2010 Minerals Yearbook

NORWAY [ADVANCE RELEASE]

U.S. Department of the Interior
U.S. Geological Survey

July 2012

The Mineral Industry of Norway

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Norway's diverse geologic terrains offer a broad spectrum of mineral resources for exploration and development, including metals, industrial minerals, and mineral fuels. Norway's mineral resources include coal, iron ore, natural gas, nickel, petroleum, and titanium. The mining and quarrying industry, which was mostly of regional significance, was located mainly along the coast. The growth of the country's natural gas and petroleum sector in the past 10 years has contributed significantly to Norway's economy. Even though Norway was not a member of the European Union (EU), it participated in the EU's eurozone single market through the European Economic Area (EEA).

Minerals in the National Economy

Norway's economy is highly dependent upon the country's hydrocarbon resources; they were the country's single largest source of revenue. The petroleum sector provided about one-half of the country's exports and more than 30% of Government revenue. In anticipation of an eventual decrease in natural gas and petroleum production, the Government saves a significant amount of revenue from petroleum exports in a sovereign wealth fund (SWF), and its accumulated fund was the third largest of all the SWF holder's after the Governments of Luxembourg and Qatar (Dimireva, 2010).

Mineral Trade

Mineral trade was important to the national economy. In terms of the value of exports, petroleum was Norway's most important mineral commodity. Norway was ranked 31 in the world in terms of the value of its exports. U.S. exports to Norway were valued at $3,100 million and included other nonferrous metals, $271 million; oilfield and drilling equipment, $119 million; petroleum products, $59 million; iron and steel products, $26 million; and metallurgy-grade coal, $12 million. Norway's mineral-related exports to the United States were valued at $6,950 billion and included crude petroleum, $29,398 million; fuel oil, $1,959 million; petroleum products, $1,922 million; copper, $343 million; and stone, cement, and lime, $334 million (U.S. Census Bureau, 2010a, b).

Production

Norway produced aluminum, cadmium, cobalt, copper, ferroalloys, nickel, steel, and zinc metals and was a global supplier of aluminum, ferroalloys, and petroleum. Production of primary aluminum, cobalt, and petroleum decreased whereas production of ilmenite concentrate, olivine sand, and zinc metal increased. Aggregates, limestone, nepheline syenite, and sand and gravel were some of Norway's more economically important industrial mineral raw materials (table 1). The country's production of titanium accounted for about 6% of world production (Gambogi, 2011).

Structure of the Mineral Industry

The Norwegian mineral industry was composed of a mixture of Government and privately owned operations. Table 2 lists the major mineral companies that were operating in Norway in 2010 and their respective locations and capacities.

Commodity Review

Metals

Aluminum, Bauxite and Alumina.—Norsk Hydro ASA announced plans to build an aluminum recycling plant at Karmoy. The plant would have an initial capacity of 35,000 metric tons per year (t/yr); a capacity increase of 35,000 t/yr was planned after the first furnace is fully operational. The new plant would recycle dross and scrap from all of Norsk Hydro's aluminum plants in Norway, as well as from external sources in Iceland and Scandinavia. The first furnace was planned to be operational by midyear 2012 at an estimated cost of about $39.5 million (Solem, 2010).

Norsk Hydro announced a $4.9 billion purchase of Vale S.A. of Brazil's aluminum facilities in Brazil, thus securing bauxite reserves that would last Norsk Hydro for an estimated 100 years. This acquisition gave the company a leading bauxite mine and the world's leading alumina refinery among other mineral-related assets in Brazil. Norsk Hydro expected that the global demand for aluminum would increase by 76% between 2010 and 2020 and that gaining better access to bauxite and alumina would enable Norsk Hydro to respond to increased demand (Thomson Reuters, 2010).

Iron and Steel.—In 2010, the MV *Nordic Barents*, carrying 40,000 metric tons (t) of iron ore, took the northern most route from Norway to China on an Arctic Ocean shortcut through the melting ice cap. The *Nordic Barents* was the first non-Russian commercial vessel to attempt a nonstop crossing of a route that skirts the receding Arctic ice cap. This route reduced the trip by about 5,000 nautical miles and several days, saved the owners of the cargo thousands of dollars, and made history in the process. Russian law required icebreaker escort, even when ice danger was small, owing to the lack of onshore mechanical and medical support. Northern Iron Ltd. had sent 15 ships of iron ore to China since it began mining in 2009. All had steamed south, then east through the Suez Canal or around the Cape of Good Hope and had thereby risked the possibility of encountering pirates in the Indian Ocean (Gibbs, 2010).

Industrial Minerals

Norway was a regionally significant producer of industrial minerals. It was among the world's leading producers of olivine sand and nepheline syenite. Production of aggregate, gravel, and sand were some of Norway's important raw materials. The European industrial minerals market was the primary market for Norway's mineral raw materials.

Feldspar.—SCR Sibelco Nordic A/S announced that it was closing its pegmatite mine near Lillesand owing to the decreased market demand for feldspar. Sibelco stated that the closure was because of expensive processing costs and the decreasing demand for feldspar in traditional cathode ray tube TV sets. This market had declined steadily since the development of liquid crystal display and plasma TV screens—developments that also affected consumption of other minerals, such as celestite (Industrial Minerals, 2010).

Mineral Fuels and Other Sources of Energy

Norway had a highly developed natural gas and petroleum sector. Natural gas production had been steadily increasing since 2005, and petroleum production had been declining since 2001 (table 1). Norway was the leading petroleum producer and exporter in Western Europe in 2010. Also, Norway was the world's second ranked exporter of natural gas after Russia and the world's fifth ranked natural gas producer in 2010 (U.S. Energy Information Administration, 2010a).

The Government signed a natural gas and petroleum agreement with six West African countries to help them gain jurisdiction over their natural gas and petroleum resources by helping establish the limits of each country's outer continental shelf (the area beyond 200 nautical miles). Under the agreement, the Government would provide assistance with the establishment of these continental shelves. The agreement was signed with Cape Verde, Gambia, Guinea, Guinea-Bissau, Mauritania, and Senegal. Establishing the limits of the continental shelf is important because it determines who can exploit the mineral resources in that area (Afriquejet.com, 2010).

Coal.—Store Norske Spitsbergen Kulkompani A/S (Store Norske) was Norway's sole coal producer and the most northerly operator in the world. Coal mining was the main industry on the Svalbard Arctic archipelago, which is located about midway between mainland Norway and the North Pole. Norway continued to be a net exporter of coal from two mines on Svalbard: Svea Nord, which is located south of Longyearbyen, and the Gruve 7 Mine. About 25,000 t of coal from the Gruve 7 Mine was used in the country's only coal-fired power station on Spitsbergen Island; the rest was exported to Europe. Store Norske announced that it was investing about $17 million in the Gruve 7 Mine. The investment would be used for new equipment, a new coal storage facility and new loading facilities (Barents Observer.com, 2011).

Store Norske announced that it had applied for permission to open a new mine in Lunckefjell. Development of the Lunckefjell Mine was scheduled to commence in the spring of 2012. The planned start of mining operations was scheduled for the winter of 2013. The Lunckefjell deposit consisted of high-calorific-value coal that was expected to be suitable for metallurgical purposes. Such coal had a higher market value than coal for energy production (Store Norske Spitsbergen Grubekompani A/S, 2010).

Natural Gas.—Norway had estimated proven reserves of 2 trillion cubic meters of natural gas as of January 2010. Norway's natural gas production had been increasing every year since 1994. The annual increases had been sustained by incorporating new fields in the Barents Sea and the Norwegian Sea. Norway's single largest natural gas field was the Troll-Oseberg field (U.S. Energy Information Administration, 2010a).

Dong Energy AS announced a development plan for the Marulk natural gas field. Marulk was to be developed to connect to the adjacent Norne field, which was in production. Two production wells would be connected to and controlled by the production vessel at the Norne field by way of a sea-bed installation. The natural gas would be transported from the production vessel to facilities on the west coast of Norway through the Gassled pipeline system either to the European continent or to the United Kingdom (Dong Energy AS, 2010).

Petroleum.—Norway, which had the largest petroleum reserves in Western Europe, was reported to have 5.67 billion barrels of estimated proven reserves as of January 2010. All the reserves are located offshore on the Norwegian Continental Shelf (NCS), which is divided into three sections: the Barents Sea, the North Sea, and the Norwegian Sea. The bulk of production had taken place in the North Sea, with smaller amounts extracted in the Barents Sea and the Norwegian Sea. (U.S. Energy Information Administration, 2010b).

The Government announced its 2010 licensing round for predefined areas (APA). The 2010 APA offered 63 more predefined areas than were offered in the 2009 round; 43 in the Norwegian Sea and 20 in the Barents Sea. The announcement was thought to represent a major extension of natural gas and petroleum operations in the Norwegian Arctic. The Government was planning to announce more projects in the APA on the NCS (Oil and Gas Journal, 2010).

StatoilHydro ASA announced that it was awarded 11 production licenses on the NCS. Most of the licenses lie near established infrastructure and could help to extend the life of the installations and open up further exploration opportunities in these areas (Rigzone.com, 2011).

Renewable Energy.—Norway had excellent wind power potential and the Government was continuing its efforts to develop offshore wind power generation. Typical sites at the coast have prevalent mean annual Arctic winds in the range of 8 meters per second (m/s) to 10 m/s. This was considerably better than the typical wind conditions in Denmark or northern Germany. Enova SF, a Government agency, announced plans to build the world's most powerful wind turbine. The $23 million, 162-m-tall prototype wind turbine would be built with the objective of developing a technology that would result in more efficient energy generation for offshore wind power. The prototype would first be tested on land in Oeygarden in southwestern Norway for 2 years and was expected to be able to supply power to 2,000 homes. Norway was one of the world's leading natural gas and petroleum producers; however,

it obtained most of its own energy through hydroelectric power. The amount of hydropower it produced—120 terawatt hours per year—was the highest in Europe. About 0.4% of its electric grid was supplied by solar cells (Independent, The, 2010).

Outlook

Exploration drilling in frontier areas in the Barents Sea and the Norwegian Sea is set to continue. The Norwegian Petroleum Directorate plans to continue with efforts to open up new offshore areas, particularly in the Arctic region. Norway is also expected to continue to obtain nearly all its electricity from hydropower; however other renewable resources, such as wind power, are being investigated. Industrial minerals are expected to continue to be important to Norway's economy.

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TABLE 1

NORWAY: PRODUCTION OF MINERAL COMMODITIES[1]

(Thousand metric tons unless otherwise specified)

Commodity		2006	2007	2008	2009	2010[e]
METALS						
Aluminum:						
Primary	metric tons	1,422,000	1,304,400	1,368,000 [r]	1,090,000	800,000
Secondary	do.	349,200	350,000	350,000 [e]	350,000	300,000
Cadmium, smelter	do.	125	269	178	249 [2]	300
Cobalt, metal, refined	do.	4,927	3,939	3,719	3,510 [2]	3,208 [2]
Copper, metal, refined, primary and secondary	do.	39,700	34,212	32,000 [e]	33,900	32,000
Iron and steel:						
Iron ore and concentrate, Fe content		397 [r]	403 [r]	477 [r]	896 [2]	3,105 [2]
Metal:[e]						
Pig iron		100	100	100	100	100
Ferroalloys:						
Ferromanganese		130	130 [r]	130 [r]	130	130
Ferrosilicomanganese		326	294	273 [r]	250	249
Ferrosilicon, 75% basis		124	170 [r]	185 [r]	233 [2]	230
Silicon metal		150	146 [r]	155 [r]	150 [2]	175
Other		60	60	60	150	150
Total		790 [r]	800 [r]	803 [r]	913	934
Steel, crude		679	740	560	579 [2]	514 [2]
Semimanufactures, rolled		600	650	600	600	600
Mercury	metric tons	23	45	33	30	25
Nickel:						
Mine output:						
Concentrate[e]	do.	400	600	900	850	800
Ni content	do.	362	246	377 [r]	369 [2]	332 [2]
Metal, primary	metric tons	81,974	87,590	88,741	88,577	88,000
Titanium:[e]						
Ilmenite concentrate		850	882 [2]	915 [2]	671 [2]	864 [2]
TiO_2 content		385	390	403 [r]	289 [2]	371
Zinc, metal, primary	metric tons	160,670	157,027	145,469	137,622 [2]	147,775 [2]
INDUSTRIAL MINERALS						
Cement, hydraulic[e]		1,695	1,700	1,800	1,700	1,700
Clays		320	319	279	227 [r, 2]	230
Feldspar		65	65	62	71 [r, 2]	56 [2]
Graphite[e]	metric tons	9,000	1,400	4,100 [r]	4,562 [2]	6,270 [2]
Lime, hydrated, quicklime[e]		70 [r]	70 [r]	110 [r]	100	100
Mica, flake[e]	metric tons	2,700	1,000	1,000	--	--
Nepheline syenite[e]		312	312 [2]	346 [2]	270 [r]	327 [2]
Nitrogen, N content of ammonia[e]		350	350	350	300	300
Olivine sand		3,000 [e]	2,562 [2]	2,554 [2]	1,267 [2]	2,560 [2]
Sand and gravel		13,418	15,325	14,817	13,047 [2]	13,011 [2]
Stone, crushed:						
Dolomite		525 [e]	826	744	579 [r, 2]	604 [2]
Limestone		7,200 [e]	8,770	6,781	6,151 [2]	6,129 [2]
Quartz and quartzite		834	1,067	1,025	1,022 [r, 2]	1,055 [2]
Sulfur, byproduct:[e]						
Metallurgical		80	80	80	80	80
Petroleum		20	20	20	20	20
Total		100	100	100	100	100
Talc, soapstone, steatite	thousand metric tons	57	66	38	23 [2]	64 [2]
MINERAL FUELS AND RELATED MATERIALS						
Coal, all grades		2,359	3,223	3,429	2,437	1,685 [2]
Gas, natural, marketed[3]	million cubic meters	87,600	89,700	99,200	99,000	105,280 [2]
Peat, for agricultural use	do.	78	159	497	500	500

See footnotes at end of table.

TABLE 1—Continued

NORWAY: PRODUCTION OF MINERAL COMMODITIES[1]

(Thousand metric tons unless otherwise specified)

Commodity		2006	2007	2008	2009	2010[e]
MINERAL FUELS AND RELATED MATERIALS—Continued						
Petroleum:						
Crude[4]	thousand 42-gallon barrels	965,000	923,940	901,550	854,830 [2]	777,450 [2]
Natural gas liquids[e]	do.	60,000	60,000	50,000	50,000	50,000
Refinery products:[e]						
Naphtha	do.	10,000	10,000	10,000	10,000	10,000
Gasoline	do.	28,000	28,000	28,000	28,000	28,000
Kerosene	do.	5,800	5,800	5,800	5,800	5,800
Distillate fuel oil	do.	50,000	50,000	50,000	50,000	50,000
Residual fuel oil	do.	12,000	12,000	12,000	12,000	12,000
Other products	do.	4,000	4,000	4,000	4,000	4,000
Refinery fuel and losses	do.	3,000	3,000	3,000	3,000	3,000
Total	do.	113,000	113,000	113,000	113,000	113,000

[e]Estimated; estimated data are rounded to no more than three significant digits; may not add to totals shown. [r]Revised. do. Ditto. -- Zero.

[1]Table includes data available through January 31, 2012.

[2]Reported figure.

[3]Reported as total methane sales.

[4]Excluding natural gas liquids.

TABLE 2
NORWAY: STRUCTURE OF THE MINERAL INDUSTRY IN 2010

(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 ASA, 70%)	Smelters at Ardal, Hoyanger, Husnes, Karmoy, and Sunndal	600
Do.		do.	Plant at Holmestrand	90
Do.		Alcoa Norway ANS (Alcoa Inc., 100%)	Smelters at Lista and Mosjoen; anode plant at Mosjoen	282
Do.		Sør-Norge Aluminium ASA (Norse Hydro A/S, 50%, and Rio Tinto Alcan, 50%)	Smelter at Husnes	165
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 Grubekompani A/S	Mines at Longyearbyen and Svea	450
Cobalt		Nikkelverk A/S (Xstrata plc, 100%)	Smelter at Kristiansand	5
Copper:				
Ore, Cu content		Nikkel og Olivin A/S (Outokumpu Oyj, 100%)	Mine at Narvik	1
Metal		Nikkelverk A/S (Xstrata plc, 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		SCR Sibelco Nordic A/S	Mine at Lillesand	100
Ferroalloys		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 A/S, Rana Metal (FESIL ASA, 100%)	Ferrosilicon plant at Mo i Rana	110
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	20
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.		Northern Iron Ltd.	Sydvaranger Mine, northern Norway	3,000
Do.		Arctic 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.		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 ASA (Government, 51%)	Plants at Porsgrunn and Sauda	50
Manganese, alloys		Eramet SA	do.	500
Natural gas	million cubic meters	StatoilHydro ASA	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.	StatoilHydro ASA	Mikkel field	2,100
Do.	do.	Total S.A, 40%; Petoro S.A., 30%; Marathon Petroleum Norge AS, 20%; Norsk Hydro Produksjon A/S, 10%	Skirne field	1,550
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 (Xstrata plc, 100%)	Smelter at Kristiansand	85
Olivine		North Cape Minerals A/S (Sibelco Group, 89%, and Franzefoss A/S, 11%)	Aheim Mine and plant	2,500
Do.		do.	Stranda Mine and plant	300
Do.		Franzefoss Bruk A/S	Lefdal Mine at Bryggja	500

See footnotes at end of table.

TABLE 2—Continued
NORWAY: STRUCTURE OF THE MINERAL INDUSTRY IN 2010

(Thousand metric tons unless otherwise specified)

Commodity		Major operating companies and major equity owners	Location of main facilities	Annual capacity
Petroleum	42-gallon barrels per day	StatoilHydro ASA (Government, 100%)	Gullfaks, Norne, Statfjord, Tommeliten, Urd, 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	Draugenfield	90,000
Do.	do.	ExxonMobil Refining & Supply Co.	Slagen refinery	110,000
Do.	do.	Statoil Mongstad A/S	Mongstad refinery	200,000
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
Do.		FESIL ASA	Plant at Holla	50
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 (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	915
Zinc, metal		Norzik A/S (Outokumpu Oyj, 100%)	Smelter at Odda	150

Do., do. Ditto.