



2005 Minerals Yearbook

TAIWAN

THE MINERAL INDUSTRY OF TAIWAN

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Taiwan is an island that is located south of Japan and east of mainland China in the Pacific Ocean. The island's economy was export oriented and the growth prospects of its economy depended on the world economy. During the past three decades, Taiwan has transformed from a developing area into a developed area. According to the Council for Economic Planning and Development, the output of the service sector accounted for 70% of the island's gross domestic product (GDP) in 2005, and the manufacturing sector, for 24%. During the period between 1950 and 1964, the iron and steel and shipbuilding sectors were the backbone of the island's economic growth. Automotive products, consumer electronics, and home appliances were the major industries between 1965 and 1974. The automated machinery and microelectronics sectors flourished during the period between 1975 and 1990. Since then, the service sector has been the engine for economic growth. In the first 8 months of 2005, Taiwan's manufacturing productivity index, technological progress, and production efficiency increased by 0.75%, which was the lowest rate of growth in the past 21 years. The productivity of traditional manufacturing industries declined in 2005. The productivity of such hi-tech manufacturing industries as electronic components and precision optical equipment also posted a decline. The mining sector accounted for only about 0.1% of the total industrial production output value. According to the Taiwan authorities' industrial survey of manufacturers, about one-third of enterprises indicated that the investment environment in Taiwan declined in 2005. Taiwan relied on domestic consumers and especially on exports to drive economic growth. In 2005, the island's GDP increased by 4.03% to \$346.4 billion and the per capita income of the island's 22.6 million people increased to \$15,291 (Directorate General of Budget, Accounting, and Statistics, 2006, p. 30).

Because it has limited mineral resources, Taiwan imported various minerals to meet its increasing demand. In 2005, the production index for the mining sector decreased by 9.43% compared with that of 2004. The manufacturing output value of mineral fuels, industrial minerals, and metals accounted for about 22.0% of the total output value. Domestic fuel supplies accounted for less than 2% of the island's total fuels demand. Iron and steel was the leading metal production sector on the island. The production of other value-added manufacturing products, such as those made of aluminum and copper, depended upon imported metals and scrap (Directorate General of Budget, Accounting, and Statistics, 2006, p. 36).

During the past decade, the number of manufacturing factories has been on the decline. Such traditional industries as chemicals, electronic components, electric and metal machinery, and textiles were either shut down or operation facilities were relocated to countries with lower production costs, such as China and the countries of Southeast Asia. Taiwan's Ministry of Economic Affairs (MOEA) announced that, starting on January 1, 2006, Taiwan authorities would provide \$5.95 billion in loans to attract overseas Taiwanese producers to invest more

at home. An \$8.5 billion development fund would be used to acquire land in the industrial zone for private investors. MOEA also developed guidelines and action plans to promote the knowledge-intensive service sector as the new catalyst for economic growth in the next decade despite fierce global competition. The Taiwan authorities believed that high levels of service sector development could add value to products in the agricultural and manufacturing sectors, improve Taiwan's core competitive edge, and strengthen the industrial sector. The improvement of service would encourage Taiwanese businesses to stay in Taiwan and would attract foreign businesses to set up global logistics centers in Taiwan. Developing such service industries as entertainment, environmental protection, medicine and healthcare, tourism, and sports recreation could enhance the quality of life in Taiwan (China Post, 2005§¹).

Trade

In 2005, Taiwan's total trade increased by 8.5% to \$381.0 billion. The values of exports and imports increased to \$198.4 billion and \$182.6 billion, respectively. Crude oil remained the leading imported mineral commodity by value and was followed by coal, natural gas, iron ore, marble, and kaolin. Taiwan's leading exports were products of capital- and technology-intensive sectors and included base-metal products, electrical equipment, musical instruments, and precision instruments. Traditional labor-intensive products, such as cement, footwear, and textiles, had decreased significantly during the past decade in terms of export value and percentage share of total exports. Many of Taiwan's labor-intensive industries set up plants in mainland China during the past decade. They either focused on the Chinese market to take advantage of its overwhelming growth in consumption or received their orders from Taiwan, produced their goods in mainland China, and then shipped the goods to overseas buyers. Together, China and Hong Kong were Taiwan's leading destinations for exports in 2005. According to the Directorate General of Customs, exports to these areas increased by 12.2% to \$71.61 billion, or 36.1% of the total export value. China was Taiwan's leading foreign investment destination. In 2005, China had approved 3,907 Taiwan-investment projects with a total contractual value of \$10.36 billion. During the past several years, about 60% of Taiwan's steel exports were shipped to China. Shipments of merchandise across the Taiwan strait must be transhipped through third ports, mainly Hong Kong. Japan was Taiwan's leading importing country. Taiwan's total trade with Japan was \$61.2 billion followed by the United States, with \$50.3 billion (Ministry of Finance, 2005a, b).

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

Commodity Review

Metals

Iron and Steel.—Taiwan was the fifth ranked crude steel producer in Asia behind China, Japan, the Republic of Korea, and India. China Steel Corp. (CSC) was the leading steel producer and the only pig iron producer in Taiwan. Without any coal and iron ore resources on the island, CSC depended on imports of coal and iron ore to meet its demand. Each year, CSC imported about 8.6 million metric tons (Mt) of coking coal and 16 Mt of iron ore mainly from Australia, Brazil, Canada, India, Indonesia, Russia, and Vietnam. The increased price of iron ore affected CSC's profit margin. Even though CSC had signed long-term supply contracts with overseas suppliers, the company was considering investment opportunities in iron ore and coal mines in other countries. Taiwan produced less than 20 Mt of crude steel and consumed more than 26 Mt of crude steel. The supply and demand gap was met by imports, mainly from China, Japan, and Russia. Taiwan also imported about 4 million metric tons per year (Mt/yr) of steel scrap from Japan, Russia, and the United States (Steel Statistics Monthly, 2006c; China Steel Corp., 2006§).

CSC relined its No. 2 blast furnace and expanded the inner volume of the furnace by 15% to between 3,300 and 3,400 cubic meters from 2,850 cubic meters in 2005. After the expansion, pig iron production was expected to increase by 350,000 metric tons per year (t/yr). In 2005, owing to a temporary shutdown of the No. 2 blast furnace, pig iron output was lower than in the previous year. CSC planned to invest \$6.7 billion during the next 6 years to develop its core-business operations. CSC's subsidiary, Dragon Steel Corp., in which CSC and its affiliates combined held a 70% interest, planned to invest \$2.43 billion to build an integrated iron and steel plant in Taichung. The integrated plant was designed to have a 3,274-cubic-meter blast furnace with an annual output capacity of 2.5 Mt, a sintering plant with a production capacity of 7,440 metric tons per day of sinter, and a 2-strand slab caster that could produce 2.6-Mt/yr of slab that is between 950 and 1,680 millimeters (mm) wide and 250 mm thick. Dragon awarded Siemens Group of Germany the contract to supply the equipment. Dragon also planned to invest \$609 million to set up a 4-Mt/yr hot-rolling line. The blast furnace operation was scheduled to start in 2009. The design of the second blast furnace was under consideration. Dragon planned to have a total crude steel output capacity of 6 Mt/yr (Steel Statistics Monthly, 2006a, b).

The Executive Yuan approved Formosa Plastics Group's (FPG) request to build an integrated iron and steel plant at the Yunlin Offshore Industrial Zone in Yunlin County. The construction cost for the 7.5-Mt/yr steel plant was estimated to be \$4.3 billion. The environmental impact assessment study was submitted to Taiwan Environmental Protection Administration (EPA), which required FPG to provide more detailed information on how the plant could affect local residents because the effect of emissions of carbon dioxide and other greenhouse gases was not addressed adequately in the environmental impact assessment study. The new plant was scheduled to begin operation in 2009 (Taiwan Journal, 2006§).

In 2002, MOEA and the debt-ridden state-owned steel company Tang Eng Iron Works Co., which was the oldest stainless steel plant in Taiwan, agreed to sell off Tang Eng's nonprofitable divisions and allow the profitable stainless steel plant to stay in operation. The Legislative Yuan approved Tang Eng's privatization plan and allowed employees to purchase the company's stocks in 2005. Tang Eng planned to invest \$200 million to build a 600,000-t/yr hot-rolled stainless steel plant and to increase the crude stainless steel output capacity to 350,000 t/yr from 200,000 t/yr in 2005. Tang Eng shipped its crude stainless steel ingot to CSC for further processing into hot-rolled and cold-rolled products (United News, 2006§).

Industrial Minerals

Cement.—Owing to an increased demand for construction materials globally in 2005, the production of cement in Taiwan increased slightly. Domestic demand for cement gradually decreased to 14.7 Mt in 2005 from 27.9 Mt in 1993. Exports of cement increased by 22.5% to 7.03 Mt in 2005 compared with that of 2004. Cement was shipped mainly to, in descending order of amount shipped, Nigeria, the United States, Singapore, and Hong Kong. Owing to a lack of limestone resources and a limited market on the island, Taiwan cement producers gradually moved their production base to China in the late 1990s and expanded their cement output capacities there. Taiwan's second ranked cement producer, Asia Cement Corp., was building three cement plants in China—Hubei Yadong Cement Co. in Hubei Province, Jiangxi Yadong Cement Co. in Jiangxi Province, and Sichuan Yadong Cement Co. in Sichuan Province. Asia Cement planned to expand its cement operations in China in the near future because of the increased demand for cement in the construction sector in China. The production of Hubei Yadong was expected to increase cement output capacity to 1.6 Mt/yr in 2007. Wuhan Yadong Cement Co. increased its output capacity to 1.6 Mt/yr in 2005. The third stage expansion of Jiangxi Yadong was scheduled to be completed in May 2007, and total cement output capacity was expected to increase to 6 Mt/yr. Sichuan Yadong planned to build two kilns with a total cement output capacity of 4 Mt/yr. The first kiln was expected to be put into operation by September 2006 (Asia Cement Corp., 2006, p. 7).

Taiwan Cement Corp.'s (TCC) mainland China cement project was positioned to take advantage of the market in southern China and to be a high-end cement producer. TCC's investment strategy in China was to make direct investments and to form joint ventures with local cement producers. TCC and Conch Cement Group of mainland China set up a joint-venture cement plant in Xuzhou, Jiangsu Province. TCC had two wholly owned grinding plants in Fuzhou, Fujian Province, and Juchiachiao, Anhui Province. TCC completed the construction of a 4.5-Mt/yr cement plant in Yungde, Guangdong Province, in 2005 and planned to expand the output capacity to 9 Mt/yr by 2008. During the past several years, the company invested \$100 million in mainland China, and the output capacity of its plants was expected to reach 10 Mt by yearend 2006. TCC planned to invest \$300 million to expand capacities at its existing cement plants and to build a new plant in Kueigang, Guangxi Province.

The company's total cement output capacity in mainland China was expected to reach 20 Mt/yr in 2008. Demand for high-grade cement in southern China was 120 Mt; local cement producers could supply from about 20% to 30% of that demand (Taiwan Economic News, 2005§).

Mineral Fuels

Coal.—Without any coal production, Taiwan depended on imported coal to meet its demand. In 2005, Taiwan imported a total of 60.4 Mt of coal; of this total, Australia provided 22.43 Mt; Indonesia, 19.49 Mt; and China, 16.18 Mt. Power generation accounted for 77.05% of total coal consumption. Because its No. 2 blast furnace was shut down, coal consumption by CSC was lower, and accounted for 9.75% of total consumption, or 5.89 Mt. Taiwan Power Co. (Taipower) was the leading coal consumer on the island and imported about 52% of Taiwan's coal imports. To reduce shipping costs, imports of coal from South Africa and the United States had been decreased sharply in the past 2 years (Taiwan Energy Statistical Hand Book 2005, 2006, p. 49).

Natural Gas and Petroleum.—With limited mineral fuel resources, Taiwan produced only about 1.9% of its natural gas and petroleum requirements and relied on imports—mainly through long-term contracts with Indonesia and Malaysia—to fill the gap. Natural gas consumption grew by an average of more than 10% during the past decade and accounted for 10.2% of the island's total energy consumption. Increased use of natural gas [including liquefied natural gas (LNG)] in power generation was the primary source of the growth. In 2005, state-owned Chinese Petroleum Corp. (CPC), which was the sole LNG importing company, imported 9.37 billion cubic meters of LNG. Because Taiwan's LNG consumption was expected to continue to increase, domestic energy analysts projected that LNG imports would increase by an average of 7.9% in the next 15 years (Bureau of Energy, 2006§).

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Major Sources of Information

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2 Chenkiang Street
Taipei, Taiwan
Ministry of Economic Affairs
Mining Department
15 Foochow Street
Taipei, Taiwan

Major Publications

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- Ministry of Economic Affairs, Department of Statistics, Taiwan: Industrial Production Statistics, annual.
- Ministry of Finance, Department of Statistics, Taiwan: Monthly Statistics of Exports and Imports.

TABLE 1
TAIWAN: PRODUCTION OF MINERAL COMMODITIES¹

(Metric tons unless otherwise specified)

Commodity		2001	2002	2003	2004	2005
METALS						
Gold, primary	kilograms	2	--	--	--	--
Iron and steel, metal:						
Pig iron	thousand metric tons	10,316	10,524	10,779	10,938 ^r	9,854
Ferrosilicon		1,181	--	--	--	--
Steel, crude	thousand metric tons	17,336	18,255	18,832	19,604	18,567
Nickel, refined ^c		11,000	11,000	11,000	11,000	11,000
INDUSTRIAL MINERALS						
Cement, hydraulic	thousand metric tons	18,128	19,363	18,474	19,050	19,891
Feldspar		147	--	510	900	--
Fire clay		5,641	2,083	7,546	3,686	330
Gypsum, precipitated		1,006	--	--	--	--
Lime		457,811 ^r	503,567 ^r	519,782 ^r	493,733 ^r	443,879
Mica		9,733	6,595	3,237	2,973	8,608
Nitrogen, liquid		539,532	538,338	534,721	650,359	794,933
Salt, marine		66,150	56,720	191	--	--
Sodium compounds, n.e.s.:						
Caustic soda		466,630	508,760	568,180	570,000 ^e	570,000 ^e
Soda ash ^c		140,000	140,000	140,000	140,000	140,000
Stone:						
Dolomite	thousand metric tons	71	55	54	115	174
Limestone	do.	4,901	3,677	1,434	213	252
Marble	do.	20,475	23,736	21,041	22,970	24,070
Serpentine	do.	276	268	194	229	408
Sulfur		223,659	212,343	225,006	222,670	267,790
Talc		130	27	466	410	--
MINERAL FUELS AND RELATED MATERIALS						
Gas, natural:						
Gross	million cubic meters	849	887	831	796	548
Marketed ^c	do.	780	785	760	720	490
Petroleum:						
Crude	thousand 42-gallon barrels	279	321	288	280	203
Refinery products ^c	do.	250,000	260,000	270,000	280,000	285,000

^cEstimated; estimated data are rounded to no more than three significant digits. ^rRevised. -- Zero.

¹Table includes data available through September 20, 2006.

TABLE 2
TAIWAN: STRUCTURE OF THE MINERAL INDUSTRY IN 2005

(Thousand metric tons unless otherwise specified)

Commodity		Major operating companies	Location of main facilities	Annual capacity ^e
Cement		Asia Cement Corp.	Hsinchu	1,800
Do.		do.	Hualien	4,020
Do.		Chia Hsin Cement Corp.	Kaohsiung	1,860
Do.		Chien Tai Cement Co. Ltd.	do.	1,720
Do.		Lucky Cement Corp.	Tungao	2,000
Do.		Southeast Cement Corp.	Kaohsiung	1,090
Do.		do.	Chutung	1,400
Do.		Taiwan Cement Corp.	Hualien City	1,600
Do.		do.	Hualien County	5,600
Do.		do.	Suao	3,400
Do.		Universal Cement Corp.	Kaohsiung	1,550
Marble		Taiwan Marble Co., Ltd.	Panchiao	10
Nickel		Taiwan Nickel Refinery	Kaohsiung	14
Petroleum:				
Crude	thousand 42-gallon barrels per year	Chinese Petroleum Corp.	Chuhuangkeng and Tungtzuchiao	850
Refinery products	thousand 42-gallon barrels per day	do.	Kaohsiung	570
Do.	do.	do.	Taoyuan	200
Do.	do.	Formosa Plastics Group	Yunlin	450
Steel		An Feng Steel Co. Ltd.	Kaohsiung Hsien	2,000
Do.		China Steel Corp.	Kaohsiung	13,000
Do.		Tang Eng Stainless Steel Plant	do.	200
Do.		Yieh Hsing Enterprise Co. Ltd.	Kaohsiung Hsien	450
Do.		Yieh Phui Enterprise Co. Ltd.	do.	1,300
Do.		Yieh United Steel Co.	do.	1,000
Do.		Feng Hsin Iron and Steel Co. Ltd.	Taichung Hsien	1,200
Sulfur		China Petrochemical Development Corp.	Taipei	50

^eEstimated.