The technological developments have taken place through cooperation projects between the industry and technological institutions, and in competition between the companies.

Right from the beginning, the Norwegian oil industry has also been characterized by joint efforts by the industry, the authorities, universities and research institutions. The Norwegian Shelf is considered an arena for the development and use of new, advanced solutions. Organizing the work as joint efforts has led to lower development costs and a faster dissemination of knowledge and solutions.

Innovation and R&D

In 2001 the Ministry of Petroleum and Energy initiated the drawing up of a national technology strategy for increased value creation and competitive advantages in the oil and gas industry, the so-called OG21. This was caused by the need for a more coordinated and focused effort on research and development. The five focus areas that were singled out for the OG21 effort were the environment, increased oil recovery (IOR), deep-sea technology, technology for the development of smaller fields and the gas value chain. Nine technological areas were given a high priority in 2003, and one operating company was appointed for each area to conduct new assessments and propose specific projects. The nine high-priority areas are seismic, petroleum geology, reservoir technology, IT technology, drilling technology, materials technology, marine technology, multiphase flow and process and management technology.

OG21 does not itself have the means to finance these projects, but functions as a catalyst and an arena where operating companies, researchers and the authorities can meet. This process has helped develop oil-oriented programs in the Research Council of Norway and brought financial support from the government.

The last few years have seen an increase in government financial contributions to petroleum-related research. In 2005 the Ministry of Petroleum and Energy's grant to petroleum research increased from NOK 137.5 million to NOK 222.3 million. In addition, NOK 28 million of the extra earnings from the National Fund for Research and Innovation have been earmarked for petroleum research. This increase will first and foremost strengthen the research program Petromaks.

OLF SOCIAL PERSPECTIVES

Petromaks was launched in 2004 in order to finance the plans and strategies generated by OG21. The program relates to both basic research and technology development, with suppliers and the service industry as particular target groups. It is expected that this funding will lead to a similar motivation within the industry itself. Figures from the Research Council of Norway indicate that one krone given by the government for research purposes will trigger three kroner from the industry – to be spent on user-controlled research and project-related technology development.

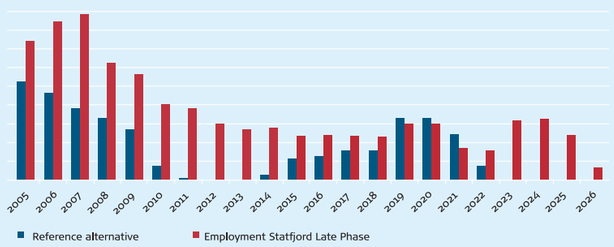
By far the biggest part of the R&D effort is funded by the industry itself. The global oil service company Schlumberger, for example, made Stavanger one of its research centers and is spending NOK 500 million a year on research that they finance themselves and purchase in Norway.

OLF and TBL (National Association of Technological Enterprises) are satisfied with the increase in public funding. It is good that the authorities responsible for these allocations and OLF now see eye to eye in their understanding of the potential for value creation on the Norwegian Shelf and the significance of research in this perspective. However, the industry feels that the authorities should contribute rather more than they do now, and OG21 has made it a goal that the government should provide NOK 600 million for petroleum-related R&D each year.

Small fields and tail-end production

As the Norwegian Shelf matures, the number of small fields and tail-end production increases. Overseas experience indicates that the major companies only to a limited extent focus on exploration of mature areas beyond those areas that are directly linked to their own infrastructure. The international trend that smaller and more specialized companies take over fields from the major companies towards the end of the fields' lifetime, has also arrived on the Norwegian Continental Shelf. Over the last few years the government has also given smaller, independent companies the opportunity to become operators of exploration and production tasks on the Shelf.

EMPLOYMENT EFFECTS OF STATFJORD LATE PHASE 2005-2026



Source: Statoil

Statfjord Late Phase is undoubtedly the most spectacular of the late phase projects. If nothing had been done, Statfjord's life would have been ebbing out in 2009. Now there is gas production planned from 2007 to 2020 and oil production up to 2010, with considerable effects on employment.

Talisman took over BP's ownership interests in Gyda and has ambitions of doubling the production on Gyda to 20,000 barrels a day in the period up to 2006. According to the previous plans, the field should have been closed down at the end of this period.

The implementation of Statfjord Late Phase will mean a total of 44,000 man-years in addition to the present production profile. A little more than half of this will be associated with the actual development project. The employment will peak in 2007 with nearly 9000 man-years, more than twice the present operating model. Just over NOK 15 billion is to be invested, most of which is related to modifications and drilling. The operating costs will rise by NOK 18 billion from the present alternative.

Related industries

Storting White Paper No. 38 (2001–2002) states that "A competitive, Norwegian-based oil and gas industry is a good starting point for the further development of Norway as an energy nation". This is a good goal. Norway has strong expertise related to oil and gas, wind power, wave power and bio-fuels.

Platforms and ships have been converted into so-called FPSOs (Floating Production Storage and Offloading vessels). There has always been a close connection between shipping and oil, and the link between the offshore activities and the maritime industries provides many innovative grafting opportunities. The common denominator for these areas of expertise is the sea and the coast, both as a resource basis and as transport routes. These opportunities have also in the past triggered creativity and innovative products and solutions which have found commercial application.

Banking and finance

The oil and gas industry is a major and long-term customer that has strengthened and developed service industries like finance and ICT. The banking industry has brought home expertise through its participation in international loan syndicates. Norwegian banks are world leaders on payment transfers, not least due to major assignments in handling a very considerable cash flow from the petroleum industry.

The supplier industry along the coast has benefited from financing and advice from the regional banks. However, the ability to use the financial wealth accumulating in the Petroleum Fund to develop internationally competitive centers for financial management is far from fully exploited. Expertise is further developed when it is used, when experience is gained and problems are solved. When activities no longer have any challenges, the expertise is lost. Because there has been only limited use of gas in industry and commerce until now, there has only been limited opportunity to develop the expertise.

ICT
The demanding conditions on the Norwegian Shelf have led to close connections between the offshore industry and the ICT industry. A number of Norwegian professional circles have been in the forefront and achieved international positions in areas such as:

- Seismic
- Subsea solutions
- Reservoir monitoring
- Positioning and automation systems
- Corrosion and wear

Among the cutting-edge Norwegian-based players are PGS, Corrocean, FMC Kongsberg Subsea and Kongsberg Simrad.

ICT

Major parts of the ICT industry focus on the needs of the petroleum industry. Statoil alone has an ICT staff of 620 people, working in the various office locations. In addition to the company's own employees, a considerable number of consultants are working under the company's management. As an example, Statoil purchases ICT services and infra-structure worth NOK 1 billion every year.

E-operation and e-drilling

It is estimated that nearly 95 percent of the world's currently non-explored oil and gas fields are located at sea depths of more than 1000 meters. This will lead to more subsea installations and more floating installations on the Norwegian Shelf as well.

New information technology enables offshore installations to be run from land. Fiber-based broad-band networks allow the transfer of real time information across vast distances. Personnel on land can receive the same information at the same time as those working offshore. Offshore activities can thus to an increasing extent be operated from land, with positive effects for both safety and cost levels.

OLF estimates that e-operations have the potential to increase production by 8–10 percent, with up to 5 percent increase in the recovery rate and up to 30 percent reduction in operating costs compared with today's levels. From this point of view e-operation is important in order to ensure a competitive Norwegian shelf which demands knowledge, technology and adaptability.

Different professional groups (geologists, petroleum engineers, etc.) meet in ConocoPhillips' drilling center in Tananger to drill and manage wells. They receive information at the same time as it is made available on the Ekofisk field. The cooperation taking place in this center and between the platforms and the center, contributes to interdisciplinary assessments, a more efficient use of available personnel and more uniform decisions. An employee working in a drilling center on land can give professional support to several operations which may take place on different fields, even in different countries. ConocoPhillips estimate that they have saved about NOK 60 million through this drilling center in less than one year.

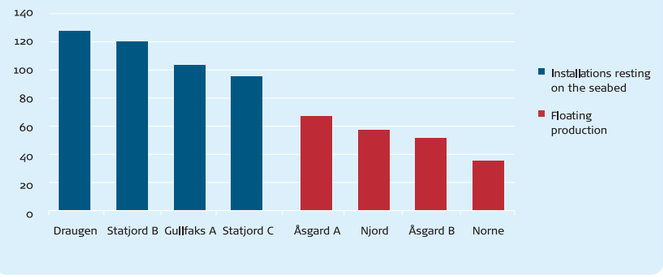
E-operations is one of the focus areas in the escalated investment into Research and Development in the petroleum sector.

During the spring of 2004, Halliburton and BP carried out the world's first remote-controlled cement job offshore. From its land-based operations center at Forus in Stavanger and in cooperation with Halliburton, BP cemented an offshore well on the Valhall field 340 km off the coast in the North Sea. "We have broken another barrier and are now progressing rapidly towards our vision of being able to control and monitor most operations and processes from land," says Director of Operations Audun Bjordal in Halliburton. "This has not least been a mental barrier, since we have had the technology available for some time, but now we have reached one of the targets in the Valhall water injection project," says Pål Tyberø, BP's Toolpusher for Valhall.

Expertise and value creation

The recovery rate is a good indicator of the decisive importance of expertise and technology development for petroleum-related value creation. Fifteen years ago, the expected average recovery rate for the five biggest oil fields so far approved for development, was 35 percent. By 1998 the corresponding figures for the same fields had risen to 53 percent. Much of this value increase was due to new knowledge, and by using this expertise the recovery is increased by about 4.5 billion barrels of oil worth NOK 1000 billion, based on an oil price of USD 25/bbl. The discovery rate, measured as the number of discoveries in relation to the number of exploration wells, is another indicator of the importance of knowledge. The discovery rate has been rising steadily, and for the last decade the average rate has been above 40 percent. There are several reasons for this, but major improvements in the collection, processing and interpretation of seismic data have been crucial to the developments. Technology is important to reduce the costs and thus increase the competitiveness of the Norwegian Shelf and the industry.

TRANSITION FROM PRODUCTION SOLUTIONS RESTING ON THE SEABED TO FLOATING ONES. INVESTMENTS IN NOK 1000 PER BARREL



Source: Statoil

The Snøhvit development is an example of how long-term efforts yield results. It has been possible to realize the Snøhvit development because of a 10-20 year period of systematic research into LNG technology and multiphase transport with universities, university colleges, petroleum research institutions, the Research Council of Norway and the industry itself taking part.

Technology has been of great importance in reducing development costs and creating new, profitable development activities. The transition from production solutions resting on the seabed to floating production solutions led to significantly improved efficiency in field developments on the Norwegian Continental Shelf in the 1990s. The figure above shows the reduction in development costs per unit produced due to the introduction of floating production in this period.

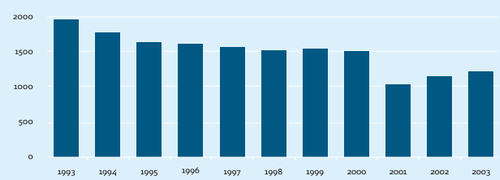
The people in the industry

There is a growing awareness that knowledge and expertise are important factors in economic growth. The human capital is now considered to be a production factor in the same way as other production factors, above all contributing to increased productivity and profitability. The human capital is also considered to be a special production factor where an educated workforce is the most basic requirement for technological progress, whether through innovation, imitation or implementation of new products and processes. A well-educated workforce is also more adaptable, because it can acquire new skills and knowledge quickly. An innovation-driven industry requires new ideas and a variety of people.

Innovations occur when ideas, concepts and technologies are combined in new ways. Such combinations develop best where there are people with many different professional backgrounds, a multiplicity of experiences and a desire to work across professional boundaries.

Given the increasing amount of remote operation, more control rooms and operations centers will be located on land, and this may mean that employees with considerable expertise and long experience can work more flexibly offshore and onshore.

RESEARCH AND TRAINING IN THE PETROLEUM SECTOR, NUMBER OF EMPLOYEES



Source: Rogaland Research

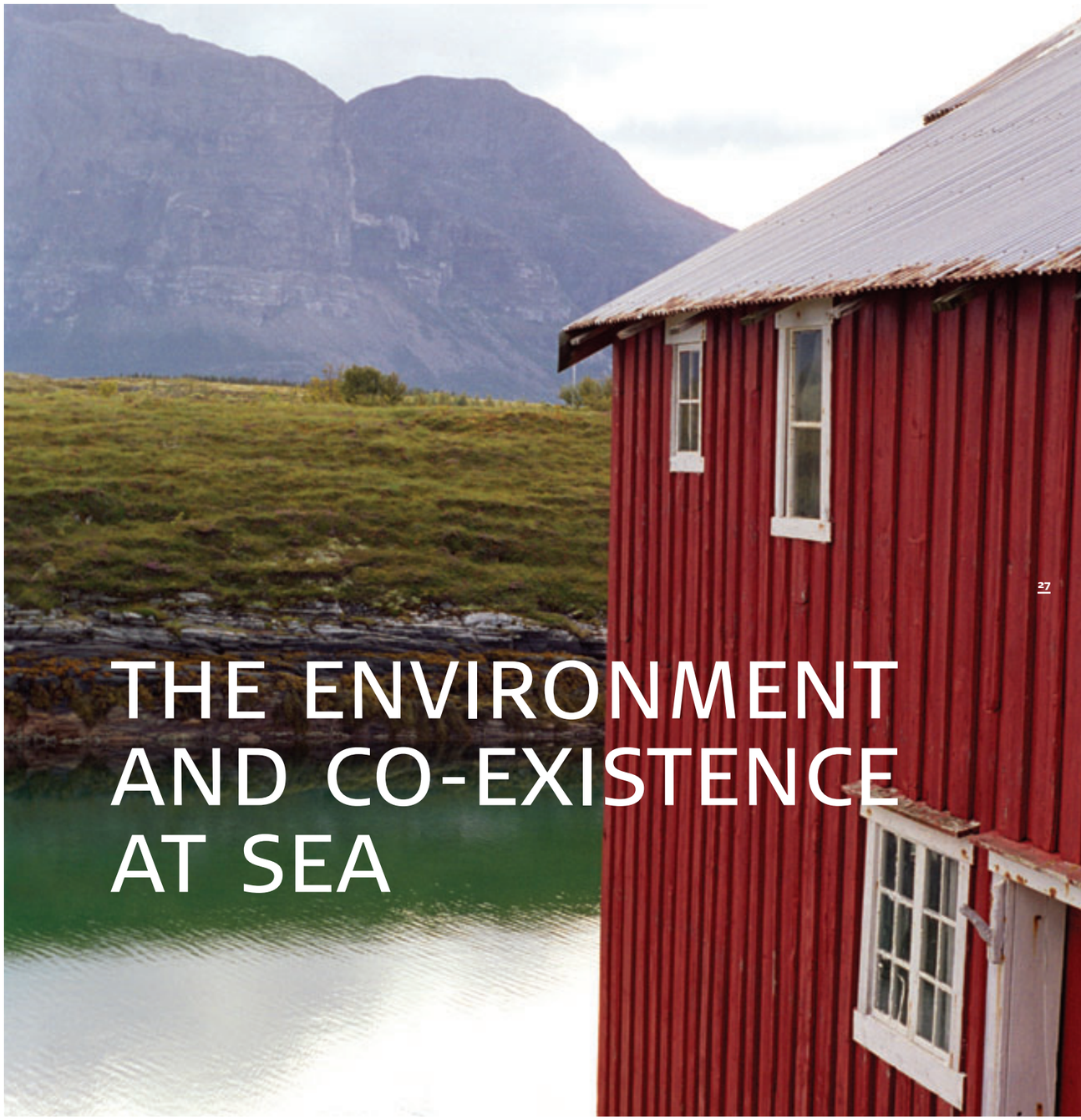
Recruiting

If the industry is to continue to develop in a positive direction, more and more financial, professional and strategic knowledge is required. It is therefore a cause for concern that fewer young people choose a science education. During the last few years OLF has carried out long-term, high-profile recruiting initiatives in order to secure sufficient expertise, and in order to market the oil and gas industry as a workplace with great potential for the future.

The number of employees associated with petroleum-related research and education was halved in the period 1993-2001. The industry and the authorities are cooperating to stimulate interest in science subjects by highlighting the exciting job opportunities in the oil and gas industry, at home as well as overseas. Many have also pointed out that the low personnel turnover gradually has produced an aging workforce, and this emphasizes the need for young people.

Surveys that MMI has carried out on behalf of OLF among students and recent graduates show that when young academics choose an employer, their top priorities are varied and challenging work tasks and a competitive salary. However, they also value a good balance between work and leisure and an opportunity to work abroad. The oil industry scores high in all these areas. This has been confirmed by the oil companies' top position as the most attractive employers for this group, and the operating companies generally find that they have many applicants.

www. jobbfeber.no has information for young people on educational and career opportunities within the oil and gas industry. Here you will find articles, information about various professions and educations, and interesting interviews that offer an insight into what it is like to work in the oil industry in Norway and abroad.



THE ENVIRONMENT AND CO-EXISTENCE AT SEA

ZERO DISCHARGES
In 2003 the SFT (Norwegian Pollution Control Authority) published the Zero Discharge Report in cooperation with the NPD and OLF. The report makes the concept "zero environmentally harmful discharges" more concrete, and explains that no discharges of environmental toxins or environmentally harmful chemicals (substances in SFT's black and red categories) are permitted, nor other chemicals (in the yellow and green categories) if it might lead to environmental damage. Furthermore, there must be no or only minimal discharges of environmental toxins, environmentally harmful chemicals or potentially environmentally harmful chemicals which are pollutants in other chemicals. As for discharges of oil and other naturally occurring substances, there must be no discharge or a minimization of discharges of environmental toxins and no discharge of other substances if it might damage the environment.

Environmental considerations are an integral part of the oil industry's framework conditions. Together with the industry's efforts to develop measures and creative environment-friendly solutions, this has led to the Norwegian petroleum sector leading the way in this area. This positive environment trend is illustrated not least in the increased focus on energy efficiency and the work towards zero environmentally harmful discharges to sea by the end of 2005.

Discharges to sea and emissions to air

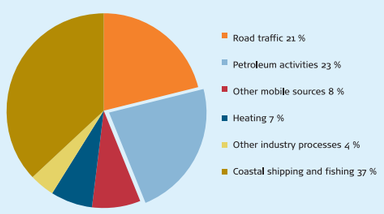
Discharges and emissions take place during exploration, development, production and transport of oil and gas. Discharges and emissions are to some extent determined by the level of activity, but technological progress and operations optimization mean that there is much less of a connection between the discharge/emission level and the activity level.

Emissions to air

The oil and gas activities account for a relatively large share of the total Norwegian emissions of CO_2 and NO_X, 28 and 23 percent respectively. The emissions largely stem from production of energy which is used on the offshore installations.

Mature fields produce relatively more water in relation to the oil and gas. Since the energy requirements largely depend on the total production of oil, gas and water, this contributes to increase the energy requirement per produced unit of oil and gas. The energy requirements also increase because gas production is moving further north so that the distance to the markets becomes longer. More energy-efficient recovery and more efficient power generation are therefore important ways of limiting the emissions of CO_2 and NO_X.

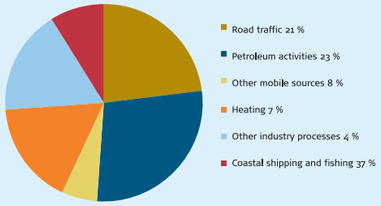
SOURCES OF NO_X EMISSIONS IN NORWAY, 2002



Source: SSB/SFT

The oil and gas industry's share of the national CO_2 discharges is expected to increase from the present 28 percent to around 30 percent in 2006, before falling again. The other major emission sources in Norway are road traffic and various industry processes. For NO_X the petroleum sector is responsible for 23 percent of the emissions. Transport on land and sea is the source of the majority of Norwegian emissions.

SOURCES OF CO_2 EMISSIONS IN NORWAY, 2002



Source: SSB/SFT

Discharges to sea

The main source of discharges to sea is produced water that is brought up from the reservoir with the oil and gas. The water is cleaned before it is discharged, but traces of oil, chemicals and dissolved organic substances will still be present when the water is discharged into the sea. On several fields produced water is now injected back into the reservoir, and new methods of limiting the volumes of produced water are constantly being developed.

For new developments north of the 68th parallel there must be no discharges of produced water under normal operations. Various chemicals are used to ensure regular and secure operations. The use of chemicals is strictly controlled. From 2002 to 2003 there was a 26 percent reduction in chemicals being discharged. Even more importantly, the industry has come far in its transition to environmentally-friendly chemicals. Most chemicals that are discharged consist of substances with natural components that are documented to have little or no environmental effect.

The environmentally harmful chemicals, categorized as red or black, made up less than half a percent of the 2003 discharges. The trend curves show that discharges of black and red chemicals have been reduced by 84 and 48 percent respectively since 2002. Continuous efforts are made to reduce discharges of oil and environmentally harmful substances, and the companies' plans indicate a further 80 percent reduction in prioritized substances by the end of 2005.

The extensive research program "Long-term effects of discharges to the sea from offshore petroleum industry" (PROOF) began in the autumn of 2002 and will be concluded in 2008. The program is organized by the Research Council of Norway with an annual budget of just over NOK 20 million. It is 60 percent funded by the oil industry through OLF, with the remaining funds coming from the Ministry of Petroleum and Energy and the Norwegian Petroleum Directorate.

Environmental considerations and technological challenges

Among all the world's oil regions, the Norwegian Shelf has one of the lowest emissions of CO_2 per produced unit of oil and gas. This has been achieved because new technology and energy-efficient solutions have been developed that give low greenhouse gas emissions, for example combined solutions for power generation offshore (combi-power), recirculation of flare gas and reinjection of CO_2 from produced gas. As for NO_X, the growing use of low-NO_X burners can reduce emissions from a turbine by up to 90 percent. OG21 has a goal of a 30 percent reduction in CO_2 emissions from the forecast for 2010. This goal requires some technological breakthroughs if it is to be realized in a commercially viable manner. The CO_2 issue is therefore very much in focus, and developing environmentally-friendly technology has a high priority.

When gas is produced on fields like Sleipner and Snøhvit, where large amount of CO_2 must be removed from the gas prior to further treatment, CO_2 is injected into the reservoirs on the field. This process contributes to clean gas production, and the investments made are part of the projects' total economy. Seen in isolation such solutions are still very expensive, and stand-alone injection projects carried out purely for the sake of the climate are therefore hard to justify financially.

Using CO_2 for increased recovery

On some fields, CO_2 can be injected as pressure support for increased oil recovery. Such injection has an advantage over stand-alone depositing of CO_2 as it can lead to greater revenues. Implementing such solutions on existing fields, however, would demand a total transformation of the field's recovery strategy and would lead to technological and expense challenges in modifying platforms and wells. In addition there would be investments in infrastructure and facilities for large-scale capture and transport of CO_2.

Produced water

Discharges to sea will increase over the next few years, both because of increased water production from the major fields and because more chemicals are used on fields with seabed templates. Reducing the amount of produced water by getting rid of it as close to the source as possible, is a major challenge. This can for example be done through subsea separation, where oil and water are separated on the seabed and water injected back into the reservoir while the oil and gas is brought up to the platform.

EPCON is a Norwegian cleaning technology that has received a great deal of attention from both Norwegian and overseas oil companies. On many fields this technology will be a better solution, both environmentally and financially, than traditional hydrocyclone facilities. The technology is not very demanding with regard to weight, space and maintenance and it has been permanently installed on the Heidrun, Snorre, Brage and Troll C fields.

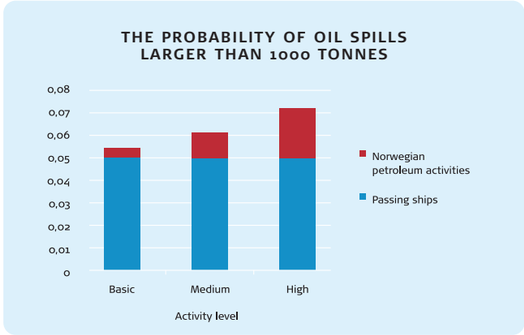
TECHNOLOGY FOR ZERO DISCHARGES

The petroleum industry is working on extensive measures which will eliminate environmentally harmful discharges to sea from existing installations by the end of 2005. During normal operations there must be no discharge of produced water from the new field developments in the north. Except for the top hole section, there will there be no discharge from the drilling of wells, either.

To reach its goal of zero environmentally harmful discharges the industry is also focusing on developing new, efficient technology to clean the water that is brought up to the platform.

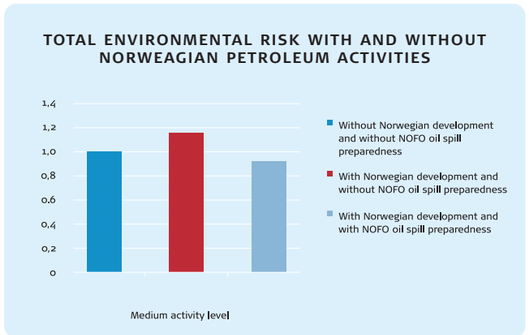
Environmental risk, incidents and preparedness

Environmental challenges vary with the local conditions and the activities to be conducted. The impact assessments that are carried out prior to the opening of new areas or new projects contain calculations of the probability of certain incidents occurring as well as the scope of potential consequences. In impact calculations it is also important to include the positive effects of the activity's preparedness measures, since the operating companies' oil spill preparedness in an area will help reduce the consequences of any spill.



Source: ULB/Det Norske Veritas

In connection with the impact assessment of year-round petroleum activities in the Lofoten-Barents Sea area (ULB), Det Norske Veritas conducted a calculation indicating the probability of an oil spill larger than 1000 tonnes in the Lofoten/Barents Sea area, with and without petroleum activity. The basis risk without petroleum activity is based on potential discharges from shipping, including Russian oil transport. The red sections show how three different levels of petroleum activity will increase the total probability of an oil spill. The preparedness provided by the oil industry will increase the area's total preparedness, and this will in turn reduce the consequences of any oil spill, including discharges from other activities, e.g. shipping. The results shown in the figure below demonstrate that the total environmental risk will be reduced with Norwegian petroleum activities present in the area.

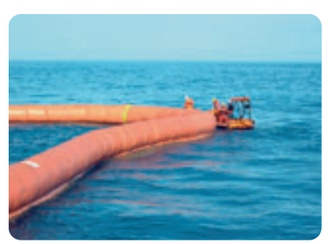


Source: ULB/Det Norske Veritas

Fifty-seven fields have been developed on the Norwegian Shelf, encompassing around 400 facilities and 11,000 km of pipelines. The total production amounts to 2.1 billion tonnes oil and 730 billion m^3 gas. During this period there has only been one accident that resulted in a large oil spill (Bravo in 1977), plus a few minor incidents on Statfjord and Draugen, where the discharges measured 500–100 m^3. No oil spill from oil activities on the Norwegian Shelf has reached land or caused any lasting environmental damage. In comparison to international figures, the extensive activities on the Norwegian Shelf have excellent incident statistics.

NOFO – NORWEGIAN CLEAN SEAS ASSOCIATION FOR OPERATING COMPANIES

NOFO is owned by 14 operating companies and handles the companies' oil spill preparedness on the Norwegian Continental Shelf. In recent years NOFO has been developing a new generation of equipment for better and more efficient combating of oil spills. By the end of 2007 the entire equipment park will be replaced, at a cost of around NOK 200 million. Contracts for the first deliveries of new oil booms at a value of NOK 51 million went to companies in Lofoten and Tromsø in 2003, while a company in Bergen is to deliver new oil skimmers worth NOK 112 million.



Co-existence

Nearly 40 years of petroleum activities on the Norwegian Shelf have given us much knowledge concerning the effects of the activities on the community and other industries. Before the industry enters a new area, environmental impact assessments make a study of local issues and involve the general public in the decision-making process. On the basis of this the developers choose solutions that safeguard any issues that have been highlighted. Potentially critical connections are followed up through monitoring once the new facilities have been put into operation.

Oil and fisheries

Co-existence with other industries has always been very important. Our relationship to the fisheries has been particularly important – not least as the oil and gas activities have moved further north.

The general opinion is that petroleum industry and fisheries can function side by side, but the fishing industry is concerned about some effects that may occur:

- Competition for, and loss of, access to traditional fishing banks
- Waste on the seabed or other obstacles that may represent a risk factor
- Pollution
- Increased shipping

However, the fishing industry can also see the positive effects, for instance that the increased emergency preparedness in the area will be able to assist if a fishing boat is in distress or if there is an accident or pollution related to some other activity at sea.

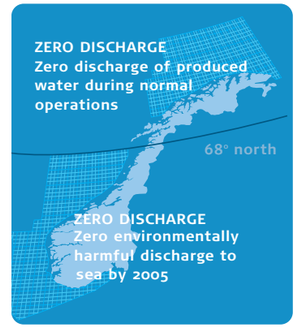
THE LOFOTEN AQUARIUM

The Lofoten Aquarium in Kabelvåg opened an exhibition called "The Ocean – A Gigantic Treasure Chest" on 6 May 2004. The three industries that harvest the ocean – the petroleum industry, aquaculture and fisheries – have joined forces to create a 200 m² exhibition that takes the visitors on a journey into the fish cages and the fishing boats and on board the oil rigs. Here is much information about the development of the three industries, their significance for Norway and their challenges and efforts with regard to the external environment.
"This exhibition indicates that oil and fish will face the future together, with shared knowledge and shared target groups," said the director of the aquarium when the exhibition was opened. Besides The Lofoten Aquarium, four oil companies, OLF, the Norwegian Fishermen's Association and the Norwegian Seafood Federation back the exhibition.

Environmental challenges in the Barents Sea petroleum activities

The Barents Sea is not a new and unknown area in a petroleum context. More than 60 exploration wells have been drilled in the area since 1980 without any accidents. Thus the oil industry has realistic and practical experience with both the operational and the environmental challenges, as well as documented knowledge of potential environmental impacts in such waters.

Management Plan for the Barents Sea



Activities in the Barents Sea were halted in 2001, awaiting an impact assessment of year-round petroleum activities in the Lofoten-Barents Sea area. In order to identify and assess the overall challenges relating to human activities in these waters, assessments were also conducted relating to the impact of shipping, fisheries and aquaculture. The overall Management Plan for the Barents Sea will be prepared on the basis of these assessments. The main purpose of the management plan is to establish framework conditions which allow for a balancing of the industrial interests associated with fisheries, sea transport and petroleum activities within the framework of sustainable development. This work will be done in the period 2002–2005.

The oil activity assessment was completed during the autumn of 2003. Based on this assessment the government decided that the petroleum activity in the south of the Barents Sea could be resumed with the exception of certain particularly valuable areas. One condition was that there must be no discharge of produced water or environmentally harmful substances to sea during normal operations. This is considerably stricter than the regulations for the rest of the Continental Shelf. In addition, there must be no discharge during the drilling of wells, except for discharges from the top hole section.

Operational safety in the northernmost seas

Our knowledge of the Barents Sea geology indicates that it is no more complicated to drill there than elsewhere on the Shelf. The Barents Sea reservoirs do not have high pressure, as is the case in some places in the North Sea and the Norwegian Sea, and there is thus little risk of an uncontrolled blowout. Statistics show that wind and wave conditions both summer and winter are much the same as in the North Sea.

With activities conducted by competent players and supported by continual technological developments and adapted regulations, the risk of undesirable incidents or discharges is no greater in the Barents Sea than elsewhere on the Shelf.

Technology

The Norwegian Petroleum Directorate has evaluated various technologies in relation to the preconditions and requirements stipulated for year-round petroleum activities in Lofoten and the Barents Sea, and the general conclusion was that technology that will meet all the requirements exists or is being tested. Each petroleum development is unique, of course, and the technical solutions must be adapted to the needs in the individual situation. This in turn contributes to further development of the technology.

"Norway possesses technological solutions that satisfy stringent environmental requirements, and we can point to 25 years without serious blowouts from our oil and gas activities. The skepticism to production in Lofoten and the south of the Barents Sea is without foundation."

NPD august 2003

EXPLORATION DRILLING IN THE BARENTS SEA

During the winter/spring of 2005 Hydro and Statoil drilled an exploration well each in the Barents Sea. Statoil is also planning another exploration well. These drilling operations are considered the most environmentally-friendly ever on the Norwegian Shelf – with no discharge of drill cuttings and drilling fluid apart from limited discharges when drilling the top hole.

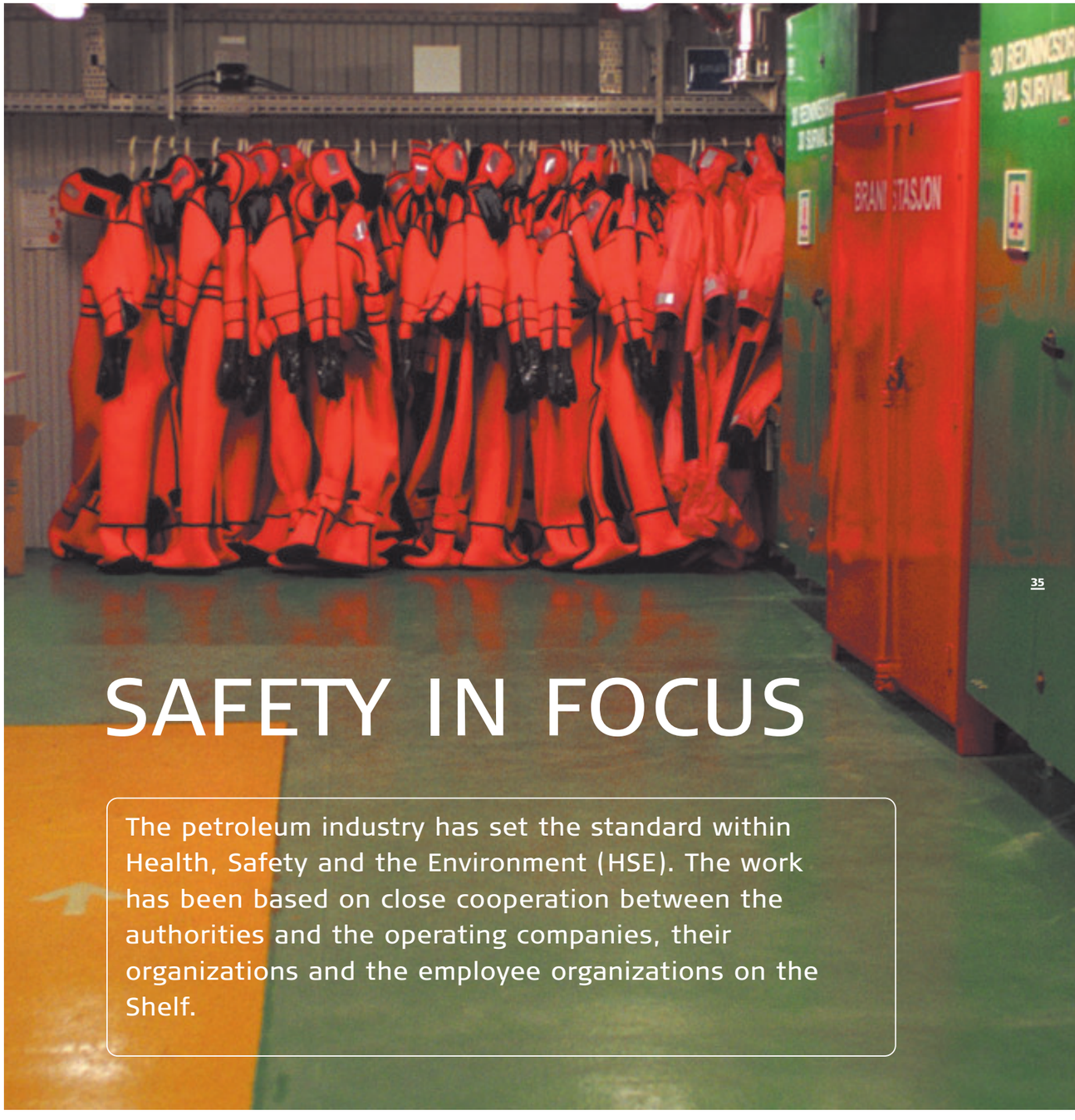
The drilling rig used for these operations, "Eirik Raude", is specially equipped for such tasks and meets stringent demands for the safety of personnel, equipment and the environment. Among the features are double barriers for all systems that might cause a leak or which, if operated in a wrong way, could lead to accidental discharges.

Drill cuttings and drilling waste is collected and transported to land for reuse/depositing, while washing water and rain water from rig areas that might contain traces of oil or chemicals is collected and cleaned. The only substance discharged that might raise environmental concerns is small amounts of thread compound from the drilling of the top hole section (around 650 grams per well). Production testing of any discoveries is done down in the hole without any oil or gas being burned. Careful feasibility studies concluded that the area does not contain exposed corals, and that neither bird life nor fishing resources will be adversely affected by the discharges which the companies had applied for, for the brief duration of drilling operations.

Overall assessment

With the preconditions stipulated, the assessment shows that the normal operations of year-round petroleum activities will have small or insignificant adverse effects on the natural resources, the environment, other industries and the general community. It is also pointed out that the activity will stimulate the region, in that it will increase the industrial activity and this will also produce ripple effects.

Some geographical areas still stand out as having a greater impact potential than others. These include Lofoten/Vesterålen, Tromsøflaket, Bjørnøya, the Arctic Frontier, the Ice Edge and some areas near the coast. They are described as particularly valuable areas and they will require the oil companies to take extra care, with more extensive prevention and preparedness measures.



SAFETY IN FOCUS

The petroleum industry has set the standard within Health, Safety and the Environment (HSE). The work has been based on close cooperation between the authorities and the operating companies, their organizations and the employee organizations on the Shelf.

The HSE culture – important for reliable operation

The oil industry shall be in the forefront in HSE. The goal is that our activities should cause no harm to people, the environment or material assets.

The Norwegian Shelf regulations stipulate functional requirements, and it is up to each enterprise to integrate these requirements in their activities in such a way that they are conducted within the regulatory framework for a good HSE culture. Together with research institutions, the Norwegian Petroleum Directorate and the Petroleum Safety Authority Norway the industry is also conducting a number of projects that contribute to a deeper understanding of the concept 'HSE culture'.

Experience shows that short-term thinking does not pay, and that the companies that invest heavily in HSE also achieve the best financial results over time. One of the reasons for this is that accidents and undesirable incidents incur huge costs. We have also seen that deliberate investments in HSE contribute to increased regularity and a robust protection against undesirable incidents as well as greater flexibility and efficiency.

INTERNATIONAL SAFETY AWARD TO NORWEGIAN OIL INDUSTRY

The Norwegian oil industry received the safety award "The Carolita U Kallaur Award" on 31 March 2005 for the extensive safety work that has been carried out on the Norwegian Shelf through the project "Working Together for Safety" (SfS). The International Regulators Forum (IRF) gave the award to SfS on account of "Outstanding International Safety Leadership".

Among the reasons why SfS received the award, were its development of joint guidelines for issuing work permits and implementation of safe job analyses for work on the installations.

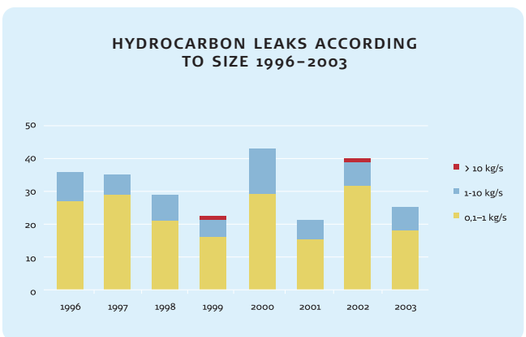
It was also emphasized in the award that Working Together for Safety had a great potential for contributing to increased offshore safety in other parts of the world as well.

Working Together for Safety

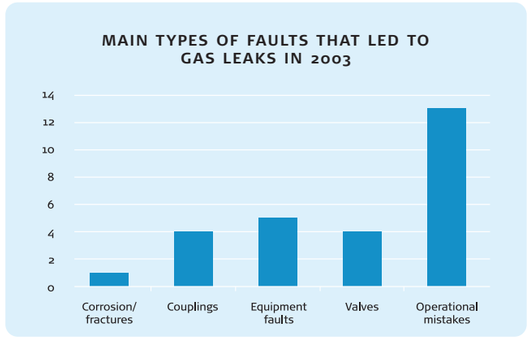
Working Together for Safety (SfS) is one of the most extensive cooperation projects implemented within safety in the oil and gas industry. The participants are oil companies and supplier companies represented through OLF, the trade unions Lederne and NOPEF, LO (The Norw. Confederation of Trade Unions), the Norwegian Shipowners' Association, the National Association of Technological Enterprises (TBL), the Norwegian United Federation of Trade Unions and The Co-operating Organizations (DSO). The project draws up joint guidelines for work on installations and on board ships, highlighting human behaviour and all other issues that can affect the nature and framework conditions of the work. This means that the company culture, organization and management also are seen in a safety perspective.

Focusing on gas leaks

Because statistics showed little improvement in the number of major gas leaks, OLF and the operating companies set up a joint project in 2003 to look more closely at the causes of and measures to reduce such incidents. Both technical and organizational issues were studied, and this has led to the identification of several areas which the companies will continue to work on. Better procedures have also been introduced for classification and registration of near misses, and we have committed ourselves to the target of a 50 percent reduction in the number of leaks in 2005.



Source: PSA



Source: PSA

Safety research and education

Through excellent cooperation, the authorities, operating companies and research institutions have built up a highly professional group of safety experts. PhD grants from the oil companies have been a contributory factor in this. Since the mid-1980s the NTNU has developed a wide range of academic courses in safety subjects. Based on its already established courses within petroleum education, the University of Stavanger (UiS) commenced a national security course with a particular focus on government planning and management. On the international scene, where there are fewer safety experts and safety is linked more to a few individual researchers' efforts than to coordinated work, it is unusual to find safety subjects as well integrated into the normal curriculum as they are at NTNU and UiS.

"The Government wants the petroleum sector to be in the forefront with a strong focus on Health, Safety and the Environment at all levels of the activities, with continuous improvement and precaution as basic principles."

The Storting White Paper No. 7 (2001–2002) on Health, Safety and the Environment in the petroleum activities

Tragic accidents in the community and global terrorism developments have highlighted society's vulnerability. At the same time national security has become a separate discipline which to a large extent is based on the petroleum industry's approach to the issue. Here developments started with stipulated instructions, went via functional requirements and then progressed to principles based on barriers and organization, where the responsibility for safety has been elevated so that it is also an organizational and management issue. These methods now form the basis for the preventive work which the new Directorate for Civil Protection and Emergency Planning will be looking after. As one has had little specific data to base evaluations on, the debate on security and vulnerability within various community activities has often been based on emotions and personal opinions. The methods that are now being adapted and introduced should provide a better basis for assessing risk issues, understanding what mechanisms can lead to accidents and serious incidents and what preventive measures and processes must be introduced.

Such an approach would be relevant regarding e.g major transportation accidents, fires, explosions, coastline pollution and infrastructure failures within e.g. telecommunication and water and energy supply.

One contribution to better safety and security is to register, analyze and understand the data from near incidents and near misses. The oil industry has long experience in doing this, and the increased awareness and openness that is a consequence of the systematic registration of incidents, has in itself contributed significantly to the prevention of accidents.

CHANGES IN THE SUPERVISORY ARRANGEMENTS

In 1972 the authorities' HSE supervision of offshore oil activities was delegated to the Norwegian Petroleum Directorate (NPD).
On 1 January 2004, however, the NPD was divided into two bodies, the NPD and the Petroleum Safety Authority Norway (PSA), with the PSA handling the authorities' responsibility for safety, preparedness and the working environment. From the same date the PSA also took over supervision of the land-based petroleum facilities, which had previously come under the Directorate for Civil Protection and Emergency Planning and the Directorate of Labour Inspection. By making all the petroleum activities answerable to the same supervisory body, the authorities achieved a unified approach to HSE onshore and offshore. This also reflects how the industry itself is organized, in that the operating companies work according to the same requirements and guidelines for all parts of their activity, whether installations are offshore or on land.

RESPONSIBILITY FOR THE COMMUNITY

Business and industry contributes to a society's development through employment, technological developments and value creation, and the taxes they pay help finance the general welfare of the people. However, many companies have much wider community considerations on their agenda. Some expressions used in this connection are:

Social accountability – focusing on standards, measurements and reporting
Sustainability – particularly with the regard to the external environment
Local content – contribute to the host country and the local community by setting up new companies, building expertise, transferring technology and other local content in purchased goods and services
Corporate social responsibility – social and corporate responsibility for the community

The concept 'corporate social responsibility' (CSR) is often used to cover all areas that relate to social responsibility.

Finance – the environment – society

A sustainable financial development is a combination of financial, environmental and social aspects. Several companies are now issuing their reports with a three-part bottom line to represent these aspects. This provides the activity with a framework for the description of goals and associated activities, and a format for reporting efforts/investments and goal achievement.

The company's stakeholders

The companies' activities directly affect their owners, employees and the immediate neighborhood, but there are other stakeholders who also wield an influence. Among these are the authorities, who determine the framework conditions, and voluntary organizations that work actively to influence political decisions.

The owners are now expecting more than just a good return on their investment; they are also urging the companies to assume more social responsibility. In addition to the ethical advantage in running a business with social responsibility, there is also a belief that it is more profitable in the long run because of the reputation risk and reputation upside, the capital market's evaluation and the competitive advantage. A rapidly growing number of institutional investors are now applying criteria for social responsibility, and some companies are also finding that environmental and human rights organizations are trying to wield an influence as shareholders.

Local cooperation

The oil industry is of great importance for local employment and subcontractors. Building expertise and transferring technology in the local community gives long-term social and financial ripple effects, and forms part of the companies' strategy. The local content requirement may also be part of the authorities' licensing conditions. Companies in the oil and gas industry often have resources that exceed what the national authorities have access to, and in underdeveloped areas there are examples of important social tasks being handled by the companies in cooperation with the authorities, trade unions or charities.

Voluntary organizations

Bilateral cooperation and a dialogue with voluntary organizations help create an understanding of the significance of the petroleum activity and what society expects or is able to accept. At the same time it may give the companies access to local information they would otherwise not have had, thus strengthening financial or environmental sides of their projects. An insight into the companies' work to reconcile financial, environmental and social considerations may also help people to make realistic demands and lay the foundation for a positive cooperation that will be useful in providing successful input and criticism.

Various support activities

Oil companies and supplier companies make considerable contributions to different sized projects within sports, the arts and education. Recipients are organizations as well as high-profile or just talented individuals. The companies consider such support important both because it gives the recipients more opportunities and because it highlights the company's own values and attitudes.

When other players make choices and decisions that will affect the oil companies, there are many criteria involved, and a good reputation is one of them. Examples may be selection of cooperation partners and who should have access to information regarding new opportunities. When the best applicants for a job have to choose between several attractive employers, they will also consider whether they can identify with a company's profile and values.

Ethical issues

Transparency International has identified the international oil and gas industry as particularly exposed to corruption. An important reason for this is the vast sums of money which this industry represents. The industry is also of such a nature that it must conduct activities where the petroleum resources are found. As the companies prioritize some opportunities higher than others, they are not always able to choose freely which countries to work in. They therefore have to accept working in a country with whatever system of government that country may have, and this contributes to the companies' exposure.

The oil industry maintains a strong focus on corruption. The International Association of Oil and Gas Producers (OGP) has a special committee for combating corruption, partly through unified standards and methods within the industry.

Each company has strict ethical guidelines as well as systems for practical training and follow-up at all levels. But even if transparency and openness in all issues are important principles with regard to the ethical goals, situations may still arise where commercial issues are subject to strict confidentiality. In such cases the transparency may be limited to trusted colleagues, however always in light of the ethical guidelines drawn up by the company.

TRANSPARENCY INTERNATIONAL was set up in 1993 to combat national and international corruption. Through its branches in 90 countries the organization encourages the authorities to implement effective legislation and policies against corruption, promote reforms together with international organizations, increase the population's awareness of work to combat corruption, and increase transparency in international business transactions.

TI's corruption indexes are often referred to and recognized for their systematic approach and credibility. TI's Norwegian branch is financed through member subscriptions and support from the government (NORAD), business and industry. Contributions from Hydro and Statoil account for about one quarter of the operating budget.

Member companies

OLF – The Norwegian Oil Industry Association – is a professional body and employer's organization for oil companies and supplier firms involved in exploration for and production of oil and gas on the Norwegian Continental Shelf. OLF is a member of the Confederation of Norwegian Business and Industry, NHO.

OLF UNITES 27 OIL AND GAS COMPANIES AND 48 SUPPLIER FIRMS ON THE NORWEGIAN SHELF. OUR MEMBER COMPANIES REPRESENT AROUND 23,500 EMPLOYEES.

OIL/GAS COMPANIES
AMERADA HESS NORGE A/S
BG NORGE LIMITED
BP NORGE AS
CHEVRONTEXACO AS
CONOCOPHILLIPS NORGE AS
DET NORSKE OLJESELSKAP ASA
DONG NORGE AS
ENDEAVOUR ENERGY NORGE AS
ENI NORGE AS
E.ON RUHRGAS NORGE AS
ESSO NORGE AS
GASSCO AS
GAZ DE FRANCE NORGE AS
IDEMITSU PETROLEUM NORGE AS
LUNDIN NORWAY AS
MAERSK OIL NORWAY AS
MARATHON PETROLEUM COMPANY (NORWAY)
NORSK HYDRO ASA
A/S NORSKE SHELL
PALADIN RESOURCES (NORWAY) LTD
PETORO AS
REVUS ENERGY AS
RWE DEA NORGE AS
STATOIL ASA
SVENSKA PETROLEUM EXPLORATION A/S
TALISMAN ENERGY NORGE AS
TOTAL E&P NORGE AS

SUPPLIER FIRMS
DRILLING AND WELL SERVICE COMPANIES
BAKER ATLAS
BAKER HUGHES CENTRILIFT
BAKER HUGHES INTEQ
BAKER OIL TOOLS NORWAY
BJ SERVICES AS
BJ PROCESS & PIPELINE SERVICES AS
GEOSERVICES
HALLIBURTON AS
I.O.S. TUBULAR MANAGEMENT AS
KVÆRNER OILFIELD PRODUCTS AS
MARITIME WELL SERVICE AS
M-I NORGE AS
PROSAFE ASA
PROSAFE DRILLING SERVICES AS
RESERVOIR LABORATORIES AS
SCHLUMBERGER NORGE AS
SMITH INTERNATIONAL NORWAY A.S
SWACO NORGE AS
VETCO AIBEL AS
WEATHERFORD NORGE AS
WEST LAB SERVICES AS

SUBSEA CONTRACTORS
NUI A/S
OCEANEERING A/S
STOLT OFFSHORE A/S
SUBSEA7 NORWAY
TECHNIP NORGE

CATERING COMPANIES
ESS OFFSHORE AS
UNIVERSAL SODEXHO NORWAY AS

SUPPLY BASES
ASCO NORGE AS
COAST CENTER BASE AS
HELGELANDSBASE AS
MONGSTADBASE AS
NORSEA AS
POLARBASE AS
SAGA FJORDBASE AS
VESTBASE AS

OTHER COMPANIES
AKER KVÆRNER OPERATIONS AS
LANDMARK GRAPHICS AS
NOSEFO
NUTEC AS
NUTEC BEREDSKAP OG KRISELEDELSE AS
NETEC BERGEN AS
NUTEC TRONDHEIM AS
RAMCO NORWAY AS
RESQ AS
SECURITAS A/S
SOILCARE A/S
TEEKAY NORWAY AS

OLF SOCIAL PERSPECTIVES