



2015 Minerals Yearbook

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

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

By Alberto Alexander Perez

DENMARK

The Kingdom of Denmark, which is a parliamentary constitutional monarchy, includes Denmark and the self-governing areas of Greenland and the Faroe Islands. Denmark is a member of the European Union (EU) and is located at the junction of the Baltic Sea, the North Sea, and the Skagerrak Strait. In 2015, Denmark had a gross domestic product (GDP) of \$295 billion,¹ measured at 2010 prices, which represented real GDP growth of 1.2%. In 2015, the value of production in the mining and quarrying sector in Denmark was \$5 billion and that of the construction sector was about \$29.9 billion. About 4,500 people were employed in the mining and quarrying sector in 2015, and about 154,600 were employed in the construction sector (Statistics Denmark, 2016b, p. 273, 288, 297).

In terms of land mass, the ice-free part of Greenland is almost 10 times larger than Denmark, and Denmark itself is 30 times larger than the Faroe Islands. The population density in Denmark is about 132 persons per square kilometer (km²); in these terms, Denmark has a relatively high population density compared with that of other European countries. On January 1, 2016, Denmark's population was 5,707,251, with a population growth rate of 7% in 2015. Denmark's population growth was owing not only to a 1.7% annual birth rate but also to having a higher percentage of immigrants than emigrants (Statistics Denmark, 2016a, p. 2–4). Denmark's mineral resources are limited and composed mainly of industrial minerals and mineral fuels; the country's production of these minerals was not significant (U.S. Department of State, 2016).

In 2015, Denmark had a record high trade surplus of \$18.6 billion, exporting mainly (in order of value) crude petroleum, pharmaceuticals, mink fur, windmill parts, and food. Denmark's imports consisted mostly of, in order of total value, pharmaceuticals, crude petroleum, automobiles, and electronics. The leading trading zone for Denmark was the European Union (EU). Germany received 14.6% of Denmark's exports and was the country of origin for 16.9% of Denmark's imports. Sweden received 10.9% of Denmark's exports and supplied 11% of its imports; the United States received 9.5% of Denmark's exports and supplied 5.6% of its imports; and the United Kingdom received 6.6% of Denmark's exports and supplied 6.5% of its imports (Statistics Denmark, 2016a, p. 25).

Production

In 2015, Denmark's production of bentonite decreased by 42%; sand and gravel, by 29%; and recovered sulfur, by 15%.

¹Where necessary, values have been converted from Denmark kroner (DDK) to U.S. dollars (US\$) at an annual average exchange rate of DKK6.727=US\$1.00 for 2015. All values are nominal unless otherwise stated.

Production of crude petroleum (which was the only commodity that had a significant—10% or more—increase in production) increased by 34%. The country lacked economically viable metallic mineral resources, and its mineral production consisted mainly of industrial minerals, crude petroleum, and natural gas and refinery products. Denmark was the world's only commercial producer of moler, which is a natural mixture of diatomite and smectite clay; the range of uses for this mineral is wide, including filtration systems, insulation bricks, and cat litter (table 1; Damolin A/S, 2016).

Structure of the Mineral Industry

Private ownership, exploration, development, and production of minerals are allowed under Danish law. The permitting procedures for mineral production are developed and administered at the county level. Regulations concerning the mineral industry are comparable with those of other EU countries. The Danish mineral industry was mostly privately owned. One of the principal exceptions is Nordsøfonden, which is the state oil and gas company. Nordsøfonden has been a 20% interest partner in all new licenses in the Danish oil and gas sector since 2005. The company was also a nonoperating partner in the Dansk Undergrunds Consortium (DUC) and had a 20% interest in the DUC concession area. Table 2 is a list of the country's major mineral industry facilities, their capacities, and their locations (table 2; Nordsøfonden, 2016).

Commodity Review

Industrial Minerals

Cement.—Aalborg Portland A/S (Aalborg) (a subsidiary of Cementir Holding S.p.A. of Italy) was the main producer of gray and white cement in Denmark. Aalborg operated seven kilns at its plant in Rørdal, which had a combined production capacity of 2.1 million metric tons per year of gray cement and 850,000 metric tons per year of white cement. The gray cement was sold mainly on the Danish market, whereas the white cement was sold on the international market. Aalborg also produced ready-mix concrete (Cementir Holding S.p.A., 2017).

Salt.—Akzo Nobel A/S's production of salt at Mariager was based on vacuum salt technology. The main material was a raw brine produced by solution mining in multieffect evaporation plants located at Hvornum. The salt produced was suitable for the electrolytic production of caustic lye, chlorine, and sodium chlorate (Akzo Nobel A/S, 2017).

Mineral Fuels

Crude Petroleum and Natural Gas.—On February 10, Dana Petroleum Denmark B.V., which was the operator of license no. 12/06, confirmed the presence of oil in Miocene sandstones in the Lille John-2 structure in the southern part of the Danish North Sea. The company had drilled the Lille John-1 exploration well and made the Lille John oil discovery in 2011; it had later drilled the Lille John-2 (5504/20–06) appraisal well and a side track, Lille John-2A, in order to evaluate further the extent of the discovery. Lille John-2 was drilled as a vertical well to a total depth of 1,344 meters below sea level. The company took cores and instituted a program of comprehensively logging data during a production test for oil and gas. The company planned to evaluate the results to assess if the oil discovery was economically viable and could be produced commercially (Danish Energy Agency, 2015).

Outlook

Denmark will continue to issue licenses for future natural gas and petroleum exploration, as Denmark's crude petroleum and gas production continues to decline. The development of mineral deposits in Greenland will affect how the Government subsidizes the autonomous region, and the benefits to be gained from such development as yet remain unclear.

References Cited

- Akzo Nobel A/S, 2017, Danish salt: Akzo Nobel A/S. (Accessed March 3, 2017, at http://www.akzonobel.com/Mariager/historie/dansk_salt/.)
- Cementir Holding S.p.A., 2017, Cement: Cementir Holding S.p.A. (Accessed March 10, 2017, at <http://www.cementirholding.it/danimarca.php>.)
- Damolin A/S, 2016, Absorbents—Absodan: Damolin A/S. (Accessed July 22, 2014, at <http://damolin.com/Default.aspx?ID=654>.)
- Danish Energy Agency, 2015, Lille John-2 appraisal well encounters oil in the Danish North Sea: Danish Energy Agency, February 10. (Accessed March 10, 2017, at <https://ens.dk/en/press#/pressreleases/lille-john-2-appraisal-well-encounters-oil-in-the-danish-north-sea-1781675>.)
- Nordsøfonden, 2016, About us: Nordsøfonden. (Accessed July 29, 2015, at <http://www.nordsoefonden.dk/en/about-us>.)
- Statistics Denmark, 2016a, Denmark in figures 2016: Statistics Denmark. (Accessed March 10, 2017, at <http://www.dst.dk/pubfile/21500/denmark2016>.)
- Statistics Denmark, 2016b, Statistical yearbook 2016: Statistics Denmark. (Accessed March 10, 2017, at <http://www.dst.dk/pubfile/22256/sy>.)
- U.S. Department of State, 2016, Denmark: U.S. Department of State Fact Sheet. (Accessed March 10, 2017, at <http://www.state.gov/r/pa/ei/bgn/3167.htm>.)

FAROE ISLANDS

The Faroe Islands, a self-governing overseas administrative division of Denmark, had no significant identified mineral resources besides small amounts of crushed stone that were produced for domestic consumption. The Faroese economy depended mainly on fishing and salmon farming and was aided by an annual subsidy from Denmark of about 3% of the gross domestic product. The main involvement of the Faroe Islands in the international mineral industry was as a market for imported materials, principally cement, fertilizer materials, and fuels.

Commodity Review

Mineral Fuels

Crude Petroleum.—Statoil ASA of Norway reported that it operated four petroleum licenses in the Faroe Islands and that the licenses were part of the company's exploration strategy of early access to establish a leading position in frontier areas. Statoil said that its partners in license no. 006 were Exxon Mobil Corp. of the United States (49% share), OMV Aktiengesellschaft of Austria (15% share), and Atlantic Petroleum P/F (1% share). Statoil indicated that it planned to move its semisubmersible rig *West Hercules* to its license area no. 008 in the Faroe Islands, where the company was an operator, to drill the Sula-Stelkur well (Statoil ASA, 2014).

Outlook

The search for crude petroleum will likely continue in the areas adjacent to the Faroe Islands, and this search is expected to continue to be the most important activity in the local mineral industry for the foreseeable future. Several companies will continue to be engaged in geophysical exploration and exploration well drilling. Future discoveries in the Faroese area could make the eventual production of petroleum possible.

Reference Cited

- Statoil ASA, 2014, Drilling concluded at Brugdan II re-entry: Statoil ASA, June 27. (Accessed March 10, 2017, at <https://www.statoil.com/en/news/archive/2014/06/27/26JunBrugda.html>.)

GREENLAND

Greenland (officially known as Kalaallit Nunaat) is a self-governing overseas administrative division of the Kingdom of Denmark. Its government is based in its capital, Nuuk. It has an ice-free area of 410,449 km² and a coastline of 44,087 kilometers (km), making it the largest island in the world. Greenland receives an annual grant and subsidies from Denmark of about \$546.9 million, and it uses the Danish kroner as its official currency. Greenland's population in 2015 was 55,847 people, with 17,316 living in Nuuk. The country had a negative population growth rate of 0.5%. Greenland's economy depended mostly on fisheries and, in 2015, its most important exports were provisions and livestock (Statistics Greenland, 2016, p. 3–7).

On September 1, 2014, the Mineral License Safety Authority received two competing applications for exclusive licenses for exploration for and extraction of hydrocarbons on Jameson Land, which is located in eastern Greenland. Two companies applied for the same two blocks and, in July 2015, the government of Greenland granted two exclusive exploration and exploitation licenses on Blocks 2 and 3 on Jameson Land to Greenland Gas and Oil A/S, with government-owned Nunaoil A/S as a carried partner. Nunaoil participates in every oil and gas license in Greenland (Ministry of Mineral Resources, 2016, p. 3–4).

Greenland had six rare-earth projects, of which the most important were two located in the Ilimaussaq complex—the Kvanefjeld project and the Kringlerne project. Other projects of note were, in order of importance, the Tiquusaaq, the Motzfeldt, the Sarfartoc, and the Milneland projects. As of the end of 2014, only feasibility studies had yet been produced, and mining activity in Greenland remained small (Goldletter International, 2014, p. 10–12; Greenland Minerals and Energy Ltd., 2014).

Commodity Review

Metals

Iron and Steel.—In 2015, General Nice Resources (Hong Kong) Holdings Ltd., of China (General Nice), which was one of China's top coal and iron ore importers, took over the \$2 billion Isua iron ore mine project. The finance ministry of Greenland reported, however, that General Nice was unlikely to develop the project as long as iron ore prices remain low. General Nice had replaced the previous owner, London Mining Ltd. of the United Kingdom, which went bankrupt, and became the first Chinese firm to have the right to exploit metals and minerals in Greenland. Owing to the price of iron ore on the world market, however, the company had been unable to get funding for the mine's construction. In 2012, London Mining had stated that the operational costs at Isua would be about \$45 per metric ton, which did not take into consideration shipping costs (Thomson Reuters, 2016).

Industrial Minerals

Gemstones.—The Ministry of Mineral Resources of Greenland reported that construction of infrastructure was underway for development and exploitation of True North Gems Inc.'s (TNG's) Aappaluttoq ruby and pink sapphire deposit in Fiskenæsset, which is located in southwestern Greenland approximately 160 km southwest of Nuuk. The Ministry stated that gem-quality and near-gem-quality rubies and pink sapphires occur along the metasomatic contact between the Fiskenæsset anorthosite and amphibolite, which extends for more than 200 km. The government stated that, to date, more than 65,000 grams (g) of gem-quality and more than 129,700 g of near-gem-quality rubies and pink sapphires had been recovered from 48 metric tons (t) of processed material. TNG had been exploring the area since 2004 and was granted a mining license for the Aappaluttoq project in March 2014. The company updated its prefeasibility study, which stated that the deposit had an inferred resource of 77,160 t at a grade of 1,417 carats per metric ton and a 1.7-millimeter lower size cutoff; the expected mine life was 9 years. According to the government of Greenland, mining of the deposit would introduce a significant amount of Greenlandic colored gemstones to the international market for the first time. The company reported that it had commenced mining in December 2015 (Bureau of Minerals and Petroleum, 2015, p. 1–2).

Rare Earths.—As of 2014, Greenland had issued several exploration licenses for rare-earth elements (REEs) since it had changed its policy on extraction of radioactive minerals in October 2013. The largest REE deposits that had been identified were the Kvanefjeld and the Kringlerne deposits, which were owned by Greenland Minerals and Energy (GMEL) of Australia and Tanbreez Mining Greenland ALS (Tanbreez), respectively. The Kvanefjeld project is located in the Northern Ilimaussaq complex in the southwestern tip of Greenland. The main focus of GMEL's investigation was to develop an effective method of beneficiating the deposit's multielement ores. The Kringlerne deposit is located in southern Greenland between the cities of Narsaq and Qaqortoq. The Kringlerne project was also known simply as the Tanbreez project (Goldletter International, 2014, p. 10; Greenland Minerals and Energy Ltd., 2014).

Outlook

After Greenland changed its legislation to permit the extraction of radioactive minerals, several companies began exploration. The conditions of extraction and the size of the investment necessary for this type of enterprise, however, means that only well developed and well funded projects that are seen as able to live up to their production potential are likely to be realized. More areas for exploration in Greenland are expected to open up if the ice sheet recedes, especially for crude petroleum and gas in the Arctic Sea. The country's political autonomy and the likelihood that the government of Greenland will continue to see the new sources of revenue as instrumental in achieving economic autonomy from Denmark are reasons to expect the continued development of the mineral industry in Greenland for the foreseeable future.

References Cited

- Bureau of Minerals and Petroleum [Greenland], 2015, Greenland Mineral Exploration Newsletter no. 47: Bureau of Minerals and Petroleum, March 8, 12 p.
- Goldletter International, 2014, Strategic metals & rare earths letter international: Goldletter International, February, 22 p. (Accessed July 27, 2015, at http://www.goldletterint.com/documents/pdf/SMRE_LETTER_Febr2014Update.pdf.)
- Greenland Minerals and Energy Ltd., 2014, Kvanefjeld—REEs, uranium, zinc: Greenland Minerals and Energy Ltd. (Accessed July 28, 2015, at <http://www.ggg.gl/projects/kvanefjeld-rees-uranium-zinc/>.)
- Ministry of Mineral Resources [Greenland], 2016, Greenland oil and gas exploration newsletter, No 6: Ministry of Mineral Resources, August, 9 p. (Accessed March 11, 2017, at https://www.govmin.gl/images/Uulex_No6_August_2016.pdf.)
- Statistics Greenland, 2016, Greenland in figures 2016: Statistics Greenland, 35 p. (Accessed July 29, 2015, at [http://naalakkersuisut.gl/~media/Nanoq/Files/AttachedFiles/Engelske-tekster/Publications/Greenland in Figures 2016.pdf](http://naalakkersuisut.gl/~media/Nanoq/Files/AttachedFiles/Engelske-tekster/Publications/Greenland%20in%20Figures%202016.pdf).)
- Thomson Reuters, 2016, Chinese firm unlikely to develop \$2 billion Greenland iron ore mine soon—Minister: Thomson Reuters, January 26. (Accessed March 10, 2017, at <http://www.reuters.com/article/us-greenland-mining-china-idUSKCN0V425D>.)

TABLE 1
DENMARK: PRODUCTION OF MINERAL COMMODITIES¹

(Metric tons unless otherwise specified)

| Commodity ² | 2011 | 2012 | 2013 | 2014 | 2015 |
|--|--------------------|--------------------|---------|---------------------|---------------------|
| METALS | | | | | |
| Aluminum, metal, secondary | 31,300 | 26,700 | 25,700 | 26,400 | 26,000 |
| Gold, mine output, Au content kilograms | 103 | 307 | 100 | -- | -- |
| INDUSTRIAL MINERALS | | | | | |
| Cement, gray and white thousand metric tons | 1,810 | 1,820 | 1,830 | 1,876 | 1,810 |
| Chalk, calcium carbonate thousand cubic meters | 2,600 ^e | 2,600 ^e | 2,571 | 2,610 | 2,600 ^e |
| Clay: | | | | | |
| Bentonite | 38,300 | 30,330 | 56,355 | 66,388 | 38,300 |
| Moler, extracted thousand cubic meters | 201 | 177 | 205 | 190 | 201 |
| Salt, all forms ^c | 600,000 | 600,000 | 600,000 | 600,000 | 600,000 |
| Sand and gravel thousand metric tons | 19,966 | 18,981 | 17,762 | 28,306 | 19,966 |
| Stone, crushed do. | 542 | 500 | 512 | 525 | 542 |
| Sulfur, recovered | 3,045 | 3,400 | 3,599 | 3,600 ^e | 3,045 |
| MINERAL FUELS AND RELATED MATERIALS | | | | | |
| Petroleum: | | | | | |
| Crude thousand 42-gallon barrels | 80,665 | 73,730 | 63,875 | 60,225 | 80,665 |
| Refinery products: | | | | | |
| Liquefied petroleum gas do. | 1,533 | 1,862 | 1,278 | 1,533 ^r | 1,500 ^e |
| Gasoline do. | 15,768 | 17,046 | 18,980 | 15,768 ^r | 15,800 ^e |
| Jet fuel do. | 2,154 | 1,752 | 1,168 | 2,154 ^r | 2,200 ^e |
| Distillate fuel do. | 21,280 | 25,331 | 31,025 | 21,280 ^r | 21,300 ^e |
| Residual fuel do. | 7,373 | 8,432 | 9,855 | 7,373 ^r | 7,400 ^e |
| Total do. | 48,108 | 54,423 | 62,306 | 48,108 ^r | 48,200 ^e |

^eEstimated; estimated data are rounded to no more than three significant digits; may not add to totals shown. ^rRevised. do. Ditto. -- Zero.

¹Table includes data available through March 10, 2017.

²In addition to the commodities listed, Denmark is thought to have produced kaolin clay, lime, naphta, and peat, but available information was adequate to make reliable estimates of output.

TABLE 2
DENMARK AND GREENLAND: STRUCTURE OF THE MINERAL INDUSTRIES IN 2015

(Thousand metric tons unless otherwise specified)

| Country and commodity | Major operating companies and major equity owners | Location of main facilities | Annual capacity |
|---------------------------|--|---|--------------------|
| DENMARK | | | |
| Cement: | | | |
| Gray | Aalborg Portland A/S (Cementir Holding S.p.A.) | Plant at Rordal | 2,100 |
| White | do. | do. | 850 |
| Chalk (calcium carbonate) | thousand cubic meters Faxø Kalkbrud A/S (Lhuist Group S.A.) | Quarries at Stevns and Sigerslev | 280 |
| Diatomite (moler) | do. Damolin A/S | Quarries on Mors Island and Fur Island | 250 |
| Lime | A/S Faxø Kalkbrud (Lhuist Group S.A.) | 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 | 5,000 |
| Petroleum: | | | |
| Crude | barrels per day Dansk Undergrunds Consortium (DUC) ¹ (A.P. Møller-Mærsk, 31.2%; Chevron Corp., 12.0%; Nordsøfonden, 20.0%; Royal Dutch Shell plc., 36.8%) | Various locations | 173,000 |
| Do. | DONG Energy AS | 5 fields in the Danish North Sea ² | NA |
| Do. | Hess Corp. ³ | 1 field in the Danish North Sea | NA |
| Refined | barrels per day Statoil A/S | Kalundborg | 110,400 |
| Do. | do. Dansk Shell A/S (Royal Dutch Shell plc., 100%) | Fredericia | 63,000 |
| Salt | Akzo Nobel A/S | Mine (brine) at Hvornum, plant at Mariager | 1,000 |
| Steel, semimanufactures | NLMK DanSteel A/S (NLMK International BV, 100%) | Plant at Frederiksværk | 250 |
| GREENLAND | | | |
| Gold | kilograms Angel Mining plc ⁴ | Nalunaq Mine at Nanortalik | 1,100 |

Do., do. Ditto. NA Not available.

¹Maersk Olie og Gas A/S was the operator for all Dansk Undergrunds Consortium (DUC) activities.

²A sixth field, the Herje field, was expected to begin producing oil and gas in 2016.

³HESS Corp. operated and owned 65.1% of the South Arne field. Other owners were DONG Energy A/S (33.2%) and Danoil A/S (1.7%).

⁴Mine was placed under administration and operations were suspended in 2013.