



2009 Minerals Yearbook

DENMARK, THE FAROE ISLANDS, AND GREENLAND
[ADVANCE RELEASE]

THE MINERAL INDUSTRIES OF DENMARK, THE FAROE ISLANDS, AND GREENLAND

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DENMARK

The mining, quarrying, and mineral processing sectors have not traditionally been a significant factor in Denmark's economy. Mineral resources were limited and composed mainly of such boggy terrain mineral deposits as limonite (bog ore) and peat. Limonite was no longer exploited. Private ownership and exploitation of minerals were allowed under Danish law, but the country depended mainly on imported raw materials.

Denmark was a member of the European Union (EU). The country's economy depended on imported raw materials and foreign trade. Denmark lies directly in the path of European trade through the Baltic Sea, the North Sea, and the Skagerrak Strait (Denmark Press, 2009).

About two-thirds of Denmark's foreign trade was with EU member countries. In 2009, the other 26 EU countries accounted for 65% of the total Danish external trade, and Norway accounted for another 6%. In 2009, Germany was Denmark's leading trading partner, accounting for 21% of Denmark's imports and 16% of Denmark's exports. The United States was Denmark's leading non-European trading partner. China, which was the fourth ranked supplier of goods to Denmark, supplied 6% of all Danish imports and received 2% of all Danish exports (Statistics Denmark, 2010, p. 350).

U.S. exports to Denmark were valued at \$2.1 billion and U.S. imports from Denmark were valued at \$5.6 billion. U.S. exports to Denmark included nonferrous metals (\$28.2 million), petroleum products (\$24.1 million), coal and mineral fuels (\$12.2 million), and metallurgical-grade coal (\$4.7 million). U.S. imports from Denmark included other petroleum products (\$28.6 million), iron and steel manufactures (\$25.5 million), stone (\$10.4 million), steelmaking and unmanufactured ferroalloy materials (\$6.3 million), and bauxite and aluminum (\$2.2 million) (U.S. Census Bureau, 2009a, b).

Production

Denmark has no known economically exploitable reserves of metallic ores, but it does have reserves of such nonmetallic materials as chalk, clays (including bentonite, kaolin, and lime), peat, salt, and stone (including dimension stone and limestone). Bentonite, cement, and chalk production decreased. Denmark was the only commercial producer of moler, which consists of a natural mixture of diatomite and smectite clay and is an important ingredient of insulation bricks. The country continued to produce natural gas and petroleum from the Danish area of the North Sea; these mineral fuels were Denmark's most valuable mineral commodities. Petroleum production, however, was declining as reserves were becoming depleted. In 2009, petroleum production fell for the fourth year in a row, dropping to about 97 million barrels (Mbbbl) from about 138 Mbbbl in 2005 (table 1).

Structure of the Mineral Industry

The Danish mineral industry was mostly privately owned. Table 2 is a list of the country's major mineral industry facilities, their capacities, and their locations.

Commodity Review

Metals

Iron and Steel.—In mid-2009, Vorskla Steel Denmark A/S, which was a subsidiary of Vorskla Steel AG of Ukraine, announced that it was declaring bankruptcy. No information was available concerning what action the parent company might take to permanently close the plant or whether it might restart the plant sometime in the future. The plant had stopped electric arc furnace steel production in 2003 (Vorskla Steel Denmark A/S, 2009).

Industrial Minerals

Cement.—Aalborg Portland A/S, which was a subsidiary of Cementir Holdings S.p.A. of Italy, was the sole producer of gray and white cement in Denmark. Aalborg operated seven kilns at its plant in Rordal, which had a capacity to produce 2.7 million metric tons (Mt) of gray cement and 850,000 metric tons (t) of white cement. Aalborg was one of the world's leading manufacturers of white cement, which is used for aesthetic purposes and for highway safety barriers because its whiteness ensures high visibility both day and night (Aalborg Portland A/S, 2009).

Mineral Fuels and Other Sources of Energy

All Denmark's producing natural gas and petroleum fields are located in the Danish area of the North Sea. In 2009, 19 fields of various sizes were in production. Although most Danish fields had passed the period of peak production using known technology, oil companies, both domestic and foreign, showed continued interest in investing in natural gas and petroleum recovery in Denmark. Production in 2009 was derived from 290 production wells that included 87 natural gas wells and 203 petroleum wells (Danish Energy Agency, 2009b, p. 25).

Natural Gas.—OAO Gazprom of Russia agreed to double its shipments of natural gas to Denmark using the proposed Nord Stream pipeline. Gazprom indicated that, beginning in 2012, it would deliver 2 billion cubic meters of natural gas per year to Denmark for 18 years. The Nord Stream pipeline, which was a German-Russian joint project, was envisioned to carry up to 55 billion cubic meters of Russian natural gas to Germany and other European consumers. Construction of the pipeline had not yet begun in 2009 (Downstreamtoday.com, 2009).

Maersk Olie og Gas AS (MOG) completed the drilling of the Gita-1X exploration well, which is located about 10 kilometers (km) south of the Harald field in the Danish part of the North Sea. The drilling encountered Middle Jurassic sandstone layers containing hydrocarbons. Gita-1X was drilled as a vertical well and reached a depth of 5,162 meters (m) below mean sea level. A number of measurements were carried out for further evaluation. PA Resources AB held a 26.8% interest in the license and MOG held the remaining interest (PA Resources AB, 2009).

Petroleum.—Based on reserves in its currently producing fields, Denmark could expect to continue to be a net exporter of petroleum until the end of 2018 and of natural gas until the end of 2020. If current expectations for the exploration potential were met, Denmark would be able to maintain its position as a net exporter of mineral fuels until 2035 (Danish Energy Agency, 2009b, p. 86).

DONG Energy A/S shut down its Siri field in September after finding cracks in the storage tank under the Siri platform. The shutdown halted production from the Cecilie, the Nini, and the Stine fields, which moved their production to the Siri platform. The combined loss of production was 17,500 barrels per day (Petroleum Economist, 2009).

Renewable Energy.—A large-scale geologic survey by the Geological Survey of Denmark revealed significant supplies of hot water stored in porous sandstone layers beneath Denmark. The distribution of these underground reservoirs was such that many of the existing district heating networks could make use of geothermal heat. In 2009, there were two geothermal plants in Denmark, but the survey showed that 32 existing heating plants could be converted to geothermal energy production if the conversion process is shown to be economically viable (Ministry of Foreign Affairs, 2009).

The Danish Energy Agency announced that it had published the tender for the Anholt offshore wind farm in Kattegat, which is located west of the island of Anholt. It would be Denmark's largest offshore wind farm and would be capable of producing 400 megawatts (MW) of energy, which is the equivalent of the annual electricity consumption of 400,000 households. When completed in 2012, the wind farm would be connected to the Danish electrical grid. Development of the Anholt wind farm was a part of the Government's 2008 Energy Policy Agreement (Danish Energy Agency, 2009a).

Outlook

Further exploration of Denmark's natural gas and petroleum reserves will continue in an effort to offset the declining production. Continued research in new technology and the testing of new exploration methods could play a major role in Denmark's future natural gas and petroleum production. Denmark will continue to be a net exporter of mineral fuels into the near future.

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FAROE ISLANDS

The Faroe Islands, which is a self-governing overseas administrative division of Denmark, had no identified mineral resources. The Faroese economy depended on fishing and salmon farming and was aided by a substantial annual subsidy from Denmark. The principal involvement of the Faroe Islands in the international minerals industry was as a market for imported materials, principally cement, fertilizer materials, and fuels.

Possible discoveries of oil in the future in the Faroese area could lead to eventual oil production and diversification of the Faroese economy. A Faroese company, Atlantic Petroleum P/F, was exploring in four offshore license areas (Atlantic Petroleum P/F, 2009).

Faroe Petroleum plc of the United Kingdom had six offshore exploration licenses. License 017 was awarded in 2008 in the third Faroese licensing round to Faroe Petroleum; the license area is located adjacent to Faroe's existing Rannvå license area, which includes the very substantial Rannvå "A" prospect on the crest of the Wyville-Thomson Ridge. A seismic reprocessing program was to be undertaken to further delineate the structure (Faroe Petroleum plc, 2009).

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GREENLAND

About one-half of Greenland's revenues came from grants from the Danish Government. This was expected to change

over time following the country's move to greater independence from Denmark that took place in April 2009. The country of Greenland took 100% control of its mineral and oil acreage after the handover, and Danish subsidies were to be progressively reduced. Greenland had been granted self-rule in 1979 and since that time had shown a willingness to move toward a mining-based economy, which would enable the country to use royalties to fund greater independence and promote growth of its economy, which was reliant on fishing and other small internal industries. The private and public sectors contributed to Greenland's economy. Hydrocarbon and mineral exploration activities were the focuses of foreign investment in Greenland. Exploration was most active for base metals, diamond, gemstones, gold, nickel, and platinum-group metals (Ellis, 2009).

On January 1, 2010, the Inatsisartut (Mineral Resource) Act No. 7 of December 7, 2009, which regulates mineral resources and related activities, came into force and replaced the Consolidation Act No. 368 of June 18, 1998. The Mineral Resource Act establishes the foundation and the framework for future control of Greenland's mineral resources, including activities affecting their development. The Act states that mineral resource development activities must be performed in accordance with best international practices, and they may be executed only with the permission of the Naalakkersuisut (Government of Greenland) (Mining Journal, 2010).

The Catlin Arctic Survey reported that within a decade, the Arctic Ocean would be an "open sea" almost entirely free of ice. Ice cover during the northern summer months is expected to have disappeared entirely within 20 years, but most of the decrease would happen before 2020. Mineral resource companies have been among the first to view this as a commercial opportunity. Greenland was also attractive to investors because, despite the high cost of operating in such extreme conditions, the country was politically stable (Pasnamenta, 2010).

Commodity Review

Metals

Gold.—In late 2008, Nalunaq Gold Mine A/S (a subsidiary of Crew Gold Corp. of the United Kingdom) decided to suspend its operations at Nalunaq owing to the continued high costs of mining, shipping, and processing minerals. In 2009, Angel Mining plc of the United Kingdom (formerly Angus & Ross plc) announced that it had acquired the entire assets of Nalunaq Gold for \$1 million. Angel Mining announced that it intended to bring the Nalunaq Mine back into operation as soon as possible. As of September 2009, Angel had refurbished all the mining equipment at Nalunaq and was preparing the underground chamber that housed the processing plant. First doré production was expected by yearend (Metals Economics, 2009b).

NunaMinerals A/S announced that it had made significant gold discoveries in two of five drilled targets in the Vagar exclusive license. The discoveries were made on the north coast of the 300-square-kilometer (km²) Niaqomaarsuk Peninsula, which is located about 25 km from the Nalunaq Mine where

commercial gold mining began in 2004. NunaMinerals stated that further investigation, including drilling and test mining, would be needed to determine the grade and volume of the discoveries (Mineweb, 2009).

Lead and Zinc.—Angel Mining was continuing with its exploration program at the Black Angel Mine area in 2009. Angel Mining was storing equipment at the mine and construction was scheduled to commence in Spring 2010; mining would commence in late 2010. Angel Mining announced that contractors had been selected for the development of the mineral processing and waste handling plants. The proposed process would consist of a primary and a secondary circuit, which would involve pre-concentration by optical sorting followed by milling and fine grinding, and then feeding into a conventional froth flotation plant. This process was expected to produce concentrates grading 69% to 71% lead and 59% to 61% zinc (Metals Economics, 2009a).

Ironbark Zinc Ltd. announced the results of its 2009 drilling program at its Citronen project. Highlights included 4.2 m of core grading 11.2% zinc and 3 m of core grading 5.3% zinc. The drill program was carried out in the Beach zone, which has an estimated resource of 17 Mt of ore grading 7.1% zinc and 10 Mt of estimated inferred ore grading 5.5% zinc. A program of geotechnical drilling and infill drilling was to continue through the 2009 season (Australia's Paydirt, 2009).

Rare Earths.—Greenland Minerals and Energy Ltd. reported that it had access to what could be some of the world's largest rare earth deposits, second only to those in China. The Kvanefjeld project was estimated to have the potential to supply about 25% of the world's demand for rare earths. Uranium was also associated with the deposit and could be produced. Greenland, however, has a zero-tolerance approach to uranium mining owing to environmental concerns. This policy would have to be changed for the rare earths project to be developed (Desal, 2009).

Industrial Minerals

Gemstones.—True North Gems Inc. announced that the field-related components of the 2009 advanced exploration and engineering program had been completed at the company's 823-km² Fiskenaeset Ruby project, which is located on the southwest coast of Greenland. A 160-t Aappaluttoq bulk sample was shipped to Canada for processing. True North continued with plans to upgrade the Fiskenaeset processing plant for the preparation of sized gravity concentrates. Reinterpretation of surface outcrops and logging of all drill cores was continuing in 2009 (Greenland Mineral Exploration Newsletter, 2009).

Mineral Fuels

Petroleum.—Cairn Energy plc announced that it had secured a rig to allow it to commence a drilling program in the Disko West area offshore western Greenland in the second half of 2010. A sixth generation dynamically positioned drill ship, the *Stena Forth*, had been contracted to start operations in the summer drilling season (from June through October), subject to all required Government approvals (Cairn Energy plc, 2009).

Outlook.—Greenland has an abundance of mineral and natural resources. The global warming trend is expected to continue to open more areas for exploration. New mineral deposits are expected to be discovered as exploration accelerates. Finding new sources of hydrocarbons is likely to continue to be very important for Greenland. Greenland's new political status is expected to encourage mineral development.

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TABLE 1
DENMARK: ESTIMATED PRODUCTION OF MINERAL COMMODITIES^{1,2}

(Metric tons unless otherwise specified)

Commodity	2005	2006	2007	2008	2009
Aluminum metal, secondary	20,000	25,000	30,000	25,000	25,000
Cement, hydraulic thousand metric tons	2,120	2,937 ^{3,4}	2,871 ⁴	2,539 ^{r,4}	1,578 ⁴
Chalk, calcium carbonate do.	1,950	1,900	1,950	1,900	446 ⁴
Clays: ⁵					
Bentonite	18,515 ⁴	19,211 ⁴	20,093 ⁴	22,458 ^{r,4}	20,000
Fire clay	25	25	25	25	25
Kaolin	2,500	2,500	2,500	2,500	2,500
Other	5,500	5,000	5,000	5,000	5,000
Moler, extracted thousand cubic meters	234	240 ^r	241	252 ^{r,4}	250
Gas:					
Manufactured million cubic meters	1,500	1,500	1,500	1,500	1,500
Natural, gross do.	10,540 ⁴	10,304 ^{r,4}	9,128 ^{r,4}	9,564 ^{r,4}	9,600
Gold ³ kilograms	1,000	1,500	1,639 ⁴	1,518 ⁴	1,600
Lime, hydrated and quicklime	120,000	115,000	115,000	115,000	115,000
Natural gas plant liquids thousand 42-gallon barrels	48,000	48,000	48,000	50,000 ^r	48,000
Nitrogen, N content of ammonia	1,600	1,600	1,600	1,600	1,600
Olivine thousand metric tons	450	1,000	1,100	1,100	1,100
Peat thousand cubic meters	298,000 ^r	298,000 ^r	242,000 ⁴	145,000 ^r	145,000
Petroleum:					
Crude thousand 42-gallon barrels	137,642 ^{r,4}	124,830 ^{r,4}	113,734 ^{r,4}	104,573 ^{r,4}	97,455 ⁴
Refinery products:					
Liquefied petroleum gas do.	1,708 ⁴	1,898 ^{r,4}	1,862 ^{r,4}	1,314 ^{r,4}	1,300
Gasoline do.	16,300 ⁴	16,863 ^{r,4}	16,608 ^{r,4}	16,352 ^{r,4}	16,000
Naphtha do.	49 ⁴	50	50	50	50
Jet fuel do.	3,979 ⁴	4,818 ^{r,4}	4,271 ^{r,4}	3,942 ^{r,4}	3,900
Distillate fuel oil do.	24,053 ^{r,4}	24,601 ^{r,4}	24,054 ^{r,4}	23,068 ^{r,4}	23,000
Refinery gas do.	1,795 ⁴	1,800 ^r	1,800 ^r	1,800 ^r	1,800
Residual fuel oil do.	9,059 ⁴	9,478 ^{r,4}	9,125 ^{r,4}	8,870 ^{r,4}	8,800
Total do.	56,943 ^{r,4}	59,500 ^r	57,800 ^r	55,400 ^r	54,900
Salt, all forms	610,000	600,000	600,000	600,000	600,000
Sand and gravel:					
From onshore deposits thousand cubic meters	28,400	28,000	28,000	28,000	28,000
From offshore deposits do.	600	600	600	600	600
Total do.	29,000	28,600	28,600	28,600	28,600
Of which sand, industrial (sales) do.	500	500	500	500	500
Stone:					
Dimension (mostly granite) thousand cubic meters	207 ^r	206 ^r	205 ^r	192 ^r	247 ⁴
Limestone:					
Agricultural	700,000	700,000	700,000	700,000	700,000
Industrial	250,000	250,000	250,000	250,000	250,000
Sulfur, recovered	4,223 ⁴	4,142 ⁴	3,896 ⁴	3,800	3,800

^rRevised. do. Ditto.

¹Estimated data are rounded to no more than three significant digits; may not add to totals shown.

²Table includes data available through March 31, 2010.

³Production from Greenland Island.

⁴Reported figure.

⁵Denmark was believed to produce kaolin; however, data on production were not available.

TABLE 2
DENMARK: STRUCTURE OF THE MINERAL INDUSTRY IN 2009

(Thousand metric tons unless otherwise specified)

Commodity		Major operating companies and major equity owners	Location of main facilities	Annual capacity
Cement		Aalborg Portland A/S (Cementir Holding S.p.A.)	Plant at Rordal	2,700
Chalk (calcium carbonate)		A/S Faxe Kalkbrud	Quarries at Stevns and Sigerslev	250
Diatomite (moler)	thousand cubic meters	Dansk Moler Industri A/S (Damolin)	Quarries on Mors and Fur Islands	145
Kaolin		Aalborg Portland A/S	Mine and plant on Bornholm Island	25
Lime		A/S Faxe Kalkbrud (Aalborg Portland Holding A/S)	Plant at Stubberup, near Fakse, on Zealand Island	200
Natural gas	million cubic meters	Maersk Olie og Gas A/S	Roar and Tyra Gasfields, Danish North Sea	2,550
Olivine		Minelco A/S	Seqi Mine, Fiskefjord, west Greenland	1,100
Petroleum:				
Crude	barrels per day	Dansk Underground Consortium	Dan, Gorm, Rolf, and Tyra, Danish North Sea	127,000
Refined	do.	A/S Dansk Shell	Fredericia	55,000
Do.	do.	Kuwait Petroleum Refining A/S	Gulhavn and Skaelskor	56,500
Do.	do.	Statoil A/S	Kalundborg	65,000
Salt		Dansk Salt I/S	Mine (brine) at Hvornum, plant at Mariager	600
Do., do. Ditto.				