

The mining/metallurgical industry in Greece. Commodity review for years 2012-2013

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Production data for various mineral commodities produced in Greece in the years 2012-2013 are listed in the following Table 1. Reported figures are combined data from (a) statistics provided by the Mineral Resources Division of the Ministry of Environment, Energy and Climate Change (YPEKA) and (b) annual statistics provided by Greek Mining Enterprises Association (GMEA). In the database maintained by YPEKA/Mineral Resources Division, were recorded 700 activity statements relating to quarrying/mining (2013). The total number of active quarrying and mining sites currently used for mining activities occupy less than 0.33% of the Greek territory.

The output of the Greek mineral industry declined in both value and tonnage owing to the global economic downturn that started in 2009 and was continuing in 2012-2013. Greece also had a high budget deficit and the European Union's (EU's) second highest external debt burden after Ireland (Industry Review, 2012).

In years 2012-2013 the mining sector continued the same downward trend that emerged in previous years due to the economic crisis, following the significant decline in demand and prices of raw materials in the steel, construction, cement, and concrete industries. The recession boosted by volatility in the international markets for raw materials, reduction in international metal prices and increasing energy prices across the EU.

The domestic market suffered a collapse mainly in the field of construction products (aggregates, cement, ceramics, etc.) and companies related to aggregate quarries and generally construction products as well as cement, face daily question of survival. The sector of construction aggregate materials fell gradually to 50 million tons in 2010 (from 90-100 million tons before crisis) to 35 million tons in 2011 and 25-30 million tons in 2012 and 2013 respectively, marking an unprecedented downturn due to the shrinkage of domestic building and construction activity. Domestic and export cement sales continued to fall in response to the decrease of construction activity and the slowdown in south eastern European markets. Fortunately, as the figures show the total production and sales of primary aggregates showed a small increase of 8% by the end of 2013.

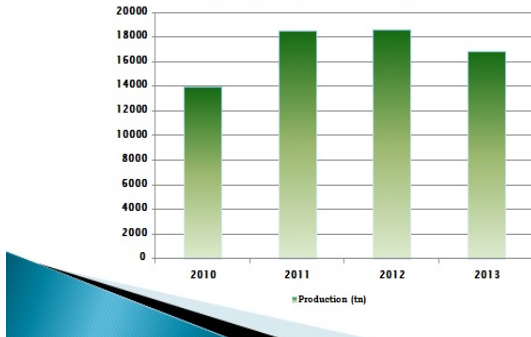
However, in contrast to the shrinking domestic market, the tendency was to strengthen the export sector with regards to products placed on the international market (industrial minerals, aluminum, nickel, mixed sulphide Pb-Zn ores, magnesium compounds etc.), where the demand and prices soon rallied largely to pre-crisis levels. For 2012-2013 the same trend continued with the export sector producing satisfactory results, while the downturn in the domestic sector deepened widely.

Specifically, for nickel (Ni) in 2013 there was a drop in production of 10% after an excellent performance for LARKO GMM SA in 2012, the year in which production reached at level of 18.600 tn Ni and sales of 19.071 tn Ni creating a new history record. Exports in 2013 totalled 17.054 tn Ni. Production of nickeliferous laterite ore from the mines of Evia, Agios Ioannis and Kastoria (the total laterite ore production used to feed the Larymna metallurgical ferronickel plant) amounted to 2.25 million tn (for 2012) and 2.22 (for 2013). However, Larco G.M.M. S.A. (Larco), which is a leading producer of nickel in Europe from domestic nickel ores, had a pre-tax loss of 76,38 million € in 2013 compared to losses of 34.32 million in 2012 (profit of 6.37 million euros in 2011). The Government is reported to be looking for a strategic investor in Larco and announced plans to restructure ahead of its privatization.

Production of G.M.M.S.A. LARCO

Nickel production is around 19.000 tones annually and is depended upon the demand and the sale price of the final product, which is exported exclusively to European steel producers

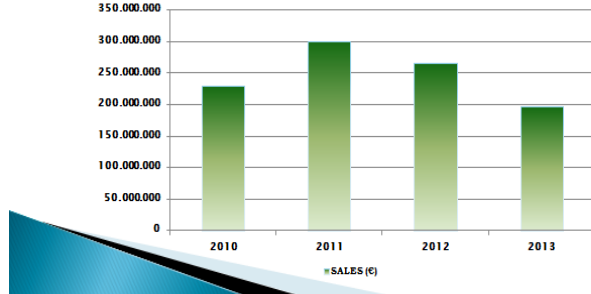
Annual Ni Production 2010-2013



Economic Facts for G.M.M.S.A. LARCO

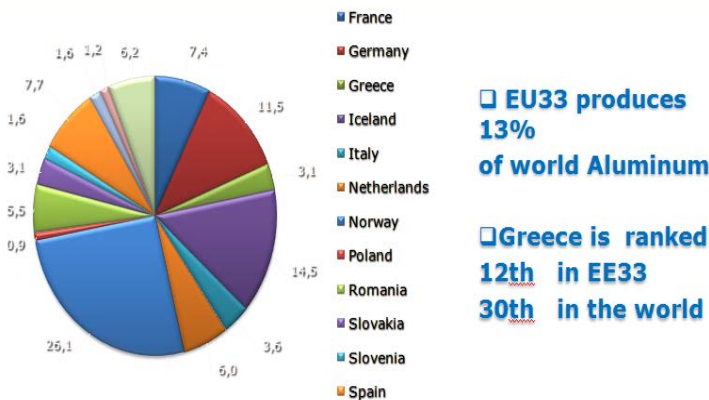
- ▶ LARCO produces 40% of nickel that is produced in the EU 27 from Primary Raw Materials
- ▶ Its production consist 1% of global nickel production
- ▶ Covers 5% European demand in nickel
- ▶ In Greek economy contributes 0,10-0,15% of Gross Domestic Product
- ▶ Its sales consist 1% of total Greek exports

ANNUAL SALES (EURO) 2010-2013



For aluminium (Al), the production by Aluminium SA -the largest integrated producer of aluminum and alumina in the European Union- remained at the same level as in 2012 (about 169 thousand tn) absorbing more than 75% of Greek production of bauxite. Intra-EU exports increased to 100.9 thousand tons Al (from 89.3 thousand for 2012) with a sales value of € 179.6 million while exports to third countries were 2.4 thousand tons Al value of 4 million €.

European Aluminum production



The production of alumina hydrate returned to the high levels of 2011 which was instrumental in the diversion of non-metallurgical uses (eg ceramics, filters etc).

The domestic production of bauxite for 2013 (1.85 million tn) remained at the same high level as in 2012 (1.8 million tn) covering the demand for both metallurgical use (domestic aluminum production) and other uses of Al in the steel industry, cement industry, etc. Greece is a leading bauxite producer in the EU, with the major bauxite deposits located in central Greece within the Parnassos-Ghiona geotectonic zone and on Evia Island.

Ghiona geotectonic zone and on Evia Island.

The production of mixed sulphide Pb-Zn ores (lead, zinc and iron concentrates) from HELLAS GOLD SA in 2013 remained at previous levels (about 230 thousand dry tn) and products of enrichment (concentrates of lead sulphide and zinc sulphide after differential flotation) exported as a whole exceeded a value of 40 million € (23.2 m € for Pb and 17.2 m € for Zn) from € 46.4 million € in 2012. The concentrates were shipped by sea to European facilities using either the Stratoni or the Thessaloniki port facilities (Eldorado Gold Corp., 2013).

Also in 2013, HELLAS GOLD SA treated 552,6 tn of the old mineral tailings in Olympias Halkidiki which generated approximately 64,8 thousand tn gold-bearing arsenopyrite with average concentrate Ag = 40,52 gr/tn and Au = 22,50 gr /tn. From this arsenopyrite concentrate a total 49,8 thousand tn (value of 21.3 m €) was exported in China. This could produce over 50 thousand ounces of gold if there was metallurgical gold plant in Greece. The particular notation is

that Greece could-for the first time in modern time-become a gold producer country from an environmental restoration work taking place in the old tailings of Olympias Halkidiki.

Grecian Magnesite SA is a leading magnesite producer and exporter in the EU and worldwide with mines and production facilities in Yerakini, Halkidiki, Northern Greece. The primary business activity is the mining, beneficiation and calcination of magnesium carbonate for the production of caustic calcined magnesia, dead burned magnesia, unshaped basic monolithic refractories and magnesium carbonate. The company's capacity is close to 200,000 tons of calcined products and 50,000 tons of Basic Monolithic refractories. In 2013 the company managed to maintain previous levels of magnesium ore exploitation (over 300 thousand tn of raw magnesite material) and production of magnesium compounds (dead-burned and caustic-calcined magnesia) with a total sales value of approximately 35 million € (for 2013) and over 30 million € (for 2012). The company, with a total of 367 employees in Greece, exports to 60 countries in all five continents. Exports of magnesium compounds represent 90% of its sales value. Activities outside Greece: Magnesitas Navarras SA in Spain(40% share), Van Mannekus & Co BV in the Netherlands (50% share) and Akdeniz Mineral Kaynaklari A.Sin Turkey (90% share).

Also, the revival of activity in Mantoudi Evia by Terna Magnesite (TERNA MAG, the GEK Terna) which took over the old BIOMAGN in North Evia and aims at exploiting the old magnesite deposits of Gerorema and Kakkavos and the further utilization for production of magnesium compounds on the premises of Furnace Mantoudi after modernization. In the first phase, the objective of TERNA MAG for next years is an annual raw magnesite production of about 170 thousand tn. Indeed, in 2013 the production of magnesite plant Gerorema amounted 23,6 thousand tn of raw magnesite while at the same time the company began underground mining from the site Plakarias-Mouritsa. Already, the company's facilities in North Evia employed a total of 100 employees. In 2014 the plan is to develop a new mining center in Kakkavos with open pit magnesite ore exploitation and function enrichment plant.

For 2013, the sector of industrial minerals maintained much of the results of 2012, mainly thanks to the diversified export-oriented products towards international markets for raw materials and the application of the approach "from Market-to-Mine" which provides the possibility of developing new integrated chain of products and accelerate the development of higher value-added specialized applications. Specifically, production of bentonite and perlite ores from Milos Island remained at 2012 levels, with a slight reduction for bentonite (1.0 million tn). The S & B Industrial Minerals SA maintained its position as first in the production of bentonite in Europe and the largest bentonite export company in the world with a total sales value of over 66 million € (100% exports). Similar performance was achieved for the branch of perlite, with a total sales value in both unprocessed and processed products of 27,5 million (compared with 30.8 million € in 2012).

In 2012-2013, the predominant fuel used in electricity generation in Greece was brown coal ("lignite") and Public Power Corp. S.A. (PPC) was Greece's major producer of lignite. Lignite production from Public Power Corp., exceeded 54 million tn (2013) reduced by 14.5% from 61.7 million tn (2012). Specifically, the 43.6 million tn came from Western Macedonia Lignite Center (LKDM) and 8.9 million tn of the Megalopolis Lignite Center (LKM). Based on the above data, in 2013, the contribution of lignite in the energy mix on the interconnected system of the country exceeded 46% (55% in 2012), while the corresponding participation in the whole country (including non-interconnected islands) was 42% (49.5% in 2012) demonstrating the dominance of lignite reserves in the country's energy scene. The energy mix on the interconnected system of the country at the end of 2013, according to official figures is: Lignite 46% (falling trend), Natural gas 24% (increasing trend), RES 15%, Hydro 11%, imports 4%.

The industry of marble products and ornamental stone, despite the severe impact of the economic crisis on domestic consumption, managed to improve production and maintain the upward trend that began in 2008-2009 mainly thanks to strong demand from the Chinese marble market. For 2012-13, the total annual production of marble products exceeded 1 million tn annually, while exports of the sector exceeded a total of 850 thousand tn worth over 240 million € (in 2013) and a total of 730 thousand tn worth over 212 million € (in 2012). Marble exports to China, the main market for Greek marble, totaled over 98 million € (in 2013) and 88 million € (in

2012), representing for 2013 more than 58% of total quantity and 42% of the total value of Greek marble exports (Fig. 1).

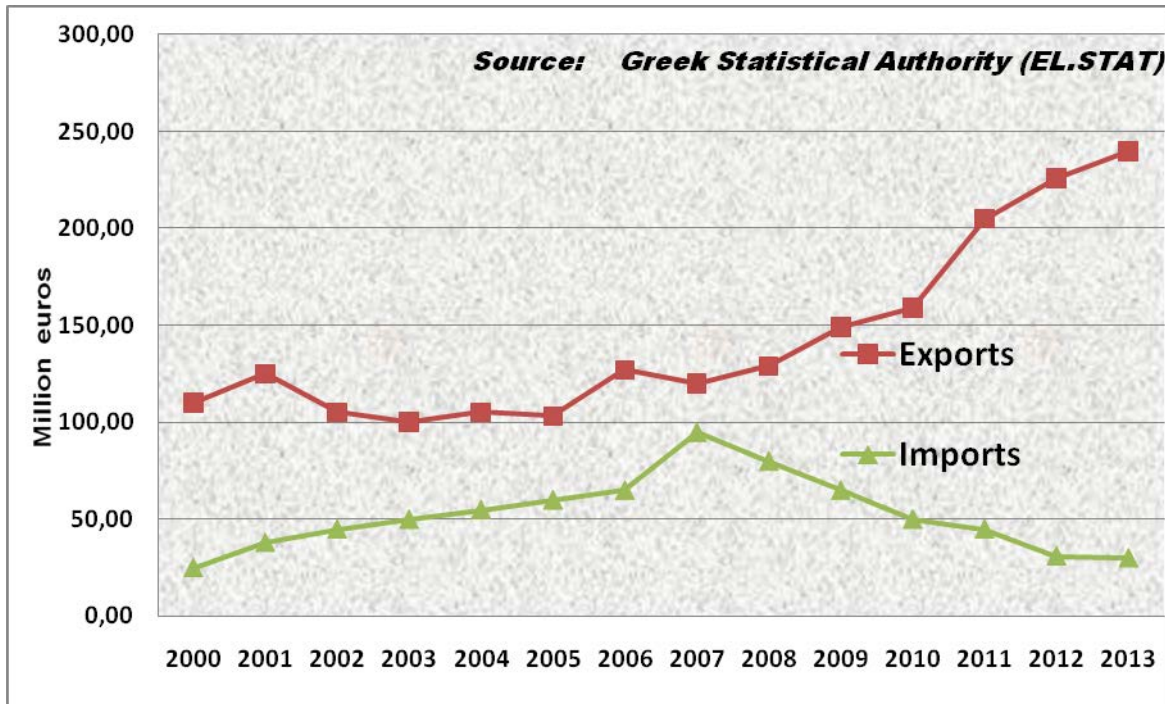


Figure 1: Imports and Exports of marble and other natural stones [2000-2013]

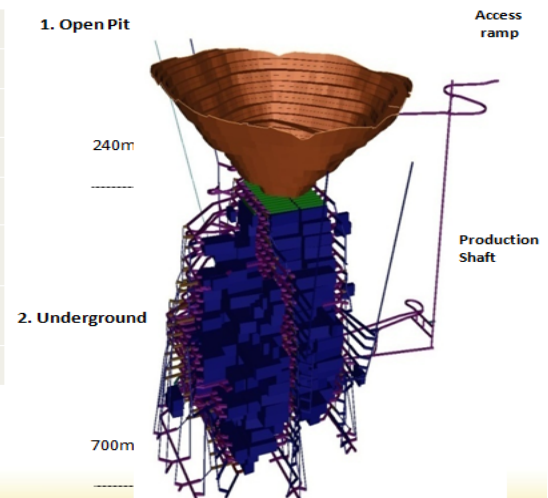
Regarding the gold-mine projects in Halkidiki peninsula and in the Thrace region, Greece has the potential to become a near-term gold producer with a number of exploration companies active in the country. Hellas Gold SA (owned by Eldorado Gold Corp. Canada) is developing a project including mining and processing at the Skouries gold-copper deposit and has initiated mining activities at the Olympias site. Eldorado Gold Corp. is also developing the Perama Hill gold project through its subsidiary Thracian Gold Mining SA, while a third project in Sappes, Thrace, is currently being evaluated by YPEKA. When all above mines are in full operation, it is estimated that they will boost country's exports by €1 billion a year, turning Greece into the largest gold producer in Europe.

Skouries Mining Installations - Overview

Deposit Type	Cu - Au porphyry
Mining Rate	8Mtpa Open Pit ; 4.4Mtpa Underground SLOS
Mine Life	27 years, (7 y s open pit 20 y s underground)
Strip Ratio	0.7 : 1.0 (w:o)
Reserves	148 MT 0.76 g/t Au, 0.57% Cu
Production	~140,000oz Au, ~30,000kt Cu pa Open Pit ~100,000oz Au, ~22,000t Cu pa Underground
Processing	Flotation (Cu/Au conc.) & Gravity circuit (Au doré)
Recoveries	LOM average ~84% Au and ~91% Cu

Highlights

- All permits issued (EIS, Technical Study, Forestry, Installation for electromechanical equipment)
- Building permit still pending



Moreover, Eldorado's projects will provide some 2,000 jobs. However, environmentalism and local opposition remains the biggest obstacle to gold mining in Greece. Many local residents

oppose the new projects, saying it will destroy the environment and harm the area's tourism potential. In 2013, Eldorado Gold Corp. announced the delay in starting production in Skouries, Halkidiki and the reduction of costs by 35% due to the significant decline in the gold price (-22% in 2012) and the intention to maintain the company's profile as a "low-cost", profitable and growing.

In the hydrocarbon sector, the production of crude oil and natural gas (from Prinos deposits, Kavala Oil SA) in 2013 were maintained at the same levels as in 2012. Kavala Oil SA (subsidiary of Energean Oil & Gas) is the only company extracting hydrocarbons in Greece, targeting with significant investments to a doubling of production from the existing Prinos deposit of 2,500 barrels currently in 4,000 barrels of oil per day. Also the company announced (in 2013) an investment program for exploitation of the deposit "E" aiming to an initial daily production of 3,000 barrels in 2013 (estimated reserves of the deposit "E" stand at 10 million barrels).

Table 1
GREECE : PRODUCTION OF MINERAL COMMODITIES

METALS, INDUSTRIAL MINERALS, MINERAL FUELS AND RELATED MATERIALS

COMMODITY PRODUCTION	Quantity in Metric tons unless otherwise specified	
	2012	2013
Bauxite	1.815.328 ¹	1.844.000 ¹
Aluminium, primary (Foundry Line)	165.046	169.457 ²
Alumina, calcined (Al ₂ O ₃)	653.011	664.512
Alumina, hydrated (Al ₂ O ₃)	784.400	811.600
Mixed sulphide ore	227.197	227.203 ³
Galena, PbS (metric tons of concentrates)	18.062	18.375
Zinc blend , ZnS (metric tons of concentrates)	41.824	41.226
FeS ₂ (metric tons of concentrates)	4.260	0
Auriferous arsenopyrite ⁴	0	64.837 ⁴
Nickeliferrous ores (laterites)	2.256.686	2.220.790
Ferronickel:	96.435 ⁵	88.910 ⁵
Ni content of ferronickel	18.632	16.890
Slag by-product (coarse)	86.776	84.300
Slag by-product (fine, -5mm)	85.511	83.970
Magnesite, crude	351.266 ⁶	360.000 ⁶
Dead-burned magnesia	26.832	30.559
Caustic-calcined magnesia	60.625	57.393
Basic monolithic refractories	44.821	41.985
Bentonite, crude	1.235.105 ⁷	1.000.000 ⁷
Attapulgitic clay	19.872 ⁸	32.400 ⁸
Huntite, crude	24.200	15.200
Pozzolan, Santorin earth	270.000	266.000
Pozzolan, specific use (not cement industry)	0	1.100 ⁹
Kaolin, crude	0	0
Perlite, crude	876.396 ¹⁰	890.000 ¹⁰
Perlite, treated	450.000 ¹¹	435.000 ¹¹
Pumice	385.917	420.000

Silica (SiO ₂)	0	10.000 ¹²
Gypsum and anhydrite, crude	621.329 ¹³	760.000 ¹³
Olivine	20.285	16.461
Amphibolite	10.398	19.360
Calcium Carbonate (CaCO ₃), processed all sources	380.000 ¹⁴	345.000 ¹⁴
Feldspar	13.000 ¹⁵	0
Quartz	0	0
CO ₂ [liquid]	10.760	10.040
Zeolite	2.850	0
Lignite	62.334.803 ¹⁶	55.500.000 ¹⁶
Crude oil, in barrels	661.510 ¹⁷	609.390 ¹⁷
Natural gas , in NM ³ ¹⁸	6.401.717	5.415.000
Salt, sea salt	191.970 ¹⁹	189.500 ¹⁹
Mineral Aggregates (sand, gravel, crushed stones etc.)	29.000.000*	30.000.000*
Marble rough blocks, in cubic meters	200.000	220.000
Marble, rough shapeless blocks	244.000*	300.000*
Slate stones, in cubic meters	160.000 ²⁰	180.000 ²⁰
Emery	4.250	4.250

NA: not available, *: estimated

(source: MinEnv, Greek Mining Enterprises Association (GMEA))

¹ bauxite: S&B Industrial Minerals S.A., Delphi Distomo AME, Elmin AE

² produced from treatment of 326,9 thousand tn of calcined alumina

³ Metal content Pb: 14.211 tn, Zn: 22.512 tn, Fe: 53.438 tn, Ag: 36.401 Kg, Au: 1033,13 Kg

⁴ Metal content Fe=17.648,63tn, Au=1.458,83Kgr, Ag=26.27,20 Kgr

⁵ %Ni content: 19,32%

⁶Total production of raw magnesite from main enrichment unit and magnets plant.

⁷Bentonite: S&B Industrial Minerals S.A., BENTOMINE S.A., Sud Chiemie Hellas, Greek Mining Ltd., Mavroyiannis

⁸ attapulgitis/palygorskite plus smectite/saponite clay: raw material for knidi Grevena factory feeding (GEOELLAS AMMAE)

⁹Pozzolan for specific use: construction pozzolanic mortars, fillers, e.g. from KYBOS SA and Greek Pozzolans SA

¹⁰Perlite: S&B Industrial Minerals S.A., EEKOM SA, Aegean Perlites S.A., MILOPAN S.A.

¹¹ Perlite (processed): S&B Industrial Minerals S.A. , Aegean Perlites S.A. ¹²Silica: Lava Mining and Quarrying Co,

¹³Gypsum: Interbeton Construction Materials SA., Lava Mining and Quarrying Co, BPB HELLAS SA (SAINT GOBAIN HELLAS), Knauf Gypsopoiia SA, Biogyps-Karvelis SA, G. Zervakis SA.

¹⁴ Calcium Carbonate (CaCO₃) products, both amorphous and crystalline: construction mortars, fillers, marble powder, adhesive and sealant, marmoline, alfamix, iokal e.g. by Dionyssomarble SA, Ionian Kalk SA, Perakis-Tzionas, Zafranias-petrochem Co. etc.

¹⁵ feldspar: MEVIOR SA ¹⁶PPC SA, Larco (Servia Kozani) GMMAE, M.E.T.E., Lign. Karapati , Lign.ACHLADAS SA

¹⁷ KABAAA OIL SA, Energean Oil & Gas ¹⁸Normal cubic meter (Nm³)

¹⁹ from seven (7) salt sites throughout Greece, 55% of the total coming from the salt pits of Mesolongi

²⁰ Karystos area slate stones are included