



2011 Minerals Yearbook

SWEDEN

THE MINERAL INDUSTRY OF SWEDEN

By Alberto Alexander Perez

In 2011, Sweden's real gross domestic product (GDP) was \$536 billion, which was 4% more than in 2010. Sweden has reached an advanced state of industrialization; as such, the largest portion of its GDP was from its services sector. Industry accounted for only 27.3% of the country's GDP. The principal products that the Swedish industry produced in 2011 were iron and steel, motor vehicles, precision instruments, processed food, and wood pulp and paper products. Its main export partners, in terms of value, were Germany (which received 10.4% of Sweden's exports), Norway (9.3%), the United Kingdom (7.4%), Denmark (6.5%), Finland (6.4%), the United States (5.5%), the Netherlands (5.2%), France (4.8%), and Belgium (4.7%). Its main import partners, in terms of value, were Germany (which supplied 18.1% of Sweden's imports), Denmark (8%), Norway (7.7%), the Netherlands (5.9%), the United Kingdom (5.8%), Russia (5.6%), Finland (5.3%), China (4.6%), and France (4.5%) (U.S. Central Intelligence Agency, 2012).

The Fennoscandian shield, which hosts a variety of mineral deposits, encompasses Sweden, Finland, Norway, and northwestern Russia (including the Kola Peninsula and Russian Karelia). Sweden's large metallic mineral deposits include those of copper, gold, iron, lead, silver, and zinc, among others. Most notably, Sweden has alum shale-hosted uranium-molybdenum-vanadium deposits and Kiruna-type iron deposits in the north (Eilu, 2011, p. 14).

Minerals in the National Economy

Sweden was a significant mineral producer in the European Union (EU). Metal mining and metal products manufacturing dominated the mineral industry and continued to be important to the country's economy. The country has substantial base-metal, gold, and iron ore deposits, which were being developed and exploited actively. Trade was important to the national economy and enabled Sweden to be one of the leading mineral commodity export countries in the EU [Mbendi Information Services (Pty) Ltd., 2011].

Production

Sweden was the leading producer of iron ore in the EU and the 10th ranked iron ore producer in the world (Jorgenson, 2012). The country produced copper, gold, iron ore, lead, molybdenum, silver, and zinc, and extracted industrial minerals, including limestone and feldspar. In 2011, primary aluminum production, copper mine production, crude steel production, and silver metal production all increased (table 1).

Structure of the Mineral Industry

The Swedish mineral industry was composed mostly of privately owned companies and operated on a free-market basis. The Government was the major equity owner of

Luossavaara-Kiirunavaara AB's (LKAB's) iron ore operation, however, and had significant ownership in the Svenskt Stal AB steel operation. Table 2 is a list of the major mineral industry facilities in 2011.

Mineral Trade

In 2011, significant mineral commodity exports to Sweden from the United States included metallurgical-grade coal (valued at \$120.9 million), nuclear fuel material (\$69.6 million), and coal and other mineral fuels (\$56 million). Significant import commodities from Sweden to the United States included semifinished iron and steel products (valued at \$618.5 million), petroleum products (\$804.8 million), fuel oil (\$411.8 million), unmanufactured steelmaking and ferroalloying materials (\$175.9 million), and iron and steel products, except those of advanced manufacture (\$113.6 million) (U.S. Census Bureau, 2011a, b).

Commodity Review

Metals

Aluminum.—Kubikenborg Aluminium AB (KUBAL), which was a fully owned subsidiary of United Company RUSAL of Russia, was the only major aluminum producer in the country. KUBAL increased output in 2011 by 19.4% compared with that of the previous year. This increased output was in response to an increase in demand for its products. KUBAL reported that, at this level of production, the plant was producing at only 87% of capacity (United Company RUSAL, 2012, p. 13).

Copper.—Boliden AB's (Boliden's) Aitik Mine, which is located in northern Sweden, was Boliden's and Sweden's largest copper mine in terms of volume of production. Although Aitik's copper grade is low, Boliden states that the open pit mine uses a combination of large-scale extraction and high levels of automation to ensure high levels of productivity, which compensates for the low grades yielded by the mine. The Aitik Mine had been under expansion for the past several years, and the expansion was scheduled to be completed by 2014. Once completed, the mine would have an ore production capacity of 36 million metric tons per year (Mt/yr). The mine increased its production in comparison with that of 2010, and in 2011, produced 31,541 metric tons (t) of milled ore at grades of 0.24% copper, 2.15 grams per metric ton (g/t) silver, and 0.41 g/t gold (Boliden AB, 2012, p. 17, 19, 97).

Boliden's Rönnskär smelter was a leading facility, in terms of tonnage produced, for the recycling of copper and precious metals in Sweden. The main products were copper, gold, lead, and zinc clinker. The smelter had the capacity to produce 250,000 metric tons per year (t/yr) of copper (Boliden AB, 2010).

Gold.—Dragon Mining Ltd. of Australia and Elgin Mining Inc. of Canada had gold mines located in the Skelleftea mining district. Dragon Mining's Svartliden Mine is located 700 kilometers (km) north of Stockholm, and Elgin's Bjorkdal Mine is located 750 km north of Stockholm. In February 2012, Gold-Ore Resources Ltd. announced an updated measured and indicated mineral resource estimate for the Bjorkdal Mine's open pit and underground mine of 30,295 kilograms (kg) of gold. The Skelleftea mining district where the Bjorkdal and the Svartliden Mines are located has been the focus of exploration for gold-rich polymetallic deposits since the mid-1920s (Dragon Mining Ltd., 2010; Gold-Ore Resources Ltd., 2012).

Boliden is the other main producer of gold in Sweden. Its polymetallic mines have an estimated capacity of about 2,000 kg/yr of gold. Its major operations were the Aitik Mine, which was principally a copper-producing mine, and the operations at the Boliden and Garpenberg sites (table 2; Boliden AB, 2012, p. 19).

Iron and Steel.—LKAB's Kiruna Mine was the world's largest underground iron ore mine in terms of volume; it has an ore body that is 4 km long and 80 meters thick and reaches to a depth of about 2 km. LKAB announced that it had been granted an environmental permit for a new open pit mine located at Gruvberget. This would be LKAB's first new iron ore mine in 50 years. Production at the new Gruvberget Mine was expected to be 2 Mt/yr. The ore body contains both hematite and magnetite (Luossavaara-Kiirunavaara AB, 2012a, b).

Industrial Minerals

Rare Earths.—LKAB was investigating the tailings ponds at the Kiruna and the Malmberget operations; these ponds were thought to contain large quantities of rare-earth elements (REEs) bound in the phosphate mineral apatite, which is considered an impurity in iron ore. LKAB planned to conduct a study to determine the conditions for the recovery of apatite and REEs from the tailings in the ponds. Test drilling results indicated the occurrence of 15 different REEs in the apatite. Estimates showed that there was enough apatite in the tailings ponds for the production of 400,000 t/yr of apatite concentrates for a period of 14 years. Startup of production was not expected before 2015 (Steel Orbis, 2011).

Mineral Fuels and Other Sources of Energy

Renewable Energy.—In 2011, Sweden had the largest share of renewable energy in the EU. About 40% of Swedish energy consumption was covered by renewable energy sources. The Government had set its target at 49% use of renewable energy by 2020. In comparison, renewable energy was projected to cover only about 20% of the whole EU's energy consumption by 2020 (Nordic Energy Solutions, 2012).

Outlook

Mining, although a small part of the country's GDP, is expected to remain important to Sweden's economy. Iron ore

production is expected to increase, and within 10 years, iron ore production is expected to reach 50 Mt/yr. Sweden has substantial base-metal, gold, and iron ore deposits, which are expected to continue to attract investors in the near future. Foreign companies are likely to continue to explore actively in Sweden for base metals, diamond, and, particularly, gold. The Government is expected to continue to support the production and use of renewable energy in electricity, heating, cooling, and transport.

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TABLE 1
SWEDEN: PRODUCTION OF MINERAL COMMODITIES¹

(Metric tons unless otherwise specified)

Commodity	2007	2008	2009	2010 ^e	2011	
METALS						
Aluminum, metal:						
Primary	98,014	81,546	69,708	93,000 ^r	111,000	
Secondary ^e	32,000	32,000	30,000	30,000	30,000	
Total	130,014	113,546	99,708	123,000 ^r	141,000	
Copper:						
Mine output, Cu content	62,905	57,688	55,400	76,500	83,000	
Metal:						
Smelter:						
Primary	203,107	204,204	125,398 ^r	137,000 ^r	155,000	
Secondary	55,148	67,795	65,000 ^e	42,000 ^r	44,000	
Total	258,255	271,999	190,398 ^r	179,000	199,000	
Refined:						
Primary	213,894	227,774	205,759 ^r	150,497 ^{r,3}	179,316	
Secondary ^e	25,000	25,000	25,000	40,000 ^r	40,000	
Total	238,894	252,774	230,759 ^r	190,500 ^r	219,316	
Gold:						
Mine output, Au content	kilograms	5,159	4,900	5,461 ^r	6,242 ^r	5,935
Metal, primary and secondary ²	do.	12,086 ^r	13,425 ^r	13,282 ^r	12,450 ^r	10,600
Iron and steel, metal:						
Iron ore concentrate and pellets:						
Gross weight	thousand metric tons	24,988 ^r	27,713 ^r	20,389 ^r	27,917 ³	22,968
Fe content (60%)	do.	14,993 ^r	16,628 ^r	12,233 ^r	16,750 ³	15,159 ⁴
Metal:						
Pig iron and sponge iron	do.	3,815	3,583	1,966 ^r	3,447 ^r	3,240
Ferroalloys:						
Ferrochromium		124,403	117,053	31,345	32,000	32,000 ^e
Ferrosilicon ^e		4,000	-- ^r	-- ^r	-- ^r	--
Total		128,403	117,053	31,345	32,000	32,000
Steel, crude	thousand metric tons	5,673	5,196	2,805	4,844 ³	4,866
Semimanufactures ^e	do.	4,600	4,200	4,000	4,000	4,000 ^e
Lead:						
Mine output, Pb content		63,224	65,100 ^e	69,300 ^r	67,700 ³	61,999
Metal, refined:^e						
Primary		69,700	56,800	55,000	56,000	52,400
Secondary		40,000	42,600	42,000	40,000	41,000
Total		139,700 ³	99,400	97,000	96,000	93,400
Molybdenum, oxide, roasted, Mo content ^e		3,000	3,000	2,800	2,800	2,800
Nickel, metal, secondary ^e		50	50	50	50	--
Selenium, elemental, refined ^e		20	20	20	20	20
Silver:						
Mine output, Ag content	kilograms	323,171	293,100	288,600	302,100 ³	238,030
Metal, primary	do.	346,574 ^r	429,637 ^r	481,223 ^r	385,684 ^r	415,066
Zinc, mine output, Zn content		214,576	188,048	192,538	198,687 ³	190,251
INDUSTRIAL MINERALS						
Cement, hydraulic ^e	thousand metric tons	2,950 ^{r,3}	2,900 ^r	2,950 ^r	2,900 ^r	2,900
Diamond, synthetic ^e	thousand carats	20,000	20,000	20,000	20,000	20,000
Feldspar, salable, crude and ground ^e		42,000	42,000	44,000	44,000	44,000
Fertilizer, manufactured:^e						
Nitrogenous	thousand metric tons	400	400	400	400	NA
Phosphatic	do.	10	10	10	10	NA
Mixed	do.	300	300	300	300	NA
Graphite ^e		800	--	--	--	--
Lime ^e	thousand metric tons	600	600	600	700	960 ⁵
Quartz and quartzite ^e	do.	700	700	700	700	NA

See footnotes at end of table.

TABLE 1—Continued
SWEDEN: PRODUCTION OF MINERAL COMMODITIES¹

(Metric tons unless otherwise specified)

Commodity	2007	2008	2009	2010 ^c	2011	
INDUSTRIAL MINERALS—Continued						
Stone: ^c						
Dimension:						
Mostly unfinished	thousand metric tons	170	170	170	180	NA
Granite	do.	132	132	132	124 ³	151 ³
Limestone	do.	32	32	32	43 ³	43
Slate	do.	16	16	16	16	NA
Other	do.	6	6	6	6	NA
Crushed:						
Dolomite	do.	450	450	450	450	NA
Granite	do.	3,500	3,500	3,500	3,500	NA
Limestone:						
Chalk	do.	80	80	80	80	NA
For cement manufacture	do.	4,000	4,000	4,000	4,000	NA
For lime manufacture	do.	950	950	950	950	NA
For other construction and industrial uses	do.	1,800	1,800	1,800	1,800	NA
For agricultural uses	do.	650	650	650	650	NA
For other uses	do.	1,500	1,500	1,500	1,500	NA
Total	do.	8,980	8,980	8,980	8,980	NA
Sandstone	do.	20	20	20	20	NA
Undifferentiated	do.	30,000	30,000	30,000	30,000	NA
Other	do.	350	350	350	350	NA
Sulfur: ^c						
Metallurgy	do.	240	240	240	240	240
Petroleum	do.	60	60	60	60	60
Total	do.	300	300	300	300	300
Talc, soapstone ^c		14,000	14,000	15,000	12,000	12,000
MINERAL FUELS AND RELATED MATERIALS						
Coke, metallurgical	thousand metric tons	1,194 ^{r,3}	1,177 ^{r,3}	987 ^{r,3}	1,197 ^{r,3}	1,190 ^e
Gas, manufactured: ^c						
Coke oven gas	million cubic meters	500	500	500	500	NA
Blast furnace gas	do.	3,500	3,500	3,500	3,500	NA
Peat:						
Agricultural use	thousand cubic meters	1,302 ^{r,3}	1,434 ^{r,3}	1,198 ^{r,3}	1,250 ^{r,3}	1,611 ³
Fuel	do.	1,624 ^{r,3}	2,135 ^{r,3}	2,143 ^{r,3}	2,213 ^{r,3}	2,139 ³
Petroleum, refinery products: ^c						
Liquefied petroleum gas	thousand 42-gallon barrels	3,062 ^{r,3}	3,886 ^{r,3}	3,248 ^{r,3}	3,200	3,200
Naphtha	do.	NA ^r	NA ^r	NA ^r	NA ^r	NA
Gasoline, motor	do.	31,095 ^{r,3}	38,444 ^{r,3}	38,070 ^{r,3}	38,000	38,000
Jet fuel	do.	1,546 ^{r,3}	1,933 ^{r,3}	1,679 ^{r,3}	1,600	1,600
Distillate fuel oil	do.	49,378 ^{r,3}	59,450 ^{r,3}	57,232 ^{r,3}	57,000	57,000
Residual fuel oil	do.	27,110 ^{r,3}	29,826 ^{r,3}	28,543 ^{r,3}	28,500	28,500
Other	do.	23,226 ^{r,3}	-- ^{r,3}	22,119 ^{r,3}	22,000	22,000
Refinery fuel and losses	do.	NA ^r	NA ^r	NA ^r	NA ^r	NA
Total	do.	135,400	133,500	150,800	150,300	150,300

^cEstimated; estimated data are rounded to no more than three significant digits; may not add to totals shown. ^rRevised. do. Ditto. NA Not available. -- Zero.

¹Table includes data available through December 10, 2012.

²Series was updated to include metal production from ores and electronics scrap recycling.

³Reported figure.

⁴Iron content reported to be 66%.

⁵Quicklime; estimate based on volume sold.

TABLE 2
SWEDEN: STRUCTURE OF THE MINERAL INDUSTRY IN 2011

(Thousand metric tons unless otherwise specified)

Commodity		Major operating companies and major equity owners	Location of main facilities	Annual capacity
Aluminum		Kubikensborg Aluminium AB (KUBAL) (United Company RUSAL, 100%)	Smelter at Sundsvall	125
Cement		Cementa AB (HeidelbergCement AG, 100%)	Plants at Degerhamn, Skovde, and Slite	3,400
Copper:				
Ore, copper content		Boliden AB	Mines at Aitik, Garpenberg, Kankberg, Kristineberg, Langdal, Mourliden, Mourliden Ostra, Petiknas, and Renstrom	68
Metal		do.	Smelter and refinery at Ronnskar	240
Feldspar		Berglins Malm & Mineral AB (Omya GmbH)	Mines at Beckegruvan, Hojderna, and Limbergsbo	50
Do.		Silbelco Nordic AS	Mines at Forshammar	30
Do.		Larsbo Kalk AB (Omya GmbH)	Manufactured from marble at Stora	20
Ferroalloys		Vargon Alloys AB (Yildirim Group 100%)	Plant at Vargon	255
Gold:				
Ore, gold content	kilograms	Dragon Mining Ltd.	Svartliden Mine, Skelleftea District	300
Do.	do.	Elgin Mining Inc.	Bjorkdal Mine, Skelleftea District	1,200
Do.	do.	Boliden AB	Mines at Aitik, Akerberg, Kankberg, Kristineberg, Langdal, Petiknas, and Renstrom	2,000
Metal	do.	do.	Smelter and refinery at Ronnskar	15,000
Graphite		Woxna Graphite AB (Tricorona Mineral AB, 100%)	Mine and plant at Kringeltjärn, Woxna (closed 2008)	20
Iron and steel		Svenskt Stal AB (Government, 48%)	Steelworks at Borlange, Lulea, and Oxelosund	3,900
Iron ore		Luossavaara-Kiirunavaara AB (LKAB) (Government, 98%)	Mines at Kiruna and Malmberget	32,500
Kyanite		Svenska Kyanite AB (Svenska Mineral AB, 100%)	Quarry at Halskoberg	10
Lead:				
Ore, lead content		Boliden AB	Mines at Garpenberg and Renstrom	100
Do.		Lundin Mining Corp.	Zinkgruvan Mine at Ammeberg	20
Metal		Boliden AB	Smelter and refinery at Ronnskar	30
Do.		do.	Smelter at Bergsoe	50
Lime		Svenska Minerals AB	Plants at Rattvik and Boda	250
Limestone		Kalproduction Storugns AB (Rettig Group, 100%)	Mines at Gotland Island	3,000
Do.		NordKalk AB	Storugns	3,200
Marble	cubic meters	Borghamnsten AB	Quarry at Askersund	15,000
Petroleum, refined	42-gallon barrels per day	Preem AB (Corral Petroleum Holdings AB (100%))	Refinery at Lysekil	210,000
Do.		Shell Raffinaderi AB	do.	82,000
Do.		AB Nynas Petroleum	Refineries at Gothenburg and Nynashamn	50,000
Silver, metal	kilograms	Boliden AB	Smelter and refinery at Ronnskar	408,000
Do.	do.	Lunden Mining Corp.	Zinkgruvan Mine at Ammeberg	25,000
Zinc, ore, zinc content		Boliden AB	Mines at Garpenberg, Laisvall, Langdal, and Renstrom	112
Do.		Lunden Mining Corp.	Zinkgruvan Mine at Ammeberg	78

Do., do. Ditto.