

2007 Minerals Yearbook

UKRAINE

THE MINERAL INDUSTRY OF UKRAINE

By Richard M. Levine, Mark Brininstool, and Glenn J. Wallace

Ukraine was a major world producer of coal, ferroalloys, ilmenite, iron ore, manganese ore, and steel. The country's steel exports were of major importance on world markets. Other major mineral commodity exports were iron ore and ferroalloys. Ukraine had been a lesser producer of a number of other metallic mineral products, which included alumina, aluminum, cadmium, germanium, secondary lead, magnesium, mercury, nickel, rutile, uranium, secondary zinc, zircon, zirconium, and a large number of industrial minerals, which included dolomite, graphite, kaolin, limestone fluxes, potash, quartz, salt, soda ash, and a variety of building materials. The country has large coal reserves but only limited oil and natural gas resources (Poltavets and others, 2008). Ukraine is one of the world's leading energy transit countries and has large oil and gas pipeline networks that transport Russian and Caspian Sea oil and gas across its territory.

Minerals in the National Economy

In 2007, Ukraine's metallurgical sector had its best year in 12 years according to a statement by the Minister of Industry, based primarily on the volume of production of metallurgical products. Not only did the volume of production increase, but so too did investment in new equipment. In 2007, investment in producing 1 metric ton (t) of steel was \$31, which was on the level of advanced European economies. Earlier, Ukraine had averaged only between \$10 and \$15 of investment per metric ton and had exceeded \$25 per metric ton only in 2005. Profitability in the metallurgical industry in 2007 reached 18.9% compared with 14.09% in 2006 (Metall Ukrainy, 2008c). As of January 1, 2007, direct foreign investment (DRI) in Ukraine totaled almost \$26.9 billion, of which DRI in metallurgy was about \$1.52 billion; the extractive industries, about \$1.02 billion; the production of nonmetallic mineral products, about \$539 million; and the production of coke and refined oil products, \$223 million (Interfax Russia & CIS Statistics Weekly, 2008a).

The steel industry was a major component of Ukraine's economy and accounted for between 5% and 6% of the gross domestic product (GDP) and 34% of export revenues. It employed about 420,000 people, which constituted about 10% of industrial employment and about 2% of total employment. Energy demand in Ukraine was characterized by high energy intensity owing to the large share of heavy industry in the country's economy and the industry's low level of energy efficiency; these factors made Ukraine's economy highly vulnerable to increases in oil and gas prices (World Bank, The, 2005).

Production

In 2007, the GDP increased by 7.3% compared with that of 2006, and the value of industrial production increased by 10.2% compared with that of 2006 (Interfax Russia & CIS Statistics

Weekly, 2008b, c). The value of output in the mineral extractive industries increased by 2.7%; the value of mineral fuel output decreased by 2%, but the value of nonfuel mineral output increased by 8.8%. The value of output in the metallurgical sector increased by 8.3% compared with that of 2006, the value of nonmetallic mineral output increased by 16.9%, and the value of coke and oil products increased by 3.3% (Interfax Russia & CIS Statistics Weekly, 2008c). The volume of production in the ferrous metals sector increased in response to the increase in global demand and metals prices. Production of iron ore increased by almost 4%; pig iron, by 8%; finished rolled steel, by almost 10%; and coke, by about 5% compared with output in 2006. The value of mined output increased by 9.4% for metallic ores, by 2.8% for coal and peat; and by 5.2% for oil and gas (Interfax Russia & CIS Statistics Weekly, 2008c).

Structure of the Mineral Industry

The country's iron ore and steel sector included 14 mining enterprises. It also included 15 iron and steel works and plants and 3 ferroalloy plants, as well as 20 metalware plants, 15 tube producing enterprises, 13 refractory production plants, and 12 byproduct coke plants (National Exhibition of Ukraine in the USA, 2006). Ukraine was engaged in privatizing major enterprises in its ferrous metals sector although the process at times had been marred in some cases by disputes and a reputed lack of transparency (Kiev Ukraine News Blog, 2007).

Mineral Trade

Europe was the destination of about one-third of Ukraine's exports, and about one-fourth of Ukraine's exports went to Russia and other countries of the Commonwealth of Independent States (CIS). Steel constituted nearly 40% of the country's exports. Ukraine imported almost 80% of its oil and 77% of its natural gas. Russia was Ukraine's main supplier of oil and Russian firms owned and (or) operated the majority of Ukraine's refining capacity (U.S. Department of State, 2008). In 2007, Ukraine reoriented its steel exports from countries in Asia to countries in the Middle East and to Turkey because China had made significant inroads into the Asian steel markets that had been importing steel from Ukraine. In 2007, iron ore exports increased by 4.7% compared with that of 2006 to 20.821 million metric tons (Mt) and exports of iron ore concentrate increased by 19.8% to 4.788 Mt. Pellet exports increased by 3.6% to 8.568 Mt. However, exports of agglomerate decreased compared with that of 2006 by 2.7% to 7.157 Mt. The main factor inhibiting iron ore exports, according to Ukrrudprom (a company made up of Ukrainian iron ore producers), was the tariff rate on rail transport (Metall Ukrainy, 2008a).

Natural gas imports, which were brokered through the intermediary company RosUkrEnergo (RUE), came from Kazakhstan, Russia, Turkmenistan, and Uzbekistan; gas was

delivered through a pipeline system that was owned and controlled by OAO Gazprom of Russia. Ukraine controlled the gas pipelines on its territory; these pipelines were used to transit Russian gas to Western Europe. Tensions between Ukraine and Russia ostensibly concerning the price that Ukraine would pay for Russian gas supplies led to Russia's decision to cut off gas supplies for 3 days in January 2006 and 3 days in March 2008 (U.S. Department of State, 2008).

A large amount of oil and natural gas destined for the European Union (EU) and southeastern Europe was transported through Ukraine, including about 23% of the EU's oil imports and 46% of the EU's gas imports. Ukraine's trunk gas transport system was state owned and was the main transit route for Russian gas exports to Europe.

In early 2006, Russia began to increase the natural gas prices that it charged Ukraine toward prices charged in Western Europe. Ukraine claimed that the proposed almost fourfold price increase was politically motivated because of the "Orange Revolution" that had occurred in Ukraine and the country's election of a President perceived to be more politically oriented towards the West than towards Russia. Russia began cutting gas supplies to Ukraine in an energy price dispute that became a major political dispute. This crisis created fears that Russian exports to Western Europe could be affected, as most of the gas from Russia destined for Europe was channeled through Ukrainian pipelines and Ukraine was capable of diverting these supplies for its own needs. Russia insisted that there would be no disruption of supplies to Europe (BBC News, 2006).

In 2006, an agreement was reached between Russia and Ukraine that set the gas import price initially at 64% higher than the prevailing price. Ukraine's gas sector had been controlled by National Joint Stock Company (NJSC) Naftogaz Ukraini, a state-owned enterprise. Naftogaz Ukraini was Ukraine's largest firm in terms of assets and supplied nearly all Ukraine's gas consumers through 2005. Beginning in 2006, however, as a result of the new gas contract between Ukraine and Russia, Ukraine's gas imports were to be handled by UkrGasEnergo (UGE), which was a joint venture between Naftogaz Ukraini and privately owned RUE. RUE provided gas at the Ukraine-Russia border to UGE, which sold and distributed it to industrial consumers and to heating and power companies. The household market remained under the control of Naftogaz (Kramer, 2008).

On October 2, 2007, Russia's Gazprom announced that it could begin to reduce natural gas supplies to Ukraine within the month if Ukraine did not begin to take action to pay the debt of more than \$1.3 billion that it owed Gazprom for previous deliveries (OAO Gazprom, 2007b). The announcement came after the September 30 Parliamentary elections when competing factions were striving to form a coalition government and select a Prime Minister (Reuters, 2007).

On October 9, an agreement on repayment of the debt was reached. Under the conditions of the agreement, Ukraine reportedly would give gas transit intermediary RUE 8 billion cubic meters of gas from Ukrainian storage facilities and Naftogaz Ukraini and UGE would pay \$929 million to settle the remainder of the debt by November. (Press reports, however, have varied on the amount of gas that Ukraine would supply

RUE and the amount of money that Ukraine would pay, and the amounts quoted may not reflect the actual amounts.) RUE would use the profits from the sale of the gas and the direct payment in gas to pay Ukraine's debts to Gazprom (Interfax Russia & CIS Oil and Gas Weekly, 2007b). On November 6, a Gazprom press release stated that RUE had fully completed its responsibilities with regard to the agreement on the settlement of the debt, which could be interpreted as meaning that the entire amount of the debt to Gazprom had been cleared (OAO Gazprom, 2007a).

In December, Gazprom and Naftogaz Ukraini agreed to increase the price at which Ukraine would purchase gas to \$179.50 per 1,000 cubic meters beginning in 2008 from \$130 per 1,000 cubic meters in 2007. The transit price that Ukraine would charge Gazprom also increased to \$1.70 from \$1.60 per 1,000 cubic meters per 100 kilometers, and Naftogaz Ukraini agreed to transit 3.4% more gas for Gazprom in 2008 (Interfax Russia & CIS Oil and Gas Weekly, 2007a). The price increase was mainly attributed to the increased costs of obtaining gas from Gazprom's Central Asian suppliers.

Commodity Review

Metals

Aluminum.—Ukraine's aluminum industry consisted primarily of the Nikolayev alumina refinery and the Zaporozh'ye aluminum smelter (ZALK). The Nikolayev alumina refinery had increased production from 2000 through 2007 by about 36% to 1.5 Mt from 1.1 Mt. The Zaporozh'ye aluminum smelter was built in 1933. It became part of Russia's Siberian Urals Aluminum Co. (SUAL) in 2004 and then part of United Company RUSAL in 2007 when the merger of SUAL and RUSAL of Russia and the alumina assets of Glencore International AG of Switzerland was completed. A large portion of the smelter's output was sold domestically to enterprises in the machine manufacturing sector. The main issue facing ZALK was obtaining an adequate supply of affordable energy. Prices for energy in Ukraine had risen to the extent that the director of the smelter stated that his enterprise could not remain competitive unless the Government lowered the price that it had set for ZALK's energy supplies (Metall Ukrainy, 2007). According to a report of a state program to develop the mining and metals sector for 2011, the Government planned to construct a plant at the Zaporozh'ye aluminum smelter to produce up to 9,600 metric tons per year (t/yr) of foil and 16,000 t/yr of strips. Ukraine was also engaged in designing a new aluminum smelter with a capacity of 100,000 t/yr (Interfax Russia & CIS Metals and Mining Weekly, 2007e).

Iron and Steel.—In 2007, Ukraine's production of crude steel decreased to about 42.8 Mt, and production of finished rolled steel increased by 9.5% to about 24.5 Mt. Projections for 2008 called for crude steel output to increase to 46 Mt; production of pig iron was projected to increase to 38.3 Mt compared with 35.6 Mt in 2006. To meet these production targets, steelmakers in Ukraine would need an additional 6.1 Mt/yr of iron ore, which would necessitate importing an additional 3.9 Mt of iron ore and receiving an additional 1 Mt or iron in material from domestic mines, including an additional 1.1 Mt of sinter,

600,000 t of pellets, and 400,000 t of iron ore concentrate. By the end of 2007, it was evident that supplies of iron ore and coke could become tight in the coming year (Metall Ukrainy, 2008c). The steel industry planned to maintain exports at no less than the 2007 level and hoped that exports could increase by as much as 12% to 20% (Interfax Russia & CIS Metals and Mining Weekly, 2008b).

The country's major steel producing enterprises each produced more than 4 Mt/yr of steel, with some producing more than 7 Mt/yr. Of the total volume of steel produced in 2006 (the latest year for which data were available), 51.7% was produced by oxygen converter furnaces, 44.6% in open-hearth furnaces, and 3.7% in electric arc furnaces (EAF), which was the same ratio as in 2005 (Kharakhulakh, 2007). Ukraine's steel industry was undergoing a major transformation as major mills invested to modernize production facilities to achieve improved operational and environmental performance.

The steel industry was dominated by large producers, and switching to EAF for steel production was a difficult process, in part because the country's supply of steel scrap was quite limited. An increase in scrap availability could take place if depreciation rates on capital stock were accelerated and if the amount of scrap available from automobiles increased with increased car ownership. Plans called for the introduction of more continuous casting of steel, which was a process used to make only 30% of the steel produced (Krivchenko and others, 2007)

In 2008, the steel industry planned to increase its investment in construction and modernization by 28% compared with its investment in 2007. In 2007, the steel industry increased its investment in construction and modernization by 57.3% compared with its investment in 2006. Steel mills increased the value of output by 32.4% compared with that of 2006, but operating margins slipped slightly because of the higher cost of inputs. Production costs were projected to continue to increase significantly and profit margins were expected to continue to decrease. Only about one-half of the steel mills were envisioned to be able to operate profitably as production costs increase, which could result in a decrease in tax revenues paid to the Government by the industry (Interfax Russia & CIS Metals and Mining Weekly, 2008d).

Iron Ore.—In 2007, Ukraine's iron ore mines increased their output of crude ore by more than 5% to about 78 Mt. Pellets output increased by 1.5 Mt to about 22.4 Mt. Sinter production remained level at 47.4 Mt. A continuing issue remained the price at which iron ore enterprises were marketing their supplies to the country's metallurgical industry, which involved problems in relations between financial and industrial groups and quality to price issues (Interfax Russia & CIS Metals and Mining Weekly, 2008b). In response, the metallurgical enterprises were increasing imports and the iron ore enterprises were increasing exports, although this solution did not resolve marketing issues for the iron ore mining enterprises. At yearend, iron ore mining enterprises had a record 2.5 Mt of ore stockpiled in warehouses in Europe where their main consumers were located. The iron ore mining industry was looking to China to further expand its export markets (Metall Ukrainy, 2008e).

A basic problem that faced the iron ore mining sector was the high cost of production, including high energy consumption coupled with a low ore grades and difficult geologic conditions for mining at greater depths. Because of these circumstances, the industry was at a disadvantage in competing on world markets. About 70% of Ukraine's output of iron ore was consumed by domestic steelmakers that were mainly oriented towards exporting their output. Changes in Government policies beginning in 1999 stimulated greater investment in renovating and reequipping mining enterprises and made it possible for Ukraine's iron ore mining sector from 2000 onward to increase production annually; as a result, iron ore output had doubled since 1999. A significant factor in the revival of the iron ore sector was the formation of the conglomerate Ukrrudpom in 2004, in which up to 80% of all production capacity for mining and processing iron ore was concentrated (Kolosov, 2007).

The iron ore mining sector had been able to raise the quality of its products, although the quality was still low by world market standards. Raising its standards enabled the sector to maintain its level of exports at about 30% of output, despite increasing global competition. Nevertheless, unless further improvements in product quality are achieved, Ukraine would be at an increasing disadvantage in marketing its output on world markets. The iron ore industry's attempt to maintain its growth in output by mining large quantities of relatively low-grade ore had resulted in the industry causing major environmental problems because of the large volume of waste generated (Kolosov, 2007).

Manganese.—Ukraine was the leading producer of manganese ore in the CIS. Ukraine's two manganese producing enterprises—the Marganets and the Ordzhonikidze mining and beneficiation enterprises—were owned by the PrivatBank Group, which also controlled the Stakhanov and Zaporozh'ye ferroalloys plants. The PrivatBank also controlled the Australian manganese mining company Consolidated Minerals, as well as Ghana Manganese Company, Ltd. Ukraine had 75% of the manganese reserves of the CIS. Explored reserves prepared for development were reportedly 2.26 billion metric tons (Gt) that have an average manganese content of 23.1% (Goshovskiy, 2007). Increases in manganese ore production were not projected for 2008 as ferroalloy producers were preferring instead to use imported ore and stocks of domestically produced ore (Metall Ukrainy, 2008b).

In 2007, Ukraine decreased production of silicomanganese by 6.4% to 1,281,000 t. In 2008, the Ukrainian Ferroalloys Production Association planned to increase production of silicomanganese at the country's ferroalloys plants by between 10% and 15% compared with between 1,341,100 and 1,402,000 t in 2007. An increase in ferromanganese production was not foreseen as the emphasis was to be placed on improving product quality rather than on the volume of production (Metall Ukrainy, 2008b).

In 2007, the Nikopol ferroalloys plant, which was controlled by the Interros Group of Russia, increased ferroalloys production by 16.5% to 1.04 Mt, which included increasing production of silicomanganese by 22.3% to 768,100 t and ferromanganese by 4.5% to 272,000 t (Interfax Russia & CIS Metals and Mining Weekly, 2008a). From January to October 2007, the Zaporozh'ye ferroalloys plant, which was the country's leading producer of medium- and high-carbon

ferromanganese, increased ferroalloys production by 1.2% compared with the same period in 2006; the production of silicomanganese was down by 4.7% year on year and the production of ferromanganese was down by 9.6%. Production of ferrosilicon at Zaporozh'ye increased by 34.2% compared with production in the same period of 2006. Zaporozh'ye was planning to invest in 2008 to upgrade facilities to improve environmental effects that would include reducing emissions and increasing recycling (Interfax Russia & CIS Metals and Mining Weekly, 2008e).

Mineral Fuels and Related Materials

Coal.—In 2007, coal production in Ukraine decreased by about 6% to 75.437 Mt of raw coal. Metallurgical coal production decreased to 28.296 Mt from 30.145 Mt, or by more than 9% compared with production in 2006, but steam coal production increased by almost 11% to 50.112 Mt (Interfax Russia & CIS Metals and Mining Weekly, 2008c). Ukraine's energy strategy for the period to 2030, which was approved by the Government in 2006, called for increasing annual coal output to 130.3 Mt by 2030. Production was projected to increase in 2008 as approximately 50 new coal faces were to be commissioned by yearend 2007 (Interfax Russia & CIS Metals and Mining Weekly, 2007a, i). Ukraine was experiencing shortages of metallurgical coal. In 2007, Ukraine imported 7.3 Mt of coking coal from Russia and about 2 Mt from other countries, and the country projected that it would import 7 Mt of coking coal in 2008, which included 2 Mt from Canada and the United States (Interfax Russia & CIS Metals and Mining Weekly, 2008c).

Ukraine's coal sector was mostly state owned, although Government participation was declining. The country's coal mines were subject to chronic financial distress and only limited efforts had been made to improve performance (International Monetary Fund, 2007). During the past 10 to 15 years, Ukraine's coal industry had undertaken measures to counter negative tendencies in the sector, but these measures were not considered to have been successful. The majority of coal mines were not profitable and required Government support. In 2008, the Coal Industry Ministry planned to finish work on closing 14 underground mines. Between 1996 and 2007, 24 coal mining enterprises shut down mines (Metall Ukrainy, 2008d).

Despite a large number of mines, production was highly concentrated, with about 20% of the mines producing almost 70% of the output. Although Ukraine was among the world's leading coal mining countries, labor productivity in the coal sector was between three and eight times lower than in Canada, Germany, Poland, Russia, and the United States (Poltavets and others, 2008).

For the past 15 years, the lack of success of the attempted solutions to the economic distress experienced by the coal industry was attributed to a high level of inertia, a lack of operating capital, and the long time period required for investment to result in increased production. Mining operations in Ukraine's major coal basin [the Donets Basin (Donbas)] have had to deal with a number of particularly complex issues, which include very deep mines with narrow coal seams and dangerously high levels of methane. Several coal mines that had been privatized as stock companies, however, were profitable

even though they had to deal with the same difficult mining conditions (Poltavets and others, 2008).

As of January 1, 2005, Ukraine's economic (balansovye) reserves (which were calculated according to the reserve classification system used during the Soviet period and later by many of the Soviet Union's successor states) were reportedly 8.704 Gt, of which 6.501 Gt was classified as industrial reserves. Metallurgical coal made up 54% of the total industrial reserves, and steam coal, 46%. Industrial reserves were considered adequate for 65 years at current domestic consumption rates. Production, however, was more than 20% below domestic consumption. Explored reserves in Ukraine were reportedly about 18 times larger than industrial reserves and were reportedly 117 Gt (Poltavets and others, 2008).

Ukraine's Coal Industry Ministry planned to attract investors to develop deposits in the Dnepr brown coal basin, according to an investment proposal that it posted on its Web site on August 15, 2006. The proposal called for developing two deposits—the Aleksandriiskoye deposit, which has brown coal reserves reported to be 485 Mt, of which 63 Mt was considered suitable for open pit development, and the Verkhnedniprovskoye deposit, which has reported reserves of 236 Mt, for which the explored sections were considered suitable for open pit development. The Ministry calculated that these deposits had the potential to produce between 5 and 6 million metric tons per year (Mt/yr) of brown coal by open pit mining. Mines at the deposits were projected to come onstream in 2 years once development begins (Interfax Russia & CIS Metals and Mining Weekly, 2007d).

Petroleum.—In 2007, production of crude oil and condensate decreased by 1.9% to 4.428 Mt. Kiev-based OJSC Ukrnafta, which is a subsidiary of Naftogaz Ukraini, was the country's leading oil producer. In 2008, Ukraine was planning to increase extraction of crude oil and gas condensate by 1.63% to 4.5 Mt, according to the Fuel and Energy Ministry (Government Portal, 2008).

Uranium.—In December 2006, the Ukrainian Government passed a resolution to create the conglomerate Ukratomprom to consolidate nuclear power production. Ukratomprom was to be composed of a number of companies and mining enterprises, and its operations would be run by the national atomic energy company, Energoatom, which was made part of Ukratomprom (Interfax Russia & CIS Metals and Mining Weekly, 2007g). Ukraine planned to increase uranium oxide output from 800 t in 2006 to 1,000 t by 2010, and 2,500 t in 2015. Ukraine was planning to increase uranium oxide production to 5,900 t by 2025 and to 6,400 t by 2030 (Interfax Russia & CIS Metals and Mining Weekly, 2007c, h, j).

Ukraine reportedly was mining only 30% of the uranium it needed for domestic nuclear power generation. The Vostochny mining complex (VostGOK), which was located in Zheltye Vody in the Dnipropetrovsk region, was the country's only uranium mining enterprise. VostGOK was mining the Michurinskoye, the Tsentralnoye, and the Vatutinskoye deposits in the Dnipropetrovsk and the Kirovohrad regions, where 50% to 60% of the reserves had been depleted. Ore was processed at VostGOK's Zheltye Vody plant in Zhetlye Vody (Interfax Russia & CIS Metals and Mining Weekly, 2007h).

Planned production increases were linked to the development of the Novokonstantinovskoye field in the Kirovohrad region. Uranium production at the Novokonstantinovskoye deposit was scheduled to commence in 2008. Initial production would be 100 t of uranium oxide, and production would be increased to 500 t by the end of 2009; full capacity of 1,500 t would be achieved in 2013 (Interfax Russia & CIS Metals and Mining Weekly, 2007j). Russian firms would participate with Ukraine to meet the needs of Ukraine's nuclear power industry for uranium development and processing (Interfax Russia & CIS Metals and Mining Weekly, 2007f). Ukraine declassified data on nine uranium deposits in an effort to attract foreign investment to develop these deposits (Interfax Russia & CIS Metals and Mining Weekly, 2007b).

Outlook

Ukraine's steel industry was a mainstay of its economy and a major source of export revenues. Ukraine, in an effort to remain competitive on the international steel market, may attempt to have its steel mills switch from costly energy-intensive technologies to technologies that reduce energy usage and costs and improve the quality of steel produced. In part, this could entail replacing open-hearth furnaces with oxygen converters and EAF and greatly increasing the percentage of steel produced with continuous casting at existing enterprises, as well as at any new facilities (Krivchenko and others, 2007).

References Cited

- BBC News, 2006, Russia cuts Ukraine gas supplies: BBC News, January 1. (Accessed February 1, 2008, at http://news.bbc.co.uk/1/hi/world/europe/4572712.stm.)
- Goshovskiy, S.V., 2007, Mineral'no-syr'yevaya baza Ukrainy I ralizatsiya polozheniy gornoy khartii stran SNG [The mineral-raw material base for Ukraine and the fulfillment of the mining charter for the countries of the CIS]: Gornyy Zhurnal [Mining Journal], no. 10, p. 69-76.
- Government Portal, 2008, Ukraine plans to increase crude production: Cabinet of Ministers of Ukraine, March 19. (Accessed May 20, 2009, at http://www.kmu.gov.ua/control/en/publish/article?art_id=119910877&cat_id=32736.)
- Interfax Russia & CIS Metals and Mining Weekly, 2007a, Ukraine could raise coal production in 2008: Interfax Russia & CIS Metals and Mining Weekly, issue 39, September 14-20, p. 29.
- Interfax Russia & CIS Metals and Mining Weekly, 2007b, Ukraine declassifies data on uranium deposits: Interfax Russia & CIS Metals and Mining Weekly, issue 30, July 20-26, p. 9.
- Interfax Russia & CIS Metals and Mining Weekly, 2007c, Ukraine plans to boost uranium production 75% in 3 years: Interfax Russia & CIS Metals and Mining Weekly, issue 4, January 19-25, p. 35.
- Interfax Russia & CIS Metals and Mining Weekly, 2007d, Ukraine seeks investors to develop brown coal deposits: Interfax Russia & CIS Metals and Mining Weekly, issue 32, August 10-16, p. 28.
- Interfax Russia & CIS Metals and Mining Weekly, 2007e, Ukraine to boost nonferrous exports: Interfax Russia & CIS Metals and Mining Weekly, issue 22, May 25-31, p. 31.
- Interfax Russia & CIS Metals and Mining Weekly, 2007f, Ukraine to develop uranium field with Russia's help: Interfax Russia & CIS Metals and Mining Weekly, issue 33, August 17-23, p. 10, 11.
- Interfax Russia & CIS Metals and Mining Weekly, 2007g, Ukraine to invest 250 mln hryvni in uranium mining in 2007: Interfax Russia & CIS Metals and Mining Weekly, issue 10, March 2-7, p. 18.
- Interfax Russia & CIS Metals and Mining Weekly, 2007h, Ukraine's eastern mining aims to triple uranium output by 2015: Interfax Russia & CIS Metals and Mining Weekly, issue 49, November 3-December 6, p. 19, 20.

- Interfax Russia & CIS Metals and Mining Weekly, 2007i, Ukrainian coal ministry to raise \$790 mln to build Novosvetlovskaya mine: Interfax Russia & CIS Metals and Mining Weekly, issue 32, August 10-16, p. 18.
- Interfax Russia & CIS Metals and Mining Weekly, 2007j, Uranium extraction at Novokonstantinovskiye deposit may start in 2008: Interfax Russia & CIS Metals and Mining Weekly, issue 25, June 15-21, p. 19, 20.
- Interfax Russia & CIS Metals and Mining Weekly, 2008a, Nikopol plant reduces ferroalloy output 4% in January. Interfax Russia & CIS Metals & Mining Weekly, issue 5, February 1-7, p. 28.
- Interfax Russia & CIS Metals and Mining Weekly, 2008b, Ukraine aims to raise steel output in 2008: Interfax Russia & CIS Metals and Mining Weekly, issue 2, January 18-24, p. 15.
- Interfax Russia & CIS Metals and Mining Weekly, 2008c, Ukraine signs contracts to import 2 mln tonnes of coking coal from N. America: Interfax Russia & CIS Metals and Mining Weekly, issue 2, January 11-17, p. 21, 22.
- Interfax Russia & CIS Metals and Mining Weekly, 2008d, Ukrainian steelmakers to spend 28% more on upgrades in 2008: Interfax Russia & CIS Metals and Mining Weekly, issue 9, February 2-March 6, p. 16.
- Interfax Russia & CIS Metals and Mining Weekly, 2008e, Zapoizhiya ferroalloys to invest \$150 mln in upgrades: Interfax Russia & CIS Metals and Mining Weekly, issue 1, December 28, 2007-January 10, 2008, p. 12.
- Interfax Russia & CIS Oil and Gas Weekly, 2007a, Ukraine agrees to up gas transit 3.4% in 2008, agrees on deliveries with RosUkrEnergo: Interfax Russia & CIS Oil and Gas Weekly, issue 49, December 6-12, p. 6-8.
- Interfax Russia & CIS Oil and Gas Weekly, 2007b, Ukraine, Russia settle gas debt issue: Interfax Russia & CIS Oil and Gas Weekly, issue 40, October 4-10, p. 3-5.
- Interfax Russia & CIS Statistics Weekly, 2008a, Direct investment in and from Ukraine by type of economic activity: Interfax Russia & CIS Statistics Weekly, issue 2-3, December 29, 2007-January 11, 2008, p. 19-20.
- Interfax Russia & CIS Statistics Weekly, 2008b, Ukraine's key socioeconomic indicators in 2007: Interfax Russia & CIS Statistics Weekly, issue 5, January 19-25, p. 7.
- Interfax Russia & CIS Statistics Weekly, 2008c, Ukrainian industrial production grows 10.2% in 2007: Interfax Russia & CIS Statistics Weekly, issue 7, February 2-8, p. 11.
- International Monetary Fund, 2007, Ukraine—Selected issues: International Monetary Fund Country Report no. 07/47, February, p. 6, 20.
- Kharakhulakh, V.S., 2007, Predpriyatiya "Metallurgproma": proizvodstvo, eknomika, tekhperevooruzheniye [Enterprises of "Metallurgprom: production, economics, and technical reequipping]: Metallurgicheskaya I gornorudnaya promyshlennost' [The Metallurgical and Mining Industry], no. 2, p. 1-4.
- Kiev Ukraine News Blog, 2007, Akhmetov snaps up Energo stake: Kiev Ukraine News Blog, August 30. (Accessed May 26, 2009, at http://blog.kievukraine.info/2007/08/akhmetov-snaps-up-energo-stake.html.)
- Kolosov, V.A., 2007, Gornodobyvayushchaya otrasl'-problemy i perspektivy razvitiya [The ore mining sector-problems and perspectives]: Meltallurgicheskaya I gornorudnay promyshlennost' [The Metallurgical and Mining Industry], Dnepropetrovsk, issue 6, p. 1-5.
- Kramer, A.M., 2008, World business briefing—Europe-Russia-Gazprom-Ukraine gas dispute: The New York Times, January 29. (Accessed February 2, 2008, at http://www.nytimes.com/2008/01/29/business/worldbusiness/29fobriefs-GAZPROMUKRAI_BRF.html?ref=worldbusiness&oref=slogin.)
- Krivchenko, Yu.S., Malik, A.A., Orman, V.Ya., and Filyak, A.V., 2007, Osnovnye napravleniya I perspektivy razvitiya staleplavil'nogo proizvodstva v Ukraine [Basic directions and perspectives for the development of the steel production in Ukaine]: Metellurgicheskaya i Gornorudnaya Promyshlennost' [The Metallurgical and Mining Industry], Dnepropetrovsk, no. 1, p. 16-18.
- Metall Ukrainy [Metals of Ukraine], 2007, Alyuminievaya promyshlennost [Aluminum industry]: no. 24, December 16-31, p. 59, 60.
- Metall Ukrainy [Metals of Ukraine], 2008a, Eksport zheleznorudnogo kontsentrata v 2007 godu uvelichil'sya na 19.8% [Exports of iron ore concentrate in 2007 increase by 19.8%]: Metall Ukrainy, no. 1, January 1-15, p. 40.
- Metall Ukrainy [Metals of Ukraine], 2008b, Ferrosplavy (Ferroalloys]: Metall Ukrainy, issue 426, April 1-15, p. 54.
- Metall Ukrainy [Metals of Ukraine], 2008c, Gorno-Metallurgicheskiy Kompleks [Mining-Metallurgical Complex]: Metall Ukrainy, issue 421, January 16-31, p. 5.
- Metall Ukrainy [Metals of Ukraine], 2008d, Minugleprom nameren likvidirovat' bolee decyati shakht [The Ministry of the Coal Industry intends to shut down more than 10 underground mines]: Metall Ukrainy, issue 424, March 1-15, p. 47.
- Metall Ukrainy [Metals of Ukraine], 2008e, Zhelezorudnoye syr'ye [Iron ore]: Metall Ukrainy, issue 42, February 1-14, p. 8.

- National Exhibition of Ukraine in the USA, 2006, Modern economic potential of Ukraine: December. (Accessed February 13, 2008, at http://www.ukrdzi.com/usa/uapotential/3201.htm.)
- OAO Gazprom, 2007a, On settlement of debt to Gazprom: Moscow, Russia, OAO Gazprom press release, November 6. (Accessed May 12, 2009, at http://www.gazprom.com/eng/news/2007/11/25937.shtml.)
- OAO Gazprom, 2007b, Press statement: Moscow, Russia, OAO Gazprom press release, October 2. (Accessed May 12, 2009, at http://www.gazprom.com/eng/news/2007/10/25466.shtml.)
- Poltavets, V.I., Gryadushchiy, B.A., Maydukov, G.L., 2008, Al'ternativy reformirovaniya ugol'noy promyshlennosti Ukraini [Alternative reforms for Ukraine's coal industry]; Ugol' [Coal], no. 7, p. 10-16.
- Reuters, 2007, UPDATE 4—Gazprom says may cut gas to Ukraine over debt: Reuters, October 2. (Accessed May 12, 2009, at http://www.reuters.com/article/companyNewsAndPR/idUSL0119224120071002.)
- U.S. Department of State, 2008, Ukraine: U.S. Department of State background note, March 17.
- World Bank, The, 2005, Ukraine, the impact of higher natural gas and oil prices: The World Bank Staff Report, December, 21 p.

${\bf TABLE~1} \\ {\bf UKRAINE: PRODUCTION~OF~MINERAL~COMMODITIES}^{I} \\$

(Metric tons unless otherwise specified)

Commodity	2003	2004	2005	2006	2007
METALS					
Alumina	1,434,050	1,562,170	1,632,020	1,671,620	1,700,000 e
Aluminum:					
Primary	113,640	113,151	114,224	112,961 ^r	113,437
Secondary	130,000	130,000	130,000	130,000	130,000
Total	243,640	243,151	244,224	242,961 ^r	243,437
Cadmium, metal ^e	25	25	25	25	25
Gallium ^e	13	14	15	15	15
Germanium ^e	20	20	20	20	20
Gold ^e	500 r	500 ^r	500 ^r	500 ^r	500
Iron and steel:					
Iron ore, marketable:					
Gross weight	62,497,600	65,550,000	68,569,600	74,000,000	77,900,000
Fe content ^e	34,300,000	36,000,000	37,700,000 2	40,700,000	42,800,000
Metal:					
Pig iron	29,570,000	31,060,000	30,747,000	32,926,000	35,600,000
Ferroalloys:					
Blast furnace: ^e					
Ferromanganese	85,000	79,000	30,000	26,700 ^r	28,400
Spiegeleisen	5,000	5,000	5,000	4,450 ^r	4,730
Electric furnace:					
Ferromanganese	250,000 ^e	375,990	359,000	373,000	368,000
Ferronickel ^e		60,000 ^r	60,000 ^r	90,000 ^r	90,000
Ferrosilicon	250,000 e	248,060	228,000	169,000 ^r	218,000
Silicomanganese	740,000 e	1,060,000	1,046,000	1,168,000	1,281,000
Other ^e	25,000	25,000	25,000	22,200 ^r	23,700
Total	1,360,000 e	1,853,050 ^r	1,753,000 ^r	1,850,000 r, e	2,010,000 e
Steel:					
Crude	36,900,000 e	38,738,000	38,636,000	42,899,000 ^r	42,830,000
Finished, rolled	22,500,000	23,200,000	22,180,000	22,387,000	24,510,000
Pipe	2,054,000	2,034,000	2,293,000	2,759,000	2,800,000
Lead, refined, secondary	13,000 ^r	15,000 r, e	61,400 ^r	56,300 ^r	62,000
Magnesium, primary ^e	3	3	2,000	2,200	2,500
Manganese ore, marketable:					
Gross weight	2,590,900	2,362,000	2,260,000	1,606,400	1,719,600
Mn content ^e	880,000	810,000	770,000	546,000 ^r	580,000
Nickel: ^e					
Mine output, Ni content of laterite ore	2,000	2,000	6,000	12,000	12,000
Ni content of ferronickel		12,000	14,000	18,000	18,000
		,	,	*	,

See footnotes at end of table.

$\label{total loss} \begin{tabular}{ll} TABLE 1--Continued \\ UKRAINE: PRODUCTION OF MINERAL COMMODITIES 1 \\ \end{tabular}$

(Metric tons unless otherwise specified)

Commodity	2003	2004	2005	2006	2007
METALS—Continued					
Titanium:					
Ilmenite concentrate:					
Gross weight	420,500	370,000 e	375,000 e	470,000	500,000
TiO ₂ content, 61% ^e	257,000	226,000	229,000	287,000	305,000
Rutile concentrate, 95% TiO ₂ ^e	60,000	60,000	60,000	60,000	60,000
Metal, sponge	6,934	7,497	8,397	9,997	9,745
Zirconium concentrates ^e	35,000	35,000	35,000	35,000	35,000
INDUSTRIAL MINERALS	,	,	,	,	,
Bromine thousand kilograms	1,324 ^r	1,878 ^r	3,138 ^r	700 e	700 e
Cement	8,923,000	10,635,000	12,183,000	13,732,000	15,000,000
Clays:	-,,	.,,	,,	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	-,,
Ball clay			118,000	294,000	652,000
Bentonite ^e	300,000	300,000	300,000	300,000	300,000
Kaolin	169,900 ^r	202,300 ^r	216,600 ^r	251,000	244,000
Diamond, synthetic ^e carats	8,000,000	8,000,000	8,000,000	8,000,000	8,000,000
Feldspar	NA	48,800 ^r	63,930	67,313 ^r	76,305
Graphite	11,000 ^r	10,960 ^r	10,400 ^r	5,800 r	5,800 °
Gypsum	264,000	337,000	380,600	375,900	741,580
Nitrogen, N content of ammonia ^e	3,900,000	3,900,000	4.300.000 ²	4,200,000	4,200,000
Potash, K ₂ O equivalent	10,000 ^{r, e}	10,100 ^r	13,100 ^r	8,100 ^r	11,900 °
Salt	3,863,000	4,393,000	4,811,000	5,996,000	5,548,000
Soda ash ^e	656.000 ²	650,000	700,000	700,000	700,000
Sulfur, native ^e	142,000	136,000	139,000 ^r	133,000 ^r	135,000
Sulfuric acid	1,113,000	1,425,000	606,000	1,493,000	1,660,000
Vermiculite	60,000	62,000	64,000	65,000	65,000 °
MINERAL FUELS AND RELATED MATERIALS	00,000	02,000	0.,000	05,000	05,000
Coal, raw:					
Anthracite thousand metric tons	14,427	18,295	16,204	13.444 ^r	13.000 e
Bituminous do.	63,866	62,100	58,000	66,600 ^r	62,255
Lignite do.	950	3,000	355	231 ^r	182
Total do.	79,243	83,395	74,559	80,275 ^r	75,437
Marketable do.	59,800	59,400	60,400	61,439 ^r	58,739
Coke	19,300,000	18,858,000	21,999,000	19,200,000	20,143,000
Natural gas cubic meters	18,600,000	20,400,000	20,788,000	21,094,000 ^r	21,104,000
Peat, horticultural use and fuel use	559,000 r, e	544,000 ^r	639,000 ^r	462,000 ^r	395,000
Petroleum:	227,000	2,000	057,000	102,000	5,5,000
Crude and gas condensate:					
As reported	3,975,000	4,179,000	4,414,000	4,506,000 ^r	4,459,000
Converted ^e 42-gallon barrels	29,200,000	30,700,000	32,400,000	33,100,000 ^r	32,800,000
Refinery products	21,900,000	22,000,000	18,400,000	14,384,000 ^r	13,910,000
Uranium:					
U content ^e	678 ^r	678 ^r	678 ^r	678 ^r	717
	800 °				

^eEstimated; estimated data are rounded to no more than three significant digits; may not add to totals shown. ^rRevised. do. Ditto. NA Not available. -- Zero.

¹Table includes data available through February 28, 2009.

²Reported figure.

${\rm TABLE~2}$ UKRAINE: STRUCTURE OF THE MINERAL INDUSTRY IN $2007^{1,\,2}$

(Metric tons unless otherwise specified)

		Major operating companies, main facilities,		Annual
Commodity		or deposits	Location or deposit names	capacity
Alumina		United Company RUSAL: ³		
		Nikolayev refinery	Mykolayivs'ka Oblast'	800,000
Do.		Zaporozhye refinery	Zaporiz'ka Oblast'	245,000
Aluminum, primary		Zaporozhye smelter	do.	120,000
Coal:				
Hard thousand	metric tons	Donets coal basin (about 225 mines that produce	Dnipropetrovs'ka, Donets'ka,	130,000
		more than 90% of Ukraine's coal)	and Luhans'ka Oblasts'	
Do.		Lviv-Volynskiy Basin (18 mines that produce about	Western Ukraine	6,000,000
		10% of Ukraine's coal)		
Brown		Dnipr (Dneprovskoye) Basin	Central Ukraine	7,000,000
Ferroalloys:				
Ferrochrome		Zaporozhye plant	Zaporiz'ka Oblast'	NA
Ferromanganese		do.	do.	NA
Do.		Nikopol ferroalloys plant	Dnipropetrovs'ka Oblast'	250,000
Ferromanganese, blast furnace		Kostyantynivka metallurgical plant	Kostyantynivka	NA
Do.		OJSC Kramatorsk (KrMZ) metallurgical plant	Donets'ka Oblast'	NA
Ferrosilicon		Nikopol ferroalloys plant	Dnipropetrovs'ka Oblast'	200,000
Do.		Stakhanov plant	Luhans'ka Oblast'	NA
Silicomanganese		Nikopol ferroalloys plant	Dnipropetrovs'ka Oblast'	NA
Do.		Stakhanov plant	Luhans'ka Oblast'	1,200,000
Do.		Zaporozhye plant	Zaporiz'ka Oblast'	160,000
Graphite		Zavalyevskiy graphite complex	Zavalyevskiy deposit	40,000
Iron ore:				
Open pit mining		Inguletskiy (Inhulets), Kamysh-Burunskiy, Kryvyy	Kryvyy Rih Basin	90,000,000
		Rih, Poltavskiy, Severnyy (Pivnichny), Sukhaya		
		Balka, Tsentralnyy, Yuzhniy (Pivdenny) and		
		Zaporizhia mining-beneficiation complexes		
Underground mining		Eksplutatsionnaya Mine of the Zaporozhye	do.	3,500,000
		Iron Ore Integrated Works cjsc		
Do.		Krivbassruda production association (16 mines)	do.	15,000,000
Kaolin		Prosyanovskoye mining-beneficiation complex	Dnipropetrovs'ka Oblast'	NA
Lead, secondary		"Ukrtsink" OJSC	Kostyantynivka	70,000
Magnesium		Magnii concern	Kalush	18,000
Do.		Zaporozhye titanium-magnesium plant	Zaporiz'ka Oblast'	10,000
Manganese:				
Ore, marketable		Marganets and Ordzhonikdze mining-beneficiation	Nikopol' Basin	6,000,000
		complexes		
		Tavricheskiy complex (under development)	Bol'shoy Tokmak Basin	
Metal		Zaporozhye plant	Zaporiz'ka Oblast'	40,000
Sinter		Nikopol ferroalloys plant	Dnipropetrovs'ka Oblast'	3,000,000
Mercury		Nikitovskiy mining-metallurgical complex	Donets'ka Oblast'	120
Nickel, Ni content in FeNi		Pobuzhskiy mining-beneficiation complex (3 open	Pobugskoye Basin	7,000
		pit mines and 1 smelter)		
Petroleum, refinery	thousand	Alliance Oil Co.	Kherson	50,200,000
42-ga	ıllon barrels			
Do.	do.	Lukoil	Odesa	28,600,000
Do.	do.	TNK-Ukraina	Lysychans'k	63,900,000
Do.	do.	Ukraine Oil Co.	Drohobych	28,600,000
Do.	do.	Ukrtatnafta	Kremenchuk	131,000,000
Do.	do.	do.	Nadvirna	18,400,000
ъо.				
Potash, K ₂ O equivalent		Khlorvinil production association, Stebnik potash	Pricarpathian region, L'vivs'ka	300,000

See footnotes at end of table.

$\label{thm:continued} \text{UKRAINE: STRUCTURE OF THE MINERAL INDUSTRY IN 2007}^{1,\,2}$

(Metric tons unless otherwise specified)

	Major operating companies, main facilities,		Annual
Commodity	or deposits	Location or deposit names	capacity
Steel, crude	OJSC Alchevsk Iron and Steel Works	Luhans'ka Oblast'	4,500,000
Do.	Azovstal Iron and Steel Works	Mariupol'	4,000,000
Do.	"Dneprospetstal" JSC	Zaporiz'ka Oblast'	1,400,000
Do.	Dnepropetrovsk Iron and Steel Works	Dnipropetrovs'ka Oblast'	2,000,000
Do.	Dnepropetrovsk Tube Works JSC (pipe plant)	Dnepropetrovsk	1,230,000
Do.	Dneprovsky Iron and Steel Integrated Works	Dniprodzerzhyns'k	3,850,000
Do.	Donetsk Iron and Steel Works	Donets'ka Oblast'	1,300,000
Do.	OJSC Ilyich Iron and Steel Works of Mariupol	Mariupol'	7,300,000
Do.	ISTIL minimill	Donets'k	1,000
Do.	Khartsyzsk Tube and Pipe Works JSC (khTZ)	Donets'ka Oblast'	NA
Do.	Kostantinovsky Steel Works	Kostyantynivka	NA
Do.	Kryvy Rih plant (AcelorMittal)	Dnipropetrovs'ka Oblast'	10,650,000
Do.	Nikopol pipe plant "YutiSt"	do.	NA
Do.	Nizhnedneprovsky pipe-rolling plant (NTZ)	do.	NA
Do.	Yenakiyeveskiy steel mill	Donets'ka Oblast'	1,200,000
Do.	Zaporozhye Steel-Rolling Mill	Zaporiz'ka Oblast'	2,300,000
Sulfur	Sera production association	Rozdol mining complex: Rozdol,	1,500,000
	•	Soroks, and Zdhidalchev deposits	
		Yarvorov complex: Nemirov-Yazov	
		deposits in L'vivs'ka and Kyyivs'ka	
		Oblasts'	
Titanium:			600,000
	Facilities:	Locations:	
Ilemenite concentrate	Irshansk mining-beneficiation complex	Irsha Valley	
	Verkhnedneprovsk mining-metallurgical complex Dnipropetrovs'ka Oblast'		
	Volnogorsk state mining-metallurgical complex	do.	
Rutile	Verkhnedneprovsk mining-metallurgical complex	do.	60,000
Do.	Volnogorsk state mining-metallurgical complex	do.	NA
Sponge	Zaporozhye titanium-magnesium plant	Zaporiz'ka Oblast'	20,000
Uranium	Vostochnyy mining and beneficiation complex	Zheltyye Vody	NA
	(Ukratomprom)		
Zinc, secondary	"Ukrtsink" OJSC	Kostyantynivka	25,000
Zirconium:			
Ore, zircon	Verkhnedneprovsk mining-metallurgical complex	Dnipropetrovs'ka Oblast'	100,000
Do.	Volnogorsk state mining-metallurgical complex	do.	NA
Metal and compounds	Kharkiv physical-technical institute	Kharkivs'ka Oblast'	NA
Do.	Pridneprovsk chemical plant	Dnipropetrovs'ka Oblast'	NA

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

¹Table includes data and information available through February 28, 2009.

²Many location names have changed since the breakup of the Soviet Union. Some enterprises, however, are still named or commonly referred to based on the former location name, which accounts for discrepancies in the names of enterprises and that of locations.

³United Company RUSAL wass formed by the merger of RUSAL (Russian Aluminum), SUAL (Siberian-Urals Aluminum Co.), and the alumina assets of Glencore International AG, which was completed in March 2007.

⁴Capacity estimates are totals for all enterprises that produce that commodity.