OLJE- OG ENERGIDEPARTEMENTET

Ministry of Petroleum and Energy

Report No. 38 to the Storting (2001–2002)

Oil and Gas Activities

Unofficial translation from Norwegian

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Part I
Principal objectives and government measures

1 The government's principal objectives for oil and gas policy

The petroleum sector is very significant for Norway. It plays an important part in the national economy, and has made a big contribution to the development of the Norwegian welfare state. A substantial proportion of the revenues from this business accrue to the state, and contribute to the government's solid financial position. The sector also generates substantial industrial activity in Norway, making oil and gas the largest industry in the country.

The focus of attention in Norwegian oil and gas operations has gradually shifted from industrial development to the management of income from this sector. Petroleum revenues represent substantial assets for the Norwegian community, and a discussion of income and fund management is both important and necessary. Nevertheless, remaining oil and gas resources on the Norwegian continental shelf (NCS) represent the biggest asset.

At 31 December 2001, the Government Petroleum Fund was worth just over NOK 610 billion. All the same, less than a quarter of the country's petroleum resources have so far been produced. This illustrates that the largest value to be obtained from the petroleum sector lies ahead of us, and that these activities accordingly represent a very long-term and central industry for Norway.

The remaining resources can provide the community with substantial revenues for a long time to come. These depend on important factors such as continued technological development, and assume that the resources are managed in an efficient and sustainable manner while a strong focus is maintained on health, safety and the environment at all levels of these activities, and that the necessary attention is paid to fundamental environmental and fisheries interests.

In its Sem declaration, the government referred to the petroleum sector as follows:

> «The coalition government believes it is important to ensure that the petroleum sector remains a significant contributor to financing the welfare state and to industrial development nationwide in future. As a result, the basis must be laid for ensuring that the NCS remains an attractive area for value creation and investment, and that Norwegian companies can strengthen their competitiveness both on the NCS and internationally.

«The coalition government will therefore lay the basis for an industrial and technological development to get more out of the resources and reduce costs. Value will increasingly be created by technology and other human inputs. That calls for a greater commitment to research and technology development. Framework terms which make this possible must accordingly be established for the whole industrial cluster. That could contribute to increased internationalisation and large positive spin-offs for the Norwegian community.»

The state owns the resources and, as their manager, the government will accept responsibility for further development of the Norwegian petroleum sector.

Development of oil and gas operations on the NCS depends on the resource base and on the willingness and ability of the oil and gas industry to recover as much as possible of the resources in an efficient and sustainable manner. Estimated remaining petroleum resources total more than 10.6 billion standard cubic metres (scm) of oil equivalent (oe). Over more than 30 years of production, we have recovered some 3.3 billion scm oe. With the right management, the remaining resources can provide the basis for substantial value creation and activity.

Operations on the NCS have so far been dominated by investments relating to the major oil and gas fields, development of the gas transport systems and the build-up of expertise in Norwegian industry. We are now reaping the benefit of these investments, and will continue to do so for a number of decades to come. To produce new resources and enhance production from existing fields, however, major additional capital spending will be required.

The NCS faces several possible development scenarios. Naturally enough, these depend on such factors as trends in oil and gas markets – including prices – structural changes in the oil and gas sector, new technologies and the environmental chal-

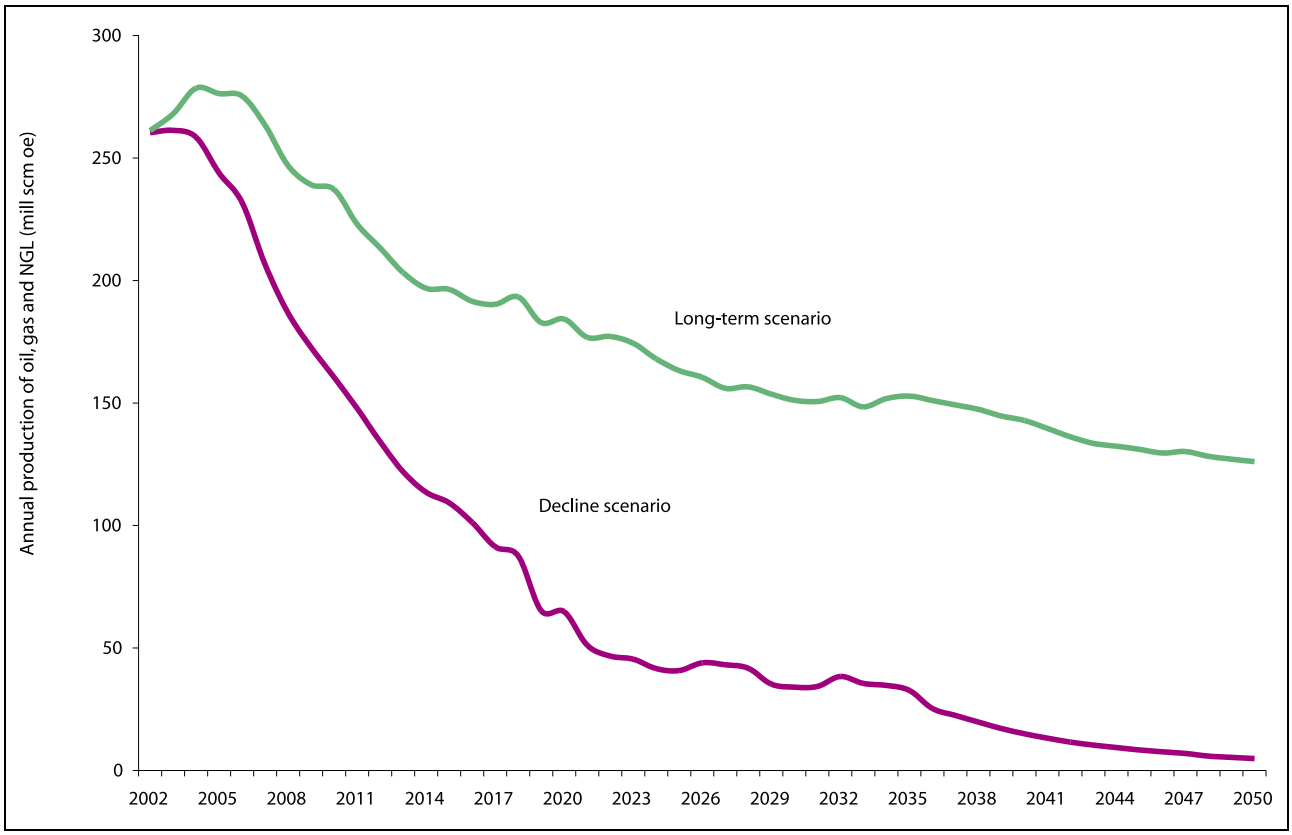

Figure 1.1 Two scenarios for petroleum production on the Norwegian continental shelf.

Source: Norwegian Petroleum Directorate/Ministry of Petroleum and Energy

lenges facing the industry. Developments also depend on a purposeful oil and gas policy to maximise value creation from the business.

Figure 1.1 illustrates two possible development scenarios for oil and gas production.

The lower of these involves production declining towards 2020, when oil output virtually ceases. This covers anticipated output from fields in production or covered by a development decision, and is termed the *decline scenario*. In the other scenario, production is maintained at a substantially higher level. This *long-term scenario* involves the realisation of profitable projects which ensure production of oil for at least 50 years and gas in a century-long perspective. The government's clear objective is to achieve the long-term scenario.

The decline scenario illustrates a trend in operations on the NCS where the industry and the authorities rest content with what has been achieved, reap returns from the investment made, and pursue policies which contribute to a relatively rapid phase-out of the oil and gas industry. Development of the NCS and Norway's oil and gas industry stagnates in the decline scenario over the next 10–20 years. This will result in substantially reduced income for the government and lower value creation for the industry by comparison with the potential for income and value creation inherent in the resource base. In addition, a trend of this kind would make an international commitment by the Norwegian petroleum industry more difficult.

The long-term scenario can be achieved if a commitment is made to efficient exploitation of the resource base. As the curve in figure 1.1 shows, the resources exist to sustain substantial oil and gas production towards and beyond 2050. This perspective is conditional on oil prices staying at a reasonable level and on a commitment by the oil and gas industry and the authorities to developing petroleum resources in a cost-effective manner. The aim is to secure the best possible resource utilisation and the highest possible value creation for the Norwegian community.

Figure 1.2 illustrates the two scenarios in terms of cumulative petroleum production from the NCS up to 2050.

The two curves reveal considerable divergences between production, value creation and government revenues. Over the period to 2050, the difference in value creation between the two scenarios totals NOK 2 000 billion in 2002 value[1]. This figure again underlines the importance of the

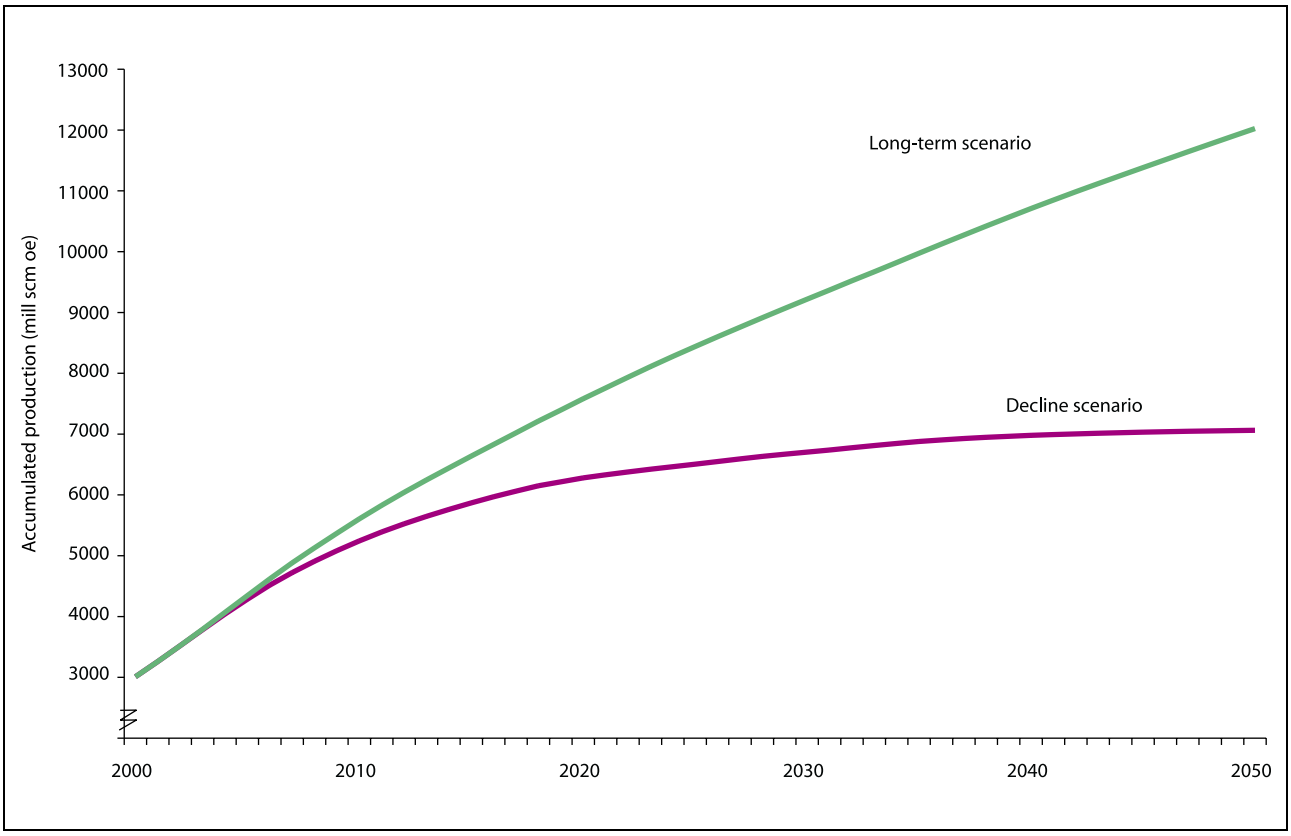

Figure 1.2 Two scenarios for accumulated petroleum production on the Norwegian continental shelf.

Source: Norwegian Petroleum Directorate/Ministry of Petroleum and Energy

government as resource manager working actively to ensure that operations on the NCS follow the long-term scenario so that value can be secured and realised.

Achieving the long-term scenario will be *very demanding*. This is partly because the most readily-accessible resources have been developed, and recovering those that are less accessible will be increasingly challenging. That job rests primarily with the oil and gas industry, but the resource potential of the NCS will not be fully realised without pursuing an aggressive policy to continue developing the petroleum sector. Unwillingness to make a commitment to the petroleum sector will be reflected in value creation and revenues for the Norwegian community and government which are substantially lower than the industry is capable of generating.

In this report to the Storting, the government will emphasise the value potential inherent in exploiting petroleum resources on the NCS and the big challenges which must be overcome to ensure the creation of that value. More than 30 years of experience in the petroleum sector demonstrate that these operations can be pursued within acceptable environmental limits. Cooperation between the various government authorities and the oil and gas industry has also shown that this business can coexist with other industries and considerations.

The government has the following objectives for its oil and gas policy:

- The government will ensure that the petroleum sector remains a significant contributor to financing the welfare state and to nationwide industrial development in future.
- The government will lay the basis for continued development of the petroleum sector by ensuring that the NCS remains an attractive area for investment, value creation and industrial development in Norway.
- The government will pursue ambitious environmental and resource management policies based on the goals of a sustainable petroleum business and coexistence between the petroleum sector, other industries and environmental considerations.

[1] These calculations are based on fixed 2002 kroner and the government's forecast for oil price trends. If a crude oil price equal to the 2002 level is achieved throughout the period, the difference between the two scenarios rises to NOK 4 000 billion.

- The government wants the petroleum sector to be a leading-edge industry with a strong focus on health, safety and the environment at all levels of the industry, and to base its operations on a goal of continuous improvement.
- The government will contribute to the internationalisation of the Norwegian oil and gas industry. This will provide the sector with development opportunities in addition to operations on the NCS, while experience from international activities can contribute to continued development of the NCS.

2 The petroleum industry and government measures

2.1 Norway's largest industry

The oil and gas business is Norway's largest industry in terms of value creation. For that reason, developments on the NCS are highly significant for the development of the Norwegian economy and for industrial growth. Oil and gas activities on the NCS account for a large proportion of government revenues through the state's direct financial interest (SDFI) in petroleum operations, the tax system and state ownership. The choices and decisions taken are thereby also very significant for the Norwegian community.

In 2001, the petroleum sector accounted for about 23 per cent of Norway's gross domestic product. That corresponds to almost three times the combined value creation by manufacturing industry, or about 15 times the total for the primary sector. Petroleum operations provided roughly 45 per cent of Norwegian exports[1]. The export value of the petroleum sector came to NOK 307 billion in 2001, about 10 times higher than for fish[2]. The industry's share of total real investment was roughly 22 per cent.

A principal objective of petroleum policy is to contribute to maintaining high value creation in the sector, while securing a large share of this value creation for the state. In 2001, the government's revenues from the industry amounted to NOK 245 billion, or 32 per cent of its total income. This figure includes a one-off sum of NOK 39 billion from the sale of SDFI assets. Income tax and net cash flow from the SDFI account for the bulk of the revenues. No other industry in the country comes close to generating government income on this scale. That makes the sector a key contributor to financing the welfare state.

The value of the Government Petroleum Fund at 31 December 2001 was just over NOK 610 billion.

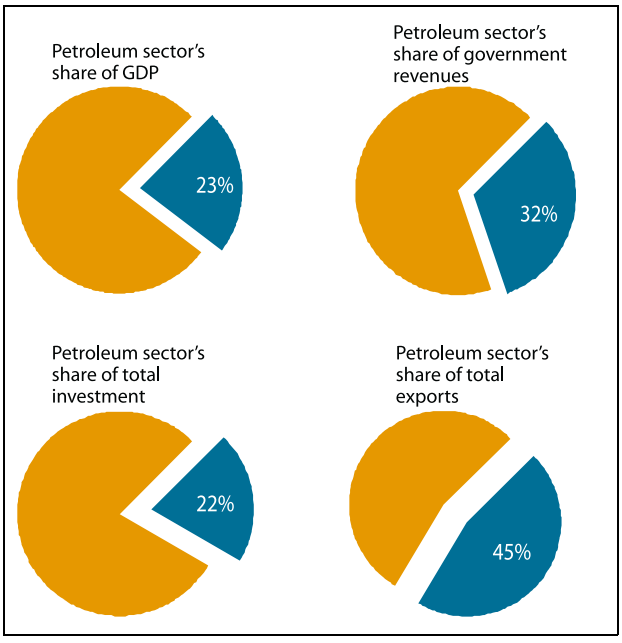

Figure 2.1 Macro-economic indicators for the petroleum sector 2001.

Source: Statistics Norway

2.2 Development opportunities on the NCS

Substantial opportunities are available to the oil and gas sector on the NCS. The interaction between the authorities and the industry's commercial and industrial players is crucial in this context. Developing and realising the opportunities for value creation and industrial activity offered by petroleum operations are primarily down to the oil and gas sector. Its players are the ones who possess and can continue developing the necessary technological, administrative, organisational and commercial expertise which is a fundamental requirement for creating value. For their part, the authorities must ensure that the industry has framework conditions which contribute to a sustainable and profitable oil and gas business.

[1] In 2000, the petroleum sector accounted for 24 per cent of GDP and 47 per cent of exports. Both 2000 and 2001 must be characterised as exceptional years because both production and oil prices were high. The petroleum sector's share of GDP and exports were roughly 15 per cent and about 35 per cent respectively in 1993–1997.

[2] The figure for petroleum sector exports includes only sale of petroleum products. In other words, foreign sales of other goods and services from this sector are excluded.

The resource base, oil market developments, technological advances, and health, safety and environmental considerations are basic factors affecting the industry.

The remainder of part I is devoted to reviewing the main features of policies covering the environment and relations with other users of the sea, exploration and licensing policy, oil and gas resource management and state involvement in the petroleum sector. (More details of each policy area are provided in part II of the report [not translated].)

2.2.1 Global energy requirements

The International Energy Agency (IEA) estimates that global energy consumption could rise by about 50 per cent over the next 20 years. Growth is expected to be particularly strong in the developing countries, where economic progress and efforts to reduce poverty will require a substantial increase in energy use.

Even with increased international awareness of and commitment to the development of renewable energy sources, global demand indicates that no significant alternatives to fossil energy bearers in the form of oil and gas are likely to emerge within a reasonable planning horizon. Although a greater range of energy sources and usage might emerge within a few decades, the great bulk of energy needs is likely to continue to be met by fossil fuels. Gas is expected to take a steadily increasing share of the market.

Generally speaking, it is desirable that a larger proportion of the world's energy supply comes from renewable and environment-friendly sources. Fossil fuels – coal, oil and natural gas – currently account for 90 per cent of global energy consumption. At present, the cost of renewable and alternative energy sources is high and supplies are still insufficient for these to represent a significant alternative to fossil fuels. It will take time before renewable sources can account for a larger proportion of energy supplies. So the world is likely to remain entirely dependent on fossil energy far into the present century.

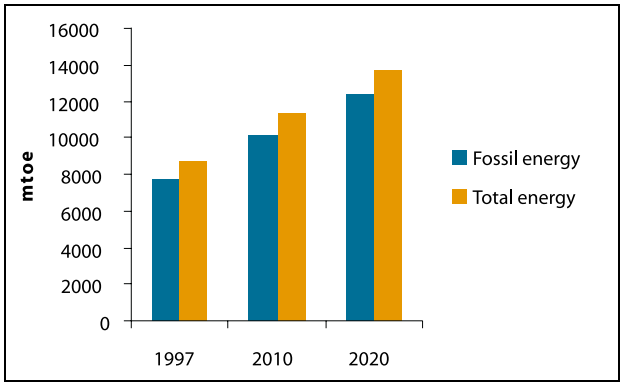

Figure 2.2 Global energy demand.

Source: IEA

The government will plan for and achieve a Norwegian status as a substantial petroleum producer and exporter in order to help meet future energy requirements. This will help to safeguard the security of energy supplies for our trading partners in the long term. At the same time, operations on the NCS must be balanced and harmonised with other considerations. The government takes the view that Norway is among the front runners for a sustainable and acceptable petroleum industry.

2.2.2 Important conditions affecting petroleum operations

The resource potential

Recoverable petroleum resources on the NCS were estimated to total 13.8 billion scm oe at 31 December 2001. Of this figure, 24 per cent had been sold and delivered, while 29 per cent were remaining reserves – fields in production, fields approved for development and discoveries which the licensees have decided to develop (see figure 2.3). The remaining resources are contained in projects not covered by a development decision. Twelve per cent of these have been found, while 28 per cent remain to be discovered. The final seven per cent of estimated resources relate to meeting the target for an average recovery factor of 50 per cent for oil and 75 per cent for natural gas.

Over more than 30 years of oil and gas production in Norway, we have recovered just under 3.3. billion scm oe. The remaining recoverable reserves are still very substantial, at 10.6 billion scm oe or almost 67 000 million barrels oe (boe). By comparison, daily production for the present year is expected to average about 4.5 million boe. In terms of energy content, remaining resources correspond to almost 1 000 years of Norwegian hydropower generation at today's level. Viewed from that perspective, the remaining recoverable resources are substantial and lay the basis for at least 50 years of Norwegian oil production and gas output in a century-long perspective.

Figure 2.4 shows remaining reserves for projects already in production or covered by a development decision – in other words, projects which we know with a relatively high degree of certainty will be implemented. This figure also presents total remaining recoverable resources – in other words,

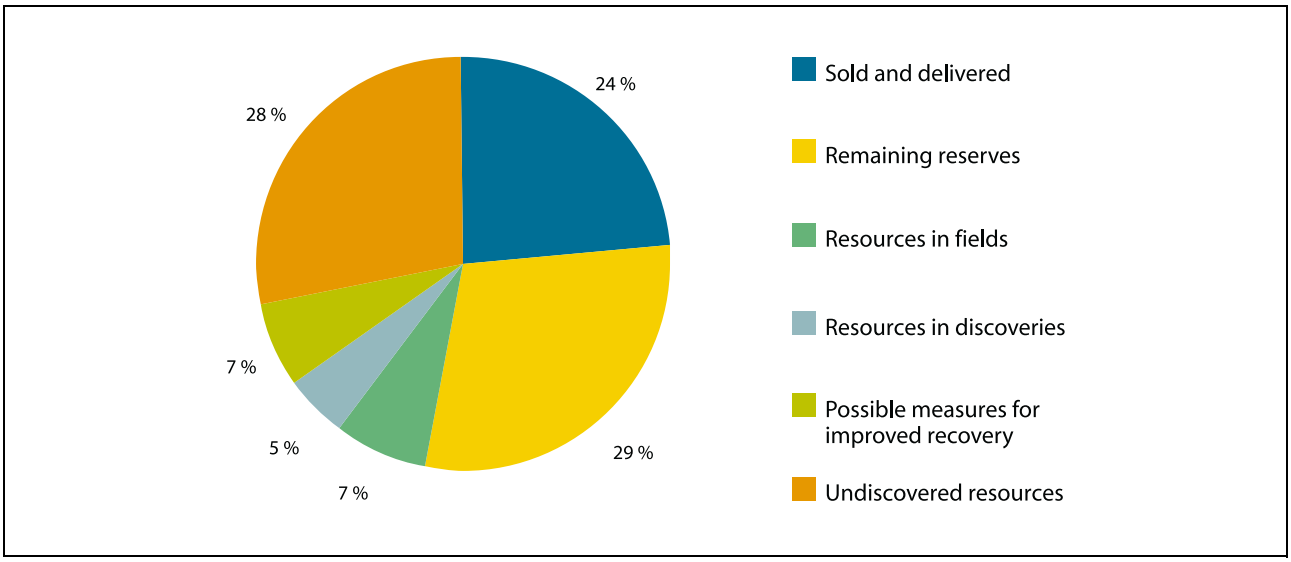

Figure 2.3 Total recoverable resources by resource category.

Source: Ministry of Petroleum and Energy, Norwegian Petroleum Directorate

resources which are expected to be producible providing certain conditions are met. The large circle represents the volume of resources with the long-term scenario, while the small one displays resource recovery in the decline scenario.

The figure illustrates that licensees must decide on a number of new developments if the long-term scenario is to be achieved. These include projects on existing fields, discoveries and undiscovered resources. Measures for improving the recovery factor on existing fields, for instance, involve big assets but also substantial costs and technological challenges. Reaching the recovery factor target of 50 per cent for oil and 75 per cent for gas represents a major and important challenge for players on the NCS. Realising existing discoveries and undiscovered resources poses corresponding technological and cost challenges. To succeed, the whole oil and gas industry must make an active and conscious commitment.

A principal objective of the government's oil and gas policy is to help achieve the long-term scenario – in other words, oil production for 50 years and gas output in a century-long perspective. As the resource owner, the government must lay a basis which ensures that the oil companies find it attractive to continue development of the NCS. This will ensure that the petroleum industry wants to explore for, develop and produce the country's oil and gas resources. The community would otherwise lose very substantial value.

The oil market

Oil prices are very important for the way exploration and investment activities develop on the NCS. For the long-term scenario to be achieved, oil prices must remain at a reasonably high level. Low oil prices can make fields unprofitable and reduce exploration and investment opportunities for oil companies on the NCS.

We experienced this in Norway from 1998 to 1999, when oil prices declined towards USD 10 per barrel. From 1997 to 2000, the number of exploration wells on the NCS was reduced by more than 50 per cent. There was also a dramatic decline in

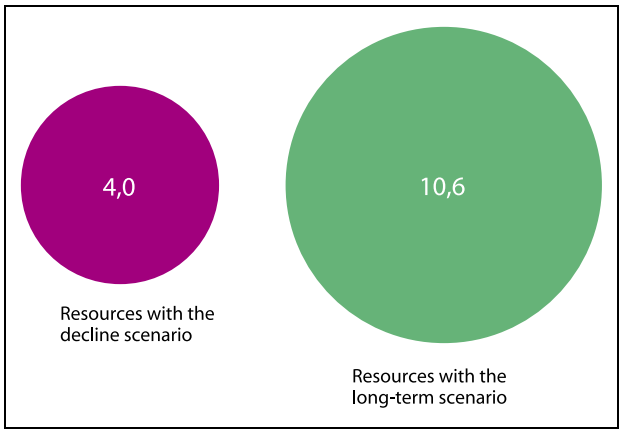

Figure 2.4 Remaining resources with the decline scenario (producing/decided projects) and the long-term scenario (total recoverable resources), billion scm oe.

Source: Ministry of Petroleum and Energy, Norwegian Petroleum Directorate

the number of new fields which licensees decided to develop during the period. This demonstrated that the oil companies responded quickly to low oil prices, and that these prices need not be depressed for long before the impact on exploration operations and new field developments is felt.

Oil market developments

If the oil price is to remain at a reasonably high level, two conditions are particularly important. First, demand for oil must be adequate. Second, the producers – primarily the Opec countries – must adapt their oil output to keep the market in balance.

World demand for oil increased annually by about one million barrels per day in the 1990s. This growth was greatly affected by developments in the former Soviet Union, where oil consumption declined sharply. Over the past few years, the expansion in oil consumption has been very small because of low economic growth, mild winters and reduced travel following the events of 11 September 2001. In the long term, market forecasts indicate an annual growth in demand of at least 1.5 million barrels per day.

A key role in production developments is played by Opec. Its member countries exert considerable influence on oil prices because they possess large oil reserves and spare production capacity.

Opec has existed for 40 years. There are good reasons for supposing that it will remain an important oil market player in a long-term perspective. This will make an important contribution to ensuring that the development of oil production is reasonably balanced against the growth in demand, so that an oil price at a reasonably high level can be maintained.

The Ministry's oil price forecast is based on steady growth in oil demand over the next five to 10 years, and on the assumption that this increase will exceed the expansion in non-Opec production. A development along these lines will make it possible for the Opec countries and other players to keep the market in balance.

Norway's role in the oil market

Norway is a relatively large player in the oil market. It ranks as the world's third largest crude oil exporter and its sixth largest producer of oil (including natural gas liquids). Norwegian oil output accounts for about five per cent of the world market for crude. This means that, in given circumstances, we can exert short-term influence on the oil price and developments in the oil market. In the longer term, however, the oil price will be determined by fundamental supply and demand conditions over which Norway has insignificant influence.

Norway wants stability and predictability in the oil market, and an oil price at a reasonably high level. The most important reason for this objective is to ensure stable development of operations on the NCS.

Production regulation is the most important instrument available to Norway for influencing oil prices. Norwegian oil production has been reduced on three occasions to help stabilise the oil market and prices – from 1987–1990, from 1998–2000 and most recently from 1 January 2002.

Norway has emphasised that this regulation is unilateral in character, and not part of any formalised agreement-based collaboration with Opec or other producers. Norway alone cannot influence developments in the oil market. Norwegian measures presuppose that other producers also adopt effective measures to help stabilise oil prices at a reasonably high level. Furthermore, our measures will be suspended if other countries fail to take similar action, or if our assessment of the market situation so warrants.

Regulation of Norwegian crude oil production will be a temporary agreement in response to an exceptional market situation, and will not be a permanent element of Norwegian market policy. Norway will not enter into any formal cooperation with other producing countries on production regulation.

The government will:

– *monitor developments in the oil market, and possibly contribute with measures to regulate production if the level of activity on the NCS suffers as a consequence of conditions in the oil market.*

Technology and expertise

The petroleum industry will be even more knowledge-based in future. Developing and implementing new and more cost-effective technologies represent an important element in this industry's progress. Development of the remaining resource base must be based to a great extent on technologies which are not available today, but which have to be created. That will make it possible to produce oil and gas from ever more technically-challenging fields. In addition, new technology will contribute to the required cost reductions. That is also cruci-

ally important for international competitiveness. And cost-effective technologies developed to enhance resource utilisation will contribute to ever safer and more environment-friendly development and production solutions.

As the resource owner, the government has a substantial interest in ensuring maximum value creation from the industry in future. The resource base provides great opportunities, but these require that major technological and expertise-related challenges in developing oil and gas resources are solved. Technologies and expertise must be viewed in conjunction with each other. A high level of expertise is required to develop and apply new technology. The highest quality of expertise is essential for competitiveness, value creation and a sustainable petroleum industry. Consequently, a commitment to technology development will yield desirable results which extend far beyond new technical solutions alone. A constant commitment to developing and maintaining technology and expertise accordingly represents a key requirement for an efficient industry which will be sustainable with the long-term scenario.

Given the value creation potential and technical challenges on the NCS, a growing need has arisen over time for an overall review of the national research and technology commitment in this sector. Such a review will be important in assessing the establishment of a more holistic and purposeful system for technology, research and development directed at the petroleum sector. The Ministry of Petroleum and Energy took the initiative on the strategic Oil and Gas in the 21st Century (OG_{21}) collaboration to undertake such a review.

The government has the largest financial interests in the oil and gas business, and will gain from securing value creation opportunities and the potential for enhanced competitiveness through the development and use of new technologies. As a result, the authorities will lay the basis for the companies to continue their commitment to developing and applying new technologies.

In its Sem declaration, the government specified that it wishes to make a commitment to research and technology development in the petroleum sector. In its Recommendation no 222 (2001–2002), the Storting has asked the government to consider measures to strengthen the research and development commitment in this industry.

The government will return in more detail to the question of the public sector's research commitment in connection with the central government budget for 2003.

The government will make a commitment to the development of new technologies and expertise in order to:

- *enhance research utilisation and long-term value creation in both new and existing fields and discoveries*
- *achieve environmental improvements and efficiency enhancements in exploration and production*
- *strengthen commercial competitiveness and internationalisation.*

Health, safety and the environment

Safeguarding health, safety and the environment (HSE) for employees in the petroleum sector is a fundamental requirement for future development of these operations and for value creation on the NCS. That calls for strategies which seek to reduce relevant risk factors, but which also pursue opportunities for enhancing value creation by investing in HSE. This requires that management strategies for HSE are included as a natural component in value creation strategies.

On 14 December 2001, the government presented a separate Report no 7 (2001–2002) to the Storting on health, safety and the environment in petroleum operations (the HSE report). This emphasised the expectation that the industry will give weight to HSE in planning and decision-making processes as well as in pursuing petroleum activities.

The report identifies unfortunate development features which are considered to be unacceptable, measures which must be implemented, and where the primary responsibility for their implementation rests. It clarifies objectives for continued development in the HSE area, and makes the industry and the authorities responsible for meeting the demand for continuous improvement enshrined in the regulations. The report identified the HSE culture in the industry as a priority area. A key requirement in this context is that the industry applies a unified understanding of and approach to HSE.

The government wants:

- *the petroleum business to be a leading-edge industry with a strong focus on health, safety and the environment at all levels, and to base its operations on a goal of continuous improvement.*

2.2.3 Sustainable petroleum activities

The need for continued coexistence between important social interests such as petroleum activi-

ties, the fishing industry and environmental considerations will be important for the opportunities to develop the resource potential of the NCS in order to achieve the long-term scenario. However, value creation and prosperity in Norway must continue to rest on further industrial development based on living marine resources. It will accordingly remain important for the oil industry to accept responsibility for ensuring that fishing and environmental considerations form an integral part of its operations from the planning phase, and continuously to explore opportunities for adopting additional measures to meet the environmental challenges facing the industry.

Activities such as exploration for and development, production and transport of oil and gas involve discharges to the sea and emissions to the air. Through moorings, pipelines, cables and piles of drill cuttings, oil and gas operations can also have a physical impact on the seabed. The various discharges/emissions are regulated through a broad range of instruments. More than 30 years of petroleum operations have demonstrated that it is possible to pursue such activities within acceptable environmental limits and in coexistence with other maritime-based industries, such as fishing. This experience also applies to the 20 years of petroleum operations in the Barents Sea. Activities in the latter waters have so far been limited and confined to exploration. Reasons why it has been possible to operate acceptably in line with this coexistence model include the fact that petroleum operations have been regulated from an early stage by the Petroleum Act and its appurtenant regulations, which imposed early requirements for impact assessments – including an assessment of environmental impacts. This has laid the basis for value creation based on both valuable oil and gas resources and rich fish stocks. In Report no 12 (2001–2002) to the Storting on protecting the riches of the seas, the government presented proposals for a more holistic and ecosystem-based management of our sea areas.

The government has initiated an impact assessment of year-round petroleum operations in the area from Lofoten to the Barents Sea. This is an important measure aimed at securing continued coexistence between the petroleum industry and other important social interests, such as the fishing sector and the environment.

Discharges to the sea from petroleum operations primarily include oil, other organic compounds, chemicals and heavy metals. The most important sources of continuous discharges are produced water, drilling and well operations. The Storting has set a target of zero environmentally-harmful discharges to the sea by 2005. See Report no 58 (1996–1997) to the Storting. This target was more explicitly stated in Report no 12 (2001–2002) to the Storting, and work is under way.

Emissions of carbon dioxide, nitrogen oxides and nmVOC[3] to the air from petroleum operations account for a substantial proportion of national emissions of these gases. A cost-effective approach to the application of countermeasures will benefit both the economy and the environment because it will ensure the largest improvement for each krone applied to environmental measures, and will reduce the overall cost of meeting Norway's environmental obligations.

Technological advances could contribute to good solutions for many of the environment-related challenges facing petroleum operations. New technologies which can help to reduce the environmental loads imposed by the petroleum industry's discharges to the sea and emissions to the air are under development.

Opportunities to select new technologies are normally greater for new developments than on existing fields. Technological progress is accordingly only one of several responses to the environmental challenges facing the industry. Given the long-term perspectives for Norwegian oil and gas operations, there are good reasons for making a commitment to technological development in order to respond to environmental challenges in the longer term. The market is likely to assign increasing value to good environmental solutions in all industrial operations. Early development of such solutions could therefore also provide a competitive advantage in the oil and gas industry.

The government will:

- *ensure that collaboration between the authorities and the industry is further developed to achieve the target of zero discharges of possible environmentally-harmful substances to the sea by 2005*
- *on the basis of these zero discharge efforts, make a further commitment to environmental research – in part to meet the challenges faced at the interface between petroleum operations, fishing and the environment*
- *initiate a research programme on the long-term effects of petroleum-related discharges to the sea, in cooperation with the industry*
- *make a commitment to research and development of technology which contributes to more*

[3] Non-methane volatile organic compounds.

cost-effective solutions for environment-related challenges facing petroleum activities
- *be committed in future to measures for meeting obligations on emissions to the air which are cost-effective in social terms.*

2.2.4 Exploration and licensing policy

The goal for exploration operations is to identify petroleum resources as the basis for profitable development and production, and to secure a stable and continuous level of activity. Exploration and licensing policy will lay a basis which allows the companies to draw up exploration strategies that can ensure socio-economically profitable development and production of oil and gas on the NCS.

How policy instruments are designed and combined depends on the maturity of the various geological provinces. Traditionally, licensing policy has divided the NCS into the North, Norwegian and Barents Seas. Great variations exist between these regions with regard to the resource base, maturity, established infrastructure and environmental challenges. These make different demands on exploration strategies, development and production solutions and consideration for other industries.

Overall, about 60 per cent of the NCS has been opened for exploration. Nine per cent of the open area is currently allocated in the form of production licences.

From the summer of 1966 until 2002, a total of 628 exploration wells have been drilled. Discoveries have been made by 254 of these. (That provides an average discovery frequency of 40 per cent, a very good performance by international standards. This frequency also includes non-commercial discoveries.

Pursuing an exploration and licensing policy which takes due account of the environment, safety and other industrial interests is a priority. Within exploration and licensing policy, two processes in particular give a central place to environmental and fishery considerations. These are the opening of new areas to petroleum activities, and the award of production licences through licensing rounds.

Before production licences can be awarded in an area, it must have been opened for petroleum operations by the Storting. In connection with such an opening, the Ministry of Petroleum and Energy is responsible for preparing an impact assessment) of petroleum operations which identifies environmental, fishing and other community interests in the area. This process ensures that the interests affected are heard and that a decision to open is based on a solid scientific foundation.

Parts of the NCS were opened to petroleum operations at an early stage without any overall assessment of the impact which these activities and emissions might have on the environment. The Petroleum Act of 1985 incorporated provisions which required impact assessments of exploration operations to be made before opening new areas, while development and operation should be subject to an impact assessment in connection with possible plans for development and operation of each field. Subsequently, operators were also given the opportunity to perform regional impact assessments for existing and planned operations.

Before announcing a licensing round, the Ministry of Petroleum and Energy, together with the Ministry of the Environment and the Ministry of Fisheries, implements a process in which fishery and environmental considerations are assessed for the blocks considered relevant for inclusion in the round. On the basis of these assessments, the government decides which areas are to be put on offer and which environmental and fishery-related conditions should apply. The latter can be both general and block-specific.

Challenges in different parts of the NCS

The *North Sea* is the best-explored region of the NCS. After more than 30 years of exploration and production, large parts of these waters can be regarded as mature. Both the authorities and the companies have a good geoscientific understanding of the region, but areas still unexplored exist in parts of the North Sea and in the Skagerrak, which have not been formally opened to petroleum operations.

One challenge in the North Sea is to ensure timely drilling of prospects close to existing or planned infrastructure. Unless small discoveries in such areas are produced while the large installations remain in operation, there is a risk that producing a number of them will never be profitable.

The biggest contribution to resource growth over the past decade has come from exploration operations in the *Norwegian Sea*. Stepwise exploration of this area through a corresponding allocation of production licences could ensure effective coordination and utilisation of field centres, pipelines and land-based terminals.

The Norwegian Petroleum Directorate's resource calculations show that the *Barents Sea* could have a substantial potential. New seismic survey data collected in the Barents Sea project,

combined with the results of drilling in recent years, will contribute to increase understanding of the regional geology and to further mapping of potentially recoverable petroleum resources.

To achieve the long-term scenario, with production of oil for 50 years and gas in a century-long perspective, new resources must be proven. This makes big demands on exploration operations. The authorities must ensure effective utilisation of licensed areas through the award of acreage opened to petroleum operations.

Exploring all areas opened to petroleum operations in an effective manner is important for ensuring resource availability. That applies particularly to acreage with high prospectivity – in other words, where the likelihood of making commercial discoveries is good. This implies that it must be possible to include already-opened areas which pose environmental and fishing challenges in future licensing rounds. However, special environmental and fishery-related conditions must be imposed on exploration within these areas.

The government has initiated an impact assessment of year-round petroleum operations in the Lofoten-Barents Sea area. Results from this study will form an important basis for the government's evaluation of future petroleum activities in these waters. A possible process for opening the remaining parts of the southern Barents Sea and the Norwegian Sea which have not been opened to petroleum operations must wait until this assessment has been completed.

Framework conditions

The award of production licences and the scope of such allocations represent an important element in the framework conditions governing the industry and the regulatory system applied by the authorities to the NCS.

In this report, the government presents a proposal which aims to make the award of new production licences in mature areas more efficient. To simplify the allocation process and enhance its efficiency, the government intends to establish fixed, pre-defined exploration areas in mature parts of the North Sea. It will also be relevant to include mature areas of the Norwegian Sea. This proposal implies that it will no longer be necessary to pursue a process of announcing blocks in connection with the annual awards.

The selected areas will in future form the basis for annual awards in mature areas. Companies will accordingly know which acreage they can apply for in the subsequent year. A system is envisaged in which companies can submit applications at any time during a year, with the authorities once a year – on 1 September, for instance – considering the applications received until that date. Acreage would subsequently be awarded before the end of the same year.

Most future discoveries in mature areas are likely to be relatively small. As a result, the industry also needs regular access to immature acreage with higher prospectivity. The numbered licensing rounds will thereby focus in future on such immature areas.

One challenge for licensing policy is to avoid an accumulation of acreage in companies which do not work actively with these holdings. Until now, production licences have been awarded for an initial exploration period of up to 10 years, but generally for six. The combination of a long initial period and today's frequent awards in mature areas, in particular, could lead to an unfortunate accumulation of acreage in companies. To avoid such circumstances, the Ministry wishes to adjust the length of the initial period and the work obligation to accord with the maturity and level of exploration of an area.

Report no 39 (1999–2000) to the Storting on oil and gas operations introduced the system with group applications throughout the NCS and licensing rounds in the Norwegian Sea every other year. Following the 17th licensing round, it would be appropriate to assess the experience gained with these new arrangements. In such a review of 17th round experience, the Ministry also considers it appropriate to assess the processes relating to nominations ahead of the announcement, and the frequency of rounds.

Players

Statoil, Norsk Hydro and the major international oil companies have traditionally been the dominant players on the NCS. This has been a natural consequence of the technically and financially demanding character of petroleum operations. Since great differences in maturity and level of exploration now exist on the NCS, it would be appropriate to reflect this in the range of players involved. The big players who can undertake demanding and capital-intensive projects are still required, but it is important at the same time to bring in companies which focus on small projects and tail end production. In that connection, the Ministry has established a system for prequalifying licensees and operators. This system offers companies an evaluation of their suitability for participation on the

NCS before they devote resources to considering commercial opportunities.

Summary

The government will:

- *ensure that the industry has regular access to prospective acreage*
- *implement a licensing system which differentiates to a greater extent between mature and immature areas, not least through the length of the initial licence period and its work obligations*
- *make the award of new production licences in mature areas more efficient, including fixed, predefined areas with specified general conditions relating to the environment and fisheries, which will form the basis for future annual awards in mature areas*
- *specify requirements for faster exploration of future production licences in mature areas than has hitherto been usual*
- *assess experience gained in the 17th licensing round, including group applications for the whole NCS, nominations before a round is announced, and the frequency of rounds in immature areas*
- *challenge the industry to a dialogue on exploring acreage already awarded.*

2.2.5 Oil management for enhanced value creation in mature areas

Although Norway has produced oil for over 30 years, more than 60 per cent of its total crude oil resources remain to be recovered. Remaining oil resources in producing fields represent a substantial proportion of this total. Providing the appropriate basis is laid, Norway could continue to produce oil for at least 50 years.

Many fields on the NCS are in a mature phase, with declining output and rising operating costs. Production from these fields will be phased out in a short space of time unless special measures are adopted. This presents the companies with demanding challenges for reducing operating costs, extending field lifetimes and improving resource utilisation. Operations on a number of fields must be extensively reorganised. That requires a certain resource base to be profitable, however, and the decisions required are accordingly time-critical in many cases. As a result, operations on the NCS are entering a new era, when decisions which must be taken within a short space of time will help to determine whether the long-term scenario can be attained.

If valuable resources are not to be left below ground, there must be a willingness to consider a broad range of measures to improve efficiency. These could include:

- replacing existing installations with fewer, better-adapted units
- expanding the use of or initiating new methods for improved recovery
- adopting new technology
- intensifying exploration for and phasing in additional resources, so that processing and transport capacity can be exploited efficiently
- simplifying existing work processes, including an assessment of moving jobs to land
- coordinating logistical and other support functions
- strengthening collaboration across production licences
- restructuring licence participation interests, including the introduction of new players with leading-edge expertise.

This list is not exhaustive, but is intended to show that new challenges could require new solutions. In such a context, there must be a willingness to think innovatively so that the resource potential is better utilised.

A substantial value potential lies in improving the recovery factor on the NCS. Many of its producing fields contain such large resources that even a marginal increase in this factor will yield large producible oil volumes. The remaining oil volumes in the 10 largest fields currently total about four billion scm. This is almost twice as much as all the other oil fields put together.

The government believes that raising the expected average oil recovery factor from its present level of 44 per cent to at least 50 per cent should be a common goal for both the authorities and the industry. Licensees in the relevant production licences, and particularly the operating companies, are the key players in this process. It is first and foremost they who must convert the challenges into solutions which contribute to enhanced value creation.

Given the need for change, the government must be willing to consider whether established principles and the prevailing policy framework create the right incentives for enhanced value creation, and possibly adapt policies to ensure that the resources are not wasted. Assessment of recovery factor improvements must be weighed against environmental considerations. The government would emphasise the significance of all players in the oil and gas industry supporting value creation

measures, even if these involve big changes. Major assets would otherwise be lost to the community because we fail to exploit the opportunities while we have them. The government believes that licensees on the NCS have the expertise and willingness needed to secure maximum resource utilisation.

2.2.6 Gas management and enhanced value creation

Norway's gas sector is experiencing important changes. The Gas Negotiating Committee (GFU) was permanently terminated on 1 January 2002, and the companies are now selling their gas on an individual basis. Terminating the GFU was prompted by the increased maturity of the NCS. The need for joint gas sales to accomplish new projects had been reduced. At the same time, the gradual opening-up of the European gas market means that companies on the NCS wished to participate along the whole gas chain, making the opportunity to sell their equity gas more important to them. The gas market is also becoming more short-term, and the GFU arrangement – with source-neutral sales and subsequent allocation – was less suited to selling gas in such a market.

Each company is now free to choose the level of its own sales and to conclude gas sales contracts with buyers within limits determined by production permits issued by the Ministry for each field. The authorities will monitor the gas markets and the development of company-based gas sales.

The authorities will continue to exercise control over resource management by awarding production licences, approving and, where appropriate, attaching conditions to plans for development and operation (PDOs), plans for installation and operation (PIOs) and contracts concluded on the NCS, specifying appropriate licence periods, issuing production permits for natural gas – in part to ensure optimal liquids production – and regulating the gas transport system.

A separate company, Gassco AS, has been established to operate the gas pipeline network and thereby ensure neutrality and efficiency in the operation and development of this transport system. Further changes to the organisation of the regime have been initiated. The gas market directive has been incorporated in the European Economic Area agreement, and will be fully implemented in Norwegian legislation. Licensees have reported to the Ministry that they are agreed on the terms for establishing new joint ownership of the gas transport system on the NCS. A unified infrastructure will lay the basis for efficient use and new construction. At the same time, the Ministry is working to frame new regulations for access to the pipelines and for setting tariffs.

The changes to the Norwegian system for resource management mark the start of a new era in the country's gas operations. These modifications aim to ensure value creation on a long-term basis. That means securing efficient development of gas resources on the NCS.

The government will:
- *monitor gas markets and developments in company-based sale of gas*
- *safeguard resource management through acceptable and efficient development and production of gas resources on the NCS*
- *contribute to ensuring that Gassco is an efficient and neutral operator of the gas transport system, including being responsible for its continued development*
- *establish a more efficient and flexible access regime for the gas transport system, and simplify the tariff structure*
- *follow up the establishment of a new joint ownership structure for the gas transport system*
- *work to achieve a more efficient utilisation of the North Sea gas transport system and Norwegian-British operational synergies by creating closer links between the UK and Norwegian oil and gas industries.*

2.2.7 The petroleum industry

One of the most important challenges facing petroleum operations is to create a better understanding of this sector's significance for the Norwegian economy, and of the future opportunities it represents. This business is a fundamental value creator in the community, and has a time frame which extends significantly further than most of our industrial activities. This means in part that young people must be encouraged to see future and career opportunities in the petroleum industry. Knowledge and expertise are crucial for exploiting the resource base on the NCS and for the industry's continued development. That makes it necessary to create a common understanding of the realities of the petroleum industry's opportunities and needs.

KonKraft

In a dialogue with the Norwegian-based oil and gas sector, the Ministry of Petroleum and Energy has

worked to respond to the many challenges facing the industry and the authorities. The aim is to strengthen the competitiveness of the NCS and the industry. This process is known as *KonKraft*.

All parts of the petroleum industry are represented in KonKraft. An important part of its work is to create a long-term vision for the industry, which reflects the long-term development perspective for this sector, and to identify and implement measures which support that vision.

The Norwegian-based oil and gas industry

The Norwegian-based oil and gas industry has expertise in all phases of the business – exploration for as well as development and production of oil and gas, including land-based operations. This industry is defined as the Norwegian oil companies, the supply companies , and research and educational institutions related to the petroleum business.

About 74 000 people were directly employed in oil and gas operations in 2001. The industry has great macro-economic significance in Norway. Value creation per person employed in the industry, expressed as GDP per person employed, exceeded NOK 4.3 million in 2001, when the export value per person employed totalled more than NOK 4.1 million. This represents a high value creation per job. Big regional variations exist in the significance of the industry for employment. Most of the jobs have so far been concentrated on and near the coast of Rogaland and Hordaland countries. Nevertheless, the industry employs substantial numbers along the whole Norwegian coast and in the Oslo/Akershus region. About 1 000 skilled workers live in typically inland counties.

Research and educational institutions represent a significant component of the oil and gas sector. They perform a fundamental function in the industry through education, further education, and research and development of new technology and applications. The research institutions do long-term basic work, but also more short-term projects commissioned by the industry. Activity in these organisations is heavily influenced by developments on the NCS. Long-term and continuous progress in research appropriations and assignments is important for maintaining and developing expertise at these institutions.

Impact on other industries

Oil and gas operations involve very substantial investment and operating costs. Capital spending in 2001 exceeded NOK 60 billion, while operating costs came to about NOK 30 billion. These expenditures generated big demand for products and services from the supply industry, but also a high level of demand for related industries. The indirect economic effects on both employment and production in land-based sectors are substantial. The Federation of Norwegian Manufacturing Industries (TBL) has estimated that petroleum operations indirectly contribute to about 220 000 jobs spread over the whole country. Local and regional spin-offs from this demand are accordingly very important.

In general, the oil and gas industry is a very important prime mover for innovation and development of technology and work processes in other Norwegian industry. Particularly close ties exist between the oil and gas business and the information and communication technology (ICT) sector, and between the oil and gas business and the maritime industry, the finance sector and the rest of Norway's energy industry. These industries interact with many others, but studies[4] show that the pace of innovation and growth is usually higher in those sectors which deal with the oil and gas business. That has been documented in particular for the ICT and maritime industries. This illustrates the importance of oil and gas operations as a driving force and prime mover for other Norwegian industrial activities. Great opportunities are also available here for developing internationally competitive industrial operations at the interface between the oil and gas business and other sectors. One example is the opportunities relating to remote operation of offshore installations, at the interface between the ICT and petroleum industries. Studies show that as much as 50 per cent of the investment in an offshore installation relates to ICT[5].

For the finance sector, the oil and gas industry cannot be identified to the same extent as a prime mover in developing a commercial advantage in special segments. Major challenges face the sector in this area, however, including future asset management and services relating to the whole petroleum industry.

Many links exist between the oil and gas industry and other energy-related activities in Norway. Several of the major oil companies are involved in the electricity market, energy utilities want to participate in upstream gas operations, and the supply industry sees major opportunities in the

[4] Karlsen, Rogaland Research 2002.
[5] Source: Telenor ASA.

sale of products and services to the energy industry. Several of the major international oil companies have established subsidiaries to develop alternative energy sources, such as wind and solar power.

A competitive Norwegian-based oil and gas industry represents a good starting point for continued development of Norway as an energy nation. Expertise built up in the oil and gas sector can lay the basis for a commitment to other energy forms. A gradual decline of the Norwegian oil and gas industry could hinder innovation in and development of related energy industry. Today's policies will accordingly be crucial for Norway's future development as an energy nation.

Location and ownership

The extent to which players are part of the Norwegian-based oil and gas industry depends on how far an enterprise contributes to value creation in Norway. A Norwegian location for head offices and units for technology development is an important parameter in assessing whether an enterprise helps to strengthen the oil and gas sector and Norwegian industry in general. An important condition for long-term development of the Norwegian-based oil and gas industry is that companies with strategic significance in the value chain are rooted in Norway.

The Norwegian oil companies have been and are prime movers in building up a national supply industry, and in exploiting the resource base on the NCS. Keeping the head offices of these companies in Norway will remain important. Foreign enterprises with offshore-related operations in Norway are also very valuable for developing the NCS. This presence gives important signals about a long-term involvement on and commitment to the NCS.

Consolidation and acquisitions in the petroleum sector mean that many enterprises which were originally Norwegian-owned now have foreign majority owners. That applies, for instance, to companies in seismic surveying and drilling operations. To the extent that foreign owners choose to move such enterprises out of Norway, this can undermine the Norwegian petroleum community and value creation in Norway. Both the industry and the authorities face challenges here, relating to the location of enterprises.

Internationalisation

The future of the Norwegian oil and gas industry depends on its international success. Internationalisation provides development opportunities to supplement operations on the NCS. Apart from direct effects on the Norwegian economy in the form of revenues and activity, internationalisation is crucial for the long-term competitiveness and growth of companies. International competitiveness is important for learning, innovation and development, and essential in maintaining a good growth capability in the petroleum industry.

Substantial interactions occur between activities at home and abroad. Strong progress with technology for the NCS has been and will remain an important springboard for continued internationalisation by the Norwegian oil and gas industry. At the same time, international research projects are crucial for further development on the NCS.

The significance of a competitive oil and gas industry for continued development of the domestic market

Continued development of the NCS depends on a competitive oil and gas industry rooted in the domestic market. The NCS is dependent on an industry which wants to contribute to long-term development of the industry. Extracting the substantial remaining resources on the NCS will be ever more demanding in terms of technology and cost. That applies not least to the deepwater areas. In this perspective, applying the best experience, expertise and research results – including from international projects – will be crucial for achieving cost-effective recovery of Norwegian petroleum resources. It is important that framework conditions, including research and development appropriations, are shaped to ensure that the industry can adopt a long-term perspective on Norwegian offshore operations.

Its jobs, value creation and impact on other industries make the oil and gas sector an important prime mover for Norwegian industry. It will be important that we maintain a high level of activity in Norwegian oil and gas operations and keep important functions in Norway. This is important for dynamism and for the development of technology and expertise. Good progress by the industry is essential for its ability to operate internationally. On the other hand, international competitiveness is essential for fully realising the value held by an industry working on the NCS. It is important that

the authorities lay the basis for ensuring that we retain a competitive industry.

Summary

The government will:
- *support the Norwegian petroleum sector by helping to maintain a stable level of activity and industrial, technological and expertise-related development*
- *work actively to secure continued development of the Norwegian oil and gas business through KonKraft*
- *work to lay the basis for a competitive oil and gas industry based in Norway*
- *contribute to internationalisation of the Norwegian oil and gas industry.*

2.2.8 State involvement in petroleum operations

The state's direct financial interest (SDFI)

The government will continue to take interests in selected new production licences and permits for installation and operation, on the basis of profitability and resource potential. In supplementary awards, the holding taken by the SDFI will generally reflect its interests in adjacent fields or areas.

The restructuring carried out has been very extensive. Over the next few years, the Ministry of Petroleum and Energy will place great emphasis on ensuring that the increase in value creation expected from these measures is actually achieved. The government has no current plans for further sales of SDFI assets.

Petoro AS

Petoro manages substantial assets on behalf of the government. The company's principal task is, on a commercial basis, to maximise the possible economic value of the state's oil and gas portfolio. Its key duties are accordingly:

1. Managing the state's participatory interests in partnerships where such interests are held at any given time.
2. Monitoring Statoil's sale of petroleum produced by the SDFI, in accordance with the sales and marketing instruction given to Statoil.
3. Financial management, including accounting, for the SDFI.

The Ministry of Petroleum and Energy expects Petoro to concentrate its appropriated funds, resources and expertise on these duties. It is the company's responsibility to ensure that its priorities are in accordance with the three main assignments.

On an annual basis, the Ministry of Petroleum and Energy will evaluate and measure Petoro's ability to meet its targets. Such evaluations will be implemented from 2003, when the company has completed its first operating year.

Statoil ASA

The government expects Statoil to be a large owner, licensee and operator on the NCS in the time to come. For a number of years, the company has had the largest number of operatorships on the NCS. It plays and will continue to play a key role in production from and operation of substantial Norwegian oil and gas fields. As a result of its involvement on the NCS, Statoil possesses important knowledge and experience for approaching the challenges facing the NCS in coming years. Norsk Hydro is also a significant operator, but the company is not part of the government's common ownership strategy with Statoil and Petoro (as manager for the SDFI).

Statoil operates most of the fields in which the SDFI has holdings. Combined with its responsibility for selling and marketing the government's oil and gas, this puts the company in a special position. The government's common ownership strategy and its marketing and sales instruction assume that the state will remain the majority shareholder in Statoil. As a result, the state will be a substantial owner of the company in the long term. This is essential for ensuring that Statoil can discharge the long-term responsibilities it has been given in Norwegian oil and gas operations.

The government will await possible assessments and recommendations from the Statoil board on the company's continued development, including possible proposals which may be significant for its shareholder structure. The government will continuously review the size of state ownership in Statoil.

Ownership

The private sector in Norway has limited capacity to replace the state in capital-intensive and strategically-important state-owned companies. In particular, petroleum and energy companies are of such a substantial size that an extensive sale of government holdings could not be replaced by Norwegian private-sector interests. The government therefore regards it as very important for the state to play a

role as a substantial, long-term and stable owner in order to retain a Norwegian base for Statoil and Norsk Hydro[6].

Efficient management of Norway's petroleum resources indicates the need for two Norwegian-based oil companies. Statoil and Norsk Hydro, as competing operators, remain important for realising the substantial value on the NCS. Both companies possess considerable industrial and technological expertise of crucial importance for the Norwegian petroleum industry.

The government will:
- *continue to take SDFI holdings where good profitability or a large resource potential is offered*
- *not plan for further SDFI sales*
- *ensure that Petoro manages the SDFI in accordance with the assumptions and targets defined by the government and the Storting*
- *keep the size of the state shareholding in Statoil under constant review*
- *emphasise the significance of the state's role as a long-term and stable owner in order to ensure a national base for Statoil and Norsk Hydro.*

2.3 Future value creation

The oil and gas sector is Norway's largest and most important industry, and creates very considerable value for the Norwegian welfare state.

A substantial potential exists for continued operations and value creation on the NCS. Providing we achieve the long-term scenario, we can produce oil for at least 50 years and gas in a century-long perspective. The industry also has a substantial potential internationally. Opportunities facing the industry will not be realised by themselves, but call for a long-term commitment from the industry and the authorities.

Through a strengthened commitment to the oil and gas sector, these operations will contribute substantial value in future to the Norwegian community in the form of large revenues to the government, a stable level of activity and knowledge-based industrial development. That will also provide positive spin-offs for other Norwegian industry.

The government is concerned to ensure that the significance of the petroleum industry and petroleum policy is broadly understood in Norwegian society. In its view, the petroleum business is a positive and long-term industry of great value to the country. It safeguards value creation, revenues and industrial development, which it can at the same time be pursued in a sustainable and acceptable manner. Petroleum resources represent a community asset which the government wishes to manage in such a way that the whole of Norwegian society benefits in a long-term perspective and with the long-term scenario.

The government will:
- *make a commitment to developing the Norwegian oil and gas industry in such a way that it can also contribute in the long term to financing Norway's welfare state*
- *work to lay the basis for a competitive oil and gas industry based in Norway*
- *contribute to the internationalisation of the Norwegian oil and gas industry.*

[6] Responsibility as owner for Norsk Hydro ASA rests with the Ministry of Industry and Trade.