6 Industry, employment and technology development

Petroleum-related industry

Employment in the petroleum sector

The significance of technology development for value creation and competitiveness in the petroleum sector

Petroleum-related industry

One of the policy objectives formulated after the discovery of oil and gas in the Norwegian North Sea was that these resources should form the basis for developing petroleum-related industry in Norway. Transfer of expertise from abroad and the build-up of domestic operations were important elements in this development. A competent and competitive Norwegian supplies industry for oil operations has been gradually developed.

The country now has a large number of companies in this sector, covering most stages in the petroleum value chain from exploration via development to production and operation. In certain areas, Norwegian suppliers to the oil and gas industry are among the world leaders. This applies particularly to seismic surveying, subsea installations and floating production solutions.

Activity in Norway's offshore supplies industry has so far largely related to new investment, maintenance and operational assignments on the NCS. The likelihood that future activity in these waters will be lower, combined with a high level of expertise, means that the industry is focusing to a greater extent on international market opportunities.

The global market for deliveries to the oil and gas sector is substantial. According to Norland Consultants, the offshore market should grow by 30 per cent over the next four years to reach USD 110 bn in 2005. Moderate, stable growth of about five per cent is forecast for Norway, while the Gulf of Mexico and West Africa are expected to expand by 30 and 65 per cent respectively.

In cooperation with the domestic petroleum industry, the government established the Intsok – Norwegian Oil and Gas Partners foundation in 1997 to promote deliveries to the international market. Currently embracing 84 companies, Intsok aims to boost revenues from abroad to NOK 50 bn by 2005, compared with the current level of just under NOK 30 bn. Such growth will require a substantial and purposeful commitment. The MPE has appropriated NOK 10 million for this purpose in the central government budget for 2002.

A new forum for top executives was established in September 2000. Chaired by the Minister of Petroleum and Energy, this body embraces more than 20 leaders from oil companies, suppliers, unions and the authorities. It represents a joint initiative to revitalise the Norwegian petroleum sector.

The mandate for the forum is to identify and initiate projects to strengthen the competitiveness of the oil and gas sector. Its actions have included the launch of projects and work processes relating to conflict resolution, marginal fields and rig market improvements. In addition, the forum will monitor established processes such as OG21, Intsok and the Environment Forum.

Employment in the petroleum sector

The Directorate of Labour has compiled annual statistics for petroleum-related employment since 1973. Its latest survey was conducted in August 2001. Figure 6.1 shows developments in such employment from 1982 to 2001.

A total of 73 904 people were employed by the

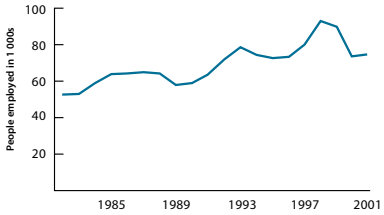

Figure 6.1 Employment in Norway's petroleum sector.
(Source: Directorate of Labour)

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Norwegian petroleum sector in August 2001, an increase of 2 469 or about three per cent from 2000 and corresponding to roughly three per cent of total employment in Norway. The number of people employed declined by no less than 21 186, or roughly 23 per cent, from August 1998 to August 2000 – the largest contraction since records began in 1973. So the decline in jobs appears to have halted, although the level of employment still falls well short of the peak recorded in 1998 when a number of major development projects coincided.

Table 6.1 shows employment over the past seven years, grouped by four functional areas. After the dramatic contraction in jobs from 1998-2000, a slight improvement has been registered in three of these categories.

Employment in the petroleum sector can also be broken down by company type. The oil companies account for 15 724 of the 73 904 people employed in

Table 6.1 Employment by functional area. *(Source: Directorate of Labour)*

Group	1995	1996	1997	1998	1999	2000	2001
Exploration, drilling and production, etc	25 678	25 469	27 861	30 270	30 130	26 372	27 968
Bases, logistics, catering, administration, etc	10 635	11 522	12 480	13 652	13 285	13 469	13 924
Construction and maintenance of platforms and vessels	29 693	30 160	34 200	43 535	41 032	27 633	28 422
Construction and operation of processing and landing facilities	6 522	6 020	5 161	5 164	5 072	3 961	3 590
Total	72 528	73 171	79 702	92 621	89 519	71 435	73 904

Norway's petroleum industry, with the rest working for the supplies sector. Of the latter, the largest category – 20 878 people – worked in manufacturing and construction. Engineering firms had 8 429 employees and the service sector 7 614.

Engineering companies recorded the biggest expansion in jobs during 2001, up by 1 200 or about 16 per cent from the year before. Employment rose by 700 in the oil companies and 600 in the service sector. Manufacturing and construction experienced a slight decline by 400 jobs.

The significance of technology development for value creation and competitiveness in the petroleum sector

The need for an overall review of strategy for technology and research was discussed in Report no 39 (1999-2000) to the Storting on oil and gas operations. As a follow-up, the MPE initiated a process in the summer of 2000 to produce recommendations on a national strategy for the overall commitment to technology and research in the petroleum sector.

Named OG21 (for oil and gas in the 21st century), this study was conducted by representatives of the oil companies, supplies industry and research institutions. A final report, which will form the basis for further work, was submitted to the MPE in February 2001. The new board for OG21 was established in August 2001, with a secretariat head appointed in October.

Part of the background for the OG21 initiative was that the industry has defined technology as the most important factor for reducing costs and enhancing the competitiveness of Norway's oil and gas business. In addition, technology will be crucial for meeting major challenges facing the industry.

Research efforts in the sector have so far been fragmented. A more unified and purposeful structure accordingly needs to be established for technology, research and development activities directed at this business.

OG21 has defined five priority areas as the basis for its future work:

- improved recovery
- environmental protection
- deep water
- small fields
- the gas value chain.

Increased and better coordinated technological development will lay the basis for ensuring:

- improved resource utilisation and continued profitable value creation
- strengthened industrial competitiveness and internationalisation, including increased exports
- major national environmental gains.

One of the main conclusions of the OG21 report is that resources on the NCS represent an unrealised value potential without parallel in a national context. However, this potential has so far been under-focused, and the report notes that stronger attention needs to be paid to the unexploited opportunities which could be addressed through future technology development.

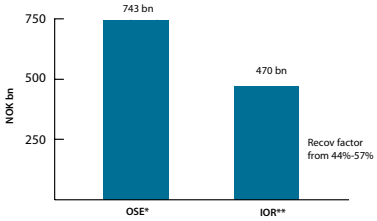

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Figure 6.2 Possible value creation from improved oil recovery. *(Source: OG21)*
**Oslo Stock Exchange, February 2002 **Gross present value, size dependent on timing and volumes*

The vision is that the NCS will become the world's most productive petroleum province. A review of the potential for improved recovery from different categories of field – small with reserves of less than 50 mill scm, medium-sized with 50-200 mill scm and large with more than 200 mill scm – was one of the approaches taken by OG21 in studying the value creation potential on the NCS.

A potential for improving the offshore recovery factor from today's 44 per cent to 57 per cent was identified on this basis. An increase on this scale would allow Norway to recover additional oil with a gross present value of NOK 470 bn measured by current price expectations applied in the national planning budget. By comparison, the combined value of stocks listed on the Oslo Stock Exchange at 4 February 2002 was roughly NOK 743 bn. See figure 6.2.

Enhanced productivity in utilising gas resources is not included in the above-mentioned gross present value. A potential value increase from productivity gains for gas would boost the overall value of the additional volumes yielded by improved recovery.

The NPD has operated since 1997 with 50 per cent as its target for the average offshore recovery factor. According to OG21, achieving an average of 57 per cent would require an improvement in the recovery factor from 28 to 35 per cent for small finds, 39 to 50 per cent for medium-sized discoveries and 46 to 60 per cent for big fields.

The Verteks analysis conducted by the Rogaland Research institute in Stavanger notes that no technology currently available can bring the recovery factor up to the desired level. On the contrary, this analysis concludes that the recovery factor could decline from the present average of 44 per cent with today's technology – partly because remaining resources are more technically and commercially demanding to produce than those already recovered.

Market fluctuations in 1998-99, with consequent swings in revenues and levels of activity, indicate that Norway's offshore operations need to become more commercially robust. This is largely due to the high cost level, as shown by the expenditure comparison between the NCS and other upstream provinces in figure 6.3.

As the figure illustrates, Norway has the highest level of offshore costs in the market. Reducing costs accordingly represents one of the principal challenges in securing the continued competitiveness of the country's offshore sector. As figure 6.3 shows, the break-even price for Norwegian offshore developments is USD 12 per barrel (1998 figures).

The Demo 2000 collaboration on project-oriented technology has helped to reduce the break-even oil price required for new developments on the NCS by USD 2-3 per barrel. Devising the next generation of development and production solutions offers a major value creation potential. According to the review of Demo 2000 provided in Report no 39 (1999-2000) to the Storting, future technological leaps offer potential cost reductions close to USD 5 per barrel.

In addition to enhancing value creation on the NCS, new technology could contribute to more stable and robust growth for Norway's supplies industry through internationalisation. OG21 con-

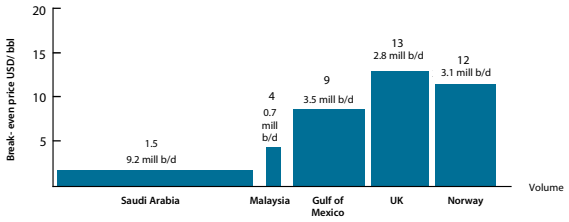

Figure 6.3 Daily production and break-even prices for various upstream provinces (1998).
(Source: Reve / Jacobsen "Et verdiskapende Norge")

cluded that the aim should be to increase the value of exports by this sector from roughly NOK 27 bn today to NOK 70 bn by 2010, without taking account of market growth during the period.

The global offshore market is very dynamic, with requirements and needs in constant change. New technology and leading-edge expertise will therefore be crucial for such growth. Strengthened Norwegian expertise in such areas as deepwater technology, improved recovery and utilisation of small fields could represent a basis for significant international opportunities.

Substantial environmental gains are also offered by technological leaps. Reducing the overall burden on the environment imposed by the petroleum business should be a goal for new technology. Many of the technical solutions developed and adopted to improve recovery on the NCS could also have a positive environmental effect. Technology for separating wellstreams on the seabed or downhole would save energy, for example.

Participants in OG21 agree on the need to establish a stronger and more unified system for R&D, demonstration and commercialisation in the petroleum sector, in part to realise the value creation opportunities outlined above and to strengthen the coordination and productivity of overall operations in the area.