ICELAND

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Iceland is geologically young, and is still being formed by volcanoes and continental drift. The rift zone between the North American and Eurasian tectonic plates passes through the centre of Iceland in a SW/NE direction, causing volcanic and seismic activity, although of less power than where the plate movement is convergent. Minerals from old crystalline geological formations are therefore rare, although in areas farthest from the rift zone some bodies of crystalline rock have been found, for example, gabbro containing ilmenite in the east. Nevertheless, some minerals are commercially mined in Iceland. These are mostly volcanic by origin as might be expected, and interestingly, some minerals of biological origin from still active ecosystems are also mined in Iceland.

Mineral wool is produced from basalt, which is abundant as most of Iceland is made of it. Pumice, expanded rock grains airborne from volcanic eruptions, is found in layers around certain volcanoes and mined for use as mainly lightweight building aggregate. Rhyolite is mined for cement production, which also uses an organic raw material, calcareous shell sand, as a lime source. The shell sand is dredged from the seabed in Faxafloi Bay, where it has formed, and is still being formed, by several species of mollusks shell. Another industrially used mineral of biological origin is diatomite from lake sediments of siliceous algae.

A few minerals or inorganic raw materials from local sources are used industrially in small quantities. These include silica, precipitated from geothermal brines, and uses include special skin care products. Salt from geothermal brines is also used in special low-sodium health salt and fish salt. Sulphur was mined a long time ago from small geothermal deposits. There are a few other minerals of commercial potential found in Iceland, including maërl and perlite; they have, however, not yet found any significant industrial application.

Metallurgy was not practised to any extent in Iceland for about four centuries. The Vikings (the first settlers in 874 AD) brought with them from northern Europe the art, sometimes referred to as the bloomery method, of producing iron and steel for tools and weapons. The raw material was bog iron, which is iron-rich clay from bogs, and charcoal from birch wood, both available locally in Iceland. After the Reformation, about 1560 AD, this art seems to have finally vanished, there has not been any primary steel production in Iceland since then. It was not until the first aluminium smelter, ISAL, started operation in 1969 that metallurgy returned to Iceland.

Energy

Although Iceland may lack abundance of minerals, energy resources are abundant, and are still untapped to a large extent. These are both geothermal, thanks to the volcanic activity, and hydroelectric from the rivers. On a conservative estimate, 50 TWh/y of electric power could be harnessed, whereas only 16% have already been utilised. Nevertheless, Iceland is a world leader in geothermal energy use, with some 52% of its primary energy usage being provided from geothermal sources, and about 30% from fossil fuels and the remainder from hydro power. Iceland has the lowest electric power costs in Western Europe, which is the main attraction for energy-intensive industry. This has made Iceland interesting for the minerals industry as most of these energy-intensive plants import minerals to Iceland for their production.

Iceland's Aluminium Production (t)			
	1998	**1999**	**2000**
ISAL	172,860	163,653	168,028
Nordural	10,500	57,780	57,693
Total	**183,360**	**221,433**	**225,721**

There are several hydro-electric power projects in various stages of completion. The National Power Co. (NPC) will commission a 90 MW plant later this year. The 690 MW Karahnuka plant in the east is in advanced stages of preparation and could come on stream during 2004. The State Electricity Distribution company has plans for both small and large new power plants.

Geothermal electric power production is also expanding. The NPC plans to expand its Krafla geothermal electric power plant by 30-40 MW. The Reykjavik Utility will reach a geothermal electricity production of 90 MW with a 30 MW expansion coming on stream in 2001. Sudurnes Regional Heating Co., which was changed into a limited company (plc) at the end of March 2001, has several drilling projects in various stages of completion. There are more energy projects in preparatory stages, geothermal and hydroelectric, large and small, and some of these could come on stream at relatively short notice as new buyers or market expansion demands.

Aluminium

Primary aluminium is the main area of interest for Iceland's metallurgy industry. Both expansions and new projects are on the agenda. Algroup of Switzerland, the owner of Icelandic Aluminium Co. (ISAL) merged during October 2000 with Alcan of Canada. The ISAL plant was expanded in 1997 to a nominal 162,000 t/y but is currently producing in the vicinity of 170,000 t/y of primary aluminium. ISAL has decided to install a 30,000 t/y melting furnace to produce rolling slabs from material sourced elsewhere.

Nordural, owned by Columbia Ventures of the US, will commission a 30,000 t/y expansion to its existing 60,000 t/y plant in 2001, bringing the capacity up to 90,000 t/y. Nordural has shown interest in expanding the capacity up to 300,000 t/y and is currently in discussions with the power companies. An expansion to 180,000 t/y is likely to be the next step. The Noral project in east Iceland is at an advanced stage of preparation. The government, the NPC and local investors signed a declaration in May 2000 with Norsk Hydro of Norway, concerning a plant of initially 240,000 t/y, to be expanded later to 360,000 t/y. The parties aim to reach a decision early in 2002.

Other Sectors

The Icelandic Alloys plant, now owned 56% by Elkem, has three furnaces in operation with total capacity of 114,000 t/y of 75% FeSi. The production increased during 2000 to 108,400 t (smaller quantities of lower and higher Si-content are also produced) with output from a new third furnace.

Icelandic Magnesium Co., which is 40% owned by Australian Magnesium Investments, intends building a primary magnesium plant in Iceland, and has indicated that it will resume project preparations during 2001. The plan is to utilise electric power as well as geothermal heat for the production. Other metallurgical projects are in initial or study phases.

The diatomite plant on Lake Myvatn was sold in February 2001 by the government and World Minerals to Allied Efa Ltd, a joint venture of Allied Resources Co. of the US and Efa Ltd of Iceland. It is expected that the plant will continue diatomite production, from siliceous sediments from the lake. Allied Efa has plans to produce precipitated silica by a proprietary process they have been developing.

Ferroalloy Production in Iceland (t)			
	1998	**1999**	**2000**
FeSi (as 75%)	63,000	68,754	108,400

Siliceous Minerals Industry in Iceland, Production (t)			
	1998	1999	2000
Diatomite	25,734	28,482	27,614
Mineral wool	7,380	7,850	8,250
Cement	118,000	133,647	142,600
Pumice (export)	140,000	77,285	123,837

The Steinullarverksmidjan mineral wool plant increased its production of high quality basalt wool for both domestic use and export. The company is investing in new equipment, including a packaging system, which will enhance both production and efficiency. The wool is spun from electrically melted basalt sand sourced near by.

Icelandic Cement Ltd also increased its production, despite the fact that it now has competition in the Icelandic market, after Alborg Portland of Denmark established a storage and distribution system in Iceland during 2000. Alborg imported about 10,000 t during late 2000, as compared with Iceland Cement´s production of 142,600 t during 2000. Iceland Cement uses mainly coal as fuel although recycled oil has been increasing and stands now for about 30% of the energy used.

Pumice export increased again after a decline in 1999. It is sensitive to fluctuations in exchange rates, freight costs and conditions in the European light weight building aggregate market.

Scrap and Recycling

Metal scrap has been exported from Iceland for a long time, particularly ferrous scrap, but copper and other metal scrap, and lately aluminium, have also been exported. Some scrap is used for remelting and casting purposes inside the country, in small quantities. A steel scrap melting arch-furnace was operated in the early nineties for a few years but has now been dismantled.

A newly formed Icelandic company, Alur Ltd, has plans to recover arisings of aluminium dross in Iceland. The method is based on oxyburner technology by an AGA co-owned licence and a special geothermal water treatment (patent pending) of the secondary dross and the elimination of nitrogen (AIN) contents. The overall aim is to return the alumina back to smelters. Alur has signed a contract with ISAL and expects to treat some 5,000 t/y. The company, which aims to offer its services to all aluminium producers in Iceland, also plans to treat aluminium alloys available as scrap in Iceland.

Metal Scrap Export from Iceland (t)			
	1998	1999	2000
Ferrous	20,834	21,206	28,726
Aluminium	4,845	4,916	6,136
Copper	341	288	373
Lead	115	111	108