



2016 Minerals Yearbook

NORWAY [ADVANCE RELEASE]

THE MINERAL INDUSTRY OF NORWAY

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Norway, a constitutional monarchy located on the Scandinavian Peninsula, is a producer of industrial minerals and a major producer of ground calcium carbonate, flake graphite, olivine, and silicon. The metallic ores and minerals produced in Norway are iron ore and titanium minerals. In 2016, Norway was the seventh-ranked producer of titanium ore (ilmenite), accounting for 5% of the world's production. Norway accounted for 5% of the world's production of silicon and was the world's fifth-ranked producer. In 2016, Norway was the leading petroleum producer and exporter in Western Europe and the third-ranked exporter of natural gas (U.S. Energy Information Administration, 2016; Government of Norway, 2017a; Bedinger, 2018).

Minerals in the National Economy

In 2016, Norway's estimated real gross domestic product (GDP) growth rate was 1.1% compared with 1.6% in 2015. The industrial sector, which includes mining, natural gas, and crude petroleum, contributed 31.7% of the GDP. The export value of natural gas, crude petroleum, and condensate accounted for 47% of the total value of Norway's exports. Norway's most significant mines and quarries were located mainly along the coast; the natural gas and petroleum fields were located mostly offshore in the Norwegian Sea and Barents Sea. As of 2015 (the latest year for which data were available), there were 5,179 employees in the mining and quarrying sector (Statistics Norway, 2015, 2017; Norwegian Petroleum, 2017b, c; U.S. Central Intelligence Agency, 2017).

Government Policies and Programs

The Norwegian Minerals Act of 2010 regulates the exploration, investigation, and extraction of mineral resources and the acquisition of mining rights. The act differentiates between state-owned and landowner minerals. The state owns metals with a specific gravity of 5 grams per cubic centimeter and above and the ores of these metals. This includes arsenic, cadmium, cobalt, copper, gold, iron, lead, manganese, molybdenum, nickel, niobium, platinum, silver, thorium, tin, titanium, tungsten, uranium, vanadium, and zinc. All other minerals are owned by the landowner and can be divided into three main categories: natural stone, construction raw materials, and industrial minerals (Government of Norway, 2013, p. 60).

Norway's petroleum act (Act 29 November 1996 No.72 Relating to Petroleum Activities) provides the regulations and requirements for exploration, award licensing, field development, infrastructure, cessation and decommissioning, of petroleum activities. The act also includes provisions on insurance requirements, liability for pollution, and others (Norwegian Petroleum Directorate, 2012; Svensen, and others, 2014).

In 1990, the Government Pension Fund Global, formerly the Government Petroleum Fund, was established to ensure the management of Government petroleum revenues. In 2016, the fund had a 6.9% return and a market value of more than \$900 billion¹ (Norges Bank Investment Management, 2017).

Production

In 2016, the production of mineral commodities in Norway was similar to that of 2015, with increases in the production of cobalt (13%), and raw steel, titanium minerals, and zinc (5% each). The most notable production decreases were for feldspar (34%), copper (21%), and bituminous coal (17%). Building materials such as aggregate, sand, gravel as well as industrial minerals, accounted for the largest quantity of production (in terms of tonnage) in the mineral industry of Norway. Data on mineral production are in table 1.

Structure of the Mineral Industry

The Directorate of Mining, which is under the Ministry of Trade and Industry, is Norway's technical department responsible for administering the extraction of mineral resources. The Norwegian Petroleum Directorate (NPD), which is under the Ministry of Petroleum and Energy (MPE), regulates the use of petroleum resources. As of 2016, Norway's mineral industry was composed of Government-owned and privately owned operations. Table 2 is a list of the major mineral industry facilities in Norway (Government of Norway, 2017b; Norwegian Petroleum Directorate, 2017a).

Mineral Trade

Norway's main export products were coal, crushed rock, ground calcium carbonate, and iron ore concentrate. Other important export minerals were ilmenite, nepheline syenite, olivine, quartz, quartzite, and stone blocks. Sales of metallic ores decreased by 54% compared with the average revenue for the previous 3 years. Sales of natural stone decreased by 10% and that for energy minerals, by 38%. The reduction in sales of metallic ores was a result of the bankruptcy of Sydvaranger Gruve AS in 2015, which was a wholly owned subsidiary of Northern Iron Ltd. of Australia. Petroleum exports increased for the third consecutive year; however, the value decreased compared with that of 2015 because of lower average prices (Norwegian Directorate of Mining, 2017, p. 24, 28; Norwegian Petroleum, 2017b).

¹Where necessary, values have been converted from Norwegian kroner (NOK) to U.S. dollars (US\$) at an annual average exchange rate of about NOK8.327=US\$1.00 for 2016. All values are nominal, at current prices, unless otherwise stated.

Commodity Review

Metals

Titanium.—Norway has approximately 300 titanium and iron-titanium mineral occurrences and deposits; one of the most significant deposits is the Tellnes ilmenite deposit located on the country's southwest coast. The Tellnes Mine was operated by Titania A/S (a subsidiary of Kronos Worldwide Inc.) and had an annual production of about 850,000 metric tons of ilmenite concentrate containing approximately 45% titanium dioxide (Geological Survey of Norway, 2015b).

The Engebø rutile (TiO₂) project, which was managed by Nordic Mining ASA, is a hard-rock deposit with high grades of both rutile and garnet; it had an estimated resource (measured and indicated) of 98 million metric tons (Mt) at a cutoff rate of 3% TiO₂ with an average grade of 3.87% and 44.4% of rutile and garnet, respectively. A high-level definitive feasibility study was scheduled to start in November 2017 and to last approximately 12 months. It was expected that the project would proceed directly into a front-end engineering design phase, where critical path engineering and procurement work would expedite the start of the construction (Nordic Mining ASA, 2018).

Industrial Minerals

Important industrial minerals and deposits in Norway included apatite, carbonates (dolomite, limestone, and marble), graphite, nepheline syenite, olivine, quartz and quartzite, talc, titanium minerals, and vanadium. The industrial minerals produced form the basis for many other domestic industries; for instance, the use of titanium dioxide as a pigment and the use of ground marble for filler in paper and cement. In addition, major amounts of other domestically produced industrial minerals are used in other products, such as fertilizers and chemicals (Karlsen, and others, 2000; Geological Survey of Norway, 2015a).

Cement.—Norcem A/S (a subsidiary of HeidelbergCement Group) is Norway's main producer of cement; it had plants in Brevik and Kjøpsvik. Kjøpsvik is the northernmost cement plant in the world and had an annual production of about 0.5 Mt; Brevik, located in southern Norway, had an annual production of 1.2 Mt. In 2016, Norway produced aggregates, alternative fuels, prefabricated concrete, and ready-mixed concrete (HeidelbergCement AG, 2017; Norcem AS, 2017).

Mineral Fuels

Coal.—In May 2016, the Norwegian Government announced that Store Norske Spitsbergen Kulkompani AS, which was the only company that produced coal in Norway, would be suspending operations at the Lunckefjellgruva and the Svea Mines starting in 2017. The cessation of operations was a result of the challenging market for the coal business and was expected to last for up to 3 years. The Lunckefjellgruva and the Svea Mines are located in the Svalbard archipelago, which lies in the Arctic Ocean halfway between Norway and the North Pole (Government of Norway, 2016c).

Natural Gas.—Most of the natural gas produced on the Norwegian Continental Shelf (NCS) is exported to the major consumer countries in Western Europe. Gas production had increased in recent years and accounted for a large share of petroleum production. Statoil ASA operated the Troll field, which was both the largest gasfield on the NCS and a major oilfield. As of 2016, the Troll field contained about 40% of the total gas reserves on the NCS (Government of Norway, 2016a; Statoil ASA, 2017a, p. 23).

Petroleum.—The estimated petroleum resources on the NCS are about 14 billion standard cubic meters [89.9 billion barrels (Gbb)] of petroleum. According to the Norwegian Government, 47% of the total discovered and undiscovered petroleum resources on the NCS had been produced and sold. In 2016, 36 exploration wells were drilled on the NCS and 18 discoveries had been made, resulting in new resources of between 18 million and 44 million standard cubic meters of recoverable oil. Most of the new discoveries were small in size and located near existing or planned infrastructure (Government of Norway, 2016b; Norwegian Petroleum, 2017a; Norwegian Petroleum Directorate, 2017b).

The Johan Sverdrup oilfield, which was discovered in 2010, was one of the largest oilfields discovered on the NCS. It was operated by Statoil ASA and had estimated resources of between 2 to 3 Gbb of oil. Phase 1 was expected to start in late 2019 with a production of 440,000 barrels per day (bbl/d); when reached, peak production was projected to be 660,000 bbl/d (Statoil ASA, 2017b).

Outlook

Norway is one of the world's largest petroleum and gas exporters and has a variety of industrial minerals. Despite a decline in investments in the petroleum industry in 2016, the growth in exports is expected to lead to greater economic growth in 2017. The activity on the NCS and such major projects as the development of Johan Sverdrup oilfield will continue to be of great importance to the Norwegian economy in the years ahead. It is expected that industrial minerals will likely continue to contribute to the mineral economy of the country (Statistics Norway, 2016; Norwegian Petroleum, 2017c).

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TABLE 1
NORWAY: PRODUCTION OF MINERAL COMMODITIES¹

(Thousand metric tons, gross weight, unless otherwise specified)

Commodity	2012	2013	2014	2015	2016
METALS					
Aluminum metal:					
Primary metric tons	1,145,000	1,154,900	1,250,000 ^e	1,225,000	1,220,000 ^e
Secondary ^e do.	250,000	250,000	250,000	250,000	250,000
Cadmium, refinery production, primary, metal do.	310 ^{r, e}	310	310 ^{r, e}	310 ^e	310 ^e
Cobalt, refinery production, Co content do.	2,969	3,348	3,600 ^{r, e}	3,100 ^r	3,500
Copper, refinery production, primary, Cu content do.	37,900 ^{r, e}	37,500 ^{r, e}	35,800 ^e	35,500 ^e	28,100
Iron and steel:					
Pig iron metric tons	100,000	106,000 ^r	102,000	100,000 ^r	100,000
Raw steel	700 ^{r, e}	605 ^e	600 ^e	590 ^e	620
Iron ore, mine production:					
Gross weight metric tons	3,420,684 ^r	3,409,269 ^r	3,854,155 ^r	3,519,116 ^r	3,520,000 ^e
Fe content	2,121 ^r	2,114 ^r	2,390 ^r	2,182 ^r	2,180 ^e
Manganese:					
Ferromanganese	338 ^r	307 ^{r, e}	295 ^e	309 ^e	300 ^e
Silicomanganese metric tons	271,400	301,400	314,300	309,900	309,000 ^e
Mercury, Hg content do.	25 ^e	25 ^e	25 ^e	20 ^e	20
Nickel, Ni content:					
Mine production, concentrate do.	351	350	350 ^r	350 ^r	350 ^e
Metal do.	91,687	91,017	90,500 ^r	91,200 ^r	92,300 ^e
Silicon:					
Ferrosilicon, 75% basis ^e	250	349 ^r	350 ^r	350 ^r	350
Silicon metal metric tons	150,000 ^r	150,000 ^e	150,000	150,000 ^e	150,000 ^e
Tin, smelter production, secondary ^e do.	50	50	50	50	50
Titanium mineral concentrates, ilmenite and leucoxene	831	826	864	430 ^r	450 ^e
Zinc, smelter production, primary metric tons	152,647	143,444 ^r	165,600	162,878	170,541
INDUSTRIAL MINERALS					
Cement, hydraulic	1,659 ^r	1,700	1,700 ^e	1,800 ^r	1,850 ^e
Clay and shale ^e	225	225	225	225 ^r	225
Feldspar, mine production, gross weight	--	--	154	76	50
Graphite, flake metric tons	6,992	6,207	8,308	8,000	8,000 ^e
Lime, hydrated and quicklime ^e	125	125	125	110	110
Nepheline syenite	320	320	331	330 ^r	330 ^e
Nitrogen, ammonia, N content ^e	300	300	300	300	300
Stone, sand, and gravel:					
Sand and gravel, construction, unspecified	14,260	13,984	14,110	13,000	14,445
Silica, mine production, quartz and quartzite	1,083	1,451	1,100 ^{r, e}	1,000 ^r	1,030 ^e
Stone, crushed:					
Dolomite	643	661	714	472	730 ^e
Limestone	5,856	5,703	5,839	5,865	5,547
Olivine	1,650	1,702	1,394	1,672	1,400 ^e
Sulfur, byproduct, S content: ^e					
Metallurgy	41 ^r	39 ^r	40 ^r	40 ^r	40 ^r
Petroleum	20	22 ^r	22 ^r	22 ^r	22 ^r
MINERAL FUELS AND RELATED MATERIALS					
Coal, bituminous	1,583	1,855	1,701	1,203	1,000 ^e
Natural gas, marketable million cubic meters	106,710	113,116	112,796	151,800	152,000 ^e
Peat, horticultural use ^e	68	68	99	100	100
Petroleum:					
Crude thousand 42-gallon barrels	694,230	558,450	572,320 ^r	587,100	598,000 ^e
Refinery production:					
Distillate fuel oil do.	46,866	51,100	47,815	48,000 ^e	49,100 ^e
Gasoline do.	30,920	32,850	28,105	28,000 ^e	28,100 ^e
Jet fuel do.	4,636	3,650	4,380	4,400 ^e	4,500 ^e

See footnotes at end of table.

TABLE 1—Continued
NORWAY: PRODUCTION OF MINERAL COMMODITIES¹

(Thousand metric tons, gross weight, unless otherwise specified)

Commodity	2012	2013	2014	2015	2016	
MINERAL FUELS AND RELATED MATERIALS—Continued						
Petroleum:—Continued						
Refinery production:—Continued						
Kerosene	thousand 42-gallon barrels	1,351	2,555	875	900 °	920 °
Residential fuel oil	do.	10,366	10,950	11,315	11,500 °	11,700 °
Other	do.	20,805	21,170	18,615	18,600 °	19,000 °
Total	do.	115,000	122,000	111,000	111,000 °	113,000 °

^eEstimated. ^rRevised. do. Ditto. -- Zero.

¹Table includes data available through December 11, 2017. All data are reported unless otherwise noted. Totals and estimated data are rounded to no more than three significant digits; may not add to totals shown.

TABLE 2
NORWAY: STRUCTURE OF THE MINERAL INDUSTRY IN 2016

(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, Karmoy, and Sunndal and Husnes	1,020
Do.	do.	Rolling mill at Holmestrand	90
Do.	Alcoa Inc.	Smelters at Lista and Mosjoen	282
Cadmium	metric tons Boliden Odda A/S (Boliden AB, 100%)	Smelter at Eittheimsneset	300
Cement	Norcem A/S (HeidelbergCement Group)	Plants at Brevik and Kjospsvik	1,700 ^e
Coal	Store Norske Spitsbergen Kulkompani AS	Mines at Longyearbyen and Svea	2,000
Cobalt	Nikkelverk A/S (Glencore plc, 100%)	Refinery at Kristiansand	3
Copper, metal	do.	do.	40
Ferroalloys	Elkem Bjolvefossen (China Bluestar)	Ferrosilicon plant at Alvik	NA
Do.	Elkem Bremanger (China Bluestar)	Ferrosilicon plant at Svelgen	NA
Do.	Finnfjord Smelteverk A/S	Ferrosilicon plant at Finnsnes	100
Do.	FESIL Rana Metall ASA (MFC Group)	Ferrosilicon plant at Mo i Rana	90
Do.	Hafslil AS	Ferrosilicon powder plant at Sarpsborg	5
Do.	Eramet Norway AS	Ferromanganese plant at Porsgrunn	115
Do.	do.	Ferromanganese plant at Sauda	170
Do.	Glencore Manganese (Glencore plc, 100%)	Ferromanganese plant at Mo i Rana	120
Graphite, flake	Skaland Graphite AS (LNS Group)	Traelen Mine and plant at Skaland	9
Iron ore	Rana Gruber A/S (LNS Group)	Mine at Mo i Rana	4,600
Do.	Northern Iron Ltd.	Mine at Bjørnevatn	6,000
Pig iron	Ulstein Jernstoperi A/S (Bergen Engines A/S)	Hordvikneset	10
Do.	TiZir (Eramet Norway AS, 50%)	Pig Iron plant production at Tyssedal	110
Lime	Hylla Kalkverk (Franzefoss Minerals, 100%)	Verdal plant	200
Manganese, alloys	Eramet Norway AS	Silicomanganese plant at Kvinesdal	160
Do.	do.	Silicomanganese plant at Porsgrunn	65
Natural gas	million cubic meters Petoro AS, 56%; Statoil ASA, 30.6%; A/S Norske Shell, 8.1%; Total E&P Norge, 3.7%; ConocoPhillips Skandinavia A/S, 1.6%	Troll field	20,000 ^e
Do.	do. Statoil ASA	Grane, Gullfaks, Sleipner Ost, and Statfjord fields	12,270
Do.	do. ConocoPhillips Skandinavia A/S (operator)	Ekofisk field	9,900
Do.	do. Elf Petroleum Norge A/S	Frigg, Heimdal, and Ost-Frigg fields	5,750
Do.	do. Statoil ASA	Mikkel field	2,100
Do.	do. Total E&P Norge AS, 40%; Petoro AS, 30%; LOTOS Exploration and Production Norge AS, 30%	Skirne field	1,550
Do.	do. Esso Norge A/S	Odin field	1,000
Do.	do. Amoco Norway A/S	Hod and Valhall fields	910
Nepheline syenite	Sibelco Nordic AS	Mine at Stjernoy	350

See footnotes at end of table.

TABLE 2—Continued
NORWAY: STRUCTURE OF THE MINERAL INDUSTRY IN 2016

(Thousand metric tons unless otherwise specified)

Commodity		Major operating companies and major equity owners	Location of main facilities	Annual capacity
Nickel:				
Ore, concentrate, Ni content	metric tons	Titania A/S (Kronos Norge A/S, 100%)	Mine at Tellnes	350
Metal		Nikkelverk A/S (Glencore plc, 100%)	Refinery at Kristiansand	92
Petroleum	42-gallon barrels per day	Aker BP ASA, 80%, and Faroe Petroleum Norge AS, 20%	Ula fields	155,000
Do.	do.	A/S Norske Shell	Draugen field	90,000
Do.	do.	Esso Norge A/S (Exxon Mobil Corp., 100%)	Slagen refinery at Slagentangen	11,000
Do.	do.	Statoil Mongstad A/S (Statoil ASA, 100%)	Mongstad refinery	84,000
Silicon metal		Elkem Salten (China Bluestar)	Silicon plant at Straumen	70
Do.		Elkem Thamshavn (China Bluestar)	Silicon plant at Orkanger	45
Do.		Holla Metall (Wacker Chemicals Norway A/S)	Plant at Holla	50
Steel		Celsa Armeringsstal	Plant at Mo i Rana	600
Stone:				
Dolomite		Franzefoss Miljokalk A/S	Mine at Ballangen	350
Do.		Omya Hustadmarmor A/S	Mines at Hammerfall and Seljeli	900
Limestone		Norcem A/S (HeidelbergCement Group)	Dalen, Bjortvedt, and Kjopsvik Mines	1,600
Do.		Bronnoy Kalk	Akselberg Mine	2,200
Do.		Vardelskalk A/S (Franzefoss Burk A/S, 100%)	Sandvika Mine	800
Do.		Visnes Kalk AS	Lyngstad quarry	600
Do.		Franzefoss Minerals	Hamar and Hole quarries	50
Olivine		Sibelco Nordic AS	Mines and plant at Aheim	2,000
Quartzite		Elkem Tana (China Bluestar)	Mine at Tana	1200
Do.		Elkem Marnes (China Bluestar)	Mine at Marnes	200
Do.		Georg Tveit A/S (Eramet Norway AS, 75%)	Mine at Kragero	110
Titanium minerals, concentrate		Titania A/S (Kronos Norge A/S, 100%)	Mine at Tellnes	850
Zinc, metal		Boliden Odda A/S (Boliden AB, 100%)	Smelter at Odda	200

^cEstimated. do. Ditto. NA Not available.