



2022 Minerals Yearbook

UKRAINE [ADVANCE RELEASE]

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World rankings for mineral production, shares of world production, and reserves presented in this chapter are derived from the referenced sources. Production data in this chapter may differ from data in other sources because of differences in the date of reporting

THE MINERAL INDUSTRY OF UKRAINE

By Elena Safirova

In 2022, Ukraine was among the world's leading producers of several minerals. Ukraine was the 4th-ranked producer of rutile (14.8% of world output); the 5th-ranked producer of bromine (2.7%; not including United States production) and titanium sponge (0.4%; not including United States production); the 8th-ranked producer of magnesium metal (0.2%; not including United States production); the 9th-ranked producer of manganese ore (Mn content) (1.6%); the 11th-ranked producer of ilmenite (2.2%, tied with Kenya), iron ore (Fe content) (1.4%), and peat (1.9%); and the 12th-ranked producer of lime (0.6%), pig iron (0.5%, tied with Canada), and silicon (0.5%). Ukraine also was a significant world producer of raw steel and gypsum. The country had large coal and uranium resources but depended on imported petroleum and natural gas (Apodaca, 2024; Bray, 2024; Brioche, 2024; Crangle, 2024; Gambogi, 2024a, b; Kim, 2024; Schnebele, 2024a, b; Tuck, 2024a, b).

Minerals in the National Economy

In 2022, Ukraine's real gross domestic product (GDP) decreased by 29.1% compared with a 3.4% increase in 2021.¹ The nominal GDP in 2022 totaled \$161.5 billion.² Manufacturing activities accounted for 7.5% of the GDP and mining and quarrying, for 5.7%. The continuing Russia-Ukraine conflict negatively affected Ukraine's economy, including production and exports of mineral commodities (State Statistics Service of Ukraine, 2024b, c; U.S. Central Intelligence Agency, 2024).

In 2022, the State Statistics Committee of Ukraine reported only indices of industrial production without disclosing actual production volumes. According to the Committee, industrial production in 2022 decreased by 36.9%. During the year, industrial production was most severely affected during the months of October, November, and December, when damages to infrastructure negatively affected the power supply. During those months, some industrial enterprises temporarily reduced or stopped production. Mining and metallurgical enterprises reduced production more than did industry in general—metallurgical production decreased by 66.5%, and production of metallic ores, by 61.7%. At the same time, production of coal decreased by 7.7%, and that of natural gas and petroleum, by 8.4% (Grigorenko, 2023a).

To a limited extent, decreased industrial production was tempered by relocating some industrial capacity to parts of the country less affected by the ongoing conflict. The Government relocation program helped relocate about 800 enterprises, of which 620 enterprises restarted operations in new locations.

¹The data in this section exclude the territory of the Autonomous Republic of Crimea, the city of Sevastopol, and part of the territory in Donetsk and Luhansk Oblasts.

²Where necessary, values have been converted from Ukrainian hryvnia (UAH) to U.S. dollars (US\$) at the annual average exchange rate of UAH32.1543=US\$1.00 for 2022 and UAH27.2786=US\$1.00 for 2021.

Steel consumption in Ukraine decreased by 43.1%, and metal consumption decreased by 55% to about 2 million metric tons (Mt) compared with that in 2021 (Grigorenko, 2023a).

The geopolitical risk firm SecDev of Canada evaluated 2,209 mineral deposits in Ukraine and estimated that the total value of minerals in Ukraine's deposits located in areas occupied by Russian forces was at least \$12.4 trillion. This value accounted for almost 50% of the total value of all deposits in Ukraine, including 63% of the country's coal deposits; 42% of the metal deposits; 33% of the deposits of rare earths and other critical minerals, including lithium; 20% of the natural gas fields; and 11% of the petroleum fields. During the military operations of 2022, 41 coal fields, 27 natural gas sites, 14 propane sites, 9 oilfields, 6 iron ore deposits, 2 titanium ore sites, 2 zirconium ore sites, deposits of gold, lithium, strontium, and uranium (one of each), and a large limestone quarry, which had previously been used in steel production, were occupied by Russian forces (Faiola and Bennett, 2022).

According to Ukraine's Institute for Geological Sciences, Ukraine had a total of 2,160 deposits, of which 700 were in areas that Ukraine did not control, which accounted for 80% of its coal deposits, 24% of its petroleum and natural gas fields. Other important deposits under occupation included those of gold, iron ore, lithium, manganese, salt, and uranium. Reconstruction of some enterprises damaged during the conflict, such as coal mines, may not be economically feasible (Malinovskaya, 2023).

Government Policies and Programs

In April, the Government of Ukraine imposed an embargo on all goods imported from Russia, including mineral commodities (but excluding transit of natural gas to Europe), and expected that this measure would translate to about \$6 billion per year in lost revenues for Russia. Earlier, in March, NAK Naftogaz Ukraine, which was Government owned, stated that Ukraine would continue transit of Russia's natural gas through its territory, as long as it was technically feasible to do so. According to the existing contract on natural gas transit, Ukraine expected to receive \$1.2 billion from Russia for the use of Ukraine's gas transit infrastructure. Although both NAK Naftogaz and Russia's Gazprom would have been allowed to break the contract owing to force majeure, neither party chose to do so (Ivanova, 2022).

In May, the United States suspended for 1 year the 25% tariff on steel imports from Ukraine owing to the importance of the steel industry to Ukraine's economy. In June, the European Commission canceled all tariffs and restrictions on imports from Ukraine for 1 year. In 2021, steel imports from Ukraine totaled 130,636 metric tons (t), which was less than 1% of the total United States steel imports (Lazarro, 2022; Yermolenko, 2023).

Ukraine's major law regulating mining relations in the country was the Law on Subsoil of 1994. The goal of the law

was to protect the rights and legitimate interests of enterprises, institutions, organizations, and citizens as well as ensure the safety of people, property, and the environment during the use of subsoil (Urst.com.ua, 2025).

Production

Production of all major mineral commodities decreased in 2022 compared with that in 2021 owing to the Russia-Ukraine conflict. The output of other ferroalloys decreased by an estimated 93%; graphite, by an estimated 90%; alumina, by 83%; titanium sponge, by an estimated 83%; primary magnesium, by an estimated 80%; ferromanganese (estimated), soda ash (estimated), and uranium, by 78% each; ferrosilicon, germanium (estimated), and kaolinitic clay (estimated), by 75% each; gypsum, kaolin, manganese metal, and petroleum refinery products, by an estimated 74% each; rolled steel, by 72%; raw steel, by 71%; pig iron, by 70%; zirconium (zircon concentrate), by an estimated 69%; nitrogen, ammonia (N content), by 68%; sulfuric acid, by an estimated 62%; iron ore, lime, and salt (estimated) by 61% each; coke, by 59%; limestone, by an estimated 51%; bentonite, cement, and feldspar, by an estimated 50% each; mined manganese, by an estimated 46%; ferronickel (Ni content), by an estimated 44%; ilmenite, by an estimated 42%; silicomanganese, by an estimated 41%; secondary lead, by an estimated 40%; steel pipe, by 38%; ferronickel (gross weight) by an estimated 28%; bromine, by an estimated 26%; and peat for horticultural use, by an estimated 14%. Secondary copper and gallium were not produced. Data on mineral production are in table 1.

Structure of the Mineral Industry

The State Service of Geology and Mineral Resources of Ukraine was responsible for implementing Government policy for geologic exploration and rational use of the subsoil, issuing exploration and production licenses for all mineral resources and monitoring their performance, and establishing production-sharing agreements. The Ministry of Energy was responsible for the formation and implementation of Government policy regarding the coal industry, electric power, natural gas and petroleum production and processing, and the nuclear industry. In the beginning of 2022, the majority of mineral industry facilities in Ukraine were privately owned. Table 2 is a list of major mineral industry facilities.

Mineral Trade

The total value of Ukraine's exports of goods decreased by 64.8% to about \$44.1 billion in 2022. One of Ukraine's leading export categories (in terms of value) was base metals and products made thereof, and in 2022, they were valued at \$6.0 billion and made up 13.6% of the total value of all exports of goods. Of this amount, exports of ferrous metals totaled \$4.5 billion, or 10.3% of the total export of goods. Exports of mineral products were valued at \$4.3 billion and made up 9.8% of the total value of exports of goods, of which ores, slag, and ashes totaled \$3.1 billion (7.0% of the total value of exports of goods); exports of mineral fuels and petroleum products contributed \$1.0 billion (2.4% of the total value of exports of

goods), and exports of salt, soil, stone, and sulfur were valued at \$202 million (0.5% of the total value of exports of goods). Together, the value of exports of mineral products and metals made up about 23.4% of the total value of exports of goods (State Statistics Service of Ukraine, 2024a).

The total value of Ukraine's imports of goods decreased by 75.9% to \$55.3 billion in 2022. One of the leading imported commodities was mineral fuels and refined petroleum products, which made up about 23.6% of the total value of imports of goods in 2022 (State Statistics Service of Ukraine, 2024a).

Commodity Review

Metals

Bauxite and Alumina.—As of the beginning of 2022, the Nikolayevskiy Alumina Refinery (NGZ) was the only producer of alumina in Ukraine and was owned by United Company RUSAL (RUSAL) of Russia. In 2021, NGZ produced about 1.77 Mt of alumina, which was 21.3% of all alumina produced by RUSAL. During the first 2 months of 2022, NGZ produced 300,000 t of alumina, which was similar to 2021 production in terms of monthly output. The 2021 production of the plant was close to its capacity, which had been increased in 2020 (tables 1, 2; Mil'kin, 2022; Orel, 2023).

On March 1, 2022, following the beginning of the Russia-Ukraine conflict, RUSAL's refinery stopped operations. The company's press release explained that production was stopped temporarily owing to unavoidable logistical and transportation problems in the Black Sea and adjacent areas. Following RUSAL's decision, RUSAL's stock at the Hong Kong Stock Exchange fell by 14.3%, and the aluminum price at the London Metal Exchange reached a new historic maximum of \$3,445 per metric ton of aluminum on February 28, 2022 (Mil'kin, 2022).

On March 30, 2022, the Perechinskiy District Court of Zakarpattia Oblast' arrested funds and corporate rights of NGZ because the managers of the plant were accused of tax evasion and embezzlement of funds in the amount of about \$6.22 million. On May 31, 2022, the Zakarpattia appellate court affirmed the decision. In July 2022, corporate management for NGZ was transferred to the Agency for Investigation and Management of Assets (ARMA). However, ARMA was unable to begin managing NGZ because it required the agreement of the owners who were Russian citizens; therefore ARMA needed to wait until NGZ was nationalized (Pavlysh, 2022b; Orel, 2023).

Ferroalloys.—Before the onset of the Russia-Ukraine conflict in February 2022, the four ferroalloys plants operating in Ukraine were the Kramatorskiy ferroalloys plant (KZF), the Nikopol'skiy ferroalloys plant (NZF), the Pobuzhskiy ferronickel plant (PFK), and the Zaporozhskiy ferroalloys plant (ZZF). More than 80% of the produced materials were exported, and the primary consumers of Ukraine's ferroalloys were China, Italy, and Turkey. In 2022, the ferroalloys plants significantly reduced production owing to maritime port closures and the destruction of two metallurgical plants in Mariupol in spring 2022. Later in 2022, the ferroalloys plants were able to export their products by railroad. Then, even later in the year, the major obstacle to the production of ferroalloys was power

outages caused by destruction of the power infrastructure. In October, PFK stopped operations owing to the lack of power, and NZF and ZZF also had insufficient power supply to run their plants. Overall, in 2022, the ferroalloys plants operated at 30% capacity (table 2; Kolisnichenko, 2022; Kryoka, 2023a; Leart.com.ua, 2023; Lityo.com.ua, 2023).

In 2022, Ukraine exported 349,600 t of ferroalloys, which was a 47.7% decrease compared with that in 2021, and export revenues decreased by 46.0% to about \$564 million. The primary recipients of Ukraine's ferroalloy exports were Poland (which purchased 53.3% of Ukraine's ferroalloys), the Netherlands (13.1%), and Romania (5.7%) (Kolisnichenko, 2023a).

Iron and Steel.—Ukraine produced 72.0% less rolled steel in 2022 (5.35 Mt) than in 2021; raw steel production decreased by 70.7%, to 6.26 Mt; pig iron production, by 69.8% to 6.39 Mt; and steel pipe, by 38.0% to 608,000 t. The notable decrease in production was owing to logistical problems, unfavorable market conditions, and the destruction of two large metallurgical plants—the OAO Azovstal Iron and Steel Works and the OAO Ilyich Iron and Steel Works—during the military operations. Following the start of the conflict in February 2022, the only market for Ukraine's metallurgical products was Europe and the main transportation mode was by railroad. Railroad transportation of steel products was costly and complicated; specifically, transportation costs for rolled steel doubled. At the same time, the demand for metallurgical products decreased. Additionally, starting in summer 2022, destruction of the power infrastructure of Ukraine as a result of the ongoing military operations affected metallurgical production (Biz.nv.ua, 2023; Kolisnichenko, 2023b).

The leading raw steel producer in Ukraine, PAO ArcelorMittal Kryvyi Rih, produced 4.1 times less raw steel in 2022 (1.2 Mt). The company also decreased its pig iron production by 3.3 times to 1.6 Mt, and rolled steel production, by 4.2 times to 1.1 Mt. Owing to the conflict, limited export opportunities, and reduced energy supply, ArcelorMittal Kryvyi Rih's facilities operated at between 20% and 25% of production capacity. ArcelorMittal Kryvyi Rih specialized in rolled steel, specifically long-rolled products, fittings, and wire rods (Herasimova, 2023).

Iron Ore.—In 2022, Ukraine produced 32.7 Mt of usable iron ore, which was a 61.0% decrease compared with that in 2021. About 70% of the iron ore production facilities in Ukraine were owned by Metinvest B.V. Among the major production facilities owned by Metinvest were the ChAO Inguletskiy mining and beneficiation complex (GOK), the ChAO Severnyi GOK, and the PAO Yuzhnyi GOK. All three produced iron ore concentrates with Fe content of between 64.8% and 70.5%, and iron ore pellets with Fe content of between 62% and 67.5%. Ferrexpo plc. was another significant producer of iron ore. Overall, in 2022, Metinvest mines reduced production by 66%, and Ferrexpo mines, by 46%. The primary reasons for production decreases were increased transportation costs, reduced demand for iron ore, and shortages of power supplies caused by the destruction of the power infrastructure in October (Kryoka, 2023b; Metalinfo.ru, 2023).

In 2021, the primary importer of Ukraine's iron ore was China, which received 41.9% of Ukraine's iron ore exports,

followed by Czechia (9.7%) and Poland (8.0%). In 2022, the only transportation mode available for exports of iron ore was by railroad, which was more cumbersome and more expensive than maritime transportation, which was no longer accessible because of the conflict. In 2022, total exports of iron ore from Ukraine decreased by 45.9%, to 24.0 Mt. The leading importer of iron ore in 2022 was Slovakia, which received 19.23% of Ukraine's exports, followed by Czechia (17.32%) and Poland (16.49%) (Kryoka, 2023b; Metalinfo.ru, 2023).

Titanium.—In 2022, Ukraine decreased production of ilmenite and leucoxene concentrate by 41.6% to an estimated 410,000 t. In 2022, Ukraine's exports of titanium ores decreased by 41.8% to 322,100 t, and the exporters' revenues decreased by 19.6% to \$130.1 million. The primary recipients of Ukraine's titanium ores (in terms of value) were Czechia (which received 47.9% of all exports), the United States (11.9%), and Romania (9.7%). The recipients were very different from those in 2021, when titanium ores were exported to Mexico (21.2%), China (18.2%), and Czechia (14.1%) (Grigorenko, 2023b).

Under Ukraine law, information about titanium reserves in the country is classified. Ukraine had about 40 titanium deposits, of which 13 deposits were categorized as large, 10 as medium, and 1 (the Stremigorodskoye deposit) as unique. As of 2022, production of ilmenite in Ukraine was only from alluvial deposits, which accounted for about 10% of all known ilmenite deposits. The production of titanium from ore deposits would require significant upfront investment for construction of new mines and processing plants (Grigorenko, 2023b).

In 2022, some titanium-producing facilities were affected by the Russia-Ukraine conflict but no specific information about the damages was available. Also, individual companies did not disclose their production figures. In May 2022, the Zaporozhskiy Titanium and Magnesium Complex was nationalized. Ukraine's titanium industry would likely go through nationalization and then privatization in the near future, but such events were unlikely until the end of the conflict (Grigorenko, 2023b).

Industrial Minerals

Cement.—In 2022, Ukraine's cement production totaled an estimated 5.4 Mt, which was a 49.9% decrease compared with 2021 output. According to the Association of Cement Producers of Ukraine (UkrCement), most of the cement producers continued operations in 2022. The only cement plant that stopped operations was PAO Eurocement Ukraine, which was located in the city of Balakliya in Kharkiv Oblast'. Domestic consumption of cement amounted to about 35% of that in 2021. However, relatively increased exports of cement countered the production decrease. In 2022, cement exports decreased by 3.7% compared with those in 2021 to 935,000 t; most of the exports were shipped to countries within the European Union. In 2022, Ukraine's plants produced 16 types of cement, of which the most popular was slag-containing cement (Bukatyuk, 2023; Interfax.com.ua, 2023; Kul'bachnyi, 2023).

UkrCement forecast that 2023 production would be between 7.2 and 7.4 Mt and that cement plants would be expected to operate at about 65% of 2021 production levels. According to industry experts, after the end of the conflict,

annual demand for cement in Ukraine would likely amount to between 15 and 16 Mt, and total monetary demand for cement, including intermediary demand, would likely amount to between \$2 billion and \$5 billion (Bukatyuk, 2023; Interfax.com.ua, 2023; Kul'bachnyi, 2023).

Clay and Shale.—In 2022, Ukraine's kaolin production decreased by 74% to an estimated 600,000 t. The majority of white clay deposits in Ukraine were located in Donetsk Oblast', where most military operations were concentrated. Before 2022, Ukraine exported about two-thirds of its production of white layered clay; the primary recipients of exports were the producers of ceramic tile in Italy and Spain, and about 70% of the white layered clay imported by Spain was from Ukraine (table 1; GMK Center, 2022).

Graphite.—In 2022, Ukraine's graphite production decreased by an estimated 90% to 1,000 t. The only graphite producer in Ukraine was the Zavalievskiy Graphite Complex. Volt Resources of Australia, a graphite and gold exploration company, acquired a 70% stake in the complex in 2021. The Zavalievskiy Graphite Complex operated an open pit mine, had the capacity to produce 20,000 metric tons per year (t/yr) of graphite, and exported its output to countries in Europe and Asia (tables 1, 2).

In November, OOO Spis Ukraina obtained a special mining permit from the State Service for Geology and Subsoil (Gosgeonadra) to develop the Gorodnyavskiy section of the Burtinskiy graphite mine, which is located in Khmelnytskyi Oblast'. The deposit had an area of 105 hectares (about 260 acres), and the resources of the deposit were estimated to be 130 Mt at an average graphite content of 5.14%, which was enough to mine the deposit for 130 years. Annual production could be as much as 1 million metric tons per year of ore and 55,900 t/yr of graphite concentrate. OOO Spis Ukraina was registered in 2010 in the city of Lviv, and the primary investor was the Onur Group of Turkey. It was expected that the total investment in the graphite deposit would total between \$60 million and \$280 million. The development of the deposit was expected to begin before the end of 2023 (Orlyuk, 2021; GMK Center, 2021; Kolisnichenko, 2021; Orlyuk, 2021; Antikor.com.ua, 2022; Zasyad'ko, 2022; Inventure.com.ua, 2023).

Mineral Fuels and Related Materials

Uranium.—In 2022, production of mined uranium in Ukraine decreased by 78% to 100 t. The only enterprise that produced uranium in Ukraine in 2022 was the Vostochniy GOK, which mined uranium at four deposits—the Michurinskoye, the Novokonstantinovskoye, the Tsentral'noye, and the Vatutinskoye. In recent years, the Vostochniy GOK had financial problems owing to high production costs that exceeded uranium market prices (tables 1, 2; Uatom.org, 2022; Yarosh, 2022).

In June, NAEK Energoatom, which was the operator of all Ukraine's nuclear powerplants, proposed to the Government that it merge with the Vostochniy GOK. Both companies were owned by the Government. NAEK Energoatom's management specified that they intended to merge only with competitive mines that could produce uranium at costs below market prices. It was estimated that to make the Vostochniy GOK profitable,

the company would need to invest a total of about \$373 million, although an initial investment of about \$62 million was thought to be sufficient for the first stage of development (Pavlysh, 2022a).

Outlook

Ukraine's mining, metallurgy, and other mineral sectors had significant setbacks during the past few years: ferroalloys plants required inexpensive electricity to run profitably, coal mines and petroleum refineries were outdated and required significant investments, and uranium production was insufficient for meeting domestic demand. The Russia-Ukraine conflict further exacerbated the situation—some facilities faced reduced demand for their products, had difficulties exporting their output, and had reduced power supply for normal operations, and some plants and deposits were either damaged or had been seized by Russian forces.

Ukraine is likely to remain one of the world's leading producers of manganese ore, titanium ore, and titanium sponge. Remaining competitive in metallurgy may prove difficult owing to high energy costs, the need for new investments, and the often-differing interests of plant owners and the Government.

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TABLE 1
UKRAINE: PRODUCTION OF MINERAL COMMODITIES¹

(Metric tons, gross weight, unless otherwise specified)

Commodity	2018	2019	2020	2021	2022
METALS					
Alumina	1,715,000	1,690,000	1,725,000	1,769,000	300,000
Copper, refinery, secondary, Cu content	24,901	20,409	24,335	28,817	--
Ferroalloys:					
Ferromanganese	79,480	151,090	122,960	100,600	22,000 ^e
Ferronickel, electric furnace:					
Gross weight	79,537	74,400	73,700	61,700 ^e	44,700 ^e
Ni content	15,807	14,200	14,719	14,000 ^e	7,800 ^e
Ferosilicon, electric furnace	97,084	62,560	60,800	87,600	21,600
Silicomanganese	859,640	804,680	559,880	662,700	390,000 ^e
Other, unspecified	13,150	20,670	13,605	13,000 ^e	900 ^e
Gallium ^c	4,000	--	--	1,000	--
Germanium, Ge content ^e	500	400	400	400	100
Iron ore, mine:					
Crude ore	160,877,900	168,000,000 ^e	210,000,000 ^e	223,000,000 ^e	87,000,000 ^e
Usable ore	60,548,900	63,204,900	78,837,700	83,844,900	32,700,000
Fe content	37,800,000	39,500,000	49,300,000	52,400,000	20,400,000
Iron and steel:					
Pig iron	20,531,200	20,055,900	20,420,000	21,170,000	6,391,117
Steel:					
Raw steel	21,101,000	20,848,000	20,550,000	21,366,000	6,263,000
Products:					
Pipe	1,100,000	1,005,000	850,000	980,000	608,000
Rolled	18,367,000	18,202,000	18,430,000	19,080,000	5,350,000
Lead, refinery, secondary	29,755	24,704	24,649	25,000 ^e	15,000 ^e
Magnesium, metal, primary ^{e, 3}	7,000	8,000	6,000	10,000 ^r	2,000
Manganese:					
Mine, marketable:					
Mineral concentrates	1,521,140	1,687,000	1,887,950	1,760,000	950,000 ^e
Mn content ^e	517,000	574,000	642,000	600,000	323,000
Metal	7,544	6,140	2,800	7,750	2,000 ^e
Titanium:					
Ilmenite and leucoxene, mineral concentrate:					
Gross weight	745,417	818,543	773,093	702,249 ^r	410,000 ^e
TiO ₂ content ^e	300,000	330,000	310,000	280,000	162,000
Rutile, 95% TiO ₂	106,858	100,000 ^e	100,000	100,000 ^e	100,000 ^e
Sponge	7,300 ^e	8,000	6,000	6,000 ^e	1,000 ^e
Zirconium, zircon concentrate	21,614	17,000 ^e	16,000 ^e	29,000 ^e	8,900 ^e

See footnotes at end of table.

TABLE 1—Continued
UKRAINE: PRODUCTION OF MINERAL COMMODITIES¹

(Metric tons, gross weight, unless otherwise specified)

Commodity	2018	2019	2020	2021	2022	
INDUSTRIAL MINERALS						
Bromine	6,000 ^e	7,500 ^e	8,500	10,800	8,000 ^e	
Cement, hydraulic	thousand metric tons	9,241	9,201	9,568	10,780 ^r	5,400 ^e
Clay:						
Bentonite	178,200	180,000 ^e	180,000 ^e	180,000 ^e	90,000 ^e	
Kaolin	thousand metric tons	2,092	1,844	1,681	2,318 ^r	600 ^e
Kaolinitic clay	do.	148	396	400 ^e	400 ^e	100 ^e
Feldspar	50,000 ^e	60,000 ^e	50,000 ^e	60,000 ^e	30,000	
Graphite, crystalline flake ^e	15,000	16,000	10,000	10,000	1,000	
Gypsum, including anhydrite	1,386,400	1,409,400	1,529,000	1,753,500	450,000 ^e	
Lime	thousand metric tons	2,298	2,245	2,341	2,622 ^r	1,023
Nitrogen, ammonia, N content	do.	801	1,502	2,304	2,170	700
Salt, all types	2,191,619	2,092,800	1,717,096	1,800,000 ^e	700,000 ^e	
Soda ash, synthetic	618,500	489,700	450,000 ^e	460,000 ^e	100,000 ^e	
Stone, crushed, limestone	thousand metric tons	6,116 ^r	6,891	7,003	7,141	3,500 ^e
Sulfur, compounds, sulfuric acid	do.	680	674	683	782	300 ^e
MINERAL FUELS AND RELATED MATERIALS						
Coal:						
Anthracite	thousand metric tons	5,809	6,323	5,764	7,234	6,700
Bituminous	do.	27,477	24,901	23,054	22,153	20,500 ^e
Lignite ^e	do.	4,700	4,600	4,200	4,300	4,000
Total	do.	38,000	35,800	33,000	33,700	31,200
Coke, metallurgical	10,824,100	10,055,200	9,526,100	9,327,900	3,800,000	
Natural gas	million cubic meters	20,806	20,520	20,171	19,362	18,500
Peat:						
Fuel use	540,300	539,500	271,700	332,300 ^r	300,000 ^e	
Horticultural use	146,400	139,900	120,500	163,000 ^r	140,000 ^e	
Total	687,000	679,000	392,000	495,000 ^r	440,000	
Petroleum:						
Crude, including condensate ⁴	thousand 42-gallon barrels	16,500	17,700	17,300	17,000	15,600 ^e
Refinery ⁵	do.	19,700	16,000	18,800	19,500	5,000 ^e
Uranium, mine, U content	790	800	744	455	100	

^eEstimated. ^rRevised. do. Ditto. -- Zero.

¹Table includes data available through November 28, 2023. All data are reported unless otherwise noted. Totals and estimated data are rounded to no more than three significant digits; may not add to totals shown.

²In addition to the commodities listed, a number of other mineral commodities may have been produced, but available information was inadequate to make reliable estimates of output.

³Used in production of titanium sponge.

⁴Figures were converted to barrels from metric tons, which were reported as follows: 2018—2,293,300; 2019—2,453,000; 2020—2,429,700; and 2021—2,391,900.

⁵Figures were converted to barrels from metric tons, which were reported as follows: 2018—2,456,000; 2019—1,998,100; 2020—2,354,000; and 2021—2,439,000.

TABLE 2
UKRAINE: STRUCTURE OF THE MINERAL INDUSTRY IN 2022

(Metric tons)

Commodity	Major operating companies and major equity owners ^{1,2}	Location or deposit names ¹	Annual capacity ^c
Aluminum:			
Alumina	Nikolayevskiy Alumina Refinery (NGZ) (Government) ³	Plant, 20 kilometers south of Mykolaiv	1,800,000
Metal, primary	Zaporozhskiy Aluminum Complex (ZAIK) (Government) ⁴	Plant in Zaporizhzhya, Zaporizhzhia Oblast'	114,000
Bromine	AO Brom	Plant in Krasnoperekopsk, Crimea	11,000
Cement	Facilities:	Plants in the following locations:	
	OAO KyivCement (PAO Dyckerhoff Cement Group)	Kyiv	NA
Do.	OAO YuGCement (PAO Dyckerhoff Cement Group)	Mykolayiv	NA
Do.	OOO Cement (CRH plc)	Odesa, Odesa Oblast'	NA
Do.	Overin Ltd. (Concorde Capital Group)	Plants in Amvrosiivka, Kamenskoye, and Kryvyi Rih	3,800,000
Do.	PAO Eurocement Ukraine	Balakliya, Kharkiv Oblast'	NA
Do.	PAO Ivano-Frankovsktsement	Ivano-Frankivsk	3,600,000
Do.	PAO Kramatorskiy Tsementnyi Zavod PUSHKA	Kramatorsk, Donetsk Oblast'	NA
Do.	PAO Nikolayevtsement (CRH plc)	Mykolayiv	NA
Do.	PAO Podolsk Cement (CRH plc)	Khmelnyskiy Oblast'	NA
Do.	PAO Volyn'Cement (PAO Dyckerhoff Cement Group)	Volyn Oblast'	NA
Clay:			
Bentonite	ChAO Weighting Agents Plant	Mine in Kostyantynivka, Donetsk Oblast'	NA
Do.	PAO Dashukovskiy Bentonit	Mine in Dashukivka, Cherkasy Oblast'	NA
Kaolin	AKW Ukrainian Kaolin Co.	Mine in Hlukhivtsi, Vinnytsia Oblast'	320,000
Do.	Kirovohrads'ke Rudoupravlenne	Mine in Katerinivka, Kirovohrad Oblast'	NA
Do.	OOO Mineral Mining Co.	Mine in Polohy, Zaporizhzhia Oblast'	200,000
Do.	OOO UkrRosKaolin	Mine in Ekaterinivka, Donetsk Oblast'	NA
Do.	ProscO Resources Ltd.	Mine in Prosyana Deposit, Dnipropetrovsk Oblast'	NA
Coal	About 150 surface and underground mines, including: Dobropolyeugol' (Government) Donbass Fuel and Energy Co. (DTEK) (System Capital Management, 100%): DTEK Komsomolets Donbassa Mine DTEK Pavlogradugol DTEK Rovenkyanthracite DTEK Sverdlovanthracite Krasnoarmeiskaya-Zapadnaya No. 1 OAO Krasnodon Coal Co. (Metinvest B.V.) Smaller producers	About 95% of coal produced in Donetsk, Dnipropetrovsk, and Luhansk Oblasts: 5 mines near Dobropillia, Donetsk Oblast' Kirovs'ke, Donetsk Oblast' 10 mines in Dnipropetrovsk and Donetsk Oblasts' 6 mines and 3 processing plants in Luhansk Oblast' 5 coal mines and 3 processing plants in Luhansk Oblast' 1 mine at Pokrovs'k, Donetsk Oblast' 7 mines and 2 processing plants in Luhansk Oblast' Donetsk, Dnipropetrovsk, Luhansk, Lviv, and Volyn Oblasts'	40,000,000 ⁵
Coke, metallurgical	Evraz plc facilities, including: OAO Bagliykoks coke plant OAO Dneprkoks coke plant OAO Dneprodzerzhinsk coke plant	Plants in Dnipropetrovsk Oblast': Kamians'ke Dnipro Kamians'ke	3,000,000
Do.	Horlivka coke plant	Horlivka, Donetsk Oblast'	440,000
Do.	Kharkiv coke plant	Kharkiv	225,000
Do.	Makiivka coke plant	Makiivka, Donetsk Oblast'	NA
Do.	Metinvest B.V. facilities: OAO Avdiivka coke plant	Locations: Avdiivka, Donetsk Oblast'	2,700,000
Do.	OAO Azovstal Iron and Steel Works ³	Plant in Mariupol, Donetsk Oblast'	3,180,000
Do.	OAO Alchevsk coke plant [Industrial Union of Donbass (ISD Corp.)]	Alchevsk, Luhansk Oblast'	3,700,000
Do.	OAO Donetskkoks ³	Plant in Donetsk, Donetsk Oblast'	390,000
Do.	OAO Yasinovskiy coke plant	Makiivka, Donetsk Oblast'	NA
Do.	OAO Zaporozhkoks (JSC Zaporizhstal, 42%; Metinvest B.V., 25%)	Plant in Zaporizhzhia, Zaporizhzhia Oblast'	800,000
Do.	PAO ArcelorMittal Kryviy Rih	Plant in Kryviy Rih, Dnipropetrovsk Oblast'	3,300,000
Do.	Yenakiieve coke plant	Yenakiieve, Donetsk Oblast'	NA

See footnotes at end of table.

TABLE 2—Continued
UKRAINE: STRUCTURE OF THE MINERAL INDUSTRY IN 2022

(Metric tons)

Commodity	Major operating companies and major equity owners ^{1,2}	Location or deposit names ¹	Annual capacity ^c
Ferroalloys:			
Ferromanganese	Kostyantynivka Iron and Steel Works ³	Plant in Kostyantynivka, Donetsk Oblast'	NA
Do.	Kramatorskiy ferroalloys plant (KZF) ³	Kramatorsk, Donetsk Oblast'	35,000
Do.	Nikopol'skiy ferroalloys plant (NZF) (PrivatBank Group and EastOne Group)	Nikopol'	100,000
Do.	Stakhanovskiy ferroalloys plant (PrivatBank Group) ³	Luhansk Oblast'	NA
Do.	Zaporozhskiy ferroalloys plant (ZZF) (PrivatBank Group)	Zaporizhzhia, Zaporizhzhia Oblast'	100,000
Ferronickel	Pobuzhskiy ferronickel plant (PFK) (Solway Investment Group)	Pobuz'ke, Kirovohrad Oblast'	100,000
Ferrosilicon	Stakhanovskiy ferroalloys plant (PrivatBank Group) ³	Luhansk Oblast'	120,000
Do.	Zaporozhskiy ferroalloys plant (PrivatBank Group)	Zaporizhzhia, Zaporizhzhia Oblast'	100,000
Silicomanganese	Nikopol'skiy ferroalloys plant (PrivatBank Group and EastOne Group)	Nikopol'	600,000
Do.	Stakhanovskiy ferroalloys plant (PrivatBank Group) ³	Luhansk Oblast'	50,000
Do.	Zaporozhskiy ferroalloys plant (PrivatBank Group)	Zaporizhzhia, Zaporizhzhia Oblast'	250,000
Gallium	Nikolayevskiy Alumina Refinery (NGZ) (Government)	Plant, 20 kilometers south of Mykolaiv	5
Germanium	Zaporozhskiy Titanium and Magnesium Complex (ZTMK) (Government, 100%)	Plant in Zaporizhzhia, Zaporizhzhia Oblast'	1
Graphite	Zavaliyevskiy Graphite Complex (Volt Resources, 70%; private investors, 30%)	Mine in Zavalyevskiy deposit, Kirovohrad Oblast'	20,000
Gypsum	AO Dekonskiy Gips (Knauf Gips KG)	Plant in Soledar, Donetsk Oblast'	NA
Do.	OAo Mamalygovskiy Gypsovyi Zavod	Plant in Mamalyha, Chernivtsi Oblast'	NA
Do.	PAO Gipsovik	Plant in Kamyanets-Podol'skiy, Khmelnytskyi Oblast'	NA
Iron ore:			
Underground mining	ChAO Tsentral'nyi GOK (Metinvest B.V.)	Mine in Dnipropetrovsk Oblast'	2,200,000
Do.	ChAO Zaporozhskiy Iron Ore Complex	Ekspluatatsionnaya Mine in Zaporizhzhia Oblast'	4,500,000
Do.	PAO ArcelorMittal Kryvyi Rih	2 mines at Kryvyi Rih	1,500,000
Do.	PAO Krivorozhskiy Iron Ore Complex (Metinvest B.V., 50%, and PrivatBank Group, 50%)	4 mines in Kryvorizkiy iron ore basin	6,000,000
Do.	Sukha Balka GOK (Berklemont Investments Ltd.)	2 mines in Dnipropetrovsk Oblast' (Yubileynaya and Frunze Mines)	3,100,000
Open pit mining	ChAO Inguletskiy GOK (Metinvest B.V.)	Ingulets Mine south of Kryvyi Rih	35,000,000
Do.	ChAO Severnyi GOK (Metinvest B.V.)	2 mines in Dnipropetrovsk Oblast'	30,000,000
Do.	ChAO Tsentral'nyi GOK (Metinvest B.V.)	3 mines in Dnipropetrovsk Oblast'	12,000,000
Do.	PAO ArcelorMittal Kryvyi Rih	2 mines at Kryvyi Rih	24,900,000
Do.	PAO Yuzhnyi GOK (Evraz Holding, 50%; Smart Holding, 50%)	Mine at Kryvyi Rih	22,000,000
Do.	Poltavskiy GOK (Ferrexpo plc)	Gorishne-Plavninskoye and Lavrikovskoye (GPL) Mines, 15 kilometers east of Kremenchuk	30,000,000
Lead, secondary	CJSC Svinets	Plant in Kostyantynivka	30,000
Magnesium metal	Magnii concern	Plant in Kalush	22,000
Do.	Zaporozhskiy Titanium and Magnesium Complex (ZTMK) (Government, 100%)	Plant in Zaporizhzhia, Zaporizhzhia Oblast'	8,000
Manganese:			
Ore, marketable, Mn content	ChAO Pokrovskiy GOK (PrivatBank Group)	Mine in Pokrov, Dnipropetrovsk Oblast'	700,000
Do.	PAO Marganetskiy GOK (PrivatBank Group)	7 mines in Marhanets, Dnipropetrovsk Oblast'	300,000
Metal	Zaporozhskiy ferroalloys plant (PrivatBank Group)	Plant in Zaporizhzhia, Zaporizhzhia Oblast'	NA
Natural gas	Olesskoye deposit (Chevron Corp.)	Lviv and Ivano-Frankivsk Oblasts	NA
Do.	Yuzovskoye deposit (Royal Dutch Shell plc)	Kharkiv and Donetsk Oblasts	NA
Nickel, Ni content in FeNi	Pobuzhskiy ferronickel plant (Solway Investment Group)	Plant in Pobuz'ke, Kirovohrad Oblast	20,000
Peat	SK Urtorf	Plants in Chernihiv, Lviv, Rivne, and Volyn Oblasts'	600,000

See footnotes at end of table.

TABLE 2—Continued
UKRAINE: STRUCTURE OF THE MINERAL INDUSTRY IN 2022

(Metric tons)

Commodity	Major operating companies and major equity owners ^{1,2}	Location or deposit names ¹	Annual capacity ^c
Petroleum, refined	Halychyna oil refinery (Ukraine Oil Co.) ³	Drohobych, Lviv Oblast'	NA
Do.	JSC Naftokhimik Prykarpattya oil refinery ³	Nadvirna, Ivano-Frankivsk Oblast'	NA
Do.	Kherson oil refinery ³	Kherson	NA
Do.	Kremenchug oil refinery (CJSC Ukrtatnafta)	Kremenchuk	NA
Do.	Lisichanskiy oil refinery (TNK-BP) ³	Lysychansk	NA
Do.	Odessa oil refinery (OAO Lukoil) ³	Odesa	NA
Do.	Shebelinskiy oil refinery ³	Plant in Shebelinka, Kharkiv Oblast'	NA
Soda ash, synthetic	AO Krymskiy Sodovyi Zavod	Plant in Krasnoperekopsk, Crimea	NA
Steel, raw	ChAO Kamet-Stal'	Plant in Dnipro	NA
Do.	Donetskiy electrometallurgical plant (Mechel OAO, 100%)	Plant in Donetsk, Donetsk Oblast'	1,000,000
Do.	Donetskstal	Plant in Donetsk, Donetsk Oblast'	NA
Do.	Dnepropetrovsk Metals Plant "Petrovskogo" (DMZP) (Evraz plc, 96.77%)	Plant in Dnipro	1,360,000
Do.	Dneprospsststal	Plant in Zaporizhzhia, Zaporizhzhia Oblast'	918,000
Do.	Industrial Union of Donbass Corp. (ISD Corp.): ChAO Dneprovskiy Metallurgical Plant OOO Alchevskiy Metallurgical Complex	Locations: Dnipropetrovsk Oblast' Alchevsk, Luhansk Oblast'	NA
Do.	JSC Energomashspetsstal (OJSC Atomenergomash)	Plant in Kramatorsk, Donetsk Oblast'	NA
Do.	JSC Zaporizhstal' (Metinvest B.V., 24.9%)	Plant in Zaporizhzhia, Zaporizhzhia Oblast'	4,350,000
Do.	Kramatorskiy Metal Plant "Kuibysheva" Metinvest B.V.:	Kramatorsk, Donetsk Oblast'	NA
Do.	OAO Azovstal Iron and Steel Works ³	Mariupol, Donetsk Oblast'	NA
Do.	OAO Ilyich Iron and Steel Works ³	do.	NA
Do.	OAO Yenakievskiy Iron and Steel Works ³	Yenakieve, Donetsk Oblast'	NA
Do.	OOO Elektrostal	Plant in Kurakhove, Donetsk Oblast'	565,000
Do.	PAO ArcelorMittal Kryvyi Rih	Plant in Kryvyi Rih, Dnipropetrovsk Oblast'	7,500,000
Do.	PAO Interpipe	Interpipe Stal' Plant in Dnipro	NA
Do.	PJSC Azovelectrostral (JSC Azovmash) ³	Plant in Mariupol, Donetsk Oblast'	500,000
Titanium:			
Mineral concentrate:			
Ilmenite	Demurinskiy GOK (VSMPO-Avisma, 75%; Limpeza Ltd., 25%)	Mine in Dnipropetrovsk Oblast'	NA
Do.	Irshanskiy GOK (Government)	Mine in Irshansk, 50 kilometers north of Zhytomyr	NA
Do.	OOO Valki-II'menit (Group DF)	do.	65,000
Do.	OOO Mezhdurechenskiy GOK (Group DF)	Mine in Zhytomyr Oblast'	180,000
Do.	Velta llc	Birzulovskoye Mine, Kirovohrad Oblast'	270,000
Do.	do.	Mine in Korobchino, Novomirgorod district, Kirovohrad Oblast'	NA
Do.	Vol'nogorskiy GOK (Government)	Mine, Vil'nohirs, 70 kilometers west of Dnipro	NA
Rutile	do.	do.	NA
Sponge	Zaporozhskiy Titanium and Magnesium Complex (ZTMK) (Government, 100%)	Zaporizhzhia, Zaporizhzhia Oblast'	NA
Ingots	OOO Antares	Plant in Kyiv	NA
Do.	OOO Fico	do.	NA
Do.	Zaporozhskiy Titanium and Magnesium Complex (ZTMK) (Government, 100%)	Zaporizhzhia, Zaporizhzhia Oblast'	NA
Titanium dioxide, pigment	Crimea Titanium (Russian Hydrogen)	Plant in Crimea	NA
Do.	OAO Sumykhimprom	Mine in Sumy	NA
Uranium, U content:			
Ore	Vostochniy GOK (Government)	Ingul'skaya Mine at Kirovohrad (Vatutinskoye deposit)	450
Do.	do.	Novokonstantinovskoye deposit in Kirovohrad Oblast'	1,500
Do.	do.	Mine at Smoline (Michurinskoye and Tsentral'noye deposits)	600
Concentrate	do.	Hydrometallurgical concentration plant at Zhovty Vody	1,000

See footnotes at end of table.

TABLE 2—Continued
 UKRAINE: STRUCTURE OF THE MINERAL INDUSTRY IN 2022

(Metric tons)

Commodity	Major operating companies and major equity owners ^{1,2}	Location or deposit names ¹	Annual capacity ^c
Zinc, secondary	CJSC Svinets	Plant in Kostyantynivka	30,000
Do.	Ukrzinc plant	do.	25,000
Zirconium:			
Mineral concentrate	Vol'nogorskiy state mining-metals complex (Government, 100%)	Mine in Vil'nohirs'k, 70 kilometers west of Dnipro	30,000
Metal and compounds	State Research and Production Enterprise "Zirconium" ³	Plant in Kamians'ke	NA

^cEstimated; estimated data are rounded to no more than three significant digits. Do., do. Ditto. NA Not available.

¹Inconsistencies in enterprise and location names may appear in this table because both Ukrainian and Russian spellings were used for transliterations. English versions of company names are used as given by official company sources (web sites, press releases, and so forth). Ukrainian versions of location names are used

²GOK is the abbreviation for gorno-obogatitel'nyi kombinat, which translates as "mining and beneficiation complex."

³Not in operation at the end of 2022.

⁴Stopped operations in March 2022

⁵Capacity estimates are totals for all enterprises that produced that commodity.