



# 2019 Minerals Yearbook

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**UKRAINE [ADVANCE RELEASE]**

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# THE MINERAL INDUSTRY OF UKRAINE

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In 2019, Ukraine was among the world's leading producers of numerous minerals. The country was the 4th-ranked producer of rutile (14.4% of world output); the 5th-ranked producer of titanium sponge<sup>1</sup> (4.0% of world output); the 6th-ranked producer of bromine (1.0% of world output), ilmenite (6.4% of world output), and magnesium metal (0.7% of world output); the 7th-ranked producer of graphite (1.8% of world output) and iron ore (2.6% of world output); the 8th-ranked producer of kaolin (4.2% of world output) and manganese ore (2.6% of world output); the 9th-ranked producer of pig iron (1.6% of world output); the 11th-ranked producer of peat (2.1% of world output); the 12th-ranked producer of bentonite (1.1% of world output) and silicon (0.7% of world output); the 13th-ranked producer of raw steel (1.1% of world output); and the 14th-ranked producer of lime (0.5% of world output). Ukraine was also a significant world producer of nitrogen (N content of ammonia), accounting for 1.1% of world output. The country had significant coal and uranium resources but depended on imported petroleum and natural gas (Apodaca, 2021a, b; Bray, 2021; Brioche, 2021; Gambogi, 2021a, b; Olson, 2021; Schnebele, 2021a–c; Simmons, 2021; Tuck, 2021a, b).

## Minerals in the National Economy

In 2019, Ukraine's real gross domestic product (GDP) increased by 3.2% compared with a 3.4% increase in 2018.<sup>2</sup> The nominal GDP in 2019 amounted to 3.98 trillion hryvnias (about \$154 billion).<sup>3</sup> Total industrial production in 2019 was valued at 2.93 trillion hryvnias (about \$114 billion). Mining and quarrying were valued at 394.8 billion hryvnias (about \$15.3 billion), or 13.4%. The State Statistics Committee of Ukraine reported that, in 2019, the share of manufacturing in industrial production was 60.6%. The share of metallurgical production in manufacturing production was 23.6%, the share of coke and refined petroleum in manufacturing production was 4.8%, and the share of chemical production and chemical products in manufacturing production was 4.4%. In 2019, overall industrial production decreased by 0.5% compared with a 3.0% increase in 2018. Mining and quarrying production decreased by 1.6% compared with a 3.4% increase in 2018. Of mining and quarrying production, mining of coal decreased by 3.1% in 2019 compared with a 6.1% increase in 2018; extraction of crude petroleum and natural gas increased by 0.3% compared with an increase of 2.5% in 2018; and mining of metallic ores decreased by 2.9% compared with a 4.4% increase in 2018. Manufacturing production increased by 0.9% compared with a 2.9% increase

in 2018, including a 12.9% increase in the manufacturing of chemicals and chemical products compared with a 15.3% increase in 2018; a 3.1% increase in the manufacturing of coke and refined petroleum compared with a 6.8% increase in 2018; and a 1.4% decrease in metallurgical production compared with an increase of 0.8% in 2018 (State Statistics Service of Ukraine, 2020a; 2020b, p. 190, 246–276; U.S. Central Intelligence Agency, 2021).

## Government Policies and Programs

In 2019, the State Service for Geology and Subsoil planned to use electronic auctions for land parcels prospective for various minerals. Overall, it planned to auction off about 70 parcels, 30 of which contained petroleum and natural gas; the total resource of all 70 hydrocarbon parcels combined was estimated to be 130 billion cubic meters of natural gas. The first auction in 2019 was scheduled for March 2019 and involved 10 parcels with total resources of 90 billion cubic meters. Another set of auctions was scheduled for April 2019 and involved parcels prospective for amber, beryllium, clay, graphite, and rare earths. Later in the year, the State Service for Geology and Subsoil intended to auction off four more parcels containing resources of basalt, sand, sand and gravel, and underground waters; the auction was scheduled for September 2019. In October 2019, the Government changed the mechanism of auctions for mineral resource parcels. Beginning in October, if the original price for the parcel turns out to be too high, the price is automatically reduced to attract bidders. Also, the Government eliminated approval of the auction lots by the special Government commission to avoid potential influence of bidders on the auction rules for specific resources (Ubr.ua, 2019; Ukrinform.ru, 2019a, c).

In December 2019, the State Service for Geology and Subsoil announced the creation of an Investment Atlas for subsoil users. The new Atlas allows interested parties to review data about parcels available for exploration and production and to register to become a bidder in one of the future auctions. This new tool was intended to provide a more efficient and competitive distribution of exploration and mining licenses (Ukrinform.ru, 2019b).

## Production

In 2019, the output of kaolinitic clay increased by 168%; ferromanganese, by 90%; nitrogen content of ammonia, by 88%; other ferroalloys, by 57%; magnesium metal, by an estimated 14%; limestone, by 13%; manganese concentrate, by 11%; ilmenite concentrate, by an estimated 10%; and titanium sponge, by 10%. On the other hand, production of ferrosilicon decreased by 36%; uranium, by 32%; soda ash, by 21%; germanium, by an estimated 20%; refined secondary lead and manganese metal, by 19% each; refined secondary copper, by 18%; refined petroleum, by an estimated 15%; kaolin, by 12%; and nickel content of ferronickel, by 10%. These and other production data are in table 1.

<sup>1</sup>U.S. production for bromine, magnesium metal, and titanium sponge is withheld and is not included in world output percentage and rank calculations.

<sup>2</sup>The data in this section exclude the territories of the Autonomous Republic of Crimea, the city of Sevastopol, and parts of the zone of anti-terrorist operation.

<sup>3</sup>Where necessary, values have been converted from Ukrainian hryvnia (UAH) to U.S. dollars (US\$) at the annual average exchange rates of UAH25.813=US\$1.00 for 2019 and UAH27.171=US\$1.00 for 2018.

## Structure of the Mineral Industry

The majority of companies working in Ukraine's mineral industry were privately owned, although Government-owned enterprises were also present. Table 2 is a list of major mineral industry facilities.

## Mineral Trade

The total value of Ukraine's exports of goods and services increased to about \$65.7 billion in 2019 from \$62.6 billion in 2018, and exports of goods increased to \$50.1 billion in 2019 from \$47.3 billion in 2018. The value of total exports was about 42.7% of Ukraine's GDP in 2019. In terms of export value, one of Ukraine's leading export categories was nonprecious metals and products made of them and, in 2019, exports in this category were valued at \$10.3 billion and made up 20.5% of the total value of all goods exports. Exports of cinder, ores, and slag were valued at \$3.6 billion and made up 7.2% of the total value of goods exports; exports of mineral fuels and petroleum products were valued at \$863 million (1.7% of the total value of goods exports); and exports of salt, soil, stones, and sulfur were valued at \$413 million (0.8% of the total value of goods exports). Overall, the value of exports of mineral products and metals made up about 30.2% of the total value of Ukraine's exported goods. The country's main export partners in the trade of goods were China (which received 7.2% of Ukraine's exported goods), Poland (6.6%), Russia (6.5%), Turkey (5.2%), Germany and Italy (4.8% each), Egypt (4.5%), India (4.0%), the Netherlands (3.7%), Belarus and Hungary (3.1% each), and Spain (3.0%) (State Statistics Service of Ukraine, 2020a; 2020b, p. 361–371).

The total value of Ukraine's imports of goods and services was about \$67.7 billion in 2019 compared with \$63.7 billion in 2018. The total value of Ukraine's imports of goods was \$60.8 billion in 2019 compared with \$57.2 billion in 2018. One of the leading imported commodities was mineral fuels and refined petroleum products, which made up 20.0% of the total value of goods imports in 2019. The country's main import partners in 2019 were China (which supplied 15.1% of Ukraine's imports), Russia (11.5%), Germany (9.8%), Poland (6.8%), Belarus (6.2%), the United States (5.4%), Turkey (3.9%), and Italy (3.4%) (State Statistics Service of Ukraine, 2020a; 2020b, p. 361–370).

## Commodity Review

### Metals

**Bauxite and Alumina.**—In 2019, production of alumina in Ukraine decreased by 1.5% to 1.69 million metric tons (Mt). The only alumina producer in the country, Nikolayevskiy Alumina Refinery, had increased production by 14.1% during the past 5 years. In 2018, the plant produced about 1.72 Mt of alumina, which was the highest output in the plant's history. The plant had been in operation since 1980 and produced metallurgical-grade alumina and marketable aluminum hydrate. The plant used a hydrochemical Bayer method of alumina production and produced alumina at a cost of \$226 per metric ton of alumina. In October 2017, the Antimonopoly Committee of Ukraine announced its approval of the sale of the

Nikolayevskiy Alumina Refinery by United Company RUSAL plc of Russia to Glencore plc of Switzerland (tables 1, 2; Biz.censor.net.ua, 2017; Nikvesti.com, 2020).

**Ferroalloys.**—In 2019, ferroalloys plants in Ukraine increased their total production by about 1% to about 1.113 Mt. In Ukraine, the leading ferroalloys plants were the Kramatorskiy ferroalloys plant (KZF), the Nikopol'skiy ferroalloys plant (NZF), the Pobuzhskiy ferronickel plant (PFK), and the Zaporozhskiy ferroalloys plant (ZZF). In 2019, ZZF increased its total production by 1.9% to 250,910 metric tons (t). In particular, the ZZF increased its silicomanganese production by 17.2% to 145,210 t, whereas its ferrosilicon production decreased by 17.1% to 62,560 t and its ferromanganese production decreased by 5.9% to 37,000 t. ZZF's production of manganese metal decreased by 17.7% to 6,140 t. The NZF reduced its total production by 8.3% to 723,600 t in 2019. Specifically, the NZF reduced its silicomanganese production by 10.4% to 659,470 t and increased its ferromanganese production by 8.3% to 43,460 t. In addition, the NZF increased its production of other ferroalloys by 57.2% to 20,670 t. In 2019, Ukraine exported 833,600 t of ferroalloys, which was a 7.8% decrease compared with that in 2018. In terms of value, revenue from ferroalloys exports decreased by 6.9% to \$910.2 million (Biz.censor.net.ua, 2020; Fixygen.ua, 2020; Levchuk, 2020b; Ukrudprom.com, 2020a, c).

In 2019, production of ferronickel decreased by 6.5% to 74,400 t, and the nickel content of the ferronickel, by 10.2% to 14,200 t. About 1.35 Mt of nickel ore was processed for ferronickel production, which was a decrease of 5.4% compared with that in 2018. The PFK was the only producer of ferronickel in the country. The PFK was owned by Solway Investment Group, which also had assets in Argentina, Guatemala, Indonesia, North Macedonia, the Philippines, and Russia. In 2017, the company began a long-term project for modernization of the air purification equipment at its rotating pipe furnaces 1 and 2. In 2018, the PFK completed a portion of the necessary construction and switched to a temporary scheme of emissions. Then, in 2019, the PFK completed an additional smoke vacuum installation and an additional portion of the construction work. The total cost of the work and purchased equipment in 2018 and 2019 amounted to 58 million hryvnias (about \$2.25 million). The PFK planned to conduct modernization of its thermal ore furnace 3 and rotating pipe furnace 2 in the fourth quarter of 2020 (table 1; Levchuk, 2020b; UAProm.info, 2020).

**Iron Ore.**—In 2019, Ukraine's production of iron ore increased to about 63.2 Mt of usable ore and 39.5 Mt of iron content, which were increases of 4.4% and 4.5%, respectively. Compared with that in 2018, revenue from exports of iron ore and concentrate increased by 18.5% to about \$3.4 billion; in terms of quantity, exports of iron ore and concentrate increased by 8.1% to 39.9 Mt. From the total amount of iron ore exported from Ukraine, 34.4% was shipped to China; 12.7%, to Poland; and 10.3%, to Czechia. Also, Ukraine imported 14.2 Mt of iron ore valued at about \$1.4 billion. Of this amount, 90.9% was imported from Russia; 6.0%, from the Netherlands; and 2.3%, from the United Kingdom. In 2019, production of iron ore was one of the most profitable types of business in Ukraine; producers of iron ore earned 39.5 billion hryvnias (about \$1.5 billion) (table 1; Levchuk, 2020a).

In August 2019, the Parliament began consideration of a new bill (Bill 1210) that proposed changes to the tax rules for companies that produce iron ore. The bill would increase the rent for the use of subsoil to 10% of the value of the extracted commodities from 8% and would use the amount of commodity product (for example, agglomerate, concentrate, or pellets) with iron content of between 62% and 67% as the basis for the determining the tax amount rather than the amount of iron ore with iron content of 30%. The proponents of the changes argued that an increase in taxation is needed to extract excess profits related to increased world market prices for iron ore, and opponents claimed that the increase in the tax could bankrupt Ukraine's iron ore industry. One proposed change was to tie the tax rate to the world price for iron ore so that when the world prices are higher, the tax rates would also be higher, and vice versa. By yearend, it was not clear whether or not Bill 1210 would be adopted (5.ua, 2019; Mind.ua, 2019; Capital.ua, 2020).

**Manganese.**—In 2019, Ukraine produced an estimated 574,000 t of manganese in concentrate, which was an 11% increase compared with the amount produced in 2018. Ukraine increased its imports of manganese ore and concentrate by 28.8% to 1.21 Mt. In terms of value, the country's imports of manganese ore and concentrate increased by 15.2% to about \$210.6 million. According to customs statistics, most imports came from, in order of the value of the imports, Ghana (75.9%), Russia (19.1%), and Georgia (2.7%). Ukraine exported about 33,200 t of manganese ores and concentrates with a total value of \$3.3 million, of which 44.0% (by value) was exported to Hungary; 23.4%, to Czechia; and 18.8%, to Slovakia (table 1; Delo.ua, 2020).

In 2019, Ukraine had two major producers of manganese concentrate—the PAO Marganetskiy Mining and Metallurgical Complex (GOK) and the ChAO Pokrovskiy GOK (formerly the Ordzhonikidzevskiy GOK), both of which were located in Dnipropetrovs'ka Oblast'. The Marganetskiy GOK was the only enterprise in Ukraine that mined manganese using an underground method, and it extracted about 80% of the mined manganese using the underground method and 20% using the open pit method. The GOK mined the eastern portion of the Nikopol'skoye manganese deposit, and the complex included two open pits, seven underground mines, two beneficiation plants, and auxiliary services. The Marganetskiy GOK engaged in the production and beneficiation of manganese ore, production of bentonite clays, extraction of slams from metallurgical waste, and production of manganese sulfate. In 2019, the Marganetskiy GOK produced 522,500 t of manganese concentrate, which was an 8.4% decrease from that produced in 2018; it also had a net financial loss of 297 million hryvnias (about \$11.5 million), whereas in 2018, it had a net profit of 166 million hryvnias (about \$6.3 million) (table 2; Marganetz.wordpress.com, 2019; Ukrudprom.com, 2020b).

The Pokrovskiy GOK was the other producer of manganese ore in Ukraine. The GOK produced manganese using an open pit method and mined the western part of the Nikopol'skoye manganese deposit. In 2019, the Pokrovskiy GOK produced 1.14 Mt of manganese concentrate, which was a 22.4% increase compared with the output in 2018, and 91,080 t of manganese agglomerate, which was a 53.7% decrease compared with the output in 2018 (Fixygen.ua, 2019; Ukrudprom.com, 2020b).

**Titanium.**—In 2019, ilmenite production in Ukraine increased by 9.8% to about 818,500 t. In 2019, Ukraine exported 620,900 t of titanium ores and concentrates valued at \$154.5 million. The leading recipients were Egypt (157,600 t valued at \$25.5 million); Czechia (140,900 t valued at \$29 million); Russia (107,000 t valued at \$24.1 million); and the United States (66,200 t valued at \$15.7 million). In September 2019, the Government held a meeting focused on development of the titanium industry in Ukraine through 2030, including potential Government support of the country's titanium sector (table 1; Lavnikovich, 2020).

Group DF continued to produce ilmenite concentrate at two of its GOKs—OOO Valki-II'menit and OOO Mezhdurechenskiy. Together, these two GOKs increased their ore production by 13.7% to 3.2 million cubic meters (about 15 Mt), and their concentrate production, by 7.2% to 150,000 t. In 2019, the Mezhdurechenskiy GOK opened a new \$7 million inhouse beneficiation plant with the capacity to produce 250,000 metric tons per year (t/yr) of ilmenite concentrate. About 57% of the ilmenite concentrate was shipped to SumyChimprom, which was a producer of chemical products, and the remaining 43% was exported to customers in Europe. The average wages at the two GOKs were increased by 7% to 12,900 hryvnias per month (about \$334 per month). The original design capacity of the Valki-II'menit GOK was 65,000 t/yr of ilmenite concentrate, and that of Mezhdurechenskiy GOK, 180,000 t/yr of ilmenite concentrate. In addition to the two operating GOKs, Group DF was in the process of building two new titanium GOKs—the Stremigorodskiy GOK in Zhitomir'ska Oblast' and the Motronovskiy GOK in Dnipropetrovs'ka Oblast'. According to the preliminary estimates, when operational, the Stremigorodskiy GOK would have the capacity to produce 500,000 t/yr of ilmenite concentrate and 150,000 to 200,000 t/yr of apatite concentrate, and the Motronovskiy GOK would have the capacity to produce 120,000 t/yr of ilmenite concentrate, 14,000 t/yr of zircon concentrate, and 20,000 t/yr of rutile concentrate (Ukrudprom.com, 2018; 2020d; Larionova, 2020; Lavnikovich, 2020; Ukrmet.pd.ua, 2020).

In November 2019, Velta LLC announced that it had received a mining permit for the Lekarevskoye titanium deposit, which is located in Kirovohrads'ka Oblast', from the State Service for Geology and Subsoil. The exploration permit for the Lekarevskoye deposit was issued in 2011, and its resources were estimated to be 3 Mt of ilmenite. The deposit is situated within 6 kilometers of the Birzulovskiy titanium GOK, which was operated by Velta. The company planned to construct a new \$30 million GOK with the capacity to produce 120,000 t/yr of ilmenite concentrate. The new GOK was projected to create 350 new jobs, in addition to 500 jobs at the Birzulovskiy GOK. Velta stated that after the new GOK is commissioned, the total capacity at the two mines would reach 390,000 t/yr of titanium raw materials. Production at the Birzulovskiy GOK began in 2012 with a design capacity of 185,000 t/yr of ilmenite concentrate, and the design capacity was increased to 270,000 t/yr in 2013. The resources of the Birzulovskoye deposits were estimated to be 9.45 Mt of ilmenite (Andreeva, 2019b).



In August 2019, the residents of the villages of Logvin, Mikhaylovka, and Volodarka in Kyivskaya Oblast' filed a petition against OOO Rutile-Ilmenite Co., which had a license to develop the Tarasovskoye titanium-zirconium deposit. The residents were concerned that the development would likely have a negative environmental impact on the area and would lead to water shortages. The residents thought that the extraction of mineral sands at the deposit would adversely affect the Ros' River because sand processing is a highly water-intensive process and would likely deprive residents of potable water. By yearend, it was not known which Government agencies were considering the petition (Interfax.com.ua, 2019b; Kiev.dozor.ua, 2019).

### *Industrial Minerals*

**Cement.**—In 2019, the tonnage of Ukraine's cement production remained practically unchanged from that in 2018, decreasing by just 0.4% to 9.2 Mt. In the beginning of 2019, Ukraine had four major cement producing companies—CRH Group, which included PAO Podolsk Cement, ChAO Nikolayevtsement, and OOO Cement; PAO Dyckerhoffcement Group, which included OAO YuGCement, PAO Volyn'Cement, and OAO KyivCement; PAO HeidelbergCement (HeidelbergCement), which included plants in Amvrosievka, Kamenskoye, and Kriviy Rih; and PAO Ivano-Frankovsktsement, which had the capacity to produce 3.6 million metric tons per year (Mt/yr) of cement (tables 1, 2; Dako-group.com.ua, 2020).

In February 2019, HeidelbergCement decided to leave Ukraine and to sell its plants there. HeidelbergCement had worked in Ukraine since 2001 and owned three plants, but during the past 5 years, the plant in Amvrosievka, which is located in eastern Ukraine close to the city of Enakievo, was not in operation and the company had no access to the plant. According to the company reports, HeidelbergCement's assets in Ukraine in 2017 (the latest year for which information was available) produced about 1.5 Mt of cement, which was 35% less than in 2013, when the company produced 2.35 Mt of cement. In May, HeidelbergCement announced that 99.8% of the shares of its assets in Ukraine had been sold to Overin Ltd., which was reportedly owned by the investment group Concorde Capital. The amount of the transaction was not disclosed (Delo.ua, 2019; Ilyin, 2019; Vorontsov and Finchuk, 2019).

In May 2019, the Government introduced import tariffs on portland cement and clinker imported from Belarus, Moldova, and Russia. The tariff rates were very high; for example, the tariff on cement and clinker from Belarus was set at 57.03%. It was expected that the tariffs would lead to increased domestic prices for cement and a decrease in cement imports and would protect domestic producers (Gergel', 2019; Interfax.com.ua, 2019a).

### *Mineral Fuels and Related Materials*

**Coal.**—In 2019, total coal production decreased by 5.8% to 35.8 Mt. Production of hard coal (a term for the sum of bituminous and anthracite coal) amounted to 31.2 Mt and decreased by 6.2% compared with production in 2018 and by 21.4% compared with production in 2015. The leading coal-producing regions were Dnipropetrovs'ka Oblast', which

produced 18.21 Mt (a 9.0% decrease compared with that in 2018); Donets'ka Oblast', 11.26 Mt (a 1.3% increase); Lvivs'ka Oblast', 1.36 Mt (a 13.6% decrease); Luhans'ka Oblast', 328,800 t (a 33.2% decrease); and Volyns'ka Oblast', 69,700 t (a 29.5% decrease) (table 1; Strana.ua, 2020).

In 2019, Government-owned coal mines produced about 3.6 Mt of coal, which was a 13.9% decrease compared with production in 2018, and the remainder of the country's coal output was produced by private companies. The Ministry of Energy reported that between 2016 and 2019, coal mining output at Government-owned coal mines decreased to about 3.6 Mt from 6.7 Mt, but that Government subsidies per metric ton of coal produced increased by almost 3.7 times, to 908 hryvnias (about \$35.2) per metric ton in 2019 from 246 hryvnias (about \$9.6) per metric ton in 2016. The leading privately owned coal-producing company was Donbass Fuel and Energy Co. (DTEK), which decreased its coal production by 7.1% to 22.43 Mt. The leading DTEK subsidiary was DTEK Pavlogradugol, which produced 18.21 Mt of coal—a 9.0% decrease compared with production in 2018 (Interfax.com.ua, 2020; Tereshuk, 2020).

As of yearend, Ukraine had a total of 148 coal mines, of which 102 were Government owned. The majority of Government-owned mines (67) were located in eastern Ukraine in breakaway regions in Donets'ka and Luhans'ka Oblast's. It was known that 33 mines were in operation, but only 4 of them were profitable. The Government was considering closing and possibly privatizing unprofitable mines but did not have specific plans to do so in 2020 (Slovoidilo.ua, 2020).

**Uranium.**—In 2019, production of mined uranium in Ukraine decreased by 32% to 801 t. The only enterprise that was producing uranium in Ukraine in 2019 was the Vostochnyi GOK, which mined uranium at four deposits—the Michurinskoye, the Novokonstantinovskoye, the Tsentral'noye, and the Vatutinskoye deposits. The Novokonstantinovskoye was the largest of the four deposits; it had a designed production capacity of 1.5 Mt/yr of uranium ore and total resources of 93,000 t of uranium; in 2019, however, it produced only about 200,000 t of ore and 200 t of uranium. The uranium-powered powerplants in Ukraine required about 2,500 t/yr of uranium (table 1; Metallurgprom.org, 2019; Volkov, 2019).

In 2019, The Government approved a state-funded investment project in the amount of 140 million hryvnias (about \$5.4 million) for 2020 to increase uranium production at the Novokonstantinovskoye deposit. After construction of a new uranium-processing plant, annual production at the Novokonstantinovskoye deposit was projected to increase to 700 t/yr from the 200 t produced in 2019. In July, the Government restructured the Government-owned energy enterprises and included the Vostochnyi GOK as a structural unit of NAEK Energoatom, which is a nuclear-energy-generating company (Andreeva, 2019a; Volkov, 2019; Rybchenkov, 2020).

In February 2017, the State Service for Geology and Subsoil issued an exploration license to OOO Nuclear Energy Systems of Ukraine (AESU), which was wholly owned by U-Tech Energy LLC—a United States-based company registered in Delaware. The license was issued for 5 years and covered four deposits located in Dnipropetrovs'ka and Mykolaivs'ka Oblast's.

The company planned to invest about 1 billion hryvnias (about \$39 million) in exploration from 2018 to 2020. AESU planned to build a hydrometallurgical plant in Mykolaiv's 'ka Oblast' and to produce between 150 and 200 t/yr of uranium. In the future, the company intended to build small atomic reactors for use as powerplants in Ukraine (Inshe.tv, 2019).

## Outlook

Ukraine's mining, metallurgy, and other mineral sectors had significant setbacks during the past few years. Primary aluminum production stopped, and it was not clear if another owner could make production profitable; coal mines and petroleum refineries were outdated and required significant investments; and steel plants were struggling to break even financially. Nevertheless, in 2019, production of such mineral commodities as iron ore, manganese, and titanium increased and production of alumina, cement, and ferroalloys remained stable.

Ukraine is likely to remain one of the world's leading producers of manganese ore, titanium ore, and titanium sponge. Development of new titanium mines is likely to increase production of mined titanium and titanium sponge. Remaining competitive in metallurgy may prove difficult owing to high energy requirements, the need for new investments, and the often-differing interests of plant owners and the Government. Recent attention of the country's Government to uranium production will likely lead to Ukraine's ability to meet the needs of the country's nuclear energy facilities. It still remains to be seen if the Government and the owners of privately owned industrial facilities will be able to reach compromises and whether the country will be able to attract new investments to move the mineral and metallurgical industries forward.

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

(Metric tons, gross weight, unless otherwise specified)

Commodity <sup>2</sup>	2015	2016	2017	2018	2019
METALS					
Alumina	1,481,000	1,510,000	1,676,000	1,715,000	1,690,000
Copper, refinery, secondary	18,485 <sup>r</sup>	21,973	25,186	24,901	20,409
Ferroalloys:					
Ferromanganese	87,740	104,470	114,500	79,480 <sup>r</sup>	151,090
Ferronickel, electric furnace:					
Gross weight	95,209	79,900	72,500	79,537	74,400
Ni content	18,000 <sup>c</sup>	18,100	15,300	15,807	14,200
Ferrosilicon, electric furnace	90,200	101,420	92,910	97,084	62,560
Silicomanganese	698,400	814,970	810,670	859,640 <sup>r</sup>	804,680
Other, unspecified	19,360	22,219	12,635	13,150	20,670
Gallium kilograms	9,400	9,000 <sup>c</sup>	4,000 <sup>c</sup>	4,000 <sup>c</sup>	-- <sup>c</sup>
Germanium, Ge content <sup>c</sup> do.	500	500	500	500	400
Iron ore, mine:					
Crude ore	175,000,000	167,815,000	165,548,200	160,877,900	168,000,000 <sup>c</sup>
Usable ore	66,900,000	62,876,000	60,574,400	60,548,900	63,204,900
Fe content	41,800,000	39,300,000	37,900,000	37,800,000	39,500,000
Iron and steel:					
Pig iron	21,878,000	23,560,000	20,123,000	20,531,200	20,055,900
Steel:					
Raw steel thousand metric tons	22,935	24,197	21,334	21,101 <sup>r</sup>	20,848
Products:					
Pipe	852,400	849,000	1,047,800	1,100,000	1,005,000
Rolled	20,016,000	21,400,000	18,400,000	18,367,000 <sup>r</sup>	18,202,000
Lead, refinery, secondary	30,000 <sup>c</sup>	28,465	33,633	29,755	24,050
Magnesium, metal, primary <sup>c,3</sup>	7,700	6,770	7,300 <sup>r</sup>	7,000 <sup>r</sup>	8,000
Manganese:					
Mine, marketable:					
Gross weight	1,203,320	1,250,000	1,424,650	1,521,140	1,687,000
Mn content <sup>c</sup>	409,000	425,000	484,000	517,000 <sup>r</sup>	574,000
Metal	10,100	7,420	7,640	7,544 <sup>r</sup>	6,140
Titanium:					
Ilmenite and leucoxene, mineral concentrate:					
Gross weight	350,000 <sup>c</sup>	350,000 <sup>c</sup>	392,000	745,417	818,543
TiO <sub>2</sub> content <sup>c</sup>	155,000	155,000	160,000	300,000	330,000
Rutile, 95% TiO <sub>2</sub>	90,000 <sup>c</sup>	100,000 <sup>c</sup>	100,000 <sup>c</sup>	106,858	100,000 <sup>c</sup>
Sponge	7,700 <sup>c</sup>	6,770	7,300 <sup>c</sup>	7,300 <sup>r, c</sup>	8,000 <sup>c</sup>
Zirconium, zircon concentrate	25,000 <sup>c</sup>	22,200 <sup>c</sup>	26,500	21,614	21,000 <sup>c</sup>
INDUSTRIAL MINERALS					
Bromine	4,060	4,866	4,500 <sup>c</sup>	4,500 <sup>c</sup>	4,500 <sup>c</sup>
Cement, hydraulic thousand metric tons	8,511	9,023	9,003	9,241	9,201
Clay:					
Bentonite	210,000 <sup>c</sup>	210,000 <sup>c</sup>	113,200	178,200	180,000 <sup>c</sup>
Kaolin thousand metric tons	1,815	2,335	2,380	2,092	1,844
Kaolinitic clay do.	2,510 <sup>c</sup>	560	71	148	396
Feldspar	44,460	33,627	35,000 <sup>c</sup>	35,000 <sup>c</sup>	35,000 <sup>c</sup>
Graphite, crystalline flake	14,500	15,000 <sup>c</sup>	20,000 <sup>c</sup>	20,000 <sup>c</sup>	20,000 <sup>c</sup>
Gypsum, including anhydrite	1,255,000	1,303,000	1,528,900	1,386,400	1,409,400
Lime thousand metric tons	2,717	2,542	2,151	2,298 <sup>r</sup>	2,245
Nitrogen, ammonia, N content do.	2,168	1,678	979	801 <sup>r</sup>	1,502
Salt, all types	2,137,000	1,783,500	1,815,700	2,191,619	2,092,800
Soda ash, synthetic	600,000 <sup>c</sup>	600,000 <sup>c</sup>	608,200	618,500	489,700
Stone, crushed, limestone thousand metric tons	7,620	7,675	6,525	6,117	6,891
Sulfur, compounds, sulfuric acid do.	526	498	561	680 <sup>r</sup>	674

See footnotes at end of table.

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

(Metric tons, gross weight, unless otherwise specified)

Commodity <sup>2</sup>	2015	2016	2017	2018	2019	
<b>MINERAL FUELS AND RELATED MATERIALS</b>						
<b>Coal:</b>						
Anthracite	thousand metric tons	8,325	8,361	6,807	5,809	6,323
Bituminous	do.	31,420	32,503	28,109	27,477	24,901
Lignite <sup>3</sup>	do.	5,000	5,000	5,000	4,700	4,600
Total	do.	44,700	45,900	39,900	38,000	35,800
Coke, metallurgical		11,617,000	12,723,000	10,102,100	10,824,100	10,055,200
Natural gas	million cubic meters	19,900	20,047 <sup>4</sup>	20,510	20,806	20,520
<b>Peat:</b>						
Fuel use		491,000	539,100	517,600	540,300	539,500
Horticultural use		79,000	136,400	88,200	146,400	139,900
Total		570,000	676,000	606,000	687,000	679,000
<b>Petroleum:</b>						
Crude, including condensate <sup>5</sup>	thousand 42-gallon barrels	17,800	16,400	15,600	16,500	17,700
Refinery <sup>6</sup>	do.	21,000 <sup>c</sup>	21,100	22,400	19,700	16,800 <sup>c</sup>
Uranium, mine, U content		980	1,050	836	1,180	801

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

<sup>1</sup>Table includes data available through November 3, 2020. 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.

<sup>2</sup>In addition to the commodities listed, secondary zinc, titanium dioxide pigment, and zirconium metal and compounds may have been produced, but available information was inadequate to make reliable estimates of output.

<sup>3</sup>Used in production of titanium sponge.

<sup>4</sup>Concentrate.

<sup>5</sup>Figures were converted to barrels from metric tons, which were reported as follows: 2015—2,461,700; 2016—2,272,100; 2017—2,169,900; 2018—2,293,300; and 2019—2,453,000.

<sup>6</sup>Figures were converted to barrels from metric tons, which were reported as follows: 2015—2,605,000; 2016—2,626,000; 2017—2,791,000; 2018—2,456,000; and 2019—2,100,000.

TABLE 2  
UKRAINE: STRUCTURE OF THE MINERAL INDUSTRY IN 2019

(Metric tons unless otherwise specified)

Commodity	Major operating companies and major equity owners <sup>1,2</sup>	Location or deposit names	Annual capacity <sup>5</sup>
Alumina	Nikolayevskiy Alumina Refinery (Glencore plc)	Plant, 20 kilometers south of Mykolaiv	1,700,000
Aluminum, primary	Zaporozhskiy Aluminum Complex (ZAIK) [Government] <sup>3</sup>	do.	114,000
Bromine	AO Brom	Plant, Krasnoperekopsk, Crimea	5,000
Cement	Facilities:	Plants in the following locations:	
Do.	ChAO Nikolayevtsement (CRH plc)	Mykolayiv	NA
Do.	OAO KyivCement (PAO Dyckerhoff Cement Group)	Kyiv	NA
Do.	OAO YuGCement (PAO Dyckerhoff Cement Group)	Mykolayiv	NA
Do.	OOO Cement (CRH plc)	Odessa, Odes'ka Oblast'	NA
Do.	Overin Ltd (Concorde Capital Group)	Plants in Amvrosievka, Kamenskoye, and Kriviy Rih	2,400,000
Do.	PAO Eurocement Ukraine	Balakleya, Kharkiv'ska Oblast'	NA
Do.	PAO Ivano-Frankovsktsement	Ivano-Frankivsk	3,600,000
Do.	PAO Kramatorskiy Tsementnyi Zavod PUSHKA	Kramatorsk, Donets'ka Oblast'	NA
Do.	PAO Podolsk Cement (CRH plc)	Khmel'nyts'ka Oblast'	NA
Do.	PAO Volyn'Cement (PAO Dyckerhoff Cement Group)	Volyn'ska Oblast'	NA
Clay:			
Bentonite	ChAO Weighting Agents Plant	Mine, Konstantinivka, Donets'ka Oblast'	NA
Do.	PAO Dashukovskiye Bentonity	Mine, Dashukovka, Cherkas'ka Oblast'	NA
Kaolin	AKW Ukrainian Kaolin Co.	Mine, Gluhivtsi, Vinnits'ka Oblast'	320,000
Do.	Kirovohrads'ke Rudoupravlenne	Mine, Katerinivka, Korovohrads'ka Oblast'	NA
Do.	OOO Mineral Mining Co.	Mine, Pology, Zaporizh'ska Oblast'	200,000
Do.	OOO UkrRosKaolin	Mine, Ekaterinivka, Donets'ka Oblast'	NA
Do.	Proscro Resources Ltd.	Mine, Prosyano Deposit, Dnipropetrovs'ka Oblast'	NA
Coal	About 150 active surface and underground mines, including:  Donbass Fuel and Energy Co. (DTEK) (System Capital Management, 100%): DTEK Dobropolyeugol  DTEK Komsomolets Donbassa Mine DTEK Pavlogradugol  DTEK Rovenkyanthracite  DTEK Sverdlovanthracite  Krasnoarmeiskaya-Zapadnaya No. 1  JSC Krasnodon Coal Co. (Metinvest B.V.)  Smaller producers	About 95% of coal produced in Donets'ka, Dnipropetrovs'ka, and Luhans'ka Oblasts  5 mines near Dobropillya, Donets'ka Oblast'  Kirovskoe, Donets'ka Oblast'  10 mines in Dnipropetrovs'ka and Donets'ka Oblasts  6 mines and 3 processing plants in Luhans'ka Oblast'  5 coal mines and 3 processing plants in Luhans'ka Oblast'  1 mine at Krasnoarmeisk, Donets'ka Oblast'  7 mines and 2 processing plants in Luhans'ka Oblast'  Donets'ka, Dnipropetrovs'ka, Luhans'ka, Lvivs'ka, and Volyn'ska Oblasts	90,000,000 <sup>4</sup>
Coke	Evrax plc: OAO Baglykoks coke plant OAO Dneprkoks coke plant OAO Dneprodzerzhinsk coke plant	Plants, Dnipropetrovs'ka Oblast': Dniprodzerzhinsk Dniepr Dniprodzerzhinsk	3,000,000
Do.	JSC Donetskoks (Metinvest B.V., 24.5%, and OJSC Ilyich Iron and Steel Works, 12.96%)	Plant, Donetsk, Donets'ka Oblast'	390,000
Do.	Horlivka coke plant	Horlivka, Donets'ka Oblast'	440,000
Do.	Kharkov coke plant	Kharkiv	225,000
Do.	Makeevka coke plant	Makeevka, Donets'ka Oblast'	NA
Do.	Metinvest B.V.: JSC Avdiivka coke plant	Avdeyevka, Donets'ka Oblast'	4,000,000
Do.	JSC Azovstal Iron and Steel Works	Plant, Mariupol, Donets'ka Oblast'	3,180,000

See footnotes at end of table.

TABLE 2—Continued  
UKRAINE: STRUCTURE OF THE MINERAL INDUSTRY IN 2019

(Metric tons unless otherwise specified)

Commodity	Major operating companies and major equity owners <sup>1,2</sup>	Location or deposit names	Annual capacity <sup>c</sup>
Coke—Continued			
Do.	OAo Alchevsk coke plant [Industrial Union of Donbass (ISD Corp.)]	Alchevsk, Luhans'ka Oblast'	3,700,000
Do.	OAo Yasinovskiy coke plant	Makeevka, Donets'ka Oblast'	NA
Do.	OAo Zaporozhkoks (JSC Zaporizhstal, 42%, and Metinvest B.V., 25%)	Plant, Zaporizhia	NA
Do.	PAo ArcelorMittal Kryviy Rih	Plant, Kryviy Rih, Dnipropetrovs'ka Oblast'	3,300,000
Do.	Yenakievo coke plant	Yenakieve, Donets'ka Oblast'	NA
Ferroalloys:			
Ferromanganese	Konstantinovka Iron and Steel Works <sup>5</sup>	Plant, Konstantynivka, Donets'ka Oblast'	NA
Do.	Kramatorskiy ferroalloys plant	Kramatorsk, Donets'ka Oblast'	NA
Do.	Nikopol'skiy ferroalloys plant (PrivatBank Group and EastOne Group)	Nikopol'	100,000
Do.	Stakhanovskiy ferroalloys plant (PrivatBank Group)	Luhans'ka Oblast'	NA
Do.	Zaporozhskiy ferroalloys plant (PrivatBank Group)	Zaporizhia	100,000
Do.			
Do.			
Ferronickel	Pobuzhskiy ferronickel plant (Solway Investment Group)	Pobuzhye, Kirovohrads'ka Oblast'	100,000
Ferrosilicon	Stakhanovskiy ferroalloys plant (PrivatBank Group) <sup>5</sup>	Luhans'ka Oblast'	120,000
Do.	Zaporozhskiy ferroalloys plant (PrivatBank Group)	Zaporizhia	100,000
Silicomanganese	Nikopol ferroalloys plant (PrivatBank Group and EastOne Group)	Nikopol	600,000
Do.	Stakhanovskiy ferroalloys plant (PrivatBank Group)	Luhans'ka Oblast'	50,000
Do.	Zaporozhskiy ferroalloys plant (PrivatBank Group)	Zaporizhia	250,000
Gallium	Nikolaevskiy Alumina refinery [Glencore plc]	20 kilometers south of Mykolaiv	13
Germanium	Zaporozhskiy Titanium and Magnesium Complex (ZTMK) (Government, 51%, and Tolexis Trading Ltd., 49%)	Plant, Zaporizhia	1
Graphite	Zavalyevskiy graphite complex	Mine, Zavalyevskiy deposit, Kirovohrads'ka Oblast'	20,000
Gypsum	AO Dekonskiy Gips (Knauf Gips KG)	Plant in Soledar, Donets'ka Oblast'	NA
Do.	OAo Mamalygovskiy Gypsovyi Zavod	Plant in Mamalyga, Chernivets'ka Oblast'	NA
Do.	PAo Gipsovik	Plant in Kamyanets-Podol'skiy, Khmel'nits'ka Oblast'	NA
Iron ore:			
Underground mining	ChAO Tsentral'nyi GOK (Metinvest B.V.)	1 mine in Dnipropetrovs'ka Oblast'	2,200,000
Do.	ChAO Zaporozhskiy Iron Ore Complex	Ekspluatatsionnaya Mine in Zaporiz'ka Oblast'	4,500,000
Do.	PAo ArcelorMittal Kryviy Rih	2 mines at Kryviy 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	7,000,000
Do.	Sukha Balka GOK (Berklemont Investments Ltd.)	2 mines in Dnipropetrovs'ka Oblast' (Yubileynaya and Frunze Mines)	3,100,000
Open pit mining	ChAO Inguletskiy GOK (Metinvest B.V.)	Ingulets Mine south of Kryviy Rih	35,000,000
Do.	ChAO Severnyi GOK (Metinvest B.V.)	2 mines in Dnipropetrovs'ka Oblast'	30,000,000
Do.	ChAO Tsentral'nyi GOK (Metinvest B.V.)	3 mines in Dnipropetrovs'ka Oblast'	12,000,000
Do.	PAo ArcelorMittal Kryviy Rih	2 mines at Kryviy Rih	26,600,000
Do.	PAo Yuzhnyi GOK (Evraz Holding, 50%, and Smart Holding, 50%)	Mine at Kryviy Rih	22,000,000
Do.	Poltavskiy GOK (Ferrexpo plc)	Gorishne-Plavninskoye and Lavrikovskoye (GPL) Mine, 15 kilometers east of Kremenchug	30,000,000
Lead, secondary	CJSC Svinets	Plant, Kostyantynivka	20,000

See footnotes at end of table.



TABLE 2—Continued  
UKRAINE: STRUCTURE OF THE MINERAL INDUSTRY IN 2019

(Metric tons unless otherwise specified)

Commodity	Major operating companies and major equity owners <sup>1,2</sup>	Location or deposit names	Annual capacity <sup>c</sup>
Magnesium metal	Magnii concern	Plant, Kalush	22,000
Manganese:			
Ore, marketable, Mn content	ChAO Pokrovskiy GOK (PrivatBank Group)	Mine, Pokrov, Dnieprovskaya Oblast'	700,000
Do.	PAO Marganetskiy GOK (PrivatBank Group)	7 mines in Marhanets, Dnieprovskaya Oblast'	NA
Metal	Zaporozhskiy ferroalloys plant (PrivatBank Group)	Plant, Zaporizhia	NA
Natural gas	Olesskoye deposit (Chevron Corp.)	Lvivs'ka and Ivano-Frankovs'ka Oblasts	NA
Do.	Yuzovskoye deposit (Royal Dutch Shell plc)	Kharkivska and Donets'ka Oblasts	NA
Nickel, Ni content in FeNi	Pobuzhskiy GOK (Solway Investment Group)	Plant, Pobuzhye, Kirovohrads'ka Oblast	20,000
Peat	SC Ukrtorf	Plants in Chernihivs'ka, Lvivs'ka, Rivnens'ka, and Volyns'ka Oblasts	600,000
Petroleum, refined	JSC Naftokhimik Prykarpattya refinery	Nadvirna, Ivano-Frankivs'ka Oblast'	NA <sup>3</sup>
Do.	Halychyna refinery (Ukraine Oil Co.)	Drohobych, Lvivs'ka Oblast'	NA <sup>3</sup>
Do.	Kherson oil refinery	Kherson	NA <sup>3</sup>
Do.	Kremenchug refinery (CJSC Ukrtatnafta)	Kremenchug	NA
Do.	Lisichanskiy refinery (TNK-BP)	Lisichansk	NA <sup>3</sup>
Do.	Odessa refinery (OAO Lukoil)	Odessa	NA <sup>3</sup>
Do.	Shebelinskiy refinery	Plant, Shebelinka, Kharkivs'ka Oblast'	NA
Soda ash, synthetic	AO Krymskiy Sodovyi Zavod	Plant, Krasnoperekopsk, Crimea	NA
Steel, raw	Donetskiy electrometallurgical plant (Mechel OAO, 100%)	do.	1,000,000
Do.	Dnepropetrovsk Metals Plant "Petrovskogo" (DMZP) (Evraz plc, 96.77%)	Plant Dniepr	1,360,000
Do.	Dneprospsstal	Plant, Zaporizhia	918,000
Do.	Donetskstal	Plant Donetsk	NA
Do.	Industrial Union of Donbass Corp. (ISD Corp.), of which: Dneprovskiy Metallurgical Plant	Locations: Dnipropetrovs'ka Oblast'	3,850,000
Do.	OOO Alchevskiy Metallurgical Complex	Alchevsk, Luhans'ka Oblast'	5,200,000
Do.	JSC Energomashspetsstal (OJSC Atomenergomash)	Plant, Kramatorsk, Donets'ka Oblast'	NA
Do.	JSC Zaporizhstal (Metinvest B.V., 24.9%)	Plant, Zaporizhia	4,350,000
Do.	Kramatorskiy Metal Plant "Kuibysheva"	Kramatorsk, Donets'ka Oblast'	NA
Do.	OOO Elektrostal	Plant, Kurakhovo, Donets'ka Oblast'	NA
Do.	Metinvest B.V.: OAO Azovstal Iron and Steel Works	Locations: Mariupol, Donets'ka Oblast'	6,200,000
Do.	OAO Ilyich Iron and Steel Works	do.	6,000,000
Do.	OAO Yenakievskiy Iron and Steel Works	Yenakieve, Donets'ka Oblast'	2,700,000
Do.	PAO ArcelorMittal Kryviy Rih	Plant, Kryviy Rih, Dnipropetrovs'ka Oblast'	7,500,000
Do.	PJSC Azovelectrostral (JSC Azovmash)	Plant, Mariupol, Donets'ka Oblast'	500,000
Titanium:			
Mineral concentrate:			
Ilmenite	Irshanskiy GOK (Government)	Mine, Irshansk, 50 kilometers north of Zhitomir	NA
Do.	OOO Valki-Il'menit (Group DF)	do.	65,000
Do.	OOO Mezhdurechenskiy GOK (Group DF)	Mine, Zhytomyrs'ka Oblast'	180,000
Do.	Velta LLC	Birzulovskoye Mine, Kirovohrads'ka Oblast'	270,000
Do.	do.	Mine Korobchino, Novomirgorod district, Kirovohrads'ka Oblast'	NA
Do.	Vol'nogorskiy GOK (Government)	Mine, Vol'nogorsk, 70 kilometers west of Dnipropetrovsk	NA
Do.	Demurinskiy GOK (Limpeza Ltd., 25%, and VSMPO-Avisma, 75%)	Mine, Dnipropetrovs'ka Oblast'	NA
Rutile	do.	do.	NA
Sponge	Zaporozhskiy Titanium & Magnesium Complex (ZTMK) (Government, 51%, and Tolexis Trading Ltd., 49%)	Zaporizhia	NA

See footnotes at end of table.

TABLE 2—Continued  
 UKRAINE: STRUCTURE OF THE MINERAL INDUSTRY IN 2019

(Metric tons unless otherwise specified)

Commodity	Major operating companies and major equity owners <sup>1, 2</sup>	Location or deposit names	Annual capacity <sup>c</sup>
Titanium:—Continued			
Ingots	OOO Antares	Plant, Kyiv	NA
Do.	OOO Fico	do.	NA
Do.	Zaporozhye Titanium & Magnesium Complex (ZTMK) (Government, 51%, and Tolexis Trading Ltd., 49%)	Zaporizhia	NA
Titanium dioxide, pigment	Crimea Titan CJSC	Plant, Crimea	NA
Do.	OAO Sumykhimprom	Mine, Sumy	NA
Uranium, U content:			
Ore	Vostochnyi GOK (Government)	Ingulskaya Mine at Kirovohrad	450
Do.	do.	Michurinskiy Mine at Kirovohrad	NA
Do.	do.	Smolinskaya Mine at Smolino	600
Do.	do.	Novokonstantinovskoye deposit in Kirovohrads'ka Oblast'	1,000
Concentrate	do.	Hydrometallurgical concentration plant at Zheltye Vody	1,000
Zinc, secondary	CJSC Svinets	Plant, Kostyantynivka	30,000
Do.	Ukrzinc plant	do.	25,000
Zirconium:			
Mineral concentrate	Volnogorsk state mining-metals complex [Leased from the Government by Crimea Titan CJSC (Ukraine Government, 50% plus one share, and OstChem GmbH, 50% minus one share)]	Mine, Volnogorsk, 70 kilometers west of Dnipropetrovsk	30,000
Metal and compounds	State Research and Production Enterprise “Zirconium”	Plant, Dniprodzerzhinsk	NA <sup>5</sup>

<sup>c</sup>Estimated; estimated data are rounded to no more than three significant digits. Do., do. Ditto. NA Not available.

<sup>1</sup>Inconsistencies 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 whenever possible.

<sup>2</sup>GOK is the abbreviation for gorno-obogatitelny kombinat, which translates as “mining and beneficiation complex.”

<sup>3</sup>Not in operation as of 2019.

<sup>4</sup>Capacity estimates are totals for all enterprises that produce that commodity.

<sup>5</sup>Operational status in 2019 is unknown.