

# 2016 Minerals Yearbook

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## VIETNAM

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# THE MINERAL INDUSTRY OF VIETNAM

By Yolanda Fong-Sam

In 2016, Vietnam was the second-ranked producer of tungsten in the world and accounted for about 7.4% of world production. The country was also the fourth-ranked producer of cement, clinker, and fluorspar, accounting for about 2%, 2.4%, and 3% of world production, respectively. Vietnam also was the 8th-ranked producer in the world for rare earths and tin, 9th for titanium and ilmenite, and 13th for phosphate rock. As of 2016, Vietnam was the seventh-ranked producer of crude petroleum in the Asia and the Pacific region. Other minerals produced in the country included antimony, bauxite, chromite, coal, cobalt, natural gas, lead, manganese, nickel, phosphate rock, salt, zinc, and zircon. As for major processed minerals, Vietnam produced refined copper, rolled steel, refined tin, and zinc (smelter). A complete list of mineral commodities produced in Vietnam can be found in table 1 (U.S. Energy Information Administration, 2016; Anderson, 2018; Bedinger, 2018; Gambogi, 2018; Jasinski, 2018; Shedd, 2018; Singerling, 2018; van Oss, 2018).

## Minerals in the National Economy

In 2016, the mining and quarrying sector made up about 7.6% of the country's total estimated gross domestic product (GDP) of \$138 billion. Vietnam's GDP in 2016 increased by 6.2% compared with that of 2015. According to the General Statistics Office of Vietnam, the output value of the mining and quarrying sector (which included mineral fuels and nonfuel minerals) in 2016 decreased by about 6% to an estimated \$10.4 billion<sup>1</sup> from \$11.1 billion in 2015. The output value of the construction sector increased by about 8% to an estimated \$8.6 billion from \$8 billion in 2015. In 2016, the construction sector made up about 6.5% of the country's total estimated GDP (General Statistics Office of Vietnam, 2016b).

According to the General Statistics Office of Vietnam, the number of employees working in the mining and quarrying sector in 2016 was approximately 236,100, which was less than 1% of the total number of employed people in the country. Investment in the mining and quarrying sector in 2016 decreased by about 5% to an estimated \$1.8 billion from \$1.9 billion in 2015 and represented about 3.5% of the total investment in the country. Investment in the construction sector increased by 6.5% to an estimated \$3 billion from \$2.8 billion in 2015 (General Statistics Office of Vietnam, 2016a, c).

## Government Policies and Programs

The Government of Vietnam continued with the creation and approval of a series of legal instruments in support of the 2010 Mineral Law. The 2010 Mineral Law is the legislation that regulates the mining industry in Vietnam, and it became fully effective in July 2011. The 2010 Mineral Law replaces the 1996

Mineral Law, as amended in 2005 (Mayer-Brown JSM, 2011, p. 1).

In February 2016, the Government of Vietnam issued a decree that required payment of environmental protection fees for production of mineral commodities, including mineral fuels. The decree proposed implementing the fees at the end of 2017, and the amount of payment required was to be determined by the type of mineral commodity being produced. The environmental fees collected (applicable to all mineral commodities, excluding coal gas, crude petroleum, and natural gas) were to be applied in their entirety (100%) to support local government budgets, and they were to be invested in the areas where the mineral extraction was taking place. The fees were to be applied in accordance with environmental protection laws and laws regarding government budgets. Environmental protection fees collected from the coal gas, crude petroleum, and natural gas sector would support the central Government budget for the protection of the environment and would be invested in accordance with national environmental protection laws and state budget laws (Vietnam National Coal Mineral Industries Holding Co. Ltd., 2016a).

In March 2016, the Government issued Decree No. 19/2016/ND-CP proposed by the Ministry of Industry and Trade (MOIT), which stipulated the regulations on gas businesses and the requirements for trading gas in Vietnam. The decree applied to traders and entities involved in the gas business. All gas distributors, producers, processors, and traders must work for an enterprise incorporated in and in compliance with the country's laws (CustomsNews.vn, 2016).

In August 2016, the MOIT announced the issuance of Circular No. 12/2016/TT-BCT concerning mineral exports (which amends Circular No. 41/2012/TT-BCT) and requires all enterprises that export minerals to provide a sample of every batch of goods for export to the General Department of Vietnam Customs. The sample is to be examined by the Vietnam Laboratory Accreditation Scheme (VILAS) of the Bureau of Accreditation of Vietnam to check the quality of the exported goods. Circular No. 12/2016/TT-BCT also requires that mineral commodities meet quality standards, are on the list of allowed exports, and have legal original documentation (Vietnam National Coal Mineral Industries Holding Co. Ltd., 2016b).

According to the Law on Nuclear Energy, exporters of minerals containing thorium and uranium that exceed 0.05% of the gross weight are required to have an export license (issued by the Ministry of Science and Technology) for radioactive minerals. Enterprises that export minerals that need to be analyzed outside Vietnam are required to submit a request and the proper documentation to the MOIT, including information about the technology needed for the analysis, justification for the analysis, handling procedures, and evidence of mineral origin (Vietnam National Coal Mineral Industries Holding Co. Ltd., 2016b).

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<sup>1</sup>Where necessary, values have been converted from Vietnam dong (VND) to U.S. dollars (US\$) at an annual average exchange rate of VND22,125=US\$1.00 for 2016, and VND21,682=US\$1.00 for 2015.

## Production

In 2016, mineral production increased significantly for zirconium mineral concentrates (120.9%), iron ore (gross weight, 40.9%), ferrotungsten (25.0%), bauxite (23.4%), rolled steel (20.3%), raw steel (19.7%), pig iron (17.6%), iron ore (metal content, 17.2%), tungsten (metal content, 16.1%), cement (14.2%), and tin (smelter, 12.3%). Production decreases were reported for lead (70.5%), phosphate rock (gross weight, 69.5% each), ilmenite (57.1%), barite (56.3%), cobalt (51.6%), nickel (50.0%), bismuth and zinc mine production (20.0% each), fluor spar (18.8%), and salt (12.1%). Data on mineral production can be found in table 1.

## Structure of the Mineral Industry

Table 2 is a list of major mineral industry facilities, which is dominated by Government-owned enterprises.

## Mineral Trade

The total value of exports in 2016 was about \$176.6 billion compared with \$162 billion in 2015 (an increase of about 9%). Exports of crude petroleum decreased by 27.8% to 50.4 million barrels (Mbbl) in 2016 from 69.8 Mbbl in 2015. Additionally, exports of coal decreased by about 29% to approximately 1.2 million metric tons (Mt) from about 1.7 Mt during the same timeframe. The total value of imports increased by about 5.4% to \$174.8 billion from \$165.8 billion in 2015. In 2016, imports of iron and steel increased by 18.1% to about 18.3 Mt from 15.5 Mt in 2015, and imports of refined petroleum products increased by 12.8% to 86.4 Mbbl from 76.6 Mbbl in 2015. Imports of fertilizers decreased by about 7% to 4.2 Mt in 2016 from 4.5 Mt in 2015 (General Statistics Office of Vietnam, 2016d, g, h).

In 2016, the United States was Vietnam's leading export partner, accounting for \$38.4 billion (about 22%) of the country's total exports, followed by China, which imported about \$22 billion (12.4%), and Japan, which imported \$14.7 billion (8.3%). Vietnam's imports came mainly from China (which accounted for 28.6% of the country's total imports, or about \$50 billion), followed by the Republic of Korea (18.4% of total imports, or \$32.2 billion), and Japan (8.6% of total imports, or about \$15 billion) (General Statistics Office of Vietnam, 2016d–f).

## Commodity Review

### Metals

**Bauxite and Alumina and Aluminum.**—In 2016, bauxite production increased by 23.4% to 1.42 Mt from 1.15 Mt in 2015, whereas alumina production decreased by 8.8% to 602,000 metric tons (t) from 660,000 t (revised) in 2015. In April 2016, Vietnam National Coal and Mineral Industries Holding Corp. Ltd. (VINACOMIN) announced its commitment to start exporting bulk alumina, rather than smaller packaged bags of alumina, in May. VINACOMIN began exporting alumina when the Tan Rai alumina complex started production in 2012. Most of the product was shipped to China because not many smelters in the world accepted alumina in bagged form.

The Tan Rai complex, which is located in Lam Dong Province, was projected to reach design capacity of 650,000 metric tons per year (t/yr) in 2017 (table 1; Lim and Sivaramakrishnan, 2016; Vietnam National Coal Mineral Industries Holding Co. Ltd., 2017).

As of the end of 2016, construction of the Nhan Co-Dac Nong Aluminum Complex had been completed and the complex was on trial and testing. VINACOMIN expected the factory to start commercial operation in the first quarter of 2017. According to VINACOMIN, the complex included a bauxite mine and an alumina refinery and had an estimated cost of \$776 million (as of 2015). The project had a design capacity of 1.65 million metric tons per year (Mt/yr) of bauxite and 650,000 t/yr of alumina (Vietnam National Coal Mineral Industries Holding Co. Ltd., 2015, 2017; DTI News Dantri International, 2017).

**Gold.**—Gold production in Vietnam has been disrupted since 2013, when Besra Gold Inc. of Canada started having issues with the local tax department. In August 2016, Besra announced that its subsidiary, the Phuoc Son Gold Co. (PSGC), was allowed to restart operations in the country. Phuoc Son reached an agreement with the tax department of Quang Nam Province concerning tax disputes that had prevented the company from selling its gold production. Operations at the Phuoc Son Mine were originally suspended in 2014. In October 2015, Besra announced that it had resumed operations at another of its properties, the Bong Mieu Mine [operated by Bong Mieu Gold Mining Co. (BMGMC)], where operations had been suspended over similar issues. The license to operate the Bong Mieu Mine was originally issued in 1997, and the license expired in May 2016. The company applied for an extension of the license, but the request was denied by the Ministry of Natural Resources and Environment (Besra Gold Inc., 2015a, b; 2016; Vietnamnet.com, 2017).

**Iron and Steel.**—In June 2016, Formosa Plastics Group (FPG) of Taiwan announced a halt in the start of operations at Formosa Ha Tinh Steel Corp.'s complex located in the Vung Ang Economic Zone in central Ha Tinh Province; no new date was set. The delay was owing to disputes with the Government concerning tax issues; the company had started to negotiate for a satisfactory solution. Construction of the 7.5-Mt/yr-capacity steel complex was started in 2013; the complex cost about \$10 billion to build, and the steel produced was to be used for domestic consumption and export. The company originally had planned to commence operations at the complex in 2016 (Vietnam Breaking News, 2016).

### Industrial Minerals

**Cement.**—In 2016, the production of cement increased by 14.2% to 77.3 Mt from 67.6 Mt (revised) in 2015. According to the Vietnam Cement Association (VCA), in 2016, the country had a production capacity of 88 Mt/yr of cement; capacity was expected to reach 108 Mt/yr by 2018 and up to 130 Mt/yr by 2020. Domestic consumption was projected to reach 82 Mt/yr by 2020, however, thereby creating an estimated oversupply of nearly 50 Mt/yr of cement. In 2016, the Government enacted a regulation to increase the export fees for cement; however, the VCA proposed a delay in anticipation of the oversupply of cement (table 1; GlobalCement.com, 2017).

In July 2016, the Ministry of Construction announced plans to sell its stake in Vietnam National Cement Corp. (VICEM, formerly known as Vietnam Cement Industry Corp.). The Government planned to reduce its holdings to 51%. VICEM held stakes in 31 companies in the cement sector and controlled 34% of the market in the country. In August 2016, Siam City Cement of Thailand signed an agreement valued at \$890 million to acquire LafargeHolcim Ltd.'s 65% stake in LafargeHolcim Vietnam. The latter operated an integrated cement complex in the country as well as four cement grinding plants with a total grinding capacity of 6.3 Mt/yr (GlobalCement.com, 2016a, b).

### Mineral Fuels

**Coal.**—In 2016, the production of coal decreased by 7.5% to 38.5 Mt from 41.7 Mt (revised) in 2015. In 2016, the Government continued to invest in coal projects, including the construction of the Khe Cham II Mine (at a cost of \$547 million), the construction of a new pit at the Mao Khe Coal Co. project (\$254 million), and the construction of an open pit mine at Nui Beo Coal JSC (\$232 million). Other coal projects that the Government was involved in included the Binh Minh coal mine, the Ha Lam coal mine, and the Nga Hai coal mine. The status and details of the proposed commencement dates were not provided by VINACOMIN (DTI News Dantri International, 2017).

**Natural Gas.**—In April 2016, Vietnam Oil and Gas Group (PetroVietnam) announced the resumption of activities at the Block B gas project. In June 2015, PetroVietnam had announced the acquisition of 100% of Chevron Corp.'s assets in the country, which included two offshore production-sharing contracts (PSC) and a stake in a gas development project. The three offshore PSCs, which are located in the Malay Basin off the coast of southwestern Vietnam, consisted of (1) Block B and 48/95 [operated by Chevron Vietnam (Block B) Ltd. (42.4%); other stakeholders were Mitsui Oil Exploration Co. Ltd. of Japan (25.6%), PetroVietnam Exploration and Production (23.5%), and PTT Exploration and Production Public Company Ltd. (PTTEP) of Thailand (8.5%)]; (2) Block 52/97 [operated by Chevron Vietnam (Block 52) Ltd. (43.4%); other stakeholders were PetroVietnam Exploration and Production (30%), Mitsui Oil Exploration (19.6%), PTTEP (7%)], and (3) a nonoperating working interest in the Block B–O Mon pipeline project (28.7%; also known as the Gas Development Project, which was operated by Chevron Southwest Vietnam Pipeline Co. Ltd.). The Block B–O Mon pipeline project was designed to transport natural gas from Block B and 48/95 and Block 52/97 to existing and planned powerplants located in southern Vietnam (Rigzone.com, 2015; Dao, 2016).

By 2040, PetroVietnam expected to invest about \$6.8 billion for the construction of a central processing platform, 750 wells, 46 wellheads, a hub platform, a flotation storage unit, and an offloading vessel. In addition, the company planned to invest \$1.2 billion in the construction of 431 kilometers of gas pipelines for the transportation of more than 20 million cubic meters per day of natural gas for the fueling of various powerplants that had a total (combined) capacity of 3,660 megawatts (Rigzone.com, 2015; Dao, 2016).

### Outlook

Cement, fluorspar, petroleum, phosphate rock, rare earths, tin, titanium, and tungsten will most likely continue to be the most significant mineral commodities in Vietnam's mineral industry. Since passage of the 2010 Mineral Law, the Government has continued to pass legislation in support of implementation of the mineral law in order to attract international investment and to develop of the country's mineral resources. Investments have been made in such minerals as bauxite, cement, cobalt, copper, fluorspar, gold, nickel, and tungsten. Foreign direct investment in the mining sector along with world market prices of commodities will determine the course of Vietnam's mineral industry in the long run.

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

(Metric tons, gross weight, unless otherwise specified)

Commodity <sup>2</sup>	2012	2013	2014	2015	2016
<b>METALS</b>					
Aluminum:					
Bauxite	100,000	482,000	1,090,000	1,150,000	1,419,000
Alumina thousand metric tons	--	214	485	660 <sup>r</sup>	602
Antimony, mine production:					
Gross weight	1,199	2,476	2,745	548 <sup>r</sup>	511
Sb content, 40% Sb	480	990	1,100	220	204
Bismuth	--	--	2,000	2,000	1,600 <sup>e</sup>
Chromite, mine production	1,900	24,990	3,400	14,000	15,000 <sup>e</sup>
Cobalt, mine production, Co content	--	25	223	277	134
Copper, mine production, concentrate:					
Gross weight	50,862	49,148	48,394	49,032 <sup>r</sup>	51,476
Cu content <sup>e</sup>	12,700	12,300	12,100	12,300	12,900
Gold, mine production, Au content kilograms	1,508 <sup>r</sup>	1,681 <sup>r</sup>	164	--	100 <sup>e</sup>
Iron and steel:					
Pig iron thousand metric tons	650	650	1,393	1,700 <sup>r</sup>	2,000 <sup>e</sup>
Raw steel do.	2,965	3,484	3,954	4,093 <sup>r</sup>	4,901
Products, rolled do.	8,405	9,252	10,739	12,543 <sup>r</sup>	15,083
Iron ore, mine production:					
Gross weight	2,842,000	4,708,200	5,130,200	4,222,300	5,951,000
Fe content, 53% Fe	1,506,200 <sup>r</sup>	2,495,329 <sup>r</sup>	2,719,000 <sup>r</sup>	2,691,000 <sup>r</sup>	3,154,000
Lead, mine production, Pb concentrate, Pb content <sup>e</sup>	360	1,870	2,980 <sup>r</sup>	2,750 <sup>r</sup>	810
Manganese, mine production: <sup>e</sup>					
Gross weight	15,800	9,700	760	--	300
Mn content	6,800	4,200	330	--	100
Nickel, mine production, concentrate, Ni content	--	1,166	6,854	8,607	4,300
Rare earths, monazite concentrate:					
Gross weight	370 <sup>r</sup>	180 <sup>r</sup>	--	460 <sup>r</sup>	400
Rare-earth-oxide equivalent <sup>e</sup>	1,700	2,000	2,600	2,700	2,900
Tin:					
Mine production, Sn content	3,191	5,129	4,833	4,530	4,579
Smelter production, primary	3,095	4,961	4,688	4,382	4,919
Titanium mineral concentrates, ilmenite and leucoxene	978,300	1,025,800	558,000	238,000 <sup>r</sup>	102,000
Tungsten:					
Mine production, concentrate, W content	1,050	1,660	4,500	5,600	6,500 <sup>e</sup>
Ferrotungsten	--	511	764	400 <sup>e</sup>	500 <sup>e</sup>
Zinc: <sup>e</sup>					
Mine production, Zn content	30,000	20,000	17,000 <sup>r</sup>	15,000 <sup>r</sup>	12,000
Smelter production, primary	18,000	12,000	12,000	10,000	10,000
Zirconium mineral concentrates <sup>e</sup>	22,500 <sup>r</sup>	10,200 <sup>r</sup>	10,000 <sup>r</sup>	4,300 <sup>r</sup>	9,500
<b>INDUSTRIAL MINERALS</b>					
Apatite	2,364	2,656	2,471	2,923	2,849
Barite <sup>e</sup>	90,000 <sup>r</sup>	55,000 <sup>r</sup>	95,000 <sup>r</sup>	80,000 <sup>r</sup>	35,000
Cement, hydraulic thousand metric tons	56,353	57,516	60,982	67,645 <sup>r</sup>	77,278
Fluorspar <sup>e</sup>	600 <sup>r</sup>	300 <sup>r</sup>	50,000	191,000 <sup>r</sup>	155,000
Lime <sup>e</sup> thousand metric tons	850	850	850	840	840
Nitrogen, ammonia, N content	830,000	1,000,000	1,100,000	1,100,000	1,100,000 <sup>e</sup>
Phosphate rock:					
Gross weight thousand metric tons	2,365	2,656	2,471	2,758	840
P <sub>2</sub> O <sub>5</sub> content do.	665	745	700	800	240
Salt do.	776	718 <sup>r</sup>	906	1,061 <sup>r</sup>	933
Stone, sand, and gravel:					
Sand and gravel, construction, unspecified, including silica sand do.	83,223	87,205	91,231	93,072 <sup>r</sup>	95,531
Stone, crushed, all grades do.	226,814	222,540	244,349	262,177	274,264

See footnotes at end of table.

TABLE 1—Continued  
VIETNAM: PRODUCTION OF MINERAL COMMODITIES<sup>1</sup>

(Metric tons, gross weight, unless otherwise specified)

Commodity <sup>2</sup>		2012	2013	2014	2015	2016
MINERAL FUELS AND RELATED MATERIALS						
Coal, anthracite	thousand metric tons	42,083	41,064	41,086	41,664 <sup>†</sup>	38,527
Natural gas	million cubic meters	9,355	9,751	10,210	10,660	10,610
Petroleum:						
Crude	thousand 42-gallon barrels	127,049 <sup>†</sup>	126,791 <sup>†</sup>	132,005 <sup>†</sup>	142,282 <sup>†</sup>	130,776
Refinery production:						
Gasoline	do.	19,000	17,200	16,200 <sup>†</sup>	20,100 <sup>†</sup>	20,200
Liquefied petroleum gas	do.	2,900	3,000	2,600 <sup>†</sup>	3,300 <sup>†</sup>	3,300
Other	do.	23,300	24,300	22,900 <sup>†</sup>	24,900 <sup>†</sup>	25,000
Total	do.	45,200	44,500	41,700 <sup>†</sup>	48,300 <sup>†</sup>	48,500

<sup>†</sup>Estimated. <sup>‡</sup>Revised. do. Ditto. -- Zero.

<sup>1</sup>Table includes data available through March 30, 2018. All data are reported unless otherwise noted. Totals and estimated data are rounded to no more than three significant digits; may not add to totals shown.

<sup>2</sup>In addition to the commodities listed, bentonite, refractory clay, refined and smelted copper, gemstones, graphite, gypsum, kaolin, lignite, marble, pyrite, pyrophyllite, silver, and sulfur may have been produced in Vietnam, but available information was inadequate to make reliable estimates of output.

TABLE 2  
VIETNAM: STRUCTURE OF THE MINERAL INDUSTRY IN 2016

(Thousand metric tons unless otherwise specified)

Commodity	Major operating companies and major equity owners	Location of main facilities	Annual capacity
Alumina	Vietnam National Coal and Mineral Industries Group (VINACOMIN)	Tan Rai alumina complex, Bao Lam District, Lam Dong Province	650.
Barite	NA	Ao Sen deposit, Son Duong District, Tuyen Quang Province	80.
Bauxite	Vietnam National Coal and Mineral Industries Group (VINACOMIN)	Tan Rai plant, Bao Lam District, Lam Dong District	650.
Do.	do.	Nhan Co Mine, Dak Nong Province	NA.
Bismuth	Masan Group	Nui Phao Mine, Thai Nguyen Province	2.
Cement	An Giang Cement Co.	An Giang cement plant, An Giang Province	400.
Do.	Binh Phuoc Cement Co.	Binh Phuoc cement plant, Binh Phuoc Province	2,000.
Do.	Building Materials Corp. No. 1	Fico Tay Ninh cement plant, Tan Chau District, Tay Ninh Province	2,000.
Do.	Cement X18 Factory Co.	Cement X18 plant, Lang Son Province	100.
Do.	Chin Fon Cement Co.	Chin Fon cement plant, Ha Giang Province	2,200.
Do.	Chinfon Hai Phong Cement Corp. [Chinfon Group, 70%; Hai Phong Municipal Government, 15.56%; Vietnam National Cement Corp. (VICEM), 14.44%]	Min Duc cement near Hai Phong City	1,400.
Do.	Cong Thanh Cement Joint Stock Co.	Cong Thanh cement plant, Thanh Hoa Province	1,000.
Do.	Cao Ngan Cement Co.	Cao Ngan cement plant, Thai Nguyen Province	600.
Do.	Dong Banh Cement Co.	Dong Banh cement plant, Lang Son Province	1,000.
Do.	Dong Son Cement Co.	Dong Son cement plant, Thai Nguyen Province	1,500.
Do.	Dong Thanh Cement Co.	Dong Thanh cement plant, Dong Nai Province	1,000.
Do.	Ha Long Cement Co.	Ha Long cement plant, Ho Chi Minh City	2,000.
Do.	Ha Tien Kien Giang Cement Co.	Ha Tien Kien Giang cement plant, Binh Duong Province	200.
Do.	LafargeHolcim Vietnam (Siam City Cement, 65%)	Cement complex and four cement grinding plants, Dong Nai Province	6,300.
Do.	La Hien Cement Co.	La Hien cement plant, Thai Nguyen Province	600.
Do.	Langbang Cement Co.	Langbang cement plant, Quang Ninh Province	1,500.
Do.	Luckvaxi Cement Co.	Luckvaxi cement plant, Thien Hue Province	1,200.
Do.	Luck's Group (Vietnam Holdings) Co. Ltd.	Kim Dinh cement plant and Ninh Thuan grinding plant, Thua Thien-Hue Province	2,800.
Do.	Lucky Group Ltd. and Phuc Son Cement Corp.	Phuc Son cement plant, Hai Duong Province	4,000.
Do.	Mai Son Cement Co.	Mai Son cement plant, Son La Province	1,200.

See footnotes at end of table.



TABLE 2—Continued  
VIETNAM: STRUCTURE OF THE MINERAL INDUSTRY IN 2016

(Thousand metric tons unless otherwise specified)

Commodity	Major operating companies and major equity owners	Location of main facilities	Annual capacity
Cement—Continued	Midland Construction Corp. (COSEVCO)	Song Gianh cement plant, Quang Binh Province	1,400.
Do.	Morning Star Cement Ltd. [Holcim Group, 65%, and Vietnam National Cement Corp. (VICEM), 35%]	Cat Lai grinding plant, Hiep Phuoc grinding plant, Thi Vai grinding plant Hon Chong, Kien Giang Province	5,200.
Do.	Nghi Son Cement Corp. [Taiheiyo Cement Corp., 45.5%; Mitsubishi Materials Corp., 19.5%; Vietnam National Cement Corp. (VICEM), 35%]	Nghi Son cement plant, Thanh Hoa Province	4,300.
Do.	Quang Ninh Cement and Construction Joint Stock Co.	Quang Ninh cement plant, Ha Long, Quang Ninh Province	1,200.
Do.	Quan Trieu Cement Joint Stock Co. [Viet Bac Mining Industry Corp. and Vietnam National Coal and Mineral Industries Group (VINACOMIN)]	Quan Trieu cement plant, Thai Nguyen Province	820.
Do.	ROLI-Quang Tri Cement Co.	ROLI-Quang cement plant, Quang Tri Province	600.
Do.	Song Thao Cement Co.	Song Thao cement plant, Phu Tho Province	1,000.
Do.	Thai Nguyen Cement Co.	Thai Nguyen cement plant, Thai Nguyen Province	1,400.
Do.	PT Semen Indonesia (Persero) Tbk, 70%	Thang Long cement plant, Quang Ninh Province	2,500.
Do.	Tuyen Quang Cement Group 1	Tuyen Quang cement plant, Tuyen Quang Province	600.
Do.	Vietnam Construction and Import-Export Joint Stock Corp. (VINACONEX)	Cam Pha cement grinding plant in Phu Tau Province	2,300.
Do.	do.	Luongson cement plant, Hoa Binh Province	1,200.
Do.	do.	Yen Bai cement plant, Yen Bai Province	200.
Do.	Vietnam National Cement Corp. (VICEM) (100% state-owned)	Bim Son cement, Thanh Hoa Province	3,800.
Do.	do.	But Son cement, Ha Nam Province	1,600.
Do.	do.	Hai Phong cement, Ha Giang	1,700.
Do.	do.	Ha Tien I, Ho Chi Minh City	1,500.
Do.	do.	Ha Tien II, Kien Giang Province	1,200.
Do.	do.	Hai Van cement, Da Nang City	600.
Do.	do.	Hoang Mai cement, Nghe An Province	1,400.
Do.	do.	Hoang Thach cement, Hai Duong Province	2,300.
Do.	do.	Tam Diep cement, Ninh Binh Province	1,400.
Do.	Vietnam Industrial Construction Corp. (VINAINCON)	Quang Son cement factory, Quang Son Commune, Dong Hy District, Thai Nguyen Province	1,500.
Chromite, gross weight	Thai Nguyen Nonferrous Metal Co. [Vietnam National Minerals Corp. (VIMICO) (Government, 100%), 100%]	Nui Nua, Thanh Hoa Province	10.
Coal, anthracite	Vietnam National Coal Corp. (VINACOAL) (Government, 100%)	Cam Pha, Cao Son, Coc Sau, Vang Danh, Dong Trieu, Ha Lam, Ha Tu, Hong Gai, Khe Cham, Mao Khe, Mong Duong, Deo Nai, Cua Ong, Uong Bi, Quang Ninh Province	42,000.
Cobalt	metric tons Asian Mineral Resources (Ban Phuc Nickel Mines LLC, 90%)	Ban Phuc nickel project, Son La Province	200.

See footnotes at end of table.

TABLE 2—Continued  
VIETNAM: STRUCTURE OF THE MINERAL INDUSTRY IN 2016

(Thousand metric tons unless otherwise specified)

Commodity		Major operating companies and major equity owners	Location of main facilities	Annual capacity
<b>Copper:</b>				
Concentrate, Cu content		Asian Mineral Resources (Ban Phuc Nickel Mines LLC, 90%)	Ban Phuc nickel project, Son La Province	3.
Do.		Lao Cai Copper Complex [Vietnam National Minerals Corp. (VIMICO) (Government, 100%), 100%]	Sin Quyen, Lao Cai Province	11.
Do.		Masan Group	Nui Phao Mine, Thai Nguyen Province	7.
Ore		Sin Quyen Copper Co. [operated by Vietnam National Coal and Mineral Industries Group (VINACOMIN)]	Sin Quyen Mine, Bat Xat District, Lao Cai Province	1,200.
Refined		Tang Loong Lao Cai Copper Smelting Enterprise [wholly owned subsidiary of Vietnam National Coal and Mineral Industries Group (VINACOMIN)]	Tang Loong Long Commune, Bao Tang District, Lao Cai Province	10.
<b>Fertilizer:</b>				
Nitrogen, ammonia		Vietnam National Chemical Corp. (VNCC) (Government, 100%), and Phyl My Nitrogenous Fertilizer and Chemical Joint Stock Corp.	Ha Bac, northern Vietnam Phu My, Ba Ria-Vung Tau Province	375.
Superphosphate		do.	Lam Thao, Phu Tho Province	800.
Fluorspar		Masan Group	Nui Phao Mine, Thai Nguyen Province	210.
Gas, natural	million cubic meters per day	VietSovPetro (Vietnam Oil and Gas Corp. and Zarubezhneft), and the joint venture of PetroVietnam, BP p.l.c., Oil and Natural Gas Co., and ConocoPhillips Co.	Offshore Bach Ho oilfield, Rang Dong oilfield, and Lan Tay and Lan Do gasfields	20.
Do.		Vietnam Oil and Gas Group (PetroVietnam) and operated by Cuu Long Joint Operating Co.	Su Tu Trang offshore field (Block 15.1), Cuu Long Basin	NA.
Do.		Vietnam Oil and Gas Group (PetroVietnam), 42.4%	Block B and Block 48/95	NA.
Do.		Vietnam Oil and Gas Group (PetroVietnam), 43.4%	Block 52/97	NA.
Gold, mine output, Au content	kilograms	Bong Mieu Gold Mining Co. Ltd. (Besra Gold Inc., 80%; Mineral Development Co., 10%; Quang Nam Mineral Joint Stock Co., 10%)	Bong Mieu Mine and Nui Kem underground mines, Quang Nam Province	400.
Do.		Besra Gold Inc. through subsidiary Phuoc Son Gold Co. (PSGC), 85%	Bai Dat and Bai Go deposit in Phuoc Son gold property, Quang Nam Province	NA.
Gypsum		USG Boral Gypsum Vietnam Co. Ltd. (Boral Ltd., 50%, and USG Corp., 50%)	USG Boral Building Products, Ho Chi Minh City	20,000.
Do.		Huy An Co.	NA	2,500.
Do.		Saint-Gobain Gyproc	Nha Be District, Ho Chi Minh City	9,000.
Iron ore, gross weight		Thai Nguyen Iron and Steel Corp. [Vietnam National Steel Corp. (VNSTEEL), 100%]	Trai Cau and Tien Bo, Thai Nguyen Province; Thach Khe, Ha Tinh Province	NA.
Nickel		Asian Mineral Resources (through subsidiary Ban Phuc Nickel Mines LLC, 90%)	Ban Phuc nickel sulfide deposit, Son La Province	6.
<b>Petroleum:</b>				
Crude	thousand 42-gallon barrels per day	Santos Ltd., 31.875%; Premier Oil, 53.125%; Petro Vietnam, 15%	Dua Oil project (offshore) in Nam Con Son Basin (Block 12W)	NA.
Do.	do.	VietSovPetro (Vietnam Oil and Gas Corp. and Zarubezhneft)	Offshore Bach Ho, Rong, Rang Dong, Ruby, Bunga Kekwa, Dai Hung, and SuTu Trang oilfields	320.
Refined	do.	Vietnam Oil and Gas Group (PetroVietnam), 50%; ConocoPhillips Co., 23.25%; Korea National Oil Corp., 14.25%; SK Innovation, 9%; Geopetrol SA, 3.5%. Operated by Binh Son Refining and Petrochemical Co.	Dung Quat refinery, Quang Ngai Province	47,600.
Phosphate rock, gross weight		Vietnam Apatite Limited Co. [Vietnam National Chemical Corp. (VNCC) (Government, 100%), (VIMICO) 100%]	Cam Duong and Tang Loong, Lao Cai Province	1,250.

See footnotes at end of table.

TABLE 2—Continued  
VIETNAM: STRUCTURE OF THE MINERAL INDUSTRY IN 2016

(Thousand metric tons unless otherwise specified)

Commodity	Major operating companies and major equity owners	Location of main facilities	Annual capacity
Rare earths	Lai Chau-Vietnam National Minerals Corp. Rare Earth Joint Stock Co. and the Japanese Dong Pao Rare Earth Development Co.	Dong Pao Rare Earth Mine, Tam Duong District, Lai Chau Province	NA.
Salt	Vietnam National Salt Corp.	Nam Dinh, Nghe An, and Hai Tin Provinces	1,200.
Steel:			
Crude	Vietnam National Steel Corp. (VNSTEEL)	Cai Lan, Thai Nguyen Province, and Phu My, Ba Ria-Vung Tau Province	1,500.
Products	Shengli (Vietnam) Special Steel Co. Ltd., established by Shengli Group Corp., and Guangdong Metals and Minerals Import & Export Corp.	Cau Nghin Industry billets plant, Quynh Phu, Thai Binh Province	500.
Do.	do.	Bar and wire rod plant, Quynh Phu, Thai Binh Province	600.
Do.	Lotus Group	Cold-rolled steel plant, Phu My Industrial Park, Ba Ria-Vung Tau Province	1,000.
Do.	POSCO-Vietnam (POSCO Group, 100%)	POSCO Special Steel, Phu My Industrial Park, Ba Ria-Vung Tau Province	700 cold- rolled steel.
Do.	do.	do.	3,000 hot- rolled steel.
Do.	Vietnam Shipbuilding Industry Group (VINASHIN)	Cai Lan steel plate hot-rolling plant, Ha Long City, Quang Ninh Province	1,000.
Do.	Viet Steel Corp.	Bar mill, Ba Ria-Vung Tau Province	450.
Do.	Vietnam National Steel Corp. (VNSTEEL)	Cai Lan, Thai Nguyen Province, and Phu My, Ba Ria-Vung Tau Province	2,500.
Do.	China Steel Sumikin Vietnam Joint Stock Co. (China Steel Corp., 56%; Nippon Steel & Sumitomo Metal Corp., 30%; Formosa Ha Tinh Steel Corp., 5%; Nippon Steel & Sumikin Bussan Corp., 5%; Chun Yuan Steel Industry Co., Ltd., 2%; Hsin Kuang Steel Co., Ltd., 2%)	Sheet steel mill, Ba Ria-Vung Tau Province	1,200.
Do.	Ton Dong A Corp.	Steel sheet plant, Dong An 2 Industrial Park, Binh Duong Province	800.
Tin:			
Concentrate, Sn content	Cao Bang Nonferrous Metal Co. and Nghe Tinh Nonferrous Metal Co. [wholly owned subsidiaries of Vietnam National Minerals Corp. (VIMICO) (Government, 100%)]	Pia Oac, Cao Bang Province; Quy Hop, Nghe An Province; and Tam Dao, Tuyen Quang Province	4.
Refined	Thai Nguyen Nonferrous Metal Co.	Thai Nguyen, Bac Thai Province	2.
Titanium, ilmenite	Bimal Minerals Co. Ltd. (Malaysia Mining Corp. and Syarikat Pendorong Sdn. Bhd., 60%, and Binh Dinh Minerals Co., 40%)	Cat Khanh, Qui Nhon, and Binh Dinh Provinces	70.
Do.	Ha Tinh Minerals and Trading Co.	Cam Hoa, Ky Annh-Cam, Xuyen, Ky Khan, and Ky Ninh, Ha Tinh Province	450.
Do.	Mineral Development Co. No. 4 and No. 5 [wholly owned subsidiaries of Vietnam National Minerals Corp. (VIMICO) (Government, 100%)]	Vinh City, Nghe An Province; Tuy Hoa, Dong Xuan in Phu Yen Province; and Quang Ngan, Vinh My in Thua Thien-Hu Province	50.

See footnotes at end of table.

TABLE 2—Continued  
VIETNAM: STRUCTURE OF THE MINERAL INDUSTRY IN 2016

(Thousand metric tons unless otherwise specified)

Commodity	Major operating companies and major equity owners	Location of main facilities	Annual capacity
<b>Tungsten:</b>			
Concentrates	Nui Phao H.C. Starck Tungsten Chemicals Manufacturing LLC [Nui Phao Mining Co. Ltd. (74.1%) (Masan Group) and H.C. Starck GmbH]	Nui Phao, ammonium para-tungsten plant, Dai Tu District, Thai Nguyen Province	7.
Do.	Sanher Tungsten Vietnam Co. Ltd.	Nhon Trach District, Dong Nai Province	NA.
Do.	Tejing (Vietnam) Tungsten Co., Ltd.	Trang Bang District, Tay Ninh	2.
Do.	Vietnam Youngsun Tungsten Industry Co.	Thienke tungsten mine, Tuyen Quang Province	2.
Ferrotungsten, W content	Vietnam Youngsun Tungsten Industry Co. Ltd. (Hong Kong Wolfram International Investment Co., Ltd.)	Cailan Industrial Zone, Quang Ninh plant, Halong, Quang Ninh Province	3.
Do.	ATC Ferrotungsten [Asia Tungsten Products Vietnam Ltd. (ATC Alloys Ltd., 60%)]	Tan Tien Industrial Zone, Vinh Bao District, Hai Phong Province	4.
<b>Zinc:</b>			
Concentrate, Zn content	Thai Nguyen Nonferrous Metal Co. [Vietnam National Minerals Corp. (VIMICO) (Government, 100%), 100%]	Cho Dien, Bac Can Province	50.
Refined	The Ta Pan Zinc-Lead Plant (a Chinese private firm, 70.2%, and Ha Giang Mineral Exploiting and Engineering Co., 29.8%)	Lung Vay, Bac Me District, Ha Giang Province	6.
Do.	Thai Nguyen Zinc Refinery [Vietnam National Minerals Corp. (VIMICO) (Government, 100%), 100%]	Thai Nguyen City, Thai Nguyen Province	10.

Do., do. Ditto. NA Not available.