



2020–2021 Minerals Yearbook

GREECE [ADVANCE RELEASE]

THE MINERAL INDUSTRY OF GREECE

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Note: In this chapter, information for 2020 is followed by information for 2021.

Greece had resources of metals (bauxite, copper, gold, iron, lead, nickel, silver, and zinc) and industrial minerals; the country held the world's largest reserves of perlite and the fifth largest reserves of magnesite (accounting for 4% of the world total) as of 2020. It was the world's second-ranked pumice producer (accounting for 7% of the world total), third-ranked perlite producer (17%), fifth-ranked bentonite producer (7%), and eighth-ranked magnesite producer (2%, not including United States production) in 2020. The country was the world's only producer of huntite [$\text{CaMg}_3(\text{CO}_3)_4$], a soft white mineral. Greece was the leading source of pumice and perlite for the United States, accounting for 92% and 90%, respectively, of United States imports. The country was also an important source of cement for the United States, accounting for about 13% of United States imports for the year. Greece remained one of the few European Union (EU) countries that mined nickel and produced ferronickel; as of 2019, Finland and Austria also produced nickel ore and ferronickel, respectively (Psaropoulos, 2020; Tzeferis, 2020; Crangle, 2022; Hatfield, 2022; Merrill, 2022; Simmons, 2022a, b; McRae, 2023).

Minerals in the National Economy

Greece's real gross domestic product (GDP) decreased by 9.0% in 2020; the nominal GDP was \$189 billion. The mining and quarrying sector made up 0.35% of the country's gross value added (GVA). The manufacture of base metals accounted for 0.86% of the GVA; the manufacture of nonmetallic mineral products, 0.52%; and the manufacture of coke and refined petroleum products, 0.23%. There were about 5,260 workers in the mining and quarrying sector, accounting for 0.20% of Greece's total employment of about 4.7 million people (Hellenic Statistical Authority, 2022, 2023a; World Bank, The, 2023).

Government Policies and Programs

The mining sector in Greece is regulated by the Mining Code of 1973, Legislative Decree 210/1973, as amended in 1976 by Law 274/1976 and in 2018 by Law 4512/2018. The quarrying sector, which includes the extraction of aggregate, marble, and ornamental rock, is regulated by Law 4512/2018 (specifically, Part II, Exploration and Exploitation of Quarry Minerals and Other Provisions). Field operations for mining and quarrying are regulated by the Mining and Quarrying Works Regulation of 2011 (Tzeferis, 2018, p. 3–4; Ministry for the Environment, Energy and Climate Change, 2021).

Production

In 2020, activity in Greece's mineral industry declined owing to decreased economic activity related the coronavirus disease 2019 (COVID-19) pandemic. The production of sand and gravel

(industrial) decreased by 67%; olivinite, 63%; ferronickel, 51%; mined nickel, 50%; lignite coal, 49%; crude petroleum, 45%; iron ore, 41%; bentonite, 30%; and natural gas, 27%. Meanwhile, the production of dead-burned magnesite increased by 40%; fuller's earth, 37%; pumice, 32%; mined lead, 31%; mined zinc, 29%; sulfur, 24%; pozzolan (santorin earth), 16%; caustic-calcined magnesite, 15%; and perlite (crude), 14%. Data on mineral production are in table 1.

Structure of the Mineral Industry

The Ministry for the Environment, Energy and Climate Change issues mining licenses and permits at the national level. The Hellenic Survey of Geology and Mineral Exploration (formerly the Institute of Geology and Mineral Exploration) identifies mineral resources and provides provisional opinions on the licensing of geoscientific research. Most mineral companies in Greece were privately owned. Government ownership in the mineral sector was limited to ownership of Power Corp. Public S.A.-Hellas (PPC) (for coal) and LARCO GMSA (for nickel ore and ferronickel). The Government's majority stake in LARCO was set to be sold to private investors in 2020 (Koutantou, 2020a; Public Power Corporation S.A.-Hellas, 2021b). Table 2 is a list of major mineral industry facilities.

A total of 577 companies were engaged in the mining and quarrying sector in 2020. Of this number, 499 companies were affiliated with or engaged in the mining or quarrying of industrial minerals, 12 in the mining of metal ores, 9 in the extraction of coal (lignite), and 9 in the extraction of crude petroleum (Hellenic Statistical Authority, 2023b).

Mineral Trade

Greece's total exports and imports of goods were valued at about \$35.2 billion and \$55.9 billion, respectively, in 2020. The country's exports of "mineral products" [as classified under Harmonized System (HS) chapters 25 to 27] were valued at \$8.4 billion (or 24% of total exports), including \$7.0 million in refined petroleum products. Exports of base metals and articles of base metal (HS chapters 72 to 83) were valued at \$4.0 billion (11% of total exports). Imports of mineral products were valued at \$11.3 billion (or 20% of total imports); of which the leading import was crude petroleum, which was valued at \$7.0 billion. Imports of base metals and articles of base metal were valued at \$4.1 billion (7% of total imports) (Zen Innovations AG, 2023).

Commodity Review

Metals

Copper and Gold.—In 2020, Hellas Gold S.A. (a subsidiary of Eldorado Gold Corp. of Canada) was engaged in negotiations with the Government of Greece on a new investment contract for its mining operations in the country, including new royalty rates to be paid by the company. The investment agreement would provide for enhanced fiscal revenues, environmental benefits, and support for local communities in the form of job creation and local projects. After Hellas Gold had reported the receipt of installation permits for its Olympias Mine and Skouries gold-copper project in 2019, it resumed activities in Olympias; the Skouries project, however, remained under development in 2020. The company was awaiting the approval of its plan for the use of dry stack tailings disposal at the Skouries site. Total ore milled at Skouries was planned to be nearly 157 million metric tons (Mt), resulting in annual production of more than 4,300 kilograms (kg) of gold and 30,000 metric tons (t) of copper. The mine was projected to have a life of about 20 years, once commissioned (Thomson Reuters, 2019; Eldorado Gold Corp., 2021; Jamasmie, 2021).

Nickel.—LARCO extracted 1.0 Mt of nickeliferous laterite in 2020 compared with 1.9 Mt in 2019. The company operated one of the last nickel smelters in the EU, where it smelted its own extracted ore for ferronickel production. LARCO remained Europe's leading nickel producer; however, the Government initiated liquidation of the company in 2020 owing to its ongoing financial losses and outstanding debts of more than \$500 million. LARCO's financial losses were primarily attributed to the low nickel content of the ore as well as the smelter's outdated furnaces and its relatively high electricity costs (Koutantou, 2020a, b; Psaropoulos, 2020).

In February, the Parliament approved a restructuring plan for LARCO, which stipulated the appointment of an administrator in March for its liquidation, a reduction in wage costs by an average of 25%, and the launch of a fast-track tender to sell the company's smelting plant and mines. LARCO would have to file for bankruptcy if at least 75% of its assets were not sold within 12 months from the administrator's appointment per the new legislation (Koutantou, 2020a–c; Psaropoulos, 2020; Ekathimerini, 2021).

Mineral Fuels

Coal.—Greece's lignite output decreased to 13.9 Mt (which was down from 27.4 Mt in 2019), of which 13.1 Mt came from PPC-owned mines in Megalopolis and West Macedonia for use by the company's powerplants. Of the lignite output, about 0.8 Mt (down from 2 Mt in 2019) was from small, independently-owned mines. In 2020, lignite's share in Greece's electricity generation decreased further to 11% of the total; its share had been as high as 51% a decade ago. The decrease in lignite's share was owing to higher EU Emissions Trading System allowances, environmental restrictions on older lignite powerplants, and increased electricity imports. As a result, employment at PPC-owned lignite mines and powerplants decreased by 19% to about 4,360 employees. In 2020, Greece

became dependent on imported energy for most of its electricity demand for the first time (Euracoal, 2021, p. 8–9; Public Power Corporation S.A.-Hellas, 2021a).

MINERAL INDUSTRY HIGHLIGHTS IN 2021

Minerals in the National Economy

Greece's real GDP increased by 8.4% in 2021; the nominal GDP was \$215 billion. The mining and quarrying sector made up 0.39% of the country's GVA. The manufacture of base metals accounted for 0.83% of the GVA; the manufacture of nonmetallic mineral products, 0.54%; and the manufacture of coke and refined petroleum products, 0.45%. There were about 5,840 workers in the mining and quarrying sector, accounting for 0.21% of Greece's total employees (about 4.8 million people) (Hellenic Statistical Authority, 2022, 2023a; World Bank, The, 2023).

Greece's total exports and imports of goods were valued at about \$47.2 billion and \$77.1 billion, respectively, in 2021. Exports of mineral products were valued at \$14.1 billion (or 30% of total exports). Exports of base metals and articles of base metal were valued at \$5.5 billion. Imports of mineral products were valued at \$20.1 billion (or 26% of total imports); those of base metals and articles of base metal were valued at \$6.2 billion (Zen Innovations AG, 2023).

Production

In 2021, the production of bentonite (crude) increased by 33% (estimated); pozzolan (santorin earth), 24% (estimated); mined lead, 16% (estimated); and sand and gravel (industrial), 10% (estimated). Meanwhile, the production of ferronickel decreased by 32% (estimated); mined nickel, 29%; mined zinc, 17%; crude petroleum, 16%; natural gas, 15% (estimated); lignite, 13%; and dead-burned magnesite, 13% (estimated) (table 1).

Commodity Review

Metals

Gold.—Hellas Gold produced about 1,730 kg of gold at the Olympias Mine in 2021, which was a 5% decrease compared with that in 2020. The decrease in 2021 resulted from lower mining rates and lower processing volumes. As of 2021, the mine was estimated to have reserves of 62,000 kg at a grade of 6.63 grams per metric ton gold and a mine life of 19 years (Eldorado Gold Corp., 2022a, p. 9; 2022b, p. 8).

Lead, Silver, and Zinc.—Hellas Gold suspended production of lead, silver, and zinc at the Stratoni Mine, and the mine was placed on care-and-maintenance status in the fourth quarter of 2021 owing to depleted reserves. Hellas Gold continued exploration drillings to expand resources and reserves and would decide on whether to resume operations after the technical and economic review. In 2021, the company extracted about 30,300 t of lead-zinc and silver concentrates (containing 7,600 t of lead and 12,000 t of zinc) from the Stratoni Mine. As of 2021, the mine was estimated to have a remaining life of 2 to 3 years (Eldorado Gold Corp., 2023a, b).

Nickel.—The Special Administrator and the Privatization Agency of Greece (the Hellenic Republic Asset Development Fund) accelerated the privatization procedure of LARCO following the European Commission’s request to complete the case soon. Two separate tenders were issued: one for the transfer of the Agios Iannis, the Evia, and the Kastoria nickel mines by the Special Administrator and the other for the long-term lease of the Larymna metallurgical plant and deposits in Larymna and Loutsis by the Privatization Agency of Greece. In October, three of six initial investors remained in the bidding for the two tenders: (1) Gek Terna (a consortium with Swiss-based AD Holdings AG), (2) Mytilineos S.A. of Greece, and (3) United Kingdom-based Commodity & Mining Insight Ireland Ltd. The submission of bids was scheduled for the end of November (Kolonas, 2021).

Outlook

Greece is expected to remain a globally significant producer of bentonite, magnesite, perlite, and pumice. Gold and copper production may increase if Eldorado Gold commences production in the Skouries project. Meanwhile, lead-zinc and silver production may decrease because of the Stratoni Mine being placed on care-and-maintenance status. The production of nickel ore and ferronickel may decrease or cease in the country altogether owing to LARCO’s liquidation and possible closure unless new ownership is secured for its mines and smelter through the tender process. Lignite production would likely continue to decrease under the Government’s energy plan to shift substantially from coal to renewable sources for electricity generation (Euracoal, 2021, p. 9).

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TABLE 1
GREECE: PRODUCTION OF MINERAL COMMODITIES¹

(Metric tons, gross weight, unless otherwise specified)

Commodity ²	2017	2018	2019	2020	2021
METALS					
Aluminum:					
Bauxite ³	1,927,000	1,559,359	1,379,123 ^r	1,428,639	1,400,000 ^c
Alumina, Al ₂ O ₃ equivalent	821,000	827,000	820,100 ^r	826,500	871,000
Metal, primary	181,630	187,465	182,100	181,900	183,600
Ferroalloys, ferronickel:					
Gross weight	86,140	82,600 ^{r, c}	60,187 ^r	29,263	20,000 ^c
Ni content	16,781	15,720	11,604 ^r	5,774	4,000 ^c
Gold, mine, Au content kilograms	822	2,839	2,333	2,177	2,200 ^c
Iron ore, mine:					
Laterite, gross weight	2,284,000	2,115,000	1,755,000 ^r	1,030,434	1,100,000 ^c
Fe content	566,000	524,000	435,000 ^r	256,000	270,000 ^c
Iron and steel:					
Raw steel thousand metric tons	1,359	1,467 ^r	1,350 ^r	1,408	1,498
Products, semimanufactured ^c do.	1,200	1,600	1,300 ^r	1,300	1,400
Lead, mine, Pb content	8,700	8,800 ^r	10,500	13,800	16,000 ^c
Nickel, mine, laterite ore, Ni content thousand metric tons	19	18	14	7	5
Silver, mine, Ag content kilograms	23,967	25,237	28,161	30,209	29,281
Tin, smelter, secondary	50 ^c	50 ^c	--	-- ^c	-- ^c
Zinc, mine, Zn content	18,300	20,300	21,800	28,100	23,200
INDUSTRIAL MINERALS					
Cement, hydraulic thousand metric tons	6,246	6,580	5,540 ^r	5,450 ^c	5,700 ^c
Calcite	400,000 ^c	140,101 ^r	158,485 ^r	160,196	160,000 ^c
Clay:					
Bentonite:					
Crude	1,100,000	1,365,374	1,393,958 ^r	979,329	1,300,000 ^c
Processed	880,000	824,000	880,000 ^{r, c}	620,000 ^c	830,000 ^c
Fuller's earth, attapulgite, crude	54,280	53,300	10,160 ^r	13,950	14,000 ^c
Gypsum, mine, including anhydrite	855,000	827,300	589,000 ^r	623,000	630,000 ^c
Magnesite:					
Caustic-calcined	95,400	112,174	83,841 ^r	96,640	100,000 ^c
Crude ore	590,000	425,882	358,841 ^r	335,943	340,000 ^c
Dead-burned	21,900	22,784	24,441 ^r	34,327	30,000 ^c
Huntite	13,500	12,600	17,600 ^r	18,980	19,000 ^c
Nitrogen, ammonia, N content	130,000	120,000	110,000 ^r	100,000	94,000
Perlite, crude	700,000	790,412	718,077 ^r	821,233	820,000 ^c
Pumice and related minerals:					
Pozzolan, santorin earth	114,000	92,000	62,633 ^r	72,443	90,000 ^c
Pumice	840,000	842,355	701,143 ^r	923,927	920,000 ^c
Sand and gravel, industrial, unspecified	77,000	79,500	139,571 ^r	45,625	50,000 ^c
Stone:					
Dimension, marble ⁴ thousand metric tons	2,170 ^r	2,500 ^r	1,650 ^r	1,510	1,500 ^c
Size and shape unspecified, olivinite	29,000	29,071	21,205 ^r	7,825	8,000 ^c
Sulfur, byproduct, mixed sulfide ore, S content	326,100	395,000	505,500 ^r	627,800	630,000 ^c
MINERAL FUELS AND RELATED MATERIALS					
Coal, lignite thousand metric tons	37,410	36,574	27,384 ^r	13,867	12,100
Natural gas thousand cubic meters	8,249	11,531	8,902 ^r	6,480	5,500 ^c
Petroleum:					
Crude thousand 42-gallon barrels	1,023	1,844	1,204	657	550
Refinery products do.	176,000	178,000	169,000	162,000	173,000

^cEstimated. ^rRevised. do. Ditto. -- Zero.

¹Table includes data available through January 31, 2023. All data are reported unless otherwise noted. Estimated data are rounded to no more than three significant digits.

²In addition to the commodities listed, copper, dolomite, gold (refined), lignite briquets, manganese, salt, and crude construction materials may have been produced, but available information was inadequate to make reliable estimates of output.

³Dry bauxite equivalent of crude ore.

⁴Converted from cubic meters to metric tons using a conversion factor of 2.56.

TABLE 2
GREECE: STRUCTURE OF THE MINERAL INDUSTRY IN 2021

(Thousand metric tons unless otherwise specified)

Commodity	Major operating companies and major equity owners	Location of main facilities	Annual capacity
Alumina, Al ₂ O ₃ equivalent	Aluminium of Greece S.A. (Mytilineos Holdings S.A.)	Refinery at Agios Nikolaos, Boeotia area	870
Aluminum, metal, primary	do.	Smelter at Agios Nikolaos, Boeotia area	182
Bauxite	Delphi-Distomon S.A. (Mytilineos Holdings S.A.)	Mines at Amfissa and Distomon	630
Do.	Elmin Bauxites S.A. (Imerys S.A.)	Mines at Aga Marina, Lamia	500
Do.	European Bauxites S.A. (Imerys S.A.)	Mines at Amfissa and Distomon, plants at Phocis and Itea	2,000
Bentonite:			
Crude	Imerys S.A.	Mines at Adamas, Milos Island	1,000
Do.	Mediterranean Bentonite Co. S.A. (Industria Chimica Mineraria S.p.A.)	Surface mines on Milos Island	20
Do.	Mykobar Mining Co. S.A. (Silver & Baryte Ores Mining Co. S.A.)	Mines at Adamas, Milos Island	300
Do.	do.	Plants at Adamas, Milos Island	200
Processed	Imerys S.A.	Plant at Voudia Bay, Milos Island	900
Cement	Halyps Cement S.A. (HeidelbergCement Group)	Paralia Aspropyrgos plant, Athens	1,000
Do.	Heracles General Cement S.A. (Holcim Ltd.)	Plant at Volos, Thessaly	4,900
Do.	do.	Plant at Milaki, South Evia	2,200
Do.	TITAN Cement Co. S.A. (TITAN Group)	Kamari plant, West Attica	2,900
Do.	do.	Drepano Achaia plant, Patras	1,900
Do.	do.	Elefsis plant, Athens area	400
Do.	do.	Elefsis white cement plant, Athens area	130
Do.	do.	Salonica plant, Salonica	1,650
Coal, lignite	Public Power Corp. S.A.-Hellas (PPC) [Hellenic Corporation of Assets and Participations S.A. (HCAP S.A.), 23.8%; Hellenic Republic Asset Development Fund, 10.32%; Selath Holdings S.a.r.l, 10%; other investors, 55.88%]	Megalopolis Mine, Peloponnese, and West Macedonia Mine, Western Macedonia	20,000
Do.	Small, independent mining companies	Mines in West Macedonia	2,000
Ferroalloys, ferronickel, Ni content	LARCO GMMSA [Government, 55.2%; National Bank of Greece, 33.4%; Public Power Corp. S.A.-Hellas (PPC), 11.4%]	Larymna metallurgical plant, Phthiotis	20
Gold:			
Mine, Au content kilograms	Hellas Gold S.A. (Eldorado Gold Corp., 100%)	Olympias Mine, Halkidiki Peninsula	2,000 °
Refined	Nikias Gold S.A.	Refinery in Athens	NA
Gypsum	Lava Mining and Quarrying Co. (Heracles General Cement Co.)	Mine at Altsi, Crete Island	300
Do.	TITAN Cement Co. S.A. (TITAN Group)	do.	280
Huntite and (or) hydromagnesite	Microfine S.A.	Mines in Kozani Basin	100
Lead, mine, Pb content	Hellas Gold S.A. (Eldorado Gold Corp., 100%)	Olympias Mine, Halkidiki Peninsula	10 °
Do.	do.	Stratoni Mine, ¹ Halkidiki Peninsula	10 °
Magnesium compounds:			
Magnesite, concentrate	Grecian Magnesite S.A. (GM)	Mine and production facilities at Chalkidiki on Halkidiki Peninsula and in Yerakini	250
Do.	Terna Mag S.A. (Gek Terna Group, 100%)	Two underground mines in Gerorema, two open pit mines in Kakavos, two facilities in Gerorema and Kakavos, Euboea Island	120
Magnesia	do.	Mantoudi calcination plant, Euboea Island	120
Manganese, battery-grade MnO ₂	Eleusis Bauxite Mines Mining, Industrial and Shipping S.A. (National Bank of Greece)	Plant in Nevrokopi, Drama	10
Natural gas thousand cubic meters per day	Kavala Oil S.A. (Energean Oil and Gas S.A.)	South Kavala gasfield, offshore east of Thasos Island	31 °

See footnotes at end of table.

TABLE 2—Continued
GREECE: STRUCTURE OF THE MINERAL INDUSTRY IN 2021

(Thousand metric tons unless otherwise specified)

Commodity		Major operating companies and major equity owners	Location of main facilities	Annual capacity
Nickel, ore		LARCO GMMSA [Government, 55.2%; National Bank of Greece, 33.4%; Public Power Corp. S.A.-Hellas (PPC), 11.4%]	Agios Ioannis Mine at Neo Kokkino near Larymna, Evia Mine in Euboea Island, and Kastoria Mine near border with Albania	2,000
Nitrogen, N content of ammonia		Phosphoric Fertilizers S.A.	Plant at Nea Karvali, Kavala	150
Perlite		Imerys S.A.	Mines on Milos Islands; plant at Piraeus	650
Do.		Otavi Minen Hellas S.A. (Otavi Minen AG)	Mine on 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	4,000 ^c
Do.	do.	do.	Prinos North offshore oilfield, east of Thassos Island	1,000 ^c
Refined	do.	Hellenic Petroleum S.A.	Refinery at Aspropyrgos, Athens	148,000
Do.	do.	do.	Refinery at Elefsina, West Attica	100,000
Do.	do.	do.	Refinery in Thessaloniki	93,000
Do.	do.	Motor Oil (Hellas) Corinth Refineries S.A.	Refinery at Agioi Theodoroi, Corinth	185,000
Pozzolan (santorin earth)		Lava Mining and Quarrying Co. (Heracles General Cement Co.)	Quarry at Xylokeratia, Milos Island	800
Do.		TITAN Cement Co. S.A. (TITAN Group)	do.	300
Pumice		Lava Mining and Quarrying Co. (Heracles General Cement Co.)	Quarry at Yali Island	1,000
Silica, quartz (microcrystalline)		do.	Mine in Adamas, Milos Island	150
Silver, mine, Ag content	kilograms	Hellas Gold S.A. (Eldorado Gold Corp., 100%)	Olympias Mine, Halkidiki Peninsula	30,000 ^c
Do.	do.	do.	Stratoni Mine, ¹ Halkidiki Peninsula	20,000 ^c
Steel:				
Raw		Halyvourgiki S.A.	Eleusis plant, West Attica	1,200
Do.		Hellenic Halyvourgia	Aspropyrgos plant, West Attica	400
Do.		do.	Velestino plant, Volos	700
Do.		do.	Volos rolling mill and wire mesh plant	600
Do.		Hellenic Steel Co. S.A.	Thessaloniki plant, Thessaloniki	1,000
Do.		Sidenor Steel Products Manufacturing S.A.	Thessaloniki and Almyros plants	2,800
Products		Corinth Pipeworks S.A. (CPW)	Thisvi plant, Viotia, near Athens	800
Stone, marble, slab and tile		Aghia Marina Marble Ltd.	Quarries in northern Greece	NA
Do.		Gourlis Group	Quarries at Levadia, Neurokopi, and Tiseo	NA
Do.		Michelakis Marble S.A.	Quarry at Kavala	NA
Zinc, mine, Zn content		Hellas Gold S.A. (Eldorado Gold Corp., 100%)	Olympias Mine, Halkidiki Peninsula	15 ^c
Do.		do.	Stratoni Mine, ¹ Halkidiki Peninsula	20 ^c

^cEstimated. Do., do. Ditto. NA Not available.

¹Placed on care-and-maintenance status in the fourth quarter of 2021.