



# 2013 Minerals Yearbook

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TAIWAN

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# THE MINERAL INDUSTRY OF TAIWAN

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Taiwan is an island with limited mineral resources. Taiwan's economy was oriented towards exports, and the health of the economy was highly dependent on conditions in the world markets. In 2013, economic conditions in the European Union and the United States remained weak. Exports of goods and services accounted for 75% of the island's economic growth in 2013. Demand for Taiwan's goods from Asian markets increased in 2013 compared with that in 2012; these markets accounted for more than 60% of Taiwan's total exports. China was the leading destination for Taiwan's goods and received 26.8% of the total value of exports; other destinations were Hong Kong (12.9%), the United States (10.7%), and Singapore and Japan (6.4% each). Electronics remained Taiwan's leading exported products and accounted for about 35% of total exports in 2013. Mineral products accounted for 10% of the total value of exports. In anticipation of stronger external demand, private investment increased by 7.4%; however, owing to budgetary consolidation, government investment decreased. As a result, total investment increased by 3.5%, which was a reverse of the decrease in growth of the previous 2 years. Taiwan's gross domestic product (GDP) increased by 2.1% in 2013 compared with increases of 1.5% and 4.2% in 2012 and 2011, respectively. The output value of the mining and quarrying sector decreased by 1.3% in 2013, and the sector accounted for only a small share of Taiwan's GDP. The output value of the service sector increased by a modest 1.7%; this sector accounted for 68.3% of the GDP (Taiwan Statistical Bureau, 2014, p. 3, 39–43).

## Minerals in the National Economy

Taiwan's historically significant identified mineral resources included clay, coal, copper, dolomite, feldspar, gold, gypsum, natural gas, petroleum, serpentine, and talc. After several decades of mining, however, nearly all recoverable coal, metallic minerals, and talc have been depleted. The output of the mining industry, which accounted for a very small part of Taiwan's economy, was less than 1% of total industrial production. In 2013, employment in the mining sector was about 2,758 people (Bureau of Mines, 2014, p. 10; Taiwan Statistical Bureau, 2014, 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. In 2013, the production value of the major mineral commodities was \$393 million, which was 13.8% less than that in 2012. Of this amount, \$236 million was from natural gas and \$90 million was from marble. Besides natural gas and marble, sulfur was Taiwan'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 has gradually decreased during the past several years, and companies have moved their manufacturing facilities to mainland China and Southeast Asian countries. In 2013, the production of dolomite, natural gas, and petroleum decreased, but the output of iron and steel, mica, sulfur, and talc increased (table 1) (Bureau of Mines, 2014, p. 8).

## Structure of the Mineral Industry

Table 2 is a list of major mineral industry facilities.

## Commodity Review

### Metals

**Aluminum.**—Owing to increased demand for aluminum alloy on the island, C.S. Aluminium Corp., which was a subsidiary of China Steel Corp. (CSC), planned to expand its aluminum products output capacity to 319,000 metric tons per year (t/yr) in 2014 from 167,000 t/yr in 2010. The company started the second phase of its aluminum alloy production capacity expansion in 2011. Taiwan consumed about 180,000 t of aluminum alloy in 2013, of which the electronics sector consumed about 41% followed by packaging, 26%; construction, 9%; machinery, 8%; and others, 16% (C.S. Aluminium Corp., 2014).

**Copper.**—With no refined copper production, Taiwan relied on imported copper to meet its demand. In 2012 (the latest year for which data were available), Taiwan imported 435,534 t of refined copper, 458,242 t of copper alloys, and 93,767 t of scrap. Refined copper was mainly from, in descending order of tonnage of imports, Chile, Japan, Australia, Peru, and the Democratic Republic of the Congo [Congo (Kinshasa)], and copper alloy was from Japan, Russia, the Republic of Korea, and Ukraine. In 2013, Taiwan produced 382,473 t of copper wire, 166,479 t of copper cable, and 149,975 t of other copper fabricated products. Because of surging demand for copper from the electronics sector, Taiwan's copper consumption was estimated to be about 1 million metric tons (Mt) in 2013 (Ministry of Finance, 2013, p. 3-635–3-636; Ministry of Economic Affairs, 2014, p. 82–83).

**Iron and Steel and Iron Ore.**—Taiwan was the fifth-ranked iron and steel producer in Asia behind China, Japan, India, and the Republic of Korea. Owing to the increased demand for steel products and the improved global steel market, especially in Europe, Taiwan's steel producers increased their steel output in 2013. Production of carbon steel slabs and billets increased by 7.7% to 21.5 Mt. The output of hot-rolled

sheets and coils also increased. Part of the increase in steel production was from the startup of a second blast furnace at the Dragon Steel Corp. (a subsidiary of CSC) facility in 2013 (World Steel Association, 2014).

CSC, which was the only integrated iron and steel producer in Taiwan, invested \$6.7 billion to increase the company's output capacity to 20 million metric tons per year (Mt/yr) in the next several years. The company's subsidiary Dragon Steel had completed the construction of a 2.5-Mt/yr blast furnace in 2010 and completed the installation of a second 2.5-Mt/yr blast furnace in 2013. After completing the second phase of expansion in 2014, Dragon Steel would have a crude steel output capacity of 6.2 Mt/yr, of which 1.2 Mt/yr was from an electric arc furnace. CSC and Dragon Steel together would have a total crude steel output capacity of more than 16 Mt/yr (China Steel Corp., 2014).

With no iron ore resources, Taiwan imported about 19 Mt of iron ore in 2013, mainly from Australia, Brazil, and Canada. Imports of iron ore were expected to increase when a second blast furnace at Dragon Steel becomes fully operational in 2014. During the past several years, CSC tried to secure iron ore resources in Australia and other countries. CSC's subsidiary CSC Steel Australia Holding Pty Ltd. invested \$290 million to acquire a 3.95% share in ArcelorMittal Mines Canada's (ArcelorMittal Mines) Labrador Trough iron ore project in Canada. CSC and Pohang Iron and Steel Corp. of the Republic of Korea together held a 15% stake in ArcelorMittal Mines' iron ore project. CSC would receive 1 Mt/yr of iron ore from ArcelorMittal Mines (ArcelorMittal Mines Canada, 2013).

### **Industrial Minerals**

**Cement.**—Owing to a lack of limestone resources and a limited market on the island, many of Taiwan's cement producers had gradually moved their production base to China in the late 1990s and expanded their cement output capacities there. Most of Taiwan's cement producers were located in the eastern part of the island, which accounted for more than 80% of Taiwan's total output capacity. In 2013, Taiwan had an output capacity of 26 Mt/yr of cement and it produced about 16 Mt of cement and consumed about 12 Mt. Taiwan exported 4.3 Mt of cement to Ghana, Malaysia, Indonesia, Mauritius, and Australia, in descending order of tonnage exported. Taiwan's cement consumption decreased gradually to about 12 Mt in recent years from 28 Mt in the 1990s, and cement exports increased. The Taiwan authorities planned to cap cement exports at 30% of the total output by 2015 to encourage cement producers to phase out old, inefficient plants (Taiwan Cement Corp., 2014, p. 40–41).

### **Mineral Fuels**

**Coal.**—Taiwan has had no domestic coal production for more than a decade 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 2013, Taiwan imported 65.9 Mt of coal, which was an increase of 2.0% from the amount imported in 2012 and about 1.0% less than that of 2011; of that amount, 45.5 Mt was for power generation, 7.7 Mt was for coking coal production, and 1.1 Mt

was for blast furnaces. Thermal coal was imported mainly from Australia, Indonesia, South Africa, Russia, and China, in descending order of tonnage imported. Taiwan consumed 64.0 Mt of coal in 2013 (Bureau of Energy, 2014a).

**Natural Gas and Petroleum.**—With limited mineral fuel resources, Taiwan produced less than 1% of its petroleum requirements and relied on imports to meet the remaining demand—mainly through long-term contracts with Saudi Arabia, Kuwait, Angola, Oman, Iraq, and the United Arab Emirates, in descending order of supply. Taiwan imported a total of 16.8 billion cubic meters of liquefied natural gas (LNG) from Qatar, Malaysia, and Indonesia, in descending order of volume of imports, which accounted for 87% of the island's total LNG imports. Taiwan consumed 15.7 billion cubic meters of LNG, of which power generation accounted for 80.1% (Bureau of Energy, 2014b).

### **Outlook**

Taiwan's economic growth is heavily dependent on external trade. The economic recovery in the United States and other developed countries is expected to expand Taiwan's 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 the next 2 years and be more dependent on the economic growth in the Asia and the Pacific region. Given Taiwan's limited mineral resources, the mineral sector is expected to have only a minimal effect on its economy in the future. The growth of the manufacturing sector is likely to be led by the computer, electronics components, and telecommunication products sectors. Taiwan relies on imports of raw materials to support its iron and steel and nonferrous metals sectors. The prices of these raw materials could affect producers' profit margins, and tightened environmental regulations may force nonferrous metals and steel producers to relocate their production facilities to mineral-rich countries with lower labor costs. Taiwan's economy has gradually been transforming from one that is led by a labor-intensive manufacturing sector to one that is led by a knowledge-intensive service sector. Taiwan authorities continue their efforts to promote Taiwan 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	2009	2010	2011	2012	2013	
<b>METALS</b>						
<b>Iron and steel:</b>						
Pig iron	thousand metric tons	7,939	9,358	12,940	11,800	13,400
Steel, crude	do.	14,086 <sup>r</sup>	18,975 <sup>r</sup>	21,927 <sup>r</sup>	19,927 <sup>r</sup>	21,466
Nickel, refined <sup>c</sup>		11,000	11,000	11,000	11,000	11,000
<b>INDUSTRIAL MINERALS</b>						
Cement, hydraulic	thousand metric tons	15,918	16,301	16,852	15,806	16,553
Fire clay		9	--	--	--	--
Lime <sup>c</sup>		450,000	460,000	460,000	450,000	460,000
Mica		557	--	1,455	6,844	8,931
Nitrogen, liquid		346,000	334,000	328,000	316,000	320,000 <sup>c</sup>
Silica sand		328,153	305,882	173,354	58,157	61,718
Sodium compounds, caustic soda		1,662,793	1,782,680	1,693,241	1,727,597	1,700,000 <sup>c</sup>
<b>Stone:</b>						
Dolomite		69,853 <sup>r</sup>	117,466 <sup>r</sup>	67,459 <sup>r</sup>	47,489 <sup>r</sup>	37,752
Limestone		232,491 <sup>r</sup>	45,270 <sup>r</sup>	6,526 <sup>r</sup>	6,080 <sup>r</sup>	5,800
Marble (raw material)	thousand metric tons	24,145	25,118	24,351	22,524	21,714
Serpentine (raw material)		242,809 <sup>r</sup>	97,544 <sup>r</sup>	63,663 <sup>r</sup>	52,655 <sup>r</sup>	76,757
Sulfur		252,392	231,700	219,975	231,296	381,067
Talc		--	360	612	275	3,274
<b>MINERAL FUELS AND RELATED MATERIALS</b>						
<b>Gas, natural:</b>						
Gross	million cubic meters	351	290	330	442	380
Marketed <sup>c</sup>	do.	310	250	280	390	340
<b>Petroleum:</b>						
Crude	thousand 42-gallon barrels	101	91	71	72	66
Refinery products	do.	410,000	445,000	405,000	425,000	430,000

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

<sup>1</sup>Table includes data available through July 18, 2014.

TABLE 2  
TAIWAN: STRUCTURE OF THE MINERAL INDUSTRY IN 2013

(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
Iron and steel:			
Pig iron	China Steel Corp. (CSC)	do.	9,900
Do.	Dragon Steel Corp. [China Steel Corp. (CSC)]	Taichung	5,000
Steel, crude	An Feng Steel Co. Ltd.	Kaohsiung	2,000
Do.	China Steel Corp.	do.	9,900
Do.	Dragon Steel Corp. [China Steel Corp. (CSC)]	Taichung	6,200
Do.	Hai Kwang Enterprise Corp.	Kaohsiung	600
Do.	Tang Eng Stainless Steel Plant	do.	300
Do.	Yieh Hsing Enterprise Co. Ltd.	do.	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.	do.	1,200
Marble	Taiwan Marble Co., Ltd.	Panchiao	15
Nickel	Taiwan Nickel Refining Corp. (Vale Taiwan Ltd., 49.9%, and others, 50.1%)	Kaohsiung	18
Petroleum:			
Crude	Chinese Petroleum Corp.	Chuhuangkeng and Tungtzuchiao	850
	thousand 42-gallon barrels		
Refinery products	do.	Kaohsiung	570
Do.	do.	Taoyuan	200
Do.	Formosa Plastics Group	Yunlin	450
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.