

THE MINERAL INDUSTRY OF

TAIWAN

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Despite the Asian financial crisis and the September earthquake, Taiwan's economy performed remarkably well in 1999. According to the Swiss-based Business Environment Risk Intelligence, Taiwan's overall investment climate in 1999 remained the third best in the world, behind Switzerland and Singapore. Growth in the gross domestic product increased by 5.75% compared with that of 1998; this was a higher growth rate than Hong Kong and Singapore. Following the Asian financial crisis, the September earthquake was an undoubted setback for the island in terms of economic growth. Economists estimated that the earthquake damage was only about \$12 billion because it was confined to the central part of Taiwan and did not affect the financial, business, or manufacturing centers, Taipei and Kaohsiung (Council for Economic Planning and Development, 2000).

Taiwan's economic growth was concentrated in two sectors: the traditional industrial sector that included clothing, footwear, and furniture and the electronics sector, which began in the early 1990's. Although the labor-intensive traditional industries have been growing at a slow pace, Taiwan's high-technology sector has grown at a rate of 10% per year since 1990. Taiwan produced about 79% the world's computer motherboards in 1999, and production was expected to reach 80% in 2000 (Taipei Journal, 2000a). According to the Industrial Development Bureau (IDB), technology-intensive activity accounted for 41% of the island's industrial production in 1998, which was a 16% increase compounded with that of 1987. Basic industries, such as metals and chemicals, remained the same during this period; traditional labor-intensive industries, however, declined to 23% share of industrial production in 1998 from 40% in 1997. Taiwan's unemployment rate remained low, and the inflation rate was also under control. With limited natural resources, Taiwan's success was attributed to the upgrading of its industry since the 1980's, when the domestic economy and exports were dominated by the traditional sector. Taiwan's manufacturers, which included some in information technology, gradually shifted their low value-added operations offshore. Research expenditure in such fields as new semiconductor processing technologies and the development of advanced biotechnology were increased in the hope of keeping the island's economy growing.

Government Policies and Programs

On December 31, the Legislative Yuan passed an amendment to extend the Statute for Industrial Upgrading for another 10 years. Under the newly revised statute, the tax deduction rate

for investment in research and development and for personnel training has been increased to 25%, which was a 5% increase compared with the old version. Investments in facilities and technologies that reduced gas emissions or increased energy efficiency are also eligible for a 25% tax break. The "newly emerging important strategic enterprises" could qualify for a 5-year tax break. The revised statute also lowers the income tax rate for shareholders in those strategic enterprises from 20% to 10%. The deduction rate will be reduced by 1% every 2 years. The statute will serve as an engine for the overall development of the technology-intensive industries in Taiwan (Taiwan Industrial Panorama, 1999a, Taipei Journal, 2000b).

In 1999, the value of minerals consumption was \$9.3 billion, of which \$1.8 billion was domestically produced; Sand and gravel accounted for \$8.95 billion and all other mineral consumption, for \$351 million. Natural gas, marble, salt, and sand and gravel were the island's most valuable mineral products. Besides minerals, the island also produced iron and steel from imported iron ore and iron scrap and processed products of aluminum, copper, lead, nickel, tin, and zinc from imported raw materials.

Trade

In 1999, Taiwan's total trade increased by 7.9% to \$232.3 billion. Exports rose 10% to \$121.6 billion, and imports increased by 5.8% to \$110.7 billion. Values of minerals imports and exports were \$7.5 billion and \$51.1 million, respectively. Crude oil remained the leading imported commodity, followed by coal, natural gas, iron ore, marble, and kaolin. Owing to the economic recovery of the Asian countries, exports to Japan, the Republic of Korea, and the Association of Southeast Asian Nations enjoyed double-digit growth in 1999 compared with the sharp decline in 1998. Exports of machinery and electric machinery equipment grew by 16.1% or \$8.9 billion (Ministry of Finance, 1999a, b).

Commodity Review

Because Taiwan had no domestic primary aluminum smelting capacity, aluminum fabricating manufacturers relied on imports of aluminum ingots and aluminum scrap. Owing to high labor costs, environmental problems, and weak domestic demand, the output of aluminum ingots and alloy has gradually declined in the past several years—321,589 metric tons (t) in 1999, 388,261 t in 1998, and 449,536 t in 1997 (Department of Statistics, 2000). Also, Taiwan's two largest secondary aluminum producers, New Sun Metals Co. and Feng An Metal

Industrial Co. Ltd., which was a subsidiary of Feng An Steel Co. Ltd., faced financial difficulties and reduced their total aluminum output to about 200,000 t in 1999. The demand for rolled aluminum products, however, has increased gradually in the past several years. Taiwan's largest aluminum fabricator, China Steel Aluminum Corp. (CS Aluminum) of China Steel Corp. (CSC), expanded its rolling mill output capacity to 120,000 metric tons per year (t/yr) in 1999 from 60,000 t/yr, using imported aluminum ingots. CSC and U.S.-based Aluminum Company of America (Alcoa) discussed forming a partnership to market CS Aluminum's product. Alcoa was the major supplier of primary aluminum ingots to CS Aluminum. New Sun Metals Co. planned to commission its 25,000-t/yr plant in early 2000 (Metal Bulletin, 1999b, c).

In 1999, Taiwan had 12 cement producers that operated 16 plants with a total of 26 kilns. The total cement production capacity was 23.8 million metric tons per year (Mt/yr). The limestone mining rights on the island's west coast, except for the Asia Cement Corp.'s limestone mine in Hsinchu, expired in 1997. Owing to the slowdown in the construction sector, the demand for cement continued to decline in 1999. Taiwan consumed about 18.6 million metric tons (Mt). Asia Cement Corp., which was Taiwan's largest cement producer and supplier, accounted for about 30% of the market share, and Taiwan Cement Corp., which was the second, accounted for 24%. Taiwan imported about 2.9 Mt of cement mainly from Japan. With limited expansion available in Taiwan, cement producers such as Tong Nan Cement Corp. and Taiwan Cement Corp. planned on turning to China, through their subsidiaries in Hong Kong and Singapore as their second production site (Building Materials Industry Information, 1999).

The IDB established a special task force, which included Government and private experts, to accelerate the development of the titanium alloy sector in Taiwan. More than 70 companies were engaged in the development of titanium alloy products such as golf club heads and high value-added medical equipment. Annual production value totaled \$62 million. The annual expansion rate for titanium alloy was expected to be 20% for the next 5 years. The task force would coordinate the joint development effort to upgrade the technical level in this sector to compete for world market shares (Taiwan Industrial Panorama, 1999b).

Ritek Corp., which was a major compact disk manufacturer in Taiwan, planned to build another indium tin oxide polishing plant in Miaoli, central Taiwan, to alleviate the shortage of indium tin oxide glass substrates. Ritek's newly installed indium tin oxide production line was operating at its full capacity in 1999, and two additional production lines were scheduled to be added in 2000, thus increasing the total production capacity to 1.8 million square feet (Taiwan Industrial Panorama, 2000).

Owing to the relining of CSC's No. 3 blast furnace and the September earthquake, in 1999, Taiwan's crude steel production declined slightly. Taiwan consumed more than 29 Mt of steel products, which was a 6% increase compared with that of 1998. The supply-and-demand gap was met by imports. Without any iron resources in the island, CSC had to import

about 12 Mt/yr of iron ore from Australia, Brazil, and India (Steel Statistics Monthly, 2000).

On December 17, CSC and Yieh Loong Group (YLG), which were Taiwan's two largest steel producers, reached an agreement to form an alliance. CSC acquired 22.5% of YLG shares for \$43.8 million and intended to increase its share to 35% in 2000. After the acquisition, CSC would have about 65% of Taiwan's total hot-rolled coil production capacity. The total hot-rolled coil production capacity from CSC, Yieh Loong Steel Co., and Feng An Steel Co. Ltd. was about 7 Mt/yr; domestic consumption, however, was about 5 Mt/yr. The consolidation was expected to improve the hot-rolled coil quality and compete in overseas markets. CSC was expected to participate in YLG's integrated steel project in Taiwan (Free China Journal, 1999b; 2000 Iron and Steel Yearbook, 2000).

Sheng Yu Steel Co. Ltd. (Sysco) commissioned its second continuous galvanizing line, which had an output capacity of 250,000 t/yr, at the end of 1999. The total galvanized sheet production capacity for Sysco increased to 450,000 t/yr. Sysco also had two 100,000-t/yr each color-coating lines in its Kaohsiung plant. Hot-rolled feeds were mainly from local suppliers such as CSC, YLG, and An Feng Steel Co. Ltd. Construction and electronic sectors were major users for Sysco products (Metal Bulletin, 1999a, 2000a).

Taiwan's zinc sector was in a transitional period. Many zinc alloy production companies moved their production sites offshore, especially to sites in China, and reexported their products to Taiwan. The total zinc consumption was about 273,000 t in 1999. Diecasting and zinc alloys accounted for 48% of consumption, followed by galvanizing, 34%; brass making, 14%; and other sectors, 4%. In 2000, the zinc sector demand for zinc was expected to decline by 30% from that of 1999 (Metal Bulletin, 2000b).

The September earthquake did not cause heavy damage to petrochemical plants; problems in power supply and transportation caused by the damage of infrastructure around the epicenter of the earthquake in central Taiwan, however, affected petrochemical production. Chinese Petroleum Corp.'s (CPC) refinery in Taoyuan, DuPont Far Eastern's titanium oxide plant in Taoyuan, Nan Ya Plastics Co. in Mailiao, and Taiwan Fertilizer Co. in Toufen were shut down for a period of time.

CPC was the dominant player in all upstream and downstream petroleum activities. Although competition has been growing in the past couple of years in refinery and liquefied natural gas (LNG) imports under the energy liberalization program, CPC remained the sole explorer for and exploiter of onshore and offshore oil (Free China Journal, 1999a). In December, CPC signed a letter of intent with officials from Chiayi County to build the island's eighth cracker plant in Pudai. A feasibility study and an environmental impact assessment of the project were scheduled to begin in 2000. The \$19 billion naphtha cracker complex was expected to face serious challenges from environmentalists (Asian Chemical News, 2000a; Financial Times, 1999).

In December, Taiwan authorities granted a conditional approval for the construction of the island's seventh cracker complex. The \$10 billion project, which will be jointly

developed by Tuntex Group (52%) and YLG (48%), will include a 900,000-t/yr naphtha cracker plant and a 151,000-barrel-per-day refinery in Pinnan Industrial Park in Tainan County. The project, however, was put on hold because of the change of administration on the island. Tuntex reached an agreement with Australia LNG Pty Ltd. to supply 4 Mt of LNG from Australia beginning in 2003 (Asian Chemical News, 2000b; Chemical and Engineering News, 2000).

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TABLE 1
TAIWAN: PRODUCTION OF MINERAL COMMODITIES 1/

(Metric tons unless otherwise specified)

Commodity		1995	1996	1997	1998	1999
METALS						
Gold, primary	kilograms	11	11	9	9	13
Iron and steel, metal:						
Pig iron	thousand tons	6,056	6,050	8,870	9,374 r/	9,020
Ferrous alloys:						
Ferromanganese		13,136	14,059	12,130	12,532	--
Ferrosilicon		288	2,481	3,391	3,775	3,212
Steel, crude	thousand tons	11,605	12,655	15,478	17,192	16,027
Nickel, refined e/		10,000	10,000	10,500	9,700	10,000
INDUSTRIAL MINERALS						
Cement, hydraulic	thousand tons	22,478	21,537	21,522	19,652 r/	18,283
Clays:						
Fire clay		10,194	9,230	5,045	2,967	3,703
Kaolin e/		100,000	95,000	80,000	79,000	70,000
Feldspar		--	20	--	--	171
Gypsum, precipitated		3,136	2,603	2,317	2,221	336
Lime e/		650,000	650,000	650,000	800,000	800,000
Mica		9,792	8,510	7,806	7,750	7,000
Nitrogen, N content of ammonia		225,750	251,850	289,490 r/	231,419	146,228
Salt, marine		220,531	233,321	62,484	7,425	76,916
Sodium compounds, n.e.s.:						
Caustic soda		183,330	196,980	204,470	230,620	329,640
Soda ash e/		128,090 2/	128,000	127,000	126,000 r/	140,000
Stone:						
Dolomite	thousand tons	196	116	198	181	201
Limestone	do.	13,270	11,332	15,447	2,927	2,819
Marble	do.	16,975	17,528	18,071	17,519	17,755
Serpentine	do.	447	526	436	421	358
Sulfur		167,468	181,600	163,964	184,324	194,812
Talc		3,500	1,500	1,331	73	201
MINERAL FUELS AND RELATED MATERIALS						
Carbon black		90,384	100,234	103,450	100,000 e/	100,000 e/
Coal, bituminous		234,965	147,497	98,203	79,310	91,673
Gas, natural:						
Gross	million cubic meters	889	874	849	870	848
Marketed e/	do.	820	810	780	790	780
Petroleum:						
Crude	thousand 42-gallon barrels	369	358	319	340	296
Refinery products e/	do.	227,000	227,000	233,000	227,000	230,000

e/ Estimated. r/ Revised. -- Zero.

1/ Includes data available through August 30, 2000.

2/ Reported figures.

TABLE 2
TAIWAN: STRUCTURE OF THE MINERAL INDUSTRY IN 1999

(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.		Lucky Cement Corp.	Tungao	2,000
Do.		Chien Tai Cement Co. Ltd.	Kaohsiung	1,758
Do.		Hsing Tai Cement Co. Ltd.	Taipei	1,300
Do.		Taiwan Cement Corp.	Chutung	1,400
Do.		do.	Hualien	280
Do.		do.	Kaohsiung	1,900
Do.		do.	Suao	3,400
Do.		Universal Cement Corp.	Kaohsiung	1,550
Coal, bituminous		Numerous independent operators	Taipei Prefecture (12 pits)	200
Marble		Taiwan Marble Co., Ltd.	Panchiao	10
Nickel		Taiwan Nickel Refinery	Kaohsiung	14
Petroleum:				
Crude	thousand barrels per year	Chinese Petroleum Corp.	Chuhuangkeng and Tungzuchiao	850
Refinery products	thousand barrels per day	do.	Kaohsiung	570
Do.	do.	do.	Taoyuan	200
Do.	do.	Formosa Plastics Group	Yunlin	450
Steel		China Steel Corp.	Kaohsiung	10,000
Do.		Feng Hsin Iron and Steel Co. Ltd.	Taichung Hsien	1,000
Do.		Tang Eng Iron Work Co. Ltd.	Kaohsiung	288
Do.		Yieh United Steel Co.	do.	1,000
Sulfur		China Petrochemical Development Corp.	Taipei	50

e/ Estimated.