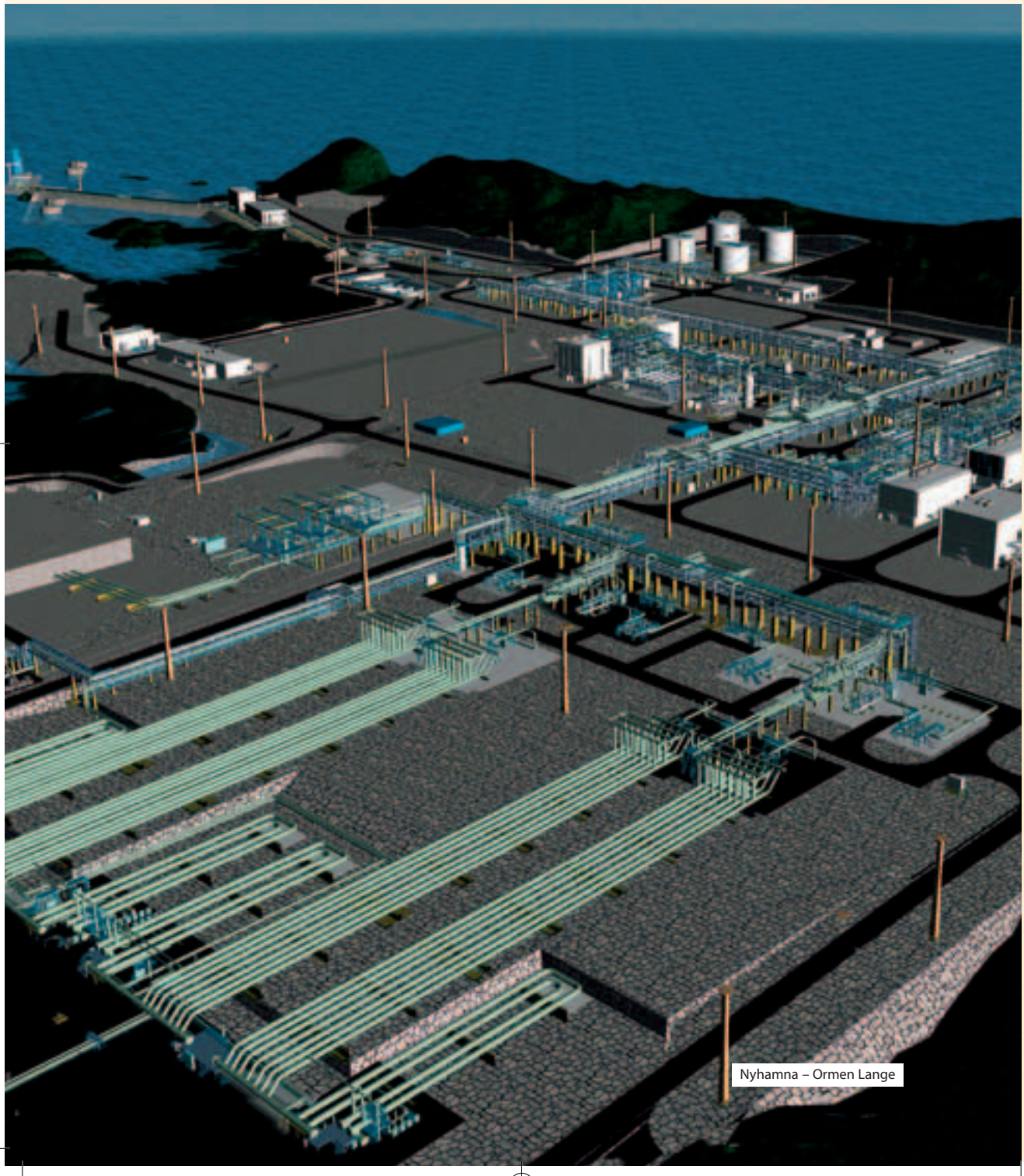
13 Pipelines, land facilities and other infrastructure



Nyhamna – Ormen Lange

The transport capacities quoted are based on standard assumptions for pressure, gas energy content, maintenance downtime and operational flexibility.

The map shows existing and planned pipelines

Gassled pipelines

Operator: Gassco AS

Licensees:	
Petoro AS[1]	38.29%
Statoil ASA	20.38%
Norsk Hydro Produksjon AS	11.13%
Total E&P Norge AS	9.04%
ExxonMobil Exploration and Production Norway AS	5.18%
Norske Shell Pipelines AS	4.68%
Mobil Development Norway AS	4.58%
Norsea Gas AS	3.02%
Norske ConocoPhillips AS	2.03%
Eni Norge AS	1.67%

[1] In autumn 2005, the completion of the Kårstø gas processing complex extension will lead to a change in the ownership shares. Petoro's holding in Gassled will be increased by around 9.5 percent with effect from 1 January 2011, and the other parties' holdings will be reduced proportionally with effect from the same date.

The Parliament requested in the spring of 2001 that the MPE invite the relevant companies to negotiations on the creation of a unified ownership structure for gas transport. Gassled represents the merger of companies owning nine pipelines between them into a single partnership. The partnership agreement establishing Gassled was signed on 20 December 2002, and came into effect on 1 January 2003. Gassled's licence runs to 2028. Gassled encompasses the following pipelines: Zeepipe, Europipe I and II, Franpipe, Statpipe (including the transport-related facilities at Kårstø), Vesterled, Oseberg Gas Transport, Åsgard Transport and Norpipe. The Kollsnes gas processing facility also became part of Gassled on 1 February 2004. Gassled is organised into various zones for access and tariffs. For more detailed information on Gassled and the organisation of Norwegian gas transport operations, see the www.gassco.no web site. Gassco, which serves as operator for Gassled and certain other pipelines, is based at Bygnes in the municipality of Karmøy in Rogaland. From here, it coordinates gas deliveries through the pipeline network from fields in the North and Norwegian Seas to land facilities in Norway and receiving terminals in continental Europe and the UK. Gassco coordinates and controls the flow of gas through a network about 6,600 kilometres long, and manages all transport of Norwegian gas to market. The following presentation describes the pipelines owned by Gassled and operated by Gassco.

Europipe I

This 40-inch pipeline starts at the Draupner E riser facility and runs for 660 km to terminate at Emden in Germany. Europipe I came into service in 1995. It has a capacity of about 46-54 mill. scm/day, depending on operating mode. The pipeline has been built for an operating life of 50 years and total investment is put at NOK 20.7 billion (2005 value).

(Agreement between Norway and Germany concerning the transmission of gas from the Norwegian continental shelf and other areas through a pipeline to the Federal Republic of Germany. See Proposition no. 60 (1992-93) and Recom. no. 164 (1992–93) to the Parliament.)

Europipe II

This 42-inch pipeline runs for 650 km from Kårstø to Dornum in Germany, and became operational in 1999. With a capacity of about 71 mill, scm/day, Europipe II has been built for an operating life of 50 years. Total investment at start-up is put at NOK 9.3 billion (2005 value).

(Supplementary agreement of 19 May 1999 to the Europipe agreement (see Proposition no. 60 (1992-93) and Recom. no. 164 (1992–93) to the Parliament) concerning the transmission of gas from Norway through a new pipeline (Europipe II) to Germany, ratified by Royal Decree of 14 September 2001.)

Franpipe

This 42-inch gas pipeline runs for 840 km from the Draupner E riser platform in the North Sea to a receiving terminal at Dunkirk in France. A separate partnership has been established for the terminal, owned 65 per cent by the Gassled group and 35 per cent by Gaz de France. The pipeline became operational in 1998. Franpipe has a capacity of about 52 mill. scm/day. It has been built for an operating life of 50 years, with the total investment put at NOK 9.6 billion (2005 value).

(Agreement between Norway and France concerning the transmission of gas from the Norwegian continental shelf and other areas through a pipeline to France. See Proposition no. 44 (1996–97) and Recom. no. 164 (1996–97) to the Parliament.)

Norpipe Gas pipeline

This 36-inch line starts at Ekofisk and runs for 440 km to the Norsea Gas terminal in Emden, Germany. Also owned by Gassled, the Emden terminal cleans and meters the gas prior to onward distribution. The line became operational in 1977. Two riser platforms, H7 and B11, each with three compressors, are positioned on the German continental shelf to pump the gas southwards. The compressors on one of these installations have now been shut down. The transport capacity is around 35 mill. scm/day without using the compressor capacity on the B11 riser platform, and capacity will increase to 42–43 mill. scm/day if the B11 compressors are used. Norpipe has been built for an operating life of at least 30 years. Its technical life is under constant review. Total investment at start-up was about NOK 25.6 billion (2005 value).

(Agreement between Norway and Germany concerning the transmission of petroleum through a pipeline from the Ekofisk field and adjacent areas to Germany. See Proposition no. 88 (1973-74) and Recom. no. 250 (1993–74) to the Parliament.)

Oseberg Gas Transport (OGT)

This 36-inch line starts at Oseberg and runs for roughly 109 km to the riser facility at Heimdal. Becoming operational in 2000, its capacity is about 40 mill. scm/day. OGT has been built for an operating life of 50 years, and total investment is NOK 1.84 billion (2005 value).

Statpipe

This 880-km pipeline system includes a riser facility and a gas processing plant at Kårstø. Becoming operational in 1985, the system's 30-inch rich gas leg begins at Statfjord and runs for 308 km to Kårstø, with a capacity of about 25 mill. scm/day. The dry gas section has three components. One of these comprises a 28-inch pipeline running for about 228 km from Kårstø to the Draupner S riser facility, with a capacity of roughly 20 mill. scm/day, depending on operating mode. The second component is a 36-inch pipeline running for about 155 km from the Heimdal riser facility to Draupner S, with a capacity of about 30 mill. scm/day. The third section is a 36-inch pipeline running for roughly 203 km from Draupner S to Ekofisk, with a capacity of about 30 mill. scm/day. The Heimdal-Draupner S and Kårstø-Draupner S pipelines can also be used for reversed flow. Total investment is put at NOK 44.4 billion (2005 value), excluding the gas processing plant at Kårstø.

Vesterled

This 32-inch pipeline runs for about 350 km from the Heimdal riser facility to St. Fergus in the UK and became operational in 1978. It has a capacity of about 36 mill. scm/day. Total investment in Vesterled is put at NOK 31.4 billion (2005 value).

(Agreement between Norway and the UK concerning amendments to the Frigg treaty of 10 May 1976. See Proposition no. 73 (1998–99) and Recom. no. 219 (1998–99) to the Parliament.)

Zeepipe

Zeepipe I comprises a 40-inch pipeline running for about 814 km from Sleipner riser to Zeebrugge in Belgium. The gas receiving terminal in Zeebrugge belongs to a separate partnership, with the Gassled partners holding 49 per cent and the Belgian Fluxys company 51 per cent. Zeepipe I became operational in 1993 and has a capacity of roughly 41 mill. scm/day. Zeepipe I also includes a 30-inch pipeline between Sleipner and Draupner S with a capacity of 29 mill. scm/day. Zeepipe II A starts at the Kollsnes gas processing plant near Bergen and runs for about 303 km to the Sleipner riser platform. This 40-inch line became operational in 1996 and has a capacity of 57 mill. scm/day. Work has begun to increase capacity in Zeepipe II A to 72 mill. scm/day and to 71 mill. scm/day in Zeepipe II B. This capacity will become available from 1 October 2005 for Zeepipe II B and from 1 October 2006 for Zeepipe II A. Zeepipe II B is 40 inches in diameter and runs for roughly 300 km from the Kollsnes gas processing plant to the Draupner E. Becoming operational in 1997, this line has a capacity of 60 mill. scm/day. The Zeepipe system has been built for an operating life of 50 years. Total investment is put at NOK 23.5 billion (2005 value).

(Agreement between Norway and Belgium concerning the transmission of gas from the Norwegian continental shelf and other areas through a pipeline to Belgium. See Proposition no. 148 (1987–88) and Recom. no. 164 (1988–89) to the Parliament.)

Åsgard Transport

This 42-inch pipeline runs for about 707 km from the Åsgard field to terminate at Kårstø. It became operational in 2000, with a capacity of about 69 mill. scm/day. Åsgard Transport is built for an operating life of 50 years, with total investment at start-up of around NOK 10.2 billion (2005 value).

Gassled land facilities

Kollsnes gas processing plant

The gas processing plant at Kollsnes in the municipality of Øygarden in Hordaland County forms part of Gassled. Construction work began at the site in 1991 and was completed by 1 October 1996, the deadline for starting contractual gas deliveries from Troll. Wellstreams are separated at Kollsnes into gas and condensate. The gas is dried and compressed before being piped to continental Europe. The condensate is piped on to the Vestprosess facility at Mongstad. The facility has been extended with a plant for extraction of NGL from 1 October 2004 to receive gas from Kvitebjørn, and later Visund. The plant's capacity is now 146 mill. scm of gas and 11,000 scm of condensate per day.

Kårstø gas and condensate processing plant

The Kårstø gas processing facilities north of Stavanger separate and fractionate rich gas to methane, ethane, propane, iso-butane, normal butane and naphtha. Methane and some of the ethane is piped away. Unstabilised condensate delivered through a pipeline from Sleipner Øst is stabilised at Kårstø's condensate facility by separating out the lightest components. The rest of the ethane, as well as iso-butane and normal butane, is stored in refrigerated tanks, while naphtha and condensate are held in tanks at ambient temperature. Propane is stored in large refrigerated rock caverns. These products are exported from Kårstø in liquid form by ship. The complex received 592 vessel calls in 2004 and shipped out more than 8 mill. tonnes of liquids.
Processing facilities at Kårstø comprise four fractionation/distillation lines for methane, ethane, propane, butanes and naphtha, plus a fractionation line for stabilising condensate. The gas processing facilities have a rich-gas capacity of 70 mill. scm per day, while the condensate and ethane plants can process roughly 5.5 mill. and 620,000 tonnes per year respectively. An expansion of the Kårstø gas processing facilities to 88 mill. scm/day has been initiated, and is due to become operational by 1 October 2005.

Other pipelines

Draugen Gas Export

Operator	A/S Norske Shell[1]	
Licensees	Petoro AS[2]	47.8%
	BP Norge AS	18.36%
	A/S Norske Shell	26.20%
	ChevronTexaco Norge AS	7.56%
Investment	Total investment at start-up around NOK 1 billion (2005 value)	
Operating lifetime	The technical operating lifetime is 50 years	
Capacity	About 2 billion scm/year	
Operating organisation	Kristiansund	

[1] The operatorship is due to be transferred to Gassco AS.

[2] Petoro's participation in Gassled will be increased by around 9.5 percent with effect from 1 January 2011, and the participation of the other parties will be reduced correspondingly with effect from the same date.

The plan for installation and operation of Draugen Gas Export was approved in April 2000. The 16-inch pipeline from the Draugen field to Åsgard Transport is 78 km long and provides opportunities for possible tie-ins of other fields in the area. The pipeline started up in November 2000.

Grane Gas Pipeline

Operator	Norsk Hydro Produksjon AS
Licensees	As for the Grane field
Investment	Total investment at start-up was around NOK 0.3 bn. (2005 value)
Operating lifetime	The technical operating life is 30 years
Capacity	Around NOK 3.6 billion scm per year

The plan for installation and operation of the Grane Gas Pipeline was approved in June 2000. This 18-inch pipeline from the Heimdal riser facility to the Grane facility is 50 km long and became operational in September 2003. It carries gas to Grane for injection into the reservoir to improve oil recovery from this field.

Grane Oil Pipeline

Operator	Norsk Hydro Produksjon AS	
Licensees	Petoro AS	43.60%
	ExxonMobil Exploration and Production Norway AS	25.60%
	Norsk Hydro Produksjon AS	24.40%
	Norske ConocoPhillips AS	6.40%
Investment	Total investment at start-up was around NOK 1.53 billion (2005 value)	
Operating lifetime	The technical operating lifetime is 30 years	
Capacity	34,000 scm oil per day	

The plan for installation and operation of the Grane Oil Pipeline was approved in June 2000. This 29-inch pipeline from Grane to the Sture terminal is 220 km long. It became operational in September 2003 to coincide with the start of production from Grane.

Haltenpipe

Operator	Gassco AS	
Licensees	Petoro AS	57.81%
	Statoil ASA	19.06%
	Norske ConocoPhillips AS	18.13%
	Eni Norge AS	5.00%
Investment	Total investment at start-up was around NOK 2.75 billion (2005 value) in pipelines and the terminal	
Operating lifetime	The licence expires on 31 December 2020	
Capacity	2.2 billion scm/year of gas	

This 16-inch gas pipeline runs for 250 km from Heidrun on the Halten Bank in the Norwegian Sea to Tjeldbergodden in the municipality of Aure in Møre og Romsdal county, where Statoil ASA and Norske ConocoPhillips AS have built a methanol plant close to the receiving terminal. The latter uses Heidrun gas as feedstock. Annual gas supplies to the methanol plant total some 0.7 billion scm.

Heidrun Gas Export

Operator	Statoil ASA[1]	
Licensees	Petoro AS	58.16%
	Norske ConocoPhillips AS	24.31%
	Statoil ASA	12.41%
	Eni Norge AS	5.12%
Investment	Total investment at start-up was around NOK 0.9 bn. (2005 value)	
Operating lifetime	The technical operating lifetime is 50 years	
Capacity	Around 4.0 billion scm per year	

[1] The operatorship is due to be transferred to Gassco AS.

The authorities received a plan for installation and operation of Heidrun Gas Export in 1997, plus a supplement to this in March 1999. Approval of the proposals was given by the MPE in the spring of 2000. This 16-inch pipeline runs roughly 37 km from Heidrun to tie into the Åsgard Transport system. It became operational in February 2001.

Kvitebjørn Oil Pipeline

Operator	Statoil ASA	
Licensees	Statoil ASA	50.00%
	Petoro AS	30.00%
	Norsk Hydro Produksjon AS	15.00%
	Total E&P Norge AS	5.00%
Investment	Total investment at start-up was around NOK 0.51 bn. (2005 value)	
Operating lifetime	The technical operating lifetime is 25 years	
Capacity	About 10,000 scm per year	
Operating organisation	Bygnes, Karmøy	

Kvitebjørn Oil Pipeline will transport condensate from Kvitebjørn to the Mongstad oil terminal; this 16-inch line runs for about 90 km to tie in to an existing connection point on Troll Oil Pipeline II. The pipeline became operational in the second half of 2004.

Langeled

Operator	Norsk Hydro Produksjon AS	
Licensees	Petoro AS	32.95%
	Norsk Hydro Produksjon AS	17.61%
	A/S Norske Shell	16.50%
	Statoil ASA	14.99%
	DONG Norge AS	10.22%
	ExxonMobil Exploration and Production Norway AS	6.95%
	Norske ConocoPhillips AS	0.78%

The plan for installation and operation estimates start-up costs at around NOK 20.3 billion (2005 value). Interests in Langeled will be determined before the line becomes operational on the basis of updated cost estimates.

The Langeled system will transport gas from the land facilities for Ormen Lange at Nyhamna in mid-Norway via a tie-in at the Sleipner riser facility to a new receiving terminal at Easington on the UK East coast. This system will comprise a 42-inch pipeline from Nyhamna to Sleipner (the northern leg) and a 44-inch line from Sleipner to Easington (southern leg). Capacity will be just over 80 mill. scm/day in the northern leg and about 70 mill. scm/day in the southern. The system will have an overall length of roughly 1,200 km. The southern leg is due to become operational in October 2006, with the northern following in October 2007. Norsk Hydro will be the operator for the development phase. Gassco AS will be the operator for the operating phase.

Norne Gas Transport System (NGTS)

Operator	Gassco AS	
Licensees	Petoro AS	54.00%
	Statoil ASA	25.00%
	Norsk Hydro Produksjon AS	8.10%
	Eni Norge AS	6.90%
	Enterprise Oil Norge AS	6.00%
Investment	Total investment at start-up was around NOK 1.1 bn. (2005 value).	
Operating lifetime	Technical operating lifetime is 50 years	
Capacity	About 3.6 billion scm per year	

The authorities received a plan for installation and operation of the NGTS in 1997, plus a supplement to this in April 1999. Licence to install and operate the NGTS was given by the MPE in the spring of 2000. This 16-inch pipeline runs roughly 126 km from Norne to tie in to the Åsgard Transport system. It became operational in February 2001.

Norpipe

Owner	Norpipe Oil AS[1]	
Operator	ConocoPhillips Skandinavia AS	
Ownership in Norpipe Oil AS	ConocoPhillips Skandinavia AS	35.05%
	Total E&P Norge AS	34.93%
	Statoil ASA	20.00%
	Eni Norge AS	6.52%
	Norsk Hydro Produksjon AS	3.50%
Investment	Total investment at start-up was around NOK 15.8 billion (2005 value)	
Operating lifetime	The pipeline has been designed for an operating lifetime of at least 30 years Extending its technical life is under constant review	
Capacity	Design capacity is about 53 mill. scm/year (900,000 b/day), – including the use of friction-inhibiting chemicals. The receiving facilities restrict capacity to about 810,000 b/day.	
Operating organisation	Stavanger	

[1] The SDFI will receive a five per cent interest in Norpipe Oil AS on 15 October 2005 through a similar reduction in the equity interest held by Statoil ASA in the company.

Owned by Norpipe Oil AS, the 34-inch Norpipe oil pipeline is about 354 km long and starts at the Ekofisk Centre, where three pumps have been placed. It crosses the UK continental shelf to come ashore at Teesside. A tie-in point for UK fields is located about 50 km downstream of Ekofisk. Two riser facilities, each with three pumps, were previously tied to the pipeline, but were bypassed in 1991 and 1994 respectively.

Two British-registered companies, Norsea Pipeline Ltd and Norpipe Petroleum UK Ltd, own the oil export port and fractionation plant for extracting NGL in Teesside, and are operated by ConocoPhillips. The oil pipeline carries crude from the four Ekofisk fields (Ekofisk, Eldfisk, Embla and Tor) as well as from Valhall, Hod, Ula, Gyda and Tambar and from several British fields.

(Agreement between Norway and the UK concerning the transmission of petroleum through a pipeline from the Ekofisk field and adjacent areas to the UK. See Proposition no. 110 (1972–73) and Recom. no. 262 (1972–73) to the Parliament.)

Oseberg Transport System (OTS)

Operator	Norsk Hydro Produksjon AS	
Licensees	Petoro AS	48.38%
	Norsk Hydro Produksjon AS	22.24%
	Statoil ASA	14.00%
	Total E&P Norge AS	8.65%
	Mobil Development AS	4.33%
	Norske ConocoPhillips AS	2.40%
Investment	Total investment at start-up was around NOK 9.5 bn. (2005 value)	
Capacity	121,000 scm/day (technical), 990,000 scm (storage)	
Operating lifetime	The pipeline is designed for a lifetime of 40 years	
Operating organisation	Bergen	

Oseberg oil is piped for 115 km through a 28-inch line from the field's A facility to the crude oil terminal at Stura in Øygarden municipality. The Oseberg group has established a separate partnership to operate the line. This partnership has concluded agreements with the licensees for Veslefrikk, Brage, Oseberg Sør, Oseberg Øst, Tune and Huldra to transport oil and condensate from these fields via Oseberg A and the OTS to the Sture terminal at Stura. Oil and NGL from Frøy were piped from the TCP2 facility on Frigg to Oseberg A through Frostpipe. After Frøy was shut down in March 2001, Frostpipe was filled with seawater and preserved for reuse by 2005. The OTS partnership has concluded an agreement with the Grane shippers to receive, store and export oil from this field.

Sleipner Øst Condensate pipeline

Operator	Statoil ASA	
Licensees	Statoil ASA	49.60%
	ExxonMobil Exploration and Production Norway AS	30.40%
	Norsk Hydro Produksjon AS	10.00%
	Total E&P Norge AS	10.00%
Investment	Total investment at start-up was about NOK 1.53 bn. (2005 value)	
Capacity	200,000 b/d	
Operating organisation	Bygnes, Karmøy and Kårstø, Tysvær	

The decision to land condensate from Sleipner Øst at Kårstø in Norway rather than at Teesside in the UK meant that the field's licensees had to lay a 20-inch pipeline from Sleipner A and organise the required expansion of the Kårstø complex. The Storting approved the construction of this line in December 1989. Unprocessed condensate from Sleipner Øst began to flow through the 245 km pipeline in 1993. At Kårstø, it is fractionated into NGL and stabilised condensate for the market. This line also began carrying condensate from Sleipner Vest, Loke, Sigyn and Gungne in 1997.

Troll Oil Pipeline I

Operator	Statoil ASA	
Licensees	Petoro AS	55.77%
	Statoil ASA	20.85%
	Norsk Hydro Produksjon AS	9.73%
	A/S Norske Shell	8.29%
	Total E&P Norge AS	3.70%
	Norske ConocoPhillips AS	1.66%
Investment	Total investment at start-up was about NOK 1.12 bn. (2005 value)	
Operating lifetime	Troll Oil Pipeline I is designed to operate for 35 years	
Capacity	42,500 scm/day of oil with use of friction inhibitors	
Operating organisation	Bygnes, Karmøy and Kårstø, Tysvær	

This 85 km facility transports oil from the Troll B facility to the terminal at Mongstad. With its plan for installation and operation approved in December 1993, the 16-inch line was ready when Troll B came on stream with oil in September 1995 and is licensed to 2023. The Troll licensees have established a separate partnership to handle operation of the line.

Troll Oil Pipeline II

Operator	Statoil ASA	
Licensees	Petoro AS	55.77%
	Statoil ASA	20.85 %
	Norsk Hydro Produksjon AS	9.73%
	A/S Norske Shell	8.29%
	Total E&P Norge AS	3.70%
	Norske ConocoPhillips AS	1.66%
Investment	Total investment at start up was about NOK 1.02 bn.(2005 value)	
Operating lifetime	Troll Oil Pipeline II is designed for a lifetime of 35 years	
Capacity	Current oil capacity is 40,000 scm/day. The hydraulic capacity of the line is 47,500 scm/day (without use of friction inhibitors)	
Operating organisation	Bygnes, Karmøy and Kårstø, Tysvær	

This 20-inch pipeline has been built to carry oil over the 80 km from Troll C to the terminal at Mongstad. The plan for installation and operation received government approval in March 1998, and Troll Oil Pipeline II was ready to begin operation when Troll C started production on 1 November 1999. Oil from Fram and Kvitebjørn is piped through Troll Oil Pipeline II, which is licensed to 2023.

Other land facilities

Mongstad crude oil terminal

Owner	Statoil ASA	65.00%
	Petoro AS	35.00%

The terminal at Mongstad incorporates three jetties able to accept vessels up to 440,000 tonnes, as well as six caverns excavated from the bedrock 50 metres below ground. These caverns have a total storage capacity of 1.5 mill. m^3 of crude oil. About 500 calls by oil carriers are handled annually.
This facility was constructed to support the marketing of crude oil loaded offshore on Gullfaks, Draugen, Norne, Åsgard, Heidrun and other fields. These consignments are loaded into shuttle tankers, which have a steaming range confined to north-west Europe. By storing and transhipping crude at Mongstad, however, Statoil can sell the oil to more distant destinations. Mongstad is also the receiving terminal for the oil pipelines from Troll B, Troll C, Troll Blend (Fram) and Kvitebjørn as well as shuttle tankers from Heidrun.

Sture terminal

Owner	The Sture terminal forms part of the joint venture for the Oseberg Transport System (OTS), with the same ownership interests. The exception is the LPG export facilities, which are owned by Norsk Hydro Produksjon AS (the refrigerated LPG store and transfer system to ships) and Vestprosess DA (the transfer system to the Vestprosess pipeline).

The Sture oil terminal at Stura near Bergen receives oil and condensate via the OTS pipeline from the Oseberg A facility as well as from the Oseberg, Veslefrikk, Brage, Oseberg Sør, Oseberg Øst, Tune and Huldra fields. Since the autumn of 2003, the terminal has also received Grane oil through the Grane Oil Pipeline. The terminal began operating in December 1988. It incorporates two jetties able to berth oil tankers up to 300,000 tonnes, five rock cavern stores for crude oil with a combined capacity of 1 million scm, a 60,000 m^3 rock cavern store for LPG and a 200,000 m^3 ballast water cavern. A separate unit for recovering volatile organic compounds given off from tankers has been installed.

The MPE approved an upgrading of the facility in March 1998. A fractionation plant which came on line in December 1999 processes unstabilised crude from Oseberg into stabilised oil and an LPG mix. The latter can be either exported by ship or piped through the Vestprosess line between Kollsnes, Stura and Mongstad.

Tjeldbergodden

Owner:	Statoil Metanol ANS:	
Owners in Statoil Metanol ANS:	Statoil ASA	81.70%
	Norske ConocoPhillips AS	18.30%

Plans to utilise gas from Heidrun as feedstock for methanol production at Tjeldbergodden in the municipality of Aure in Nordmøre were approved by the Parliament in 1992. The methanol plant began production on 5 June 1997. Gas deliveries through the Haltenpipe line total 0.7 billion scm per year, which yield 830,000 tonnes of methanol.

An air separation plant, Tjeldbergodden Luftgassfabrikk DA, has been built in association with the methanol facility. This partnership has also constructed a small gas fractionation and liquefaction plant with an annual capacity of 35 mill. scm.

Norferm AS, owned by Statoil ASA and DuPont, produces bioproteins at Tjeldbergodden. With an annual design capacity of 10,000 tonnes of bioproteins, this plant can consume up to 25 mill. m^3 of methane per year. That corresponds to three per cent of the gas received from Heidrun.

Vestprosess

Ownership	Petoro AS	41.00%
	Statoil ASA	17.00%
	Norsk Hydro Produksjon AS	17.00%
	Mobil Exploration Norway Inc.	10.00%
	A/S Norske Shell	8.00%
	Total E&P Norge AS	5.00%
	Norske ConocoPhillips AS	2.00%

The Vestprosess DA partnership owns and operates a system to transport and process NGL (wet gas). These facilities came on stream in December 1999. A 56 km pipeline carries unprocessed NGL from the Kollsnes gas terminal, via the oil terminal at Stura, to Mongstad.

At Mongstad, processing starts by separating out naphtha and LPG. The naphtha serves as refinery feedstock, while the LPG is fractionated in a dedicated process into propane and butane. The latter are stored in rock caverns before export. The Vestprosess plant utilises waste energy and utilities from the refinery.

The map shows the optical fibre cables on the Norwegian continental shelf

E-operations on the Norwegian continental shelf

Within the petroleum industry, e-operations involve using (near) real-time data to integrate work between organisations and between specialist areas in order to make faster and better decisions in all phases of petroleum activities. Modern technology, connecting fields to the shore by broadband links, allows onshore personnel to access information at the same time as those offshore. When field data is available in real time for relevant specialist groups, more efficient support, monitoring and control can take place from shore-based organisations.

E-operations can contribute to increasing the resources that are recovered, reducing costs and increasing safety. This assessment is based on e-operations providing improved use of the information that is gathered and higher levels of automation. They will also reduce offshore manning, which will both reduce costs and improve the risk scenario.

The current situation

Optical fibre cables have been laid over much of the Norwegian continental shelf and they provide a excellent starting point for e-operations, and many installations are already hooked up to broadband communication. This is a prerequisite for transferring large volumes of data. To exploit the digital infrastructure to the full, there need to be access solutions for third parties, with appropriate cost sharing and sufficient data security. The map shows the optical fibre cable network on the Norwegian continental shelf.

Most inroads into the new operational methods have been made within drilling. Real-time data has begun to be integrated between the operations rooms on and offshore, making these simultaneously available for technical personnel, drilling engineers and reservoir geologists. Similar progress has not been achieved within operations and maintenance, although some companies have implemented the technology and work processes in production management. Several operators have already established onshore operations centres that are linked to operations rooms on the installations. It is also possible to connect to operations rooms in other parts of the world.

Future progress

E-operations will be an important element in future developments, as can be seen already in the Kristin, Snøhvit and Ormen Lange fields, now under development. Where profitable, existing fields will be able to link into the digital infrastructure in order to use the new technology.

Changes in working methods and distribution of labour between offshore and onshore, and between operators and suppliers, will be able to create new organisational structures, which link staff and organisations regardless of physical position.

To realise the potential offered by e-operations, coordination between fields, operators and suppliers is necessary, making standardisation vital. For older fields, the challenge is to adapt the ambition levels and progress schedules to get the solutions accepted and deployed in good time before they are decommissioned.

Research and development is taking place among suppliers, oil companies and research institutions. Technical solutions exist, but more research and development is needed to transform data into useful information and knowledge, and to develop advanced sensors that are reliable over time, as well as wireless communication on the installations themselves. Organisational solutions must also be found so that the necessary integration is achieved across specialist boundaries and geographical location, as well as between different suppliers and oil companies.