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The Mineral Industry of Iceland

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Iceland has a few industrial mineral resources including salt and pumice but no proven base metals, precious metals, or mineral fuel reserves. The country was dependent on imports to meet domestic demand for most mineral commodities. Given its abundant hydropower and geothermal resources, Iceland was an economically attractive location for power-intensive smelter operations. In 2013, the country accounted for about 1.7% of global production of primary aluminum and about 1.0% of global production of silicon (Bray, 2015; Corathers, 2015).

Minerals in the National Economy

The nation's real gross domestic product (GDP) increased by 2.9% to $14.59 billion in 2013 compared with that of 2012. It was projected that the rate of growth for GDP would be 2.7% for 2014 and 3.1% for 2015. Mineral-related production played a significant role in the national economy. In 2012 (the latest year for which data were available), the value of basic metals accounted for 32.7% of the total value of goods produced in the country, second only to fish products (35.7%). In 2013, the country exported 830,000 metric tons (t) of aluminum and 130,000 t of ferrosilicon, which accounted for 38.6% of the total value of the country's exported goods. The imports of aluminum ores and concentrates amounted to 1.6 million metric tons, accounting for 10.5% of the value of the country's imported goods. The aluminum and ferrosilicon industries consumed 68.4% and 8.7% of the total electricity generated in the country, respectively (Statistics Iceland, 2013; 2014a, b; International Monetary Fund, 2014, p. 54; U.S. Central Intelligence Agency, 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 utilization 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 acts pertaining to natural resources, the environment, hydrocarbons, and electricity (Orkustofnun, 2014b).

New Government-initiated activities undertaken in 2013 included the following: (a) on June 9, the Government announced that it would resume construction of a new aluminum smelter plant in Helguvik, which had been suspended owing to environmental concerns and the uncertainty of power supply projects; (b) in October, the Government approached the Government of the United Kingdom for financial support for the subsea electricity cable project that would enable power to be exported to Scotland; and (c) in early 2013, two licenses were issued for offshore oil exploration (Bowers, 2013; Veal, 2013; Mainwaring, 2014).

Production

Aluminum was Iceland's leading mineral commodity followed by ferrosilicon. In 2013, production of aluminum and ferrosilicon decreased by 8.3% and 5.0%, respectively. The production of cement was estimated to be zero for 2012 and 2013 because Sementsverksmidja Rikisins (the only producer in the country) was converted to an importation and distribution company in 2012, and production ceased at its factory in Akranes. The country's domestically produced industrial minerals included crushed stone, pumice, salt, sand and gravel, and scoria (tables 1 and 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 expanded owing to the competitive electricity price in the country. In 2013, three aluminum smelting plants were in operation in Iceland. They were Alcoa Inc. of the United States Fjaroaal smelter at Reydarfjordur [which had 344,000 metric tons per year (t/yr) of capacity]; Century Aluminum Co. of the United States smelter at Grundartangi (260,000 t/yr of capacity); and Rio Tinto Alcan of Canada's Reykjavik [ISAL] smelter at Straumsvik (200,000 t/yr of capacity) (Alcoa Inc., 2014, p. 12; Association of Aluminum Producers in Iceland, 2014; Century Aluminum, 2014a; Rio Tinto, 2014, p. 230).

The construction of Century Aluminum's Helguvik smelter project, which was curtailed pending confirmation from power suppliers that they would be able to deliver the required power to the project, as well as environmental concerns, received renewed support from the Government in 2013. The project was planned to start production in 6 to 8 years with an initial capacity of 250,000-t/yr and potential expansion up to 360,000 t/yr (Century Aluminum, 2014b).

Operation of current plants and implementation of expansion projects for Iceland's aluminum industry were subject to some uncertainties associated with power supply contracts with Landsvirkjun, which was Iceland's national power company. In 2012, Iceland extended the energy consumption tax (imposed on heavy industries in 2009) through 2015. Environmental concerns were also growing. The country has the highest greenhouse emissions per capita in the Nordic region (composed of Denmark, Finland, Iceland, Norway, and Sweden) owing to its sizable aluminum and ferrosilicon industries and relatively

small population. The aluminum industry had been under pressure owing to low aluminum prices in world markets in recent years, making the Government eager to identify other options to diversify the use of Iceland's abundant energy resources (Bowers, 2013; Katz, 2013; Alcoa Inc., 2014, p. 23).

Silicon.—Elkem Iceland was established in 1975. The company had 120,000-t/yr ferrosilicon capacity and consumed about 945 gigawatthours (GWh) of energy per year. 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. In 2012, Iceland's Government and China National Blue Star (the owner of Elkem Iceland) signed a letter of intent for the potential implementation of a 10,000-t/yr solar silicon plant and a 50,000-t/yr silicon smelter in Iceland. In 2013, the company produced 125,204 t of ferrosilicon (Elkem Iceland, 2012; 2014a, b).

Globe Specialty Metals' 40,000-t/yr silicon metal project in Helguvik (Globe Specialty Metals, 85%, and Tomahawk, 15%), which was planned to come online in 2013, was put on hold in 2012 owing to the adverse economic situation of the market. Two new silicon facilities were in the process of obtaining the required permits in 2013—a 32,000-t/yr project in Husavik by PCC Group of Germany and a 16,000-t/yr project in Grundartangi by Silicor Materials Inc. of the United States. Both were expected to come online in 2016 (Globe Specialty Metals Inc., 2011; Metal Bulletin, 2012; PCC Group, 2014; Silicor Materials Inc., 2014).

Industrial Minerals

Pumice.—Jardefnaidnadur ehf (JEI) mined pumice in the Mount Hekla region about 100 kilometers from Reykjavik. Data on production in 2013 were not available. JEI's main export markets were Belgium, Denmark, the Netherlands, and the United States. In 2006, about 70,000 t of pumice stone was exported; however, no exports of pumice stone have been reported since 2007 (Jardefnaidnadur ehf, 2013; Statistics Iceland, 2014a).

Mineral Fuels and Other Sources of Energy

Petroleum.—Available sediment evidence indicated that the Dreki area, which is located northeast of Iceland, could be a hydrocarbon-rich region. In 2013, the Government approved two exploration licenses: one was awarded to a joint venture of Faroe Petroleum of the United Kingdom (67.5%), Iceland Petroleum (7.5%), and Petoro Iceland (25%) for exploration in the Jan Mayen microcontinent area; the other was awarded to a joint venture of Ithaca Energy of the United Kingdom (56.25%), Kolvetni of Norway (18.75%), and Petoro Iceland (25%) for exploration in the Dreki area. In May 2013, Kolvetni merged with Eykon, and the new company (Eykon) became the largest oil company in Iceland. It held two exploration and production licenses in the Dreki area in cooperation with Ithaca Energy and China National Offshore Oil Corporation (CNOOC). According to the licensing terms, the duration of the exploration license was 12 years and could be extended to 16 years. A production license for up to 30 years could be granted if economically recoverable resources were confirmed by the exploration results (Mannvit, 2013; Iceland Geosurvey, 2014; Mainwaring, 2014).

Renewable Energy.—Iceland was at the forefront in the use of renewable energy resources, and it has one of the largest potential sources of renewable energy in the world. In 2013, the primary energy use in Iceland totaled 250 quadrillion joules. 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 95.8% 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). In February 2013, Landsvirkjun started to operate two wind turbines close to Burfell in southern Iceland; each turbine has 900 kilowatts of capacity and their combined annual power generation could be up to 5.4 gigawatthours (Landsvirkjun, 2013, 2014; Orkustofnun, 2014a, p. 3–5, 13).

Outlook

Aluminum production is expected to remain steady or decrease if the overall market condition does not improve. Century Aluminum's Helguvik 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 2014. Implementation of new ferrosilicon projects in a few years would help the country diversify the use of its abundant hydroelectric and geothermal power. Petroleum exploration is expected to continue offshore Iceland and the earliest decision on well drilling by Faroe Petroleum is expected to be in 2017. In the long term, the Government will continue to develop its plan for the subsea electricity cable project as the country attempts to generate revenue by exporting energy without affecting domestic energy operations or heavy industries (Bowers, 2013; Alcoa Inc. 2014, p.12 Century Aluminum, 2014a; Mainwaring, 2014).

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TABLE 1
ICELAND: PRODUCTION OF MINERAL COMMODITIES[1]

(Metric tons)

Commodity[2]	2009	2010	2011	2012	2013
Aluminum, metal, primary[3]	817,963	825,803	780,853	802,827	736,429
Cement, hydraulic	138,000	140,000	142,000	-- [e, r]	-- [e]
Ferrosilicon	112,983	114,231	120,076	131,818	125,204

[e]Estimated. [r]Revised. -- Zero.

[1]Table includes data available through September 25, 2014.

[2]In 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.

[3]Ingot and rolling billet production.

TABLE 2
ICELAND: STRUCTURE OF THE MINERAL INDUSTRY IN 2013

(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
Ferrosilicon	Elkem Iceland (Elkem A/S)	Plant at Grundartangi	120
Pumice	Jardefnaidnadur ehf	Mount Hekla	210
Do.	BM Valla Ltd., 100%	do.	32

Do., do. Ditto.