



2014 Minerals Yearbook

ICELAND

THE MINERAL INDUSTRY OF ICELAND

By Alberto Alexander Perez

Iceland has no proven base metal, precious metal, or mineral fuel reserves. It has some industrial mineral resources, including salt and pumice, but, overall, Iceland depends on imports to meet domestic demand for most mineral commodities. Iceland has abundant hydropower and geothermal resources, which makes the country an economically attractive location for power-intensive smelter operations. In 2014, the country accounted for about 1.6% of global production of primary aluminum and about 1.0% of global production of ferrosilicon (Bray, 2016; Schnebele, 2016).

Minerals in the National Economy

The nation's real gross domestic product (GDP) increased to \$14.86 billion in 2014, or by 1.9% compared with that of 2013. Mineral-related production played a significant role in the national economy. In 2014, the value of basic metals accounted for 30.1% of the total value of production in the country, second only to food products and beverages (51.3%). In 2014, the country exported 844,721 metric tons (t) of aluminum and 112,657 t of ferrosilicon, which accounted for 39.5% of the total value of the country's exported goods. Imports of aluminum ores and concentrates amounted to 1,583,285 t and accounted for 9.2% of the value of the country's imported goods. The aluminum and ferrosilicon industries consumed 74.3% of the total electricity generated in the country (International Monetary Fund, 2015, p. 51; Statistics Iceland, 2015a–c).

In early 2014, Statoil ASA of Norway, Eni S.p.A. of Italy, GDF Suez S.A. of France, Det norske oljeselskap ASA of Norway, and Repsol S.A. of Spain began exploration drilling in the Barents Sea, although it was still unclear if the region could become as significant a hydrocarbon-producing region as the North Sea has proved to be. Statoil's discovery of up to 63 million barrels of recoverable oil equivalent at the Drivis prospect in 2014 may lead to development of the Johan Castberg area. In 2014, China National Offshore Oil Corp. (CNOOC) of China took a 60% stake in license No. 2014/01, which covers the area between Iceland and Norway's Jan Mayen Island. With this action, CNOOC was positioned to become the first Chinese company to explore for oil in the Arctic region. CNOOC was partnering with Iceland's Eykon Energy (15%) and Petoro Iceland (25%) (Mainwaring, 2014).

Government Policies and Programs

The laws applicable to the mineral industry include 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 use of land are also subject to the Nature Conservation Act, Planning and Building Act, and other acts. Orkustofnun (the National Energy Authority under the Ministry of Industry and Innovation) is responsible for granting licenses and regulating

compliance related to mineral exploration, prospecting, and extraction operations based on relevant laws pertaining to natural resources, the environment, hydrocarbons, and electricity (Orkustofnun, 2014c).

Production

Aluminum was Iceland's leading mineral commodity, followed by ferrosilicon. In 2014, the estimated production of aluminum increased by 9.2%. The production of cement had likely ceased in 2012 when Sementsverksmidja Rikisins (the only producer in the country) was converted to an importation and distribution company when production ceased at its facility in Akranes. The country's domestically produced industrial minerals included crushed stone, pumice, salt, sand and gravel, and scoria (tables 1, 2; Cement Ltd., 2014).

Structure of the Mineral Industry

Table 2 is a list of major mineral industry facilities.

Commodity Review

Metals

Aluminum.—Iceland started aluminum production in 1969. Since then, the production capacity had been gradually increasing owing to the competitive price of electricity in the country. In 2014, three aluminum smelting plants were in operation in Iceland. They were Alcoa Inc. of the United States Fjarooal smelter at Reydarfjordur [344,000-metric-ton-per-year (t/yr) capacity]; Century Aluminum Co. of the United States smelter at Grundartangi (260,000-t/yr capacity); and Rio Tinto Alcan of Canada's Reykjavik [ISAL] smelter at Straumsvik (200,000 t/yr capacity). The aluminum industry had become less profitable in recent years, making the Government eager to attract other industries that could take advantage of its abundant energy resources (Katz, 2013; Association of Aluminum Producers in Iceland, 2014; Alcoa Inc., 2015, p. 12; Century Aluminum, 2015a; Rio Tinto plc, 2015, p. 230).

Silicon.—Elkem Iceland was established in 1975. The company had the capacity to produce 120,000 t/yr of ferrosilicon, and it consumed about 945 gigawatt-hours per year of energy. About one-third of the ferrosilicon output was used to produce magnesium ferrosilicon products; the plant also produced refined metal with reduced aluminum and carbon content. Elkem reduced production to 90% in February 2014 and planned to idle one of the three furnaces by April owing to the low water levels at the powerplant reservoirs. As a result, the production of ferrosilicon declined in 2014. Two new silicon facilities were in the process of obtaining the required permits in 2013—a 32,000-t/yr-capacity project in Husavik by PCC Group

of Germany and a 16,000-t/yr-capacity project in Grundartangi by Silicor Materials Inc. of the United States. Both facilities were scheduled to come online in 2016 (table 2; PCC Group, 2014; Silicor Materials Inc., 2014).

Industrial Minerals

Pumice.—Jardefnaindnatur ehf (JEI) mined pumice in the Mount Hekla region about 100 kilometers from Reykjavik. JEI's main export markets were Belgium, Denmark, the Netherlands, and the United States (Jardefnaindnatur ehf, 2015; Statistics Iceland, 2015a).

Mineral Fuels and Other Sources of Energy

Petroleum.—In December 2014, the Icelandic National Energy Authority, Orkustofnun, received notification from Faroe Petroleum and its partners Petoro Iceland and Iceland Petroleum that they had relinquished their license No. 2013/01, which was issued on January 4, 2013. The results of Faroe Petroleum's initial studies of the licensed area suggested that seismic data in the next phase of exploration would be inconclusive owing to the presence of basalts on the eastern edge of the Dreki area, which would complicate the imaging of sediment sequences below. The company stated that alternative exploration methods, excluding drilling, were evaluated by the joint-venture partners and were assessed as not significantly increasing the probability of identifying hydrocarbon-bearing structures in the IS2013/01 license area. Other license holders in the Dreki area appeared to be continuing with explorations as planned (Orkustofnun, 2014b).

Renewable Energy.—Iceland was at the forefront in the use of renewable energy resources, and it had one of the largest potential sources of renewable energy in the world. In 2013, the total primary energy used in Iceland was 278 gigawatthours. About 86% of the energy supply was from domestic geothermal and hydropower resources; the rest was from imported coal and oil. The installed power-generation capacity of the country was 2,767 megawatts (MW), of which 1,986 MW was hydropower and 665 MW was geothermal, together accounting for 95.5% of the total. The country had 51 hydropower plants, of which the largest was the Fljotsdalsvirkjun plant (690 MW). The country had seven geothermal powerplants, of which the largest was the Hellisheidi plant (303 MW) (Orkustofnun, 2014a, p. 3–5, 13).

Outlook

Aluminum production is expected to remain steady or to increase, depending on the terms of future energy contracts between the aluminum companies and the Government of Iceland—specifically, the tax imposed on large energy consumers. Century Aluminum's Helguvuk smelter project is expected to increase Iceland's aluminum production capacity by 45% by 2020 if a long-term power supply contract can be secured in 2015. Implementation of new silicon projects in a few years would help the country diversify the use of its

hydroelectric and geothermal power. Petroleum exploration is expected to continue offshore of Iceland (Elkem Iceland, 2014; Mainwaring, 2014; Century Aluminum, 2015b).

References Cited

- Alcoa Inc., 2015, Annual report 2014: Pittsburgh, Pennsylvania, Alcoa Inc., 210 p.
- Association of Aluminum Producers in Iceland, 2014, Members: Reykjavik, Iceland, Association of Aluminum Producers in Iceland. (Accessed June 15, 2015, at <http://en.samal.is/adildarfyrirtaeki/>.)
- Bray, E.L., 2016, Aluminum: U.S. Geological Survey Mineral Commodity Summaries 2016, p. 22–23.
- Cement Ltd., 2014, Cement Ltd.: Akranes, Iceland, Cement Ltd. (Accessed June 24, 2015, at <http://www.sement.is/Fyrirtaekid/>.)
- Century Aluminum, 2015a, Grundartangi plant and products: Chicago, Illinois, Century Aluminum. (Accessed June 15, 2015, at <http://www.centuryaluminum.com/grundartangi.php>.)
- Century Aluminum, 2015b, Helguvuk plant and products: Chicago, Illinois, Century Aluminum. (Accessed June 24, 2015, at <http://www.centuryaluminum.com/helguvuk.php>.)
- Elkem Iceland, 2014, Elkem Iceland reduces FeSi production by 10,000 tons in Q2: Grundartangi, Iceland, Elkem Iceland press release, February 19. (Accessed June 22, 2015, at <https://www.elkem.com/en/news/item/Elkem-Iceland-reduces-FeSi-production-by-10000-tons-in-Q2/>.)
- International Monetary Fund, 2015, World economic outlook: Washington, DC, International Monetary Fund, April, 238 p.
- Jardefnaindnatur ehf, 2015, About JEI: Jardefnaindnatur ehf. (Accessed June 24, 2015, at <http://www.jei.is/index.html>.)
- Katz, Cheryl, 2013, Iceland seeks to cash in on its abundant renewable energy: New Haven, Connecticut, Environment 360, Yale University, October 3. (Accessed September 20, 2014, at http://e360.yale.edu/feature/iceland_seeks_to_cash_in_on_its_abundant_renewable_energy/2697/.)
- Mainwaring, Jon, 2014, Offshore Iceland—The next Arctic opportunity?: Rigzone, May 26. (Accessed September 20, 2014, at http://www.rigzone.com/news/article.asp?a_id=%20133196.)
- Orkustofnun, 2014a, Energy statistics in Iceland 2013: Reykjavik, Iceland, Orkustofnun [National Energy Authority], Ministry of Industries and Innovation, April, 14 p.
- Orkustofnun, 2014b, First exclusive licences in the Dreki rea elinquished: Reykjavik, Iceland, Orkustofnun [National Energy Authority], Ministry of Industries and Innovation. (Accessed May 6, 2016, at <http://www.nea.is/the-national-energy-authority/news/nr/1623>.)
- Orkustofnun, 2014c, Legal framework: Reykjavik, Iceland, Orkustofnun [National Energy Authority], Ministry of Industries and Innovation. (Accessed September 22, 2014, at <http://www.nea.is/geothermal/legal-and-regulatory-framework/>.)
- PCC Group, 2014, Silicon metal project in Iceland, investments worldwide: Duisburg, Germany, PCC Group press release. (Accessed September 22, 2014, at https://www.pcc.eu/ttw/pcc.nsf/id/EN_Silicon-metal-project-in-Iceland.)
- Rio Tinto plc, 2015, Annual report 2014: London, United Kingdom, Rio Tinto plc, March 5, 248 p.
- Schnebele, E.K., 2016, Silicon: U.S. Geological Survey Mineral Commodity Summaries 2016, p. 150–151.
- Silicor Materials Inc., 2014, Silicor Materials selects Iceland site for first large-scale solar silicon plant: San Jose, California, Silicor Materials Inc. press release, July 15. (Accessed June 21, 2015, at <http://www.silicormaterials.com/news-a-event/press-releases/79-silicor-materials-selects-iceland-site-for-first-large-scale-solar-silicon-plant.html>.)
- Statistics Iceland, 2015a, Exports by commodities (SI classification) 1999–2013: Reykjavik, Iceland, Statistics Iceland. (Accessed June 23, 2015, at <http://www.statice.is/Statistics/External-trade/Exports>.)
- Statistics Iceland, 2015b, Imports by groups of the SITC Rev. 4, 1999–2013: Reykjavik, Iceland, Statistics Iceland. (Accessed June 24, 2015, at <http://www.statice.is/Statistics/External-trade/Imports>.)
- Statistics Iceland, 2015c, Verdmæti seldra framleidsluvara 2014 [Value of sold production in 2014]: Reykjavik, Iceland, Statistics Iceland, June 24, 2015, 1 p.

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

(Metric tons)

Commodity	2010	2011	2012	2013	2014
Aluminum, metal, primary ³	825,803	780,853	802,827	736,429	800,000 ^e
Cement, hydraulic	140,000	142,000	146,000 ^r	-- ^r	--
Ferrosilicon	114,231	120,076	115,000 ^r	125,204	118,000 ^e

^eEstimated data are rounded to no more than three significant digits. ^rRevised. -- Zero.

¹Table includes data available through June 24, 2015.

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

³Ingot and rolling billet production.

TABLE 2
ICELAND: STRUCTURE OF THE MINERAL INDUSTRY IN 2014

(Thousand metric tons)

Commodity	Major operating companies and major equity owners	Location of main facilities	Annual capacity
Aluminum	Alcoa Inc.	Fjaroaal smelter at Reydarfjordur	344
Do.	Reykjavik [ISAL] (Rio Tinto Alcan, 100%)	Straumsvik	200
Do.	Century Aluminum Co.	Grundartangi	260
Cement	Sementsverksmidja Rikisins (Government, 100%) ¹	Akranes	--
Ferrosilicon	Elkem Iceland (Elkem A/S)	Plant at Grundartangi	120
Pumice	Jardefnainadur ehf	Mount Hekla	285
Do.	BM Valla Ltd.	do.	32

Do., do. Ditto. -- Zero.

¹The company was converted to an importation and distribution business in 2012.