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Encouraging the successful transition of the former East Bloc into prosperous, market-oriented democracies is the most important long-term foreign policy issue facing the United States. A successful transition can convert former enemies into friendly trading partners and allow reductions in U.S. defense spending. Failure of the transition could have very undesirable implications for the United States, including the rise of nationalistic, authoritarian regimes, the possible resumption of the Cold War, and dangerous international instability.¹

Reforming and revitalizing the energy sector will be a critical factor in the overall transition, and energy technology transfer will be one of the most influential tools the United States can use in support. Russia and several other republics of the former Soviet Union (FSU) have extensive reserves of oil, gas, coal, and uranium that can generate the hard-currency export earnings needed to finance reform in all sectors. Tapping that potential will entail adoption of market-economy business practices as well as the modernizing of facilities, technologies, and techniques in the production and consumption of energy. The result will be a reduction in the present wasteful use of energy and an enhanced ability to develop and produce energy. Most importantly, successful reform in the energy sector can make systemic reform easier by raising

¹ The former East Bloc is **made** up of Central/Eastern Europe and the states of the former Soviet Union (FSU) as shown in figures 1-1 and 1-2. This **report** will focus on former East Bloc countries with significant energy supply and processing industries. In Central Europe, this includes Poland, the Czech Republic, and Hungary. In the FSU, this includes Russia, Ukraine, Azerbaijan, Kazakhstan, Uzbekistan, and Turkmenistan. Other countries, especially Romania, also produce significant amounts of energy, but were beyond the scope of this study.



St. Basil's Cathedral, Red Square, Moscow.

BILL WESTERMEYER

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levels of economic well-being and by providing a model for transition.

At present, almost the entire energy sector faces serious problems. Technology is years behind that of the West. Production facilities and the transportation infrastructure are deteriorating and require massive upgrading. Management frequently is unfamiliar with concepts basic to market economies, such as minimizing costs, finding markets, financing, and customer service. In all countries, energy is an unnecessarily great economic cost because it is used so wastefully. Moreover, pollution from energy production, transportation, and consumption is a large factor in the environmental devastation that affects much of the region.

Revitalization of the energy sector will depend primarily on changes in political and economic decisionmaking in each country. It will involve appropriate pricing of energy and the elimination of subsidies so that proper cost signals are sent to consumers and adequate investment capital is made available to the energy industry. It will entail fair and responsible treatment of both domestic and foreign investors who can bring desperately needed investment, technology, and expertise. This is already happening in some of the Central European countries, especially Poland, the Czech Republic, and Hungary. There, economic recovery is occurring, and people see their economies and political systems increasingly linked to the West.

In the FSU, however, the present economic depression precludes instant reform. People earning \$30 per month simply do not have enough money to pay world market prices for the energy required to stay alive. Many people have yet to see any benefit to reform and, in fact, are starting to blame it for the steep drop in their standard of living. The December 1993 parliamentary election in Russia raised considerable doubt about future political and economic directions.

The spread of corruption and racketeering also seriously undermines prospects for reform, fan-

ning popular discontent over declining living standards and the inequitable distribution of wealth. Corrupt practices pervert efforts to rationalize systems of pricing, supply, management, and economic policymaking.

The West cannot force economic and political reform and revitalization, but it can play a vital role. In the energy sector, the United States can provide advice on sorely needed changes in institutional structures and economic policies. U.S. governmental assistance programs can provide information, training, technology, and direct assistance to energy-related enterprises trying to modernize. Multilateral development banks can stipulate that loans be made only to enterprises and governments that make decisions on a more rational basis. Private industry can provide modern technology through products and services as well as investment in new facilities. Policy advice, financing, and technology can help build a rational, productive, and noncorrupt system of energy supply and consumption that will be a model of economic transformation for other sectors.

The potential benefits to the United States of assisting in FSU energy sector reform are many. Foremost is the reduction in future conflict and geopolitical competition that should redound from political stability and economic prosperity in the former East Bloc. Modernizing energy-related facilities and technologies through technology transfer should also advance U.S. energy and environmental business interests, open up vast new resources of fossil fuels to the world fuel supply, and reduce pollutants that contribute to global warming.

OTA has previously examined the importance of improving the efficiency of energy use in its companion report of 1993.² This report explores the role that the United States can play in revitalizing the energy supply sector. Chapters 2 through 5 examine the need for modern energy technology, especially for oil and gas, coal, nuclear energy,

² U.S. Congress, Office of Technology Assessment, *Energy Efficiency Technologies for Central and Eastern Europe*, OTA-E-562 (Washington, DC: U.S. Government Printing Office, May 1993).

electric power, renewable energy, and pollution control. Chapters 6 through 8 review the political and economic problems that inhibit reform, U.S. and other Western programs intended to overcome these barriers, and possible modifications to U.S. policy to enhance support of national goals. The remainder of this chapter summarizes the report. Figures 1-1 and 1-2 show the region and its major energy resources.

ENERGY TECHNOLOGIES

I Oil and Natural Gas

A major strength of the FSU is its abundant oil and gas resource base. The FSU contains about 7 percent of the world's proven oil reserves and has immense potential for new discoveries. Russia has the lion's share of proven reserves, about 85 percent. Kazakhstan accounts for much of the rest. The gas reserves of the FSU are even more abundant—almost 40 percent of the global total. Russia again has the lion's share. Kazakhstan, Azerbaijan, and Turkmenistan, though less explored, are also well endowed.

The oil and gas sector is critical for the FSU. In individual exporting and importing countries alike, oil and gas are key inputs to economic growth and stability. However, despite abundant resources that supported the growth of the world's largest integrated oil and gas industry, the sector is encountering severe problems. Oil production has fallen by 40 percent over the past 5 years, and gas production has stagnated, in sharp contrast to previous rapid rates of growth. There is little indication of an early recovery in production. This drop, and the resultant drop in exports, is a major economic disaster for Russia. Rehabilitation and development of the oil and gas industry is crucial to the economic recovery of many of the FSU countries, Russia in particular.

The failure of the oil and gas sector is in part due to outdated technology and inadequate investment. Underpinning both is an economic and institutional regime that does not offer adequate incentives to either domestic or foreign investment or encourage the rapid adoption and diffusion of improved technology.

The need for extensive technological upgrading has created expectations among Western companies that the FSU will be a large export market. Oil and gas technology is a generation out of date, and inadequate to meet the challenges of future development. In exploration, seismic equipment is bulky and of low quality. The Russian industry has not benefited from recent improvements in drilling technologies that reduce the cost or risk of exploration. Excessive and premature use of water flooding during recovery has damaged reservoirs. Lack of deep-water offshore technology holds back the development of rich offshore deposits. Pipeline infrastructure faces major problems of technical performance, and equipment is frequently in short supply. Refinery technology is chronically outdated, and does not match current and likely future demands for petroleum products.

However, economic and political factors in the FSU will limit the role of imported technology. The FSU has a comprehensive supply industry that can produce most equipment, often more cheaply, even if inferior to Western technology. Russia in particular has a distinct preference for domestic development and an acute shortage of foreign exchange. There are some areas in which foreign technology has compelling advantages. These include technologies connected with work-overs and rehabilitation of existing wells, advanced drilling systems, offshore technologies, improved compressors, refinery upgrading, and technology transfer to improve the production of oil and gas field equipment currently produced in FSU countries.

The adoption and diffusion of improved technologies will depend on economic and institutional reforms. Until incentives are in place to ensure that technology is correctly and efficiently used, even the best technology will not be effectively deployed.

A major handicap to oil and gas development (especially oil) has been the lack of funds for sector rehabilitation and expansion. After many years of favored status in the investment budget, capital expenditure in oil and gas has been sharply cut in recent years. In principle, the shortfall in central government expenditures was to be met from for-

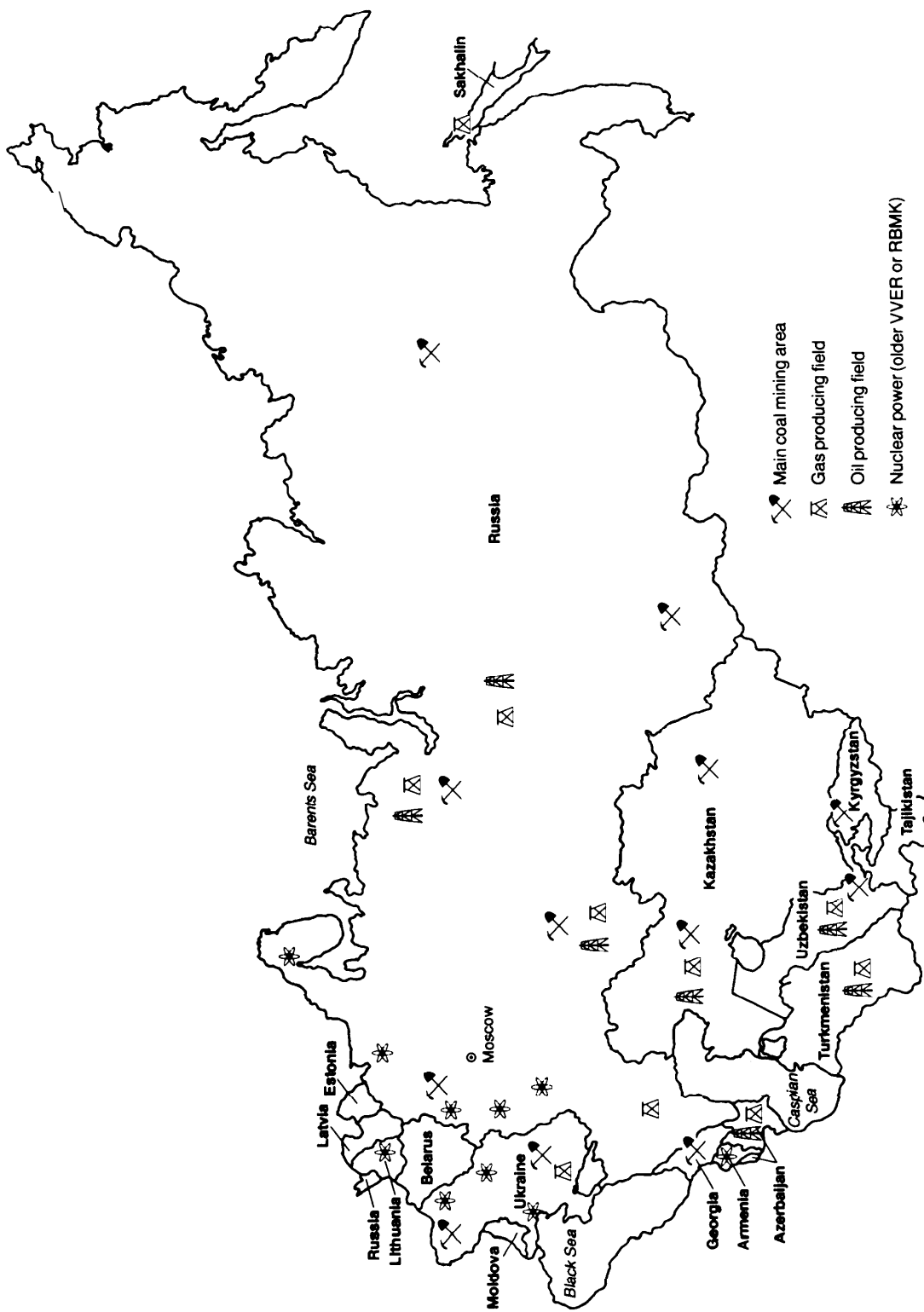
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FIGURE 1-1: Selected Energy Sources in Central Europe



SOURCE Dered from "Atlas of Eastern Europe," Central Intelligence Agency, August 1990.

FIGURE 1-2: Selected Energy Resources in the Former Soviet Union



SOURCE: Derived from "Energy in the Newly Independent States of Eurasia," Central Intelligence Agency, August 9-2

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eign investment and from the surplus revenues of the new operating entities, particularly the production associations. In practice, domestic industry resources have been squeezed by changes in pricing policies. With the continued control of domestic oil prices and the decontrol of other prices, added to higher taxes, production association costs have risen much faster than revenues, thus compressing the surplus available for investment. Moreover, production associations have limited access to hard-currency earnings from their oil exports.

In addition to domestic investment, external financing requirements are also substantial—estimated at between \$5 billion and \$7 billion annually. Although major public sector commitments have been made (through the multilateral development banks and the U.S. Eximbank Framework Agreement), the bulk of the resources for foreign investment in oil and gas must come from the private sector.

Recognizing the need for foreign direct investment and its accompanying technology transfer, Russia made major changes to its rules governing foreign investment. Joint ventures were authorized in 1987, and later changes permitted foreign companies to take majority ownership and control. In response, the international oil industry has shown a high level of interest. There are currently over 100 projects in FSU countries with foreign participants. The projects cover all branches of the sector, all of the oil and gas producing republics, and different sizes of companies of many nationalities. Over half of these projects had U.S. joint venture partners. However, many projects have been making modest progress.

The attractions of FSU countries to foreign investors are strong. Immense resources offer a wide range of opportunities, at low geological risk. Most republics have a trained work force at all levels of expertise, from scientists to oil field workers.

On the other hand, important obstacles block foreign investment. Beyond the high level of political uncertainty, there is as yet no legal and regulatory framework governing oil and gas leasing, exploration, and development. Ownership

rights are hotly contested between the central federation, local governments, and the production associations themselves, causing uncertainty among potential foreign investors about the legality of their agreements and contracts.

Taxes are high compared with those of alternative areas, such as those near the North Sea, and are based on revenues rather than profitability. These taxes are also subject to retroactive change.

Differences in perception between Russian hosts and foreign investors are a significant obstacle to foreign participation. To the Western eye, the need for modern technologies throughout the oil and gas industry is obvious and represents a large export market. The Russian industry and government have different views. Some parts of the industry are eager for new technologies, but others exhibit deep opposition to the involvement of foreign capital in the oil and gas sector. Joint ventures are viewed as necessary only to produce oil that cannot be produced with current Russian technology—hence the offering of depleted or technically difficult oil fields to foreign investors. Many of these perceptual differences stem from differences in business practices. Russians are generally unfamiliar with basic Western business terms and concepts such as accounting, profit, depreciation, risk, market pricing, accountability, quality control, contracts, and liability.

In sum, the rehabilitation of the FSU oil and gas industry offers a tantalizing but challenging prospect for the foreign investor. FSU countries offer exciting, rich possibilities for oil and gas development, but many obstacles threaten these mutually beneficial outcomes. Overall, the picture is mixed, showing some improvement of late but suggesting that the rehabilitation of the oil and gas sector will take more time and care than originally thought.

/ Coal

Coal is an abundant resource in Russia, Ukraine, Kazakhstan, the Czech Republic, and Poland. In recent decades, coal has declined in importance in the Soviet economy, but it is still the major national energy resource (and source of employment) in

Poland, Hungary, and the Czech Republic. For example, in Poland, more than one-half of the residential/commercial sector's energy needs are derived from coal.

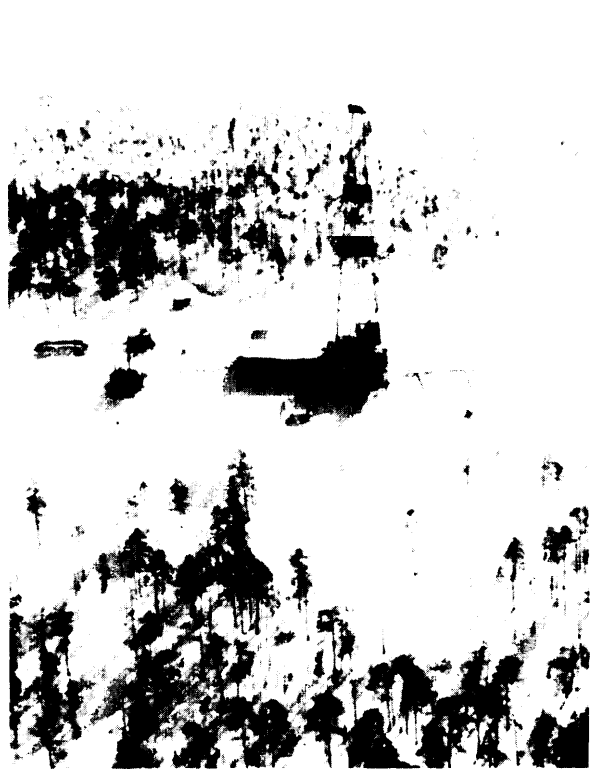
In the FSU, the coal industry is in crisis. Coal production has been declining since 1988 and will probably continue to decline for the near future, owing to equipment shortages, inefficient technologies, labor unrest, and a lack of capital investment in new mine development. Environmental concerns further cloud the industry's future. Coal production has had serious harmful environmental effects, some of which linger long after mines have closed. The widespread burning of low-quality coal is largely responsible for environmental degradation.

Some restructuring of the coal industry has begun in former East Bloc countries, including closure of inefficient mines, price increases, and reduced subsidies. However, the industry is still far from competitive.

Modern Western mining technologies may provide short-term improvements in productivity, efficiency, safety, and environmental impacts. However, Western assistance alone will not reverse the coal industry's downward slide. In the long term, the success of the coal industry will depend on the success of economic reforms. Capital must be invested in mine development and modernization, and labor and transportation problems must be resolved.

Thus far, the U.S. coal industry has not actively pursued former East Bloc markets. The characteristics of the region's coal industry and related problems have hampered foreign investment. Also, differences in mining techniques render much U.S. underground equipment unsuitable for FSU mines. Longwall mining is the principal underground mining technique used in the FSU and throughout Europe. Germany, a leader in longwall mining R&D, is actively marketing its equipment in Central Europe.

The biggest U.S. effort in the FSU has been part of a much larger humanitarian program, Partners in Economic Reform (PIER). With U.S. government funding and coal industry and labor support, PIER administers the Coal Project, which pro-



Idle drilling rig, Raduzhney Siberia,

vides technical assistance and training in health, safety, efficiency, and productivity throughout the coal regions of Russia, Ukraine, and Kazakhstan. This focus is unlikely to change unless former East Bloc countries make a successful transition to a market economy and coal industry problems are resolved.

As reforms are implemented and the coal industry stabilizes, transfer of U.S. coal mining technology may become significant. In the near term, however, U.S. companies might focus on opportunities after the coal is extracted, such as coal cleaning. There has been little cleaning of coal in former East Bloc countries, but U.S. companies have extensive experience in this technology. Over 200 million tons of coal are cleaned each year in the United States to remove ash and sulfur impurities and to increase coal's heating value. Cleaning also reduces transportation costs by removing significant quantities of noncombustible material from raw coal before shipment. Because coal cleaning is relatively labor intensive, new or

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expanded coal-cleaning facilities could provide jobs in areas where mass unemployment looms.

In April 1993, a U.S. firm (Custom Coals Corp.) announced that it was seeking to design, construct, and operate three coal cleaning plants in Poland. One facility will serve three mines, with a capacity of 25 million tons. Another facility will be a fine-coal cleaning plant to produce ultra-clean coal products for home and district heating systems in Krakow.

I Nuclear Energy

The Chernobyl accident demonstrated that Soviet reactors had serious safety deficiencies. Subsequent analysis and inspection by Western experts have confirmed that major accidents are far more likely in these reactors than those of the West because of design problems and poor operation. The greatest concerns are over the graphite-moderated RBMK reactors, such as at Chernobyl, and the oldest pressurized-water reactors, the VVER 440 Model 230. These reactors lack basic safety equipment such as a containment vessel. The RBMK, unlike Western reactors, is vulnerable to an uncontrolled nuclear accident, as happened at Chernobyl.

A nuclear accident could harm millions of people and contaminate vast regions of Europe. As the world's leading manufacturer and operator of nuclear powerplants, the United States has the expertise and a particular responsibility to help reduce this risk. U.S. involvement can also mean U.S. exports, such as the \$434 million sale of equipment and fuel by Westinghouse Electric Corp. to the Czech Republic announced in 1993.

Ideally, the riskiest plants should be closed. However, the power they produce is greatly needed, and none of these countries can afford to build and fuel replacement powerplants. Even Ukraine has decided to defer closing the Chernobyl station on the grounds that the economic necessity outweighs the risk.

It should be noted that the actual level of risk is not well understood. Soviet reactors have some safety advantages, such as a large water inventory in the VVER 440 that slows core heating follow-

ing an accident and allows more remedial action than that of Western reactors. Some experts believe that the newer reactors can be upgraded to safety levels near Western standards. The uncertainty over risk complicates decisions over how soon reactors should be closed. Nuclear assistance is controversial because some critics believe that none of these reactors can be made sufficiently safe and that all should be shut down as soon as possible.

U.S. nuclear assistance funding is rising from \$30 million in fiscal year 1993 to \$100 million in fiscal year 1994. The program has focused primarily on information transfer (e.g., training in operations, regulations). The increase will allow some physical improvements at nuclear power stations. Most attention has been paid to the newer plants on the assumption that the riskier ones would be shut down soon. However, since it appears that these plants will be operated for a substantial period, they will present a disproportionate threat unless near-term safety upgrades are supported. Nevertheless, it also is important not to upgrade them to the point that they are kept operating longer than necessary. No funds are yet being allocated for replacing any nuclear powerplants.

Western companies are concerned that their assistance could lead to liability if an accident occurs at a reactor despite upgrades. This concern is a significant impediment to assistance. Recipient countries may have to limit liability, as have many in the West, because the potential consequences of a major accident are so great.

Concerns about nuclear weapons proliferation have increased because of political and economic instability in the FSU. Analysts fear that with the weakening of central control over weapons and associated facilities, nuclear weapons or materials could be stolen and sold to an irresponsible country or terrorist group. Alternatively, FSU weapons experts could work for other countries.

The United States has already taken steps to reduce this danger, as discussed in other OTA reports. The key issue in this report concerns the use of FSU weapons experts in the civilian nuclear power industry. Many have a technical back-

ground suitable for conducting research and analyzing nuclear reactor safety. Using them for this purpose would serve the dual purpose of increasing safety and reducing proliferation risks.

International science and technology centers have been proposed for Moscow and Kiev. Both have been delayed because of difficulties in getting legislative approval. The Russian institute was started in December 1993 by Presidential proclamation, but it is uncertain how permanent this arrangement will be. An alternative approach would be to increase collaborative R&D activities with existing institutions.

I Electric Power

All countries in the former East Bloc have a substantial and sophisticated electric network. In some countries, electricity is more available than oil and gas because it can be generated from nuclear energy or local coal. Nevertheless, the electric power industry faces many problems, including decrepit generating stations, expensive fuel, poor operations, and massive pollution.

Modernization is badly needed to improve operations, reduce costs, and reduce pollution. In addition to physical plants, utility management and government regulators need training to understand how to operate in a free market environment. Particularly in the FSU, rates are subsidized heavily, so neither utilities nor users see incentives to make optimal decisions.

Several U.S. technologies would be of considerable benefit. Burning coal cleanly will be important in reducing pollution. Flue-gas desulfurization, fluidized-bed combustion, and integrated gasification combined cycle are ways to use coal much more cleanly. These and other technologies may be used widely as the electric sector modernizes, if financing is available.

Demand-side management (DSM) could also become important in countries that base rates on costs. Utilities work with their customers to reduce waste so that the construction of new plants will be minimized. Since capital is scarce and demand for electricity will soar as economies re-

bound, DSM may be critical in preventing shortages.

The U.S. assistance program has created partnerships between U.S. utilities and their Central European and FSU counterparts. The partners exchange information and expertise. The program has been so successful that U.S. utilities are finding that the demands on their time are getting too great, since they are reimbursed only for travel and other expenses. The U.S. Agency for International Development (AID) is adding a supplementary program to pay for intensive projects such as large training courses.

The major barrier to modernization is financial. Many power companies in the region lack funds for investment, and their borrowing capability is limited. Export financing will be essential for wide-scale sales. Present U.S. export financing policies may not be adequate to support the electric equipment industry's unusual opportunity. Central European countries may open up new markets and opportunities for American companies for investment and sale of electrical equipment-opportunities that have been limited by protected domestic industries elsewhere in the world.

Cooperation in electric technology should also result in technology transfer to the United States. Russia pioneered high-voltage transmission and has built lines at twice the voltage of any in the United States. Super-critical boilers are another area where U.S. manufacturers and utilities can learn valuable lessons.

I Renewable Energy Technology

Solar and other renewable energy technologies contribute only a small share of total energy production in the former East Bloc, and that is unlikely to change soon. Nevertheless, the potential is significant.

Soviet scientists conducted extensive research on renewable resources over the last several decades, resulting in sophisticated technologies and well-developed science, but few commercial successes, with the exception of hydroelectric power

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FRANK ZOLLU, NEW ENGLAND POWER SERVICE



Vertes Powerplant, Hungary New England Power Service is paired with Hungarian Electric Companies, Ltd. under the Utility Partnership Program.

projects. Russia inherited much of this technology and expertise, although Ukraine has substantial technical know-how in windpower and solar thermal areas. Little expertise, however, has emerged over the years regarding project planning, development, and management.

The potential for renewable development varies since geography, climate, and weather patterns largely determine prospects. For example, wind energy potential is enormous in Russia, Kazakhstan, and Ukraine. The U.S. Windpower project in Ukraine, which calls for the installation of 500 MW (megawatts) by 1995, typifies the country's potential. Moreover, the southern areas of Ukraine, Russia, and the Central Asian republics are well suited to solar use. Solar water heating already is used in some areas. Also, Russia has significant amounts of hydroelectric capacity and experience in developing its resources. Hydroelectric power contributes about 19 percent of total electric power capacity.

Other republics are pursuing renewable energy projects out of economic necessity and to become more self-sufficient. Estonia, which has extensive forests, is taking the lead among former republics in biomass development. Lithuania is exploring its geothermal potential. Hungary is a leader in geothermal use for horticultural purposes.

However, significant obstacles interfere with renewable development and use. These include artificially low conventional fuel prices, limited capital, and the lack of political and institutional commitment. For example, Russia's institutional structure is geared to producing fossil fuels, not renewable. These obstacles are significant and will hinder development in the near term.

In several countries, the situation is somewhat different. The need to develop indigenous energy resources, reduce dependency on foreign imports and related costs, and address environmental concerns is creating niches for renewable, such as the wind energy project in Ukraine. Defense conversion and the availability of idle or underutilized industrialized plants may provide an added incentive to develop indigenous renewable resources.

Assistance from Western countries could improve the prospects for renewable development, especially in those countries that have limited or no indigenous fuel supplies. Technology transfer is one avenue for developing these resources at a more rapid pace. It can take many forms, including engineering and design expertise, management and training programs, licensing foreign manufacture of technologies, and equipment sales. Wind turbines, photovoltaic cells, and solar thermal collectors could be manufactured under joint ventures with the West.

Even if assistance is forthcoming, former East Bloc countries must develop a favorable climate for renewable development. Economic reform and the development of domestic markets are essential to renewable use in the long term.

ENVIRONMENTAL TECHNOLOGIES

Uncontrolled production and use of energy has been a leading cause of environmental degradation in the former East Bloc. The area's centrally planned economies placed a higher priority on the quantity of industrial production than on economic efficiency, environmental protection, or consumer demands. They provided cheap, state-subsidized fuels, which encouraged very high consumption of energy relative to that of other in-

dustrialized countries. The nature of major fuel resources, such as the high-ash coal used in power generation, has further increased pollution.

Environmental problems due to energy use vary across the region. Programs to alleviate environmental damage from energy use must therefore consider the problems of each region individually. For example, regional air pollution patterns vary. In Estonia, more than two-thirds of the emissions of particulate, sulfur dioxide (SO₂), and nitrogen oxide (NO_x) come from just three sources. In Poland, fuel use at a large number of small, decentralized boilers and home heating units is a major source.

Solutions to environmental problems must also address a variety of institutional constraints. An ineffective regulatory structure is a prime impediment. Contrary to Western perceptions, all of the countries in the region have stringent environmental standards. However, regulatory enforcement of these standards has been lax. Without enforcement of regulations, there has been little incentive to install, operate, or produce emission-abatement equipment. Doubts about future environmental standards have also discouraged local entrepreneurs and potential foreign investors.

Lack of public and private capital also delays the installation of pollution control equipment. Public budgets are under extreme pressure to meet a variety of investment, restructuring, and social safety net costs, severely limiting the amount of public money available for environmental purposes. While foreign sources of public and private financing can provide some interim funds, these sources are relatively small. This renders local private sector capital markets essential, since most environmental expenditures will ultimately be made by privatized companies. But these markets barely exist now. A number of AID and other assistance programs are aimed at developing local capital markets.

Coordinating environmental assistance with larger economic and social reforms can maximize overall effectiveness. Assistance should also target those energy plants and sectors that can withstand the economic reforms, and not those that will probably be shut down. The structure of the

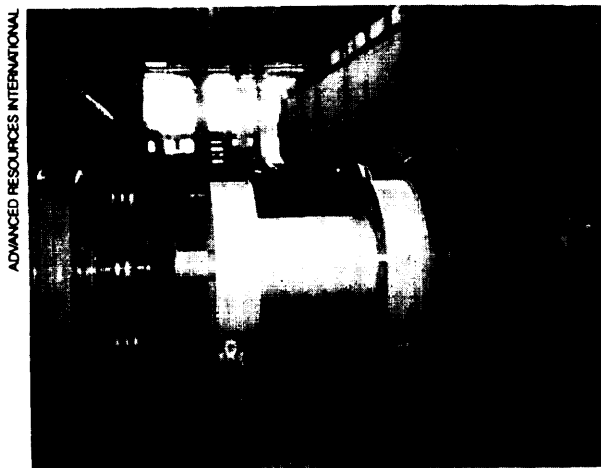
energy industry itself is an impediment to environmental reform. Public utilities and industries are overstaffed and inefficient. Until they restructure and downsize, they will not be able to afford pollution control.

All of these factors will constrain the market for energy-related environmental technologies. Nevertheless, the United States, through its public programs and private business activity, can help upgrade environmental protection in the former East Bloc. Opportunities for technology cooperation are excellent because the United States has a commercial and technical advantage in several areas.

One of the strongest areas of U.S. technological expertise is in coal cleaning. U.S. firms are also well positioned in emission-abatement equipment. One area of particular strength is in low NO_x combustion reburn technologies. Other technologies include flue-gas desulfurization units, electrostatic precipitators, and baghouse filters for powerplants; lean-burn technology for mobile sources; and desulfurization equipment for refineries.

U.S. companies can also help reduce the environmental impact of energy production. For example, as Russia expands gas production further north, the sensitive tundra ecosystem would benefit from some of the lessons learned in Alaska. U.S. mining firms are the world's most experienced in dealing with acid mine drainage and have extensive experience in land reclamation.

However, prospects for U.S. business may suffer because European Union emission standards are generally stricter than U.S. standards. Countries aspiring to join the EU will need to meet these standards with higher efficiency abatement systems than U.S. companies produce. Moreover, since pollution coming from the region affects Western Europe more than the United States, European countries might be more motivated to give more financial and technical support to address these issues. Thus, additional government efforts are likely to be necessary to assure that U.S. environmental equipment is competitive.



Drilling equipment manufacturing plant in Kazakhstan.

THE POLITICAL, ECONOMIC, AND SOCIAL CONTEXT FOR EFFECTING CHANGE

The modernization of the energy sector of the former East Bloc is only one facet of a much larger set of reforms that involve fundamental changes in the political and social orders of these societies. Energy sector reforms depend on the larger set and will also contribute to it. This transition involves several distinct but closely interrelated processes, the most important of which is the establishment of a new political order that embodies a popular consensus about the need for economic reform. Those countries where there is less popular consensus about reform and that have yet to enact new political structures have moved much more slowly and less successfully to stabilize their economies and lay the foundations for a new economic system. The energy-producing countries analyzed in this report fall into three groups: those in the vanguard of reform, those slow to reform, and those lagging in reform.

I Countries in the Vanguard of Reform

Poland, the Czech Republic, and Hungary occupy the first tier of reform. They were the quickest to establish a political consensus on the need for democratic and market transformations and to translate this political will into effective mechanisms for the implementation of reform programs.

Poland launched the earliest, most radical, and, to date, the most successful reform program. Although recent electoral gains by former Communists highlight the need to pay greater attention to social protection during the period of transition, Poland has been the first post-Communist country to experience economic growth and is solidly on the road to reform. The Czech Republic has pursued a more cautious approach toward economic transformation and as a result has not experienced the expansion that Poland has seen. Nevertheless, the Czechs have weathered the breakup with Slovakia and made substantial progress in introducing structural and institutional change, stabilizing the economy, and laying a firm basis for future growth. Hungary pursued a deliberately more cautious strategy, hoping to minimize the social costs of change. As a result, although Hungary remains in the vanguard of reform, the costs of reform have been strung out and even accentuated.

Despite problems, all three countries have freed most energy prices, started privatizing state industries, and welcomed foreign investment. Because of this, Western assistance programs are producing promising results, especially for improving energy efficiency. There is also solid ground for American trade and investment programs. U.S. exports and investments can support reform and development in Central Europe.

| Countries Reforming Slowly

Russia and Kazakhstan occupy the next tier of reform. Both countries have yet to undertake the types of domestic price, legal, and regulatory reforms that would make energy-efficiency projects profitable, stimulate more extensive and efficient energy production, and make it easier to structure bilateral and multilateral lending for energy-sector modernization.

Since the coup attempt of August 1991, Moscow has been in the throes of a multifaceted struggle over fundamental questions of power, sovereignty, property, and the nature of the future socioeconomic order. The most prominent aspect of this struggle has been the debate by political and social constituencies over the nature and

course of economic reform. These debates are anchored in Russia's uniqueness. Russia's size, as well as its much larger, more complex, and more deeply troubled economy, render the country less amenable to the types of Western-sponsored aid and trade programs that have been instrumental in the transformation of the economies of Central Europe. Although impressive strides have been made in price reform and private sector growth, the Russian economy is still contracting. Unless Russia resolves its crisis of authority so that it can pursue consistent and coordinated monetary and fiscal policies, it will not achieve the type of solid economic stabilization that is an absolute prerequisite to economic reform and growth. Until then, Russia will at best flounder or muddle through reform.

Under these conditions, an increase in U.S. trade-promotion programs may stimulate near-term sectoral stabilization and provide opportunities for American firms. But without strong conditionalities, both aid and trade programs are unlikely to promote long-term, self-sustained, systemic reform.

In contrast to Russia, Kazakhstan has opened its doors to foreign investment, providing potentially mutually beneficial opportunities for American energy companies and the Kazakhstani government. But the country is suffering from the dissolution of economic ties with the FSU and the strains of being a multi-ethnic state. Although Kazakhstan's current energy bonanza provides grounds for optimism, oil development will be limited in the short term by lack of export pipeline capacity and the immense need for capital renovation and exploration. As a result, the Kazakhstani economy is not likely to start growing substantially until the second half of the 1990s. In the interim, the United States can reward Kazakhstan's openness to foreign investment and encourage further systemic reform through expansion of American aid, trade, and investment programs.

I Countries Yet To Reform

Ukraine, Turkmenistan, Uzbekistan, and Azerbaijan occupy the final tier of reform. Despite the pro-

found economic and political changes occurring in the FSU, these countries have barely taken even the first steps down the road of economic reform. The reasons they lag so far behind are fundamentally political—in these states, Soviet-era bureaucrats remain entrenched in power and cling tenaciously to the tenets of the old system. As a result, most of the distortions and inefficiencies of the Soviet-era energy production, consumption, and pricing system remain in place, and opportunities for Western investment and trade promotion remain murky.

In Ukraine the debilitating competition for internal political power and continuing squabbles with Russia over the legacy of Soviet-era property and nuclear weapons have resulted in the neglect of economic reform. Analysts warn that the consequences of this neglect-economic collapse and hyperinflation-could lead to economic and political disintegration.

Since 1991, economic conditions in Uzbekistan have also deteriorated, but state policies have maintained many of the characteristics of the Soviet-era economy, such as subsidies and price controls. Economic reform will likely proceed slowly in Uzbekistan under the official goal of "market socialism." Political reform may be even slower. Uzbekistan's president has suppressed almost all political parties, jailed opposition activists, enforced press censorship, and stifled the development of democratic politics.

The reins of economic and political power are also held tightly in Turkmenistan by an authoritarian ruler who has created a Stalin-like "cult of personality" and suppressed potential political opposition. Although Turkmenistan's vast gas and oil wealth offers excellent opportunities for development, potential revenues from energy development are likely to be squandered through corruption.

Finally, in Azerbaijan, the continuing war with Armenia over Nagorno-Karabakh, and attempts by Russia, Turkey, and Iran to influence domestic politics, have diverted attention from economic reform. Despite the proliferation of small-scale capitalism and negotiations with foreign compa-

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TABLE 1-1: Selected FY 1994 USAID Program Budget Allocations
(Italics indicate energy sector-specific items)³

Program type	FSU (millions)	Central Europe (millions)
Policy and market reform assistance		
<i>Pricing policy and institutional reform</i>	22.0	
<i>Energy sector restructuring and privatization</i>		8.0
Rule of law	25.5	2.8
Commercial law reform		11.3
Local governance	9.5	
Democratic governance and public administration		23.0
Privatization	115.0	44.3
Business development	75.0	30.0
Banking sector reform and bankers training	12.6	
Fiscal sector reform	15.5	
Financial and monetary sector reform	10.7	18.1
Training and macroeconomic advice (Dept. of Treasury)	2.1	
Market environment	14.4	
Business and organizational training		
Short- and long-term training	91.5	
US/NIS partnerships	5.0	
Exchanges (USIA)	128.0	
SABIT Program (DOC)	2.0	
CAST Program (NAS)	2.0	
Eurasia Foundation	12.0	
Energy efficiency		
<i>Efficiency & performance improvement</i>	35.0	9.0
<i>Production and delivery systems</i>	39.0	
<i>Special earmarks (lab-to-lab, etc.)</i>	33.0	
Nuclear power		
<i>Nuclear power plant safety and regulation</i>	85.0	5.0

Continued next page

nies to develop the Caspian Sea's energy resources, there has been no systematic program of economic reform. Instead, corruption and a highly lucrative illicit trade in oil and other valuable raw materials have proliferated.

Given the leadership's lack of interest in reform in these countries, the most effective form of assistance to spur progress may be U.S. policies to promote energy efficiency and training in market skills. As in Russia, an increase in American trade and investment support programs may do little to promote market reform.

Problems Common to All Countries

Despite their differences, the countries of the former East Bloc share a similar set of problems in the transition from Communist authoritarianism to market democracy. All need to minimize unemployment and other social disruption during the transition period while fighting inflation and maintaining budget discipline. These states must also overcome a broad lack of understanding of market principles and the mindset of the old system. This challenge is complicated by the charac-

TABLE 1-1: Selected FY 1994 USAID Program Budget Allocations (cont'd.)
(Italics indicate energy sector-specific items)^a

Program type	FSU (millions)	Central Europe (millions)
Technical assistance		
<i>Russia Energy & Environment</i>	125.0	
<i>Commodity Import Program</i>		
<i>Krakov Power Project</i>		4.5
Environment		
Policy and institution building	21.9	
Technology cooperation	36.5	
Local NGO support	14.6	
Trade and investment promotion		
Transfer payments to DOC and TDA	8.5	
American business initiative		3.0 ^b
Enterprise funds		
Russian-American Enterprise Fund	120.0	
Western NIS Enterprise Fund	45.0	
Central Asian Enterprise Fund	30.0	
Fund for Large Enterprises in Russia	100.0	
EBRD Small Business Fund	15.0	
Multi-Lateral Equity Fund	21.0	
Central European Enterprise Funds		55.8

^a This table is not a comprehensive listing of USAID former East Bloc programs. It includes only those programs that are either specifically targeted at the energy sector or that address general areas of economic and systemic reform that are important for energy-sector development.

All figures represent original appropriations

■ They do not reflect rescissions under way in February 1994

■ They do not reflect considerable carryover of funds appropriated in fiscal year 1992-93

^b ABI terminated after fiscal year 1994

SOURCE U S Congress, Office of Technology Assessment, 1994

ter of newly emergent market relations, which often create a negative image of capitalism and highlight its very worst aspects. These factors complicate the efforts of American companies to conclude investment and purchase agreements and render even more imperative U.S. government efforts to promote the principles of market reform.

But even more important, the huge drop in living standards and the political chaos of the post-Communist era have led to a crisis of identity in many areas of the FSU, especially Russia. With Russia and the other FSU countries now in a weak position on the world stage, with economies in

collapse, with crime on the rise, and with citizens earning paltry incomes, nostalgia for the old system has grown. Unless these countries start achieving economic and political progress soon, the social consensus needed for the transition to democratic politics and market economics will not emerge.

CURRENT U.S. PROGRAMS PROMOTING COOPERATION

The United States supports a wide range of programs designed to promote energy and environmental technology cooperation (see table 1-1.) Bilateral aid programs operated by AID, the U.S.

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Department of Energy (DOE), the U.S. Environmental Protection Agency (EPA), and others include technical assistance, training, provision of information, policy advice, R&D, and technical cooperation. Other bilateral programs managed by the Export-Import Bank of the United States (Eximbank), the Overseas Private Investment Corp. (OPIC), and the U.S. Department of Commerce (DOC) provide backing to the U.S. private sector, which can play a key role in the rehabilitation of the former East Bloc energy sector. As the largest shareholder in the multilateral development banks (MDBs), the United States also actively exercises influence over their large project lending programs. MDB lending has emphasized the oil and gas industry and the power sector, but there are also active programs for environmental improvements and energy efficiency. Most of the programs surveyed for this report are quite recent in origin, but even on the basis of limited experience, their strengths and weaknesses have become apparent.

I U.S. Program Evaluation

The U.S. government moved with exemplary speed to develop assistance programs for the Central European countries and later the FSU. The energy sector has been an appropriate part of these programs. Within overall budget constraints, the existing programs are comprehensive in coverage and address the main issues identified in OTA's technical analysis—capital constraints for both energy supply and conservation projects, energy sector and macroeconomic reform, and technical assistance. Particularly strong efforts have been made to include the U.S. private sector in these efforts.

In addition, U.S. programs have shown considerable flexibility and responsiveness to changing conditions, even over the short time they have been in operation. There has been a clear shift from the early emphasis on providing energy and environmental technologies directly to building underlying policy and institutional capacity. Efforts have been made to respond to early criticisms of the U.S. effort, including too many temporary

consulting missions, lack of in-country expertise, slow procurement, and confusion over country needs due to a regional approach to aid disbursement.

Moreover, these programs have been developed and implemented under difficult circumstances, including budget constraints. Considerable political pressure was put on agencies to disburse quickly to give visible evidence of Western support for the new regimes. All agencies have experienced difficulties recruiting permanent staff with the necessary area expertise.

An additional problem is that many programs are lodged in institutions that were designed for different types of operations. The World Bank and AID were designed for projects in developing countries, whose capabilities and needs differ considerably from those of the former East Bloc. The primary mission of Eximbank is to support U.S. exports, but Eximbank's Framework Agreement is both a major support to U.S. exports and a cornerstone of U.S. financial assistance to the FSU countries.

Moreover, unstable political and economic conditions in some recipient countries have hampered program development. Several U.S. agencies report a shortage of viable projects in the FSU, either because of unwillingness to accept conditions attached to financial assistance or lack of interest. In several countries, notably in the Russian oil and gas sectors, foreign investment is viewed with deep suspicion.

Several specific weaknesses of U.S. assistance have emerged over the past several years. The large number of U.S. agencies offering broadly similar services raises issues of coordination and duplication. Officials in the former East Bloc complain that they are swamped by visiting missions and that the funds are going largely to foreign consultants rather than to the countries themselves.

Coordination among the various donors, reportedly fairly low during the first years of assistance, has apparently improved as the energy and environmental assistance efforts proceed. Even so, there are several examples of lack of donor

coordination, which seriously weakens the entire effort. For example, while the World Bank insists on conditionality in its loans, the Eximbank Framework Agreement contains no conditionality, thus weakening World Bank requirements.

Underpinning these weaknesses in implementation is a more fundamental uncertainty over the best means to achieve U.S. policy goals. The optimal scale of U.S. assistance and its distribution between the many countries of the region have not been defined. Allocations of assistance within the energy sector are open to question, particularly the emphasis on supply expansion, given the immense potential for energy conservation. The reluctance of some host countries, notably Russia, to cooperate in key parts of the assistance program raises questions about the wisdom or feasibility of the present approach.

These mixed experiences suggest that the time is opportune to reexamine the totality of U.S. efforts in the light of original U.S. policy objectives and to suggest ways in which the programs that support U.S. policies can be improved.

US. POLICY GOALS AND OPTIONS

| U.S. National Goals

The primary U.S. goal is to promote the transition of formerly hostile East Bloc countries to democratic, market-oriented trading partners. Some countries are well on their way to a successful transition, but others face a much more uncertain future. Energy technology transfer supports the transition, but will have only modest impact unless accompanied by market reform measures such as the elimination of subsidies, privatization, and new legal structures.

U.S. goals toward the former East Bloc with specific energy implications include the following:

10 Support Market Reform in the Energy Sector

Modernization is unlikely without reform, and the energy sector can lead the way for other sectors.

To Modernize Energy Sector Facilities and Technologies.

Improving the technology of supply and use of energy can have major economic advantages by increasing exports of oil, providing new options, and reducing unnecessary costs to the economy.

To Advance U.S. Energy-Related Business Interests.

U.S. companies have many products and services appropriate for export to the energy sector of the former East Bloc.

To Reduce Energy-Related Pollution and Threats to the Environment.

Local and global pollution can be significantly ameliorated with modern technology.

To Augment World Fuel Supplies.

Increased exports of oil and natural gas from the former East Bloc because of increased production and reduced consumption will mean less strain on world energy markets.

I Policy Options

Policymakers have a variety of options to support the goals discussed above (see ch. 8 for a more extensive discussion). As listed in table 1-2, policy options are available in the following areas:

U.S. Bilateral Development Assistance

U.S. development assistance to the FSU is intended to increase the flow of information and skills needed to operate a modern, environmentally acceptable energy system; to assist in building needed facilities; and to reduce the risk of nuclear weapons proliferation. AID is the primary agency for development, and it funds many of the programs run by other agencies. A large fraction of U.S. assistance funding is spent in the United States, and the assistance is delivered in the form of goods and services. The activities listed (and discussed under Element 2 in the following section) are those selected by this study as particular

TABLE 1-2: Policy Options

U.S. Foreign Development Assistance

Increase funding for the following areas:

- Policy assistance
 - Price reform, privatization, regulation, and policy training
- Training in market activities and skills
- Energy efficiency improvements
 - Demonstrations and assistance
 - Efficiency centers and information
- Nuclear safety and proliferation control
- Environmental information and assistance
- Specific technology transfer programs
 - Utility Partnership Program
 - Powerplant renovations
 - Clean-coal demonstrations and assistance
 - Coal mine safety
- Energy research and development

U.S. Export Promotion

- Increase flexibility of financing
- Increase feasibility studies
- Direct Small Business Administration to create programs assisting small businesses
- Enhance Foreign Commercial Service and other information programs
- Upgrade visibility of exports within U.S. diplomatic policy
- Remove barriers to exports

Multilateral Development Banks

- Encourage smaller- scale loans
- Make energy efficiency a higher priority

Investment Promotion

- Raise limit on Overseas Private Investment Corporation insurance for oil and gas projects

Program Management and Coordination

- Improve procedures to expedite activities
- Improve coordination among agencies

SOURCE: Office of Technology Assessment, 1994.

ly effective. All could be considered for increased funding if it is available.

U.S. Export Promotion

DOC, Eximbank, and the Trade and Development Agency (TDA) have useful programs that support U.S. businesses. Increased funding for export financing (e.g., through guarantees for commercial bank loans that otherwise would not be available,) feasibility studies, and information programs would assist U.S. industry and contribute to economic modernization.

Multilateral Development Banks

Loans from The World Bank and the European Bank for Reconstruction and Development (EBRD) are major vehicles for development. Congress could influence the MDBs to give a higher priority to energy efficiency and smaller projects that cumulatively can have a greater impact.

Investment Promotion

Foreign investment will be one of the prime forces for development. OPIC provides project finance and insures against political risk.

TABLE 1-3: Low Cost Improvements for U.S. Programs

AID

Streamline and accelerate the grants and procurement process.

Lift the hiring ceiling and require AID to hire more personnel with regional expertise.

Coordinate AID programs more closely with DOC to ensure maximum benefit to U.S. business

Eximbank, OPIC, TDA

Increase operating budgets to

Permit the hiring of personnel with regional expertise.

Speed processing and improve monitoring of credit, insurance, and other applications.

Commerce and State Departments

Upgrade status of the Foreign and Commercial Service to ensure maximum coordination between trade promotion and diplomatic efforts.

DOE

Provide more direct funding for international programs,

SOURCE Office of Technology Assessment, 1994

Program Management and Coordination

Even at the current level of funding, programs can be made more effective.

* * * *

Most of these options are for changes in programs already in effect. They are listed because the programs could usefully be enhanced with increased funding or a change in emphasis. Funding has risen sharply in recent years, but the need for assistance and financing remains enormous. Doing business as usual will mean relatively slow progress at best and a substantial risk of serious political instability, especially in Russia and other countries in the FSU. U.S. budget problems suggest that additional funding can come only at the expense of other priorities; however, measures to restore economic growth in the region could, in the long term, prove highly cost-effective if they succeed in creating friendly, prosperous trading partners.

| Policy Strategy

Some policy options (e.g., development assistance) support all U.S. policy goals simultaneously in all areas of the former East Bloc. In other cases, priorities must be set and choices made. The United States must ensure that goals and initiatives are sufficiently flexible to account for differ-

ing local conditions. The options discussed above fall into three groups, each of which can be considered separately or as elements of an overall strategy: low-cost changes to maximize the effectiveness of current U.S. programs; additional funding for effective programs; and options that support some goals but can conflict with others in some countries. A complete strategy to support U.S. goals might consist of the low-cost changes (which are largely noncontroversial), some additional funding for effective programs (depending on the priority accorded energy revitalization in the former East Bloc), plus whichever elements of the last group support the highest priority goals.

Element 1: Maximize the Effectiveness of Current U.S. Programs

Changes that could improve the effectiveness of U.S. activities and programs for all countries in the former East Bloc are listed in table 1-3. Improvements in program effectiveness should be considered whether or not any further options are entertained because they support all goals without penalizing other national priorities.

Element 2: Expand the Most Effective Assistance Programs

Reform and modernization of the FSU energy sector are clearly in the U.S. national interest, espe-



The early stages of assembly at the Skawina plant site. In the background is the thickener with preassembled sections of the absorber vessel in the foreground. The absorber vessel sections are ready to be placed in position

cially if accompanied by overall economic and political reform. As noted throughout this report, there is a great need for assistance, and U.S. programs can have considerable impact in supporting reform. The steps that could be taken if Congress is willing to allocate more funding to enhance the U.S. role, as listed in table 1-2, include the following:

Emphasize Government-to-Government Policy Assistance—U.S. officials can supply information and encouragement for policy makers in the former East Bloc to take the painful steps involved in economic transformation and help them design realistic reform programs that meet the need to maintain domestic political and social stability. Total additional costs might be \$1 million per agency—e. g., DOE, NRC—for time and travel.

Expand Business and Organizational Training—One of the most effective U.S. initiatives to promote change is providing training in general business-related skills—a transfer of the knowledge and skills necessary to support the development of new modes of economic organization and technical processes. This type of technology transfer promotes domestic reform while supporting U.S. economic interests. It provides former East Bloc firms with the skills to organize their work and efficiently employ advanced technologies from the West. Additional costs would de-

pend on the level of activity. Several million dollars would allow a significant amount of additional training.

Expand Energy-Efficiency Programs—American demonstration projects and information programs (especially the efficiency centers) are a vital component of technology transfer in the energy sector. Energy-efficiency projects can promote reform by demonstrating that it is possible to cushion the effects of raising energy prices and introducing market-based economic relations. An additional \$2 million to \$5 million could easily be justified simply on the basis of energy savings.

A more activist approach, at least for Russia, where domestic oil is still subsidized, would be to persuade the Russian government to commit to raising energy prices to world levels over several years. In the meantime, enterprises would be guaranteed their current quota of energy, but the state would buy back at near-world prices all that was not needed. This would provide a revenue stream for investments in improved efficiency. The EBRD could finance initial improvements based on anticipated revenues. AID and DOE could provide training to create an energy service and equipment industry. There should also be many opportunities for American businesses which could be funded by Eximbank. Such a program would call for an unprecedented amount of planning and coordination, but it offers a way around the problems (inadequate incentive, information, and capital) that inhibit the reduction of energy waste. Additional costs for the U.S. government might be several tens of millions of dollars over 3 years for U.S. energy auditors and service companies to get the process moving and to start joint ventures for investments in equipment manufacture and directly in efficiency improvements.

Expand Technical Assistance Programs—Technical assistance programs provide access to technologies essential to short-term stabilization and long-term modernization and economic growth. Since U.S. firms are leaders in several areas, an expansion of technical assistance programs, consistent with an activist program of U.S. policy, would provide benefits for U.S. business. Priority projects, as listed in table 1-2, include

additional assistance in installing nuclear safety equipment, additional assistance in pollution control, an expanded utility partnership program, powerplant renovations, more clean coal demonstrations, additional coal mine safety activities, and R&D cooperation. Several of these initiatives (nuclear safety, powerplant renovations, clean coal demonstrations) could entail costs of several tens of millions of dollars, depending on how much activity is wanted.

Element 3: Select Priorities for Trade and Development

In the case of conflicting goals, policies must be tailored to each country or region to ensure their appropriateness and consistency, especially where economic reform is tenuous. This is most important in the area of export- and investment-promotion programs.

The key question for Congress is how actively to promote market reform and long-term sectoral modernization versus short-term economic stability and U.S. economic interests. The most important vehicle for expressing this policy preference is the conditionality provision of export credits and insurance.

Government financing of exports to modernize the energy sector benefits U.S. business and jobs, and it can stimulate increased energy production. However, these credits may simultaneously harm other American interests by discouraging Russian firms from accepting Western firms as investors, a potentially much larger, though more costly, source of the enormous amounts of capital needed for energy sector modernization. The availability of public-sector financing may even inhibit reform by removing the incentive for firms to restructure their operations to attract commercial credit and cooperation.

Nevertheless, there is good reason for the United States to maintain its export-credit programs at a level sufficient to keep American firms competitive with their Western rivals and to provide a foot in the door to potentially lucrative markets. The political importance of foreign assistance and trade-promotion programs should

also not be underestimated. Thus, reconciling trade and aid programs with one another and with the larger goal of promoting market reform will prove difficult, if not impossible.

The differing conditions among the former East Bloc countries suggest two approaches for U.S. policy, depending on which goals are to be supported:

1. Support near-term economic stabilization through expansion of energy production. This option seeks to support former East Bloc countries by maximizing energy output to provide foreign exchange, regardless of their progress on economic reform. It also aggressively emphasizes U.S. exports.

Policies: Expand export-credit and MDB programs to ensure that financing is not a major constraint; provide minimal conditionality and restrictions on loans. Higher subsidies might be necessary for OPIC and Eximbank to cover increased losses on bad debt.

2. Support long-term energy sector modernization and systemic market reform. This approach may entail further declines in oil and gas production in order to achieve long-term gains.

Policies: Expand export-credit programs only insofar as they can support reforms and can be effectively used. Impose maximal conditionality on credits: export-credit and investment assistance would go only to firms actively engaged in a real transition to market functions.

It is possible to satisfy these dual priorities only in countries that have embarked firmly on a course of economic reform. A balanced approach is appropriate for Poland, the Czech Republic, and Hungary because their progress toward economic reform makes it possible to promote both trade and reform simultaneously. This option may also be appropriate in Kazakhstan. Although market reform has been limited there, Kazakhstan is open to foreign investment and trade.

In other countries of the former East Bloc, the choices are not so easy. Declining oil production is a serious threat to Russia's weak economy. Bolstering that economy may be essential for preventing social and political instability. The United

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States has the technology and the resources to provide significant help, and U.S. industry would benefit from supplying it. However, if the help is provided without insisting on continued reforms, U.S. long-term interests and Russia's long-term economic health could be damaged. Selecting the appropriate balance depends on one's views of the urgency of Russia's short-term energy problems and the importance of U.S. equipment exports vis-a-vis long-term development.

CONCLUSION

Improved energy technology will be a critical factor in modernizing the economies of the former East Bloc, and the transfer of energy technology

will be an important asset in achieving U.S. national goals. However, financial and institutional constraints in these countries will limit Western investment and sales of equipment and services. A strong and active U.S. government role is necessary to expedite the transition to market economies and democracy and to assure that export markets are available for U.S. industry. The policy options discussed above, if implemented skillfully and with adequate funding, can help very significantly. Congress will face the issue of whether increased efforts are warranted in light of other U.S. national priorities and uncertainties over progress toward reform in Russia and other countries of the former East Bloc.