



# 2011 Minerals Yearbook

---

REPUBLIC OF KOREA

---

# THE MINERAL INDUSTRY OF THE REPUBLIC OF KOREA

By Lin Shi

The Republic of Korea is located in northeastern Asia between China and Japan and shares a border with North Korea. The country had limited mineral and energy resources for consumer goods and for its manufacturing sector and depended on imports of the raw materials for the production of processed mineral products. In 2011, the Republic of Korea's real gross domestic product (GDP) growth rate was 3.6%, and the inflation rate was 4%. The growth rate for mining and quarrying was -4.6%; the manufacture of nonmetallic mineral products, 1.9%; the processing of petroleum, coal, and chemicals combined, 4.3%; and the production of metals, 9.6%. The number of persons employed in the mineral industry decreased to 5,900 from 19,000 in 2010, and nominal wages in the mining and quarrying sector increased to 10.3% from 7.3% in 2010 (Bank of Korea, 2012, p. 20–29).

## Minerals in the National Economy

The Republic of Korea's mining and quarrying sector was not a significant contributor to the country's economic development, accounting for only a 0.2% share of the GDP in 2011. Much of the country's mineral resource requirements were met through imports (Bank of Korea, 2012, p. 20–29).

## Government Policies and Programs

In late 2011, the legislatures of the United States and the Republic of Korea approved a free trade agreement between the two countries and, on March 15, 2012, this free trade agreement entered into force. The purpose of the agreement is to boost the value of annual exports and increase export-related jobs in both countries (U.S. Department of State, 2012).

## Production

In 2011, increases in mineral commodity production included that of mined lead (the output of which increased by 121% compared with that of 2010) and lead metal (30%); mined zinc (109%) and zinc metal (16%); ferrosilicomanganese (62%); pig iron (35%); mined silver (30%) and silver metal (27%); and steel (16%). Among the industrial minerals, the output of talc increased by 172%; diatomaceous earth, 134%; and salt, 67%. Decreases in production included that of cadmium metal, by 28%; sand, 26%; pyrophyllite, 24%; and feldspar, 23% (table 1).

## Structure of the Mineral Industry

The Government—through the Ministry of Commerce, Industry and Energy—owned and supervised the country's coal mining, natural gas, petrochemicals, and petroleum refining companies. The rest of the mining, quarrying, and mineral processing companies were privately owned and operated (table 2).

## Mineral Trade

There were significant flows of manufactured goods, services, and technology between the Republic of Korea and the United States. The Republic of Korea exported goods and services valued at \$56.7 billion to the United States in 2011, which was an increase of 16% from the \$48.9 billion in goods and services exported to the United States in 2010. These exports included \$8.6 billion in passenger cars, \$3.2 billion each in semiconductors and petroleum products (other than fuel oil), \$2.2 billion in computer accessories, \$1.2 billion in semifinished iron and steel products, and \$570 million in iron and steel manufactured products. The Republic of Korea imported from the United States goods and services valued at \$43.4 billion, which was an increase of 20% from the \$38.8 billion imported from the United States in 2010. These imports included \$3.5 billion in semiconductors, \$1.6 billion in petroleum products (other than fuel oil), \$1.4 billion in steelmaking materials, \$750 million in precious metals, \$749 million in nonferrous metals, \$424 million in alumina and aluminum, and \$264 million in copper (U.S. Census Bureau, 2012a, b).

## Commodity Review

### Metals

**Copper.**—The Republic of Korea did not produce copper ore and copper concentrate in 2011. The country imported 1.73 million metric tons (Mt) of copper ore and concentrate valued at about \$5.6 billion in 2011, and it exported 38,883 metric tons (t) of copper concentrate. Stockpiled ore at the beginning of the year was 11,267 t and at the end of the year was 16,067 t. Domestic copper consumption in 2011 was 1.69 Mt. The country relied on imports to meet the raw material requirements for its copper smelters, which were located in Changhang and Onsan (Korea Institute of Geoscience and Mineral Resources, 2012, p. 7).

In 2011, LS-Nikko Copper Inc. was constructing the GRM recycling factory in the Maepo Agricultural and Industrial Complex at Danyang, Choongchungbuk-do. The Danyang factory would reportedly be able to recycle 17,600 t of copper (LS-Nikko Copper Inc., 2011).

**Gold.**—The country produced 49,550 kilograms (kg) of gold in 2011, of which 1,283 kg was produced from domestic ore. Imports of gold amounted to 32,433 kg and were valued at \$1.61 billion; 63,044 kg of gold valued \$3.07 billion was exported. There was 1,774 kg of gold in the national stockpile. A total of 32,892 kg of gold was consumed domestically to manufacture coins, dental products, electronic communication parts, jewelry, and semiconductor materials. Woulfe Mining Corp. of Canada was drilling to test the gold and silver mineralization on the Muguk gold-silver property, which was owned by Hanguem Co. Ltd., in preparation for a preliminary

economic assessment (Korea Institute of Geoscience and Mineral Resources, 2012, p. 7; Woulfe Mining Corp., 2012).

**Iron Ore and Iron and Steel.**—In 2011, domestic production of mined iron ore was about 542,000 t, and the country relied heavily on imports to meet its iron ore requirements. Imports of iron ore totaled 64.9 Mt and were valued at about \$11 billion. Domestic iron ore consumption, which was consumed mainly by the country's steel manufacturing sector, was about 67 Mt. The country exported about 119,000 t of iron ore valued at about \$6.5 million, and there was about 3 Mt in stockpile (Korea Institute of Geoscience and Mineral Resources, 2012, p. 7).

**Manganese.**—The Republic of Korea did not produce manganese in 2011. The country imported about 1.4 Mt of manganese ore, which was valued at about \$369 million and barely met the domestic demand. The country had 4,000 t of manganese ore in stock and exported 44 t valued at \$11,000 (Korea Institute of Geoscience and Mineral Resources, 2012, p. 7).

**Tin.**—Tin is a strategic metal in the Republic of Korea. The country imports 16,000 t of tin every year. Daewoo International was exploring a tin mine in Cameroon to acquire needed tin resources; the company held a 100% stake in this mine (Pohang Iron and Steel Co. Ltd., 2012).

**Tungsten.**—When Woulfe bought the Sangdong tungsten-molybdenum mine in 2009, the average price for tungsten was \$18,000 per metric ton. Tungsten prices reached \$44,000 per metric ton in 2011 as demand increased. The Sangdong tungsten-molybdenum mine is located on the east coast 187 kilometers from Seoul; it was expected to become the world's leading tungsten production site (including the mine and plant) and to account for 7% to 10% of global output when it commences production in 2013. Woulfe also owned 100% of the Chongyang tungsten mine and had three mining licenses for the mining area, which is located south of Seoul. Demand for tungsten, which was used to make wear-resistant abrasives and cutting machinery for the metalworking industry, was increasing rapidly (Hill, 2012; Woulfe Mining Corp., 2012).

### **Industrial Minerals**

**Cement.**—According to the Korea Cement Association (KCA), the Republic of Korea exported 4.49 Mt of cement in 2011, which was an increase of 62% from the 2.77 Mt exported in the previous year. The KCA indicated that the low domestic demand for cement and sluggish construction markets had forced the cement companies into overseas markets to diversify their business portfolios (Global Cement, 2012).

**Rare Earths.**—In June, the Republic of Korea announced the discovery of a major deposit of rare-earth elements, which was estimated to be adequate to supply the country's domestic demand for rare earths for about 50 years. The Korea Institute of Geoscience and Mineral Resources analyzed the soil samples collected from 11 locations around the country and reported that there was 23 Mt of rare-earth minerals in deposits located in Chungju, North Chungcheong Province, and Hongcheon, Gangwon Province. The rare-earth minerals are hosted in iron ores. As of 2011, the Republic of Korea relied 100% on imports for rare-earth elements (KBS World, 2011).

### **Mineral Fuels and Related Materials**

**Natural Gas and Petroleum.**—OAO Gazprom of Russia was under a contract to supply at least 1.5 Mt of liquefied natural gas to the Republic of Korea each year until 2025, and the volume was expected to increase greatly to meet the country's future energy needs. Gazprom sent gas to Japan directly through the Sakhalin-2 pipeline, but it had to send gas to the Republic of Korea by ship. The Government of Russia was in discussions with the Governments of North Korea and the Republic of Korea concerning a possible railway, gas pipeline, and power line from Russia to the Republic of Korea by way of North Korea (L'Agence France-Presse, 2011; Blank, 2012).

**Uranium.**—Stonehenge Metals Ltd. of Australia is engaged in the exploration of uranium in the Republic of Korea and was focusing on its 100%-owned Daejeon project in the areas of Chubu, Kolnami, and Yokwang, where the uranium deposits are located. The company had also identified significant vanadium mineralization at the site. Wolfe owned the Ogshon uranium project; the project is located within the Okcheon metamorphic belt, which extends through the middle of the country. Woulfe had been granted five registered mining rights (RMRs) and four mining applications (MAs) in the Daejeon-Geumsan area. Korea Resources Corp. conducted the U<sub>3</sub>O<sub>8</sub> resource drilling program for Woulfe in Daejeon 29, Daejeon 39, and Daejeon 48. Woulfe had also been granted one RMR and two MAs in the Miwon area, and the company's sampling and testing programs were in process (Australia's Paydirt, 2012, p. 71; Woulfe Mining Corp., 2012).

### **Outlook**

The Republic of Korea's GDP was mainly dependent on exports. The Bank of Korea projected that the country's economy would grow by approximately 3.8% in 2012. The country's 2012 export volume is expected to decrease slightly based on forecasts of global economic conditions. Domestic demand, however, is projected to remain relatively steady as real purchasing power increases owing to improved working conditions and stable oil prices (Bank of Korea, 2012, p. 14–17).

### **References Cited**

- Australia's Paydirt, 2012, Stonehenge looks for Korean domestic fit: West Perth, Western Australia, Australia, Australia's Paydirt, v. 1, issue 193, p. 71.
- Bank of Korea, 2012, Annual report: Seoul, Republic of Korea, Bank of Korea, June 29, 133 p.
- Blank, Stephen, 2012, Russia's Lorea projects gather dust: Asia Times Online, October 26. (Accessed November 30, 2012, at [http://www.atimes.com/atimes/Central\\_Asia.html](http://www.atimes.com/atimes/Central_Asia.html).)
- Global Cement, 2012, 2011 a record year for South Korean cement exports: Global Cement, January 18. (Accessed November 29, 2012, at <http://www.globalcement.com/news/item/709-2011-a-record-year-for-south-korean-cement-exports>.)
- Hill, Matthew, 2012, Korean tungsten project gets Berkshire Hathaway investment: Mining Weekly, February 29. (Accessed November 29, 2012, at <http://www.miningweekly.com/article/korean-tungsten-project-gets-berkshire-hathaway-investment-2012-02-29>.)
- KBS World, 2011, Rare earth mineral deposits found in S. Korea: Korea Communications Commission, June 29. (Accessed June 30, 2011, at [http://world.kbs.co.kr/english/news/news\\_Ec\\_detail.htm?No=82621&id=Ec](http://world.kbs.co.kr/english/news/news_Ec_detail.htm?No=82621&id=Ec).)
- Korea Institute of Geoscience and Mineral Resources, 2012, 2011 mineral demand and supply information: Daejeon, Republic of Korea, Korea Institute of Geoscience and Mineral Resources, 310 p.

L'Agence France-Presse, 2011, Russia sets '17 target for S. Korean pipeline gas: L'Agence France-Presse, November 3. (Accessed May 17, 2013, at <http://my.news.yahoo.com/russia-sets-2017-target-korean-pipeline-gas-201942766.html>.)

LS-Nikko Copper Inc., 2011, LS-Nikko Copper finished construction of a recycling factory: LS-Nikko Copper Inc., June 13. (Accessed October 28, 2011, at [http://www.lsnikko.com/english/cyber/news\\_view.aspx?idx=100007&page=2&Category=S](http://www.lsnikko.com/english/cyber/news_view.aspx?idx=100007&page=2&Category=S).)

Pohang Iron and Steel Co. Ltd., 2012, Daewoo International builds on the success of its inroads into Africa; vows to expand: Pohang Iron and Steel Co. Ltd. press release, February 9. (Accessed February 14, 2012, at <http://www.posco.com/homepage/docs/eng2/jsp/prcenter/news/s91c1010035p.jsp?idx=1983>.)

U.S. Census Bureau, 2012a, U.S. exports from S. Korea by 5-digit end-use code 2002–2011: U.S. Census Bureau. (Accessed November 27, 2012, at <http://www.census.gov/foreign-trade/statistics/product/enduse/exports/c5800.html>.)

U.S. Census Bureau, 2012b, U.S. imports from S. Korea by 5-digit end-use code 2002–2011: U.S. Census Bureau. (Accessed November 27, 2012, at <http://www.census.gov/foreign-trade/statistics/product/enduse/imports/c5800.html>.)

U.S. Department of State, 2012, South Korea: U.S. Department of State background note, April 12. (Accessed November 27, 2012, at <http://www.state.gov/r/pa/ei/bgn/2800.htm>.)

Woulfe Mining Corp., 2012, On the move in South Korea: Woulfe Mining Corp., November 29. (Accessed November 29, 2012, at <http://www.woulfemining.com/s/Home.asp>.)

TABLE 1  
REPUBLIC OF KOREA: PRODUCTION OF MINERAL COMMODITIES<sup>1</sup>

(Metric tons unless otherwise specified)

Commodity	2007	2008	2009	2010	2011
<b>METALS</b>					
Bismuth, metal	267	210	300	498	480
Cadmium, smelter	2,846	3,090	2,500	4,166	3,005
Copper:					
Mine output, Cu content	6	4	14	9	--
Metal:					
Smelter, primary and secondary	515,000	544,000	499,200	NA <sup>r</sup>	NA
Refined, primary and secondary	581,467	537,925	531,701	564,600	595,447
Gold:					
Mine output, Au content kilograms	162	175	274	235	209
Metal, refined do.	47,078	37,989	51,186	54,540	49,550
Iron and steel:					
Iron ore and concentrate:					
Gross weight thousand metric tons	291	366	455	513	542
Fe content do.	163	205	274 <sup>r</sup>	308	320
Metal:					
Pig iron do.	29,437	31,043	27,475	31,228	42,213
Ferroalloys:					
Ferromanganese	209,321	251,125	--	286,259 <sup>r</sup>	355,047
Ferrosilicomanganese	105,607	76,184	--	120,779 <sup>r</sup>	195,650
Total	314,928	327,309	--	407,038 <sup>r</sup>	550,697
Steel, crude thousand metric tons	51,517	53,493	48,572	58,914 <sup>r</sup>	68,519
Lead:					
Mine output, Pb content	12	449	2,064	1,168	2,577
Metal, smelter	195,022	244,137	216,918	197,900	256,851
Nickel:					
Ferronickel	--	2,506	21,609	20,000 <sup>e</sup>	20,000 <sup>e</sup>
Metal	28,675	28,653	NA	NA	NA
Silver:					
Mine output, Ag content kilograms	1,400	--	--	2,025 <sup>r</sup>	2,649
Metal do.	1,393,935	1,461,886	1,740,078	1,735,535 <sup>r</sup>	2,197,409
Zinc:					
Mine output, Zn content	4,067	3,672	3,672	710	1,486
Metal, primary	670,000	738,000	751,179	717,100	828,735

See footnotes at end of table.

TABLE 1—Continued  
REPUBLIC OF KOREA: PRODUCTION OF MINERAL COMMODITIES<sup>1</sup>

(Metric tons unless otherwise specified)

Commodity	2007	2008	2009	2010	2011	
<b>INDUSTRIAL MINERALS</b>						
Cement, hydraulic	thousand metric tons	52,182	51,653	50,127	47,420 <sup>r</sup>	48,300
Clays, kaolin	do.	688	955	659	764	799
Diatomaceous earth		2,360	2,540	2,440	2,200	5,150
Feldspar		398,513	344,257	622,700	496,511	384,221
Graphite, all types		52	73	48	34	--
Lime, slaked lime <sup>e</sup>		3,900,000	4,000,000	NA	NA	NA
Mica, all grades		42,385	49,474	27,078	36,486	NA
Salt		249,515	384,304	382,270	222,509	372,230
Soda ash, manufactured <sup>e</sup>		-- <sup>r</sup>	-- <sup>r</sup>	-- <sup>r</sup>	-- <sup>r</sup>	--
Stone, sand and gravel:						
Limestone	thousand metric tons	82,655	83,469	77,923	79,625	82,368
Quartzite	do.	3,511	3,325	3,536	3,603	3,603
Sand, including glass sand	do.	22,227	1,757	455	535	394
Sulfur, byproduct: <sup>e</sup>						
Metallurgy	do.	670	660	600	480 <sup>r</sup>	480
Petroleum	do.	1,000	900	900	720 <sup>r</sup>	720
Total	do.	1,670	1,560	1,500	1,200 <sup>r</sup>	1,200
Talc and related materials:						
Pyrophyllite		798,054	892,625	617,411	673,936	510,708
Talc		9,557	6,438	5,996	5,729	15,608
Zeolites		157,408	217,691	235,226	242,190	231,420
<b>MINERAL FUELS AND RELATED MATERIALS</b>						
Carbon black <sup>e</sup>		497,191 <sup>2</sup>	484,000	500,000	500,000	500,000
Coal, anthracite	thousand metric tons	2,886	2,773	2,519	2,500 <sup>e</sup>	2,500 <sup>e</sup>
Fuel briquets, anthracite briquets <sup>e</sup>	do.	2,400	2,320	2,000	2,000	2,000
Petroleum, refinery products <sup>3</sup>	thousand 42-gallon barrels	770,523	747,827	750,000	750,000 <sup>e</sup>	750,000 <sup>e</sup>

<sup>e</sup>Estimated; estimated data are rounded to no more than three significant digits; may not add to totals shown. <sup>r</sup>Revised. do. Ditto. NA Not available.

-- Zero.

<sup>1</sup>Table includes data available through October 24, 2012.

<sup>2</sup>Reported figure.

<sup>3</sup>Includes bunker oil C-type, diesel oil, gasoline, kerosene, liquefied petroleum gas, and naphtha.

Sources: Ministry of Commerce, Industry and Energy, Korea Institute of Geoscience and Mineral Resources, 2011 supply and demand balance by mineral, p. 9; U.S. Geological Survey Minerals Questionnaires 2007–11. World Bureau of Metal Statistics, December 2011. The Bank of Korea Monthly Statistical Bulletin, table 41, Exports by principal commodity, and table 42, Imports by principal commodity, May 2011, p. 132–135.

TABLE 2  
REPUBLIC OF KOREA: 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
Bismuth, metal	metric tons	Korea Zinc Co. Ltd.	Onsan refinery	500
Cadmium	do.	do.	do.	2,100
Do.	do.	Young Poong Corp.	Sukpo refinery	2,100
Cement		Ssangyong Cement Industrial Co. Ltd.	Plants at Tonghae, Kwang Yang, Munhyung, Pukpyong, and Yeongwol	15,040
Do.		Sung Shin Cement Manufacturing Co. Ltd.	Tanyang plant	13,700
Do.		Tong Yang Major Corp.	Plants at Pukpyong and Samchok	11,580
Do.		Lafarge Halla Cement Corp.	Plants at Kwang Yang and Okkye	9,500
Do.		Hyundai Cement Co. Ltd.	Plants at Tanyang and Yongwol	8,600
Do.		Hanil Cement Manufacturing Co.	Plants at Chungbuk and Tanyang	7,200
Do.		Asia Cement Manufacturing Co. Ltd.	Plants at Daegu and Jaecheon	4,600
Coal		Korea Coal Corp.	Mines at Changsung, Dogae, and Hwasoon	2,000
Copper, metal, primary		Korea Zinc Co. Ltd.	Onsan	20
Do.		LS-Nikko Copper Inc.	Changhang	60
Do.		do.	Onsan	510
Gas, natural		Korea National Oil Corp.	Ulleung Basin	NA
Gold:				
In concentrate	kilograms	Hangum Co. Ltd.	Muguk Mine, Haenam, Jeonnam (South Cholla) Province	1,600
Refined	do.	Korea Zinc Co. Ltd.	Onsan	50,000
Do.	do.	LS-Nikko Copper Inc.	do.	60,000
Graphite		Kaerion Graphite Ltd.	Kangwon	NA
Do.		Wolmyong Mining Co.	do.	NA
Indium, metal	kilograms	Korea Zinc Co. Ltd.	do.	55,000
Iron ore		NA	Mines at Sinyemi, Gangwon Province	300
Lead, metal, primary		Korea Zinc Co. Ltd.	Kangwon	200
Magnesium		Pohang Iron and Steel Co. Ltd.	Magnesium refinery plant, Gangneung City, Gangwon Province	10
Do.		do.	Magnesium metal sheet plant, Suncheon City, Jeonnam (South Jeolla) Province	3
Molybdenum	metric tons	Korea Resources Corp.	Mine at Uljin; Smelter at Yeosu, Jeonnam (South Jeolla) Province	6,000
Do.	do.	NMC Resource Corp.	Moland Mine, at Daejang-ri, Geumseongmyeon, Jecheon-si, Chungcheongbuk-do District	2,000
Nickel:				
Metal		Korea Nickel Corp.	Onsan nickel refinery	48
Ferronickel		Pohang Iron and Steel Co. Ltd.	Gwangyang ferronickel plant	30
Petroleum, refinery products	thousand 42-gallon barrels per day	SK Corp.	Ulsan	817
Do.	do.	LG-Caltex Corp.	Yocheon (Yosu)	650
Do.	do.	Hyundai Oil Refinery Co.	Daesan and Incheon	589
Do.	do.	S-Oil Corp.	Onsan	520
Pyrophyllite		NA	Wan-Do, Sungsan, Hwansan, Okmesan, Dae-Do, and Chin-Do Mines in Haenam	446
Do.		NA	Nilyang, Yangsan, Kimhae, Pusan, and Kyong-Nam Mines in Dong-Nae	446
Silver:				
In concentrate	kilograms	Hangum Co. Ltd.	Haenam, Jeonnam (South Cholla) Province	3,700
Refined	metric tons	Korea Zinc Co. Ltd.	Onsan	1,000
Do.	do.	LS-Nikko Copper Inc.	do.	370

See footnotes at end of table.

TABLE 2—Continued  
 REPUBLIC OF KOREA: 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
Steel, crude	Pohang Iron and Steel Co. Ltd.	Kwangyang (Gwangyang) Works	15,000
Do.	do.	Pohang Works	13,000
Do.	Hyundai Steel Co. Ltd.	Inchon Plant	4,800
Do.	do.	Pohang Plant	3,200
Do.	Dongkuk Steel Mill Co. Ltd.	Inchon Works	1,450
Do.	do.	Pohang Works	3,600
Do.	Korea Iron and Steel Co. Ltd.	Masan and Changwon Works	1,200
Talc	IL Shin Industrial Co. Ltd.	Choong Ju, Chungbuk Province	160
Do.	Korea Zinc Co. Ltd.	Onsan	430
Do.	Young Poong Corp.	Sukpo	280
Zinc	Korea Zinc Co. Ltd.	Onsan refinery	445
Do.	Young Poong Corp.	Sukpo refinery	303

Do., do., Ditto NA Not available.