



# 2019 Minerals Yearbook

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**PORTUGAL [ADVANCE RELEASE]**

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# THE MINERAL INDUSTRY OF PORTUGAL

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The geologic environment in Portugal is complex and variable. The country hosts resources of many minerals, including copper, feldspar, kaolin, lithium, marble, tungsten, and zinc. In 2019, Portugal was estimated to be the 7th-ranked producer of lithium (excluding United States production) globally, accounting for 1.0% of world production, and the 10th-ranked producer of tungsten, accounting for 0.6% of world production (table 1; Veiga, 2013, p. 22; Jaskula, 2021; Shedd, 2021).

## Minerals in the National Economy

In 2019, Portugal's real gross domestic product (GDP) decreased by 2.2%; the nominal GDP was \$237.7 billion. The unemployment rate decreased to 6.5% from 7.0% in 2018. In 2019, the number of people employed in the mining sector was 3,010, and in the quarrying sector, 5,834. There were 65 active mines and 695 active quarries in the country. In 2019, total mine production decreased by 5.6% compared with that of 2018 to \$529.5 million.<sup>1</sup> Of this amount, mine production of metallic ores decreased by 4.6% to \$476.5; mine production of industrial minerals (excluding construction minerals), by 14.6% to \$43.0 million; and mine production of construction minerals, by 9.4% to \$9.9 million. Total quarry production decreased by 4.6% to \$376.5 million. Of this amount, quarry production of industrial minerals (excluding construction minerals) increased to \$17.9 million, or by 26.2%, and quarry production of construction minerals decreased to \$358.6 million, or by 5.8% (General Directorate of Energy and Geology, 2020a–d; International Monetary Fund, 2020).

In 2019, Portugal's total exports amounted to \$67.1 billion, which was an increase of 3.5% from those of 2018. Of this amount, exports of base metals accounted for \$5.0 billion, or 7.4%; mineral fuels, \$4.1 billion, or 6.1%; and minerals and ores, \$2.9 billion, or 4.3%. The country's total imports increased by 6.4% to \$89.9 billion. Of this amount, imports of mineral fuels accounted for \$10.2 billion, or 11.4%; base metals, \$6.6 billion, or 7.4%; and other mineral commodities, \$1.2 billion, or 1.4% (Statistics Portugal, 2020a, tables Q5 and Q6; 2020b, p. 40).

## Production

In 2019, the most significant mineral commodity production increases included those of dolomite, which increased by 143%; mined lead (Pb content), 51%; graywacke, 48%; talc, 27%; sand (common and special), 20%; and refined lead (secondary) and zinc (concentrate, Zn content), 11% each. The most significant production decreases included those of slate, which decreased by 67%; tungsten (concentrate, W content), 28%; rock salt,

24%; lithium (pegmatite, gross weight), 22%; feldspar, 18%; copper (concentrate, Cu content), 15%; kaolin, 14%; gypsum (including anhydrite) and schist, 10% each. Data on mineral production are in table 1.

## Structure of the Mineral Industry

Table 2 is a list of major mineral industry facilities.

## Commodity Review

### Metals

**Copper and Zinc.**—Lundin Mining Corp. of Canada, through its wholly owned subsidiary Sociedade Mineira de Neves-Corvo, S.A. (Somincor), operated the Neves-Corvo underground mine and a copper concentrate plant and a zinc concentrate plant located in southern Portugal, southeast of Lisbon. In 2019, Lundin Mining continued to work on a large-scale zinc expansion project. Once constructed, it would increase the capacity at the plant to 2.5 million metric tons per year (Mt/yr) of ore throughput [producing about 150,000 metric tons per year (t/yr) of zinc concentrate] from 1.1 Mt/yr. In 2019, Lundin Mining's zinc production decreased to 73,202 metric tons (t) from 75,435 t in 2018. Copper recoveries were 2.8% higher than in 2018; however, copper production decreased to 41,436 t from 45,692 in 2018, which was owing to lower ore grades. The increase in the recovery of copper was attributed to the company's operational improvements during the year (Lundin Mining Corp., 2020a, p. 18; 2020c).

**Lead.**—The mill at the Aljustrel copper-silver mine, which was owned by Almina – Minas do Alentejo, S.A., was converted to process zinc ore and to produce zinc-lead-silver concentrates in March 2018; 2019 was the mill's first full year of processing lead. The company's mining concession was located near the village of Aljustrel in the Alentejo region (Almina – Minas do Alentejo S.A, 2011; Wood Mackenzie, 2019).

**Tungsten.**—Almonty Industries Inc. of Canada operated the Panasqueira tin-tungsten mine through its wholly owned subsidiary Beralt Tin & Wolfram (Portugal), S.A. Phase 1 of the second tailings dam at Panasqueira was completed in 2019, allowing the mine to process and store tailings for another 6 years at a rate of 800,000 t/yr. The company planned to increase the dam capacity by 4 years of operation during phase 2 construction and by 10 years during phase 3 construction, for a total of 20 years once the construction is complete (Almonty Industries Inc., 2015, 2019).

### Industrial Minerals

**Cement.**—In January 2019, OYAK Cement of Turkey completed its acquisition of Cimentos de Portugal SGPS, S.A. (Cimpor), which had been a subsidiary of InterCement Participacoes, S.A. In Portugal, Cimpor operated 3 integrated

<sup>1</sup>Where necessary, values have been converted from euro area euros (EUR) to U.S. dollars (US\$) at the annual average exchange rate of EUR0.893=US\$1.00 for 2019.

cement plants, 2 cement mills, 15 quarries, 43 concrete plants, 2 mortar plants, and 1 packing facility, with a total cement production capacity of approximately 6.5 Mt/yr (World Cement, 2019; OYAK, 2020).

**Lithium.**—Portugal was the leading lithium producer in Europe. The lithium produced in Portugal was sold in crude form domestically to the ceramics industry. (Production of high-grade lithium for car batteries requires the lithium to be refined, and there was no lithium refinery in the country.) Felmica - Minerai Industriais S.A. operated the Gondiaes Mine at Cabeceiras de Basto in the Guarda District, which, according to the company, was the largest lithium mine in Europe and was estimated to have reserves sufficient for 30 years of production (Lithium.today, 2017; de Freitas, 2020).

In 2017, Savannah Resources Plc of the United Kingdom, which held a 25% share, acquired the remaining 75% share of the Mina do Barroso lithium project, which is located near the northern border with Spain. Through the acquisition, Savannah Resources became the sole owner of the project and added the adjacent “Aldeia” mining lease application [2.94 square kilometers (km<sup>2</sup>)] to the original granted Mina do Barroso mining lease (5.42 km<sup>2</sup>). According to the company, Mina do Barroso was the most significant spodumene lithium project in western Europe. As of May 2019, the project had a resource of 27 million metric tons (Mt) and contained 285,900 t of lithium oxide (Li<sub>2</sub>O) (or 707,000 t of lithium carbonate equivalent) at an average grade of 1.06% Li<sub>2</sub>O (Savannah Resources Plc, 2020).

In December 2018, Lepidico Ltd. of Australia, which was a company engaged in the exploration for, development of, and production of lithium, completed a diamond-drilling program at the Alvarroes lepidolite project in the Guarda District. In April 2019, the company announced the results. Compared with the December 2017 estimates, the estimated resources at Alvarroes were increased by 290% and the lithium content was increased by approximately 210%. The total indicated and inferred resource was 5.87 Mt at an average grade of 0.87% Li<sub>2</sub>O; this included lithium mineralization within five pegmatites and a 0.5-meter mineralized halo within the granite host rock. Of this total, pegmatites accounted for 3.9 Mt of the indicated and inferred resource at an average grade of 1.16% Li<sub>2</sub>O. Lepidico Ltd. had signed an ore access agreement with Grupo Mota (the 66% owner and operator of the Alvarroes lepidolite mine). Lepidico and Sociedade Mineira Carolinos Ltd. (Grupo MOTA, 66%) were considering an expansion of the mine and development of a small-scale mineral concentrator within the Alvarroes mining lease area. In 2019, the mine was supplying lithium concentrate containing 1.8% Li<sub>2</sub>O to the ceramics industry (Portuguese Environment Agency, 2019, p. 3; Smallcaps.com.au, 2019; Lepidico Ltd., 2020, p. 39).

### **Mineral Fuels and Other Sources of Energy**

**Petroleum.**—Portugal had two petroleum refineries but did not produce crude petroleum. Petroleos de Portugal, S.A., which was a wholly owned subsidiary of Galp Energia SGPS, S.A. (Galp), operated the Matosinhos and Sines refineries. The two refineries had a total crude petroleum processing capacity of about 120 million barrels per year. During 2019, planned maintenance continued at the Galp refineries to increase energy

efficiency and conversion capacity. In 2019, Portugal imported crude petroleum mainly from West Africa (37% of the country's total crude petroleum imports). Exported refinery products totaled 30.8 million barrels (reported as 4.2 Mt) in 2019, which was a decrease of 14% compared with that in 2018. Gasoline accounted for 36% of the total refinery products exports; fuel oil, 25%; and diesel, 19%. The refinery products exports were shipped mainly to the United States, followed by Spain and the Netherlands (Galp Energia SGPS, S.A., 2020a, p. 56–59; 2020b).

**Renewable Energy.**—In 2019, wind power accounted for 15% of all electricity consumption in the European Union (EU) countries. Portugal was ranked third among EU countries in the percentage of the average annual electricity consumption covered by wind power; 27% of the country's electricity consumption was from wind power. At the end of 2019, Portugal had installed a total of about 5.4 gigawatts of capacity, most of which was installed onshore (WindEurope, 2020, p. 10, 17).

### **Outlook**

Portugal's real GDP is expected to decrease by 10.0% in 2020. Production of metallic ores and concentrates are expected to increase as some exploration efforts transition to the development phase; however, in the short term, owing to the coronavirus disease 2019 (COVID-19) pandemic, some delays in project activities may take place. The anticipated increase in zinc production through Lundin Mining's zinc expansion project may be affected by temporary suspensions of operations and other pandemic-related disruptions. Regular investment in wind power and hydropower are moving Portugal towards increased use of renewable energies (International Monetary Fund, 2020; Lundin Mining Corp., 2020b, p. 2).

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

(Metric tons, gross weight, unless otherwise specified)

Commodity <sup>2</sup>	2015	2016	2017	2018	2019	
METALS						
Copper, mine, concentrate, Cu content	83,081	74,352	63,812	49,064	41,553	
Iron and steel, steel, raw steel	thousand metric tons	2,030	2,010	2,076	2,215	2,000
Lead:						
Mine, Pb content	3,077	4,126	5,164	18,397 <sup>r</sup>	27,852	
Refinery, secondary	8,000	8,000	10,000	9,000	10,000	
Silver, mine, Ag content	kilograms	37,677	35,211	36,713	50,774	48,364
Tin, mine, Sn content	42	54	81	111	108	
Tungsten, mine, concentrate, W content	474	549	669	715	518	
Zinc, mine, concentrate, Zn content	66,871	69,526	71,356	144,983	161,569	
INDUSTRIAL MINERALS						
Cement, hydraulic	thousand metric tons	5,620	4,100 <sup>r</sup>	3,790 <sup>r</sup>	3,960 <sup>r,c</sup>	4,050 <sup>e</sup>
Clay, kaolin, washed and unwashed	252,000	283,571	307,982	355,829 <sup>r</sup>	304,677	
Feldspar	93,789	132,105	126,211	130,475	106,754	
Gypsum, mine, including anhydrite	309,966	255,026	152,209	232,921	209,076	
Lithium, lepidolite, pegmatite:						
Gross weight	17,120	25,758	52,741 <sup>r</sup>	76,818 <sup>r</sup>	59,912	
Li content	257	386	791 <sup>r</sup>	1,152 <sup>r</sup>	1,198	
Salt, rock	30,008	6,092	7,800	6,201	4,709	
Sand and gravel, industrial, silica	650 <sup>r</sup>	1,000	205,272 <sup>r</sup>	189,668 <sup>r</sup>	181,392	
Stone, sand, and gravel, construction:						
Sand and gravel, common and special sand	thousand metric tons	7,517	6,779	7,117 <sup>r</sup>	8,069 <sup>r</sup>	9,683
Stone:						
Crushed, quartzite	27,000	25,000	25,460 <sup>r</sup>	24,560 <sup>r</sup>	25,008	
Size and shape unspecified:						
Basalt	thousand metric tons	264	268	382	322	322 <sup>e</sup>
Dolomite	do.	--	117	158	165	401
Gabbro	do.	817	475	400	292	291
Granite	do.	13,535	14,309	13,702	13,995	15,300
Graywacke	do.	17	14	8	33	49
Limestone	do.	21,757	19,332	21,869	21,854	22,163
Marble	do.	200	221	290	294	310
Schist	do.	191	141	116	117	105
Slate	do.	7	9	11	15	5
Talc	11,204	11,699	13,600	10,144	12,901	
MINERAL FUELS AND RELATED MATERIALS						
Petroleum, refinery	thousand 42-gallon barrels	115,000	112,000	128,000	118,000	112,100

<sup>e</sup>Estimated. <sup>r</sup>Revised. do. Ditto. -- Zero.

<sup>1</sup>Table includes data available through December 8, 2020. All data are reported unless otherwise noted. Estimated data are rounded to no more than three significant digits.

<sup>2</sup>In addition to the commodities listed, ammonia, beryl concentrate, calcium carbonate, hot-rolled steel, iron ore and concentrate, manganese, manufactured gas, metallurgical coke, other clays, pig iron, pyrite and pyrrhotite (including cuprous), secondary aluminum, sodium compounds, sulfur, syenite, and white arsenic may have been produced, but available information was inadequate to make reliable estimates of output.

TABLE 2  
PORTUGAL: STRUCTURE OF THE MINERAL INDUSTRY IN 2019

(Thousand metric tons unless otherwise specified)

Commodity		Major operating companies and major equity owners	Location of main facilities	Annual capacity
Calcium carbonate		Omya Mineral Portuguesa, Lda (Omya AG, 50%, and Salmon & Cia, Lda, 50%)	Plants at Perulheira, Setubal, and Soure	NA
Cement		Cimentos de Portugal SGPS, S.A. (Cimpor) (OYAK Cement, 94.19%)	Plants at Alhandra, Loule, and Souselas	6,500
Do.		Companhia Geral de Cal e Cimento, S.A. (Secil) [Sociedade de Investimento e Gestao SGPS, S.A. (Semapa), 100%]	Plants at Cibra, Maceira, and Outao	4,000
Clay, kaolin		Felmica - Minerai Industriais, S.A. (Grupo MOTA)	Mines at Alto da Lixa, Boticas, Cab. Basto, Goncalo, Guarda, Sabugal, Satao, Trancoso, Ponte de Lima, and Vila Pouca de Aguiar	190
Do.		Saibraes Arelas e Caulinos, S.A. (Denain Anzin Mineraux, S.A.)	Mines at Casal dos Bracais and Mosteiro	175
Copper:				
Ore		Almina - Minas do Alentejo, S.A.	Mine at Aljustrel, Alentejo	NA
Do.		Sociedade Mineira de Neves-Corvo, S.A. (Somincor) (Lundin Mining Corp., 100%)	Neves-Corvo Mine near Castro Verde	2,700
Concentrate, Cu content		do.	Plant near Castro Verde	45
Iron and steel, steel, semi-manufactured		Lusosider Acos Planos, S.A.	Rolling mill at Seixal	550
Do.		Siderurgia Nacional, S.A. (Metalúrgica Galaica, S.A., 100%)	Steelworks at Maia and Seixal	1,700
Lead, mine, Pb content		Almina - Minas do Alentejo, S.A.	Mine at Aljustrel, Alentejo	NA
Do.		Sociedade Mineira de Neves-Corvo, S.A. (Somincor) (Lundin Mining Corp., 100%)	Neves-Corvo Mine near Castro Verde	7
Lithium minerals, pegmatite, ore		Felmica - Minerai Industriais, S.A. (Grupo MOTA)	Gondiaes Mine at Cabeceiras de Basto	30
Do.		Pegmatítica - Sociedade Mineira de Pegmatites, Lda	Castanho Mine at Mangualde	NA
Do.		SlipStream Resources Portugal Unipessoal, Lda (Savannah Resources Plc)	Barroso Mine at Boticas	NA
Do.		Sociedade Mineira Carolinos, Lda (Grupo MOTA, 66%)	Alvarroes Mine at Guarda	NA
Pegmatite		Jose Aldeia Lagoa & Filhos, S.A.	Alijo Mine at Ribeira de Pena	NA
Petroleum, refined	million 42-gallon barrels	Petroleos de Portugal, S.A. (Galp Energia SGPS, S.A.)	Refineries at Matosinhos and Sines	120
Pyrite		Almina - Minas do Alentejo, S.A.	Mine at Aljustrel, Alentejo	NA
Silver, mine, Ag content		Sociedade Mineira de Neves-Corvo, S.A. (Somincor) (Lundin Mining Corp., 100%)	Neves-Corvo Mine near Castro Verde	NA
Stone:				
Size and shape unspecified, granite		Granital - Granitos de Portugal, S.A. (EIP Group, 60%)	Quarries at Bardeira, Chacins, Favaco, Maria Ribeira, Pedra da Moura, Pedra do Guarda, Preto F, and Rosa Sta. Eulalia	14,500
Dimension, unspecified	metric tons	Airemarmores - Extracao de Marmores, Lda	Quarries at Alcobaca, Catanhede Leiria, and Santarem	22,500
Tin, concentrate, Sn content	do.	Beral Tin & Wolfram (Portugal), S.A. (Almonty Industries Inc., 100%)	Underground Panasqueira Mine and plant at Covilha, Barroca Grande	115
Tungsten, concentrate, W content	do.	do.	do.	950
Zinc, concentrate, Zn content		Almina - Minas do Alentejo, S.A.	Mine at Aljustrel, Alentejo	75
Do.		Sociedade Mineira de Neves-Corvo, S.A. (Somincor) (Lundin Mining Corp., 100%)	Neves-Corvo Mine near Castro Verde	65

Do., do. Ditto. NA Not available.