

# THE MINERAL INDUSTRY OF UKRAINE

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In 1996, Ukraine continued to be a major producer of coal, ferroalloys, ilmenite, iron ore, manganese ore, and steel. Also, the country was a lesser producer of a number of other mineral products, including alumina, aluminum, cadmium, germanium, rutile-zirconium ores, secondary lead, mercury, nickel in ferronickel, magnesium, titanium metal and pigment, uranium ore, secondary zinc, and a large number of industrial minerals, including dolomite, graphite, kaolin, limestone fluxes, potash, quartz, salt, soda ash, and a variety of building materials.

In 1996, Ukraine reported a 10.2% decline in gross domestic product, slightly less than the 12% decrease in 1995. Industrial output fell by 5.1% (compared to 12% in 1995), as did the gross value (in constant prices) of the mining and metallurgical sector. The magnitude of the decline in the mining and metallurgical industry (which accounted for 23.4% of the country's industrial output) was less than that in the overall economy, as noted by Ukraine's Minister of Industry, because of substantial exports of metal products abroad. Ukraine's economic transition in 1996 was hindered by an impasse between the country's parliament and the executive branch over key issues of economic reform such as approval of the national budget and terms for the privatization of industrial enterprises. The political stalemate complicated negotiations with major international financial institutions (such as the World Bank and International Monetary Fund) and slowed progress toward improving the legal framework for foreign investment in the country's mineral industries. Despite these problems, the annual rate of inflation in Ukraine decelerated in 1996, to 17.3% versus the more than twofold rise in 1995, and some privatization continued, with the share of state-owned enterprises in industry as a whole dropping to 29.8% by yearend.

Nonetheless, some progress was evident in privatization of Ukraine's mining and metallurgical enterprises and in the establishment of cooperative ventures with foreign companies to develop mineral deposits and upgrade processing technologies. Although Ukraine has been late in comparison to other countries of the former Soviet Union (FSU) to adopt market economy reforms in its mineral sector, there is an apparent economic necessity for change. The country has experienced a prolonged economic downturn following the dissolution of the U.S.S.R., accompanied by low capacity utilization rates (50% to 60% in ferrous and nonferrous metallurgy), and a severe shortage of operating capital and funds for renovations and technological upgrades. Although

investment funds are to be generated from a variety of sources, purportedly first from the enterprises themselves, and from government subsidies, it is clear that over the short term practically all investment resources will need to be generated externally. A Deputy Prime Minister of Ukraine estimated in April 1996 that, of a total of \$40 billion needed by the country in direct foreign investment, some \$7 billion of this would be needed for modernization of the metallurgical industry alone. Despite the fact that 90% of Ukraine's metals output was exported in 1996, according to the country's Minister of Industry, a key problem reducing export volume and potential future earnings remained the substandard quality of the exported commodities.

Ukraine's Cabinet of Ministers enacted a decree governing the activity of foreign investors in the country's economy, "On the Rules Governing Foreign Investment." The decree provides formal state guarantees to protect investments against unwarranted expropriation, unlawful actions by government bodies, and unimpeded rights to transfer income abroad. Enterprises with foreign investment enjoy certain exemptions from customs duties and from taxes on assets brought into the country, as well as a 5-year exemption on the profits tax for enterprises registered before January 1, 1995.

In addition, the State Property Fund in June 1996 announced that 14 major metallurgical enterprises were slated for privatization, with blocks of shares ranging in size from 25% to 51% being tendered for competitive bidding. The enterprises included such major ferrous metallurgical enterprises as the Kryvyi Rih (Krivoy Rog) steel mill, the Dneprospetstal electrometallurgical plant, the Azovstal Metallurgical Combine in Mariupol, and the Zaporozhstal' steel plant in Zaporizhzhya. Although there is no law limiting the percentage share of a company registered in Ukraine that can be foreign owned, the Ukrainian parliament attempted to block the plans of the State Property Committee to sell large blocks of shares in strategic enterprises to foreign investors, and the State Property Fund itself announced in the autumn of 1996 that the state would continue to hold a controlling block of shares in those companies deemed to be "strategic," including precious metals producers. In industry overall in 1996, the share of wholly state-owned enterprises had dropped below 30% at yearend.

In 1996, the country's Minister of Industry unveiled the basic outlines of a draft National Development Program for the Mining and Metallurgical Complex of Ukraine to the Year 2010. The plan, which focuses on the ferrous metallurgical sector, calls for a measured approach to halting the decline in output, for technological renovation, for the introduction of new

<sup>1</sup>References will be provided by the author upon request.

product lines (e.g., new types of ferroalloys), and for energy-saving equipment and procedures, while at the same time eliminating excess capacity, closing unprofitable enterprises, and reducing levels of pollution. Emphasis also is placed on attaining quality certification for Ukrainian exports on international markets.

Ukraine's mineral industries played a major role in the country's foreign trade activity in 1996. Metals and metal products were estimated to have accounted for roughly one-third of the country's exports by value, with ferrous metals alone comprising a 23.4% share. Most Ukrainian exports (54% of the total for all commodities) were directed to the countries of the FSU, with almost 40% going to Russia alone; the countries of Eastern Europe also were important customers, especially with respect to steel exports. Just over 61% of Ukraine's imports were from the FSU; in the commodity composition of that trade, just over one-half (52%) consisted of oil and natural gas. Two leading exporters to Ukraine were Russia (42.5% of Ukraine's imports, predominantly of oil and natural gas) and Turkmenistan (4.9%, predominantly natural gas). Raw materials imported into Ukraine for processing, including crude oil and metallic ores through tolling arrangements, were valued at over \$1.4 billion in 1996; over one-half of this consisted of mineral fuels, oil, and oil products.

According to an analysis by PlanEcon, Inc. V. XIII, Nos. 13-14, April 30, 1997, p. 13, Ukraine's dependency on imported mineral fuels contributed substantially to the country's \$4.1 billion trade deficit in 1996. Ukraine currently has the largest negative trade balance with Russia of any Commonwealth of Independent States (CIS) country and cumulative arrears at yearend stood at 2.38 trillion rubles for natural gas and 35.6 billion rubles for oil. However, much of Ukraine's overall 1996 trade deficit was offset by a surplus in "nonfactor services" of \$3,959 billion—largely transit fees paid by Russia on the use of pipelines for delivery across Ukrainian territory of natural gas and oil to Western Europe.

At yearend, the Ukrainian government issued a decree abolishing the special exclusive export status granted to particular enterprises producing metals, coal, electricity, natural gas, and oil/oil products. It is now possible for any company to export these commodities providing export contracts are registered with the Ukrainian Ministry of Foreign Economic Relations. As in the case of a similar move in Russia, the decree is designed to break the power of monopolies and to increase overall export volume and thus collection by the state of export duties. A customs duty of 30% was imposed on exports of ferrous and nonferrous scrap in May 1996, a move that the Government deemed warranted to ensure scrap availability for Ukrainian mills (and to increase customs revenues), but which Ukrainian steel producers attempted to circumvent by concluding tolling arrangements with European Union (EU) partners for scrap processing.

Ukraine's iron and steel industry in 1996 began to show signs of stabilization after a 60% decline in output over the period 1990-95. Production of crude steel rose slightly, to 22.3 million metric tons (Mt) from 21 Mt in 1995; rolled steel output rose to over 17 Mt from 16.6 Mt; and steel pipe production increased

by 25% to 2.0 Mt from 1.5 Mt. Nonetheless, most of Ukraine's 26 major iron-steel-industry enterprises continued to report serious problems involving a lack of operating capital and nonpayments by principal customers (often necessitating barter arrangements), low capacity utilization rates, and rising prices for critical inputs, such as iron ore, ferroalloys, and energy (energy costs at some plants reportedly accounted for as much as one-half of total production costs). Rail freight charges in the economy as a whole also more than doubled in 1996, but this was less than the reported sixfold increase in 1995. In steelmaking, 55% of production was from open-hearth furnaces, 43.5% from oxygen converter furnaces, and the remainder from electric-arc furnaces. Continuous casting accounted for only 12% of output. Energy consumption per unit output of rolled stock reportedly exceeded that of Japan by over 30%. Despite these problems, Ukraine's Ministry of Statistics stated that the output of technically advanced products—such as oxygen-converted steel, billets produced by continuous casting machines, and cold-rolled sheets—increased in 1996.

Continued depressed demand for steel products domestically was an important factor promoting exports of nonferrous metallurgical products. For example, production volumes in Ukraine's machine-building and metal-working industry, a major consumer of iron and steel products, dropped by 26% in 1996 and the level of construction activity fell by 34%. In Ukraine, the quality of steel generally was not high enough to receive international certification and therefore had to be sold at a discount on the international market. Ukraine was reported to have exported large quantities of steel to Russia at prices 10% to 20% below those charged by Russian producers.

As in other sectors of the country's minerals industry, in the ferrous metallurgy sector producers have viewed privatization and collaboration with foreign partners as one of the few viable means of raising operating capital and financing plant upgrades and renovation. A large percentage of the privatization initiatives now being undertaken in the Ukrainian minerals industry involve iron steel and ferroalloys producers. In addition to privatization, consolidation of companies also is being promoted by the government as an efficiency-boosting measure. An example of this trend involves the vertical integration, approved by the Ukrainian government in September 1996, of three of the country's largest iron steel enterprises in the Kryvyy Rih basin—the Kryvyy Rih metallurgical plant, the country's largest steel producer; the Kryvyy Rih State Central mining and beneficiation combine, a major iron ore producer; and the Kryvyy Rih coke-chemical plant.

After privatization is complete, consolidation also is being considered in the case of the two major iron and steel plants in the southern Ukrainian city of Mariupol—the Azovstal iron and steel metallurgical combine and the nearby Mariupol "Il'yich" iron and steel works. In both plants, privatization plans, according to officials of the State Property Fund, call for the state to retain 51% of the authorized capital, and, according to the country's Minister of Industry, the plants may be amalgamated upon approval of their privatization plans. Azovstal's privatization was approved by the Ukrainian Cabinet of Ministers in November, at which time the Il'yich works plan

was still under consideration.

The Kirov metallurgical combine in Makeyevka and the German firm Sket from Megdeburg in the former East Germany announced the formation of a consortium in December 1996 to operate an existing steel mill and to complete reconstruction work on another mill. The new arrangement represents the continuation of a project financed by a loan from the German government in 1992. The existing mill, currently operating at only about one-half capacity, is a major producer of wire stock; the upgrading of the output of this mill for international certification is one of the specific provisions in Ukraine's National Program for the Development of the Mining and Metallurgical Complex (henceforth, "draft program"). Reconstruction of the second mill, which produces rolled steel, also was a priority in the draft program, but had been suspended temporarily because of depletion of the original credit.

At the Khartsyzk pipe mill, one of the FSU's largest producers of large-diameter pipe for the oil and gas industry, representatives from 13 Ukrainian and Russian metallurgical plants signed an agreement to form a transnational consortium, known as Trubtrans, to manufacture large-diameter (1,020; 1,220; and 1,420 millimeter (mm) pipe. Officials at Khartsyzk also announced that three Western companies had advanced to the second round of a tender to supply equipment for the manufacture of 914- to 1,067-mm diameter pipe. The tender is part of a comprehensive upgrade at the pipe mill planned to cost over \$70 million. The mill, which also produces tubing for refrigeration and hydraulic systems, was reported as operating at only a fraction of its design capacity in 1995.

Privatization and foreign investment activity also were reported to be under way at two of the country's three (Nikopol', Zaporizhzhya, and Stakhanov) ferroalloys plants. Officials of the State Property Fund announced at yearend that the Nikopol' ferroalloys plant, which was reported to have extremely low reserves of working capital, was slated for privatization as soon as its assets could be reappraised. Nikopol' is one of the largest producer of manganese ferroalloys in the CIS, reflecting the large reserves of manganese at the Nikopol' deposit. The plant recently has been operating at only one-half of its designed capacity of over 1.2 million tons per year of silicomanganese and 250,000 tons per year of ferromanganese; exports, which constitute 80% of Nikopol's total output, have been hampered by high production costs, associated with expensive manganese concentrate, coke, and electricity bills that have been passed on to consumers.

At the Zaporizhzhya ferroalloy works, the first stage of a four-stage modernization program was completed, with installation and commissioning of two of eight planned furnaces. The Swedish-Swiss concern Asea Brown Boveri and Germany's Demag AG have concluded an agreement to supply hydraulic and automated control systems for the furnaces as part of plans to upgrade the plant's manganese ferroalloys division by the year 2000. Privatization at Zaporizhzhya also was under way; to date the state still is reported to own 68% of the plant's authorized capital.

Despite the present difficulties faced by the country's iron and steel plants, the raw material base for the industry remains

substantial. Ukraine's Minister of Industry noted in 1996 that "balansovyye" reserves of iron ore were 32.9 billion tons. According to the Soviet reserve classification system used by Ukraine, "balansovyye" reserves represent the economically exploitable portion of the reserves in categories A, B, C<sub>1</sub>, and C<sub>2</sub>. The Soviet reserve classification system, however, is not comparable to systems used in market-economy countries, as it did not apply market-economy criteria in assessing reserves as having to be profitable in existing market conditions using existing technology. In addition, Ukraine contains roughly four-fifths of FSU's manganese reserves, and the world's second largest proven reserves (almost 2.5 billion tons) of manganese. Proven reserves according to the Soviet reserve classification system are all reserves in categories A, B, and C<sub>1</sub>. Proven reserves are roughly comparable to the concept of measured and indicated reserves as defined in U.S. Geological Survey Circular 831, 1980.

Iron ore production in Ukraine, centered in the Kryvvy Rih basin, fell by over one-half over the period 1990-95 from 104 Mt to 51 Mt. The corresponding decrease in production of iron ore concentrate was from 77 Mt to 36 Mt. In 1996, iron ore output was reported to have decreased slightly, but no reported number was available for this report. However, Ukraine's Minister of Industry indicated that iron ore output for the first 5 months of 1997 was increasing more rapidly and was 8% higher than for the same period in 1996. Roughly three-quarters of the country's iron ore comes from open pits. Two large surface mining and beneficiation complexes (GOKs) in the Kryvvy Rih basin—Tsentralnyy (Central) and Severnyy (Northern)—were among the companies listed by the State Property Fund for privatization in 1996. The privatization plan for the Severnyy GOK is to feature a tender of 25% to 26% of shares to investors as part of its planned conversion to a public-stock company. Severnyy is Ukraine's largest producer of iron ore pellets and its second largest producer of concentrate.

The Tsentralnyy GOK is slated to auction off over 26% of its shares, although one-third of the total number of shares will remain a state holding. The Tsentralnyy GOK, with one of the country's largest iron ore mining operations, provides an example of the problems confronting iron ore producers. According to its director, the open pit will need roughly \$80 million over the immediate future to modernize and upgrade mine transportation facilities and finish the upgrading of its pelletization plant. Output of core products now is only one-half the level of 1990, and almost all of the plant's output in 1995 was bartered for key inputs, given a working capital deficit of \$47 million. The mine was reported to have exported over one-half of its output in 1996 (compared to one-quarter for Silvern), largely to the Czech Republic, Poland, and Slovakia. Ore reserves, despite current operational problems, remain substantial and have attracted the interest of foreign investors. As mentioned earlier in this report, plans announced in September call for the Tsentralnyy GOK to be integrated with a steel mill and coke chemical plant.

In the summer of 1996, the Japanese firm Komatsu concluded an agreement to supply \$19 million worth of equipment (heavy trucks, bulldozers, graders) to the Tsentralnyy, Silvern, and

Novokrivozrozhsky GOKs. In September 1996, another Japanese company, Sumitomo (later joined by Marubeni), signed a protocol of intent to supply the Severnyy, Poltaviskiy, and later the Inguletskiy (Ukraine's largest concentrate producer) GOKs with roughly \$30 million worth of road construction and mining equipment.

The Marganets manganese mining association of Ukraine (one of Ukraine's two major manganese mining and beneficiation complexes) also was identified as an original participant in the Sumitomo project, but was not identified as such in later reports on the project. Later, in 1997, the State Property Fund announced that a 57% block of shares in Marganets was to be offered for investment in a noncommercial tender to holders of privatization certificates in lots of 10%, 25%, and 22.68%. Marganets currently is operating at roughly 60% of capacity because of a shortage of working capital. Output of manganese ore at Marganets and Ordzhonikidze (the county's other major production association) was reported to have decreased in 1996, but the actual production numbers do not appear to have been reported. In 1995, production of manganese ore was reportedly 3.2 Mt.

An additional element of the draft program for the Ukrainian mineral industry is the production of new types of ferroalloys in the country (ferrochromium, ferrotitanium, ferrovandium), utilizing excess capacity currently existing at ferroalloy plants (current output of 1.5 Mt is down from 2.4 Mt in 1990). The alloying materials chromite and vanadium would have to be imported from other countries with their major producers in the FSU Kazakstan and Russia, respectively. With this in mind, the Ukrainian government in 1996 approved plans for development of the Novobuzhia chromium-magnesite deposit, associated with ultrabasic massifs in the central Pobuzh region.

In addition to the factors constraining output of the major ferrous metals industries in Ukraine, the country's nonferrous metallurgical sector, with the exception of titanium and magnesium, faces the additional problem of an inadequately developed raw material base, and thus, dependence upon imported raw materials. Privatization began at Ukraine's Mykolayiv (Nikolayev) alumina refinery, operating entirely on the basis of imported bauxite, in late 1996, when the State Property Fund officials announced that a majority share of the company would be transferred from state ownership to employees and management personnel as part of the enterprise's privatization plan. As of May 1997, the Government had approved plans to distribute and sell 28% of the plant's total shares via investment tender in blocks of 15%, 9%, and 4%.

Capacity at Mykolayiv (1.2 Mt), which was originally constructed with all-U.S.S.R. needs in mind, is considerably greater than that needed to supply Ukraine's only primary aluminum smelter (110,000 metric tons (t) of aluminum capacity) at Zaporizhzhya. Therefore, the bulk of its alumina output (960,000 tons in 1996) is exported to major Russian smelters at Bratsk and Krasnoyarsk in East Siberia. The smelter at Zaporizhzhya was operating at 88% of capacity in 1996 because of power shortages. It was reported to have exported 84% of its output abroad, principally to Belarus, Hungary, Italy, and Japan. At the end of 1996, the State Property Fund

announced that the smelter's privatization plan was to be submitted to the Cabinet of Ministers for approval; it reportedly reserved only 25% of the authorized capital in state ownership. A contract concluded in 1993 with Italy's FATA company to construct a foil mill was suspended temporarily because of inadequate funding; the sale of two blocks of shares (20% and 26% respectively) via tenders was being organized in order to raise the necessary additional funds to complete the project.

Ukraine moved one step closer to the establishment of a domestic gold mining industry with the announcement in December 1996 that a memorandum of understanding had been signed between Australia's Renison Goldfields Consolidated Ltd. (RGC), the Ukrainian government (Ministry of Industry, State Property Fund, and State Committee on Geology and Mineral Resources), and the local government of Zakarpatska Oblast to form a joint venture to explore and develop the Muzhievskoye gold/polymetallic ore deposit in far western Ukraine. RGC was expected to commit \$30 million to the venture, which is to include the construction of an underground mine and facilities and to conduct further exploration of the related polymetallic ores, which are believed to contain commercially promising quantities of lead and zinc. The first output is expected some time in 1998 as part of a state program, known as Zoloto Ukrainy (Gold of Ukraine), for Ukraine to mine up to 600 kilograms of gold annually. Other regions of Ukraine noted by Ukrainian officials as having gold development potential include the Precambrian Shield (Pobuzh, Kirovohrad, and central Dnipro regions) and Donets Basin (Nagol'nyy area).

The Khlorvinyl Industrial Association at Kalush in western Ukraine was the country's sole commercial producer of magnesium in 1996, utilizing brine feedstocks derived from a fertilizer plant processing materials from the Ivano-Frankivsk potassium-magnesium deposit. In August 1996, it was announced that Khlorvinyl, together with a number of Russian magnesium producers, had reached agreement with the EU on an export regime that would free these producers from antidumping duties imposed in 1995.

Ukraine remained an important world producer of titanium ore concentrate (ilmenite and rutile) in 1996, despite the continuation of weak domestic demand that forced producers to divert much of their output to the world market. Ukraine was the only FSU republic that mined titanium ore. Mining occurred at placer deposits in the Irsha region of Zhytomyr Oblast (ilmenite), and in the Verkhnedneprovsk region of Dnipropetrovsk Oblast (ilmenite, rutile, and zirconium). Mine output from these two regions supported domestic sponge production at the Zaporizhzhya titanium-magnesium combine (ZTMC), pigment production at plants at Sumy and Armyansk in Crimea, as well as output at metallurgical facilities in Russia and Kazakstan. Sponge production at Zaporizhzhya was terminated during the mid-1990's, apparently because of financial difficulties following the collapse of the U.S.S.R. Work is now in progress in cooperation with the Titanium Institute to reconstruct sponge production capacity at ZTMC in order to increase the quality and homogeneity of the product for international certification purposes.

Foreign investment was occurring in the titanium raw materials industry as Pennwood Technology, a U.S.-based company, began to supply equipment to the Irsha mining complex under a 5-year, \$6 million program to increase the efficiency of ilmenite recovery from concentrator wastes and develop new deposits from the central portion of the new Mezhdurechensk field to be mined by the Irsha complex. Pennwood will market up to 70% of the titanium mineral derived from tailings at Irsha on behalf of the Kerr-McGee Corp. of the United States.

Ukraine possesses a rather broad range of industrial minerals in amounts that generally are sufficient for most domestic needs as well as for export. The country's resources of some industrial minerals such as graphite appear to be substantial and Ukraine was the major producer of graphite in the FSU. Despite this fact, output of several industrial minerals decreased in 1996 relative to 1995, reflecting continuing weak domestic demand resulting from the general decline in the Ukrainian economy. Output of caustic soda and soda ash, important feedstocks in the chemical industry, was reported as falling by 20% to 30% in 1996 compared with 1995, with even more precipitous declines in building materials such as brick falling by 35.7% to 2.1 billion units, cement falling by 33.7% to 5.04 Mt, and reinforced concrete production falling by 50%.

Interest increased in 1996 in the possibilities for identification and development of diamond reserves in Ukraine, as Ukrainian geologists reported discoveries of diamond deposits in kimberlite pipes along a 250-kilometers extent of the country's Sea of Azov coastline, in southeastern Donetska Oblast, and along the Dnipro and Buh rivers. This was followed in 1997 by talks between officials of Ukraine's State Geology Committee and representatives of De Beers Consolidated Mines, Ltd. of South Africa regarding further exploration for diamonds along the Azov littoral.

The country also has three major deposits of garnet, two of which currently are in production. One deposit is being worked for the production of gem quality garnets, with the other being mined for industrial uses. Plans are to increase production in order to substitute garnet for more expensive commodities in industrial uses and to expand exports.

Output of primary energy in standard fuel units (7,000 kilocalories) fell by 11% in Ukraine in 1996 compared with 1995, primarily reflecting a 16% decrease in coal output to 70.3 Mt, which accounts for two-thirds of the structure of primary fuel and energy resources. Production of coking coal also declined in 1996, by 9.4% to 26.7 Mt. Oil and gas condensate production remained about the same as in 1995 at 4.1 Mt and natural gas output increased by 0.2% to 18.4 billion cubic meters. A 20% decline in refinery output to 13.5 Mt reflects reductions in processing imported crude oil, as domestic output could supply only a small percentage of the country's refinery throughput.

In the hydrocarbon sector, Ukraine's Ministry of Statistics reported that 36 new oil and 39 natural gas wells were drilled in 1996. A recent focus of oil exploration activity has been the Crimean Peninsula, with subsidiaries of Canada's Epic Energy, Inc. and Niko Resources concluding an agreement in the first

half of 1997 to conduct a joint-exploration program over an 11,000-sq. mi. onshore tract. A number of prospects have been identified and Niko has agreed to fund drilling at two prospects. A subsidiary of Epic has entered into a production-sharing agreement with the local Krymgeologiya enterprise.

As in the case of oil, imports continue to be the major source for meeting Ukraine's needs for natural gas, with domestic production covering only roughly 20% of demand. Major consumers include industry, particularly the metallurgical sector, and the electric power industry, where natural gas (or boiler fuel) typically is used to boost generation at coal-fired powerplants. Researchers at the Ukrainian Academy of Sciences indicated in early 1997 that 115 gas deposits were being worked and another 71 were ready for development. Aggregate A + B + C<sub>1</sub> reserves were estimated at 1.12 trillion cubic meters. The State Program on "Ukrainian Oil and Gas to 2010" envisages that development of these reserves will make it possible for output of natural gas to rise from 18.4 billion cubic meters (bcm) in 1996 to 26 bcm in 2000, 28 to 29 bcm in 2005, and 30 to 35 bcm in 2010. However, projected natural gas demand by 2010 is 70 bcm, so imports will continue to figure prominently in the country's future supplies.

Only 3 of the country's 33 coal production associations met their plan targets for coal production in 1996, and enterprise capacity utilization rates in the coal industry averaged only 56%. The Ukrainian government attributed nearly half (5.3 million tons) of the decline in output in 1996 to downtime brought about by strikes. The Ukrainian government has a policy to downsize the country's coal industry by cutting subsidies to uneconomic and/or dangerous mines.

Coal is the only energy resource that Ukraine possesses in sufficient quantities to cover its needs for the foreseeable future. The main deposits of hard coal are concentrated in the Donetsk and Viv-Valine Basins, and the main lignite deposits are located in Dnipropetrovskaya Oblast. Total hard coal reserves (A + B + C<sub>1</sub> + C<sub>2</sub> categories) recently were estimated at 52.6 billion tons by two researchers at the Ukrainian Academy of Sciences, of which 31% was reported to be of coking grade and 11.5% consisted of anthracite; 48.5 billion tons (92%) of these reserves lie in the country's main producing basin, the Donetsk (Donbas), which accounts for a similar share of the country's hard coal output. It was revealed that the Donbas's 242 coal-producing enterprises worked 65 seams in the basin in 1995; average seam thickness was 0.9 meters and average seam depth was 690 meters. The Viv-Valine Basin contains 1.4 billion tons of "balansovyye" reserves, extracted by 15 mines in 1995. Average seam width was reported to be similar to that of the Donbas, but average depth was 440 meters. Lignite reserves currently are estimated at 2.2 billion tons and are extracted from five underground mines and six open pits in Zhytomyr, Cherkassy, and Kirovohrad oblasts. Most of the 2.3 million tons of lignite mined in 1995 was used in power generation and pellet production.

At the end of 1996, the World Bank approved a lending agreement that would allocate \$300 million to Ukraine in two tranches of \$150 million. This was followed in April 1997 by the announcement of a project to address social issues connected

with the restructuring of the Ukrainian coal industry, to be implemented as a part of the European Union's TACIS (Technical Assistance to the CIS) program. The World Bank loan is to be used to assist the Ukrainian government in supporting selected coal-industry enterprises, phasing out production at others, providing social support for miners (unemployment compensation, training for new occupations, divestiture of social services once provided by coal-industry enterprises to local government bodies), technological upgrades and the installation of less environmentally damaging technologies, etc.

In addition to money offered by international lenders, the Ukrainian government continued to allocate subsidies to the coal industry—\$474 million over the period September 1995-September 1996 according to a Deputy Prime Minister. It also extended a \$68.2 million loan to state-owned electric utilities to facilitate purchases of coal and guaranteed 81.5 million hryvni of loans from commercial banks to coal-mining enterprises for mine maintenance and expansion work. In addition to subsidies, the coal industry also will continue to receive tax relief from the state; no value-added tax is to be levied on coal until 1999.

A state interdepartmental commission on socioeconomic issues in Ukraine's coal-mining regions, however, indicated that plans to shut down 53 uneconomical coal mines in 1996 as part of the coal-industry restructuring program coordinated with the World Bank loan were too severe and recommended that it be revised. In fact, only 25 such mines were transferred to the state *Ukrvuhlesrestrukturizatsiya* company in 1996; the latter body is charged with operating mines until they can be closed or drastically restructured. Only two mines were actually closed in 1996.

The Ukrainian Cabinet of Ministers in early 1997 approved a plan featuring a differentiated approach to the issue of mine restructuring and/or closure. According to the plan, the country's coal mines are to be grouped into four categories: (1) 76 profitable mines that are not to be directly subsidized, (2) 125 mines that officials believe will be made profitable in 1997 through controlled subsidization, (3) 37 mines operating at only a very low percentage of capacity, that are "subject to closure in the medium-term," and (4) 38 mines that will be transferred to *Ukrvuhlesrestrukturizatsiya* for near-term closure or reorganization.

Widely varying projections of future coal output have been offered to the year 2005, ranging from optimistic ones of up to 150 Mt (assuming an uninterrupted program of new mine construction and modernization) to as low as 30 Mt (assuming an end to all subsidies and the absence of outside funding). Critics of current state policy point to a number of problems suggesting a lower-range scenario. These include increases in rail freight charges for shipping coal to market (5.3-fold increase in 1996), an increase in prices for materials and equipment used by the industry (by 2 to 4 times) that outstrips the increase in the price of marketable coal (by 1.6 times), and rates of labor productivity (output per miner) that are only one-half that of Kazakhstan and Russia. Because of such productivity differentials, Ukraine continued to import some coal from

Russia and Poland, reflecting the fact that some grades of coal have been cheaper to purchase abroad than to produce domestically. In fact, recent years have seen a strengthening of Ukraine's role as a net coal importer within the CIS. Coal exports from Ukraine to other CIS countries fell from 4 Mt in 1994 to 2.4 Mt in 1996, at the same time that Ukraine's coal imports from CIS countries rose from 7.5 Mt to 16 Mt.

The coal industry currently is experiencing a liquidity crisis in which accounts payable (4.7 billion hryvni in early 1997) are roughly double accounts receivable (2.5 billion hryvni); the enterprises' back wage bill alone is 1.3 billion hryvni. Funds allocated by the Ukrainian Ministry of Finance to alleviate the liquidity problem have not always been disbursed on time. As a consequence, most enterprises have virtually no funds with which to finance ongoing mine construction work or to effect renovation and repair of equipment and aging infrastructure. This deficiency is compounded by the fact that it follows a late-Soviet-era policy of reducing investment in coal production in the Donets Basin in favor of increasing extraction of cheaper coal in other locations, such as the Kuznetsk and Kansk-Achinsk Basins in Siberia and at the Ekibastuz deposit in Kazakhstan. According to researchers at the Ukrainian Academy of Sciences, 80% of the mines in the Donbas have been operating at least 20 years without any appreciable modernization or renovation, and no new mines in the Donbas have been constructed in 25 years. As a consequence, nearly one-third of the hoists, 42% of the compressors, and 48% of the primary ventilation fans in Ukraine's underground coal mines are in need of immediate replacement.

Electric power production in Ukraine fell by 5.7% overall in 1996, to 181 billion kilowatt-hours; declines in thermal and hydroelectric power generation, by 17% and 13%, respectively, were offset by an increase of 13% in nuclear power generation. Ukraine's only producer of uranium concentrate, the Eastern ore mining and enrichment plant (*VostGOK*) in Zheltyye Vody, reported that it had managed to increase the content of uranium metal in the ore it mined by 10% in 1996 and signed an agreement to supply an undisclosed quantity of uranium concentrate to the German subsidiary of the U.S. company Nukem beginning in September 1996. Half of the hard-currency revenues from the contract's implementation is to be allocated on new equipment for the South Ukraine reactor at *Konstantynivka*. *VostGOK* is able to provide for 40% of the fuel needs of the Ukrainian nuclear industry, the rest being met by purchases from Russia. Ukraine also signed in September 1996 a draft agreement with Russia, Slovakia, and the Czech Republic on cooperation in the transport of nuclear materials. Under the terms of the agreement, Czech uranium concentrate will move through Ukraine to Russia, where it will be used in the production of fuel elements, some of which will be transported back to the Czech Republic through Ukraine. Russia and the Czech Republic will bear responsibility for any accident involving the material in transit on the territory of Ukraine and must answer any claim for damages. Environmental inspectors are to routinely monitor the rail shipments at Ukraine's borders.

Ukraine, although late compared to the other CIS countries,

has begun the process of transforming its mineral industries to market oriented production through rationalization, privatization, and attracting foreign investment. It has begun the process of rationalizing production by integrating enterprises in the iron and steel sector and by reducing subsidies to and closing unprofitable coal mines. The country is also perusing development of new resources which can generate wealth such as gold or reduce the trade balance such as oil.

The movement towards rationalization through integration could position Ukraine to compete more successfully on world markets. This could occur provided that the integrated facilities are more cost-effective producers capable of producing high quality and value-added products with which they can establish a competitive niche on world markets. Given that Ukraine possesses practically all of the components to produce ferrous metals and products made of them including iron ore and manganese mines, steel mills and ferroalloy plants, and a large machinery manufacturing sector as well as possessing rail lines and ports for exporting products to world markets, further integration is possible and could provide a competitive advantage. Other sectors, particularly the coal sector, are seeking to be competitive by eliminating uneconomic facilities. Although this is a painful process, it should in the long run improve the viability of the coal industry.

Both rationalization and downsizing would be greatly aided if adequate investment funds were available to modernize enterprises in this process, and these funds are available only from foreign investors. Foreign investment is needed as well to develop new deposits such as gold and diamonds and Ukraine seems on its way to succeeding in attracting investments in these developments.

However, all of these processes require the Ukrainian government to continue to implement programs and legislation that will promote privatization, integration, and foreign investment. Then Ukraine's mineral industry, as is happening with other countries of the FSU will be transformed through the initiative of private investors seeking to own profitable enterprises.

### Major Sources of Information

#### U.S. Commercial Service Office

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#### Ministry of Foreign Economic Relations

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#### Ministry of Economics

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#### Ministry of Energy and Electrification

vul. Khreschatyk, 30  
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#### Minister of Environmental Protection and Nuclear Safety

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#### Ministry of Industry

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Kyiv, Ukraine 252167  
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#### Department of Methodological Assistance for Foreign Investors

18/9 Kutuzov St., Room 621  
Kyiv, Ukraine 252133  
Telephone/Fax: (380-44) 294-4455

#### Programme for Encouraging Foreign Investment

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Kyiv, Ukraine 252054  
Telephone: (380-44) 216-6512  
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#### State Customs Committee of Ukraine

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#### World Bank Field Office (IBRD)

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#### European Bank for Reconstruction and Development (EBRD)

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#### International Finance Corporation (IFC)

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#### International Monetary Fund

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TABLE 1  
UKRAINE: PRODUCTION OF MINERAL COMMODITIES 1/

(Metric tons unless otherwise specified)

Commodity	1992	1993	1994	1995	1996 e/
<b>METALS</b>					
Alumina	1,250,000	1,200,000 e/	1,200,000 e/	1,230,000	996,000 2/
Aluminum:					
Primary	100,000	100,000 e/	100,000 e/	98,000	91,000
Secondary e/	72,000 2/	50,000	40,000	40,000	40,000
Total e/	172,000	150,000	140,000	138,000 r/	131,000
Cadmium	5	7 e/	10	15 r/ e/	25
Ferrous alloys: e/					
Blast furnace:					
Ferromanganese	50,000	40,000	30,000	25,000 r/	30,000
Spiegeleisen	5,000	4,000	3,000	2,500	3,000
Electric furnace:					
Ferromanganese	250,000 r/	140,000 r/	170,000 r/	170,000 r/	190,000
Silicomanganese	1,100,000 r/	735,000 r/	600,000	600,000 r/	650,000
Ferrosilicon	500,000	400,000	350,000	300,000	300,000
Ferro-nickel	100,000	60,000	38,800 2/	38,800	20,000
Other	40,000	30,000	25,000	25,000	25,000
Total	1,990,000 r/	1,365,000 r/	1,183,800 r/	1,133,800 r/	1,185,000
Germanium	20	21 e/	22	22 e/	22
Iron ore	75,700,000	65,000,000 e/	51,300,000	50,400,000	47,600,000
Lead metal	20,000	20,000 r/ e/	15,000	5,000	5,000
Magnesium e/	16,000	15,000	12,000	13,000	13,000
Manganese:					
Marketable ore	5,820,000	3,800,000	2,979,900	3,200,000	3,000,000 2/
Mn content	1,850,000	1,350,000	1,050,000	1,100,000 r/ e/	1,020,000
Mercury e/	100	80	60	60	50
Nickel, mine output, metal content	5,900	3,500 r/ e/	1,400	1,400 e/	1,000
Pig iron	35,300,000	30,000,000 e/	21,200,000	20,000,000	18,000,000
Silicon	1,300	1,300 e/	1,400	1,400 e/	1,000
Steel:					
Crude	41,800,000	32,400,000	23,798,000	23,000,000	22,300,000 2/
Finished	29,600,000 r/	24,200,000 r/	16,900,000 r/	16,600,000 r/	17,100,000 2/
Pipe	5,100,000	3,000,000 e/	1,600,000	1,500,000 r/ e/	2,000,000
Tin e/	4,000 2/	3,000	2,000	2,000	2,000
Titanium:					
Ilmenite concentrates	450,000	450,000 e/	530,000	359,000	420,000
Rutile concentrate	60,000	60,000 e/	80,000	112,000	180,000
Metal, sponge	12,800	10,000 e/	5,000 e/	300	--
Zinc, metal	20,000	15,000 e/	10,000 e/	3,100	3,000
Zirconium concentrates e/	40,000 2/	40,000	40,000	40,000	65,000
<b>INDUSTRIAL MINERALS</b>					
Cement	20,100,000 r/	15,000,000 r/	11,400,000	7,600,000 r/	5,000,000
Graphite	10,000 e/	7,000 e/	5,500	6,000	6,000
Nitrogen; N content of ammonia	3,908,000	3,242,000	3,000,000 e/	3,100,000 e/	3,300,000
Potash; K <sub>2</sub> O content	225,000 e/	200,000 e/	168,000	110,000	100,000
Salt e/	8,000,000	6,000,000	3,940,000 2/	3,500,000	3,500,000
Sulfur, native	800,000 e/	400,000 r/ e/	392,000	310,000	170,000
<b>MINERAL FUELS AND RELATED MATERIALS</b>					
Coal	134,000,000	115,700,000	95,300,000	83,600,000	70,300,000
Coke	27,500,000	25,000,000 e/	17,000,000	15,000,000 e/	13,000,000
Natural gas                   thousand cubic meters	20,900,000	19,200,000 r/	18,300,000	18,170,000	18,400,000 2/
Petroleum, crude	4,480,000	4,250,000	4,200,000 r/	4,100,000 r/	4,100,000 2/

e/ Estimated. r/ Revised.

1/ Table based on information and data available through Mar. 17, 1998.

2/ Reported figure.



TABLE 2  
UKRAINE: STRUCTURE OF THE MINERAL INDUSTRY FOR 1996

(Metric tons unless otherwise specified)

Commodity	Major operating facility	Location 1/	Annual capacity e/
Alumina	Mykolayiv refinery	Mykolayiv (Nikolayev)	1,200,000.
Do.	Zaporizhzhya (Dneprovsk) refinery	Zaporizhzhya (Zaporozhye)	245,000.
Aluminum, primary	Zaporizhzhya (Dneprovsk) smelter	do.	110,000.
Coal:			
Hard	Donets coal basin with about 225 mines produces more than 90% of Ukraine's coal	Donetska (Donetskaya), Dnipropetrovska (Dnepropetrovskaya) and Luhanska (Luganskaya) Oblasts	130,000,000.
Do.	Lviv-Volynskiy Basin produces remainder from 18 mines	Western Ukraine	6,000,000.
Brown	Dneprovskoye Basin	Central Ukraine	7,000,000.
Dolomite	Novotroitskoye, Severskoye mining administrations	Novotroitskoye deposit, Yamskoye deposit	3,000,000 (total).
Do.	Dokuchayevskiy flux-dolomite complex	Yelenovskoye and Stylskoye deposits	
Ferroalloys	Nikopol ferroalloys plant	Nikopol	250,000 (ferromanganese).
Do.	do.	do.	1,200,000 (silicomanganese).
Do.	do.	do.	3,000,000 (manganese sinter).
Do.	Stakhanov plant	Luhansk	NA (ferrosilicon).
Do.	Zaporizhzhya plant	Zaporizhzhya	300,000 (ferrosilicon). 160,000 (silicomanganese). NA (ferrochrome). NA (ferromanganese). 40,000 (manganese metal).
Graphite	Zavalyevskiy graphite complex	Zavalyevskiy deposit	80,000.
Iron ore	Underground mining:		
Do.	Krivbassruda production association with 16 mines	Kryvyi Rih (Krivoy Rog) Basin	30,000,000.
Do.	Ekspluatatsionnaya Mine of the Zaporizhzhskiy iron ore complex	do.	3,500,000.
Do.	Open pit mining: Yuzhniy, Novokrivorozhskiy, Tsentralnyy, Severnyy, Inguletskiy, Poltaviskiy and Kamysh-Burunskiy mining and beneficiation complexes	do.	90,000,000 (total).
Lead, secondary	Ukrtsink plant	Kostyantynivka (Konstantinovka)	70,000.
Magnesium	Zaporizhzhya plant	Zaporizhzhya	10,000.
Do.	Khlorvinil concern	Kalush	20,000.
Manganese ore, marketable	Ordzhonikidze, Marganets mining and beneficiation complexes	Nikopol basin	7,000,000 (total).
Do.	Tavrisheskiy mining and beneficiation complex (under development)	Bolshoy Tomak Basin	
Mercury	Nikitovskiy mining and metallurgical complex	Donets basin	120.
Nickel	Pobuzhskiy mining and metallurgical complex, comprising three open pit mines and smelter	Pobuga region	7,000 (nickel in ferronickel).
Potash	Khlorvinil production association, Stebnik potash plant	Pricarpathian region	300,000 (K <sub>2</sub> O).
Steel, crude	Azovstal plant	Mariupol	7,000,000.
Do.	Donetsk plant	Donetsk	2,000,000.
Do.	Kommunarsk plant	Alchevsk (Kommunarsk)	4,500,000.
Do.	Kryvyi Rih plant	Kryvyi Rih	14,000,000.
Do.	Kirov plant	Makeyevka	4,000,000.
Do.	Il'yich plant	Mariupol	7,000,000.
Do.	Zaporizhzhya plant	Zaporizhzhya	5,000,000.
Sulfur	Sera production association	Rozdol mining complex mines, Rozdol, Soroks, Zhidachev Deposits. Yavorov complex mines. Nemirov and Yazov deposits in (Lvivska) (Lvovskaya) and Kyivska (Kievskaya) oblasts	1,500,000 (total).
Titanium, ilmenite and zircon-rutile-ilmenite ores	Irshanskiy mining and beneficiation complex	Irsha River valley	600,000 (ilmenite concentrate).
Do.	Verkhnedneprovskiy mining and metallurgical complex	Verkhnedneprovsk region	120,000 (rutile concentrate). 40,000 (zirconium concentrate).
Titanium, metal	Zaporizhzhya plant	Zaporizhzhya	20,000.
Uranium	Zheltve Vody complex	Northern part of Kryvyi Rih Basin	NA.
Zinc, secondary	Ukrtsink plant	Kostyantynivka	25,000

e/ Estimated NA Not available.

1/ Old name or spelling, if applicable, given in parenthesis.

2/ Total for both enterprises