



# 2015 Minerals Yearbook

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**GREECE [ADVANCE RELEASE]**

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# THE MINERAL INDUSTRY OF GREECE

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Greece, a southeastern European country, has substantial nonfuel mineral deposits. These include such metals as bauxite, copper, gold, iron, nickel, silver, and zinc and such industrial minerals as bentonite, feldspar, gypsum, huntite (hydromagnesite), kaolin, limestone, magnesite, perlite, and pumice. The U.S. Geological Survey estimates that Greece holds the world's 2d-largest reserves of perlite (tied with the United States), 7th-largest reserves of magnesite, and 12th-largest reserves of bauxite (Tsirambides and Flippidis, 2012, p. 641; 2013, p. 4; Bennett, 2016; Bray, 2016a, b).

The mineral industry of Greece maintained leading positions globally in the production and export of bauxite, bentonite, magnesite, perlite, and pumice and was the sole producer of huntite. In 2015, Greece was the world's 2d-ranked perlite producer, 5th-ranked bentonite and pumice producer, 9th-ranked magnesite producer, and 10th-ranked bauxite producer. The country accounted for about 23% of the world's production of perlite; bentonite, 6%; pumice, 4%; and magnesite and bauxite, less than 1% each. Greece also produced alumina, aluminum, cement, lignite coal, nickel, and steel, but the amounts produced were not globally significant (table 1; Ministry of Environment, Energy and Climate Change, 2015, p. 11; Bennett, 2017, Bray, 2017a, b; Crangle, 2017; Flanagan, 2017).

## Minerals in the National Economy

In 2015, Greece's real gross domestic product (GDP) decreased by 0.2% compared with the GDP in 2014. The nominal GDP was \$195.2 billion in 2015. The Greek economy contracted less than initially forecast owing to resilient private consumption, increased public investment, and positive net exports, despite political instability and protracted negotiations with creditors in the first half of 2015 (European Commission, 2016b, p. 1, 80; World Bank, The, 2016).

Mineral extraction and processing made up about 3% of the GDP in 2015. Mining and quarrying contributed 0.53% of gross value added in 2015 compared with 0.54% in 2014. The manufacture of basic metals contributed 1.07% of the gross value added (0.99% in 2014); that of fabricated metal products, 0.84% (0.77% in 2014); that of nonmetallic mineral products, 0.48% (0.51% in 2014); and that of coke and refined petroleum products, 0.17% (0.51% in 2014) (Hellenic Statistical Authority, 2016c).

In 2015, industrial production increased by 0.6% (following a decrease of 1.9% in 2014), and manufacturing output increased by 1.2% (following an increase of 1.8% in 2014). Mining and quarrying output decreased by 6.9% in 2015 (following a decrease of 0.3% in 2014); coal and lignite mining decreased by 8.6% (following a decrease of 6.7% in 2014); and the mining of metallic mineral ores decreased by 7% (following an increase of 2.9% in 2014). The extraction of crude petroleum and natural gas increased by 3.5% (following a decrease of 15.5% in 2014). The manufacture of nonmetallic mineral products decreased

by 0.4% in 2015 (following an increase of 2% in 2014), and the manufacture of fabricated metal products decreased by 3.5% (following a decrease of 1.4% in 2014). The manufacture of basic metals increased by 4.1% in 2015 (following an increase of 5.2% in 2014), and manufacture of coke and refined petroleum products increased by 1.2% (following an increase of 7.3% in 2014) (Bank of Greece, 2016, p. 25).

Mineral fuels, lubricants, and related materials continued to be the leading export and import good category, accounting for about 29% of total exports of 25.8 billion euros (EUR) (\$27.5 billion<sup>1</sup>), and about 26% of total imports of \$46.5 billion in 2015. Mineral fuel imports exceeded exports by about 42%. Crude materials, including minerals, accounted for about 4% of total exports and 3% of total imports; in terms of tonnage, the exports and imports of these materials were almost equal. The country's mineral industry was highly export oriented, with exports accounting for about 65% of total mineral sales. The primary exported mineral commodities were alumina, aluminum, bauxite, bentonite, caustic magnesite, marble, nickel, and pumice. Greece was the leading exporter of magnesite in Europe. The entire ferronickel output was exported to other European countries (Ministry of Environment, Energy and Climate Change, 2015, p. 11; Hellenic Statistical Authority, 2016a, p. 10–11).

## Production

In 2015, mineral industry output showed significant variation across commodities. The production of huntite almost tripled, and that of crude attapulgite clay more than doubled. Treated attapulgite clay output increased by 50%; pumice, by 35%; caustic-calcined magnesite, by 23%; limestone, by 19%; crude bentonite, by 11%; and magnesite ore, by 7%. Pozzolan output decreased by 43%; zinc, by 34%; sulfur, by 30%; screened perlite, by 26%; dead-burned magnesite, by 22%; salt, by 17%; marble and natural gas, by 13% each; crude steel, by 11%; steel semimanufactures, by 9%; lignite coal, by 8%; calcium carbonate and nickel (Ni content of ferronickel), by 7% each; and processed bentonite, by 5%. Silica production resumed after stopping in 2014 (table 1).

## Structure of the Mineral Industry

Most mineral companies were privately owned. Government ownership was limited primarily to coal and nickel. The Government held a 55.2% interest in LARCO G.M.M. S.A., which was a leading nickel producer in Europe, and a 34.12% interest Public Power Corporation S.A.-Hellas (PPC), which was the country's leading lignite producer and electricity generation

<sup>1</sup>Where necessary, values have been converted from euro area euros (EUR) to U.S. dollars (US\$) at an annual average exchange rate of US\$1.00=EUR0.937 for 2015.

company (table 2; European Commission, 2014; Tzeferis, 2015, p. 6; Public Power Corporation S.A.-Hellas, 2016b).

In 2014, there were a total of 369 active enterprises in the mining sector. Four companies were engaged in extraction of lignite and crude petroleum; 4 in the extraction of nonferrous metals; 206 in the quarrying of chalk, gypsum, limestone, ornamental and building stone, and slate; 147 in the mining of clay (including kaolin) and operation of sand and gravel pits; and 8 in the mining of chemical and fertilizer minerals. There were 366 enterprises that manufactured nonmetallic mineral products, 108 that manufactured base metals, and 6 that manufactured coke and refined petroleum products (Hellenic Statistical Authority, 2016b, p. 77; 2016d).

## Commodity Review

### *Metals*

**Bauxite and Alumina and Aluminum.**—In 2015, the production of bauxite decreased by 2%, and that of alumina, by 1%, whereas the production of aluminum increased by 4%. Greece continued to be a leading bauxite producer in Europe with an output of about 1.83 million metric tons (Mt). The three leading producers of bauxite in the country were European Bauxites S.A., Delphi-Distomon S.A. (a subsidiary of Mytilineos Holdings S.A.), and Hellenic Mining Enterprises S.A. (ELMIN). In February, Kerneos S.A. of France acquired European Bauxites from S&B Industrial Minerals S.A.; this acquisition followed Kerneos's earlier majority investment in ELMIN and was aimed at increasing the company's exports of bauxite for use by the metallurgical and construction industries (Kerneos S.A., 2015; Patel, 2015; Tzeferis, 2015, p. 4).

**Gold, Lead, Silver, and Zinc.**—Hellas Gold S.A., which was a subsidiary of Eldorado Gold Corp. of Canada, operated the Stratoní lead, silver, and zinc mine. The company was in the process of refurbishing the preexisting Olympias Mine (gold, lead, silver, and zinc) and Skouries Mine (copper and gold) and evaluating the Perama Hill gold and silver deposit. In 2015, deposits in Greece accounted for 35% of Eldorado Gold's worldwide gold reserves of about 709 metric tons (t) but only 2% of its total gold production of 20.5 t. In the third quarter of 2015, the Ministry of Environment, Energy and Climate Change revoked Hellas Gold's approved technical studies, preventing the company from undertaking further development of deposits on the Halkidiki Peninsula, including the Skouries gold deposit (Eldorado Gold Corp., 2016a, p. 3, 7).

In 2015, Hellas Gold's gold production was entirely from tailings retreatment at the Olympias Mine. The company produced 465 kilograms (kg) of gold in 2015 compared with 503 kg in 2014. Hellas Gold processed 589,675 t of tailings in Olympias compared with 625,345 t in 2014. The ore grade decreased to 1.99 grams per metric ton (g/t) in 2015 from 2.70 g/t in 2014. Hellas Gold produced 40,232 t of lead-silver and zinc concentrates from the Stratoní Mine in 2015 compared with 58,375 t in 2014 (Eldorado Gold Corp., 2016b, c).

**Iron and Steel.**—Greece produced 910,000 t of continuously cast crude steel from electric arc furnaces (EAFs) in 2015 compared with 1.02 Mt in 2014, and an estimated 875,000 t of steel products compared with 965,000 t in 2014. The country

remained a net importer of steel. Greece exported 997,000 t of semifinished and finished steel products in 2015 compared with 920,000 t in 2014 and imported 1.17 Mt of these products compared with 1.26 Mt in 2014. The country also exported 537,000 t of long products (505,000 t in 2014), 323,000 t of tubular products (180,000 t in 2014); 86,000 t of flat products (180,000 t in 2014), and 47,000 t of ingots and semis (51,000 t in 2014). Greece imported 823,000 t of flat products in 2015 (907,000 t in 2014), 226,000 t of long products (235,000 t in 2014), 72,000 t of tubular products (82,000 t in 2014), 50,000 t of ingots and semis (34,000 t in 2014), and 38,000 t of pig iron (7,000 t in 2014). Greece imported 438,000 t of steel scrap and exported 24,000 t in 2015 (World Steel Association, 2016, p. 1, 11, 33, 53, 56, 59, 61, 69, 71, 74, 76, 95, 107, 109).

**Nickel.**—Greece was the only country in the European Union (EU) that produced nickel and ferronickel from its own laterite deposits. LARCO, which was a leading nickel and ferronickel producer in Europe, mined sedimentary-type nickel laterite deposits by open pit and underground mining methods. In 2015, LARCO mined 2.34 Mt of nickeliferous laterite ore from the Agios Ioannis, the Evia, and the Kastoria Mines compared with 2.38 Mt in 2014. The Government was in the process of evaluating the restructuring of the company owing to its ongoing financial losses and outstanding debts, particularly debts owed to utility provider PPC, which was also a shareholder. LARCO was found to have received state aid in breach of EU rules on market competition by the European Commission in 2014 and was ordered to repay Government funds and public guarantees with interest; however, no funds had been returned as of yearend 2015 (Michalopoulos, 2015; Ministry of Environment, Energy and Climate Change, 2015, p. 11; Tzeferis, 2015, p. 3–4; European Commission, 2016c).

### *Industrial Minerals*

**Cement.**—Greece's cement sector consisted of three integrated cement companies with a total installed production capacity of 14.6 million metric tons per year (Mt/yr) in seven plants. TITAN Group, which was the leading cement producer in Greece and southeastern Europe, had a 6.9-Mt/yr production capacity, followed by Heracles Group (a subsidiary of LafargeHolcim Ltd. of Switzerland), which had a 6.7-Mt/yr production capacity, and Halyps Cement (a subsidiary of Italcementi Group of Italy), which had a 1.0-Mt/yr production capacity. In 2015, TITAN had about a 45% share of the domestic cement market and exported more than 75% of its output (Hellenic Cement Industry Association, 2016; TITAN Group, 2016, p. 22).

In 2015, domestic cement consumption decreased substantially owing to ongoing contraction of residential and infrastructure construction activity. Capacity utilization of the cement sector remained at 58%. At Halyps' Paralia Aspropyrgos plant, clinker production was only 30% of kiln capacity. In 2015, cement exports increased by 19.2% to 2.91 Mt, whereas clinker exports decreased by 30% to 2.26 Mt. Greece exported cement, primarily in bulk, to 14 countries. In 2015, the United States imported 1.58 Mt of cement from Greece, accounting for more than one-half of Greece's total cement exports.

Algeria ranked second, receiving 530,000 t of Greece's cement exports (International Cement Review, 2016).

**Clay (Bentonite) and Perlite.**—In 2015, Greece produced about 1.12 Mt of crude bentonite and 800,000 t of processed bentonite as well as 890,000 t of crude perlite and 380,000 t of screened perlite. In February, Imerys S.A. of France, a leading world producer of industrial minerals, completed the acquisition of S&B Industrial Minerals, which was Greece's and Europe's leading producer of bentonite (including binders for foundry, sealing solutions, additives for drilling, and functional additives), and the leading global producer of continuous casting fluxes for steel and wollastonite (including functional additives for polymers and paints). S&B Industrial Minerals also supplied perlite-based products used in building materials and horticulture (Imerys S.A., 2016, p. 2).

**Magnesium Compounds.**—In 2015, Greece produced 383,230 t of magnesite ore, 86,800 t of caustic-calcined magnesite, and 20,220 t of dead-burned magnesite compared with 360,270 t, 70,660 t, and 26,010 t, respectively, in 2014. Huntite output was 15,660 t in 2015 compared with 5,340 t in 2014 (table 1).

Grecian Magnesite S.A. (the leading producer and exporter of caustic-calcined magnesite in Europe) operated mines in Chalkidiki on the Halkidiki Peninsula. The Chalkidiki deposits consisted of three main active concessions—Yerakini 20 and 22 with an area of 7 square kilometers (km<sup>2</sup>); Ormilias 15 and 16, 10 km<sup>2</sup>; and Kastri 21, 23 km<sup>2</sup>. The company also held reserve concessions for future mining totaling 16 km<sup>2</sup> in Chalkidiki and concessions 86 and 284 on the island of Euboea totaling 4 km<sup>2</sup>. Grecian Magnesite produced dead-burned magnesite, caustic-calcined magnesite, and refractory masses. Terna Magnesite S.A. (Terna Mag), which was a subsidiary of Gek Terna Group, mined magnesite deposits on the island of Euboea. The company extracted high-purity, boron-free, low-iron, cryptocrystalline magnesite and produced caustic-calcined magnesite with 83% to 97% magnesium oxide (Grecian Magnesite, S.A., 2015, p. 9, 16, 18, 21, 23; Terna Magnesite S.A., 2015; Tzeferis, 2015, p. 5).

### **Mineral Fuels and Related Materials**

**Coal.**—Lignite coal was Greece's primary mineral fuel commodity, providing 57% of the energy for electricity generation in the country in 2015. Greece was the third-ranked producer of lignite in the EU after Germany and Poland in 2015. Lignite was extracted primarily by PPC from its mines in Megalopolis and West Macedonia for use by the company's powerplants. In 2015, PPC's lignite output decreased to 46.3 Mt from 50.4 Mt in 2014. No hard coal was mined in Greece. Hard coal was used mainly for industrial purposes, and hard coal consumption in Greece was very low. In 2015, hard coal imports totaled about 200,000 t, which was unchanged from the amount imported in 2014 (Tzeferis, 2015, p. 8; Euracoal, 2016, p. 8–9; Public Power Corporation S.A.-Hellas, 2016a).

**Petroleum and Natural Gas.**—In 2014, petroleum accounted for 49.2% of Greece's total energy consumption, and natural gas, 10.2%. Hydrocarbon output was small, however; petroleum and petroleum products accounted for only 1.1% of domestic energy production in 2014, and natural gas, only 0.1%. Greece was dependent on imports for almost 100% of its petroleum

and natural gas consumption (European Commission, 2016a; Kyriakides Georgopoulos Law Firm, 2016, p. 86).

Kavala Oil S.A. (a subsidiary of Energean Oil & Gas S.A.) was the only hydrocarbons producer in Greece. In 2015, the company produced 1,266 barrels per day (bbl/d) of oil from its Prinos offshore oilfield and 197 bbl/d of oil from its Prinos North offshore oilfield in the North Aegean Sea. The Prinos field's remaining proven plus probable oil reserves were 11.7 million barrels (Mbbbl) and the Prinos North field's proven plus probable oil reserves were 3.3 Mbbbl. Through the 2015–16 drilling campaign, Kavala Oil planned to begin operating at least seven new producing wells in Prinos. In December 2015, the first well came online, adding 1,500 bbl/d to output. The company also planned to develop the Katakolo offshore field in the Ionian Sea. In November 2015, Kavala Oil received a 3-year extension of its license for the South Kavala gasfield, which had remaining gas reserves of about 73.6 million cubic meters. The company was preparing a 3-year development plan for South Kavala to place the field back into continuous production and increase gas condensate yields. Kavala Oil planned to increase its total petroleum output to 10,000 bbl/d in the near future (Energean Oil & Gas S.A., 2016a, p. 9, 11; 2016b–f).

The Government held two tenders for hydrocarbon exploration in 2015 in the Ionian Sea and the Mediterranean Sea. One tender was for 3 onshore blocks in western Greece and the other tender was for 20 offshore blocks covering an area of 200,000 km<sup>2</sup>. In February 2015, Energean Oil & Gas and Hellenic Petroleum S.A. submitted two bids for the onshore blocks. By July 2015, the Government received three bids for offshore blocks from undisclosed companies. As of yearend 2015, there were no further updates on the awarding of any blocks. In 2014, the Government had issued the first drilling licenses for three onshore and offshore blocks in western Greece to Energean Oil & Gas and a venture of Hellenic Petroleum, Edison S.p.A. of Italy, and Petroceltic Holdings Ltd. of Ireland (Koutantou, 2015; Kyriakides Georgopoulos Law Firm, 2016, p. 89).

### **Outlook**

Greece is expected to remain a globally significant producer of bauxite, bentonite, magnesite, perlite, and pumice and a regionally significant producer of aluminum and lignite. Exports of bauxite, bentonite, and perlite could increase further as the country's leading producers are integrated into their new owners' global operations. The country may not be able to maintain its nickel and ferronickel production at current levels if LARCO is not successfully restructured. Greece may increase its production of gold and silver provided Eldorado Gold obtains the requisite mining permits. Cement and steel production may recover if domestic and regional construction activity picks up in 2016. Petroleum and natural gas production are projected to increase with Energean Oil & Gas's development of offshore oil and gas fields in the Aegean Sea.

### **References Cited**

Bank of Greece, 2016, Summary of the annual report 2015: Athens, Greece, Bank of Greece, February, 48 p. (Accessed November 15, 2016, at [http://www.bankofgreece.gr/Pages/en/Publications/GovReport.aspx?Filter\\_By=8](http://www.bankofgreece.gr/Pages/en/Publications/GovReport.aspx?Filter_By=8).)

- Bennett, S.M., 2016, Perlite: U.S. Geological Survey Mineral Commodity Summaries 2016, p. 122–123.
- Bennett, S.M., 2017, Perlite: U.S. Geological Survey Mineral Commodity Summaries 2017, p. 122–123.
- Bray, E.L., 2016a, Bauxite and alumina: U.S. Geological Survey Mineral Commodity Summaries 2016, p. 32–33.
- Bray, E.L., 2016b, Magnesium compounds: U.S. Geological Survey Mineral Commodity Summaries 2016, p. 102–103.
- Bray, E.L., 2017a, Bauxite and alumina: U.S. Geological Survey Mineral Commodity Summaries 2017, p. 32–33.
- Bray, E.L., 2017b, Magnesium compounds: U.S. Geological Survey Mineral Commodity Summaries 2017, p. 102–103.
- Crangle, R.D., 2017, Pumice and pumicite: U.S. Geological Survey Mineral Commodity Summaries 2017, p. 130–131.
- Eldorado Gold Corp., 2016a, Balancing our responsibilities—Year in review 2015: Vancouver, British Columbia, Canada, Eldorado Gold Corp., 56 p. (Accessed November 21, 2016, at [http://s21.q4cdn.com/339753927/files/doc\\_downloads/eldorado\\_year-in-review-2015\\_final-1.pdf](http://s21.q4cdn.com/339753927/files/doc_downloads/eldorado_year-in-review-2015_final-1.pdf).)
- Eldorado Gold Corp., 2016b, Operations and projects—Olympias (Greece): Vancouver, British Columbia, Canada, Eldorado Gold Corp. (Accessed November 19, 2016, at <http://www.eldoradogold.com/assets/operations-and-projects/europe/projects/olympias-greece/default.aspx>.)
- Eldorado Gold Corp., 2016c, Operations and projects—Stratoni (Greece): Vancouver, British Columbia, Canada, Eldorado Gold Corp. (Accessed November 19, 2016, at <http://www.eldoradogold.com/assets/operations-and-projects/europe/projects/stratoni-greece/default.aspx>.)
- Energean Oil & Gas S.A., 2016a, Corporate profile: Energean Oil & Gas S.A., August, 25 p. (Accessed November 20, 2016, at [http://www.energean.com/wp-content/uploads/2015/01/Corporate-pres.-August2016\\_noOR.pdf](http://www.energean.com/wp-content/uploads/2015/01/Corporate-pres.-August2016_noOR.pdf).)
- Energean Oil & Gas S.A., 2016b, Development—Prinos: Energean Oil & Gas. (Accessed November 20, 2016, at <http://www.energean.com/operations/>.)
- Energean Oil & Gas S.A., 2016c, Development—Prinos North: Energean Oil & Gas. (Accessed November 20, 2016, at <http://www.energean.com/operations/>.)
- Energean Oil & Gas S.A., 2016d, Production—Prinos: Energean Oil & Gas. (Accessed November 20, 2016, at <http://www.energean.com/operations/>.)
- Energean Oil & Gas S.A., 2016e, Production—Prinos North: Energean Oil & Gas. (Accessed November 20, 2016, at <http://www.energean.com/operations/>.)
- Energean Oil & Gas S.A., 2016f, Production—South Kavala: Energean Oil & Gas. (Accessed November 20, 2016, at <http://www.energean.com/operations/>.)
- Euracoal, 2016, Euracoal market report 1/2016: Euracoal, May, 16 p. (Accessed November 21, 2016, at <http://euracoal2.org/download/Public-Archive/Library/Market-Reports/EURACOAL-Market-Report-2016-1.pdf>.)
- European Commission, 2014, State aid—Commission finds that Greek mining company Larco received incompatible state aid; opens way to sale of some assets: European Commission press release, March 27. (Accessed December 28, 2016, at [http://europa.eu/rapid/press-release\\_IP-14-328\\_en.htm](http://europa.eu/rapid/press-release_IP-14-328_en.htm).)
- European Commission, 2016a, Energy datasheets—EU—28 countries—Greece: Brussels, Belgium, European Commission, July 6. (Accessed November 14, 2016, via <https://ec.europa.eu/energy/en/data-analysis/country>.)
- European Commission, 2016b, Greece—Growth to return in the second half of the year, in European economic forecast—Spring 2016: Brussels, Belgium, European Commission Institutional Paper no. 025, May, p. 80–81. (Accessed November 13, 2016, at [http://ec.europa.eu/economy\\_finance/eu/forecasts/2016\\_spring/el\\_en.pdf](http://ec.europa.eu/economy_finance/eu/forecasts/2016_spring/el_en.pdf).)
- European Commission, 2016c, State aid—Commission refers Greece to court for failure to recover incompatible aid from LARCO and United Textiles: Brussels, Belgium, European Commission daily news, April 5. (Accessed November 18, 2016, at [http://europa.eu/rapid/press-release\\_MEX-16-1563\\_en.htm](http://europa.eu/rapid/press-release_MEX-16-1563_en.htm).)
- Flanagan, D.M., 2017, Clays: U.S. Geological Survey Mineral Commodity Summaries 2017, p. 50–51.
- Grecian Magnesite, S.A., 2015, Company presentation: Grecian Magnesite, S.A., 42 p. (Accessed November 18, 2016, at [http://grecianmagnesite.com/pdfs/PRESENTATION\\_LOW.pdf](http://grecianmagnesite.com/pdfs/PRESENTATION_LOW.pdf).)
- Hellenic Cement Industry Association, 2016, Statistics—Production: Hellenic Cement Industry Association. (Accessed November 13, 2016, at <http://www.hcia.gr/en/statistical-elements/production/>.)
- Hellenic Statistical Authority, 2016a, Commercial transactions of Greece—December 2015: Athens, Greece, Hellenic Statistical Authority press release, February 5, 13 p.
- Hellenic Statistical Authority, 2016b, Greece in figures—July–September 2016: Athens, Greece, Hellenic Statistical Authority, October, 165 p.
- Hellenic Statistical Authority, 2016c, Gross added value by industry (provisional data)—1995–2015: Athens, Greece, Hellenic Statistical Authority. (Accessed November 17, 2016, at <http://www.statistics.gr/en/statistics/-/publication/SEL12/->.)
- Hellenic Statistical Authority, 2016d, PRODCOM (provisional data) 2014: Athens, Greece, Hellenic Statistical Authority. (Accessed November 17, 2016, at <http://www.statistics.gr/en/statistics/-/publication/SIN06/2014>.)
- Imerys S.A., 2016, Imerys achieves target with +8.0% growth in net income from current operations in 2015: Paris, France, Imerys S.A. press release, February 11, 20 p. (Accessed November 18, 2016, at [https://www.imerys.com/scopi/Group/ImerysCom/imeryscom.nsf/pagesref/REBA-A72LHR/\\$File/Imerys%20CP%20res%202015%20VO.pdf](https://www.imerys.com/scopi/Group/ImerysCom/imeryscom.nsf/pagesref/REBA-A72LHR/$File/Imerys%20CP%20res%202015%20VO.pdf).)
- International Cement Review, 2016, The Mediterranean and beyond: International Cement Review, May, p. 153–154.
- Kerneos S.A., 2015, Announcement of the acquisition of European Bauxites: Kerneos S.A. news release, February 20. (Accessed November 19, 2016, at <http://www.kerneos.com/content/en/News/46-KERNEOS,-EUR-OPEAN-BAUXITE,-ELMIN,-S&B-INDUSTRIAL-MINERALS-Bauxite,-Calcium-Aluminate>.)
- Koutantou, Angeliki, 2015, Greece says it receives three bids for deep sea oil, gas drilling: Thomson Reuters, July 14. (Accessed November 20, 2016, at <http://www.reuters.com/article/eurozone-greece-drilling-idUSL5N0ZU45V20150714>.)
- Kyriakides Georgopoulos Law Firm, 2016, Greece, in Southeast Europe energy handbook 2016: Athens, Greece, SEE Legal Group, p. 78–89.
- Michalopoulos, Sarantis, 2015, How a state company derailed competition in Greece: Euractiv, November 13. (Accessed November 18, 2016, at <https://www.euractiv.com/section/energy/news/how-a-state-company-derailed-competition-in-greece/>.)
- Ministry of Environment, Energy and Climate Change [Greece], 2015, Greek extractive industry—International environment profile—Prospects: Ministry of Environment, Energy and Climate Change, 24 p. (Accessed November 15, 2016, at <https://ec.europa.eu/docsroom/documents/10003/attachments/1/translations/en/renditions/pdf>.)
- Patel, Kasia, 2015, Kerneos strengthens position in Greece through S&B bauxite business purchase: Industrial Minerals, February 20. (Accessed November 19, 2016, at <http://www.indmin.com/Article/3429522/Kerneos-strengthens-position-in-Greece-through-S-B-bauxite-business-purchase.html>.)
- Public Power Corporation S.A.-Hellas, 2016a, Corporate identity: Public Power Corporation S.A.-Hellas. (Accessed December 28, 2016, at <https://www.dei.gr/en/i-dei/enimerwsi-ependutwn/etairiki-eikona/tautotita-etaireias>.)
- Public Power Corporation S.A.-Hellas, 2016b, PPC's stateholding structure: Public Power Corporation S.A.-Hellas. (Accessed December 28, 2016, at <https://www.dei.gr/en/i-dei/enimerwsi-ependutwn/xrimatistiriaka-stoixeia/metoxiki-synthesi>.)
- Terna Magnesite S.A., 2015, Terna Mag: Terna Magnesite S.A. (Accessed November 20, 2016, at <http://www.ternamag.com/index.php/en/>.)
- TITAN Group, 2016, Company presentation: TITAN Group, November, 46 p. (Accessed November 19, 2016, at <http://ir.titan.gr/titan/uploads/parousiaseis/Company-presentation-January-2016.pdf>.)
- Tsirambides, Ananias, and Flippidis, Anestis, 2012, Metallic mineral resources of Greece: Central European Journal of Geosciences, v. 4, no. 4, p. 641–650. (Accessed November 10, 2016, at [https://eclass.uoa.gr/modules/document/file.php/GEOL290/Chalkidiki\\_fieldtrip/Metallic%20Mineral%20Res%20Greece%20CEJG%20641-650.pdf](https://eclass.uoa.gr/modules/document/file.php/GEOL290/Chalkidiki_fieldtrip/Metallic%20Mineral%20Res%20Greece%20CEJG%20641-650.pdf).)
- Tsirambides, Ananias, and Flippidis, Anestis, 2013, Reserves and gross value of mineral resources of Greece: Thessaloniki, Greece, Aristotle University of Thessaloniki, 46 p.
- Tzeferis, P.G., 2015, The mining/metallurgical industry of Greece—Commodity review for years 2013–2014: Ministry of Reconstruction of Production, Environment and Energy [Greece], July, 12 p. (Accessed November 10, 2016, at <http://www.sme.gr/the-mining-metallurgical-industry-of-greece-commodity-review-for-years-2013-2014.pdf>.)
- World Bank, The, 2016, Greece [data by country]: The World Bank. (Accessed November 14, 2016, at <http://data.worldbank.org/country/greece>.)
- World Steel Association, 2016, Steel statistical yearbook 2016: Brussels, Belgium, World Steel Association, November, 123 p.

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

(Metric tons unless otherwise specified)

| Commodity <sup>2</sup>                                | 2011                 | 2012                 | 2013                 | 2014                   | 2015                |
|---|----------------------|----------------------|----------------------|------------------------|---------------------|
| <b>METALS</b>   |                      |                      |                      |                        |                     |
| <b>Aluminum:</b>                                      |                      |                      |                      |                        |                     |
| Bauxite   | 2,324,000            | 1,816,000            | 1,844,000            | 1,872,710 <sup>r</sup> | 1,831,660           |
| Alumina, Al <sub>2</sub> O <sub>3</sub>               | 809,700              | 784,400              | 811,600              | 813,500 <sup>r</sup>   | 806,500             |
| Metal, primary  | 165,147              | 165,046              | 169,457              | 173,160 <sup>r</sup>   | 179,420             |
| Chromite, ore, crude                                  | 570                  | 576                  | --                   | --                     | --                  |
| Gold, mine output, Au content kilograms               | --                   | --                   | 567                  | 503                    | 465                 |
| <b>Iron and steel:</b>                                |                      |                      |                      |                        |                     |
| Iron ore and concentrate, nickeliferous, gross weight | 2,260,000            | 2,306,000            | 2,220,790            | 2,317,000 <sup>r</sup> | 2,264,000           |
| Fe content <sup>c</sup>                               | 560,000              | 571,000              | 550,000              | 574,000 <sup>r</sup>   | 561,000             |
| <b>Steel:</b>   |                      |                      |                      |                        |                     |
| Crude thousand metric tons                            | 1,934                | 1,247                | 1,030                | 1,022 <sup>r</sup>     | 910                 |
| Semimanufactures do.                                  | 1,790                | 1,155                | 985                  | 965                    | 875 <sup>e</sup>    |
| Lead, mine output, Pb content                         | 16,592               | 18,630               | 18,400 <sup>r</sup>  | 16,700 <sup>r</sup>    | 16,000 <sup>e</sup> |
| <b>Nickel:</b>  |                      |                      |                      |                        |                     |
| Ore, gross weight thousand metric tons                | 2,236                | 2,257                | 2,221                | 2,382 <sup>r</sup>     | 2,340               |
| Metal, Ni content of ferronickel                      | 18,527               | 18,630               | 16,890               | 18,480 <sup>r</sup>    | 17,110              |
| Silver, mine output, Ag content kilograms             | 944 <sup>r</sup>     | 1,127 <sup>r</sup>   | 1,106 <sup>r</sup>   | 845 <sup>e,r</sup>     | 781 <sup>e</sup>    |
| Zinc, mine output, Zn content                         | 20,999               | 23,196               | 22,512               | 24,203 <sup>r</sup>    | 22,000              |
| <b>INDUSTRIAL MINERALS</b>                            |                      |                      |                      |                        |                     |
| Calcium carbonate                                     | 400,000              | 380,000              | 345,000              | 414,000                | 384,000             |
| Cement, hydraulic thousand metric tons                | 6,110                | 6,918                | 7,819                | 8,384 <sup>r</sup>     | 8,500 <sup>e</sup>  |
| <b>Clay:</b>  |                      |                      |                      |                        |                     |
| <b>Attapulgitic:</b>                                  |                      |                      |                      |                        |                     |
| Crude   | 37,000               | 19,800               | 32,400               | 45,000                 | 107,740             |
| Treated   | 7,000                | 9,200                | 10,300               | 14,670                 | 22,070              |
| <b>Bentonite</b>                                      |                      |                      |                      |                        |                     |
| Crude   | 1,188,442            | 1,235,105            | 1,000,000            | 1,011,480 <sup>r</sup> | 1,123,320           |
| Processed   | 730,000              | 730,000              | 730,000              | 850,000                | 807,550             |
| Feldspar  | 10,200 <sup>r</sup>  | 13,000 <sup>r</sup>  | --                   | --                     | --                  |
| Gypsum and anhydrite                                  | 590,000              | 700,000              | 760,000              | 664,290 <sup>r</sup>   | 649,280             |
| <b>Magnesite:</b>                                     |                      |                      |                      |                        |                     |
| Ore, crude  | 380,330 <sup>r</sup> | 360,080 <sup>r</sup> | 314,770 <sup>r</sup> | 360,270 <sup>r</sup>   | 383,230             |
| Caustic-calcined                                      | 58,080               | 54,500               | 61,120               | 70,660 <sup>r</sup>    | 86,800              |
| Dead-burned   | 38,840               | 22,800               | 30,500               | 26,010 <sup>r</sup>    | 20,220              |
| Huntite, crude  | 23,800               | 24,200               | 15,200               | 5,340                  | 15,660              |
| Olivinite   | 32,000               | 20,000               | 16,400               | 25,410 <sup>r</sup>    | 23,020              |
| <b>Perlite:</b>                                       |                      |                      |                      |                        |                     |
| Crude   | 842,870              | 876,396              | 890,000              | 985,330 <sup>r</sup>   | 890,670             |
| Screened  | 420,000 <sup>r</sup> | 450,000 <sup>r</sup> | 435,000              | 507,340 <sup>r</sup>   | 376,670             |
| <b>Pumice and pumicite:</b>                           |                      |                      |                      |                        |                     |
| Pozzolan, Santorin earth                              | 350,000              | 285,000              | 266,000              | 270,000                | 153,070             |
| Pumice  | 469,000 <sup>r</sup> | 386,000 <sup>r</sup> | 420,000              | 429,870 <sup>r</sup>   | 580,960             |
| Quartz  | 8,200                | --                   | --                   | --                     | --                  |
| Salt, all types                                       | 174,500              | 191,970              | 189,500              | 146,402                | 121,537             |
| Silica  | 1,700 <sup>r</sup>   | 7,000 <sup>r</sup>   | 10,000               | --                     | 75,320              |
| <b>Stone:</b>   |                      |                      |                      |                        |                     |
| Marble cubic meters                                   | 470,000 <sup>r</sup> | 520,000 <sup>r</sup> | 585,000 <sup>r</sup> | 567,000 <sup>r</sup>   | 491,160             |
| Limestone   | 15,100               | 13,368               | 15,268               | 18,109                 | 21,632              |
| Sulfur, S content of mixed sulfide ore                | 230,000 <sup>r</sup> | 227,200 <sup>r</sup> | 228,000 <sup>r</sup> | 219,860 <sup>r</sup>   | 154,990             |
| <b>MINERAL FUELS AND RELATED MATERIALS</b>            |                      |                      |                      |                        |                     |
| Coal, lignite thousand metric tons                    | 58,400               | 62,368 <sup>r</sup>  | 55,000 <sup>r</sup>  | 50,411 <sup>r</sup>    | 46,308              |
| Gas, natural, gross production thousand cubic meters  | 5,927                | 6,402                | 5,415                | 5,062                  | 4,379               |

See footnotes at end of table.

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

(Metric tons unless otherwise specified)

| Commodity <sup>2</sup>                        |                            | 2011                 | 2012                 | 2013                 | 2014                 | 2015    |
|---|----------------------------|----------------------|----------------------|----------------------|----------------------|---------|
| MINERAL FUELS AND RELATED MATERIALS—Continued |                            |                      |                      |                      |                      |         |
| Petroleum:                                    |                            |                      |                      |                      |                      |         |
| Crude   | thousand 42-gallon barrels | 718 <sup>r</sup>     | 689 <sup>r</sup>     | 513 <sup>r</sup>     | 514 <sup>r</sup>     | 533     |
| Refinery products: <sup>c</sup>               |                            |                      |                      |                      |                      |         |
| Liquefied petroleum gas                       | do.                        | 6,500 <sup>r</sup>   | 7,300 <sup>r</sup>   | 7,800 <sup>r</sup>   | 8,500 <sup>r</sup>   | 9,000   |
| Gasoline                                      | do.                        | 33,600 <sup>r</sup>  | 39,000 <sup>r</sup>  | 35,700 <sup>r</sup>  | 39,500 <sup>r</sup>  | 40,000  |
| Naphtha                                       | do.                        | 5,400 <sup>r</sup>   | 11,400 <sup>r</sup>  | 8,200 <sup>r</sup>   | 11,900 <sup>r</sup>  | 12,000  |
| Jet fuel                                      | do.                        | 14,600 <sup>r</sup>  | 14,100 <sup>r</sup>  | 18,800 <sup>r</sup>  | 17,700 <sup>r</sup>  | 18,000  |
| Kerosene                                      | do.                        | 78 <sup>r</sup>      | 47 <sup>r</sup>      | -- <sup>r</sup>      | 8 <sup>r</sup>       | 10      |
| Distillate fuel oil                           | do.                        | 42,400 <sup>r</sup>  | 57,700 <sup>r</sup>  | 60,700 <sup>r</sup>  | 71,400 <sup>r</sup>  | 72,000  |
| Residual fuel oil                             | do.                        | 33,900 <sup>r</sup>  | 34,200 <sup>r</sup>  | 36,500 <sup>r</sup>  | 40,500 <sup>r</sup>  | 41,000  |
| Total   | do.                        | 136,500 <sup>r</sup> | 163,700 <sup>r</sup> | 167,700 <sup>r</sup> | 189,500 <sup>r</sup> | 192,000 |

<sup>a</sup>Estimated; estimated data are rounded to no more than three significant digits; may not add to totals shown. <sup>r</sup>Revised. do. Ditto. -- Zero.

<sup>1</sup>Table includes data available through November 21, 2016.

<sup>2</sup>In addition to the commodities listed, barite, dolomite, lignite briquets, manganese, nitrogen, and crude construction materials were produced, but available information was inadequate to make reliable estimates of output.

TABLE 2  
GREECE: STRUCTURE OF THE MINERAL INDUSTRY IN 2015

(Thousand metric tons unless otherwise specified)

| Commodity                               | Major operating companies and major equity owners   | Location of main facilities                              | Annual capacity |
|---|---|--|-----------------|
| Alumina, Al <sub>2</sub> O <sub>3</sub> | Aluminium S.A. (Mytilineos Holdings S.A., 53%)  | Agios Nikolaos, Boeotia area                             | 1,100           |
| Aluminum                                | do.   | do.  | 180             |
| Barite, BaSO <sub>4</sub>               | Imerys S.A.   | Mines at Adamas, Milos Island                            | NA              |
| Bauxite                                 | European Bauxites S.A. (Kerneos S.A.)   | Mines at Amfissa and Distomon, plants at Phocis and Itea | 2,000           |
| Do.                                     | Delphi-Distomon S.A. (Mytilineos Holdings S.A.)   | Mines at Amfissa and Distomon                            | 650             |
| Do.                                     | Hellenic Mining Enterprises. S.A. (ELMIN) (Kerneos S.A.)  | Mines at Aga Marina, Lamia                               | 500             |
| Cement                                  | Halyps Cement S.A. (Italcementi Group)  | Paralia Aspropyrgos plant, Athens                        | 1,000           |
| Do.                                     | Heracles General Cement S.A. (LafargeHolcim Ltd.)   | Plants at Milaki Evia and Volos                          | 6,700           |
| Do.                                     | TITAN Cement Co. S.A. (TITAN Group)   | Elefsis plant, Athens area                               | 400             |
| Do.                                     | do.   | Kamari plant, Boeotia                                    | 2,900           |
| Do.                                     | do.   | Patras plant, northern Peloponnesus                      | 1,900           |
| Do.                                     | do.   | Salonica plant, Salonica                                 | 1,650           |
| Chromite                                | # Financial-Mining-Industrial and Shipping Corp. (FIMISCO)  | Tsingeli Mine, Volos                                     | 25 <sup>1</sup> |
| Clay, bentonite:                        |   |  |                 |
| Crude                                   | Mediterranean Bentonite Co. S.A. (Industria Chimica Mineraria S.p.A.)   | Surface mines on Milos Island                            | 20              |
| Do.                                     | Mykobor Mining Co. S.A. (Silver & Baryte Ores Mining Co. S.A.)  | Mines at Adamas, Milos Island                            | 300             |
|   | do.   | Plants at Adamas, Milos Island                           | 200             |
| Do.                                     | Imerys S.A.   | Mines at Adamas, Milos Island                            | 600             |
| Processed                               | do.   | Plant at Voudia Bay, Milos Island                        | 400             |
| Coal, lignite                           | Public Power Corp. S.A.-Hellas (PPC) (Government, 34.12%; Hellenic Republic Asset Development Fund, 17%; PPC Pension Funds, 3.81%; other investors, 45.07%) | Megalopolis and West Macedonia Mines                     | 65,000          |

See footnotes at end of table.

TABLE 2—Continued  
GREECE: STRUCTURE OF THE MINERAL INDUSTRY IN 2015

(Thousand metric tons unless otherwise specified)

| Commodity                                 |                              | Major operating companies and major equity owners  | Location of main facilities   | Annual capacity    |
|---|------------------------------|--|---|--------------------|
| Ferroalloys, ferronickel, Ni content      |                              | Larco G.M.M. S.A.  | Larymna metallurgical plant   | 25                 |
| Gold, Au in concentrate                   | kilograms                    | Eldorado Gold Corp.  | Olympias Mine, Halkidiki Peninsula  | 600                |
| Gypsum                                    |                              | Lava Mining and Quarrying Co. S.A.   | Altsi, Crete Island   | 500                |
| Do.                                       |                              | TITAN Cement Co. S.A. (TITAN Group)  | do.   | 280                |
| Huntite/Hydromagnesite                    |                              | Microfine S.A.   | Mines in Kozani Basin   | 100                |
| Lead, mine, Pb in concentrate             |                              | Hellas Gold S.A. (Eldorado Gold Corp.)   | Kassandra Mines (Olympias and Stratoni) northeastern Chalkidiki                                     | 30                 |
| Magnesite, concentrate                    |                              | Grecian Magnesite S.A. (GM)  | Mine and production facilities at Chalkidiki on Halkidiki Peninsula and in Yerakini                 | 250                |
| Do.                                       |                              | Terna Magnesite (Terna Mag) (Gek Terna Group)  | Gerorema Mine, Euboea island  | 100                |
| Manganese, battery-grade MnO <sub>2</sub> |                              | Eleusis Bauxite Mines Mining, Industrial and Shipping S.A. [National Bank of Greece (OAE)]                         | Nevrokopi, Drama  | 10                 |
| Natural gas                               | housand cubic meters per day | Hellenic Petroleum S.A.  | Prinos offshore gasfield and oilfield, east of Thassos Island                                       | 14                 |
| Do.                                       | do.                          | Kavala Oil S.A. (Energean Oil and Gas S.A.)  | South Kavala gasfield, east of Thassos Island   | NA                 |
| Nickel, ore                               |                              | LARCO G.M.M. S.A. (Government, 55.2%; National Bank of Greece, 33.4%; Public Power Corp. S.A.-Hellas (PPC), 11.4%) | Agios Ioannis Mine, Evia Mine, at Neo Kokkino near Larymna; and Kastoria Mine, near Albanian border | 2,500              |
| Do.                                       |                              | do.  | Larymna smelter, near Athens  | 2,500              |
| Nitrogen, N content of ammonia            |                              | Phosphoric Fertilizers S.A.  | Nea Karvall   | 150                |
| Perlite                                   |                              | Imerys S.A.  | Mines on Milos Islands; plant at Pireaus  | 650                |
| Do.                                       |                              | Otavi Minen Hellas S.A. (Otavi Minen AG)   | Milos Island  | 150                |
| Petroleum:                                |                              |  |   |                    |
| Crude                                     | 42-gallon barrels per day    | Kavala Oil S.A. (Energean Oil and Gas S.A.)  | Prinos offshore oilfield, east of Thassos Island  | 1,300 <sup>e</sup> |
| Do.                                       | do.                          | do.  | Prinos North offshore oilfield, east of Thassos Island  | 200 <sup>e</sup>   |
| Refined                                   | do.                          | Hellenic Petroleum S.A.  | Aspropyrgos   | 115,000            |
| Do.                                       | do.                          | do.  | Eleusis   | 120,000            |
| Do.                                       | do.                          | do.  | Thessaloniki  | 92,000             |
| Do.                                       | do.                          | Motor Oil (Hellas) Corinth Refineries S.A.   | Aghii Theodori, Corinth   | 163,000            |
| Pumice and pumicite:                      |                              |  |   |                    |
| Pozzolan (Santorin earth)                 |                              | Lava Mining and Quarrying Co. (Heracles General Cement Co.)  | Xylokeratia, Milos Island   | 600                |
| Do.                                       |                              | TITAN Cement Co. S.A. (TITAN Group)  | do.   | 300                |
| Pumice                                    |                              | Lava Mining and Quarrying Co. (Heracles General Cement Co.)  | Yali Island   | 1,000              |
| Quartz (microcrystalline)                 |                              | do.  | Adamas, Milos Island  | 150 <sup>2</sup>   |
| Silver, Ag in concentrate                 | kilograms                    | Eldorado Gold Corp.  | Olympias Mine, Halkidiki Peninsula  | 1,200              |
| Steel, crude                              |                              | Hellenic Halyvourgia   | Volos plant   | 1,000              |
| Do.                                       |                              | Sidenor Steel Products Manufacturing S.A.  | Thessaloniki and Almyros plants   | 2,800              |
| Do.                                       |                              | Halyvourgiki S. A.   | Eleusis plant   | 1,200              |
| Do.                                       |                              | Hellenic Steel Co. S. A.   | Thessaloniki plant  | 1,000              |
| Steel products                            |                              | Corinth Pipeworks S.A. (CPW)   | Thisvi plant, Viotia, near Athens   | 800                |
| Stone, marble, slab and tile              | cubic meters                 | Aghia Marina Marble Ltd.   | Various areas of northern Greece  | NA                 |
| Do.                                       | do.                          | Michelakis Marble S.A.   | Kavala  | NA                 |
| Do.                                       | do.                          | Gourlis Group  | Quarries at Levadia, Nevrokopi, and Tiseo   | NA                 |
| Zinc, mine, Zn in concentrate             |                              | Hellas Gold S.A. (European Goldfields Ltd.)  | Kassandra Mines (Olympias and Stratoni), northeastern Chalkidiki                                    | 30                 |

<sup>e</sup>Estimated. Do., do. Ditto. NA Not available.

<sup>1</sup>Not active since 2013.

<sup>2</sup>Not active since 2012.