



2015 Minerals Yearbook

ICELAND [ADVANCE RELEASE]

THE MINERAL INDUSTRY OF ICELAND

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In 2015, the real gross domestic product (GDP) of Iceland increased to \$16.7 billion from \$15.2 billion¹ (revised) in 2014, or by 10%. Production in the services sector accounted for 73.3% of the GDP; the industrial sector, 20.9%; and the agricultural sector, 5.8%. Iceland had an inflation rate of 1.6% and an unemployment rate of 3.8%. The country's public debt amounted to 81.9% of the GDP, and Iceland had a budgetary surplus equivalent to 0.2% of the GDP. Iceland had a population of more than 332,000 inhabitants, of which 94.1% was urban. Despite this urban concentration, the land suitable for agricultural use amounted to only 18.7% of available land, of which the majority was used for pasture mostly of ruminant animals, such as goats and sheep, although some cattle as well (Iceland had created its own breed of cattle that had acclimated to Iceland's particular weather conditions). Only about 1.2% of the agricultural land was arable, and the rest of the country was composed of volcanic formations, hills, lagoons, and glaciers, of which the largest is the Vatnajökull glacier, which had a surface area of 8,300 square kilometers. The Bárðarbunga volcano, with an altitude of 2,009 meters, is the country's highest volcano (Statistics Iceland, 2016a; 2016b, p. 31).

Iceland had no proven base-metal, precious-metal, or mineral fuel reserves. It had, however, some industrial mineral resources, including salt and pumice, but overall, Iceland depended on imports to meet domestic demand for most mineral commodities. Iceland had abundant hydropower and geothermal resources, which made power-intensive smelter operations economically viable; in 2015, the country accounted for 1.4% of the world's production of primary aluminum and about 1.0% of the world's production of ferrosilicon (U.S. Central Intelligence Agency, 2016; Bray, 2017; Schnebele, 2017).

Minerals in the National Economy

Mineral-related production played a significant role in the national economy, in particular metal processing, such as aluminum. Although only 0.1% of the employed people in Iceland worked in mining and quarrying, 1.3% worked in the manufacture of metals and 6.2% worked in the construction sector. In 2015, the classification category comprising mining, quarrying, manufacturing, and the production of electricity, gas steam and air-conditioning, as well as the supply of water sewage, waste management, and remediation activities (that is, the classification category to which mining activities have been aggregated in the Icelandic national accounting) amounted to 18.3% of the gross domestic income, and that of the construction sector amounted to 5.9%. In 2015, 26.1% of all Iceland's exports went to the Netherlands; 11.6%, to the United Kingdom; 11.5%, to Spain; 7.4%, to Germany; and 5.7%, to France; the United States received 2.4% of Iceland's exports.

¹Where necessary, values have been converted from Icelandic krona (ISK) to U.S. dollars (US\$) at an annual average exchange rate of ISK131.85=US\$1.00 for 2015.

As to imports into Iceland in 2015, 10.1% came from Norway; 8.6%, from Germany; 7.1%, from the United States; 7.1%, from Denmark; 5.9%, from the Netherlands; and 5%, from the United Kingdom. Iceland exported 877,856 metric tons (t) of aluminum and 121,556 t of ferrosilicon in 2015, accounting for 41% of the total value of the country's exported goods. Imports of aluminum ores and concentrates amounted to 1,645,843 t and accounted for 9.8% of the value of the country's imported goods. The aluminum industry and the ferrosilicon industry together consumed 74.3% of the total electricity generated in the country (International Monetary Fund, 2016, p. 51; Statistics Iceland, 2016a; 2016b, p. 8, 19, 21).

Government Policies and Programs

The laws applicable to the mineral industry included the Act on Survey and Utilization of Ground Resources, No. 57/1998, and the Electricity Act, No. 65/2003. Activities related to the survey and utilization of land were also subject to the Nature Conservation Act, the Planning and Building Act, and other acts. Orkustofnun (which was the national energy authority under the Ministry of Industry and Innovation) was responsible for granting licenses and regulating compliance related to mineral exploration, prospecting, and extraction operations based on relevant laws concerning electricity generation, the environment, hydrocarbons, and natural resources (Orkustofnun, 2014).

Production

Aluminum was Iceland's most valuable mineral commodity, followed by ferrosilicon. Production of aluminum in 2015 is estimated to have remained about the same as in 2014. Cement had not been produced in Iceland since February 2012, when Sementsverksmidja Rikisins (the only cement producer in the country) converted its operations to a cement import and distribution company and ceased production at its facility in Akranes. The country's domestically produced industrial minerals included crushed stone, pumice, salt, sand and gravel, and scoria; however, reliable data on the quantity produced were not available (tables 1, 2; Cement Ltd., 2014).

Structure of the Mineral Industry

Alcoa Inc. of the United States owned the Fjaroaal smelter at Reydarfjordur, which had a production capacity of about 344,000 metric tons per year (t/yr). Rio Tinto Alcan Inc. of Canada owned the Reykjavik ISAL aluminum smelter in Straumsvik, which had a capacity of about 200,000 t/yr, and Century Aluminum Co. of the United States owned an aluminum smelter in Grundartangi, which had a capacity of about 260,000 t/yr. Elkem Iceland, which was owned by Elkem A/S of Norway and controlled by China National Bluestar Co. Ltd. of China, had a ferrosilicon plant in

Grundartangi with a capacity of about 120,000 t/yr. Table 2 is a list of major mineral industry facilities located in Iceland.

Commodity Review

Metals

Silicon.—In June, the PCC Group of Germany began construction of a silicon metal plant in Husavik and expected to begin production by 2018. The plant, which was to be powered using solar photovoltaics, would have a design capacity of 32,000 t/yr (PCC SE, 2016).

Also in June, Silicor Materials Inc. of the United States signed a contract with the construction and civil engineering firm MT Højgaard Group of Denmark for the design and construction of Silicor's plant at the Port of Grundartangi. Silicor stated that both companies had worked for more than 1 year to complete the design for the 121,000-square-meter facility and that the contract was valued at more than \$225.6 million. Construction at the site was scheduled to begin in 2016, and the plant would have the capacity to produce between 16,000 and 19,000 t/yr of silicon (Silicor Materials Inc., 2015).

In September, Elkem Iceland stated that Landsvirkjun (the national power company of Iceland) was going to reduce the supply of electricity made available to its industrial users through the winter of 2015–16. This reduction was necessary because Landsvirkjun had less capacity to produce electricity owing to the low inflow of water into its main reservoirs. Most of electricity production in Iceland is generated by hydropower. Elkem stated that the reduced supply of electricity would have an effect equivalent to that of shutting down its main furnace for 6 weeks and therefore reducing its annual production of ferrosilicon by 5,000 to 10,000 t. Elkem's plant had the capacity to produce 120,000 t/yr of ferrosilicon and it consumed about 945 gigawatt-hours (GWh) energy per year (Elkem Iceland, 2015).

Industrial Minerals

Pumice.—Jardefnaindnatur ehf (JEI) mined pumice in the Mount Hekla region about 100 kilometers from Reykjavik. Data on pumice production in 2015 were not available. JEI's main export markets were Belgium, Denmark, the Netherlands, and the United States (Jardefnaindnatur ehf, 2015; Statistics Iceland, 2016b).

Mineral Fuels and Other Sources of Energy

Renewable Energy.—Iceland was at the forefront in the use of renewable energy resources. The country had 52 hydropower plants, the largest of which was located in Fljotsdalsvirkjun and had a capacity of 690 megawatts (MW); the country also had seven geothermal powerplants, the largest of which was located in Hellisheiði and had a capacity of 303 MW. In 2014, the total electricity produced in Iceland was 18,122 GWh, of which 71% was generated by hydroelectric plants and 28.9% was generated by geothermal plants; the rest was generated by wind power except for about 2 GWh, which was generated from fossil fuels. The installed electricity generation capacity of the country was 2,760 MW, of which 1,986 MW was hydropower and 665 MW

was geothermal, together accounting for 96.1% of the total. Seventy-seven percent of all electricity produced was consumed by industry, 17% was used by the public, and the rest was either used by the powerplants (2%) or was subject to transmission losses (2%) or distribution losses (1%) (Orkustofnun, 2015a, p. 4, 5, 10, 13).

Petroleum.—Two main areas on the Icelandic Continental Shelf (ICS) are thought to have potential accumulations of petroleum and gas that may be commercially exploitable. These are the Dreki area located east and northeast of Iceland, and the Gammur area located on the northern insular continental shelf of Iceland. The Dreki area includes the southern tip of the Jan Mayen microcontinent. The Government, academic researchers, and the oil and gas industry had conducted several surveys in the northern part of the Dreki area that indicated the presence of thick continental crust that potentially contains Jurassic and (or) Cretaceous source rocks. The Jan Mayen Ridge is thought to have potential for hydrocarbon accumulations because of its geologic similarity to other hydrocarbon basins. The Gammur area is a relatively young sediment basin of about 9 million years old, and indications of gas escaping the sediments have been found; however, the type of gas has not been determined (Orkustofnun, 2016).

Two exploration and extraction licenses had been granted in the Dreki area. One license was awarded to the Chinese firm China National Offshore Oil Corp. (CNOOC), which owned a 60% stake in license No. 2014/01; this license lies between Iceland and Norway's Jan Mayen Island. CNOOC was in partnership with Iceland's Eykon Energy (15%) and Petoro Iceland (25%). The second license was awarded to a joint venture of Ithaca Petroleum Ltd. of the United Kingdom (56.25% interest), Kolvetni (18.75%), and Petoro Iceland (25%) (Orkustofnun, 2015b, p. 3).

Outlook

Aluminum production is expected to remain steady or increase, depending on the terms of future energy contracts between the aluminum companies and the Government of Iceland, and specifically the tax imposed on large energy consumers. Century Aluminum's Helguvirkjun smelter project would increase Iceland's aluminum capacity by 45% by 2020 if a long-term power supply contract is secured soon. Implementation of new silicon projects in the near future will help the country diversify the uses of its hydroelectric and geothermal power. Petroleum exploration is expected to continue offshore Iceland (Elkem Iceland, 2014).

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TABLE 1
ICELAND: PRODUCTION OF MINERAL COMMODITIES¹

(Metric tons unless otherwise specified)

Commodity ²	2011	2012	2013	2014	2015
Aluminum, metal, primary ³	780,853	802,827	736,429	800,000 ^c	801,000 ^c
Cement, hydraulic	142,000	146,000	--	--	--
Ferrosilicon	120,076	131,818 ^r	125,204	110,000 ^r	115,000

^cEstimated; estimated data are rounded to no more than three significant digits. ^rRevised. -- Zero.

¹Table includes data available through June 16, 2016.

²In addition to the commodities listed, other materials were thought to be produced, including pumice, salt, sand and gravel, scoria, and crushed stone; however, available information was inadequate to make reliable estimates of output.

³Ingot and rolling billet production.

TABLE 2
ICELAND: STRUCTURE OF THE MINERAL INDUSTRY IN 2015

(Thousand metric tons)

Commodity	Major operating companies and major equity owners	Location of main facilities	Annual capacity
Aluminum	Alcoa Inc.	Fjaroaal smelter at Reydarfjörður	344
Do.	Reykjavik [ISAL] (Rio Tinto Alcan Inc., 100%)	Straumsvik	200
Do.	Century Aluminum Co.	Grundartangi	260
Ferrosilicon	Elkem Iceland (Elkem A/S)	Plant at Grundartangi	120
Pumice	Jardefnainnadir ehf	Mount Hekla	210
Do.	BM Valla Ltd.	do.	32
Do., do. Ditto.			