THE MINERAL INDUSTRY OF

TAIWAN

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With the rapid growth of gross national product (GNP) and per capita GNP, Taiwan's industrial structure has undergone dramatic changes in the past four decades. In 1950's, Taiwan was predominantly an agricultural economy, with more than half of the island's labor force in the agricultural sector, accounting for about one-third of the island's gross domestic product (GDP). In 1996, the agricultural sector dropped to only 3.5% of GDP. However, the manufacturing sector, which accounted for 13% of GDP in the 1950's, expanded to 30% in 1990's. Within the manufacturing sector, the capital and technology intensive industries rose to 74% and the labor intensive industries dropped to 26% in 1990's. Taiwan's manufacturing sector is moving to areas of high technology.

According to the Directorate General of Budget of Accounting and Statistics (DGBAS), Taiwan's GDP grew only 5.67% in 1996 that was lower than 6.17% predicted by DGBAS at the beginning of the year (Far Eastern Economic Review, 1997). It was the lowest economic growth since 1990. Reasons for the less than expected economic growth for 1996 are multifaceted. Exports grew negligibly, while imports declined because of global slowdown in foreign trade especially in electronic products. The weak real estate market and construction sector, the two typhoons in late July and early August, which seriously damaged the island's infrastructure systems and industrial facilities, slowed down the industrial production growth. Also, the combined government and private investments grew only 2.6% , the lowest since 1985. Foreign investments in Taiwan dropped more than 6% in 1996, compared with the same period of 1995. According to a survey by the Ministry of Economic Affairs, many Taiwan's manufacturers are gradually diverting their investments in countries of Southeast Asia (Taiwan Industrial Panorama, 1996b). Taiwan companies tend to set up overseas manufacturing bases that are close to their material resources and export markets. They also increase to establish overseas investment holding companies to provide their flexibility in handling financial activities globally. Unemployment rate was 2.6% in 1996, a 0.8% increase over that of 1995. The consumer price index rose by 3.07%, the lowest in the past 3 years. Recently, according to Switzerland-based International Institute of Management and Development, Taiwan's economic competitiveness ranking slipped from 18 to 24 (The Free China Journal, 1997b). Compared to its Asian neighbor, Taiwan is above China, Thailand, and the Philippines, but far behind Singapore and Hong Kong, which rank second and third place, respectively.

Taiwan authorities have a consistent policy to provide a favorable environment for private investment, stimulate investment potential, and attract investment from foreign "high-tech" companies. In 1996, the Ministry of Economic Affairs (MOEA) announced that the Government will provide incentives package to attract foreign investments in Taiwan (Chemical Week, 1996). Three categories of financial incentives are offered to foreign investors–tax preferences, financial subsidies, and preferential loans. The Government is making an effort to review and revise outmoded laws and regulations, simplify administrative procedures, and set up special agencies to help enterprises to upgrade technological investments.

The Ministry of Finance (MOF) decided to propose tariff reductions on a total of 1,121 import items by an average rate of 14.78%. The proposed tariff reductions aim to bring Taiwan's import policies in line with the trade liberalization standards of the Asia-Pacific Economic Cooperation forum. According to the ministry's proposal, the average nominal import tariffs on the 342 agricultural goods and 780 industrial items will be reduced by 14.47% and 15.77%, respectively (The Free China Journal, 1996). Tariffs on imported equipment related to power generation and media production will be reduced to zero to encourage the private sector to establish powerplants, easing the energy supply problem and developing the island to become the Asia and the Pacific media center. The proposed tariff reductions requires final approval by the Legislative Yuan.

The Executive Yuan approved new regulations for the statute governing the export processing zones. The regulations grant exemption status on tariffs, commodity taxes, business taxes to the machinery equipment, raw materials, samples and semifinished products imported into the export processing zones by manufacturers operating in the zones. Companies operating cargo shipment services in the zones will be taxed 10% their business income. The tax incentives are designed to attract more multinational companies to invest in the zones and to build Taiwan into an Asian Pacific operation center.

Based on the recommendation by the Central Bank of China, MOF decided to postpone the liberation of financial market to foreign investors from 1997 to the year 2000. At that time, it would bring the local market into alignment with the policies of the World Trade Organization. The Government reportedly believed that the growing competition would improve domestic financial management and upgrade the operational technology of local securities houses (The Free China Journal, 1997a).

The Government developed a set of programs to address major problems in the areas of land, environment, labor, tariff rates, and financing to improve domestic investment conditions. The Government urged the local business community to "keep their roots in Taiwan" and to stop the exodus. The plan indicated that those who make large, substantial investments would be given the opportunity to arrange for favorable financing through the issuance of corporate convertible bonds. Imports of essential raw materials and equipment would be given preferential tariffs or quota rates. Taiwan's Environment Protection Agency (EPA) would develop more flexible regulations for less-polluting industries such as electronics.

Industry production accounted for about 34% of the country's GNP. The Industrial Development Bureau (IDB) of the MOEA was the major Government agency dealing with industry affairs. IDB initiates specific industrial policies and development strategies. However, overall economic planning, coordination, and policy evaluation were handled by the Council for Economic Planning and Development (CEPD).

In Taiwan, total mining output was less than 1% of total industrial production. The major mining activities in Taiwan were coal, dolomite, limestone, marble, natural gas, and salt. Coal, natural gas, and salt were mined in western Taiwan. Marble and limestone quarries were operated in eastern Taiwan. The production of major mineral commodities is listed in table 1.

Because of a shortage of labor, Taiwan's industry shifted from labor-intensive products to technology- and capital-intensive goods. In 1996, the imports on metals and minerals accounted for more than 36% of the total imports. It reflected the demand for quality consumer goods and capital- and technology-intensive machines and equipment.

The demand for mineral products has continuously increased over the years, while local supplies keep dwindling. The bulk of domestic supply could meet only about 25% of the country's needs. Coal, oil, and natural gas are the country's most valuable mine products. Carbonate minerals, such as dolomite, limestone, and marble, compose the most important nonfuel mining sector. In addition to the aggregates, clays, feldspar, salt, and talc make up the remaining mine production. In the metals production sector, the country produces iron and steel and processes aluminum, copper, lead, nickel, tin, and zinc from imported raw materials. Major nonfuel and fuel producers are listed in table 2.

There are 12 cement companies with a total annual output capacity of 24 million metric tons (Mt). Domestic cement output has been declining in recent years. Output of cement fell below 23 Mt in 1996. Domestic consumption has also continued to fall, with an estimated 23 Mt in 1996. Taiwan's cement industry will face a shortage in 1997 when the mining rights on its east coast expire. Domestic cement production will be cut as much as 40% in 1997. Cement companies are looking for investment opportunities in other countries to construct greenfield plants and to expand the output capacity of their plants in the east to ensure the stable supply of cement for the island's needs. MOEA approved Chia Hsin Cement Corp.'s plan to invest $120 million to build a new cement plant in the Philippines. Taiwan Cement Corp. planned to invest $230 million to set up production lines in Indonesia, Malaysia, the Philippines, and Thailand.

Since the shutdown of the island's only copper smelter-refinery in 1991, Taiwan relies on imports for refined copper, mainly from Chile, the United States, and Japan. Over 200 copper-processing plants in Taiwan consumed more than 500,000 metric tons (t) of copper each year. Because of rising labor costs, difficulties in land acquisition, and stiffening environmental protection regulations, domestic secondary copper recovery companies moved less profitable scrap plants to neighboring countries.

CEPD decided to accelerate the privatization of three state-owned enterprises–Chinese Petroleum Corp. (CPC), Chunghwa Telecom Corp., and Taiwan Power Co. With the next 5 years, the Government will sell 30% of each company shares to the public, a total value of $11.64 billion at current market price. Each applicant will be eligible to purchase up to 3,000 shares. According to CEPD, the decision on limited purchase on company shares is to prevent the privatizing state-owned enterprises from being gobbled up and controlled by conglomerates (Taiwan Industrial Panorama, 1996a).

After intensive exploration in the past several years, the Central Geological Survey (CGS) announced the discovery of four potential gold-bearing regions in the Central Mountain Range of Taiwan. The resource in the Ilan County may contain an estimated of 100 t of gold. Geologists in Taiwan believe that the Juifang Gold Mine at the border of Taipei and Ilan Counties, a depleted gold mining area, still has a sizable amount of minable gold in undiscovered ore bodies at greater depth. CGS has developed a detail plan to further explore the entire prospective areas in the Central Mountain Range. If the gold resources appear to be economically feasible for mining, the Government will seek foreign investors to mine the deposits.

With the support from the Taiwan authorities, Kuei Yu Industrial Group has secured loans from banks to build a $2.1-billion steel plant in Taichung. The new plant would have an annual production capacity of 3.25 Mt of crude steel. China Steel Corp. (CSC) will have a 30% share in the steel plant.

CSC commissioned its fourth blast furnace on November 11, 1996. The 2.4-million-metric-ton-per-year (Mt/yr) furnace began commercial production at yearend. The total output capacity of crude steel in CSC expands to 8.04 Mt/yr. CSC signed a contract with Companhia Vale do Rio Doce (CVRD) of Brazil to supply 1.8 Mt/yr of iron ore from CVRD's Itabira and Carajas. The extended 10-year contract will end0 March 2007. Brazil ranks behind Australia as the second largest iron ore supplier to Taiwan. Australia and Brazil supplied for about 90% of Taiwan's 10 Mt iron ore imports in 1996.

Yeih Loong Group (YLG) placed an order with Japan's Ishikawajima-Harima Heavy Industries Ltd. to supply three blast furnaces with an annual total output capacity of 7.5 Mt of crude steel and 2.3 Mt of hot coil in Chiku, Tainan County. The volume of each furnace is 3,800 cubic meters. The first unit will be installed in 1999 and the other two units will be added over the next 2 years. YLG also signed a contract with Thyssen Still Otto to supply a 4.5-Mt/yr coke plant. The coke plant will comprise 5 batteries with 59 ovens in each, 3 complete sets of coke oven machinery, a coal handling facility, and a three-steam gas cleaning plant.

An Feng Steel Co. of Taiwan and Kingsteam Resources NL of Australia agreed to merge into a new entity, An Feng Kingsteam. The agreement is subjected to shareholder approval. An Feng will hold 82.6% of the new company and existing Kingsteam shareholders will have 17.4%. The headquarter of the new company will be in Kaohsiung, Taiwan. The new company will solely own the hot strip mill in Kaohsiung and will have 40% interest in a 1 Mt/yr cold rolling mill and 600,000 metric tons per year galvanizing plant which both are under construction in Kaohsiung. The new company also will wholly own the iron ore mine and the steel plant in Western Australia where construction is expected to begin in 1997.

Baker Refractories of the United States formed a joint venture with Envoy Enterprises Ltd. of Taiwan to build a refractory production plant at Kaohsiung in Taiwan. The new plant will produce magnesia-dolomite monolithic for electric arc furnace. Domestic production of refractory minerals is limited to dolomite and fireclay. The output of these minerals has declined in recent years. Taiwan relies heavily on imported refractory minerals to supply its refractory manufacturers. Imports of alumina, magnesia, fireclay, and zircon have all increased.

Taiwan's coal production has been continuously declining in the last several years, while coal imports has been increasing sharply. In 1996, Taiwan imported more than 30 Mt of different kinds of coal from Australia, Indonesia, South Africa, China, United States, and Canada. Imports from Australia and China were increased by a double-digit level in 1996 from those of 1995 but those from Canada declined sharply.

As part of its bid to gain admittance to the World Trade Organization, the Government is planning to open its oil market and to end the monopoly of oil imports and refining that is operated by CPC. Taiwan's domestic oil market is expected to undergo some changes. Preferential oil prices policies to certain sector such as the island's railway and the military will be affected. According to the provisions of Taiwan's Fair Trade Act, enacted in 1991, CPC will have a 5-year grace period to phase out such preferential or monopolistic practices. According to an official from the Energy Commission, the opening of the oil market will be a step-by-step approach to assure a stable transition from a closed to an open market (Taiwan Industrial Panorama, 1996a).

CPC and Conoco Inc. of the United States agreed to jointly explore for oil and gas in three areas in the Taiwan Strait. Conoco will spend at least $65 million during in the next 5 years to drill at least 13 wells in the Taiwan Strait. Conoco will fund the entire cost of drilling the first four wells, with CPC contributing 25% of all drilling costs thereafter. The two companies will share equally any oil production that results. In the case of a commercial gas development, CPC has agreed to purchase all gas produced in those wells.

Offshore Petroleum Investment Corp., a subsidiary of CPC, signed an agreement with China National Offshore Oil Co. to jointly explore oil and liquefied natural gas in the Pearl River Delta. CPC will conduct the project through its subsidiary because the Taiwan authorities ban direct cooperation, investment, and trade between China and Taiwan. Under the agreement the two companies will contribute $500,000 each in the next 2 years to develop offshore fields and to share the expenses and profits equally. The 15,400 square kilometer exploration site is 250 kilometers (km) southwest of Kaohsiung in Taiwan and 150 km south of Shantou in China. CPC is considering to import crude oil from China as a means of diversifying Taiwan's energy sources. However, the CPC's refineries are designed to process Middle East crude oil. About 63% of the island's oil imports are from the Middle East, while the rest is from Southeast Asia, Africa, and Alaska.

Upon the completion of the second phase expansion of the Yung-an LNG Receiving Terminal at Kaohsiung, CPC increased its import of LNG to 2.62 Mt in 1996. About 73% of LNG was imported from Indonesia and the remaining was shipped from Malaysia.

Bayer AG of Germany faces a strong opposition from local residents and environmental groups for its $1.8 billion toluene diisocyanate plant on the reclaimed land near Taichung Harbor in the central of Taiwan. The plant was designed to have an annual output of 100,000 t of toluene diisocyanate, of which, 90% is expected to be exported to the Asia markets. According to an official from Bayer in Taiwan, Bayer decided to build toluene diisocyanate plant because Taiwan has ample high-tech labor force and is located at strategic geographic position. The company estimated that the demand of toluene diisocyanate will be 40,000 t in Taiwan, while in the Asia and the Pacific region, it will reach 400,000 t of the materials by the year 2000. The provincial government has ordered Bayer to conduct a second environmental study on the impact of its chemical complex in the area.

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TABLE 1
TAIWAN: PRODUCTION OF MINERAL COMMODITIES 1/

(Metric tons unless otherwise specified)

Commodity		1992	1993	1994	1995	1996
METALS						
Gold, primary	kilograms	(2/)	(2/)	5	11 r/	10 e/
Iron and steel, metal:						
Pig iron	thousand tons	5,292	6,116	5,941	6,056	6,050
Ferroalloys:						
Ferromanganese		37,802	13,628	7,000 e/	5,000 e/	5,000 e/
Ferrosilicomanganese		3,991	--	--	--	--
Ferrosilicon		2,606	689	500 e/	400 e/	500 e/
Steel, crude	thousand tons	10,705	12,038	11,590	11,605	12,655
Nickel, refined e/		10,000	9,000	10,000	10,000	10,000
INDUSTRIAL MINERALS						
Cement, hydraulic	thousand tons	21,464	23,971	23,722	22,478	21,537
Clays:						
Fire clay		55,008	35,094	24,354	10,194	9,230
Kaolin e/		100,000	100,000	100,000	100,000	95,000
Feldspar		2,216	1,716	778	--	20
Gypsum, precipitated		1,673	3,182	2,876	3,136 r/	3,000 e/
Lime e/		669,712 3/	650,000	650,000	650,000	650,000
Mica		11,038	9,751	5,220	9,792 r/	9,000 e/
Nitrogen, N content of ammonia		223,719	219,781	215,377	225,750	251,850
Salt, marine		25,732	176,298	185,987	220,531	233,321
Sodium compounds, n.e.s.:						
Caustic soda		131,223	140,978	171,840	183,330	196,980
Soda ash		91,497	89,283	128,327	128,090	128,000 e/
Stone:						
Dolomite	thousand tons	254	281	264	196	116
Limestone	do.	16,885	13,085	13,297	13,270	11,332
Marble	do.	14,604	17,713	17,740	16,975	17,528
Serpentine	do.	405	433	475	447	526
Sulfur		118,621	153,076	154,778	167,468	181,600
Talc		6,085	5,015	4,290	3,500 r/	3,400 e/
MINERAL FUELS AND RELATED MATERIALS						
Carbon black		65,409	62,527	80,691	90,384	100,234
Coal, bituminous	thousand tons	335	328	285	245	147
Gas, natural:						
Gross	million cubic meters	872	826	867	889	874
Marketed e/	do.	840	790	820	820	810
Petroleum:						
Crude	thousand 42-gallon barrels	452	445	431	369 r/	400 e/
Refinery products:						
Gasoline	do.	40,740	44,050	47,320	50,150 r/	52,780
Kerosene e/	do.	2,000	2,000	2,000	2,000	2,000
Diesel oil	do.	30,800	33,840	36,540	37,150 r/	36,140
Fuel oil	do.	81,870	84,820	88,580	99,630 r/	95,900
Lubricants fuel oil e/	do.	1,000	1,000	1,000	1,000	1,000
Asphalt. e/	do.	3,000	3,000	2,500	2,500	2,500
Liquefied petroleum gas	do.	14,880	15,010	15,380	15,490 r/	15,520
Other 4/	do.	8,120	7,990	17,300 r/	19,240 r/	20,810
Total e/	do.	182,410	191,710	210,620 r/	227,160 r/	226,650

e/ Estimated. r/ Revised.
1/ Includes data available through June 24, 1997.
2/ Less than 1 unit.
3/ Reported.
4/ Includes naphtha, solvent oil, and base oil.

TABLE 2
TAIWAN: STRUCTURE OF THE MINERAL INDUSTRY FOR 1996

(Thousand metric tons unless otherwise specified)

Commodity		Major operating companies	Location of main facilitites	Annual capacity e/
Cement		Asia Cement Corp.	Hsinchu	1,800
Do.		do.	Hualien	11,150
Do.		Chia Hsin Cement Corp.	Kaoshiung	2,200
Do.		Lucky Cement Corp.	Tungao	1,800
Do.		Chien Tai Cement Co. Ltd.	Kaoshiung	1,758
Do.		Hsing Tai Cement Co. Ltd.	Taipei	1,300
Do.		Taiwan Cement Corp.	Chutung	1,400
Do.		do.	Hualien	280
Do.		do.	Kaoshiung	1,900
Do.		do.	Suao	2,230
Do.		Universal Cement Corp.	Kaoshiung	1,400
Coal, bituminous		Numerous independent operators	Taipei Prefecture (22 pits)	400
Marble		Taiwan Marble Co., Ltd.	Panchiao	10
Nickel		Taiwan Nickel Refinery	Kaoshiung	12
Petroleum:				
Crude	thousand barrels per year	Chinese Petroleum Corp.	Chuhuangkeng and Tungtzuchiao	850
Refinery products	thousand barrels per day	do.	Kaoshiung	570
Do.	do.	do.	Taoyuan	200
Steel		China Steel Corp.	Kaoshiung	8,100
Do.		Tung Eng Iron Work Co. Ltd.	do.	90
Sulfur		China Petrochemical Development Corp.	Taipei	50

e/ Estimated.