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Report to the Chairman, Subcommittee on European Affairs, Committee on Foreign Relations, U.S. Senate

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UKRAINE ENERGY

Conditions Affecting U.S. Trade and Investment

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The Honorable Joseph R. Biden
Chairman, Subcommittee on European Affairs
Committee on Foreign Relations
United States Senate

Dear Mr. Chairman:

As you requested, we examined the conditions affecting potential future U.S. investment in Ukraine's energy sector. Specifically, in this report we provide information on (1) trends and problems related to Ukraine's energy imports and production, (2) Ukraine's energy needs and steps being taken or planned to address them, (3) factors that discourage U.S. trade with and investment in Ukraine's energy sector, and (4) U.S. government efforts to assist in developing Ukraine's energy sector.

Results in Brief

Recent declines in both oil and gas imports and production, decreases in coal production, and public pressure to discontinue the use of nuclear reactors for generating electricity have created an energy shortage in Ukraine. Historically, Ukraine has imported oil and gas to meet its energy needs. About 90 percent of the oil Ukraine consumes and about 75 percent of the natural gas it consumes is imported. The balance is produced domestically. The breakup of the Soviet Union and political tensions with the new Russian Federation have diminished Ukraine's ability to continue relying on imports from the Russian Federation, its primary supplier. Further, Ukraine cannot offset reduced imports with increased energy production because of its recent production declines.

Oil production declined by 62 percent between 1970 and 1990. It further dropped by about 8 percent between 1990 and 1991. Since 1970, gas and coal production also have shown steady declines. Between 1970 and 1990, gas production decreased by about 54 percent, and coal production declined about 20 percent. In 1991 gas and coal production dropped by about 13 percent and 17 percent, respectively, from 1990 levels. According to Ukrainian energy officials, the primary reasons for these declines have been use of inappropriate production technologies, improper maintenance of pipelines, shortages of modern equipment, and insufficient capital.

Ukraine needs both foreign investment in energy production and energy imports to ensure sufficient energy supplies in the future. To halt or slow the decline in oil and gas production, Ukraine is seeking foreign assistance

to rework older oil and gas fields. To increase coal production, Ukraine is also searching for foreign investment to exploit its large coal reserves. To address public reaction to the use of nuclear power for electricity generation, Ukraine is looking for help in safely operating its nuclear facilities. And to attract foreign trade and investment, Ukraine has passed a law on foreign investment and is planning to enter into production-sharing agreements for producing mineral resources.

Despite government efforts to attract foreign trade with and investment in Ukraine, impediments still exist. These impediments include the lack of a bilateral investment treaty and a tax treaty with the United States.

U.S. government agencies have several programs to assist Ukraine's energy sector. For example, the Environmental Protection Agency has agreed to continue implementing several energy-related projects that were under way before the dissolution of the former Soviet Union. The Department of Energy, in conjunction with the European Community and Japan, is creating an international science center in Ukraine that will employ former Soviet nuclear weapons scientists and engineers to enhance nuclear power plant safety. The Department of Energy is also soliciting proposals for projects from the nuclear industry to enhance nuclear power plant safety in Ukraine and other former Soviet republics. The U.S. Trade and Development Program has agreed to provide a grant for a study of the feasibility of power plant conversion in the energy sector, and the Commerce Department has cosponsored a conference on trade with and investment in Ukraine.

Background

The breakup of the Soviet Union in December 1991 brought independence to Ukraine. Ukraine has begun a process of reforming its centrally controlled economy into a market-based economy. Several reforms intended to remove obstacles to trade and investment are currently in various stages of development. These actions include reforming the banking system and creating a convertible currency, developing a legal code for regulating business, establishing a tax system, and developing a method for privatizing state-owned property.

One of the primary goals of U.S. policy in Ukraine and the rest of the former Soviet Union is to support the transition to democracy and a free market economy. Since securing sufficient energy supplies is vital to Ukraine's economic development, U.S. involvement in Ukraine's energy

sector can play an important role in the country's political and economic transition.

Trends and Problems Related to Ukraine's Energy Production and Imports

Ukraine's oil, gas, and coal production are declining, creating an energy shortage. Oil production declined by 62 percent between 1970 and 1990, from 13.9 million metric tons, or about 279,000 barrels per day, to 5.3 million metric tons, or about 106,000 barrels per day. In 1991, oil production dropped further by nearly 8 percent. Natural gas production declined about 54 percent between 1970 and 1990, from nearly 61 billion cubic meters, or about 5.6 billion cubic feet a day, to about 28 billion cubic meters, or about 2.6 billion cubic feet a day. It further declined by 13 percent between 1990 and 1991. Ukraine's coal production fell about 20 percent between 1970 and 1990, from about 207 million metric tons to about 165 million metric tons.[1] Coal production further dropped by about 17 percent between 1990 and 1991. Table 1 shows trends in Ukrainian oil, gas, and coal production.

Table 1: Trends in Annual Rates of Oil, Gas, and Coal Production (1970 to 1991)

Years	Oil (million metric tons)	Gas (billion cubic meters)	Coal (million metric tons)
1970	13.9	60.9	207.1
1975	12.8	68.7	215.6
1980	7.5	56.7	197.1
1985	5.8	42.9	189.0
1986	5.7	39.7	193.1
1987	5.6	35.6	192.0
1988	5.4	32.4	191.7
1989	5.4	30.8	180.2
1990	5.3	28.1	164.8
1991[a]	4.9[a]	24.4[a]	136.0[a]

[a]Includes estimates for fourth quarter.

Sources: The Ukraine: An Economic Profile Through the First Nine Months of 1991, PlanEcon (Washington, D.C.: Nov. 27, 1991); PlanEcon Soviet Energy Outlook (Washington, D.C.: Mar. 1992); and First Comprehensive Energy Overview for Eastern Europe and Fifteen Former Soviet Republics Through End 1991, PlanEcon, Vol. II, no. 1 (Washington, D.C.: Apr. 1992). PlanEcon is a Washington, D.C.-based economic research and consulting organization specializing in countries of Eastern Europe and the former Soviet Union.

Adding to Ukraine's energy problem is the possible loss of nuclear energy power plants, which produce about 25 percent of Ukraine's electricity.

[1]One metric ton is equivalent to 1.1 short tons.

Ukrainian energy officials estimated that in 1991 electricity production would decline by about 20 billion kilowatt hours to approximately 279 billion kilowatt hours, a decrease of nearly 7 percent over 1990 when Ukraine produced 298.5 billion kilowatt hours of electricity. These officials attribute this decrease principally to the reduction in demand resulting from the downturn in economic activity in Eastern Europe. However, they said that electricity production could drop more if public pressure to discontinue the use of nuclear power plants grew.

Following the Chernobyl nuclear power plant accident of 1986, public reaction has focused on closing nuclear power plants in Ukraine. The Chairman of the State Commission for Supervision on Nuclear Safety, while agreeing that Ukraine's four Chernobyl-type reactors should be closed, told us that the remaining nuclear reactors are essential in helping Ukraine meet its energy needs. According to the Chairman, if all of the nuclear power plants are closed Ukraine would have to increase its reliance on fossil fuels to generate sufficient electricity to meet its energy needs. He indicated that the United States might assist Ukraine by helping it develop ways of restoring public confidence in nuclear reactor safety and by providing technical assistance in operating nuclear facilities. Further, the Chairman said that Ukraine lacks the scientific, technological, and monetary support it once received from Moscow. According to the Chairman, the nuclear power industry lacks new equipment, and some older equipment has passed its useful life and needs replacing. He said that purchasing new equipment requires hard currency, which in turn necessitates exporting electricity for cash and keeping the nuclear industry alive.

Reasons for Oil, Gas, and Coal Production Declines

Ukrainian officials attribute the declining oil, gas, and coal production primarily to inappropriate use of production equipment and technologies, improper maintenance of pipelines and shortages of modern equipment, and lack of capital investment.

Inappropriate Use of Production Equipment and Technologies

According to Ukrainian energy officials, Ukraine primarily uses an oil extraction technique called "water flooding," which involves drilling multiple wells and injecting water into certain wells to create pressure barriers that force oil toward designated production wells. While appropriate in some production fields, this technique is used extensively and often inappropriately in Ukraine, according to Ukrainian energy officials. These officials said that this method of injecting water to extract

oil is antiquated and explains, in part, why they are unable to achieve higher production yields.

Western energy experts report that water flooding, employed to increase the initial amount of oil recovered, may eventually result in lower yields from some oil reservoirs. For example, injecting large volumes of water under high pressure may cause the water to channel and reduce the amount of oil eventually recovered. Ukrainian energy officials said that they were only obtaining about 25 to 40 percent of recoverable oil using this technique.

Improper Maintenance of Pipelines and Lack of Modern Equipment

According to Ukrainian energy officials, Ukraine loses large amounts of natural gas during its transmission from production fields to distribution centers and to storage facilities because pipelines are improperly maintained and compressors are lacking. These Ukrainian energy officials said that Ukraine lacks the technology for analyzing the structural integrity of pipelines in order to determine where rust may be present, to dismantle and clean pipes, and to coat pipes with anticorrosion linings. Further, they said that Ukraine has no equipment to detect tiny leaks in pipes. Ukrainian officials indicated that they are using equipment and technology from the 1950s and 1960s.

Similarly, two of the primary reasons Ukrainian scientists attributed to coal production declines were poor quality equipment and the lack of money for new equipment. U.S. Department of Energy officials also said that a major reason for the decline in Ukraine's coal production was that coal fields were old and uneconomical to mine because of the great depths at which coal is located. Further, they said that the coal was found in narrow seams, making extraction very difficult and expensive.

Lack of Capital Investment in the Energy Sector

Ukrainian energy officials we interviewed told us that energy production declines were also directly linked to the lack of capital investment in Ukraine's energy sector. According to these officials, before the breakup of the Soviet Union, Soviet energy officials made little or no investment in recent years in the exploration and production of Ukraine's oil and gas deposits and the construction of new coal mines. Rather, the Soviets invested in more promising prospects in Siberia.

Primary Energy Imports Have Declined

While Ukraine has become increasingly dependent on imported oil and gas supplies, recent political and economic conditions have prevented it from obtaining enough imports to offset production declines. In 1991, Ukraine

imported about 1 million barrels of oil per day from Russia. These imports represented about 90 percent of the oil it consumed. In addition, according to Ukrainian energy officials, in order to meet its annual need for about 120 billion cubic meters of natural gas per year, Ukraine imported about 56 billion cubic meters from the Russian Federation and 39 billion cubic meters from Turkmenistan. The balance was produced domestically. According to the Minister of Environmental Protection, the Russian Federation, the major supplier of oil to Ukraine, has threatened to reduce oil exports to Ukraine because of its own production declines and disagreements over who owns the former Soviet Union's assets.

In 1992, according to PlanEcon, under interrepublic agreements, Ukraine will import about 45 million metric tons of oil, or about 904,000 barrels per day, from Russia and 1.9 million metric tons, or about 38,000 barrels per day, from Belarus. PlanEcon notes that in order to meet its projected need for an additional 4 million or more metric tons of oil, Ukraine will have to either find additional sources of oil or reduce its consumption.[3] In December 1991, the Minister of Extractive Heavy Industry and Energy said that Ukraine was planning to import crude oil from Iran and natural gas from Qatar. According to PlanEcon, Ukraine signed an agreement in February 1992 to import 4 million-5 million metric tons of oil from Iran. Information on natural gas imports for 1992 was not available.

Ukraine's Future Energy Needs and Steps Being Taken to Address Them

According to Ukrainian officials, Ukraine's energy sector needs substantial foreign investment and technology. Ukraine is moving to increase energy production and attract foreign investment in its energy sector.

According to the Minister of Geology, Ukraine is looking for help in reworking older fields, some of which are nearing the end of their productive lives, given Ukrainian extraction methods. The Minister stated that, with U.S. technology, more oil and gas could be recovered from these fields. Several scientists at the State Geological Research Institute said they believed that Ukraine could increase oil and gas production by 10 and 25 percent, respectively, by reworking these fields.

U.S. Department of Energy officials agreed that investment in Ukrainian oil and gas production may reverse declining production of oil and natural gas. However, they questioned the duration of such increases. They said that peak production was reached some years ago and that production

[3]PlanEcon Review and Outlook: Analysis and Forecast to 1996 of Economic Developments in the Former Soviet Republics, PlanEcon (Washington, D.C.: Apr. 1992), pp. 93-94.

rates in Ukraine would continue to decline over the long term. Essentially, they indicated that Ukrainian oil and natural gas accumulations are basically located in the Dnepr-Donets region, an area in which oil has been produced since 1936. Energy officials estimated, based on 1990 data, that the remaining reserves of oil are about 580 million barrels. They estimated that remaining reserves of natural gas are about 28.5 trillion cubic feet.

According to Ukrainian officials, the government is seeking foreign investment in new mine construction and the purchase of new equipment to increase coal production. Ukrainian geologists estimate that Ukraine has about 40 billion metric tons of coal, or enough coal to continue current production levels for 280-300 years. The Minister of Geology stated that no new mine construction has occurred in the Ukraine in the last 10 years.

According to Ukrainian officials, to attract foreign trade and investment, the government in Ukraine's capital, Kiev, will lease the right to produce mineral resources to enterprises under production-sharing agreements. Under these agreements, licenses will also be allowed for foreign investors to develop mineral resources. The Minister of Geology said that on at least an interim basis, ownership of minerals will be retained by the state.

To address the issue of foreign investment, in March 1992 the Ukrainian government passed a foreign investment law that allows 100-percent foreign ownership of ventures, with the exception of certain undefined strategic sectors.

Impediments to Trade and Investment Exist

Although Ukraine has taken some steps to reform its economy and attract foreign business, Ukrainian officials identified the following impediments:

- While Ukraine has adopted its own foreign investment law, the United States and Ukraine currently do not have a bilateral investment treaty. According to State Department officials, the United States is interested in entering into a bilateral investment treaty with Ukraine; however, Ukraine wants to wait until it introduces its own currency before doing so.
- According to Department of the Treasury officials, the United States and Ukraine currently do not have an adequate bilateral tax treaty. These officials said that Ukraine and the United States are adhering to the 1973 U.S.-U.S.S.R. Tax Treaty, but this treaty lacks a provision that would reduce Ukraine withholding taxes on dividends and some types of interest. However, under Ukraine's newly enacted investment law, registered foreign ventures will pay no taxes during the first 5 years of operations.

After this period, they will be subject to a rate set at 50 percent of the local rate.

The U.S. Department of the Treasury has taken the lead in establishing a tax treaty with Ukraine. According to Treasury officials, Ukraine has shown strong interest in a tax treaty. Preliminary talks were held in Kiev on April 27 and 28, 1992, and full negotiations are expected to begin sometime in 1992.

U.S. Government Efforts Under Way to Assist Ukraine's Energy Sector

The United States has taken several steps to assist Ukraine's energy sector. The Environmental Protection Agency and the Ukrainian government have agreed to carry out certain environment-related energy projects that were under way before the Soviet Union split up. These projects included monitoring the impact on the environment of the Chernobyl nuclear reactor accident and controlling the extent of pollution from coal-related industries.

According to Department of Energy officials, the Department, in conjunction with the European Community and Japan, is creating International Science Centers in Russia and Ukraine to redirect scientists and engineers from the nuclear weapons programs of Russia and Ukraine to programs that enhance the near-term operational safety of nuclear power plants. As of July 1992, the Department has reallocated $100,000 of its fiscal year 1992 budget for this purpose.

The Department of Energy is also soliciting proposals from the U.S. nuclear power industry for projects to enhance the operational safety of nuclear power plants in Russia, Ukraine, and Armenia. The primary areas of interest are (1) operational safety improvements of all Soviet-designed reactors, (2) interim key risk reduction actions for RBMK[4] (Chernobyl-type reactors) and VVER 400/230[5] reactors, and (3) performance analyses of plant-specific safety measures and project feasibility studies to determine the needed upgrades to the VVER400/213s and VVER1000.

The U.S. Trade and Development Program has provided a grant, valued at $400,000, for a feasibility study of power plant conversion. The study will

[4]The RBMK is a graphite-moderated, boiling light-water-cooled nuclear reactor.

[5]The VVER is a pressurized water-cooled, water-moderated nuclear power reactor. The three models of the VVER400s are denoted V230, V213, and V318 (under construction in Cuba). The V230 is the oldest in operation and lacks basic safety features. The V213 is the next oldest and also lacks safety features. A newer VVER1000 is also a pressurized water cooled, water-moderated reactor, but contains more advanced safety systems, such as complete containment and emergency core cooling systems.

assess the conversion of a coal-fired plant to natural gas, making use of combined cycle gas turbines.

Also, the U.S. Department of Commerce has cosponsored, with the Illinois World Trade Center Association, a May 1992 conference on Ukraine's political, legal, and business climate. The conference was attended by senior-level Ukrainian government and business officials.

Scope and Methodology

To determine trends in and problems related to energy production and imports, we interviewed officials and reviewed statistical data from the Departments of State, Commerce, and Energy and from the Environmental Protection Agency. We also reviewed petroleum statistics compiled by PlanEcon. In addition, we talked to U.S. experts on Ukrainian energy and officials in the Ukrainian government to obtain information on the declines in Ukrainian oil, gas, and coal production and imports.

To determine Ukraine's energy needs and steps being taken or planned to address them, we visited Ukraine and interviewed officials within the Ukrainian Ministries of Extractive Heavy Industry and Energy, Geology, Environmental Protection, and Power and Electrification. We also interviewed energy experts from other Ukrainian organizations, including the Ukrainian State Geological Research Institute, the Western Ukraine Association of Coal Extraction, the Poltava Institute, the State Committee for Supervision of Nuclear Power Safety, and the Ukrainian Academy of Sciences.

To obtain information on the factors that discourage trade with and investment in Ukraine's energy sector and U.S. government efforts that affect that sector, we interviewed officials from the Departments of State, the Treasury, and Commerce; the Office of the U.S. Trade Representative; and the U.S. Export-Import Bank.

We did our work between October 1991 and July 1992 in accordance with generally accepted government auditing standards.

We discussed the information contained in a draft of this report with responsible officials from the Departments of State, Energy, Commerce, and the Treasury; the Environmental Protection Agency; and the U.S. Trade and Development Program. They generally agreed with the contents of the report. Their comments have been incorporated into the report where appropriate.

As agreed with the Committee, unless you publicly announce its contents earlier, we plan no further distribution of this report until 30 days from the date of this letter. At that time, we will send copies to the Secretaries of State, Energy, Commerce, and the Treasury; the U.S. Trade Representative; the Administrator of the Environmental Protection Agency; the Director of the U.S. Trade and Development Program; and other interested parties. Copies will also be made available to others on request.

Please contact me on (202) 275-4812 if you or your staff have any questions concerning this report. The major contributors to this report were Elliott C. Smith, Assistant Director; Anthony L. Hill, Evaluator-in-Charge; Casey Barrs, Evaluator; and George Logusch, Consultant.

Sincerely yours,

Allan I. Mendelowitz

Allan I. Mendelowitz, Director
International Trade and Finance Issues

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