

NORWAY

By Chin S. Kuo

Norway has abundant natural resources that include hydroelectric power, minerals, natural gas, and petroleum. Minerals produced included feldspar, graphite, ilmenite, iron ore, limestone, nickel, and platinum-group metals. The country was a mineral processor for aluminum, ferroalloys, and zinc. Of particular importance to the economy were its substantial oil and gas reserves in the North Sea. The country was the world's sixth largest producer of oil and gas and the third largest exporter of oil. Its oil and gas accounted for 23% of Norway's gross domestic product (GDP) and 45% of exports and generated 32% of tax revenues. The oil and gas sector employed some 74,000 workers directly and some 220,000 indirectly (Alexander's Gas & Oil Connections, 2002§¹). Hydroelectricity powered the country's manufacturing sector. Power shortages affected primary aluminum production and other processing industries. The exploration and exploitation of metals and minerals were extensive. The GDP growth was registered at 1.6% for 2002.

In April, the Government proposed to sell part of its stake in Norsk Hydro ASA and Statoil ASA. The opposition parties planned to block the Government's proposal to continue privatizing key state-owned companies because they feared that further privatization would erode Norwegian control of important businesses. The Government sold 17.5% of its stake in Statoil in 2001. Its stake in Norsk Hydro was reduced to 44% from 51% in 1999 (Yahoo Finance, 2002b§).

Hydro Aluminium ANS began commissioning the first electrolytic cells of its Sunndal aluminum smelter in a \$744 million expansion program. The smelter's capacity was being increased by 238,000 metric tons per year (t/yr) to 328,000 t/yr. The plan would phase out the outdated 66,000-t/yr-capacity Soderberg technology. Hydro's HAl250 proprietary processing technology was used in 340 cells. The first potline was expected to be at its full capacity of 76,000 t/yr in February 2003. The expansion program was expected to be completed in the last quarter of 2004 (Mining Journal, 2002b).

Hydro cut primary aluminum production by 3,500 metric tons (t) at its Karmoy smelter in response to tightness in Norway's hydroelectricity supplies in 2002. The reduction accounted for more than 1% of its total 270,000-t/yr capacity. Karmoy was the latest Hydro plant to be affected by the growing power crisis. Reduced rainfall failed to replenish reservoirs used for hydroelectricity generation (Metal Bulletin, 2002d). Hydro was to buy 300 megawatts per hour of electricity from the Unified Energy System of Russia beginning in January 2003. The power will be delivered through Finland to the joint Nordic electricity grid.

Hydro restructured its Light Metals Division with a plan that would eliminate 1,000 jobs in sales and administration to cut

costs. The Division's production capacity was 2 million metric tons per year of primary and secondary metal. The Division was divided into the following business segments: Hydro Aluminium Metal Products, Hydro Aluminium Extrusions, Hydro Aluminium Rolled Products, Hydro Automotive Structures, and Hydro Magnesium (Metal Bulletin, 2002g).

With the takeover of VAW Aluminium of Germany, Hydro would have a 50% stake in Aluminium Norf rolling mill. VAW's billet production at the Stade plant would form part of Hydro's operations. Hydro provided metal for Alcan Inc. of Canada's 50% owned Norf. Hydro would probably not continue to supply Alcan with metal because Hydro needed to feed its own requirements at Norf (Metal Bulletin, 2002h). Alcan claimed, however, that it had an agreement that gave it a pre-emptive right over VAW's Norf stake. The likelihood that Alcan would be allowed to take a 100% stake in Norf was minimal.

Alcoa Inc. of the United States owned 42% of Elkem A/S, and Orkla held 39.44%. Elkem was an aluminum, ferrosilicon, and silicon producer. Alcoa also owned 50% of Elkem Aluminium, which was the joint venture with Elkem. The two plants had a production capacity of 250,000 t/yr of primary aluminum.

Elkem ceased production of ferrochrome at its Rana plant in northern Norway because of poor market conditions and stiff competition from South Africa. The options for Rana included converting the plant so that it could produce other metallurgical products, such as manganese alloys, and finding a buyer for the plant that would continue ferrochrome production. The plant had a capacity of 175,000 t/yr of ferrochrome (Metal Bulletin, 2002a).

FESIL ASA began scaling back its ferrosilicon operations owing to a combination of inflated electricity costs and low market prices and closed down the 100,000-t/yr Finnjord Smelteverk plant. Capacity at the Holla plant was reduced by two furnaces, and output at the Rana plant was set to be scaled down by one furnace. The Lilleby plant was to be closed at yearend pending an improvement in market conditions (Metal Bulletin, 2002f).

Elkem planned to invest \$9.2 million to rebuild the largest furnace (No. 5) at its Bremanger silicon smelter, which had been idle since November 2001. The plant produced ferrosilicon as raw material for silicon metal used in the electronics industry. Elkem also planned to revamp the No. 9 furnace at the Fiskaa silicon smelting plant which produced silicon for the chemical industry. The furnace had been on a care-and-maintenance program since August 2001 (Metal Bulletin, 2002b).

Elkem was likely to close one of its five silicon metal plants in 2002. The Meraker plant, which was the smallest in capacity, had been performing poorly. The Kristiansand plant was affected by planned maintenance work. One of its four furnaces was out of operation for an uncertain length of time for relining work (Metal Bulletin, 2002c).

¹References that include a section mark (§) are found in the Internet References Cited section.

Fundia AB, which was a long-products subsidiary of Rautaruukki Group of Finland, produced rebar at its Mo i Rana works in Norway and shipped two-thirds of its product to the Nordic countries inside the European Union (EU) and the rest to the United Kingdom and Ireland.

Rautaruukki Profiler, which was a producer of special plates and sections for shipbuilding, was to lose one-third of its workforce at its Mo i Rana works because its production was cut by 20% in 2002. The company exported the majority of its products to the EU and was the largest producer of bulb flats in Europe with 50% of the market. Corus was Rautaruukki's major European competitor in bulb flats (Metal Bulletin, 2002e).

Outokumpu Oyj of Finland ceased production at its Nikkel og Olivin nickel mine in Norway owing to depletion of reserves. The mine began production in 1989 and produced 32,500 t of nickel, 9,140 t of copper, and 1,530 t of cobalt in concentrate during its life. Outokumpu became operator of the mine at the end of 1992, gained a 70% interest in 1995, and owned 100% interest in 2001 (Mining Journal, 2002a).

Norway lost about 1 million barrels (Mbbbl) in North Sea oil production from Statoil's 5-day shutdown of the Statfjord field and its satellites in February. The cause of the shutdown was corrosion damage to the pipe in the flare system on the Statfjord C platform. Aker Maritime, which held the maintenance contract for piping systems on Statfjord, carried out the repairs (Oil & Gas Journal, 2002b).

Statoil planned to develop the Alpha Nord gas-condensate field, which is located near Sleipner West, at an estimated cost of \$402 million. Recoverable reserves were estimated to be 13 billion cubic meters of natural gas and 32 Mbbbl of condensate. Production start was planned for October 2004 (Petroleum Economist, 2002a).

In 2002, Statoil took over operatorship and a 20% stake in the F prospect in the Barents Sea from ExxonMobil Corp. of the United States. The area is located 150 kilometers (km) east of the Statoil-operated Snohvit field. Statoil also received 11.1% of an exploration license on block 33/1 on Tampen in the North Sea and 70% of the production license. In return, ExxonMobil received 3% in an exploration area near Norsk Hydro-operated Grane Field in the southern North Sea of Norway. Statoil retained 12% of the exploration part of a production license (Oil & Gas Journal, 2002a).

Amerada Hess of the United States was to cut back its operations and sell all its assets, except its interest in the Valhall field. The company's 1.2% stake in Snorre and its 3.3% stake in Snohvit would be included in the sale (Petroleum Economist, 2002c).

Kvaerner won Statoil's contract for pre-engineering work on the expansion of the Vestprocess condensate plant at the Mongstad refinery. Vestprocess handled refinery streams and condensates from Oseberg and Troll. The capacity expansion was to accommodate condensates from Kvitebjorn and Visund. The implementation phase was due for completion in October 2004 (Petroleum Economist, 2002b).

Statoil placed an order for a new barge to support a floating natural gas liquefaction plant located near Melkoya in the Snohvit Field. The barge was scheduled for completion in August 2003. About 70 cargoes per year of liquefied natural gas

(LNG) would be shipped from the floating plant. Production of LNG from the Snohvit Field, which had reserves of 193 billion cubic meters of gas and 113 Mbbbl of condensate, was due to start in 2006. Statoil awarded two contracts for the development of the LNG plant. Wiesbaden of Linde AG group of Germany received a contract valued at \$214 million for engineering, materials procurement, and construction management. Tractebel Industry Engineering of Tractebel SA of Belgium was to supply product tanks and a vessel loading system under a \$308 million contract (Oil & Gas Journal, 2002c).

Marathon Oil of the United States planned to build a 675-km natural gas pipeline that would run from Norway's Heimdal gasfields in the North Sea to Bacton in eastern England. The proposed pipeline could begin operations in 2005 and assure adequate natural gas supply for the United Kingdom market during the next 20 years. The pipeline could transport up to 25 million cubic meters of gas per day. Norway had the largest gas reserves in western Europe (Yahoo Finance, 2002a\$).

References Cited

- Metal Bulletin, 2002a, Elkem ends ferrochrome production: Metal Bulletin, no. 8648, February 11, p. 8.
- Metal Bulletin, 2002b, Elkem plans silicon investment at Bremanger: Metal Bulletin, no. 8686, June 27, p. 9.
- Metal Bulletin, 2002c, Elkem poised to cut number of silicon plants: Metal Bulletin, no. 8665, April 15, p. 8.
- Metal Bulletin, 2002d, Energy squeeze sees Hydro cut production at Karmoy: Metal Bulletin, no. 8734, December 19, p. 4.
- Metal Bulletin, 2002e, European shipbuilding downturn hits Rautaruukki: Metal Bulletin, no. 8716, October 17, p. 18.
- Metal Bulletin, 2002f, Fesil scales back ferrosilicon output: Metal Bulletin, no. 8732, December 12, p. 6.
- Metal Bulletin, 2002g, Hydro to restructure prior to VAW purchase: Metal Bulletin, no. 8638, January 7, p. 4.
- Metal Bulletin, 2002h, Hydro-VAW deal creates another industry giant: Metal Bulletin, no. 8641, January 17, p. 7.
- Mining Journal, 2002a, Nikkel og Olivin exhausted: Mining Journal, v. 339, no. 8709, November 1, p. 311.
- Mining Journal, 2002b, Sunndal expansion commissioning: Mining Journal, v. 339, no. 8709, November 1, p. 310.
- Oil & Gas Journal, 2002a, Quick takes: Oil & Gas Journal, v. 100, no. 5, February 4, p. 8.
- Oil & Gas Journal, 2002b, Quick takes: Oil & Gas Journal, v. 100, no. 6, February 11, p. 8.
- Oil & Gas Journal, 2002c, Quick takes: Oil & Gas Journal, v. 100, no. 30, July 29, p. 8.
- Petroleum Economist, 2002a, News in brief: Petroleum Economist, v. 69, no. 8, August, p. 41.
- Petroleum Economist, 2002b, News in brief: Petroleum Economist, v. 69, no. 9, September, p. 41.
- Petroleum Economist, 2002c, News in brief: Petroleum Economist, v. 69, no. 10, October, p. 41.

Internet References Cited

- Alexander's Gas & Oil Connections, 2002 (August), Norway has enough reserves to continue drilling for another 50 years, accessed August 12, 2002, at URL <http://www.gasandoil.com/goc/news/nte23252.htm>.
- Yahoo Finance, 2002a (February), Marathon plans Norway-UK gas pipeline, accessed February 28, 2002, at URL http://biz.yahoo.com/rf/020228/128116676_1.html.
- Yahoo Finance, 2002b (June), Norway privatization plans blocked, accessed June 17, 2002, at URL http://biz.yahoo.com/ap/020614/norway_privatization_5.html.

Major Sources of Information

Norwegian Geological Survey
P.O. Box 3006 Lade
7002 Trondheim, Norway

Royal Ministry of Petroleum and Energy
P.O. Box 8148 Dep
0033 Oslo, Norway

TABLE 1
NORWAY: PRODUCTION OF MINERAL COMMODITIES¹
(Metric tons unless otherwise specified)

Commodity	1998	1999	2000	2001	2002	
METALS						
Aluminum:						
Primary	995,619	1,020,215	1,025,676	1,067,000	1,095,500	
Secondary	62,400	178,313	260,000 ^e	265,000 ^e	270,000 ^e	
Cadmium, smelter	270	211	298	318	209	
Cobalt:						
Mine output, Co content ^c	100	100	100	100	100	
Metal, refined	3,851	4,009	3,433	3,134	3,994	
Copper:						
Mine output:						
Concentrate	11,000	2,800 ^r	2,800 ^r	2,800 ^r	2,800	
Cu content	2,698	700 ^r	700 ^r	700 ^r	700	
Metal, refined, primary and secondary	31,658	33,262	27,000 ^e	26,700	30,500	
Iron and steel:						
Iron ore and concentrate, Fe content	thousand tons	382	355	369	340	350 ^e
Metal:	do.					
Pig iron ^e	do.	70	60	60	60	60
Ferroalloys: ^e						
Ferrochromium	do.	175 ²	160	154 ²	83 ²	61 ²
Ferromanganese	do.	235 ²	235	235	240	240
Ferrosilicomanganese	do.	230	230	230	230	230
Ferrosilicon, 75% basis	do.	470	460	460	450	450
Silicon metal	do.	110	100	100	100	105
Other	do.	15	15	15	15	15
Total	do.	1,240	1,200	1,190	1,120	1,100
Steel, crude	do.	644	611	620	635 ^r	694
Semimanufactures, rolled ^c	do.	507 ^r	458 ^r	573 ^r	623 ^r	630 ^e
Magnesium, primary ^e	35,400	40,800	41,400	36,000 ^{e,r}	10,000 ^e	
Nickel:						
Mine output:						
Concentrate ^c	20,000	21,000	18,000	18,000	12,000	
Ni content	2,959	2,965	2,538	2,529	1,700	
Metal, primary	70,151	74,137	58,679	68,220	68,500	
Platinum-group metals ^{e,3}	kilograms	1,000	1,000	1,000	1,000	1,000
Titanium: ^e						
Ilmenite concentrate	thousand tons	590	580 ²	750	750	750
TiO ₂ content	do.	260	257 ²	340	340	340
Zinc, metal, primary	128,000	132,600	125,800	129,300	137,300	
INDUSTRIAL MINERALS						
Cement, hydraulic	thousand tons	1,676	1,827	1,851	1,870	1,850
Feldspar ^c	75,000	72,777 ²	75,000	73,000	75,000	
Graphite ^c	2,600	2,500	2,500	2,500	2,400	
Lime, hydrated, quicklime ^c	thousand tons	100	100	100	100	100
Mica, flake ^c	2,500	2,500	2,500	2,500	2,600	
Nepheline, syenite ^c	thousand tons	300	305 ²	300	310	310
Nitrogen, N content of ammonia	do.	245	122	334	323	330
Olivine sand ^c	do.	3,600	3,162 ²	3,200	3,300	3,200
Pyrite ^c	do.	5	-- ²	--	--	--
Stone, crushed:						
Dolomite ^c	800	893 ²	900	900	900	
Limestone ^c	4,500	6,915 ²	7,000	7,500	7,400	
Quartz and quartzite	1,000	1,314	1,300 ^e	1,500 ^e	1,400 ^e	

See footnotes at end of table.

TABLE 1--Continued
NORWAY: PRODUCTION OF MINERAL COMMODITIES¹

(Metric tons unless otherwise specified)

Commodity	1998	1999	2000	2001	2002
INDUSTRIAL MINERALS--Continued					
Sulfur, byproduct:					
Metallurgical	98 ^e	97	92	105	102
Petroleum	14 ^e	12 ^e	18	18	18
Total ^e	112	109	110	123	120
Talc, soapstone, steatite ^e	26	26	27	27	28
MINERAL FUELS AND RELATED MATERIALS					
Coal, all grades	250	328	330 ^e	320 ^e	310 ^e
Gas, natural, marketed ^{e, 4}	43,600	43,000	42,000	41,000	40,000
Peat, for agricultural use ^e	30	30	30	30	30
Petroleum: ^e					
Crude ⁵	1,100,000	1,100,000	1,000,000	1,000,000	1,050,000
Natural gas liquids	42,000	42,000	41,000	41,000	41,000
Refinery products:					
Naphtha	26,000	26,000	26,000	27,000	27,000
Gasoline	25,000	25,000	26,000	26,000	26,000
Kerosene	9,000	9,000	9,000	9,000	9,000
Distillate fuel oil	45,000	45,000	46,000	46,000	46,000
Residual fuel oil	12,000	12,000	12,000	12,000	12,000
Other products	4,000	4,000	4,000	4,500	5,000
Refinery fuel and losses	4,000	4,000	4,000	4,000	5,000
Total	125,000	125,000	127,000	129,000	130,000

^eEstimated; estimated data are rounded to no more than three significant digits; may not add to total shown. ^fRevised. -- Zero.

¹Table includes data available through September 3, 2003.

²Reported figure.

³Data represent exports.

⁴Reported as total methane sales.

⁵Excluding natural gas liquids.

TABLE 2
NORWAY: STRUCTURE OF THE MINERAL INDUSTRY IN 2002

(Thousand metric tons unless otherwise specified)

Commodity	Major operating companies and major equity owners	Location of main facilities	Annual capacity
Aluminum	Hydro Aluminium ANS (Norsk Hydro A/S, 70%)	Smelters at Årdal, Hoyanger, Karmoy, and Sunndalsora	600
Do.	do.	Plant at Holmestrand	90
Do.	Elkem Aluminium (Elkem A/S, 50%, and Alcoa Inc., 50%)	Smelters at Farsund and Mosjoen	250
Do.	Sor-Norge Aluminium A/S (Alusuisse Group, 50%, and Hydro Aluminium ANS, 49%)	Smelter at Odda	50
Cadmium	Norzink A/S (Outokumpu Oyj, 100%)	Smelter at Eitrheimsneset	0.3
Cement	Norcem A/S	Plants at Brevik and Kjøpsvik	2,150
Coal	Store Norske Spitsbergen Kulkompani A/S	Mines at Longyearbyen and Svea	450
Cobalt	Nikkelverk A/S (Falconbridge Nickel Mines Ltd., 100%)	Smelter at Kristiansand	3
Copper:			
Ore, Cu content	Nikkel og Olivin A/S (Outokumpu Oyj, 100%)	Mine at Narvik	1
Metal	Nikkelverk A/S (Falconbridge Nickel Ltd., 100%)	Smelter at Kristiansand	40
Dolomite	Franzefoss Bruk A/S	Mine at Ballagen	350
Do.	Norwegian Holding A/S	Mines at Hammerfall, Logavlen, and Kvitblikk	500
Feldspar	Franzefoss Bruk A/S	Mine at Lillesand	100
Ferroalloys	Elkem Rana (Elkem A/S, 100%)	Ferrosilicon plant at Mo i Rana	175
Do.	Elkem Salten (Elkem A/S, 100%)	Ferrosilicon plant at Straumen	90
Do.	Elkem Bjolvefossen (Elkem A/S, 100%)	Ferrosilicon plant at Alvik	60
Do.	Elkem Thamshavn (Elkem A/S, 100%)	Ferrosilicon plant at Orkanger	60
Do.	Finnfjord Smelteverk AS, Rana Metal (FESIL ASA, 100%)	Ferrosilicon plant at Mo i Rana	100
Do.	A/S Hafslung Metal (FESIL ASA, 100%)	Ferrosilicon plant at Sarpsborg	75
Do.	Ila og Lilleby Smelteverk (FESIL ASA, 100%)	Ferrosilicon plant at Finnsnes	60
Do.	Oye Smelteverk (Tinfos Jernverk A/S, 100%)	Silicomanganese plant at Kvinesdal	235

TABLE 2--Continued
NORWAY: STRUCTURE OF THE MINERAL INDUSTRY IN 2002

(Thousand metric tons unless otherwise specified)

Commodity	Major operating companies and major equity owners	Location of main facilities	Annual capacity
Iron, metal	Ulstein Jernstoperi A/S	Hordvikneset	10
Iron ore	Rana Gruber A/S (Norsk Jernverk Holding A/S, 100%)	Mine at Mo i Rana	2,000
Do.	Artic Bulk Minerals A/S	Mine and plant at Kirkenes	1,500
Lime	Hylla Kalkverk (Nikolai Bruch A/S, 100%)	Verdal/Trondheim Mine and plant	80
Do.	A/S Norsk Jernverk	Plant at Mo i Rana	48
Do.	Ardal og Sunndal Verk A/S	More og Romsdal Mine at Surnadal	20
Do.	Brevik Kalkverk A/S	Alesund Mine at Larsnes	20
Do.	Mjoendalen Kalkfabrik	Plant at Asen/Drammen	7
Limestone	Norcem A/S	Dalen, Bjorntvedt, and Kjopsvik Mines	1,600
Do.	Vardelskalk A/S (Franzefoss Burk A/S, 100%)	Sandvika Mine	800
Do.	Brevik Kalkverk A/S	Visnes and Glaerum Mines	500
Magnesium	Norsk Hydro A/S (Government, 51%)	Plants at Porsgrunn and Sauda	50
Manganese, alloys	Eramet SA	do.	500
Natural gas million cubic meters	Den Norske Stats Oljeselskap A/S	Gama, Gullfaks, Sleipner Ost, and Statfjord Fields	12,270
Do.	do. Phillips Petroleum Company Norway	Ekofisk Field	9,900
Do.	do. Elf Petroleum Norge A/S	Frigg, Heimdal, and Ost-Frigg Fields	5,750
Do.	do. Norsk Hydro Produksjon A/S	Troll-Oseberg Field	2,600
Do.	do. BP Petroleum Development of Norway	Gyda and Ula Fields	1,040
Do.	do. Esso Norge A/S	Odin Field	1,000
Do.	do. Amoco Norway A/S	Hod and Valhall Fields	910
Nepheline syenite	North Cape Mineral A/S (Unimin Corp., 84%)	Mine at Stjernoy	350
Nickel:			
Ore, Ni content	Nikkel og Olivin A/S (Outokumpu Oyj, 100%)	Mine at Narvik	3
Do.	Titania A/S (Kronos Norge A/S, 100%)	Mine at Tellnes	0.5
Metal	Nikkelverk A/S (Falconbridge Nickel Mines Ltd., 100%)	Smelter at Kristiansand	85
Olivine	A/S Olivin	Åheim Mine and plant	2,500
Do.	do.	Stranda Mine and plant	300
Do.	Franzefoss Bruk A/S	Lefdal Mine at Bryggja	500
Petroleum 42-gallon barrels per day	Den Norske Stats Oljeselskap A/S	Gullfaks, Statfjord, Tommeliten, and Veslefrikk Fields	1,069,300
Do.	do. Norsk Hydro Produksjon A/S	Brage, Mime, and Oseberg Fields	566,200
Do.	do. Phillips Petroleum Company Norway	Ekofisk Field	237,500
Do.	do. Saga Petroleum A/S	Snorre Field	170,000
Do.	do. BP Petroleum Development of Norway	Gyda and Ula Fields	155,000
Do.	do. A/S Norske Shell	Draugen Field	90,000
Do.	do. ExxonMobil Refining & Supply Co.	Slagen Refinery	110,000
Do.	do. Statoil Mongstad	Mongstad Refinery	200,000
Pyrite	Folldal Verk A/S (Norsulfid A/S, 100%)	Mine at Hjerkin	10
Quartzite	Elkem Tana (Elkem A/S, 100%)	Mine at Tana	540
Do.	Elkem Marnes (Elkem A/S, 100%)	Mine at Sandhornoy	200
Do.	Vatnet Kvarts A/S	Mine at Nordland	150
Do.	Snekkevik Kvartsbrudd	Mine at Kragero	110
Silicon metal	Lilleby Metall A/S (FESIL ASA, 100%)	Plant at Trondheim	9
Steel	Fundia AB (Norsk Jenverk, 50%, and Rautaruukki Group, 50%)	Plants at Christiania, Mandal Stal, Mo i Rana, and Spigerverk	600
Talc	A/S Norwegian Talc (Pluuss-Staufer AG, 51%)	Mine/plant at Altermark/Knarrevik and Framfjord	90
Do.	Kvam Minerals A/S	Mine/plant at Kvam	6
Titanium, concentrate	Titania A/S (Kronos Norge A/S, 100%)	Mine at Tellnes	800
Zinc, metal	Norzik A/S (Outokumpu Oyj, 100%)	Smelter at Odda	150