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The Mineral Industry of Iceland

By Joanna Asha Goclawska

Mining did not play a significant role in Iceland's economy. Iceland has an abundance of geothermal and hydropower energy sources but no proven mineral fuel or metallic mineral reserves. High-energy-consuming smelting of aluminum metal, ferrosilicon, and silicon metal were economically advantageous endeavors in Iceland owing to the country's inexpensive and accessible renewable energy. In 2019, Iceland's real gross domestic product (GDP) growth rate was 1.9% compared with 3.8% (revised) in 2018. The nominal GDP was $24.2 billion.[1] The economic growth was driven mainly by an increase in foreign trade. Iceland was the 9th-ranked silicon producer in the world and the 10th-ranked aluminum producer, accounting for an estimated 1.1% and 1.3% of world production, respectively (Naess-Schmidt and others, 2017, p. 7, 13; Bray, 2020; Schnebele, 2020; Statistics Iceland, 2020d).

Minerals in the National Economy

In 2019, approximately 0.9% of Iceland's employed population worked in the metals manufacturing industries, and approximately 0.05% worked in mining and quarrying. The total value of exports of goods compared with that of 2018 increased by 6.5% to $5,229 million. Aluminum and aluminum products accounted for 33.1% of the total value of exported goods, compared with 38.2% in 2018, and included exports of 833,554 metric tons (t) of aluminum. Iceland's main trading partners in exports of goods were, in order of the value of goods exported, the Netherlands, the United Kingdom, and Spain; 70.9% of all exports went to European Union (EU) countries. The total value of imports of goods decreased by 3.1% to $6,165 million owing mainly to a decrease in the value of mineral fuel imports. Iceland's main trading partners in imports of goods were, in order of the value of goods imported, Norway, the United States, and Germany; 52% of all imports came from EU countries (Statistics Iceland, 2019; 2020a, c, e, f).

Production

In 2019, aluminum and ferrosilicon continued to be the leading mineral commodities produced in Iceland. The most significant increase was reported in the production of silicon metal, by 304%. Data on mineral production are in table 1.

Structure of the Mineral Industry

Table 2 is a list of major mineral industry facilities.

Commodity Review

Metals

Aluminum.—In 2019, three aluminum smelters were in operation in Iceland. Alcoa Corp. of the United States owned the Fjaroaal aluminum smelter at Reydarfjordur, which had a production capacity of 344,000 metric tons per year (t/yr); Century Aluminum Co. of the United States owned an aluminum smelter in Grundartangi, which had a production capacity of 317,000 t/yr; and Rio Tinto Alcan Inc. of Canada owned the ISAL aluminum smelter in Straumsvik, which had a production capacity of 212,000 t/yr (Alcoa Corp., 2020; Century Aluminum Co., 2020; Rio Tinto Iceland Ltd., 2020).

In 2019, the production of aluminum decreased by nearly 3.7% to 843,867 t from 875,924 t (revised) in 2018. The decrease was mainly attributed to the production decrease at the ISAL smelter (the result of a safety-related preventive potline outage in the third quarter); approximately 184,000 t of aluminum was produced at the smelter in 2019 compared with approximately 212,000 t in 2018. The Grundartangi smelter produced 315,867 t of aluminum in 2019 compared with 317,386 t in 2018 (table 1; Nordural Grundartangi ehf, 2020, p. 9; Rio Tinto Ltd., 2020a, p. 270; 2020b, p. 21).

Silicon.—PCC BakkiSilicon hf's new silicon metal plant located in Bakki near Husavik received a Final Acceptance Certificate on October 30, 2019, and started regular silicon metal production in November 2019. The first electric arc furnace was started up on April 30, 2018, and the second one was started up on August 31, 2018. First production began on May 11, 2018. Whereas regular production was planned to start at the beginning of 2019, it did not actually start until the end of 2019 so that a few remaining technical issues could be addressed. PCC BakkiSilicon hf was owned by PCC SE of Germany (86.5% of the shares) and a local company, Bakkastakkur slhf (13.5%); it had a production capacity of 32,000 t/yr of silicon metal. The license received from the Environment Agency was valid through November 8, 2033 (Demurtas, 2018a; PCC SE, 2019, p. 112; 2020).

During the year, Silicor Materials Inc. of the United States continued the construction of its 16,000-t/yr-capacity solar silicon production facility in Grundartangi, and Stakksberg ehf of Iceland continued with the improvement of its 23,000-t/yr-capacity silicon metal smelting plant at Helguvik. The smelting plant at Helguvik was constructed by United Silicon hf of Iceland in 2016 and began production in November that year. In August 2017, the Environment Agency of Iceland issued a notice to United Silicon to cease smelting activities owing to excessive pollution from the facility, and all operations at the smelter were halted in September 2017. On January 22, 2018, United Silicon declared bankruptcy. In February 2018, Arion Bank of Iceland, which was the largest owner and creditor of United Silicon, bought the company's

[1]Where necessary, values have been converted from Icelandic krona (ISK) to U.S. dollars (US$) at an annual average exchange rate of ISK122.571=US$1.00 for 2019.

assets and established a new company, Stakksberg. Stakksberg's objective was to conduct the necessary repairs, modifications, and improvements to the plant to meet the requirements of the Environment Agency. The company planned to restart operations at the plant in the fourth quarter of 2020 (Demurtas, 2018b; Silicor Materials, 2020; Stakksberg ehf, 2020).

Industrial Minerals

Pumice.—Jardefnaidnadur ehf (JEI) mined pumice from the Mount Hekla volcano located within the East Volcanic Zone in the south of Iceland. JEI's main export markets were Belgium, Denmark, Germany, the Netherlands, Sweden, and the United States (Jardefnaidnadur ehf, 2020).

Mineral Fuels and Other Sources of Energy

Petroleum.—The Dreki and Gammur areas on Iceland's Continental Shelf were thought to have potential for commercial accumulations of crude petroleum and gas. The Government approved the first two petroleum exploration licenses in 2013. The first license was relinquished in January 2015, and the second, in January 2017. The third and final license was granted in 2014 but was relinquished in January 2018. 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 (Orkustofnun, 2020b, c, d).

Renewable Energy.—Iceland produced 99.99% of its electricity from renewable energy. In 2018 (the latest year for which data were available), Iceland generated its electricity from a mix of hydropower (69.66%), geothermal (30.31%), wind (0.02%), and fuel (0.01%) sources. The country's power production increased by 3.1% to 19,829 gigawatt-hours (GWh) in 2018 from 19,239 GWh in 2017, mainly to support the introduction of new silicon smelting facilities. The country had 57 hydropower plants, of which the largest was the Fljotsdalsvirkjun plant [690 megawatts (MW) of installed electricity-generating capacity]; 8 geothermal powerplants, of which the largest was the Hellisheidi powerplant (303 MW); and 3 wind turbines, of which the largest was the Hafid turbine (1,800 kilowatts). Five of the hydropower plants and one geothermal powerplant—the small-scale (0.6-MW-capacity) Fludavirkjun powerplant—began operating in 2018 (Orkustofnun, 2018; 2020e).

The Master Plan Act was the Parliament's strategy to consider and develop new energy options. It advocated for 2 new hydropower plants (1 in the Westfjords region and 1 in the North Iceland region), and 14 new geothermal plants (6 in northeastern Iceland and 8 in the Reykjanes region). The Master Plan Act was approved by the Government in 1997 and came fully into force in 2013. Phase four of the Master Plan Act (2017–21) started in April 2017 when a new steering committee was formed, although recommendations for categorization of power options proposed by the steering committee during phase three of the Master Plan Act (2013–17) had not been fully processed by the Parliament and had not been submitted for a vote (Ministry for the Environment and Natural Resources, 2020a, b).

On May 31, 2017, the Parliament approved a resolution on energy transition, which aimed to increase energy efficiency and the country's energy security by increasing the share of domestic renewable energy sources in the country's energy supply and reducing imported fossil fuels. Under the resolution, the share of renewable energy used in ground transport would be increased to 10% by 2020 and 40% by 2030 from 6% in 2016, and that used by the fisheries sector would increase to 10% by 2030 from 0.1% in 2016 (Orkustofnun, 2020a).

Outlook

Iceland's GDP is expected to decrease by 8.4% in 2020 owing to the coronavirus disease 2019 (COVID–19) pandemic, which affected cross-border transport and tourism. GDP growth is expected to reach 4.9% in 2021, and the annual average GDP growth rate from 2021 through 2024 is expected to range from 2.5% to 2.9%. Silicon metal production is anticipated to increase once production at the new PCC BakkiSilicon hf plant is ramped up to full capacity in the coming years. Iceland used to be dependent upon imported oil and coal, whereas now nearly all energy is derived from domestic renewable sources and electricity production is nearly carbon free. Geothermal energy is very important to the energy supply in Iceland, and the Government continues to make renewable energy a long-term priority (Statistics Iceland, 2020b).

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TABLE 1
ICELAND: PRODUCTION OF MINERAL COMMODITIES[1]

(Metric tons, gross weight, unless otherwise specified)

Commodity[2]	2015	2016	2017	2018	2019
METALS					
Aluminum, metal, primary	877,850	853,505	882,912 [r]	875,924 [r]	843,867
Ferroalloys, ferrosilicon	121,556	128,020	116,811	116,889	120,255
Silicon, metal	--	--	7,160	7,036	28,396

[r]Revised. -- Zero.

[1]Table includes data available through July 13, 2020. All data are reported unless otherwise noted.

[2]In addition to the commodities listed, pumice, salt, sand and gravel, scoria, and crushed stone may have been produced, but available information was inadequate to make reliable estimates of output.

TABLE 2
ICELAND: STRUCTURE OF THE MINERAL INDUSTRY IN 2019

(Thousand metric tons)

Commodity	Major operating companies and major equity owners	Location of main facility	Annual capacity
Aluminum, primary	Alcoa Corp.	Fjardaal smelter at Reydarfjordur	344
Do.	Nordural Grundartangi ehf (Century Aluminum Co., 100%)	Smelter in Grundartangi	317
Do.	Rio Tinto Iceland Ltd. (Rio Tinto Alcan Ltd., 100%)	ISAL smelter in Straumsvik	212
Ferrosilicon	Elkem Iceland ehf (Elkem AS, 100%)	Akranes	120
Pumice	BM Valla Ltd.	Mount Hekla	32
Do.	Jardefnaidnadur ehf	do.	210
Silicon, metal	PCC BakkiSilicon hf (PCC SE, 86.5%, and Bakkastakkur slhf, 13.5%)	Husavik	32
Do.	Stakksberg ehf (Arion Bank, 100%)[1]	Helguvik smelter in Reykjanesbaer	23

Do., do. Ditto.

[1]Operations suspended since September 2017.