THE MINERAL INDUSTRY OF

NORWAY

By Chin S. Kuo

The economy of Norway was characterized by its substantial oil and gas revenues, shipping and fishing industries, and a small industrial base. The growth rate of the gross domestic product was 1.4% in 2001. Norway achieved a high living standard with a per capita income of $36,306 and a low inflation rate of 2.9% (U.S. Department of State, 2002§[1]). The country is richly endowed with natural resources—fishing, hydroelectric power, minerals, natural gas, petroleum, and timber. Norway produced 3.2 million barrels per day (Mbbl/d) of oil and vied with Russia to be the world's second largest oil exporter after Saudi Arabia.

The Ministry of Finance's new proposal allowed new fields to forego an offshore tax that could be as high as 78% through the early field development phase. It also proposed to split fiscal terms between the 78% offshore tax and the 28% corporate income tax in proportion with nondepreciated asset values for all oil companies that operate on the Norwegian continental shelf. The Norwegian Oil Industry Association claimed that the proposed tax changes would undermine new offshore field development (Oil & Gas Journal, 2001b).

The partial privatization of Statoil AS called for selling up to one-third of Statoil's shares to private investors; 15% to 25% would be sold through the initial public offering in June 2001. Statoil would have the opportunity to acquire 15% of the state's direct financial interest (SDFI) assets in the Norwegian continental shelf for $4.25 billion. The company indicated that it was interested in increasing its stake in the Tampen area; this would boost its production and reserve base by 50%. Norsk Hydro A/S and other companies could buy up to 6.5% of the SDFI (Oil & Gas Journal Online, 2001§). Norsk Hydro was expected to focus on increasing its stake in the Oseberg area. The 78.5% of the SDFI portfolio not sold would be entrusted to a new state-owned limited company. The Government also was expected to separate oil and gas transportation assets to an independent company.

A final decision on the expansion at Norsk Hydro's Sunndal aluminum smelter was expected in mid-2001, and completion was expected in October 2004. Hydro Aluminium ANS signed a letter of intent with AF Sunndal for a contract worth $70 million. Construction work would start in June. The new potlines would bring total production capacity to 321,000 metric tons per year (t/yr) when they came onstream in 2007. The new 234,000-t/yr smelter would use Hydro's HAL250 technology. Sunndal would become Europe's largest aluminum smelter (Hugin Online, 2001a).

Norsk Hydro's Holmestrand rolling mill started operating its new cold-rolling and slitting system that makes thinner aluminum coil. The new mill increased its production capacity to 90,000 t/yr from 70,000 t/yr at a cost of $28.6 million. Norsk Hydro's rolled products division as a whole used 127,000 t/yr of secondary aluminum. Its remelting facilities in Europe and the United States had a total capacity of 550,000 t/yr (Metal Bulletin, 2001c).

Fundia AB of Finland planned to stop production of H-beams at its Mo i Rana steel section mill in Norway. Its H-beam capacity was 100,000 t/yr. The company, however, would continue to produce shipbuilding sections and other special sections on an order-by-order basis (Metal Bulletin, 2001b).

CCB Stal (a subsidiary of Rautaruukki Oy of Finland) bought AvestaPolarit's stainless stockholding operation in Norway. AvestaPolarit's warehouse and premises in Oslo employed 20 workers. CCB Stal would become Norway's leading stainless stockholder after the deal. The group aimed to supply a full range of aluminum products and steel, which included stainless and engineering grades (Metal Bulletin, 2001d).

Elkem A/S planned to suspend ferrosilicon production of 30,000 t/yr at its Salten works owing to weak market conditions. One of the three furnaces would be closed. The country's total ferrosilicon production capacity was 485,000 t/yr (Metal Bulletin, 2001a).

Norsk Hydro planned to cut back magnesium production by closing its Porsgrunn plant in the Grenland district. Production at the 42,000-t/yr magnesium smelter would be wound down in 6 months. The possibility of continuing to operate the cast house alone by recovering recycled scrap metal and upgrading metal from other producers was being studied. Norsk Hydro had a total production capacity of 87,000 t/yr. The company would continue to be the world's leading player in the market for alloyed magnesium (Hugin Online, 2001b).

Crew Development Corp. of Canada's zinc exploration program in an area of 3,000 square kilometers in the Roros district of central Norway was completed. A total 1,788 meters was drilled from 21 holes in 3 targeted areas. In addition, 40 new targeted areas were identified, surveyed, and mapped by ground geophysical methods, and more than 900 new deep soil samples were collected and analyzed. The drilling program confirmed the existence of extensive stratiform sulfide mineralization with dimensions of a type that could host commercial deposits (Business Wire, 2001§).

Outokumpu Oyj of Finland bought Norzink A/S and Noralf A/S (its aluminum fluoride processing subsidiary), which had the zinc smelter and plant located near Odda, 250 kilometers (km) west of Oslo, in southern Norway. The 50% interests were acquired from Boliden Mineral AB and Rio Tinto plc for a total of $180 million. Norzink had a production capacity of 150,000 t/yr of zinc. With a capacity of 228,000 t/yr, Noralf was one of the largest aluminum fluoride producers in Europe and the sixth largest in the world. Noralf had begun production of anhydrite with a capacity of 70,000 t/yr in 1999 (Industrial Minerals, 2001).

The Government awarded five new oil and gas operator licenses and eight new partnership licenses for the Norwegian North Sea. In total, 11 companies were awarded licenses in 15

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

blocks or parts of blocks. Statoil was awarded one operator license. Aker Maritime and Norsk Hydro received offers of participation in licenses. The SDFI secured only a license share in one block (Alexander's Gas & Oil Connections, 2001§).

Partners in the Statoil-operated Mikkel Field in the Norwegian Sea submitted a development and operation plan that called for production of gas and condensate to start in 2003 and continue until 2017 at a development cost of $255 million. Development would involve production of 20 billion cubic meters per day of gas and 30 million barrels per day of condensate through four production wells. Statoil had a 56.52% stake; partners ExxonMobil Corp. had 33.48%, and Norsk Hydro, 10%. Mikkel Field lies on the Halten Bank, 35 km south of the Midgard deposit on the Asgard license. The 707-km Asgard transport trunkline would transport gas to the processing plant at Karsto, north of Stavanger. Condensate would flow through an existing line to the Asgard C storage ship for export (Oil & Gas Journal, 2001a).

Statoil opened its Karsto processing plant and Asgard gas transport system. Karsto would be Europe's largest natural gas treatment complex. Norwegian gas deliveries to Europe would plateau in 2005 with exports of 70 billion cubic meters per year, of which 15% would come from Asgard Field (Oil & Gas Journal, 2001c).

Statoil also started the gas export line that eventually will supply 25 million cubic meters per day from the Gullfaks area in the Norwegian North Sea to the Karsto gas complex prior to send-out to the Statpipe trunkline for transport to Europe. Gas deliveries from Gullfaks rose to 20 million cubic meters per day in October from 13 million cubic meters per day in April. The export level from Gullfaks Field was expected to reach a plateau in 2004 (Oil & Gas Journal, 2001d).

Norsk Hydro received approval from the Ministry of Petroleum to develop Farm West and Vale Fields in the North Sea. Farm West would be developed at a cost of $440 million and had reserves of 100 million barrels (Mbbl) of oil and 8 billion cubic meters of natural gas. First flow from Farm West was scheduled for October 2003. The Vale gas-condensate field would be developed at a cost of $100 million and had reserves of 21 Mbbl of condensate and 2.5 billion cubic meters of gas. First flow from Vale was set for June 2002 (Oil & Gas Journal, 2001e).

The Glitne Oilfield was the smallest discovery on the Norwegian continental shelf and was brought onstream by Petroleum Geo-Services in 2001. Glitne is on blocks 15/5 and 15/6, 40 km northwest of Sleipner Field. Owners were Statoil with 68.9%; TotalFinaElf, 21.8%; and Norsk Hydro, 9.3%. Glitne contained 25 Mbbl of recoverable oil and had an estimated production life of 3 years (Oil & Gas Journal, 2001g).

Norsk Agip (a unit of ENI of Italy) confirmed an oil discovery on the Goliath Field, 85 km north of Hammerfest in the Norwegian Barents Sea. The Goliath Field was estimated to contain from 175 to 300 Mbbl of oil equivalent with recoverable reserves of 35 to 40 Mbbl of oil equivalent. Norsk Agip was the operator with 25% interest; the other partners were the Norwegian Petroleum Directorate with 25%; Phillips Petroleum Company Norway, 20%; Enterprise Oil, 15%; and Fortum, 15% (Oil & Gas Journal, 2001h).

Statoil's Huldra Field began production of gas and condensate in the North Sea. Huldra had a simple processing plant for separating condensate and gas. Condensate was piped to the Veslefrikk A platform 16 km away for processing, and gas was sent to the Norsk Hydro-operated Heimdal Field. The field is on blocks 30/2 and 30/3. Statoil was the operator with a 51.62% interest (Oil & Gas Journal, 2001i).

Statoil awarded Kvaerner a $73.3 million contract to upgrade its 200,000-barrel-per-day Mongstad refinery near Bergen to comply with new European fuel specifications for 2005. The project was slated for completion by yearend 2001. The refinery was operated by Mongstad Refining in which Statoil owned 79% interest and Norske Shell Raffinering owned 21% (Oil & Gas Journal, 2001f).

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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 COMMODITIES 1/

(Metric tons unless otherwise specified)

Commodity		1997	1998	1999 e/	2000 e/	2001 e/
METALS						
Aluminum:						
Primary		918,558	995,619	1,020,215 2/	1,025,676 2/	1,067,600 2/
Secondary		58,635	62,400	178,313 2/	260,000	265,000
Cadmium, smelter		290	270 e/	211 2/	298 2/	318 2/
Cobalt		3,417	3,851	4,009 2/	3,433 2/	3,134 2/
Copper:						
Mine output:						
Concentrate		28,000	11,000 e/	--	--	--
Cu content		6,671	2,698	--	--	--
Metal, primary and secondary, refined		32,639	31,658	33,262 2/	27,000	26,700 2/
Iron and steel:						
Iron ore and concentrate, Fe content	thousand tons	462	382	355 2/	369 2/	340
Metal:						
Pig iron e/	do.	70	70	60	60	60
Ferroalloys:						
Ferrochromium	do.	145 e/	175	160	154 r/ 2/	83 2/
Ferromanganese	do.	235	235	235	235	240
Ferrosilicomanganese e/	do.	230	230	230	230	230
Ferrosilicon (75% basis)	do.	470 e/	470 e/	460	460	450
Silicon metal	do.	110 e/	110 e/	100	100	100
Other e/	do.	15	15 e/	15	15	15
Total e/	do.	1,210	1,240	1,200	1,190 r/	1,120
Steel, crude	do.	570	644	611 2/	620	630
Semimanufactures, rolled e/	do.	300	300	300	300	300
Lead, mine output:						
Concentrate		2,600	--	--	--	--
Pb content		2,000	--	--	--	--
Magnesium, primary		34,200	35,400	40,800 r/	41,400 r/	40,000
Nickel:						
Mine output:						
Concentrate e/		20,000	20,000	21,000	18,000	18,000
Ni content		2,454	2,959	2,965 2/	2,538 2/	2,529 2/
Metal, primary		62,702	70,151	74,137 2/	58,679 2/	68,220 2/
Platinum-group metals e/ 3/	kilograms	1,000	1,000	1,000	1,000	1,000
Titanium: e/						
Ilmenite concentrate	thousand tons	750	590	580 2/	610	600
TiO_2 content	do.	340	260	257 2/	270	265
Zinc:						
Mine output:						
Concentrate		15,800	--	--	--	--
Zn content		7,900	--	--	--	--
Metal, primary		137,400	128,000	132,600 2/	125,800 2/	129,300 2/
INDUSTRIAL MINERALS						
Cement, hydraulic	thousand tons	1,724	1,676	1,827 r/ 2/	1,851 r/ 2/	1,870 2/
Feldspar e/		75,000	75,000	72,777 2/	75,000	73,000
Graphite e/		2,600	2,600	2,500	2,500	2,500
Lime, hydrated, quicklime e/	thousand tons	100	100	100	100	100
Mica, flake e/		2,500	2,500	2,500	2,500	2,500
Nepheline syenite e/	thousand tons	300	300	305 2/	300	310
Nitrogen, N content of ammonia	do.	279	245	122 2/	334 2/	323 2/
Olivine sand e/	do.	3,600	3,600	3,162 2/	3,200	3,300
Pyrite e/	do.	5	5	-- 2/	--	--
Stone, crushed:						
Dolomite e/	do.	800	800	893 2/	900	900
Limestone e/	do.	4,500	4,500	6,915 2/	7,000	7,500
Quartz and quartzite	do.	1,000 e/	1,000	1,314 2/	1,300	1,500
Sulfur, byproduct of:						
Metallurgy	do.	105 r/	98 r/	97 r/ 2/	92 r/ 2/	105 2/
Petroleum	do.	18 r/	14 r/	12	18 r/ 2/	18 2/
Total	do.	123 r/	112 r/	109 r/	110 r/	123
Talc, soapstone, steatite e/	do.	28	26	26	27	27

See footnotes at end of table.

TABLE 1--Continued
NORWAY: PRODUCTION OF MINERAL COMMODITIES 1/

(Metric tons unless otherwise specified)

Commodity		1997	1998	1999 e/	2000 e/	2001 e/
MINERAL FUELS AND RELATED MATERIALS						
Coal, all grades	thousand tons	260 e/	250	328 2/	330	320
Gas, natural, marketed 4/	do.	42,600 e/	43,600	43,000	42,000	41,000
Peat, for agricultural use e/	do.	30	30	30	30	30
Petroleum:						
Crude 5/	thousand 42-gallon barrels	1,105,584	1,100,000 e/	1,100,000	1,000,000	1,000,000
Natural gas liquids e/	do.	42,000	42,000	42,000	41,000	41,000
Refinery products: e/						
Naphtha	do.	26,000	26,000	26,000	26,000	27,000
Gasoline	do.	25,000	25,000	25,000	26,000	26,000
Kerosene	do.	9,000	9,000	9,000	9,000	9,000
Distillate fuel oil	do.	45,000	45,000	45,000	46,000	46,000
Residual fuel oil	do.	12,000	12,000	12,000	12,000	12,000
Other	do.	4,000	4,000	4,000	4,000	4,500
Refinery fuel and losses	do.	4,000	4,000	4,000	4,000	4,500
Total	do.	125,000	125,000	125,000	127,000	129,000

e/ Estimated; estimated data are rounded to three significant digits; may not add to totals shown. r/ Revised. -- Zero.
1/ Table includes data available through August 6, 2002.
2/ Reported figure.
3/ Data represent exports.
4/ Reported as total methane sales.
5/ Excluding natural gas liquids.

TABLE 2
NORWAY: STRUCTURE OF THE MINERAL INDUSTRY IN 2001

(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%; Alcoa Inc., 50%)	Smelters at Farsund and Mosjoen	250
Do.	Sor-Norge Aluminium A/S (Alusuisse Group, 50%; 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 Kjopsvik	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	Grong Guber A/S (Norsulfid A/S, 100%)	Mines at Royrvik and Gjersvik	8
Do.	Nikkel og Olivin A/S (Norsulfid A/S, 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%)	Ferrochromium plant at Mo i Rana	140
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	140
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
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
Lead ore, Pb content	A/S Bleikvassli Gruber (A/S Sydvaranger, 100%)	Mine at Bleikvassli	2

TABLE 2--Continued
NORWAY: STRUCTURE OF THE MINERAL INDUSTRY IN 2001

(Thousand metric tons unless otherwise specified)

Commodity	Major operating companies and major equity owners	Location of main facilities	Annual capacity
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.	Breivik 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.	Breivik 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.	Phillips Petroleum Company Norway	Ekofisk Field	9,900
Do.	Elf Petroleum Norge A/S	Frigg, Heimdal, and Ost-Frigg Fields	5,750
Do.	Norsk Hydro Produksjon A/S	Troll-Oseberg Field	2,600
Do.	BP Petroleum Development of Norway	Gyda and Ula Fields	1,040
Do.	Esso Norge A/S	Odin Field	1,000
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 (Norsulfid A/S, 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 barrels per day	Den Norske Stats Oljeselskap A/S	Gullfaks, Statfjord, Tommeliten, and Veslefrikk Fields	1,069,300
Do.	Norsk Hydro Produksjon A/S	Brage, Mime, and Oseberg Fields	566,200
Do.	Phillips Petroleum Company Norway	Ekofisk Field	237,500
Do.	Saga Petroleum A/S	Snorre Field	170,000
Do.	BP Petroleum Development of Norway	Gyda and Ula Fields	155,000
Do.	A/S Norske Shell	Draugen Field	90,000
Pyrite	Folldal Verk A/S (Norsulfid A/S, 100%)	Mine at Hjerkinn	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%; Rautaruukki Group, 50%)	Plants at Christiania, Spigerverk, Mandal Stal, and Mo i Rana	600
Talc	A/S Norwegian Talc (Pluess-Staufer AG, 51%)	Mine and plant at Altermark/Knarrevik and Framfjord	90
Do.	Kvam Minerals A/S	Mine and plant at Kvam	6
Titanium, concentrate	Titania A/S (Kronos Norge A/S, 100%)	Mine at Tellnes	800
Zinc:			
Ore, Zn content	A/S Bleikvassli Gruber (A/S Sydvaranger, 100%)	Mine at Bleikvassli	10
Metal	Norzik A/S (Outokumpu Oyj, 100%)	Smelter at Odda	150