



# 2010 Minerals Yearbook

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**TAIWAN**

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# THE MINERAL INDUSTRY OF TAIWAN

By Pui-Kwan Tse

Taiwan's economy was oriented towards exports. In 2009, external demand for manufactured products was weak because the European Union and the United States were in recession. In 2010, as the global economy improved, increased demand for manufactured products from overseas led to a 30% increase in private investment. Public investment also increased modestly during 2010. As a result of the strong demand for manufactured goods, exports of electronic and chemical products increased by 40%, and exports of metal and plastic products, by 30%. The island's gross domestic product (GDP) increased by 10.8% in 2010 compared with a decrease of 1.9% in 2009. Production of manufactured goods increased by 26.8%. Construction activity increased by 10.9% and the activities in the service sector increased by 4.8%. In 2010, exports of goods were valued at \$279 billion, which was a 29% increase compared with the value in 2009. The value of imports also increased to \$256 billion in 2010, or by 38% from that of 2009. Coal, oil, and raw materials were the major imported commodities. China was Taiwan's leading trade partner followed by Japan, the United States, and Hong Kong. China accounted for 28.0% of Taiwan's total export value and Japan accounted for 20.7% of the island's total import value (Taiwan Statistical Bureau, 2011, p. 3, 41; Ministry of Finance, 2011a, b).

## Minerals in the National Economy

Mineral resources of significance identified on the island included clay, coal, copper, dolomite, feldspar, gold, gypsum, natural gas, petroleum, serpentine, and talc. After several decades of mining, nearly all the recoverable coal, metallic minerals, and talc had been depleted. The output of the mining industry, which had a very small effect on the island's economy, was less than 1% of total industrial production. In 2010, the mining sector employed about 4,000 people (Taiwan Statistical Bureau, 2011, p. 13).

## Production

The major mining activities in Taiwan were the production of dolomite, limestone, marble, natural gas, and petroleum. Natural gas and petroleum were produced on the western part of the island, and limestone and marble were mined on the eastern part of the island. The production value of the major mineral commodities was \$316 million, of which \$120 million was from marble and \$118 million was from natural gas. Besides natural gas and marble, petroleum was the island's most valuable mineral commodity. Because Taiwan had no domestic primary aluminum, copper, lead, or zinc smelting capacity, downstream metal producers relied on imports of ingots and scrap to produce products from these metals. Owing to high labor costs, environmental problems, and weak domestic demand, the output of these industries had gradually decreased during the past several

years, and companies had moved their manufacturing facilities to mainland China and Southeast Asian countries. In 2010, the production of dolomite, iron, steel, and silica sand increased significantly but the output of fireclay, limestone, mica, and serpentine decreased sharply (Taiwan Bureau of Mines, 2011).

## Structure of the Mineral Industry

Table 2 is a list of major mineral industry facilities.

## Commodity Review

### Metals

**Aluminum.**—Without any primary aluminum production on the island, aluminum product producers depended on imports of aluminum ingot and scrap to meet their needs. Owing to high production costs and a shortage of raw materials, many aluminum producers either closed down their operations or moved their production facilities to China or countries in Southeast Asia. In 2010, the island imported 354,927 metric tons (t) of unwrought aluminum, 185,317 t of aluminum alloys, and 163,112 t of scrap to meet domestic demand. Unwrought aluminum was imported from Iran, Tajikistan, South Africa, New Zealand, and Australia (in descending order of volume of imports). Owing to increased demand for aluminum alloy on the island, CS Aluminum Corp. (CS Aluminum), which was a subsidiary of China Steel Corp. (CSC), expanded its aluminum products output capacity to 158,000 metric tons per year (t/yr) in 2008 from 122,000 t/yr in 1998. The company was expanding its rolling mill output capacity by 15,000 t/yr to 36,000 t/yr to meet the domestic demand for alloy products in the electronics sector (CS Aluminum Corp., 2011; Ministry of Finance, 2011b, p. 3–631–3–632).

**Copper.**—Without any refined copper production, the island relied on imported copper to meet its demand. In 2010, Taiwan imported 534,112 t of refined copper, 549,493 t of copper alloys, and 60,149 t of scrap. Copper metal was mainly from Chile, Japan, Australia, the Philippines, and Indonesia (in descending order of volume of imports). Because of a surging demand for copper from the electronics sector, Taiwan's copper consumption was estimated to have increased to 1 million metric tons (Mt) in 2010 from 660,000 t in 2004 (Ministry of Finance, 2011b, p. 3–621–3–622).

**Iron and Steel.**—Taiwan was the 12th ranked crude steel producer in the world and the 5th ranked producer in Asia behind China, Japan, India, and the Republic of Korea. Owing to the increased demand for steel products in 2010, crude steel output returned to the pre-recession level. Many international iron and steel producers had reduced their output in 2009 if the quoted steel prices were lower than production costs. As a result, a shortage in the supply of steel products pushed prices of steel products higher in the first half of 2010. CSC was the only

integrated iron and steel producer on the island. In 2010, Taiwan imported 18.9 Mt of iron ore mainly from Australia, 67.0%; Brazil, 26.8%; and Canada, 4.8% (Ministry of Finance, 2011b, p. 3–112; World Steel Association, 2011).

The first 2.5-Mt blast furnace of CSC's subsidiary Dragon Steel Corp. (formerly known as Kuei Yu Steel Corp.) began operating in February. SMS Siemag was contracted to supply two new carbon steel converters. The first converter would be put into operation in early 2010 and would have an output capacity of 2.2 million metric tons per year (Mt/yr) of steel. A complete bin system for ferroalloys was included in the contract. The company's stage 2 phase 1 expansion project was completed in June. Dragon Steel would supply hot-rolled products to CSC customers, and CSC would shift some production from hot-rolled to cold-rolled to improve the product mix. The CSC group's steel output capacity reached 13.4 Mt/yr, and it produced 12.7 Mt of crude steel in 2010, of which 9.7 Mt was from CSC. CSC accounted for 62.0% of the island's total output. Dragon Steel planned to add a second blast furnace at its site to increase its crude output capacity to 5 Mt/yr. Also, CSC planned to increase its high-value production line output capacity to meet the demand in the domestic market. CSC planned to invest \$6.5 billion during the next 4 years to acquire shares in overseas coal and iron ore mines (China Steel Corp., 2011).

Because of China's increasing demand for ferroalloy raw materials, the prices of the raw materials in international markets were expected to increase in the near future. CSC worked with its foreign counterparts to secure raw material for its domestic consumption. CSC planned to acquire a 5% share in Dongbu Metal Co. Ltd. of the Republic of Korea. Ferroalloy was the main product of Dongbu Metal. During the past two decades, Dongbu Metal was a major ferroalloy supplier to CSC (South East Asia Iron and Steel Institute, 2010a).

Under the Economic Cooperation Framework Agreement between mainland China and Taiwan, which was signed in June 2010, imported tariff rates on Taiwanese carbon and stainless steel products to mainland China would be reduced starting on January 1, 2011. The tariff rate on imported products taxed at 5% or less would be cancelled, and that on products taxed between 6% and 15% would be reduced to 5% in 2011 and would be abolished in the following year. It was expected that steel products exported from Taiwan to mainland China would increase in the future (South East Asia Iron and Steel Institute, 2010b).

### **Industrial Minerals**

**Cement.**—Owing to a lack of limestone resources and a limited market on the island, Taiwan cement producers had gradually moved their production base to China in the late 1990s and expanded their cement output capacities there. Taiwan's leading cement producer, Taiwan Cement Corp. (TCC), was positioned to take advantage of the market in southern China and to be a high-end cement producer there. TCC's investment strategy in China was to make direct investments and to form joint ventures with local cement producers. In 2010, TCC produced 40.4 Mt of cement in mainland China, and the company planned to increase its output in China to 55 Mt in 2011. TCC's cement output in mainland China was

twice that of the total cement output in Taiwan. TCC produced 9.4 Mt of cement in Taiwan, which accounted for about 58% of the island's total output. The company planned to build new plants in mainland China. The company acquired cement plants that had a total combined output capacity of 16 Mt/yr from Hong Kong-based Prosperity Minerals Ltd. in 2010. The company also acquired a 1-Mt/yr-output-capacity plant in Guizhou Province, China, from Kaili Shui On Co. (which was headquartered in Guizhou Province), and added two more production lines with a total capacity of 3 Mt/yr at the Guizhou plant. The company's total cement output capacity would reach 7 Mt/yr in Guizhou. TCC was planning to increase its cement production capacity in mainland China to 100 Mt/yr by yearend 2014. Another Taiwanese cement producer, Asia Cement Corp., also had cement plants in the mainland China Provinces of Hubei, Jiangxi, and Sichuan, and planned to expand its cement production capacity in Sichuan Province. In 2010, Asia Cement had a total cement output capacity of 20 Mt/yr in mainland China and Taiwan (Taipei Times, 2011).

### **Mineral Fuels**

**Coal.**—Taiwan had no domestic coal production and depended on imported coal to meet its demand for coal. Taiwan Power Co. was the leading coal consumer followed by the cement and iron and steel sectors. In 2010, Taiwan imported 63.2 Mt of coal, which was an increase of 8.0% from the amount imported in 2009; of that amount, 53.2 Mt was for power generation. Bituminous coal was mainly from, in decreasing order of supply, Australia, Indonesia, China, South Africa, and Colombia. The island consumed 62.9 Mt of coal in 2010 (Taiwan Bureau of Energy, 2011, p. 44–51; Ministry of Finance, 2011b, p. 3–115).

**Natural Gas and Petroleum.**—With its limited mineral fuel resources, Taiwan produced only about 1.8% of its natural gas and petroleum requirements and relied on imports—mainly through long-term contracts with Indonesia, Malaysia, and Qatar—to fill the gap. Liquefied natural gas (LNG) imports increased by about 8% per year during the past decade. In 2010, Taiwan imported a total of 14.5 million cubic meters of LNG from Qatar, Malaysia, Indonesia, and Australia (in descending order of volume of imports), which accounted for 75% of the island's total LNG imports. Taiwan consumed 13.4 million cubic meters of LNG, of which power generation accounted for 87.1%. In 2010, the island imported 319 billion barrels of crude oil from Saudi Arabia, Kuwait, Angola, Iraq, and Iran (in descending order of volume of imports), which accounted for 80% of total imports (Taiwan Bureau of Energy, 2011, p. 52–56).

### **Outlook**

Taiwan's economic growth is heavily dependent on external trade. The slow economic recovery in the United States and other developed countries in the West is expected to increase demand for its exports. Trade and investments between Taiwan and China are expected to continue to increase in the years to come. Economic growth in Taiwan is expected to increase slowly during next 2 years and to be more dependent on the economic growth in the Asia and the Pacific region. The service

sector accounts for more than 70% of the GDP and, given the island's limited mineral resources, the mining sector is expected to have only a minimal effect on the island's economy in the future. The growth of manufacturing is likely to be led by the computer, electronics components, and telecommunication products sectors. The island relies on imports of raw materials to support its iron and steel and nonferrous metals sectors. The rising prices of these raw materials could affect producers' profit margins, and tightened environmental regulations may force nonferrous metal and steel producers to relocate their production facilities to mineral-rich countries with lower labor costs. The island has been gradually transforming from a labor-intensive manufacturing sector to a knowledge-intensive service sector. The Taiwan authorities continue their effort to promote the island as a green island and to ease restrictions on economic ties with China, primarily in the areas of investment, tourism, trade, and transportation. Such changes would likely stimulate growth in the service sector.

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TABLE 1  
TAIWAN: PRODUCTION OF MINERAL COMMODITIES<sup>1</sup>

(Metric tons unless otherwise specified)

Commodity		2006	2007	2008	2009	2010
<b>METALS</b>						
Iron and steel:						
Pig iron	thousand metric tons	10,500	10,550	9,750	7,939	9,358
Steel, crude	do.	19,203	20,883	19,222	15,566	20,498
Nickel, refined <sup>c</sup>		11,000	11,000	11,000	11,000	11,000
<b>INDUSTRIAL MINERALS</b>						
Cement, hydraulic	thousand metric tons	19,294	18,957	17,330	15,918	16,301
Fire clay		125	1,121	746	9	--
Lime <sup>c</sup>		440,000	450,000	450,000	450,000	460,000
Mica		4,841	3,387	3,179	557	--
Nitrogen, liquid <sup>c</sup>		800,000	800,000	800,000	800,000	800,000
Silica sand		91,308	193,135	249,824	328,153	305,882
Sodium compounds: <sup>c</sup>						
Caustic soda		570,000	570,000	570,000	570,000	570,000
Soda ash		140,000	140,000	140,000	140,000	140,000
Stone:						
Dolomite	thousand metric tons	61	94	104	70	117
Limestone	do.	351	210	227	232	45
Marble	do. *	25,493	26,452	25,811	24,146	25,118
Serpentine	do.	304	280	264	242	97
Sulfur		245,789	249,156	211,869	252,392	231,700
<b>MINERAL FUELS AND RELATED MATERIALS</b>						
Gas, natural:						
Gross	million cubic meters	463	417	357	351	290
Marketed <sup>c</sup>	do.	410	380	310	310	250
Petroleum:						
Crude	thousand 42-gallon barrels	148	112	101	101	91
Refinery products	do.	421,100	446,800	443,200	410,000	445,000

<sup>c</sup>Estimated; estimated data are rounded to no more than three significant digits. do. Ditto. -- Zero.

<sup>1</sup>Table includes data available through July 18, 2011.

\*Correction posted on August 11, 2014.

TABLE 2  
TAIWAN: STRUCTURE OF THE MINERAL INDUSTRY IN 2010

(Thousand metric tons unless otherwise specified)

Commodity	Major operating companies	Location of main facilities	Annual capacity <sup>e</sup>	
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	1,600	
Do.	do.	Hualien Hsien	5,600	
Do.	do.	Suao	3,400	
Do.	Universal Cement Corp.	Kaohsiung	1,550	
Marble	Taiwan Marble Co., Ltd.	Panchiao	15	
Nickel	Taiwan Nickel Refinery	Kaohsiung	14	
Petroleum:				
Crude	thousand 42-gallon barrels per year	Chinese Petroleum Corp.	Chuhuangkeng and Tungtzechiao	850
Refinery products	do.	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.		Dragon Steel Corp. (China Steel Corp.)	Taichung Hsien	2,500
Do.		Tang Eng Stainless Steel Plant	Kaohsiung	300
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	280

<sup>e</sup>Estimated; estimated data are rounded to no more than three significant digits. Do., do. Ditto.