

THE REPUBLIC OF KOREA

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In 2001, the economy of the Republic of Korea performed better than many of the tigers in the region. The global economic downturn hit the country's exports hard; since the financial crisis of 1997, however, Korea has developed a more diversified industrial base. Such sectors as shipbuilding, automobile, and steel have shown favorable growth, especially in the fourth quarter of 2001. In 2001, the largest Korean shipbuilders (Hyundai Heavy Industries, Daewoo Shipbuilding and Marine Engineering, and Samsung Heavy Industries) received 23 liquefied natural gas (LNG) carrier orders, which accounted for 70% of the global LNG carrier construction market (Far Eastern Economic Review, 2002). The LNG carrier construction contracts also benefitted other sectors of the country. Domestic demand for consumer goods maintained a growth rate of 4.2%, and the construction sector expanded by 5.8% after 3 years of decline. As a result, the gross domestic product (GDP) registered a 3% growth rate in 2001 against that of 2000. Mineral production accounted for less than 1% of the GDP (Bank of Korea, 2002).

The Government continued to restructure its financial sector throughout 2001. At yearend, the Government continued negotiations with domestic and foreign buyers regarding the sale of Seoul Bank since 1998. In 2001, the Government injected 27 trillion won (\$20.4 billion) of public funds into financial institutions for repayment of deposit, recapitalization, compensation for losses, and the purchase of nonperforming loans. Since 1998, about 24% of existing domestic financial institutions have been phased out through restructuring. Several healthy banks merged or established financial holding companies. During this period, the Government enacted and revised financial legislation to facilitate corporate restructuring (the Corporate Restructuring Promotion Act), strengthened the protection of stock investors (the revised Securities and Exchange Act), and introduced the system of outside directors and audit committee for large-scale mutual savings and financial companies (the Mutual Savings and Financial Company Act and the Specialized Credit Financial Business Act). Foreign bankers believed that the Corporate Restructuring Promotion Act stripped them of their independent credit decisions because if 75% of the creditor banks in the troubled company agreed in a creditor meeting to extend new financing to a distressed company, then all the financial institutions that had exposure to the troubled borrower would be bound by the resolution. Healthy banks have been reluctant to participate in debt restructuring of troubled companies (Asian Wall Street Journal, 2001a).

Corporate structure reform proceeded more slowly than financial sector reform. The Corporate Restructuring Promotion Act became effective in 2001 and introduced various procedures for handling of corporations' insolvent outstanding credits to financial institutions. About one-half of the top 30 chaebols, or conglomerates, which included Hanbo, Daewoo, and Haitai were removed from the market. Many of top chaebols got their debt to equity ratios below the Government

mandated 200%; their overall debts, however, were reduced very little. They increased the equity by selling shares to either the public or other chaebols. The Act will remain in effect for only 5 years, while financial institutions continue to develop and supplement techniques to supervise enterprises effectively and to dispose of ailing companies. The success of Korea's financial and corporate sectors' restructuring was the essential element to increase domestic production and to encourage foreign investment (Asian Wall Street Journal, 2001b).

Because the Republic of Korea lacks significant indigenous mineral resources, it imports various minerals to meet its increasing demand. Nearly 100% of the country's demand for mineral resources, such as bituminous coal, copper, iron, lead, and zinc ores, fluorite, gypsum, magnesite, and phosphate, was imported from other countries. Owing to the slowdown of the global economy in 2001, import and export trade declined by more than 12% compared with those of 2000. Mineral imports accounted for about 4.5% of total imports, or \$141.1 billion, and metal products and coal shared about 1% of total exports, or \$150.4 billion. In accordance to 1994 Uruguay Round of World Trade negotiation, Korea will eliminate any duties on steel products by 2004. The Korea Institute for Industrial Economic and Trade predicted that total steel imports would increase by 4.6% per year; imports on some steel products, such as galvanized steel sheets and stainless steel sheets, however, could surge to 16% to 20%. Korean steel producers needed to restructure their production lines to produce high-value-added products to survive under the no-tariff policy. Their products, such as iron reinforcing bars, could not outperform those produced from China and Turkey in terms of price (Bank of Korea, 2002).

The market for downstream aluminum products, such as sheet and extrusion, was sluggish and led to an accumulation of large stocks of ingot at the ports of Incheon and Pusan at yearend 2001. Owing to weak demand for electronics in overseas markets, domestic aluminum sector was also affected, and the yearly sales of four major aluminum sheet producers (Alcan Taihan Aluminum Co., Choil Aluminum Co., Namsum Aluminum Co., and Seoul Light Steel Co.) declined by 5.3% in 2001 compared with that of 2000. Exterior aluminum decoration products for building construction increased sharply (Korea Metal Journal, 2002a¹).

In 2001, Alcoa Inc. of the United States signed a contract with Dooray Air Metal Co. Ltd. of the Republic of Korea to buy the aluminum extrusion plant at Changwon. Dooray produced about 8,400 metric tons per year (t/yr) of aluminum extrusion products for aircraft and defense sectors. Alcoa also signed a memorandum of understanding with the aluminum extrusion producer Dongyang Gangchul Co. Ltd., which had a total capacity of 54,000 t/yr from its four factories. Since the 1997

¹References that include a section twist (§) are found in the Internet References Cited section.

financial crisis, most aluminum extrusion producers were hit hard by the sluggish demand from the construction sector. Many of the aluminum extrusion plants operated at below 60% of their output capacities. Since 1999, Alcan of Canada, which was Alcoa's competitor, started acquiring aluminum semimanufacturing plants in Korea. Alcan took shares of Aluminum of Korea and joined with the aluminum division of Taihan Electric Wire Co. to form the joint venture Alcan Taihan Aluminum Co. in 2000 (Korea Metal Journal, 2001§).

In 2001, the expansion of the construction sector helped cement producers to increase their output; the total tonnage cement output, however, remained less than that of 1997. Facing financial difficulties since 1997, Korean cement manufacturers have looked for international investors to boost their capital balance sheet. A Japanese company acquired 20% of Ssangyong Cement Industrial Co. Ltd., and Lafarge of France took a 39.9% share of Halla Cement Corp. in 2000. In 2001, Lafarge intended to take a 25% share of Tong Yang Major Corp., which would have increased the Korean market share of Lafarge and its partners to 26% from 11%. In addition to the Republic of Korea, Tong Yang also operated three ready-mix concrete plants in Beijing, China, and intended to build a 1-million-metric-ton (Mt) cement plant in Cambodia. Lafarge would enhance its position as a main cement exporter in Korea because Tong Yang's cement exports accounted for about 50% of the country's total exported volume (Korea Cement Industry Association, 2002§).

The copper market in Korea was slow but calm in 2001. During the past several years, Korea imported more than 300,000 metric tons (t) of refined copper for its semimanufacturing sector. Owing to the expanding production in domestic refinery and a decline in copper alloy exports, the country imported 352,684 t of refined copper in 2001, which was a decline of 10% from that of 2000. The import quantity was the lowest in the past 5 years. Chile was the main supplier followed by the Philippines, Australia, India, Japan, and China. Owing to increasing internal demand, exports of refined copper from China decreased by 70% in 2001 compared with that of 2000. LG-Nikko Copper Inc., which produced more than 95% of the country's refined primary copper, will increase its total refined copper output capacity to 510,000 t in 2002; the increase in output will be to meet domestic demand. According to the Korea Nonferrous Metal Association, the supply of refined copper in domestic market will be 900,000 t, 500,000 t from domestic production and 400,000 t from imports, in 2002 (Metal Bulletin, 2001a; Korea Metal Journal, 2002b§, c§).

After 4 years of prospecting in the Republic of Korea, Ivanhoe Mines Ltd. of Canada announced that the company had received a mining permit for its Seongsan gold/silver project, in South Cholla Province (Chollanam-Do). The project area contains outcropping, low-sulfidation, epithermal gold-silver mineralization that occurs as veins, breccias, stockworks, and zones of silification in the length of 3.2 kilometers (km). The Eunsan prospect had been explored with a total of 45 holes and shown large enough resources for a potential commercial operation. Ivanhoe decided to begin mining on a pilot scale to determine the actual mining grade and distribution of the high-grade mineralization. The company estimated that it would be required to invest about \$650,000 for the preproduction development work, which will include construction of a 100-metric-ton-per-day mill, site facilities, open pit, and portal. Conventional floatation circuits will be used to recover gold and

silver at a rate of 85% for oxidized surface ore and 95% for unoxidized underground ore. Milling of ores was expected to begin in the second quarter of 2002. The company discovered another high gold and silver mineralization area, which is located 2.5 km southeast of the Eunsan prospect (Asian Journal of Mining, 2001, 2002).

Korean crude steel production has grown each year of the past 3 years. Converter steel, which was mainly from Pohang Iron and Steel Co. Ltd. (POSCO) operations, grew slightly because of the normal operation of no. 5 blast furnace in the Kwangyang plant. The growth of electric arc furnaces was attributed to the growth in demand for reinforcing bars and sections from the household construction sector. The total capacity utilization rate for crude steel was 88.1% in 2001, which was 4% lower than that of 2000. In 2001, the apparent consumption of crude steel per capita ranked third (839.1 kilograms), in the world behind Taiwan and Singapore (Korea Iron and Steel Association, 2002, p. 5-9, 54, 74-77, 254, 264, 268, 392).

The demand for steel products increased by 0.3% to 49.1 Mt in 2001. Domestic demand for steel sheet decreased by 1.6%, but the overall production only declined by 0.7% because exports continued to increase by 1% compared with those of the previous year. Owing to an increase of exports, prepainted hot-dip zinc coat sheet registered a 14.4% increase in production. Steel bars have grown for the past 4 years but remained below the 1997 level. Hot-rolled coil remained Korea's largest steel product import, but its volume fell 6.1% from that of 2000 because production of domestic cold-rolled products declined and the Government reverted the import duty to the usual 6% from the temporary 2% in the second half of 2001 (Korea Iron and Steel Association, 2002, p. 10-11, 146-165, 192-200).

The trend of oversupply steel plates in the domestic market during the late 1990s was over. During past 2 years, the supply and demand for steel plates became more balanced. The shipbuilding sector consumed more than 50% of the steel plates supply followed by the construction sector. In 2001, both sectors began expanding. The steel plate consumption rate in the shipbuilding sector increased to 59% in 2001 from 51% in 1999. The export-to-import ratio decreased to 0.70 in 2001 from 1.57 in 1998; domestic production capacity, however, remained unchanged at 5.97 Mt. Owing to expansion of construction and shipbuilding sectors during the next several years, domestic demand for steel plates was expected to increase, and export of steel plates, to decrease. Steel plates from China and Japan, which were major suppliers to the Republic of Korea, would benefit from the increased demand (Korea Iron and Steel Association, 2002, p. 80-85, 104-107, 121-127, 146-165).

POSCO signed a contract with BHP Billiton Ltd. to form an unincorporated joint venture for the development of the C iron ore deposit within the larger mining area C reserves in Perth at the Pilbara region of Western Australia. POSCO held 20% shares in the POSMAC (POSCO + mining area C) project; BHP Billiton, 65%; and Japanese companies Itochu Corp, 8%; and Mitsui Corp., 7%. The cost of developing the iron ore deposit and profit sharing would be based on share ratio of each company. The estimated \$650 million investment included the development of an iron ore mine and port expansion. POSCO will receive a supply of 3 million metric tons per year (Mt/yr) of iron ore for 25 years. Production was expected to begin October 2003 and would reach its design of 15 Mt/yr in 2012.

The iron ore reserve in that area was estimated to be 890 Mt. To secure stable supplies of raw materials, iron ore and coking coal, POSCO signed long-term purchase agreements with companies in Australia and Canada. Pohang Steel Australia Pty Ltd. (POSCO's overseas subsidiary) will hold ownership of the project (Korea Metal Journal, 2002d§).

POSCO has successfully developed an ironmaking technology (FINEX), which is based on Voest-Alpine Industrieanlagenbau's Corex process. Iron ore fines are injected into coal-fired reactor vessel. POSCO operated a 600,000-t/yr Corex plant for ironmaking. The 600-t/yr FINEX pilot plant was expected to be completed in March 2003 (Steel Times International, 2001).

POSCO announced that the company had renewed its commitment to invest \$100 million in three joint-venture projects in China. A 100,000-t/yr-capacity pre-coated line will be added to its Dalian Posco CFM Coated Steel Plant in Dalian. A 50,000-t/yr pre-coated line will be installed in its Shunde Pohang Coated Steel Plant in Guangdong Province. The cold-rolled mill capacity in Zhangjiagang Pohang Stainless Steel Plant will be increased to 280,000 t/yr from 140,000 t/yr. All these projects were scheduled to be completed in 2003 (Metal Bulletin, 2001b).

Korea Zinc Group has become one of the largest primary zinc producers in the world. Its Onsan complex had a design output capacity to produce 200,000 t/yr of lead and 400,000 t/yr of zinc. Young Poong Corp's (its parent company) Sukpo plant had a design output capacity of 200,000 t/yr of zinc. The two companies produced a total of about 500,000 t of zinc in 2001 and planned to supply 631,000 t of zinc to the world market in 2002. The Korea Nonferrous Metal Association reported that the country consumed 349,880 t of lead and 612,135 t of zinc in 2001. With limited domestic lead and zinc resources, the two companies depended on imported raw materials to feed their smelters. The two companies invested a total of \$15 million (\$7.5 million each) in Perilya Ltd. in Australia. Perilya has been active in the acquisition of the Broken Hill Mine in Australia, which supplied raw materials to Korea Zinc and Young Poong. Korea Zinc thought that if Perilya's takeover was successful, then the company would be able to secure a stable ore supply from Australia (Mining Journal, 2002; Korea Metal Journal, 2002e§).

The Republic of Korea's oil sector was dominated by four refiners—SK Group (30%), LG-Caltex (26%), Hyundai-Hanwha (16%), and Ssangyong Oil Refining (16%); the rest was held by independents. The country imported all its crude oil and natural gas. Hydrocarbons accounted for about 54% of the total energy consumption in Korea. Donghai-1 Gasfield in the Ulleung basin, which is located 60 km off Ulsan, was discovered in 1998, and the state-owned company Korea National Oil Corp. intended to bring the field to production in 2003. The field had about 200 billion cubic meters of gas (Korea National Oil Corp. 2002§). The country relied on imported liquefied natural gas (LNG) to meet its demand. The state-owned Korea Gas Corp. is responsible for importing LNG to supply to the state-owned Korea Electric and Power Corp. Import quantities have continued to grow in the past 2 years, and the demand for gas was projected to grow at a rate of 4.7% per year during the next 10 years. LNG was imported on a long-term contract basis from Brunei, Indonesia, Malaysia, Oman, and Qatar. The company operated two LNG terminals in Incheon and Pyeongtaek, and the third terminal, which was

being constructed in Tongyeong, was scheduled to be completed in 2002 (Korea Gas Corp., 2001).

References Cited

- Asian Journal of Mining, 2001, South Korean gold/silver mine soon into production: Asian Journal of Mining, May-October, p. 10.
Asian Journal of Mining, 2002, Pre-production mining at South Korea mine: Asian Journal of Mining, November 2001-January 2002, p. 10.
Asian Wall Street Journal, 2001a, Banking reform draws ire: Asian Wall Street Journal, August 13-19, p. 7.
Asian Wall Street Journal, 2001b, Investor enthusiasm buys hope for economic reform: Asian Wall Street Journal, July 9-15, p. 7.
Bank of Korea, 2002, Current economic and financial movement: Bank of Korea Quarterly Bulletin, March, p. 3.
Far Eastern Economic Review, 2002, South Korea steals a march: Far Eastern Economic Review, March 21, p. 46.
Korea Gas Corp., 2001, Annual report 2000: Songnam, Republic of Korea, Korea Gas Corp., 45 p.
Korea Iron and Steel Association, 2002, Steel statistical yearbook: Seoul, Republic of Korea, Korea Iron and Steel Association, 495 p.
Metal Bulletin, 2001a, Nippon Mining & Metals cuts copper production: Metal Bulletin, no. 8630, December 3, p. 4.
Metal Bulletin, 2001b, Posco renews commitment to China with \$100m plans: Metal Bulletin, no. 8597, August 6, p. 3.
Mining Journal, 2002, Korea zinc output to rise: Mining Journal, v. 338, no. 8676, March 15, p. 201.
Steel Times International, 2001, Posco close to new iron-making technology: Surrey, United Kingdom, Steel Times International, v. 25, no. 1, p. 8.

Internet References Cited

- Korea Cement Industry Association, 2002, Summary of demand and supply, accessed April 24, 2002, at URL http://www.cement.or.kr/english/stati/total_view.asp.
Korea Metal Journal, 2001 (December 17), Alcoa of U.S. advances into Korea on full-scale, no. 678, accessed July 1, 2002, at URL http://www.kmj.co.kr/english/home/news_e.jsp?ddtcode=20011217174443.
Korea Metal Journal, 2002a (January 28), Domestic sales of aluminum sheets show steep fall last year, no. 690, accessed July 1, 2002, at URL http://www.kmj.co.kr/english/home/news_e.jsp?ddtcode=20020128182805.
Korea Metal Journal, 2002b (March 7), Electrolytic copper imports reach 350,000 tons in 2001, no. 700, accessed July 1, 2002, at URL http://www.kmj.co.kr/english/home/news_e.jsp?ddtcode=20020308192600.
Korea Metal Journal, 2002c (June 20), New era for annual supply of electrolytic copper over 900,000 tons, no. 730, accessed July 1, 2002, at URL http://www.kmj.co.kr/english/home/news_e.jsp?ddtcode=20020621182851.
Korea Metal Journal, 2002d (April 4), POSCO to jointly develop iron mine in Australia, no. 708, accessed July 16, 2002, at URL http://www.kmj.co.kr/english/home/news_e.jsp?ddtcode=20020406120651.
Korea Metal Journal, 2002e (June 3), Korea Zinc and Young Poong seek stabilized supply of ore, no. 725, accessed June 26, 2002, at URL http://www.kmj.co.kr/english/home/news_e.jsp?ddtcode=20020603183744.
Korea National Oil Corp., 2002 (January), Shaping the upstream in the 21st century, accessed July 16, 2002, at URL <http://www.knoc.co.kr/english/intro/mess/mess.htm>.

Major Sources of Information

Korea Institute of Geology, Mining, and Materials
30, Kajungdong
Yusongku, Taejon
Ministry of Trade, Industry, and Energy
1, Chungang-dong, Kwach on
Kyonggi, Seoul

Major Publications

Monthly Statistics of Korea. Economic Planning Board, Seoul.
Steel Statistical Yearbook. Korea Iron and Steel Association, Seoul.
Yearbook of Energy Statistics. Korea Energy Economic Institute, Seoul.

TABLE 1
REPUBLIC OF KOREA: PRODUCTION OF MINERAL COMMODITIES 1/

(Metric tons unless otherwise specified)

Commodity	1997	1998	1999	2000	2001
METALS					
Bismuth, metal	112	117	108	71	106
Cadmium, smelter	570	1,178	1,791	1,911	1,879
Copper:					
Mine output, Cu content	--	41	--	--	--
Metal:					
Smelter e/	225,000	293,000	370,000	410,000 r/	410,000
Refined, primary and secondary	265,426	373,305	450,444	467,900 r/	473,624
Gold, metal kilograms	14,872	22,822	25,730	22,605	28,595
Iron and steel:					
Iron ore and concentrate:					
Gross weight thousand tons	500	486	410	336	195
Fe content do.	280	272	230	188	109
Metal:					
Pig iron do.	22,712	23,092	23,329	24,938	25,898
Ferroalloys:					
Ferromanganese	158,755	158,418	140,208	146,373	143,525
Ferrosilicomanganese	77,375	106,997	116,091	103,522	101,877
Other	2,174	2,785	4,639	4,676	4,452
Total	238,304	268,200	260,938	254,571	249,854
Steel, crude thousand tons	42,554	39,896	41,042	43,107	43,852
Lead:					
Mine output, Pb content	3,632	3,558	1,822	2,724	988
Metal, smelter	122,631	133,066	143,583	170,704	161,000
Nickel	18,452	20,183	20,235	29,890	30,580
Silver, metal kilograms	267,911	339,442	488,792	591,130	664,533
Zinc:					
Mine output, Zn content	8,992	10,488	9,832	11,474	5,129
Metal, primary	335,390	390,260	429,766	473,897	508,000
INDUSTRIAL MINERALS					
Barite	105	--	--	30	--
Cement, hydraulic thousand tons	60,317	46,791	48,579	51,424	52,012
Clays, kaolin do.	2,688	2,260	1,858	2,098	2,384
Diatomaceous earth	53,538	37,649	30,222	34,143	27,530
Feldspar	341,018	248,493	409,334	330,417	389,361
Fluorspar, metallurgical-grade	617	--	--	--	--
Graphite, all types	83	62	62	65	65
Mica, all grades	34,489	38,459	24,733	65,249	109,339
Nitrogen, N content of ammonia	526,000	496,000	489,000	369,000	368,000
Salt e/	770,000	770,000	750,000	800,000	800,000
Soda ash, manufactured e/	320,000	300,000	310,000	310,000	310,000
Stone, sand and gravel:					
Limestone thousand tons	88,937	69,871	74,061	77,868	79,521
Quartzite do.	2,478	1,821	2,160	2,321	2,377
Sand, including glass sand do.	1,222	1,257	1,306	879	900
Sulfur, byproduct: e/					
Metallurgy do.	338 r/	476 r/	528 r/	572 r/	665
Petroleum do.	600 r/	600 r/	600 r/	600 r/	600
Total do.	938 r/	1,080 r/	1,130 r/	1,170 r/	1,270
Talc and related materials:					
Pyrophyllite	994,366	843,609	754,657	917,973	1,101,825
Talc	25,751	24,411	15,313	11,344	47,712
MINERAL FUELS AND RELATED MATERIALS					
Carbon black	425,605	384,318	438,128	454,699	438,128
Coal, anthracite thousand tons	4,572	4,356	4,197	4,174	3,817
Fuel briquets, anthracite briquets e/	13,000	12,500	13,000	13,000	13,000
Petroleum refinery products thousand 42-gallon barrels	897,342 r/	851,447 r/	897,373 r/	911,761 r/	930,000 e/

e/ Estimated; estimated data are rounded to no more than three significant digits; may not add to totals shown. r/ Revised. -- Zero.

1/ Table includes data available through August 30, 2002.

TABLE 2
REPUBLIC OF KOREA: STRUCTURE OF THE MINERAL INDUSTRY IN 2001

(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 Tungsten Mining Co. Ltd.	Sangdong	135
Cement		Ssangyong Cement Industrial Co. Ltd.	Plants at Chandong, Kwang Yang, Mungyong, Pukpyong, and Yongwol	17,900
Do.		Sung Shin Cement Manufacturing Co. Ltd.	Tanyang plant	13,700
Do.		Tong Yang Major Corp.	Plants at Pukpyong and Samchok	12,600
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 Chungbuk and Tanyang	7,900
Do.		Asia Cement Manufacturing Co. Ltd.	Plants at Daegu and Jaechon	4,600
Copper, metal, primary		LG-Nikko Copper Inc.	Changhang	60
Do.		do.	Onsan	460
Graphite		Kaerion Graphite Ltd.	Kangwon	NA
Do.		Wolmyong Mining Co.	do.	NA
Lead, metal, primary		Korea Zinc Co. Ltd.	Onsan	200
Nickel, metal		Korea Nickel Corp.	do.	51
Steel, crude		Pohang Iron and Steel Co. Ltd.	Kwangyang plant	15,000
Do.		do.	Pohang plant	13,000
Do.		INI Steel Co.	Donggu plant	4,750
Do.		do.	Pohang plant	3,140
Do.		Dongkuk Steel Mill Co. Ltd.	Inchon Works	1,450
Do.		do.	Pohang Works	3,600
Do.		Kia Steel Co. Ltd.	Kunsan	720
Talc		Dongyang Talc Mining Co.	Chungju mine	NA
Zinc, metal, primary		Korea Zinc Co. Ltd.	Onsan	400
Do.		Young Poong Corp.	Sukpo	200

NA Not available.