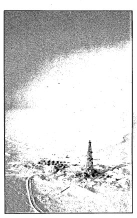

# USSR Energy
## Atlas

**REFERENCE MAP**

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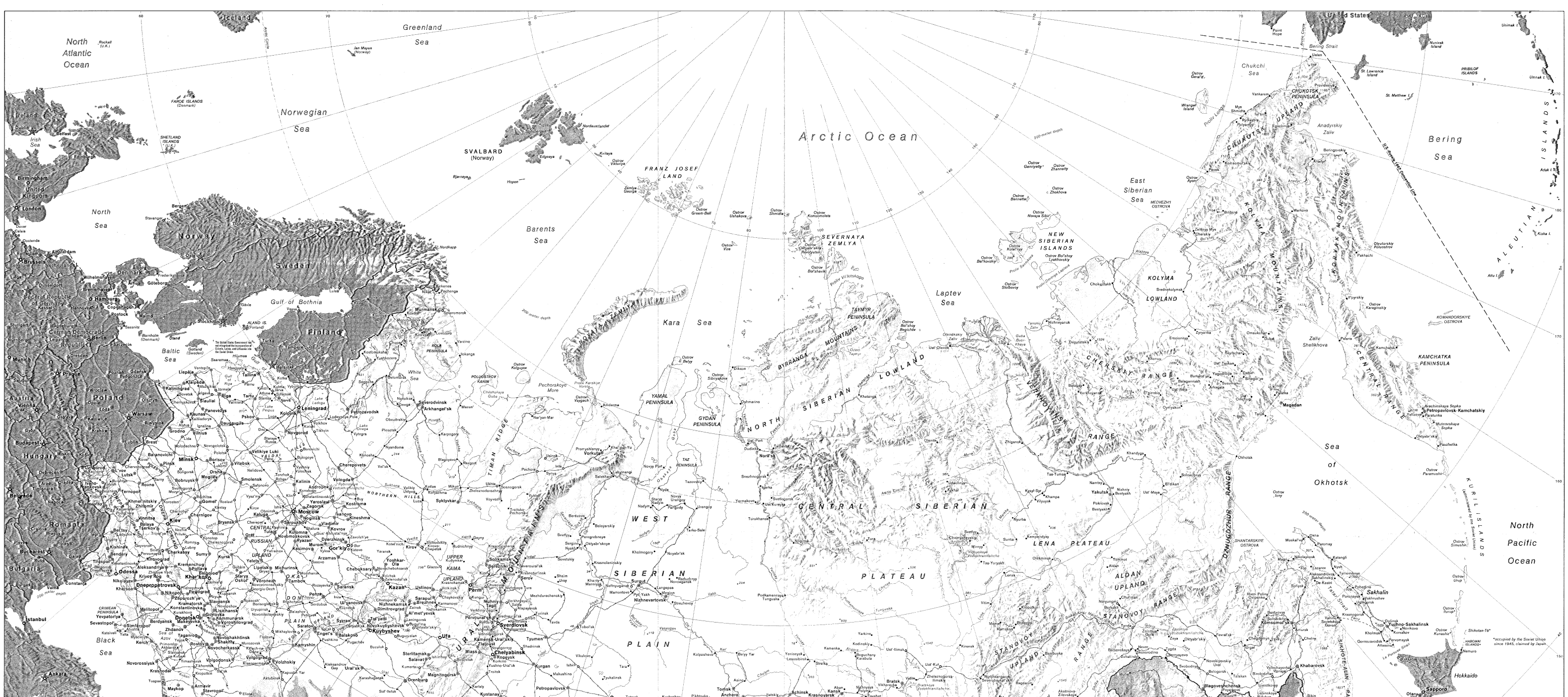
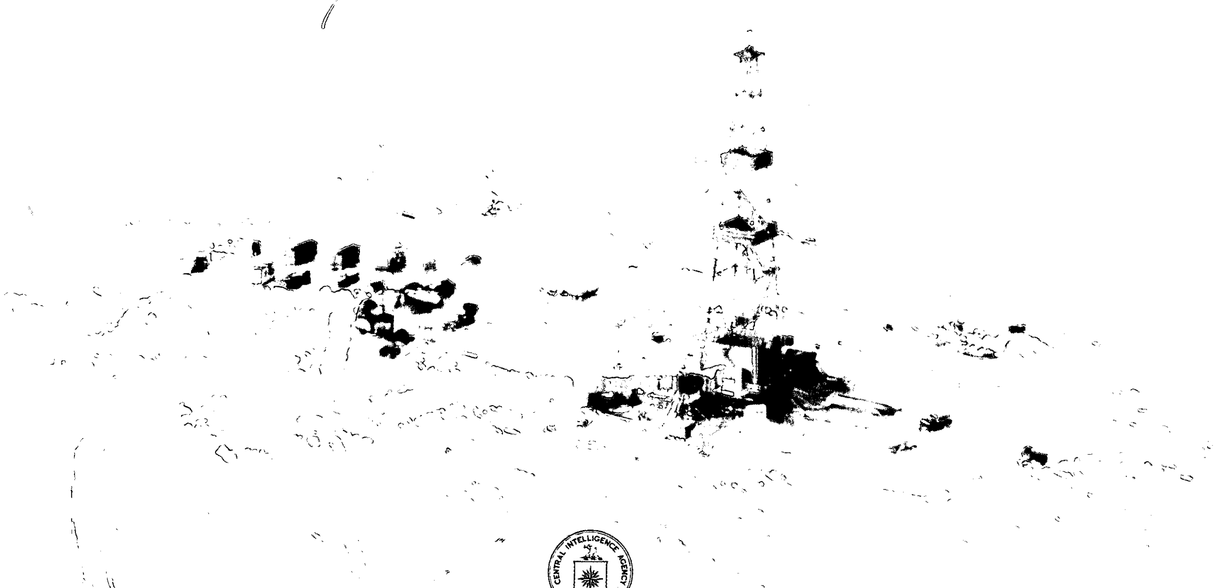
January 1985


USSR Energy
Atlas
REFERENCE MAP
International boundary
International boundary, in dispute
National capital
Railroad
Populated places
Moscow 8,202,000 (1983)
Leningrad 4,295,000 (1983)
1,000,000 and above
500,000-1,000,000
100,000-500,000
50,000-100,000
Less than 50,000
Spot elevations in meters
North Atlantic Ocean
Greenland Sea
Norwegian Sea
North Sea
Barents Sea
Arctic Ocean
Kara Sea
Laptev Sea
East Siberian Sea
Chukchi Sea
Bering Sea
Sea of Okhotsk
North Pacific Ocean
Sea of Japan
Yellow Sea
Black Sea
Caspian Sea
Baltic Sea
Gulf of Bothnia
SVALBARD (Norway)
FRANZ JOSEF LAND
SEVERNAYA ZEMLYA
NEW SIBERIAN ISLANDS
KAMCHATKA PENINSULA
CENTRAL RANGE
KURIL ISLANDS (administered by the Soviet Union)
*occupied by the Soviet Union since 1945, claimed by Japan
Sakhalin
Hokkaido
Honshu
Japan
Magadan
Petropavlovsk-Kamchatskiy
Yuzhno-Sakhalinsk
Khabarovsk
Vladivostok
Nakhodka
Sapporo
Hakodate
Finland
Sweden
Norway
Poland
Hungary
Romania
Bulgaria
Turkey
Syria
Iraq
Iran
Saudi Arabia
Afghanistan
Mongolia
China
Moscow
Leningrad
Kiev
Minsk
Kharkov
Odessa
Tbilisi
Yerevan
Baku
Tashkent
Alma-Ata
Sverdlovsk
Chelyabinsk
Omsk
Novosibirsk
Kuybyshev
Kazan'
Perm'
Gor'kiy
Volgograd
WEST SIBERIAN PLAIN
CENTRAL SIBERIAN PLATEAU
NORTH SIBERIAN LOWLAND
KOLYMA LOWLAND
LENA PLATEAU
ALDAN UPLAND
KAZAKH UPLAND
TURGAY PLATEAU
USTYURT PLATEAU
SAYAN MOUNTAINS
ALTAY MOUNTAINS
TIAN SHAN
MAYAN PENINSULA
GYDAN PENINSULA
TAYMYR PENINSULA
CHUKOTSK PENINSULA

CIA GI 85-10001

# USSR Energy Atlas



Central Intelligence Agency

January 1985

# USSR Energy Atlas



Central Intelligence Agency
January 1985

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## Preface

The USSR is the largest country in the world and the second-largest producer and consumer of energy. Its vast landmass and adjacent continental shelves contain enormous energy resources. Only in recent years, however, has the extent of the exploration and development of its fuel resources spanned the entire country.

A nationwide quest for new energy sources has rapidly outdated Soviet energy maps. Names like Samotlor, Fedorovo, Urengoy, Kansk-Achinsk, and Ekibastuz have become as well known to Soviet energy planners as Baku, Romashkino, Orenburg, and Donets were a decade or two ago. Likewise, the construction of oil and gas pipelines, electric transmission lines, roads, railroads, and towns has required extensive development of remote areas of Central Asia, Kazakhstan, Siberia, and the Far East.

Soviet energy is a strategic issue that transcends international boundaries. Soviet oil and gas exports have increasingly become available to Western buyers since the 1970s, and the Soviets also import large amounts of Western equipment and technology to upgrade the capabilities of the domestic energy industry.

This atlas uses a wide variety of information to portray many aspects of Soviet energy. Maps, graphics, photographs, and text provide a general understanding and appreciation of the major Soviet energy resources—oil, gas, coal, and primary electricity—as well as minor fuels and alternative energy sources.

Landsat photo on page 19. All others: TASS from SOVFOTO, further reproduction must be approved by SOVFOTO.

The representation of international boundaries on the maps is not necesarily authoritative. The United States Government has not recognized the incorporation of Estonia, Latvia, and Lithuania into the USSR. The southern islands of the Kurils-Ostrov Iturup, Ostrov Kunashir, Shikotan-To, and Habomai Islands are occupied by the USSR but claimed by Japan.

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## Table of Contents

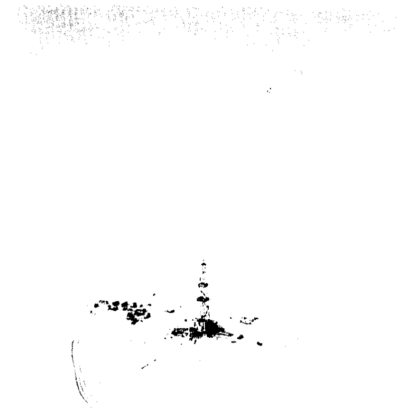
# USSR: Energy Overview

The USSR is better endowed with energy resources than any other country in the world. It is the world's largest oil producer and has the largest oil reserves outside the Persian Gulf region. Soviet gas reserves are the largest in the world, and the USSR is also the world's leading gas producer. Coal resources are enormous, although most are unfavorably located at great distances from consuming centers. Electric power output, generated largely from thermal sources, ranks second to the United States.

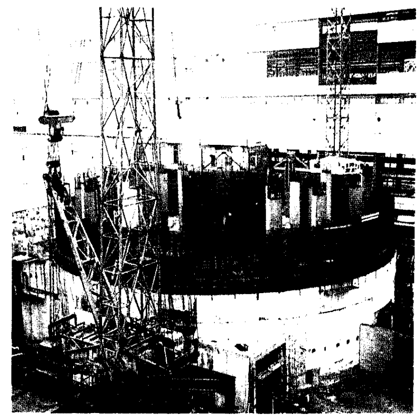
Moscow's desire to maintain steady economic growth requires an expanding energy resource development program as reflected in the 11th Five-Year Plan (1981-85). The focus of the current effort is to continue the expansion of West Siberian oil and gas development, accelerate nuclear power plant construction in the European USSR, and further exploit vast Central Siberian coal resources. In addition, the Soviets hope to increase the efficient use of these primary fuels through new programs for energy conservation and fuel substitution.

Energy exports are the principal source of Soviet hard currency earnings. Revenues from exports to Western countries permit the acquisition of equipment and technology for a variety of Soviet activities; particularly important are energy efforts to increase oil recovery, transport natural gas, and exploit offshore energy resources.

Energy investment is surging as the Soviets attempt to meet growing energy demand through investments in new production areas and maintenance and enhancement of production from established regions. Costs are rising as exploration and production move into the more remote eastern regions of the USSR and operating conditions become more difficult.



*Oil and gas exploration in Tyumen' Oblast, West Siberia.*



*Construction of nuclear power reactor in the Ukrainian SSR.*


*Foreign equipment being used to mine Central Siberian brown coal.*

*Offshore drilling technology is acquired from energy export revenues.*

# Domestic and International Issues

## Energy Decisionmaking

The driving force behind Soviet energy policy is Moscow's desire to remain self-sufficient in energy while increasing hard currency earnings from energy exports. As the Soviets themselves have often noted, "The Soviet Union is currently the only highly developed country in the world meeting all of its own fuel and energy needs from its own resources." In 1983 the Central Committee of the Communist Party of the Soviet Union (CPSU) adopted a long-range energy program that provides guidelines for energy resource development and exploitation until the year 2000. Its emphasis is on: attaining an optimal energy mix through substitution of natural gas, nuclear power, and coal for oil; developing new sources of energy, such as geothermal, solar, wind, and tidal; improving and expanding the energy infrastructure; continuing the development of oil and gas in West Siberia and their transport to the European part of the country; and increasing fuel and energy conservation by means of technological improvements and improved utilization of existing resources.

*Kremlin Palace of Congresses, Moscow.*

Responsibility for energy matters in the USSR is shared among a number of key party and government organizations. The Politburo of the CPSU, the highest decisionmaking body in the USSR, determines the country's basic energy research, development, and production policies. In the face of severe problems, the Politburo can act unilaterally to redirect energy policy or shift the allocation of resources necessary for its implementation. Much of the formulation of these energy policies actually occurs in the Presidium of the Council of Ministers, the Secretariat of the Central Committee of the CPSU, and the USSR State Planning Committee (Gosplan). These three groups advise the Politburo, provide guidance on energy policy and management to lower levels, and collectively serve as a high-level forum for discussions of alternative strategies. Like the Politburo, they are concerned with integrating energy policy into a broader economic and political framework.

A significant contribution to the decisionmaking process is made by the state committees and ministries directly involved in implementing energy policies. These organizations possess a level of technical expertise that is largely missing at higher levels. They provide assessments of resource issues and production capabilities and give continuity to energy policies.



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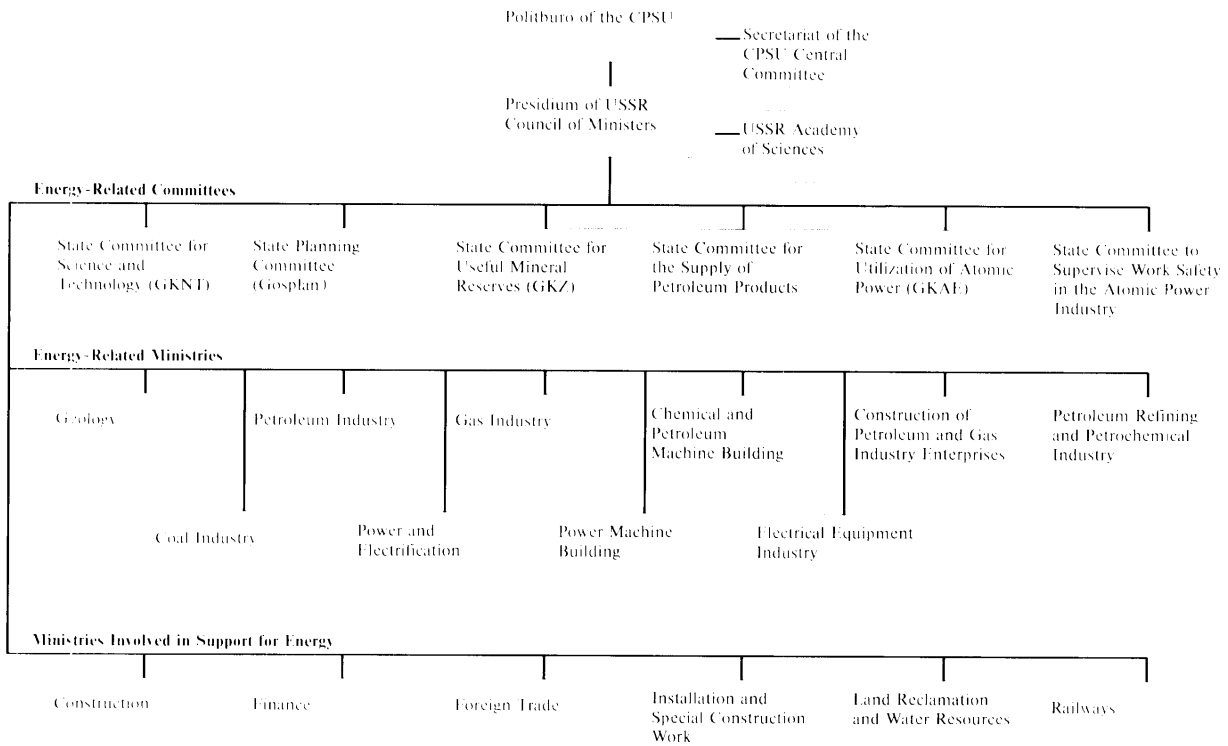
## Energy Decisionmaking in the Soviet Union




## Organizations With Primary Responsibility for Energy Production and Management

**USSR Academy of Sciences.** Oversees research on new energy sources and development of new methods of energy resource production.

### Energy-Related Committees

**State Committee for Science and Technology (GKNT) (A-U).**[a] Sets energy research and development priorities; evaluates research and development proposals from the Academy of Sciences and the production ministries; assists in acquisition of foreign technology; administers scientific and technical exchanges with foreign countries.

**State Planning Committee (Gosplan) (U-R).** Coordinates five-year plans in all fields, including energy; makes and oversees plans for energy-related departments, including geology and mineral resources, coal, petroleum and gas industries, power and electrification, and transport; serves as a consultant on energy policy.

**State Committee for Useful Mineral Reserves (GKZ) (A-U).** Reviews geologic data from exploratory wells to certify reserves and reservoir properties; establishes coefficients of extraction (rates of recovery) for petroleum and condensate; classifies petroleum and gas reserves; has final approval for field drilling plans submitted by Ministry of the Petroleum Industry; maintains reserve stocks of petroleum and fuels.

**State Committee for the Supply of Petroleum Products (U-R).** Oversees the procurement, storage, and distribution of petroleum products including those destined for export; administers petroleum pipelines and storage bases; monitors industrial use of petroleum products.

**State Committee for the Utilization of Atomic Power (GKAE) (A-U).** Administers civilian atomic energy programs; conducts joint research projects with foreign countries.

**State Committee To Supervise Work Safety in the Atomic Power Industry (A-U).** Establishes and enforces standards for nuclear power plant safety and radioactive waste disposal.

### Energy-Related Ministries

**Ministry of Geology (U-R).** Conducts exploration for new oil, gas, and coal deposits; monitors contracts with foreign firms for energy resource exploration in USSR; directs development of new prospecting techniques, equipment, and methods of mineral analysis.

**Ministry of the Petroleum Industry (A-U).** Manages production drilling, extraction, transportation, and sales of petroleum; shares responsibility with Ministry of Geology for exploratory petroleum drilling and extraction and processing of gas condensate.

**Ministry of the Gas Industry (A-U).** Oversees the extraction, processing, underground storage, and transportation of natural gas from established fields; directs offshore oil and gas exploratory drilling and production; participates in onshore gas exploration, gas condensate processing, and geothermal energy production.

**Ministry of Chemical and Petroleum Machine Building (A-U).** Oversees the manufacture and supply of extraction and production equipment to the petroleum, gas, and petrochemical industries.

**Ministry of Construction of Petroleum and Gas Industry Enterprises (A-U).** Constructs petroleum and gas pipelines and field processing plants; has primary responsibility for compressor station construction.

**Ministry of the Petroleum Refining and Petrochemical Industry (U-R).** Oversees all aspects of petroleum refining and petrochemical processing, as well as the production of synthetic rubber, aromatic hydrocarbons, lubricants, fuels, liquid paraffins, chemical feed additives, and chemical reagents for enhanced oil recovery.

**Ministry of the Coal Industry (U-R).** Manages coal and oil shale extraction and equipment production; participates in the development of technologies for solid fuel liquefaction and gasification.

**Ministry of Power and Electrification (U-R).** Directs the design, construction, operation, and maintenance of hydroelectric, thermal, and atomic power plants; participates in tidal, solar, geothermal, and wind energy production as well as research and development of techniques for solid fuel liquefaction and gasification.

**Ministry of Power Machine Building (A-U).** Provides heavy equipment for thermal, nuclear, and hydroelectric power stations; manufactures gas turbines, pumps, and superchargers for pipeline compressor stations and heat recovery equipment for the petroleum refining industry; operates the nuclear reactor manufacturing plants located in Volgodonsk and Kolpino.

**Ministry of the Electrical Equipment Industry (A-U).** Directs research, development, and manufacture of electrical generation and distribution equipment.

### Ministries Involved in Support for Energy

**Ministry of Construction (U-R).** Performs basic construction for energy production industries.

**Ministry of Finance (U-R).** Allocates financial resources for energy production, research, and development.

**Ministry of Foreign Trade (A-U).** Oversees trade in petroleum, gas, and coal products, as well as energy resource extraction, processing, and transportation equipment.

**Ministry of Installation and Special Construction Work (U-R).** Constructs installations and buildings for the coal, petroleum, and nuclear power industries; assists in construction of refineries, pipelines, and drilling rigs; conducts some drilling and blasting work.

**Ministry of Land Reclamation and Water Resources (U-R).** Participates in construction of hydroelectric plants, in the control of pollution from thermal power plants, and in the management of windpower facilities; also involved in construction of petroleum and gas pipelines.

**Ministry of Railways (A-U).** Transports coal, petroleum products, and other fuels.

[a] All-Union (A-U) organizations have no regional counterparts; union republic (U-R) organizations operate locally through corresponding organizations on the republic level.

# Energy Balances

The Soviet Union produces nearly one-fifth of the world's primary energy and is currently the leading energy exporter and the largest producer of oil and natural gas. The USSR is third after the United States and China in coal production.

Domestic production accounts for 99 percent of total Soviet energy use; imports are more a matter of geographic convenience than necessity. The USSR consumes approximately 85 percent of the primary energy it produces and relies on oil, gas, and coal for the bulk of its energy needs.

The overall production rate of primary energy, after expanding rapidly for two decades, has slowed considerably during the early 1980s. The 4.5-percent annual growth rate of the 1970s dropped to about 2.5 percent a year during 1981-82. Soviet plan goals suggest that this slower rate may continue during the remainder of the 11th Five-Year Plan. In addition to the depletion of the most easily exploitable reserves, the slower rate of production is because of inadequate technology and equipment, insufficient capital investment in some sectors of the energy industry, and poor logistic coordination of materials and supplies.

## The Energy Mix

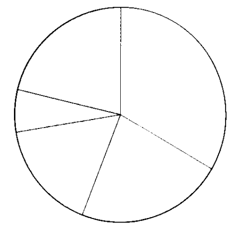
Production of major fuels (oil, natural gas, and coal) accounts for more than 90 percent of the Soviet energy mix. Oil production has begun to level off after three decades of steady growth. Output in 1983 was 12.33 million barrels per day (b/d), just 300,000 b/d more than in 1980. The production of natural gas, important both as a substitute for oil domestically and as a source of hard currency export revenues, has experienced impressive growth since 1970. Gas output rose from 3.3 million b/d oil equivalent in 1970 to 8.9 million b/d oil equivalent in 1983. Coal output, although increasing 28 percent since 1960 in terms of energy content, continues to comprise a decreasing share of primary energy production.

The shares of different fuels in total Soviet energy consumption have also shifted significantly over the past two decades. Whereas natural gas provided only 8 percent of Soviet energy requirements in 1960, it accounted for 29 percent in 1982. During the same period, oil's share rose from 24 to 37 percent. This growth in oil and gas occurred at the expense of coal. In 1960 the Soviets relied on coal for more than one-half of their total energy needs; in 1982 it provided only 26 percent.

**World: Oil, Gas, and Coal Production**

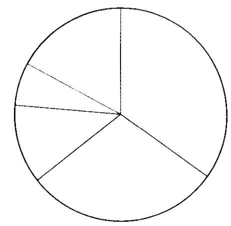
**Oil, 1983[a]**

| | Million barrels per day | Percent of total |
|---|---|---|
| OPEC[b] | 17.55 | 33.4 |
| USSR | 11.82 | 22.5 |
| United States | 8.68 | 16.5 |
| Western Europe | 3.39 | 6.4 |
| Other | 11.15 | 21.2 |
| Total | 52.59 | 100.0 |



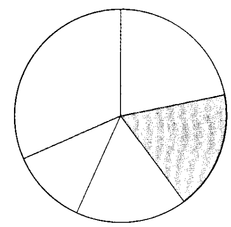
**Gas, 1983**

| | Billion cubic meters | Percent of total |
|---|---|---|
| USSR | 535.7 | 34.9 |
| United States | 452.3 | 29.5 |
| Western Europe | 183.4 | 12.0 |
| OPEC[b] | 100.2 | 6.5 |
| Other | 262.0 | 17.1 |
| Total | 1,533.6 | 100.0 |



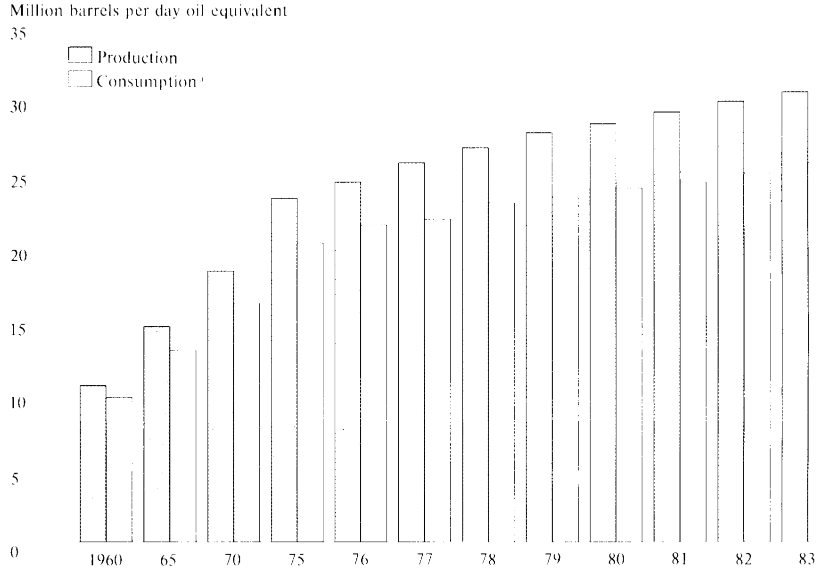
**Coal, 1983**

| | Quadrillion ($10^{15}$) Btu | Percent of total |
|---|---|---|
| United States | 17.29 | 21.8 |
| China | 14.39 | 18.1 |
| USSR | 13.44 | 16.9 |
| Western Europe | 9.18 | 11.6 |
| Other | 25.12 | 31.6 |
| Total | 79.42 | 100.0 |



[a] Excludes natural gas liquids.
[b] Includes Algeria, Ecuador, Gabon, Indonesia, Iran, Iraq, Kuwait, Libya, Nigeria, Qatar, Saudi Arabia, Venezuela, and United Arab Emirates.
Source: Energy Information Administration, US Department of Energy.

**USSR: Primary Energy**




[a] Including changes in stocks.



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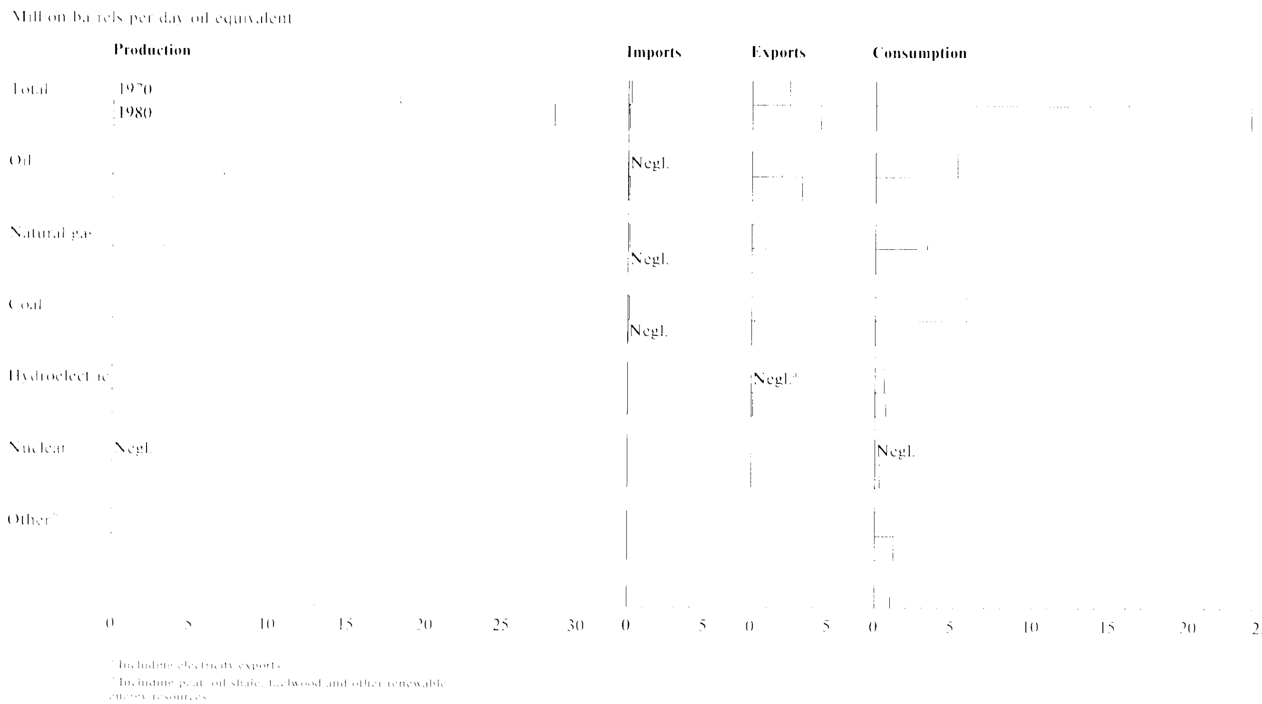
**USSR: Energy Balances**

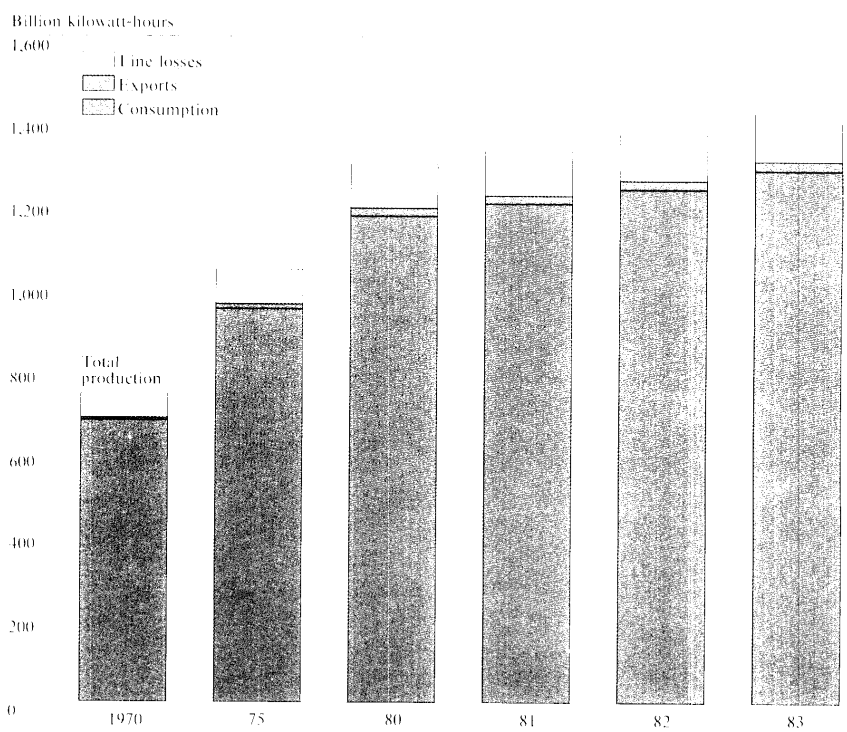



## Conservation and Substitution

Rising costs of energy production have led, as in the West, to a growing interest in curbing demand through conservation. But by most standards, the Soviet economy remains energy inefficient. Many of the barriers to improving energy efficiency are endemic to the Soviet system. Centralized planning and resource allocation, artificially low energy prices, and incentives geared toward meeting quantitative output goals do not reward innovation or efficient use of resources. Moreover, despite official goals and pronouncements about saving energy, the requisite capital and other resources have been allocated to energy production rather than conservation.

One of the best opportunities the Soviets have for reducing the growth of oil demand is by substituting natural gas for oil in electric power plants and large boilers. Such a program requires the construction of long-distance natural gas transmission pipelines, conversion of older plants to burn gas, completion of new gas-fired power plants, and expansion of lateral gas distribution lines and storage facilities. Aside from reduced use of oil in power plants and industrial boilers, the prospects for substitution are limited. Oil use for transportation and agriculture is not readily amenable to gas substitution, so that efforts to hold down oil use in these sectors of the economy must depend largely on conservation.

**USSR: Electricity Balances**



# Foreign Markets

For most of the past decade, Soviet earnings from energy exports have been increasing, partly as a result of rising prices for oil and gas. The recent expansion of Soviet exports to the West has been responsible for important increases in hard currency earnings necessary for the development of new energy resources. The Soviets have used much of the new revenue to purchase Western equipment and technology for oil and gas exploration and production.

Although Soviet increases in oil exports to Council for Mutual Economic Assistance (CEMA) partners have slowed in recent years, the continuation of a steady flow of energy resources to Eastern Europe and Cuba remains a high priority for Moscow. Except for Romania and Poland, CEMA countries are dependent on the USSR for large shares of their energy supplies.

# Hard Currency

Before the 1973 Arab oil embargo, Soviet hard currency earnings from energy exports comprised only 20 percent of the USSR's total yearly commodity export earnings. Some 85 to 90 percent of these energy-derived earnings came from oil. By 1977 the share of hard currency earned from oil and gas sales to the West had grown to more than 50 percent. In 1981 a soft world oil market forced the Soviets to reduce exports and temporarily settle for diminished earnings. Nevertheless, in 1982 Moscow achieved a record 28-percent increase in oil exports to non-Communist customers, largely through restrictions on deliveries to soft currency customers.

Oil continues to be the most important source of hard currency earnings for Moscow, but natural gas trade with the West is growing. In 1975 gas provided only 3 percent of hard currency earnings, but by 1982 natural gas earnings had risen to almost 14 percent of the total. The Soviets anticipate even greater increases in revenues from natural gas exports with the large-scale gas deliveries through the new Siberia–to–Western Europe pipeline.

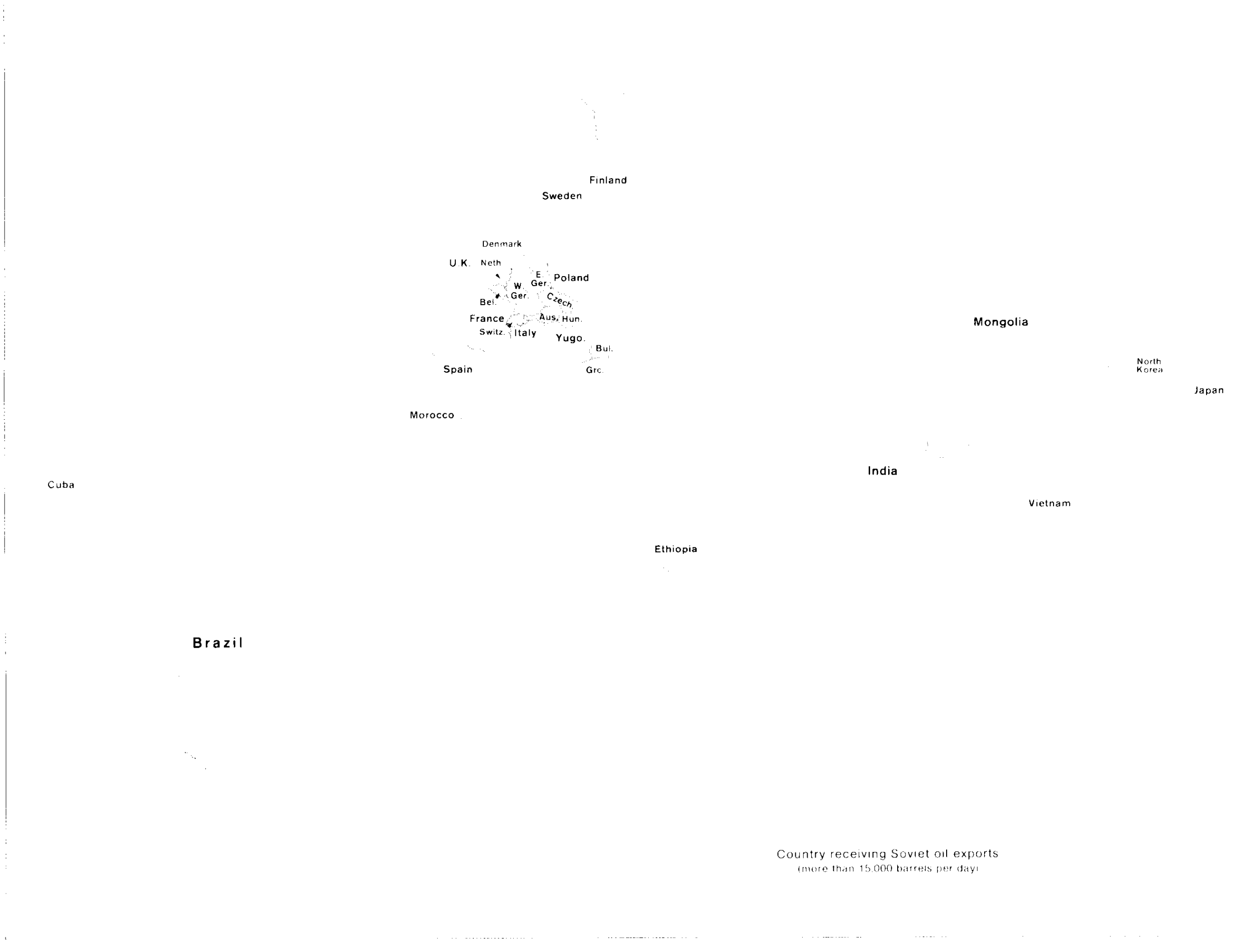
# Trading Partners

## CEMA

For nearly two decades, the USSR has been the principal supplier of energy for its East European CEMA allies, Cuba, and Vietnam. During the 1970s the Soviets provided as much as three-fourths of the oil consumed by the East Europeans and almost all of the crude oil used by the Cubans. Most—though not all—of these sales were soft currency or barter deals. To help ease the economic burden of oil price increases, Moscow delayed raising the price of oil to its CEMA partners. Thus, for a number of years after OPEC's sharp price increases in the 1970s, the economies of the Soviet allies benefited from below-world-market prices. During this time, however, the Soviet Union kept encouraging its CEMA partners to reduce their dependence on oil and increase consumption of substitutes such as gas, coal, and nuclear energy. Moscow also took steps, including a five-year-moving-average pricing formula, to discourage future increases in East European imports of Soviet oil unless the extra oil was purchased with hard currency. Finally, in 1982 the Soviets began an actual cutback in oil deliveries to some CEMA members.

Historically, the Soviet Union and the East European CEMA members have worked closely to develop Soviet energy resources. Thus far, the gas pipeline from the Orenburg field, also known as the Soyuz (Union or Alliance) pipeline and completed in 1978, has been their largest joint project. The East Europeans provided labor, equipment, and hard currency support in exchange for future supplies of natural gas.

**Soviet Oil Exports, 1983**



The production of Soviet nuclear reactors has also involved substantial East European cooperation. A recent agreement between these countries and the USSR calls for the other CEMA countries to specialize in the production of Soviet-designed reactor components to be used in an integrated electrical power system. The increased nuclear power capacity of the Soviet Union and the joint USSR-CEMA projects now under way to improve and enlarge the power transmission system should significantly increase Soviet capability to export electricity in the future.

Cuba, with limited domestic oil resources, has been heavily dependent on the Soviets for virtually all of its petroleum needs. The construction of a Soviet-designed nuclear power station in Cuba will improve Cuban energy self-sufficiency and decrease reliance on Moscow for oil.

### Western Europe

Soviet energy trade with Western Europe was limited until the mid-1970s. Since then, the share of sales from the principal exported commodities, oil and gas, has become increasingly important. Currently, the Soviet Union's largest West European energy customers are West Germany, France, Italy, Austria, Belgium, the Netherlands, United Kingdom, Sweden, and Finland.

Between 1978 and 1981, the rapid growth in oil sales to Western Europe came to an abrupt halt as conservation efforts—"aided" by an oil-fueled recession—by the West Europeans started to take hold. Beginning in 1982 the Soviets partially compensated for the reduced hard currency earnings from long-term contracts by increasing their spot market sales of oil at major West European oil terminals.

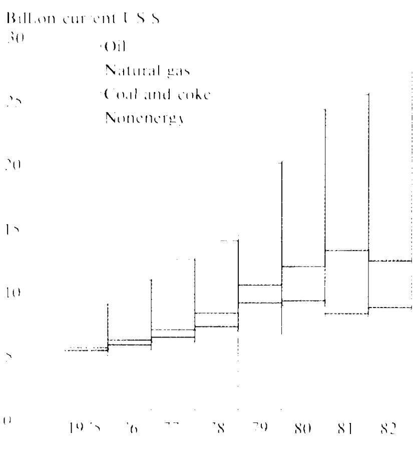
In the mid-1970s the West Europeans turned to the Soviet Union in an effort to diversify their energy sources. Existing gas contracts from the late 1960s were expanded. This also led to a number of new joint projects, of which the most notable is the Siberia-to-Western Europe natural gas pipeline. The terms of many of these contracts usually include compensation agreements, involving either a form of barter, counterpurchase, or product payback arrangements, in which future sales or delivery of a Soviet product are linked to an advance sale or delivery of Western equipment or technology. In exchange for providing technological help in constructing the Soviet gas pipeline system, the Europeans receive guaranteed supplies of natural gas.

### Japan

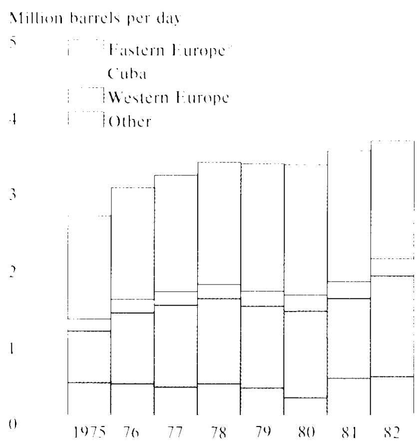
Energy trade with Japan will play an important role in the development of East Siberian resources. Joint Soviet-Japanese development of Sakhalin Island oil and gas and of East Siberian coal reserves is now under way. Progress has been slow, however, as a result of financial problems and harsh climatic conditions. Currently, Japan is the primary hard currency importer of Soviet coking coal.

In addition to the hard currency, technology has been a significant part of Soviet-Japanese energy trade negotiations. The Japanese are a major supplier of energy technology; Soviet purchases account for approximately 15 percent of Japanese energy equipment and technology exports.

**USSR: Hard Currency Exports**

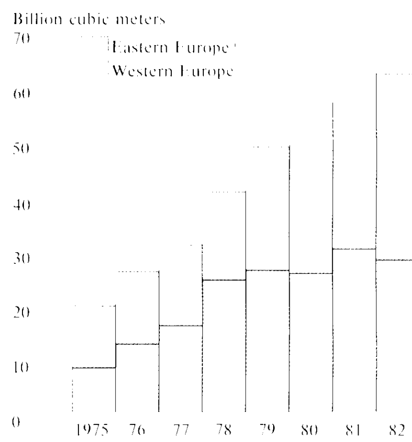



**USSR: Oil Exports**



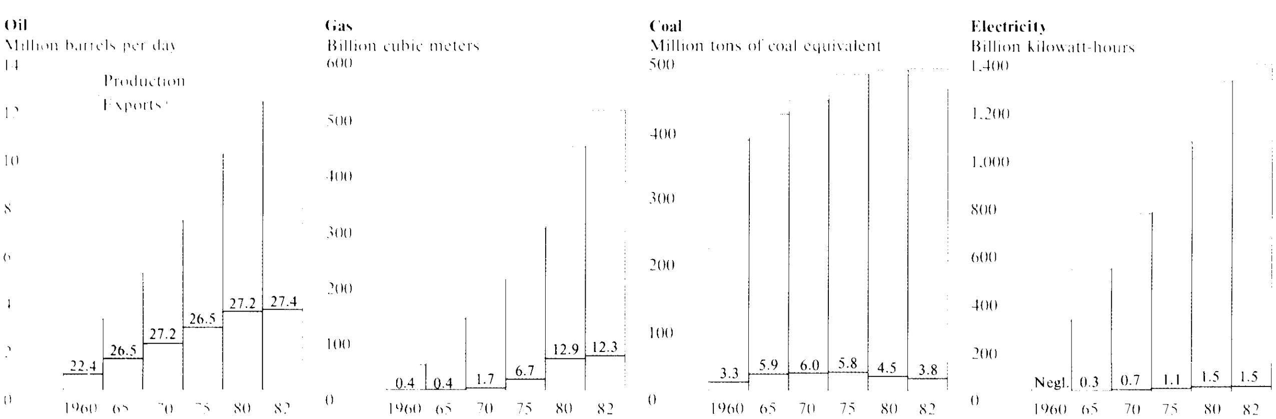

a Including Bulgaria, Czechoslovakia, East Germany, Hungary, Poland, Romania, and Yugoslavia.

**USSR: Natural Gas Exports**




a Including Bulgaria, Czechoslovakia, East Germany, Hungary, Poland, Romania, and Yugoslavia.

**USSR: Energy Production Exported**



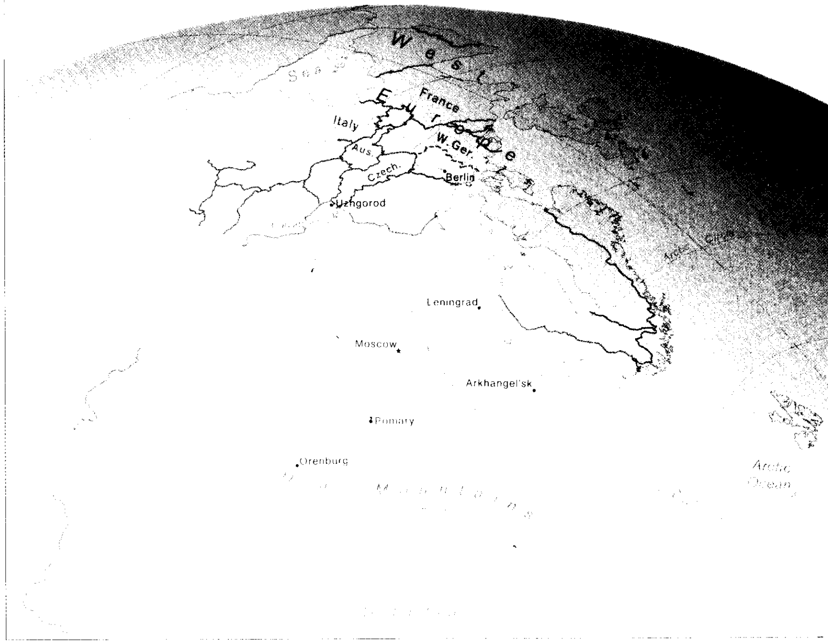

a Exports as a percent of total production

# International Energy Projects

During the 1970s the Soviet Union entered into several foreign contract negotiations associated with domestic energy development. The principal motivation for these cooperative international ventures was Soviet desire to increase hard currency earnings and to acquire essential Western technology and equipment necessary for resource development. Of the many cooperative ventures negotiated with Western countries, three projects—the Siberia-to-Western Europe natural gas pipeline, the South Yakutia coal project, and Sakhalin oil and gas development—have recently received considerable worldwide publicity.

Two widely publicized liquefied natural gas (LNG) projects of the mid-1970s were the North Star project to ship Urengoy gas to the US east coast and the joint USSR-US-Japanese venture to develop Yakutia gas. Although both projects have lost US support, the Japanese still have some interest in Yakutia gas development.

**Siberia-to-Western Europe Natural Gas Pipeline**

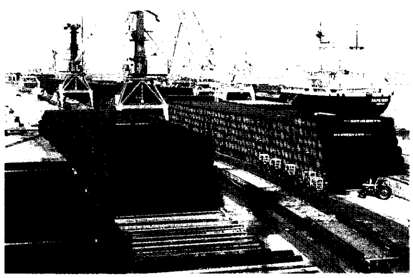



## Siberia–to–Western Europe Natural Gas Pipeline

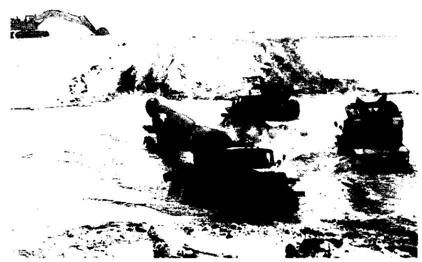
The Siberia-to-Western Europe natural gas pipeline is the largest international trade project the Soviets have undertaken to date. Negotiations for the pipeline began in 1979, and Moscow signed gas purchase agreements in late 1981 with West German and French utilities, in June 1982 with Austria's Ferngas, and in May 1984 with Italy. Included in the pipeline negotiations were contracts for Soviet purchases of large-diameter pipe, turbine compressors, and related equipment from the major West European countries and Japan. Installation of the pipeline in the Soviet section was completed in September 1983; all compressors were to be in place in 1984. Plans call for partial deliveries of gas to start in 1984 and full deliveries to begin in 1987.

The Soviet Union has been exporting gas to Western Europe since the early 1970s. Between 1968 and 1975 Moscow concluded several "gas for pipe" agreements with Austria, France, Italy, and West Germany. Under these agreements, the USSR purchased large quantities of large-diameter pipe and other gas-related equipment with long-term, government-backed credits. To repay the loans and earn foreign exchange, the USSR contracted for long-term deliveries of natural gas to Western Europe.

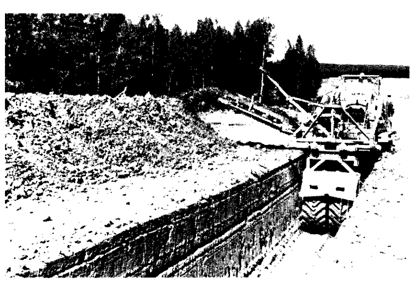
The USSR will be able to use a combination of the existing Soyuz (Orenburg) pipeline, domestic trunklines, and East European transit lines to supplement the initial throughput of the export pipeline which began in early 1984. With the completion of the new 32-billion-cubic-meter-capacity export pipeline, total Soviet deliveries to Western Europe eventually could reach 60 billion cubic meters per year. They were almost 29 billion cubic meters in 1983.



*Imported large-diameter pipe sections at Leningrad port.*

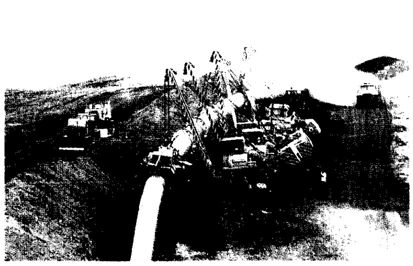


*Pipe sections are transported by trucks from railyards to the construction site.*

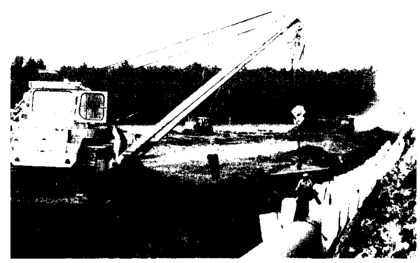


*Soviet-made excavator being used to dig pipeline trench.*

*Pipe sections being welded by manual, arc-welding technique.*



*Welded pipe is coated, wrapped, and positioned within the prepared trench.*



*Concrete blocks are used in areas of swamp and permafrost to support the pipeline.*

## The Pipeline Route

Geographically, the Soviet portion of the pipeline runs 4,451 kilometers from Urengoy in the northern portion of the West Siberian basin to Uzhgorod at the Czechoslovak border. The pipeline route traverses some 700 kilometers of swamp and marshland, 2,000 kilometers of forest, and 550 kilometers of rocky terrain including the Ural and Carpathian mountain ranges. The construction route also crosses nearly 600 rivers and streams including the Ob' in West Siberia and the Volga, Don, and Dnepr in European USSR. The 2.5-kilometer Volga River crossing is the widest waterway on the route.

In the European USSR, the pipeline route crosses several of the country's most heavily populated and industrialized regions. Interconnecting the region's existing gas pipeline network with the export pipeline enables the Soviets to better respond to changing demand for gas.

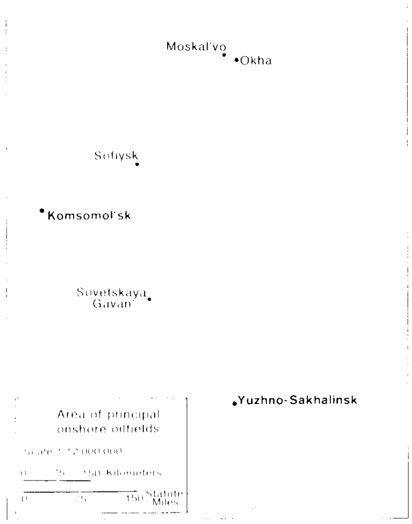
**The Pipeline at a Glance**

| | |
|---|---|
| Length | 4,451 kilometers (Urengoy-Uzhgorod) |
| Capacity | 32 billion cubic meters per year |
| Pipe | 2.7 million tons, 1,420-mm diameter |
| Operating pressure | 75 atmospheres |
| Compressor stations | 41 (40 with three 25-MW gas-turbine compressors each; one with five 10-MW gas-turbine compressors) |
| Total cost | $22 billion ($7 billion in hard currency) |
| Completion | 1983 (pipelaying)<br>1984 (compressor stations) |

# Sakhalin Oil and Gas Project

The USSR reached a general agreement with Japan in 1975 for the joint development of Sakhalin's offshore petroleum resources. The agreement calls for SODECO—a consortium of Japanese petroleum and trading companies and one US firm, Gulf Oil—to finance the exploration and development of the offshore reserves through credits extended by Japan's Export-Import Bank. In return, SODECO is to receive Soviet oil and gas at preferential prices.

**Sakhalin Oil and Gas Region**

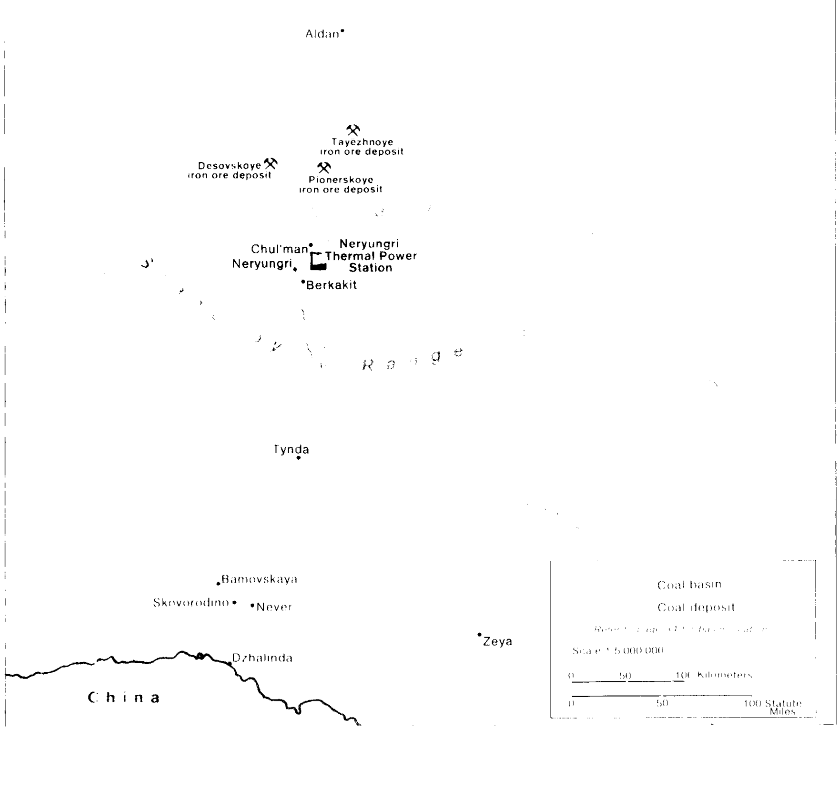



The joint Soviet-Japanese venture to exploit Sakhalin offshore oil resources is similar in many respects to the Siberia to Western Europe natural gas pipeline project. It includes the purchase of Western petroleum equipment financed through credits guaranteed by Western governments in exchange for Soviet repayment through the transfer of energy resources. In addition, the project will boost Soviet hard currency earnings.

Moscow will also acquire offshore experience and technology that could be extremely useful should the Soviets begin intensive exploitation of the potentially rich hydrocarbon deposits of the Barents and Kara Seas. The Sakhalin project will give the Japanese an opportunity to further diversify their oil and gas sources.

Work on the Sakhalin project has not met the projected plans. Exploration, already hampered by the short, ice-free drilling season, has also been delayed by equipment shortages and decisions to drill convenient but unproductive structures. Thus far, two fields—Odoptu and Chayvo—have been discovered off the northeast coast of Sakhalin Island.

**South Yakutia Coal Region**




# South Yakutia Coal Project

A third major Soviet energy development facilitated by international investment and cooperation is the South Yakutia coal project. Terms of this cooperative venture with Japan, which began in 1975, call for the Japanese to receive specified percentages of the 9 million metric tons of annual coking coal production as repayment for their financial and technical investment.

The first stage of the South Yakutia coal project includes development of the Neryungri strip mine, installation and operation of imported mining equipment, a coal concentration facility to treat exported coal, and the first section of the Neryungri Thermal Power Station, where the first 210-MW generator started up in late 1983. The project, made possible by the construction of the Bamovskaya-Tynda-Berkakit (Little BAM) railroad, is scheduled for completion in 1985, nearly two years behind schedule. Limited coal production began in late 1978 when the Little BAM reached the mine. Production has grown from 400,000 tons in 1979 to more than 5 million tons in 1983.

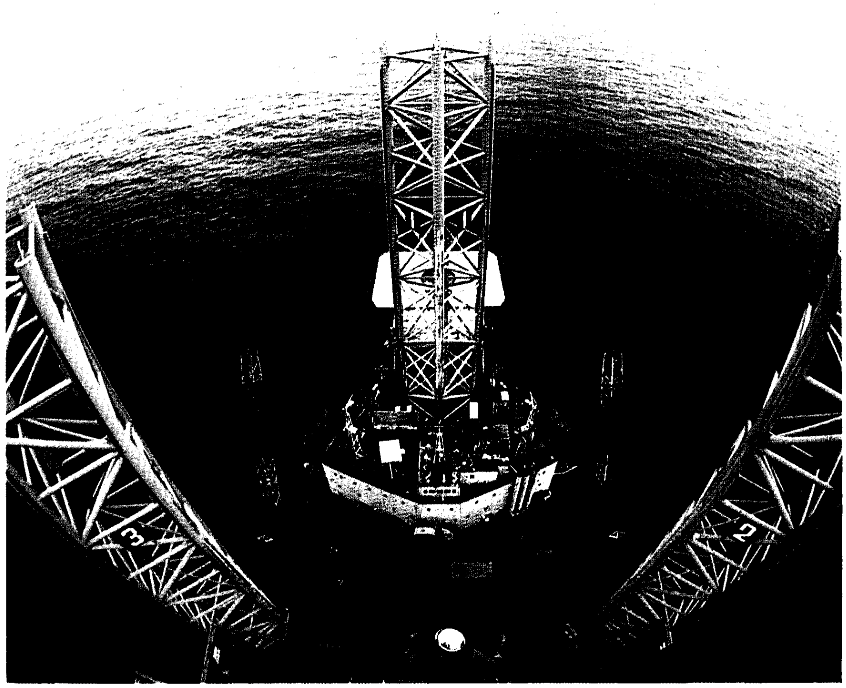
The Soviets are hopeful the new Siberian town of Neryungri, in addition to being the major industrial city and energy hub of the South Yakutia region, will become one of the largest industrial complexes in Eastern Siberia. Because of the high quality of Yakutia's coking coal and the availability of nearby Aldan iron ore deposits, Neryungri is also being considered as a possible location for steel manufacture.

# Fuel Resources

Until recently, the Soviet Union has been able to find, extract, transport, and process its vast fuel resources at a rate sufficient to support rapid economic growth. But, beginning in the late 1970s, supplies of oil and coal, which together contribute nearly two-thirds of Soviet primary energy production, have suffered setbacks. Energy costs are rising because of the growing remoteness and lower quality of the newly discovered resources. Reports of fuel shortages and a growing energy conservation campaign attest to growing fuel supply problems. A current slowdown in the growth rate of oil production, uncertainty about the future world market for natural gas despite long-term contracts with the West Europeans, and stagnating coal output are major causes of concern for Soviet energy planners.

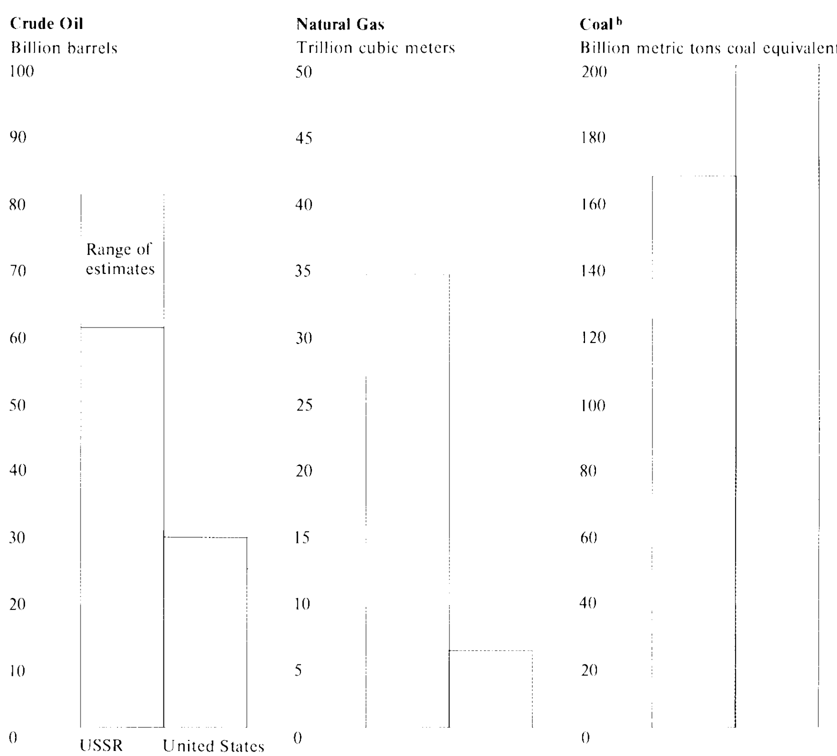
Historically, the large urban and industrial centers west of the Urals were almost totally dependent on plentiful nearby fuel resources. These western resources now provide only about 50 percent of the energy needs of the European USSR; the rest come from newly discovered reserves in Central Asia, Kazakhstan, the Urals, and Siberia. Although the Soviets have significant oil, gas, and coal resources in these southern and eastern regions, with the exception of natural gas they have been unable to develop them fast enough to keep pace with the expanding economy and replace the rapidly depleting and more accessible reserves near the consuming centers of the European USSR. Development of these new energy resources has been slow for a variety of reasons, ranging from the need for specialized equipment and technology to the requirement for enormous additional investment. Additionally, geographic constraints—climate, terrain, and distance—have compounded the problems associated with exploiting and transporting these resources.

The Soviet system of reserve classification for both major and minor fuel resources is very different from that used in the West. The Soviet reserve categories—A, B, $C_1$, $C_2$, $D_1$, and $D_2$—are based primarily on the degree of exploration and delineation drilling that has been carried out and cannot be directly equated to the Western categories of proved, probable, and possible reserves, which are based on prevailing economic and technological factors.



*Overhead view of mobile jack-up drilling platform, Okha, near Sakhalin Island.*

**USSR/US: Reserves of Major Fuels, Yearend 1983[a]**




[a] The portion of total resources assessed as exploitable under local economic conditions and available technology.
[b] Yearend 1980.

## Soviet Union: Reserve Classification System

**Soviet Reserve Classification**

Explored Commercial Reserves
A + B + 30% of $C_1$

A

B

$C_1$ (30%)

Prospective Reserves
The remaining 70% of $C_1$ plus $C_2$ + $D_1$ + $D_2$

$C_1$ (70%)

$C_2$

$D_1$

$D_2$

**Western Reserve Classification**

Proved

Probable

Possible

"A" Category
- Geologically and geophysically examined in detail
- Delineated by exploration and production over the whole deposit
- Engineering data demonstrate recoverability
- Represent reserves in current production

"B" Category
- Geologically and geophysically examined in detail
- Evaluated by drilling to a degree adequate for development planning
- Engineering data demonstrate recoverability
- Represent on-hold reserves or unused producing capacity

"$C_1$" Category
- Represent reserves adjacent to "A" and "B" categories
- Geologically and geophysically evaluated
- Verified by minimal drilling
- Engineering data demonstrate partial recoverability, and average 30 percent will shift to "B" and then "A" categories

"$C_2$" Category
- Presumed to exist, based on favorable geologic and geophysical data analogous to that for areas containing verified reserves
- Some will shift to higher categories

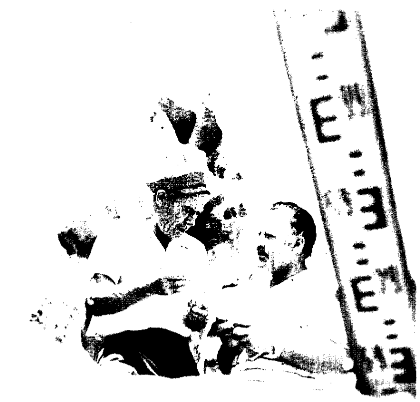
"$D_1$" Category
- Speculative reserves presumed to exist on the basis of geologic analogy to reference areas
- Some will shift to "$C_2$" category

"$D_2$" Category
- Speculative reserves presumed to exist on the basis of geologic analogy to reference area
- Less geologically and geophysically evaluated than "$D_1$" category
- Some will shift to "$D_1$" category

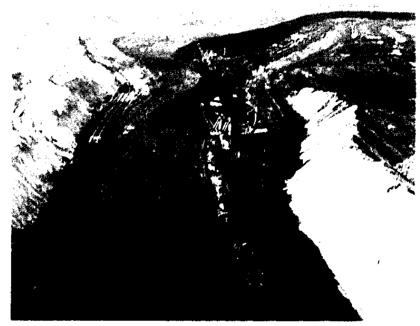
Proved
Reserves which geological and engineering or drilling data demonstrate to be recoverable under existing economic and operating conditions

Probable
Incompletely defined reserves estimated to occur:
- In known producing areas
- As extensions of endowed areas
- In undiscovered areas within known resource-bearing geologic trends
- Recoverable under existing economic and operating conditions

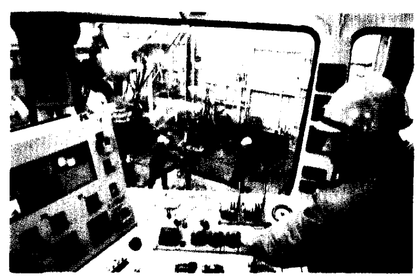
Possible
Inferred reserves estimated to occur:
- In undiscovered areas analogous to other known resource-bearing areas
- Recoverable under existing economic and operating conditions



*Oil and gas exploration on Mangyshlak Peninsula, North Caspian.*



*Extraction of lignite from a Kansk-Achinsk surface mine, Central Siberia.*



*Central control room of exploratory drill ship Viktor Muravlenko.*

*Construction workers study blueprints for Urengoy gas turbines.*

# Oil and Gas

The Soviet Union, abundantly endowed with energy resources, is now the world's leading oil and natural gas producer and a substantial net exporter of both fuels. As Soviet planners have become aware of their abundant supplies of these resources over the past three decades, they have relied heavily on them to meet the growth in demand. Oil and gas have fueled national economic growth, and the expansion of key sectors of the economy is tied to their availability. The Soviets' rich resources of oil and gas have allowed Moscow to provide the CEMA countries and other client states with low-cost energy and to export crude oil, natural gas, and petroleum products to the West in exchange for hard currency. Oil and gas have also become essential elements in the USSR's strategic position and a symbol of national pride.

Oil and gas resources are widely scattered throughout the Soviet Union but, by and large, are poorly located with respect to areas of demand. With the exception of the Volga-Urals oil region and the Ukrainian SSR gas region, both now on the decline, the economic and population heartland in the west contains mostly minor oil- and gas-bearing basins. The large sedimentary basins containing the main reserves that will provide the USSR with most of its oil and gas for the rest of this century are in the once virtually unpopulated West Siberia region, where severe environmental conditions, inadequate economic infrastructure, and high development costs will hamper exploitation.

The rapid increase in Soviet oil and gas production is a testament to the size of the reserve base, which by most estimates is among the largest in the world. The Soviets' strong position in oil and gas production should continue into the next century since a number of major potential hydrocarbon-bearing regions remain virtually unexplored and exploration of offshore areas other than the Caspian is just beginning.

## Oil Reserves

Since 1947 Moscow has treated the size and location of its oil reserves as a state secret, publishing only occasional, fragmentary, and inconsistent data. Most US and West European oil experts believe that Soviet proved reserves are in the range of 60-80 billion barrels, about 10 to 12 percent of the world's total. Reserves in geologically promising but unexplored areas such as the Barents and Kara Seas and East Siberia could significantly raise the overall amount of proved reserves, putting the USSR in an enviable position compared to other industrialized nations.

Potential oil reserves, however, hold little significance for the Soviet oil supply during the 1980s and into the 1990s. Current production will depend almost entirely on hydrocarbon-bearing structures already discovered whose reserves can be rapidly exploited. As the Soviets have been forced to move their search for new deposits into more remote parts of West Siberia, they have encountered smaller fields, lower production levels, and increased development costs.

Baku, on the shores of the Caspian Sea, was the earliest center of extractive activity, but it declined rapidly after World War II. The Soviets then moved in the 1950s and 1960s to the north and east into their "second Baku," the Volga-Urals basin. The Volga-Urals was the focus of Soviet oil activity for two decades and is still the second-largest producing area. Production from this region is now declining as major fields and reserves are being depleted.

In the early 1960s large new reserves were discovered in the remote and environmentally hostile West Siberian basin, which contains the richest known nydrocarbon deposits in the country. This prolific basin provided most of the growth in oil output during the 1970s and early 1980s and, according to Soviet statements, will remain the leading producing region into the 1990s.

Although West Siberian oil production is expected to increase for several more years, the rate of growth has slowed. Some oil industry officials are now arguing openly that the Soviets must search more aggressively for new reserves in virgin regions of the country such as East Siberia and offshore basins in the Kara and Barents Seas. The Soviets acknowledge, however, that production from these areas will not begin during this decade.

### Oil and Gas Regions

## Natural Gas Reserves

Unlike the policy for oil reserves, the Soviets do publish information about the size and location of their enormous natural gas reserves. In January 1983 the Soviet Union had explored reserves of about 34 trillion cubic meters, 40 percent of the world's total and enough to sustain rapid growth in production for several decades. Although the rate of discovery of new reserves has slowed considerably since the mid-1970s, total reserves probably will continue to rise for the near term. The location of these reserves, however, has created serious production and transportation problems because most are concentrated in remote Arctic regions. The northern part of Tyumen' Oblast in West Siberia contains about 80 percent of the Soviet gas reserves.

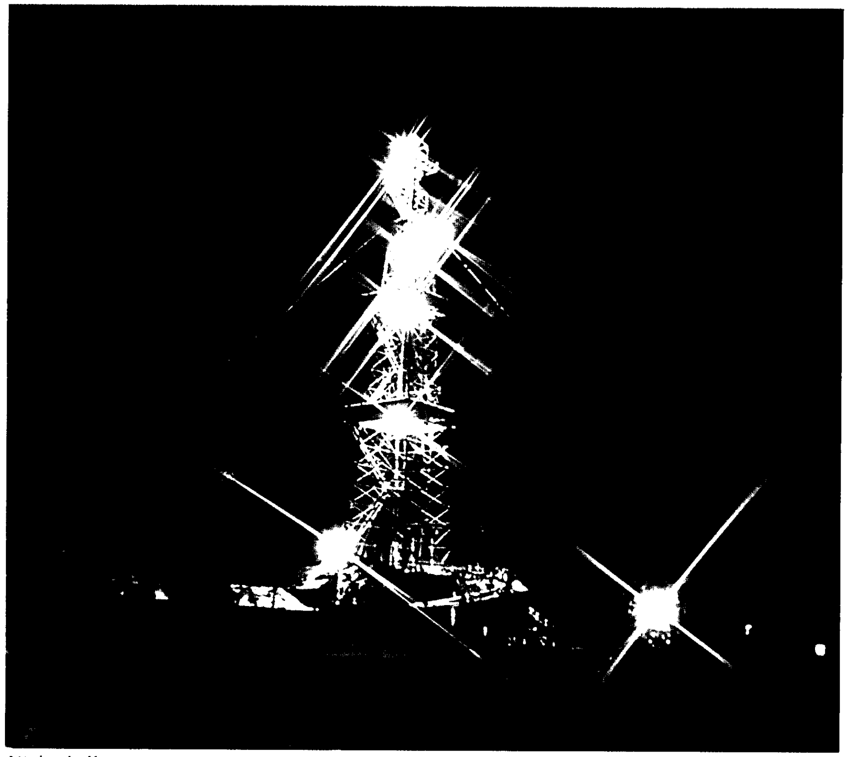
Soviet natural gas production, like that of oil, has increased through the successive development of newly discovered reserves. By the time the North Caucasus region, which was predominant in the early postwar years, reached its peak in the late 1960s, the Ukrainian gasfields had been developed and accounted for most of the growth in production until the early 1970s. Subsequently, gasfields in Central Asia, the Orenburg region of the Volga-Urals, and the Komi ASSR were developed and provided much of the growth during the mid-1970s. Growth in these regions has slowed, and West Siberia is now the primary Soviet gas-producing area. Six northern Tyumen' fields—Urengoy, Yamburg, Zapolyarnoye, Medvezh'ye, Kharasavey, and Bovanenko—together hold more than three-fourths of West Siberia's reserves. Urengoy, with reserves of almost 8 trillion cubic meters, is the world's largest gasfield.

No new, large natural gas region is being developed as a successor to West Siberia, but its enormous reserves are believed to be large enough to support sustained growth into the next century. Long-term future expansion is likely to depend on finding new gas reserves in East Siberia, the Soviet Far East, and offshore areas such as the Barents and Kara Seas.

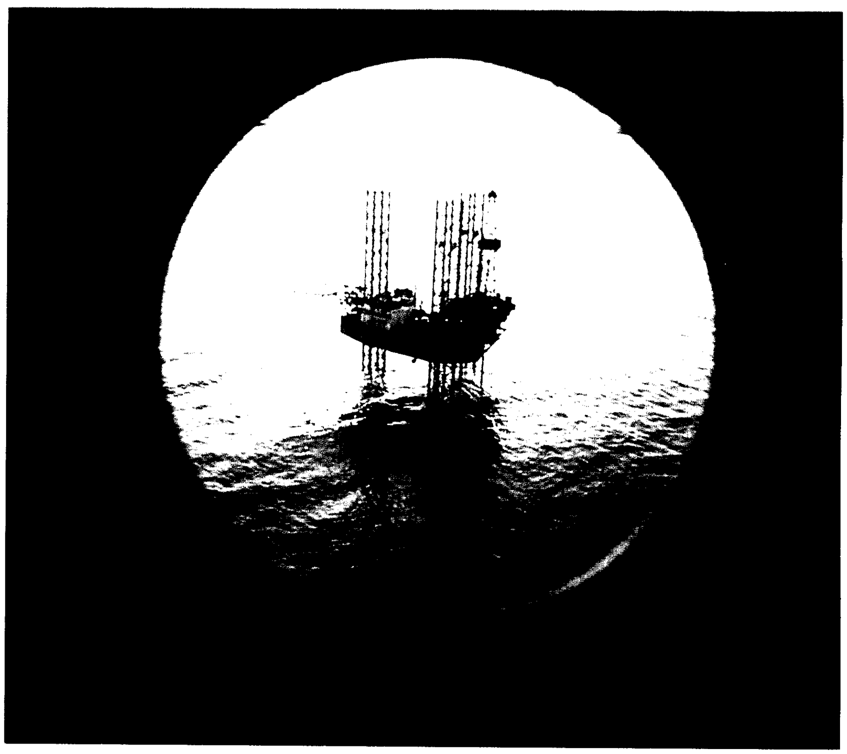
## Gas Condensate

In addition to crude oil and gas, the Soviet Union possesses large reserves of condensate—the liquid hydrocarbons that condense from associated and nonassociated gas when it is extracted from the reservoir—which are included in oil production statistics. Out of a total oil output of 12.33 million barrels per day (b/d) in 1983, about 600,000 b/d are believed to be gas condensate. Although Moscow has never published official reserve totals for gas condensate, limited data from the gas ministry suggest that the condensate reserve base is more than large enough to support current and future output requirements well into the next century.

Reserves of gas condensate are widely distributed in many parts of the USSR, with numerous deposits in West Siberia, Komi ASSR, Central Asia, and the Ukraine. West Siberia may contain as much as two-thirds of all USSR condensate resources, primarily at Urengoy and the large oilfields of the middle Ob' region. The remaining portion of the known condensate reserve base is located at a relatively small number of large fields such as Orenburg in the southern Urals, Vuktyl in the Komi ASSR, and the high-sulfur gasfields of Central Asia.



*Night drilling in the Komi ASSR.*



*Reserves in geologically promising but unexplored areas such as the Barents and Kara Seas and East Siberia could significantly raise proved reserves.*

# The West Siberian Oil and Gas Region

Although it possesses one of the Earth's most forbidding and difficult environments, West Siberia produces 60 percent of the nation's oil and roughly 50 percent of its natural gas, having surpassed the declining Volga-Urals region in oil output in 1978 and Soviet Central Asia in gas production in 1979. To meet Soviet domestic and export needs for these fuels by 1985, the region, according to the current five-year plan (1981-85), will have to produce 63 percent of the nation's oil (8 million b/d are planned) and increase its share of natural gas production to 57 percent (357 billion cubic meters). As production moves farther north in West Siberia, the average cost per unit of output will rise because of higher operating and investment outlays required for exploration, extraction, and transportation.

The oil and gas region is in the West Siberian lowland, one of the world's largest and flattest plains, and, consequently, one of the most poorly drained and flood prone. More than half of the land area of West Siberia is swamp or marshland. In the spring, flood waters of the Ob' and Irtysh Rivers, flowing from the south, are jammed by ice that has not yet melted in the north, and broad areas are inundated.

In addition, severe winter temperatures and cold winds make the West Siberian oil and gas region one of the harshest environments in which to work in the world. Before the discovery of oil and gas in 1960, the entire area was uninhabited wilderness except for hunters and trappers. All endeavors entail a struggle against the environment and result in sharply increased costs to exploit West Siberia's valuable hydrocarbon resources.

All seasons in some way seriously impair the effectiveness of men and machines in northern Siberia. The severe cold in winter as well as the swampy conditions in summer reduce the service life of vehicles and machinery. Average winter temperatures of −20°C and below substantially reduce workers' productivity; Soviet work regulations prohibit outdoor work when temperatures reach −40°C and wind speeds exceed 15 meters per second. This produces a windchill effect comparable to −110°F and causes bare skin to freeze in less than 30 seconds. Moreover, swarms of flies and mosquitoes, which saturate the region during the warm season, take an additional toll on worker efficiency and health.

## Geologic Setting

Occupying an area of more than 3 million square kilometers, the West Siberian basin is the largest structural-sedimentary basin in the world. Favorable geologic conditions have also made it, in the estimation of most petroleum geologists, one of the better locations in the world for the accumulation of hydrocarbon deposits.

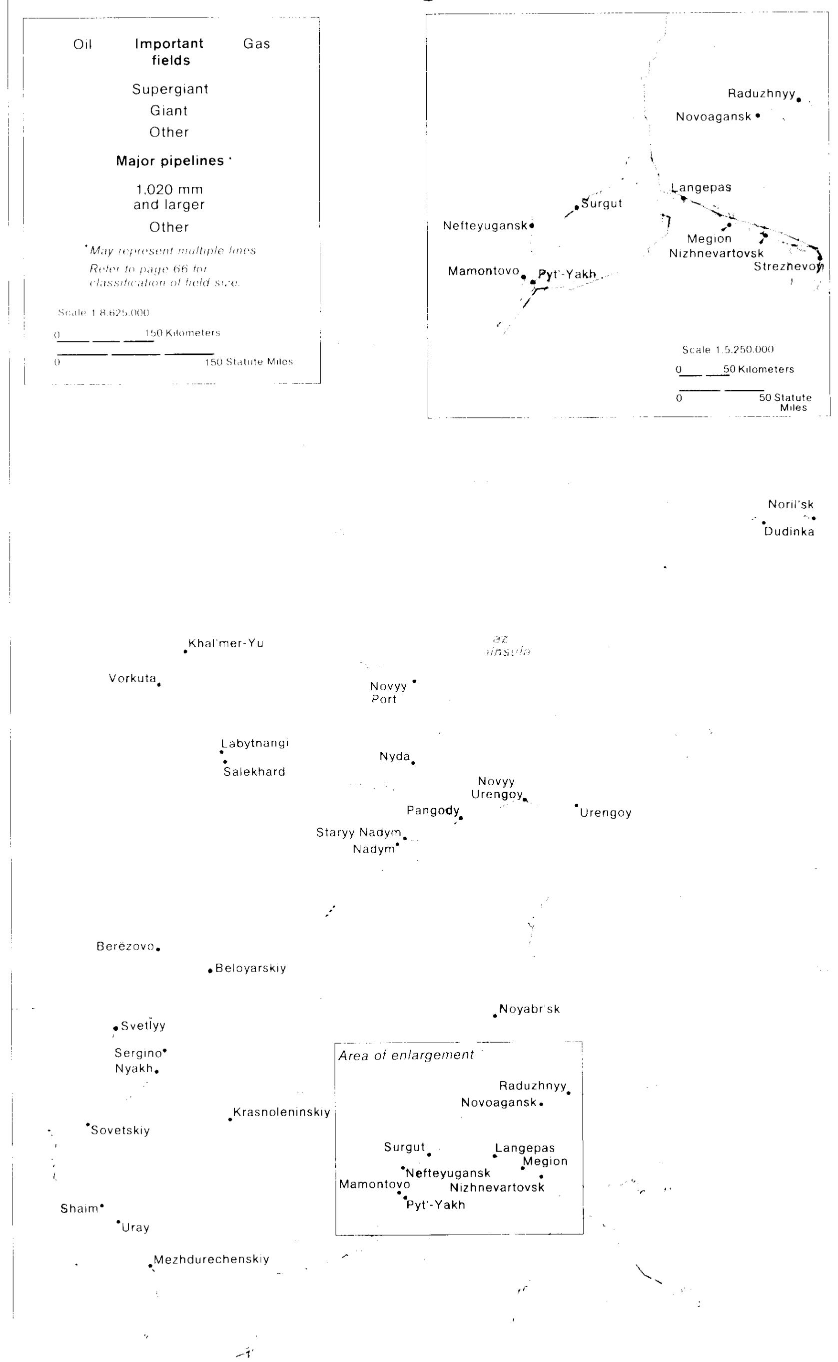
Geologically, the basin deepens to the north, where the sediments generally range up to 6 to 8 kilometers in thickness. In the southern and central parts of the basin, the sediments are 3 to 5 kilometers thick. The sedimentary cover of the basin consists of marine and continental deposits of the Jurassic, Cretaceous, and Paleocene ages, overlain by more recent glacial, lake, and stream deposits.

Surface elevations seldom exceed 100 meters above sea level except on an east-west line of low glacial hills that divides the region into two parts. To the south of this divide, where the main oil deposits have been found, rivers flow southward to the middle Ob' River; to the north, where the region's natural gas is found, they flow northward to the lower Ob' and the Arctic Ocean.

## Development

Following the initial discovery of gas at Berezovo in the mid-1950s and oil at Shaim in 1960, the search for hydrocarbons shifted to the mid-

**West Siberian Oil and Gas Region**



dle Ob' region. Here, during the 1960s, the Soviets discovered and began developing a number of oilfields with relatively high-quality reservoirs.

The immense Samotlor oilfield was discovered in the middle Ob' region of Tyumen' Oblast in 1965 and put into production in 1969. The supergiant Samotlor field near Nizhnevartovsk was soon recognized as one of the largest oilfields in the world. During the 1970s Samotlor surpassed Romashkino to become the Soviet's premier oilfield and was singularly responsible for the rapid growth in Soviet oil output during that decade. By 1980 Samotlor was yielding about 25 percent of total Soviet oil production and accounted for about 50 percent of West Siberian oil output. Production at Fedorovo, West Siberia's second-largest oilfield, started in 1973 and began to grow rapidly following the intensification of drilling in the late 1970s as output from Samotlor was beginning to level off. In 1982 Fedorovo accounted for approximately 6 percent of Soviet national output.

Explored natural gas deposits in West Siberia are concentrated in the Arctic regions of the Tyumen' Oblast. Production from Medvezh'ye, which began in 1972, and from Urengoy, which began in 1978, is to be followed by Yamburg and ultimately extend to other supergiants Zapolyarnoye, Kharasavey, and Bovanenko.

### Key Settlements

Most key West Siberian settlements developed along major waterways as ports and supply bases for the region's early exploration and development. Many became major supply and housing centers on the road and rail systems that later penetrated the region. They now serve as the focuses of the region's expanding pipeline and petroleum processing facilities.

**Labytnangi** (66°39'N, 66°21'E) Population: est. 11,000. From this railhead on the lower Ob', cargo is transferred to rivercraft bound for gas exploitation areas.

**Mamontovo/Pyt'-Yakh** (60°46'N, 72°47'E, 60°45'N, 72°50'E) Population: est. 10,000. Housing and storage areas at Mamontovo settlement and the adjacent Pyt'-Yakh rail station support Mamontovo oilfield.

**Megion** (61°03'N, 76°06'E) Population: est. over 10,000. Megion provides housing and logistic support for surrounding oilfields. All weather roads lead to these fields and to Nizhnevartovsk.

**Nadym** (65°32'N, 72°32'E) Population: est. 50,000. One of the largest urban centers in the northern gas development area has schools, stores, and community services for workers of the surrounding gas region. Its population is expected to increase to about 150,000.

**Nefteyugansk** (61°56'N, 76°38'E) Population: est. 72,000 (1984). This is the primary port and supply base for the Mamontovo and Ust Balyk oilfields. It is linked to them by all weather roads.

**Nizhnevartovsk** (60°56'N, 76°38'E) Population: est. 178,000 (1984). Nizhnevartovsk supports the Samotlor oilfield and smaller fields nearby. It has extensive port facilities on the Ob' River, a rail tie with Surgut, all-weather roads, and an airport.

**Novoagansk** (61°57'N, 76°41'E) Population: est. 7,000. Located at the western edge of the Var'yegan oil-producing area, Novoagansk is a support base for oil exploitation and transport.

**Novyy Urengoy** (66°06'N, 76°35'E) Population: est. 52,000 (1984). Novyy Urengoy, served by rail and air, is the main support city for the Urengoy natural gasfield. Industries and high rise apartments are under construction.

**Noyabr'sk** (63°08'N, 75°22'E) Population: est. 55,000 (1984). Noyabr'sk, a new urban center for the Kholmogory oilfield and other oil and gas exploitation, has a rail-served storage area covering 3.5 square kilometers.

**Pangody** (65°51'N, 74°30'E) Population: est. 6,000. Pangody is the supply base of the Medvezh'ye gasfield.

**Raduzhnyy** (62°06'N, 77°31'E) Population: est. 5,000. Raduzhnyy supports nearby oilfields and is the terminus of an all weather road from Nizhnevartovsk, 140 km to the south.

**Sergino** (62°30'N, 65°38'E) Population: est. 6,000. Sergino is a rail terminus where cargo is transferred to rivercraft or to trucks plying the winter road to the Urengoy gasfield.

**Staryy Nadym** (65°35'N, 72°42'E) Population: est. 2,000. This expanding port serves the city of Nadym (11 km southwest) and the Medvezh'ye and Urengoy gasfields.

**Strezhevoy** (60°42'N, 77°34'E) Population: est. 10,000. This port, 60 km southeast of Nizhnevartovsk supports the Sovetskoye oilfield and may support new oil exploration along the Vakh River.

**Surgut** (61°14'N, 73°20'E) Population: est. 188,000 (1984). Surgut is the key housing, industrial, and supply center of the middle Ob' oil region; it has large mechanized port facilities, an all-weather airport, and rail facilities.

**Uray** (60°08'N, 64°48'E) Population: est. 20,000. Uray, which supports an oil exploitation area west of the Ob', is served by rivercraft and an all-weather airport; a dirt road connects to a railhead at Mezhdurechenskiy.

**Urengoy** (65°58'N, 78°25'E) Population: est. 9,000. Development of Urengoy gasfields stimulated construction of port facilities and storage areas. These facilities are expanding along the left bank to the site of the railyard and projected city of Tikhiy.

## Permafrost

North of 64 degrees N latitude, West Siberian oil and gas exploration and extraction are affected by frozen ground or permafrost—a phenomenon that occurs where mean annual temperatures are below freezing. Permafrost complicates all oil and gas activity and seismic exploration; special drilling muds and concretes are necessary to avoid alternate freezing and thawing problems, and well casing has to be carefully insulated to prevent collapse. Maintenance of facilities is often more expensive than their initial construction since seasonal freezing and thawing cause the ground to heave, cracking foundations and collapsing structures.

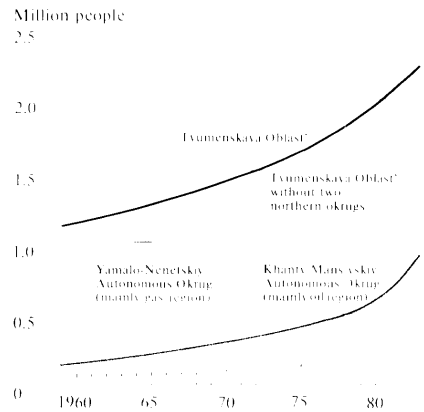
In the northernmost areas, permafrost is generally continuous and lies within 1 or 2 meters of the surface, creating surface drainage problems. Only a shallow layer of soil thaws each summer. Southward, the surface layer that freezes and thaws seasonally becomes deeper and the underlying permafrost becomes discontinuous. At its southernmost limits, permafrost is reduced to sporadic patches, as in the Surgut and Nizhnevartovsk areas.

## Population and Settlement

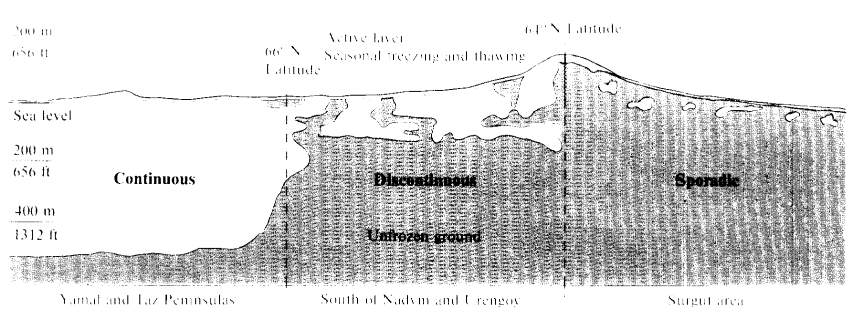
Population growth—particularly urban—has been dramatic during the two decades since oil and gas exploitation began in West Siberia. In the two administrative subunits of Tyumen' Oblast where energy development is now concentrated, the population increased from 186,000 in 1959 to 1.2 million in 1983, or from one-tenth to one-fourth of West Siberia's total. Whereas urban residents comprised less than half of the population in 1959, in 1984 four-fifths of the total lived in 44 urban settlements. Of the 44 urban places, 38 were founded after 1960 and 26 of these are oil and gas related; the largest are Surgut and Nizhnevartovsk.

The rapid and large population influx into West Siberia has required the construction of a network of settlements—with attendant housing, stores, schools, clinics, utilities, and related industrial installations. Lack of comfortable housing and amenities is the primary reason that four-fifths of the 500,000 migrants who arrive yearly soon leave the region.

**Population Trends in Tyumenskaya Oblast'**




**Variations of Permafrost**



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## Administration of West Siberian Development

The buildup of the region has involved the efforts of 26 ministries and state agencies pursuing their own plans. Concerned about the poorly coordinated management of the region, Moscow in 1981 established the unique, interdepartmental Territorial Commission for the Development of the West Siberian Oil and Gas Complex. Headquartered in Tyumen', this group includes 31 major directors and heads of organizations responsible for development in West Siberia. Representatives from the State Planning Committee (Gosplan) and the Central Committee of the Communist Party of the USSR also participate. The commission has no authority of its own and must submit its proposals and recommendations for regional development directly to Gosplan.

## Transportation Systems

The construction and maintenance of a reliable transportation network are essential in developing West Siberian resources, which are located thousands of kilometers from material suppliers and markets. Nearly all construction material, equipment, and consumer goods are imported into the West Siberian oil and gas region, and transport systems are severely strained.

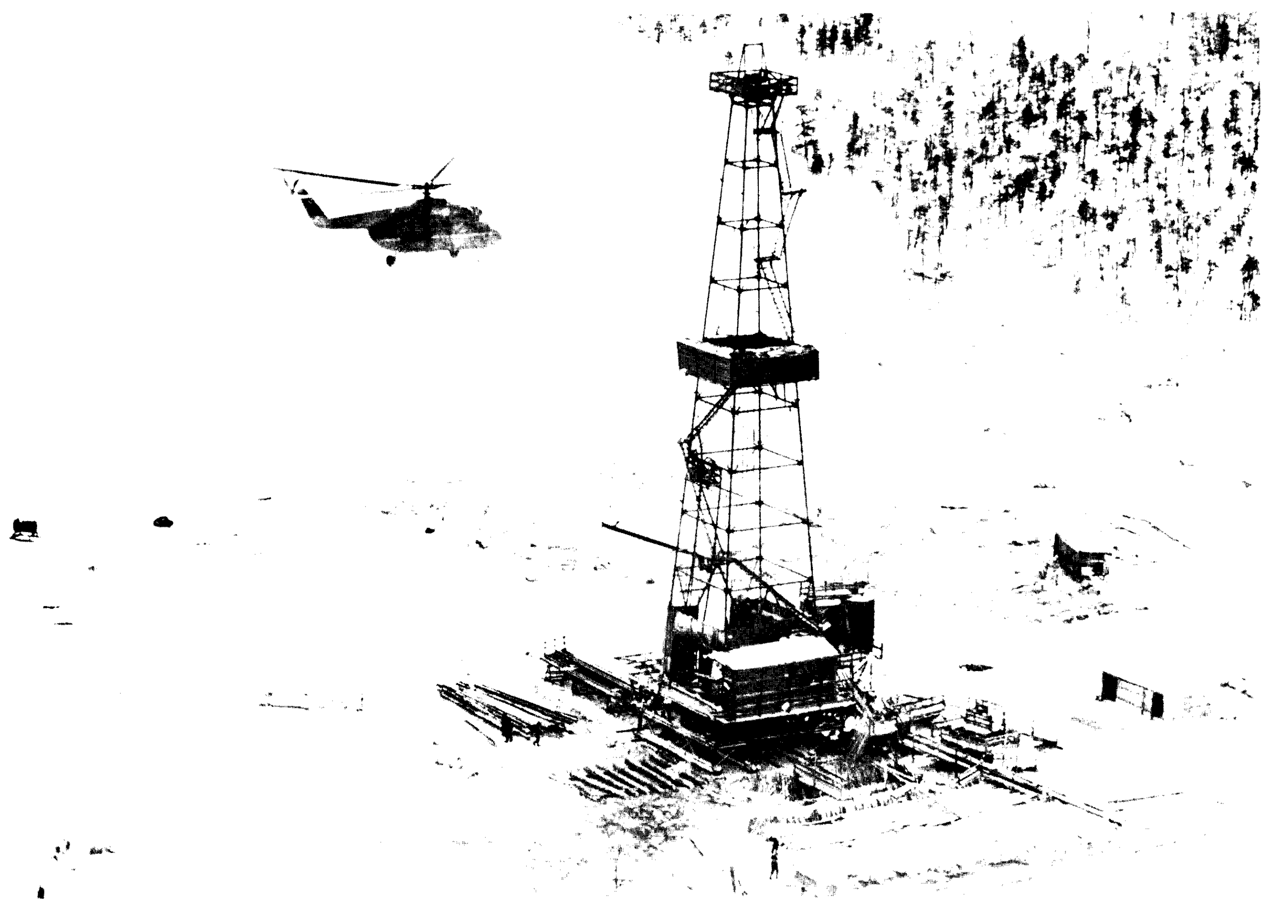
The Trans-Siberian Railroad crosses the West Siberian plain a few hundred kilometers south of the oil and gas region. In addition, only one trunk railroad extends into the main oil and gas region—a single-track, diesel-traction line from the Urals, via Tyumen', to Surgut, Nizhnevartovsk, and, in 1983, northward to Novyy Urengoy. The oilfields west of the Ob' are served by a rail line from the Urals. Another line brings freight to Sergino for transfer to ships and barges on the Ob' or, in winter, to trucks for long hauls via winter roads to the northern gasfields. A rail line to Labytnangi on the Ob' also brings freight to be transferred to the river fleet. A temporary gasfield rail line shuttling freight from the river port at Staryy Nadym to the Medvezh'ye and Urengoy gasfields is now being converted to a regular railroad extending the line that reached Novyy Urengoy in 1983.

After 20 years of building, the region's road network is still poorly developed, and the demand for roads grows faster than they are built. The situation is similar to the one faced by the United States in exploiting Alaska's energy resources. There are few all-weather (paved or gravel) roads, and most others are often impassable between May and September. In winter, however, cross-country travel is accomplished on ice roads built by spreading water over the ground or on snow roads built by compacting snow.

Without passable roads through the swamps, many supply and construction activities must wait until winter. Winter roads are vital to early exploitation of new fields and for pipeline construction and maintenance. An impressive example that serves both these purposes is a 700-kilometer winter road linking the Sergino rail terminus to Novyy Urengoy.

Despite the short navigation season caused by long and severe winters, waterways play a key role as links between railroads and the roads serving the fields. Most river freight to the oil and gas region is routed downstream (north) from rail/river junctions at Omsk, Novosibirsk, Tobol'sk, and Tyumen' to the sub-Arctic ports such as Surgut and Nizhnevartovsk on the middle Ob'.

The navigation season ranges from five months (late May to late October) at Surgut to less than

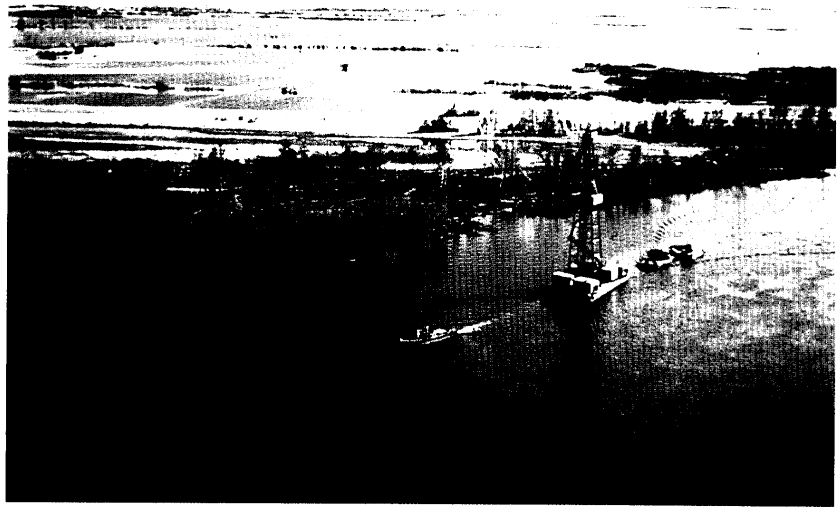


*Air transport, particularily by helicopters, is commonly used to augment road, rail, and water transport in West Siberia.*

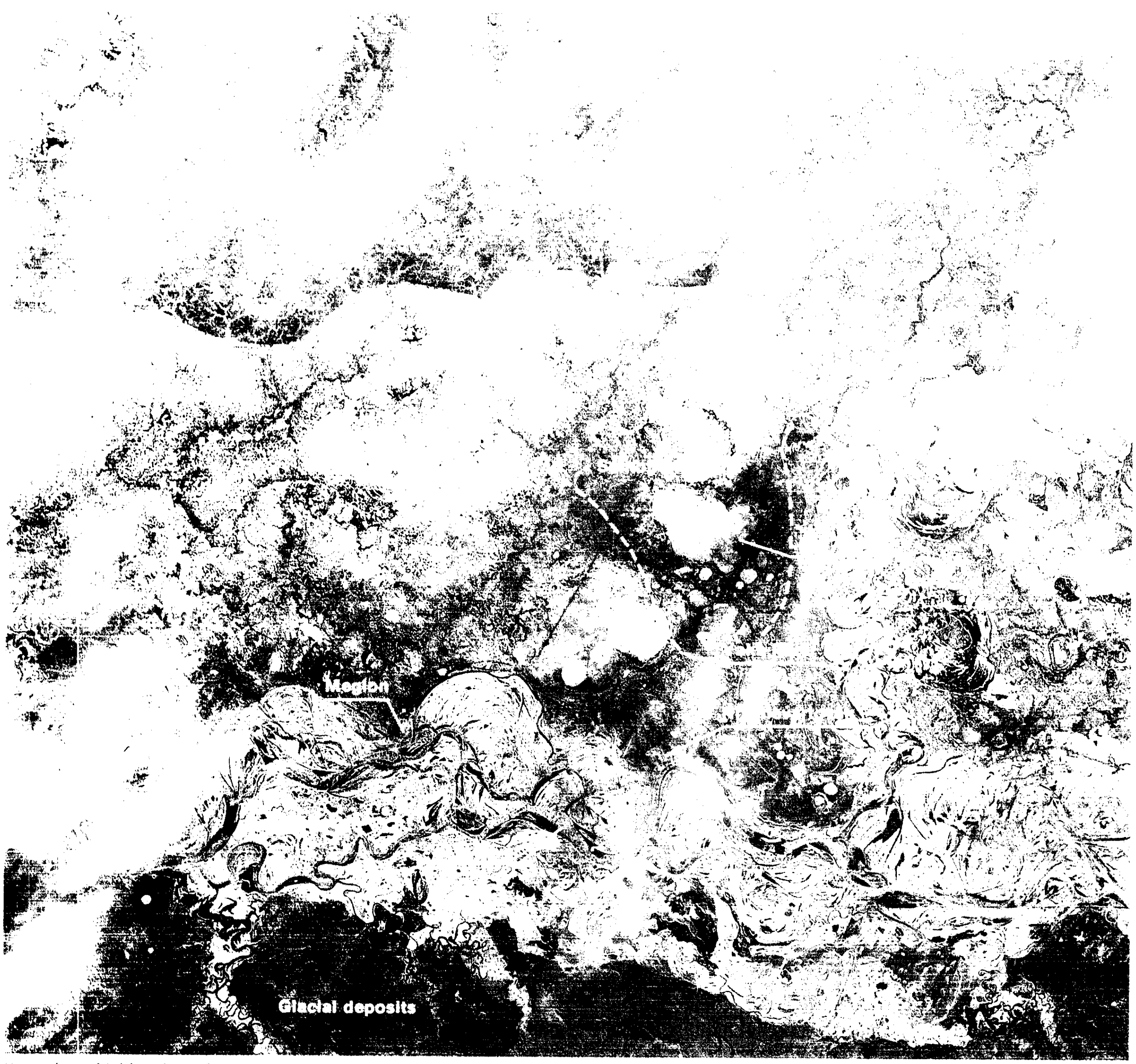
one month at the extreme northern port of Nyda. During this season, much of the freight is transferred to small ships and barges for transport up small rivers, such as the Agan in the middle Ob' region and the Nadym and Pur farther north.

While air transport provides only a small percentage of the cargo moved into the region, it is particularly important because it can be used when other modes of transportation are unavailable. Year-round air links have been established between major Soviet cities, such as Moscow and Chelyabinsk, and the larger cities of the region—Surgut, Nefteyugansk, Nizhnevartovsk, Strezhevoy, Novyy Urengoy, and Nadym.

Helicopter pads are located at almost every settlement and drilling area. Helicopters are used in laying pipe, building compressor stations, hauling supplies, delivering field crews, and constructing powerlines.



*During summer, river barges are frequently used to transport rigs to new drilling sites.*




*Samotlor oilfield and nearby Ob' River as seen from Landsat.*



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# Other Major Oil and Gas Regions

## Volga-Urals

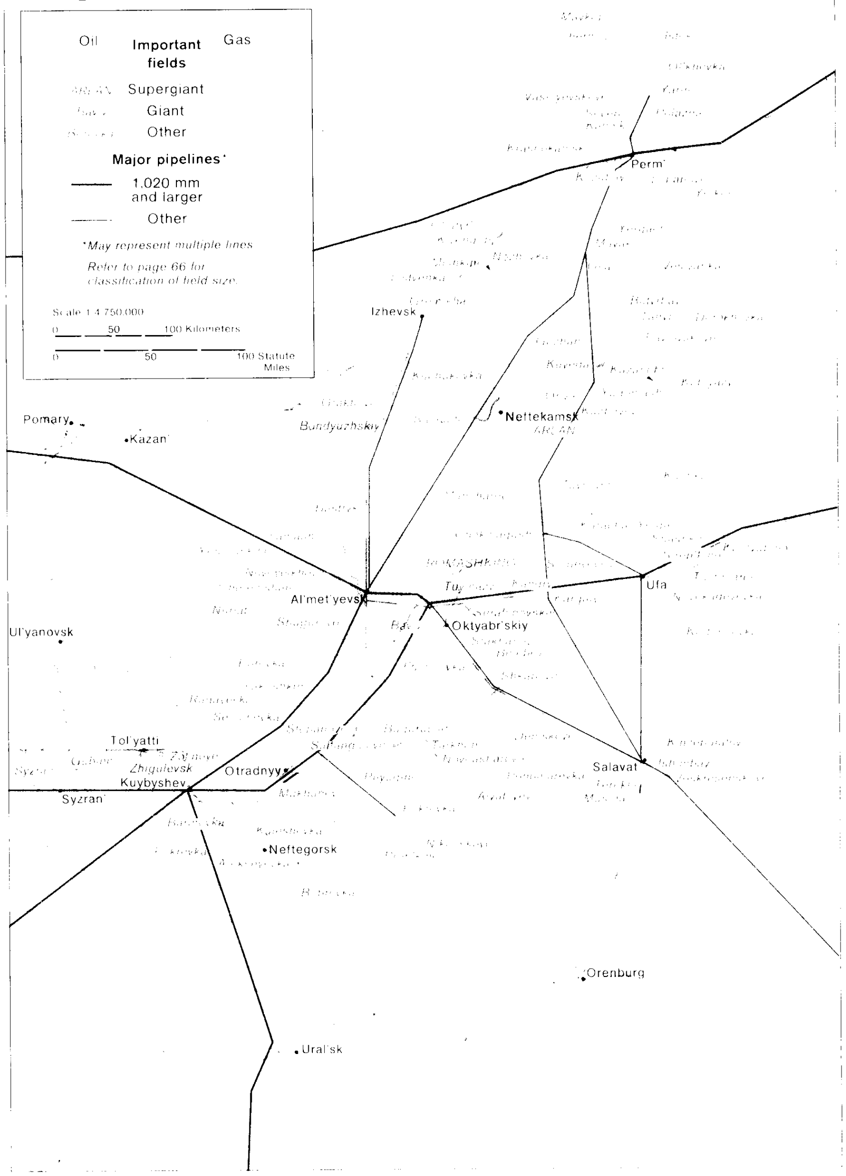
The Volga-Urals oil-producing region covers about 500,000 square kilometers between the Volga River and the Ural Mountains. It produces 25 percent of the USSR's oil—second only to West Siberia. The region includes the Tatar, Bashkir, and Udmurt Republics and the Kuybyshev and Perm' Oblasts. Other oblasts usually associated with the region are Orenburg, Saratov, and Volgograd.

Production in the "second Baku" began in the 1930s, but growth in oil output did not start to accelerate until the 1950s, when the supergiant Romashkino and Arlan fields and several other major deposits were developed. The Volga-Urals was the leading oil-producing region from the 1950s until it was surpassed by West Siberia in 1978.

Output from all major producing areas of the Volga-Urals has been declining since it peaked at 4.5 million b/d in 1975. Many fields have been producing for 20 to 30 years and their easily obtainable reserves are nearly depleted. Production wells are lifting increasing amounts of water with the remaining oil. Even with deeper drilling efforts and expanded use of secondary and enhanced oil recovery techniques, the region's share of national output has been steadily declining. It is doubtful that production from newer fields in the Udmurt ASSR and elsewhere in the region will be sufficient to slow the overall decline of the Volga-Urals.

Significant gas production in the Volga-Urals began with the development of the giant Orenburg field, southwest of the Ural Mountains, in the late 1960s. Most of Orenburg's gas has been exported since the CEMA nations completed the Orenburg or Soyuz pipeline to Eastern Europe in 1978. An additional large gas deposit is being developed at Karachaganak, south of Orenburg in Kazakhstan.

**Volga-Urals Oil and Gas Region**



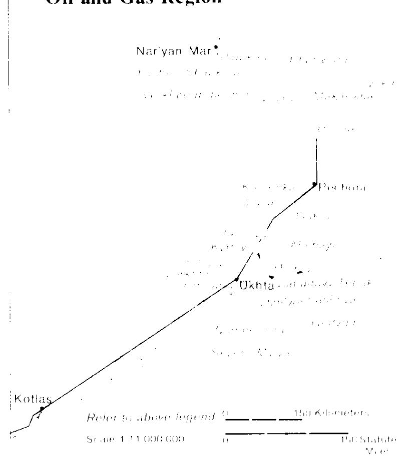

## Timan-Pechora (Komi ASSR)

The Timan-Pechora basin is a sedimentary basin of 350,000 square kilometers in the northeastern part of the European USSR. It is part of two administrative subdivisions: the Komi ASSR and the Nenets Autonomous Okrug. Development of the petroleum basin occurred in two phases. The first phase was from the early 1930s to the 1950s when the area south of the Pechora and Usa Rivers was explored and small oil and gas fields were put into production. The second phase began in the early 1960s with the exploration of Arctic areas nearer the Barents Sea. Two fields—Usinsk which was discovered in 1963, and Vozey, in 1972—accounted for more than 60 percent of Komi oil production in 1982.

Komi ASSR, one of the two oil regions outside West Siberia, has shown no significant growth in oil production since 1979. Although the region appears to have substantial oil resources, development has been slowed by the extreme Arctic environment and by the heavy and paraffinic oils that are characteristic of the region. Nevertheless, the Soviets hope to increase oil output from the region again.

Komi ASSR gas production was insignificant until the giant Vuktyl gas deposit was developed in the late 1960s. While there are more than 30 gasfields in Komi ASSR, none of the others approaches the size of Vuktyl, which in 1982 accounted for nearly all of Komi ASSR's approximately 18-billion-cubic-meter production. Vuktyl gas production was responsible for the construction of the Northern Lights pipeline from Komi ASSR to Eastern Europe.

**Timan-Pechora Oil and Gas Region**



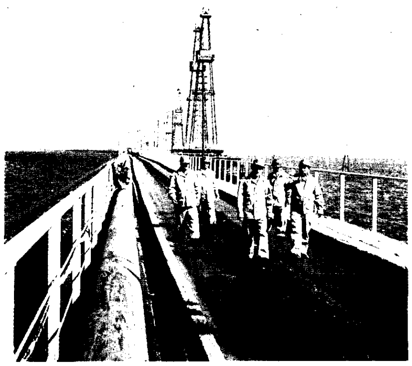
## North Caucasus–North Caspian

The North Caucasus–North Caspian oil and gas region follows a productive geologic trend more than 1,500 km from the Ukraine eastward across the Caspian Sea into Kazakhstan.

The North Caucasus region, situated west of the Caspian Sea, has been a petroleum producer for more than 60 years. In the late 1950s, as output from early producing wells began to decline, many deeper wells were drilled to increase production. Output in the North Caucasus peaked at about 740,000 b/d in 1971 and then declined to 400,000 b/d in 1980 as production fell rapidly in the most productive area, the Chechen-Ingush ASSR. Oil production in the region's other areas—Stavropol' Kray, Krasnodar Kray, and the Dagestan ASSR—is also declining.

East of the Caspian, Kazakhstan's oil development is primarily located in three areas: the Mangyshlak Peninsula, dominated by the giant Uzen' field; the Buzachi Peninsula, with several deposits of heavy oil; and the Emba region, the source of early Kazakhstan production.

Natural gas production in the North Caucasus–North Caspian has been declining since the late 1960s. A recently discovered field north of Astrakhan' on the lower Volga, however, may prove to be as large as the giant Orenburg field. Astrakhan' gas is high in sulfur and carbon dioxide (sour gas), and the USSR is acquiring Western technology and corrosion-resistant equipment to develop the field and remove the impurities from the gas.



*Caspian Sea oil workers.*

## Transcaucasus–Central Asia

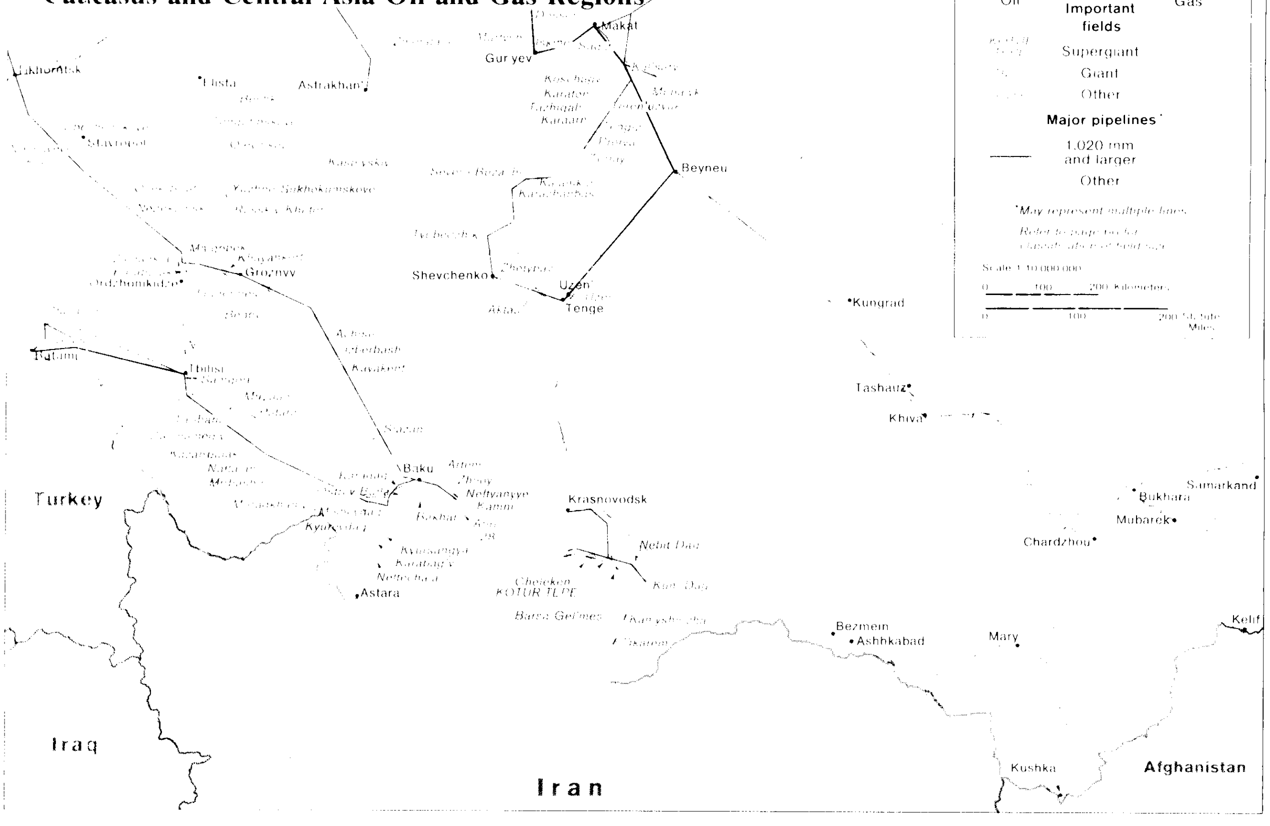
The Transcaucasus–Central Asia oil and gas regions extend from the Georgian and Azerbaijan SSRs in the Caucasus Mountains under the southern Caspian Sea across Central Asia's Turkmen and Uzbek SSRs.

Oilfields near Baku, in Azerbaijan, began producing in the 19th century. They accounted for half of the world's oil production in 1900 and more than 70 percent of Soviet oil output in 1941. Azerbaijan's oil industry declined during World War II and, although it never regained prewar production levels, again rose until 1966, accounting for 8 percent of total Soviet production. Postwar growth was spurred mainly by offshore wells in the Caspian Sea, which now account for more than 70 percent of Azerbaijan's output. Transcaucasus oil development extends from Baku westward into the Georgian SSR, where oil production, though relatively small, is rising. Georgia's output—about 60,000 b/d in 1980—is primarily from the Samgori field near Tbilisi.

Central Asia played a crucial role in Soviet natural gas production during the late 1960s and early 1970s by offsetting declining growth in the European USSR during West Siberia's early development. From 1973, when output surpassed that of the Ukraine, to 1979, when output was in turn surpassed by that of West Siberia, Central Asia was the leading gas-producing region in the USSR. During this period it accounted for more than 30 percent of total USSR production. Turkmenistan has recently replaced Uzbekistan as the major gas-producing area in Central Asia. Despite outputs from West Siberia's supergiant gasfields, surplus gas from both sparsely populated Central Asian republics continues to be integrated into the vast Soviet domestic and export pipeline network.

Future petroleum growth in the Transcaucasus and Central Asia regions will probably come from deeper drilling in the Caspian Sea rather than from the current oil and gas exploration efforts in western Azerbaijan and Turkmenistan. Any new discoveries would require nearly a decade before they would make a significant contribution to Soviet oil production.

### Caucasus and Central Asia Oil and Gas Regions



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## Production and Consumption

### Oil

For 30 years after World War II, oil production in the Soviet Union grew at enviable rates. During the mid-1970s the USSR became the world's leading oil producer. In 1983 the Soviet oil industry reported an average daily production rate of 12.33 million barrels of crude oil and gas condensate, about 20 percent more than the United States.

The rapid growth in production was largely the result of the discovery and exploration of a series of large, giant, and supergiant fields. In the 1950s and 1960s, the Soviets developed the Volga-Urals and the massive fields of Romashkino and Arlan. By the 1970s, just as production growth from the western USSR was beginning to taper off, the Soviets received a boost in production from the mammoth fields of the West Siberian basin—Samotlor, Fedorovo, and Mamontovo.

Soviet oil growth has begun to slow. The Soviets failed to make either the original or revised production targets for 1980 and have not equaled or exceeded an original annual target since the early 1970s. Plans have been revised downward to the point where the 1985 plan goal of 12.6 million b/d is no higher than the original target—later revised downward—for 1980. The present 1985 goal, already lowered from the upper limit of 12.9 million b/d, a provisional output goal, represents planned growth of less than 1 percent per year.

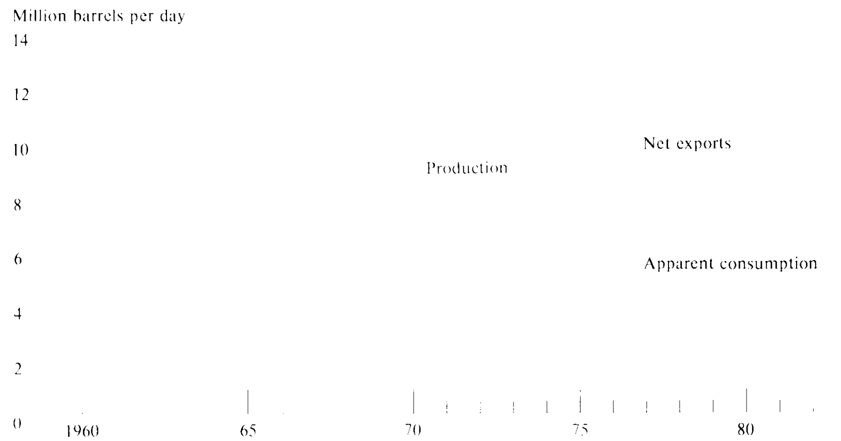
These small increases have been possible only because the Soviets have been able to keep West Siberian production growing—from 6.2 million b/d in 1980 to an estimated 7.4 million b/d in 1983. West Siberia's share of national output is now 60 percent. Outside West Siberia, only two lesser oil-producing regions of the USSR are currently able to raise output—the Komi ASSR, in the north European USSR, and Kazakhstan, on the eastern shore of the Caspian Sea. These three growth areas, together with the declining Volga-Urals region, produce more than 90 percent of Soviet oil and will largely determine Soviet output in the 1980s.

Oil production in all other major Soviet producing regions has leveled off or is declining. Volga-Urals production has declined by 1.2 million b/d—or 25 percent—since its peak in 1975. The drop was largely the result of a decline at the supergiant Romashkino oilfield, the leading producer in the region and the second-largest field in the USSR.

The USSR's first-place position in world oil production is primarily the result of its abundant resource base, massive investment, and sheer persistence rather than of any unique technical and managerial effort on the part of its oil industry. Although accorded high-priority status in the civilian economy, the oil industry is troubled by many of the same problems that afflict other Soviet industries—equipment shortages, technology shortcomings, and lagging productivity and efficiency. Moscow has been attempting to rectify this with substantial foreign equipment purchases and domestic technology enhancements.

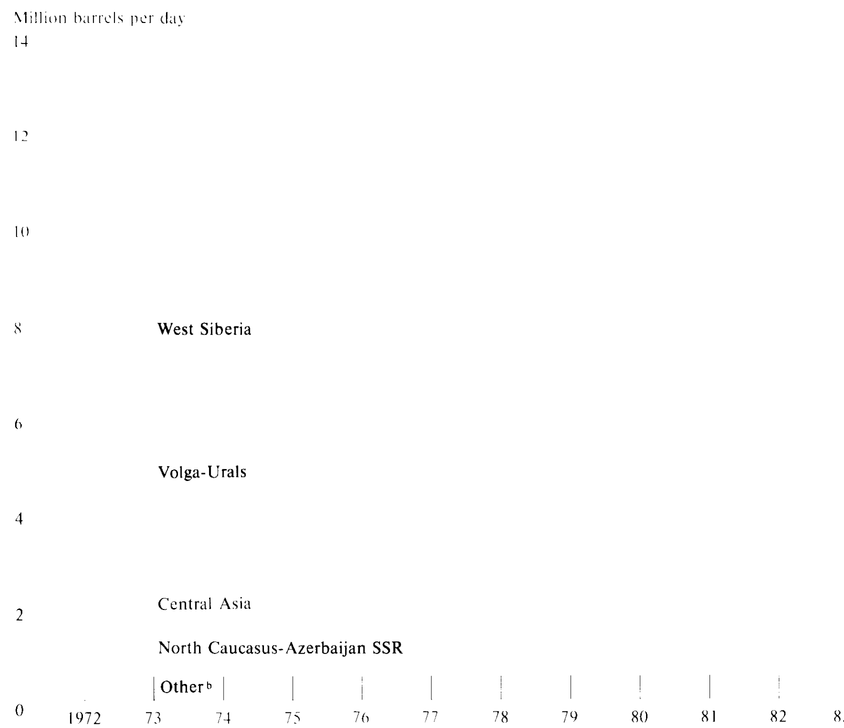
Some 70 percent of oil consumption in the Soviet Union takes place in three sectors of the economy: electric power, transportation, and industry. Although Soviet oil consumption during the last 25 years has consistently grown faster than total energy consumption, in recent years the rates of both have been declining as overall economic growth has decreased. In the first half of the 1970s, oil consumption grew about 7 percent annually (compared with 4.7 percent for total energy), but during the period 1976-80 growth in oil use fell to 4 percent per year (versus 3.5 percent for total energy). Soviet efforts over the last five to 10 years to slow the growth of domestic oil consumption, except in the industrial sector, have been minimal. Domestic oil consumption in 1983 is estimated at 9.0 million b/d.

**USSR: Oil Production[a] and Apparent Consumption**




[a] Including gas condensate.

**USSR: Oil Production by Region[a]**




[a] Including gas condensate.
[b] Includes the Belorussian SSR and Baltic, Far East, Georgian SSR, Komi ASSR, and the Ukrainian SSR.

## Natural Gas

Natural gas, rather than oil, has paced the growth in Soviet energy production in recent years. Not only is Moscow turning to gas to satisfy a large part of its increasing internal demand for energy in the 1980s, it is also relying on gas as an important source of hard currency revenue.

In 1983 the USSR surpassed the United States as the world's largest producer of natural gas. Soviet gas output of 536 billion cubic meters in 1983 compared with 450 billion cubic meters for the United States. Even if the Soviets fall short of their 630-billion-cubic-meter gas production goal for 1985, they are expected to remain in first place.

The European USSR — primarily the North Caucasus and the Ukraine — supplied 85 percent of natural gas produced in 1965. Following the discovery of the Orenburg field in the late 1960s, the Volga-Urals and Central Asia fields paced Soviet production growth during the 1970s. By 1983 West Siberia was providing nearly all of the gas industry's growth and accounted for one-half of the nation's gas production.

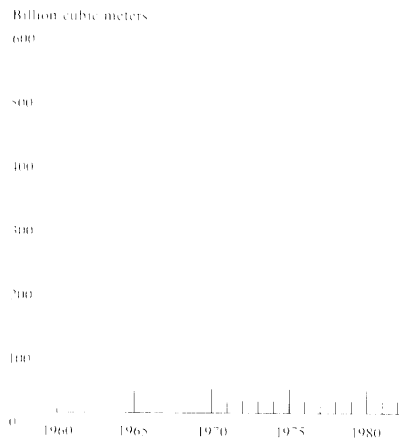
The first gasfields to be developed in West Siberia were located along the lower Ob' River, near Berezovo, where production began in 1966. The center of the West Siberian deposits, however, is located much farther to the north and east near the Arctic Circle. Of the six large fields there — Medvezh'ye, Urengoy, Yamburg, Zapolyarnoye, Kharasavey, and Bovanenko — only Medvezh'ye and Urengoy have been developed. The opening of Medvezh'ye in 1972 marked the beginning of West Siberia's rapid growth in gas production, and by 1978 it supplied about three-fourths of the region's total output.

West Siberia's Urengoy gasfield, brought into production in 1978 along with the smaller Vyngapur field, is currently being intensively developed and will account for virtually all the growth in Soviet gas production during the next several years. In 1982 Urengoy's production of 117 billion cubic meters was less than one-half the field's planned annual production for the mid-1980s. The supergiant Urengoy field, with reserves of 7.8 trillion cubic meters, is the largest gasfield in the world. Additionally, the Soviets are making preparations to start developing the adjacent Yamburg gasfield to the north in the late 1980s.

Since natural gas production increments in West Siberia exceed declines in the older regions, the total USSR output continues to increase. Furthermore, West Siberia has become a principal supplier of natural gas to Europe through several long pipeline systems that extend as far as France.

Currently, natural gas provides four-fifths as much domestic energy as oil, compared with only 63 percent in 1970. Gas output has grown an average of 8 percent per year since 1970. The Soviets plan to raise the share of natural gas in total primary energy production from 26 percent in 1980 to 32 percent in 1985.

**USSR: Natural Gas Production**




## Gas Condensate

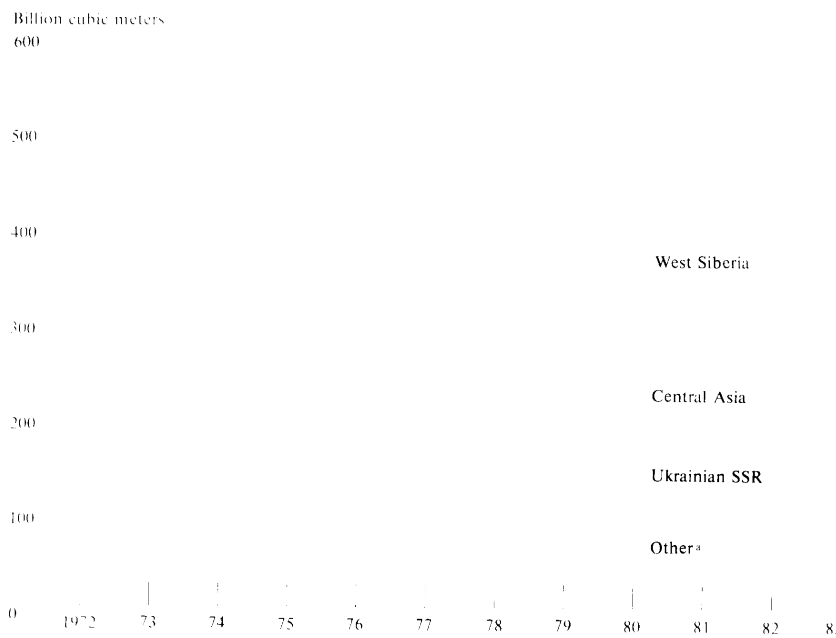
Gas condensate, also called natural gas liquids, is a hydrocarbon occurring either in natural gas or oil reservoirs. Condensate is normally in the vapor phase at reservoir temperatures and pressures, but condenses either at lower reservoir pressures or at the surface during extraction. Condensate can be processed to yield fractions usable as petrochemical feedstock, motor gasoline, "bottled gas," and raw materials for other industrial uses.

Significant production of condensate was not achieved until the early 1970s, when the Soviets first began to add condensate totals to their crude oil production output. By 1975 production had risen to 250,000 b/d with some 155,000 b/d coming from two condensate fields — Vuktyl in Komi ASSR and Orenburg in the southern Urals. Since that time national and regional condensate production figures have not been published by the Soviets. But 1983 output is estimated at 600,000 b/d out of 12.33 million b/d of combined crude oil and gas condensate.

Growth has been steady, but the Soviets have encountered numerous problems in expanding condensate output. Condensate development has long taken a backseat in investment allocations, with the oil and gas ministries preferring to concentrate instead on easier and more rewarding oil and natural gas production. Consequently, a large percentage of both oil-associated condensate and condensate available from gas production has been lost because of inadequate processing capacity and inefficient field recovery techniques. Until very recently the Soviets have lagged badly in developing their gas-processing facilities and increasing their condensate recovery totals.

The USSR is now attempting to upgrade the capabilities of its condensate industry and has set ambitious production goals for the 1980s. Substantial production increases from West Siberia, Central Asia, western Kazakhstan, and possibly Komi ASSR can be expected. The Soviets hope to recover about 100,000 b/d from the Urengoy field alone by 1985 and to transport it by a major condensate pipeline to Surgut which, according to some reports, will extend westward to the Volga-Urals. Two other major gas condensate fields, Astrakhan' on the Volga River and Karachaganak in northwestern Kazakhstan, are slated to provide together some 80,000 to 100,000 b/d of condensate by 1985.

**USSR: Natural Gas Production by Region**




[a] Includes the Azerbaijan SSR, Komi ASSR, North Caucasus, Volga-Urals and other producing regions in the RSFSR.

# Exploration

Exploration and discovery of new hydrocarbon reserves—oil, gas, and gas condensate—are a slow but critical process that will largely determine the Soviets' ability to meet future oil and gas production goals. Soviet energy planners are actively developing a wide range of plans to locate and evaluate both onshore and offshore petroleum reserves. In addition, they are upgrading their exploration capabilities through purchases of equipment from the West, reproduction of Western designs, and strengthening domestic manufacturing capability.

Historically, Soviet exploration philosophy has been to concentrate on one hydrocarbon-bearing province at a time. The bulk of Soviet exploration is currently being conducted in West Siberia in the vicinity of the oil-producing areas of the middle Ob' and the large gasfields in northern Tyumen' Oblast. Exploration there will, by necessity, be moving farther from the developed infrastructure into the more remote regions of the Tyumen' and Tomsk Oblasts.

At the same time, the Soviets have begun limited surveys of the country's remaining 20 unexplored basins for a successor to West Siberia—the third "Baku." Onshore, East Siberia and western Kazakhstan are scheduled for comprehensive regional investigation. Offshore, exploratory drilling has been under way since 1977 in waters near Sakhalin in a cooperative venture with a Japanese consortium. Soviet exploration in the Barents Sea is beginning despite the lack of engineering and technical experience in the Arctic offshore environment. Limited exploration has also started in the Baltic and Black Seas and the Sea of Azov.

Almost all of these basins, both onshore and offshore, are located away from economic and population centers. Some Soviet oil experts have been suggesting that, instead of exploring these remote areas, the search for new oil should be concentrated in the deeper zones of the older Volga-Urals, the North Caspian basin, and the developed areas of the West Siberian basin. Any major program to explore these deeper and more difficult targets would require a significant upgrading of Soviet drilling equipment and technology.

Exploration planning for new hydrocarbon reserves in the Soviet Union is the joint responsibility of the Ministry of Geology, the Ministry of the Petroleum Industry, and the Ministry of the Gas Industry. The Ministries of Geology and Petroleum Industry are tasked with onshore oil exploration; the gas ministry is responsible for all gas exploration as well as offshore oil exploration.

Plans for petroleum exploration are drawn up by these ministries with the assistance of the Academy of Sciences. The various plans are submitted to the State Planning Committee (Gosplan) for approval, after which they are announced at the beginning of each five-year plan period. During the current plan (1981-85) Soviet oilmen were expected to discover and delineate oil and gas reserves that will be translated into production during the late 1980s and 1990s.

## Technology and Equipment

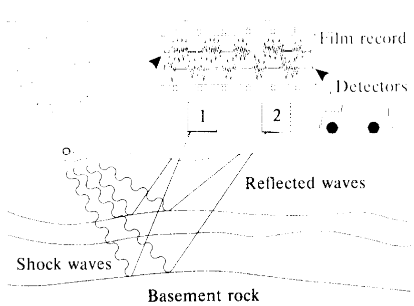
Soviet geologists, faced with searching millions of square kilometers of unexplored territory, are using every available technique to locate new hydrocarbon reserves and to decrease the time lag between discovery and the onset of production. Foremost among these is the use of space technology to minimize mapping and select areas for detailed exploration. Research for this effort was centralized in 1978 in Aerogeologiya, a geologic institute which applies space photography to terrain analysis to pinpoint promising areas for seismic surveys.

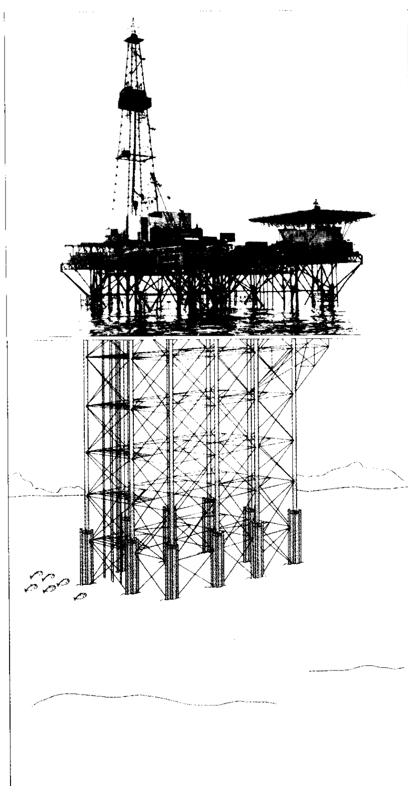
The Soviets employ standard reflection and refraction seismic techniques in exploration but are hampered by technology shortcomings. Refraction studies can locate large amplitude structures—like Romashkino or Samotlor—but lack the higher resolution to identify smaller deposits. Seismic equipment in the USSR is rated to depths of about 3,000 meters, and there is little chance that this equipment will be able to detect deeper deposits or the more subtle stratigraphic traps.

The Soviets made significant strides in offshore exploration technology during the 1970s, but they fell far short of their original goals. They had intended to have 10 mobile jack-up drilling platforms in operation in the Caspian and Black Seas by 1980, but only four were operating in that year. Efforts to obtain Western offshore

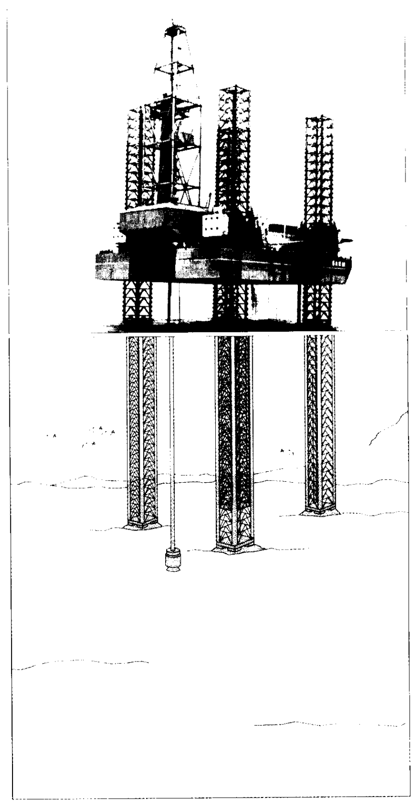
*Exploration for oil and gas in the Soviet Arctic.*

**Seismic Exploration**



*Fixed drilling platform in the "April 28" oilfield, Caspian Sea.*



*"Baky" mobile jack-up drilling platform in the Caspian Sea.*



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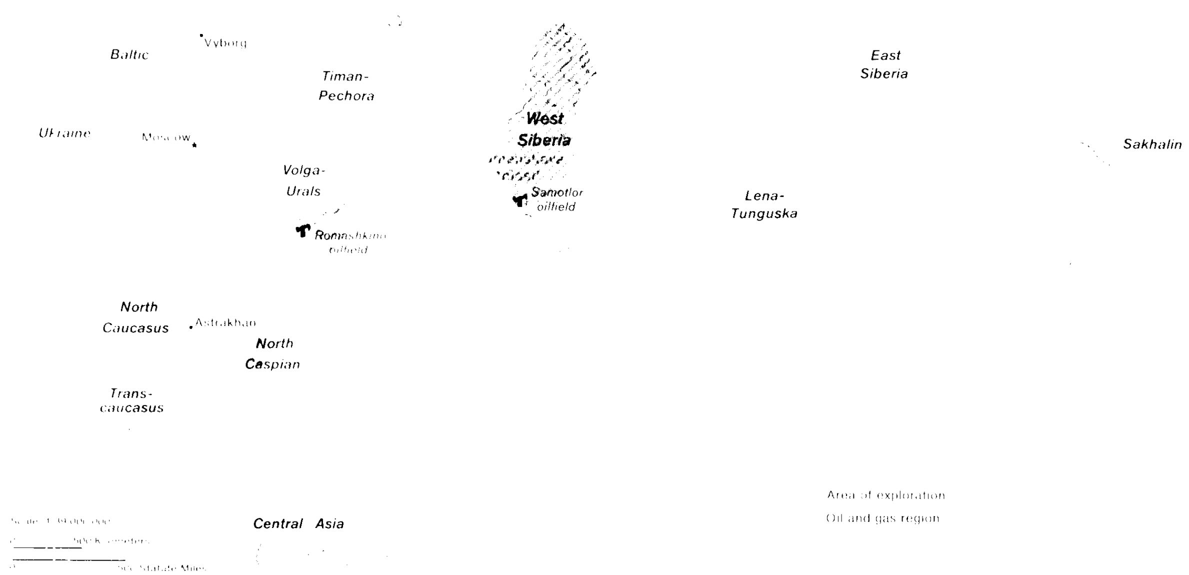
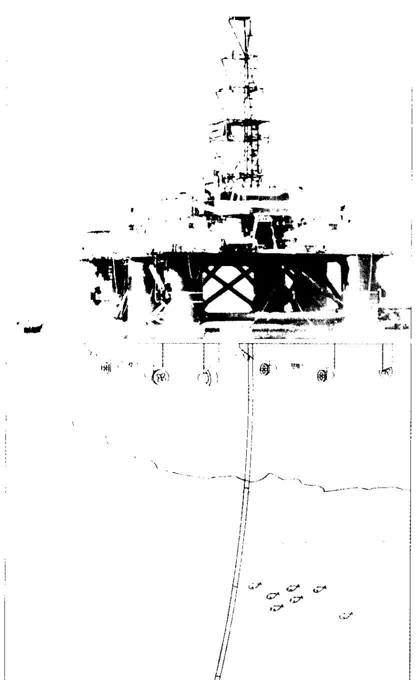
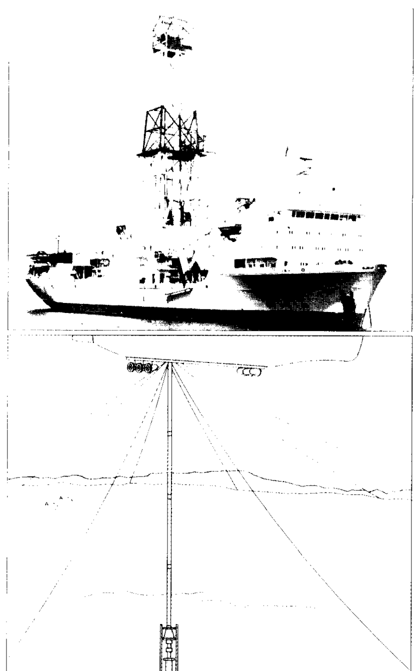
## Areas of Current Oil and Gas Exploration



*"Shelf 2" semisubmersible drilling platform in the Bay of Baku.*



*The floating drill ship "Mikhail Mirchink" is one of three built by Finland for the Soviets.*

equipment and technology were delayed by prolonged discussions and negotiations which postponed actual deliveries.

The USSR plans to concentrate offshore exploratory drilling for the next few years in the Caspian Sea, the Sea of Okhotsk near Sakhalin, and the Barents and Baltic Seas. Fabrication yards at Astrakhan' on the Caspian and Vyborg on the Gulf of Finland are now producing mobile offshore drilling platforms. The first Soviet-built, semisubmersible platform Shelf 1—began Caspian operations in early 1982. A second semisubmersible platform Shelf 2 was completed in 1982. As of mid-1984 the USSR had 11 mobile offshore drilling platforms in operation eight jack-ups and three semisubmersibles. Three semisubmersible and one jack-up drilling rig are being constructed at Astrakhan' and Vyborg. To begin exploration of the Arctic offshore region, the Soviets have bought three drill ships from Finland.

## Drilling

The past three decades have seen a fourfold increase in Soviet oil and gas drilling in terms of meters drilled. In an effort to maximize output between 1965 and 1980, the Soviets emphasized development drilling rather than exploration drilling. Plans now call for even more rapid growth in development drilling and a substantial increase in exploration drilling.

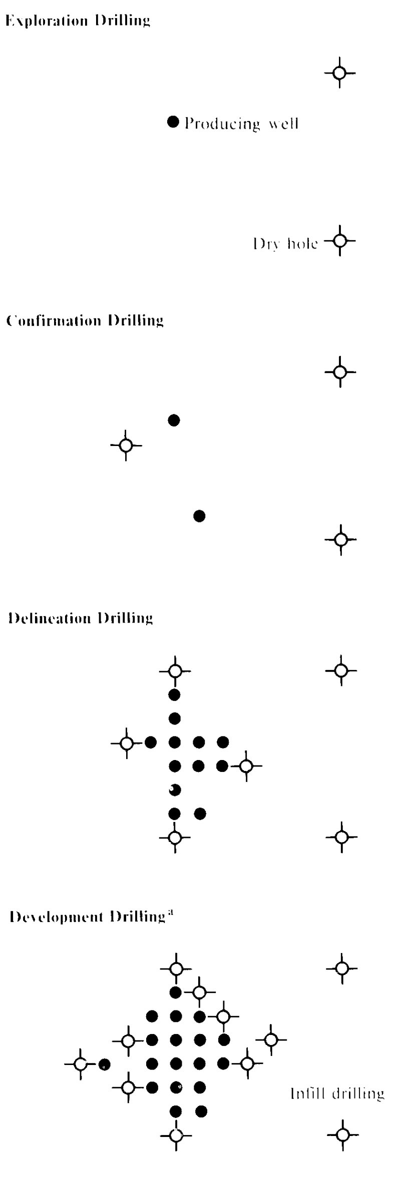
In the USSR, development drilling within oil and gas fields follows specific phases. After a discovery, several confirmation wells are drilled to learn more about the dimensions and geologic parameters of the new field and to obtain early well production data. Based on the results from early production, as well as on information from exploration wells, a field development plan is designed to establish the optimal initial well spacing for the entire field. Finally as the initial development plan is completed and more details are learned about field characteristics, infill drilling (which creates a denser network of wells) is begun to produce the hydrocarbons that cannot be produced from existing wells or to produce them at a faster rate in the near term.

### Technology and Equipment

Although Soviet drilling technology lags considerably that of Western countries, most of the drilling equipment, including rigs, pipes, casing, and bits, is produced in the Soviet Union. The Soviets rely on Western imports to fill specific needs such as additional drill pipe, high-pressure blowout preventers, and offshore drilling and logging equipment.

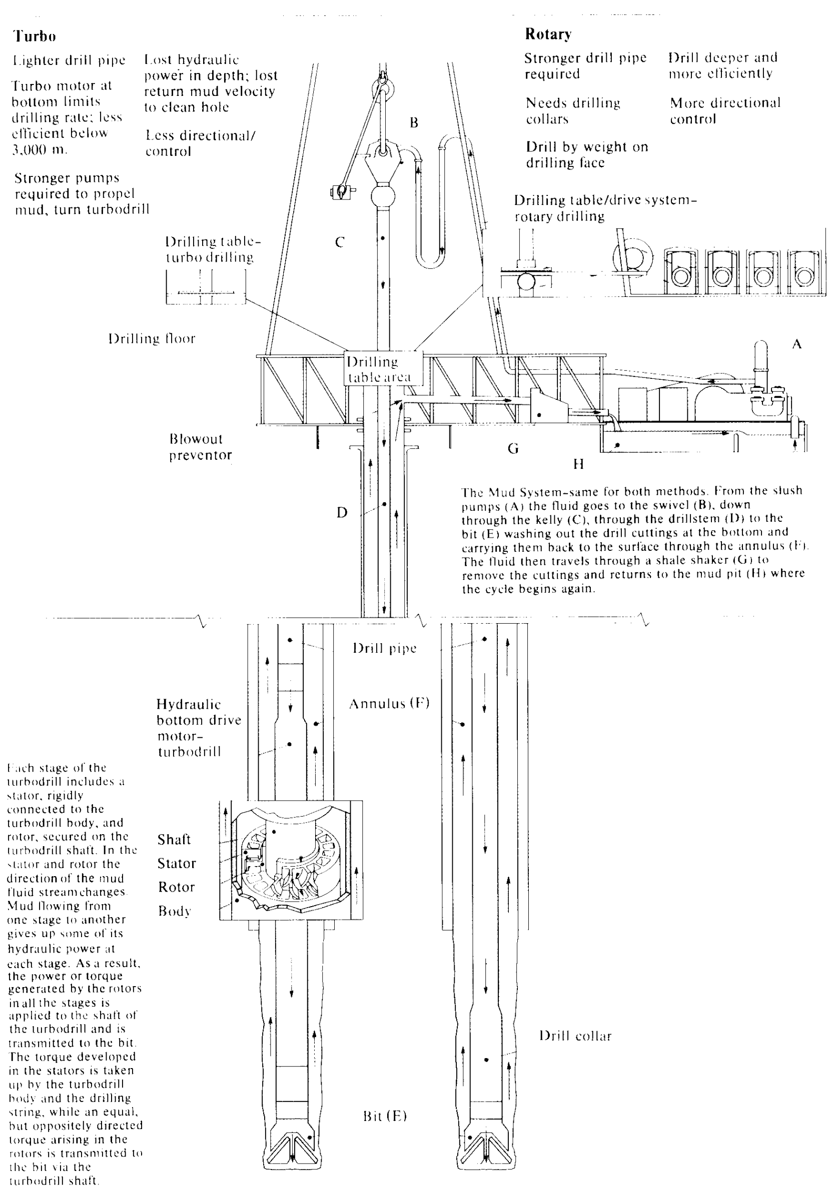
The USSR produced oil and gas drilling rigs of all types at a rate of about 500 per year in the last decade. The average service life of a Soviet rig is about six to 10 years, compared with 15 to 20 years for rigs built in the United States. Until recently, nearly all Soviet rigs were built at two plants—the Barrikady Plant in Volgograd and the Uralmash Plant in Sverdlovsk. Some 75 percent of the production has been at the Uralmash Plant. A new drilling rig plant was built in 1981 in Verkhnyaya Pyshma, north of Sverdlovsk. Productivity has risen during the past decade as improvements have been made in Soviet rig design, but there are chronic com-

**Stages in Field Development**

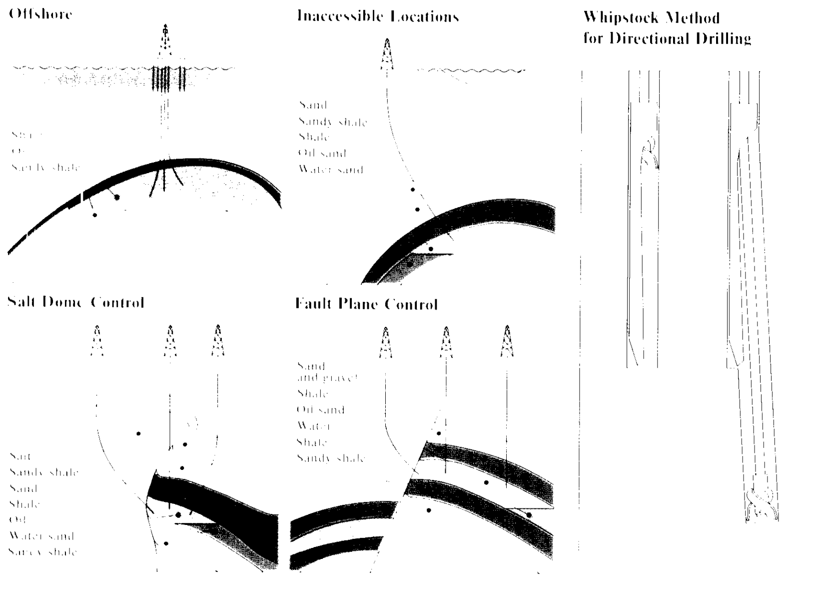


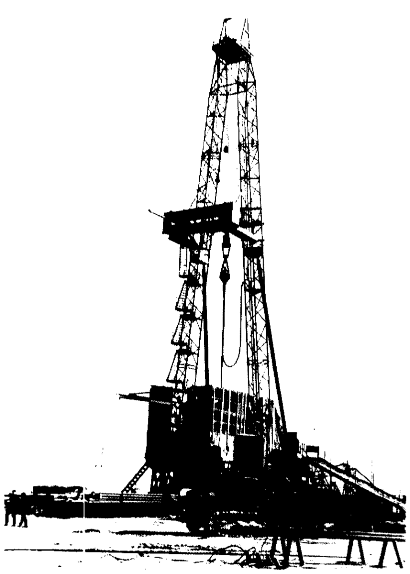

[a] Based on field development plan

**Drilling Methods**



**Directional Drilling**



*A turbodrilling rig at Zhetybay oilfield, Mangyshlak Peninsula, North Caspian.*

plaints that the mix of rig types is inadequate; especially lacking are portable rigs for use in northern climates.

Turbodrills are used for more than 80 percent of the oil and gas drilling in the Soviet Union. The turbodrill uses a downhole turbine powered by drilling mud that turns only the attached bit and not the entire drill string as does the rotary method used in the West. Turbodrills have been effective in developing the shallow, hard-rock formations in the Volga-Urals basin and for directional drilling from the cluster drilling pads in West Siberia. The original appeal of the turbodrill was that it enabled Soviet drillers to avoid many potential problems associated with the use of low-quality domestic drill pipe and tool joints that could not withstand the stresses of rotary drilling operations. Turbodrilling eliminates torque on the drill string; consequently, it reduces the amount of time lost as a result of broken drill pipe. In addition, the turbodrill is characterized by a high rate of bit rotation which increases the initial rate of penetration. The higher rate of bit rotation in turbodrilling, however, causes a drastic shortening of bit life (meters drilled per bit), reducing the rate of penetration in deep drilling. Lost productivity caused by frequent bit changes in deep drilling increases dramatically as the drilling depth increases. The USSR now produces about 9,000 turbodrill motors annually.

The quality of Soviet drill pipe is generally adequate for drilling shallow wells (less than 2,000 meters). At greater depths, the poor-quality steel cannot withstand the torque required for rotary drilling and often fails. Even with turbodrilling, pipe inadequacies are often severe. Problems relating to the quantity and quality of drill pipe and casing produced in domestic plants have been cited as factors in the failure to meet recent West Siberian drilling targets. Moscow has been negotiating with Western firms to purchase a turnkey plant to manufacture drill pipe and casing.

The Soviet Union's output of drill bits, including standard, diamond, and experimental hard alloy types, is about 1 million per year. Although the quality and performance of Soviet drill bits improved during the 1970s, they are still much less efficient than those produced in the United States.

In 1978 the Soviets bought a turnkey drill bit plant from the United States for installation at Kuybyshev. The plant, which began operating in January 1982, is capable of producing upward of 100,000 tungsten carbide insert bits per year. At the high rotational speeds of Soviet turbodrills, the bits from the new Kuybyshev plant should operate for significantly longer periods than conventional Soviet-made bits, increasing productivity because of reduced downtime for bit replacement.

## Administration and Organization

Three ministries—geology, oil, and gas—are responsible for drilling exploration wells. Of these, the oil and gas ministries are normally responsible for the detailed assessment of field size and potential and the drilling of development wells.

National drilling efforts by the oil and gas ministries are coordinated by Administrations for Drilling Operations. In addition, drillers are supported by research institutes in Moscow, Tyumen', and other cities. The gas ministry controls offshore drilling for both oil and gas.

The basic production unit in the Soviet oil and gas industry is the regional production association, which oversees all aspects of drilling activity including rig assembly and well completions. Drilling is conducted by drilling brigades, usually comprising 24 men, who generally operate in four teams on a single rig in shifts of up to 12 hours' duration around the clock.

## Offshore Drilling

Soviet offshore drilling began nearly four decades ago in the shallow waters of the Caspian Sea. As oil and gas fields were discovered, development wells were drilled from small wooden platforms connected to the shore by trestles to facilitate movement of equipment and supplies to the drilling sites. The Caspian Sea is still the Soviet center for offshore drilling and production technology. Currently, nine of the 11 Soviet-owned and -operated mobile offshore drilling rigs are operating in the area. Offshore oil output in the Caspian is estimated at 200,000 b/d, more than three-fourths of Azerbaijan SSR's production.

By 1985 the USSR plans to boost offshore drilling activity 50 percent above the level attained in 1980. New drill ships and platforms from foreign yards and new construction in Soviet yards are part of a major effort to explore the offshore Arctic and Far East. Much of this increased emphasis on offshore drilling was stimulated by geologists' reports that potential oil-bearing sedimentary rock covers more than two-thirds of the Soviet shelf area. Development of the offshore oil potential will be important to the Soviets if they plan to maintain oil production at high levels in the 1990s. Western equipment and technology will be essential for successful development of offshore areas.

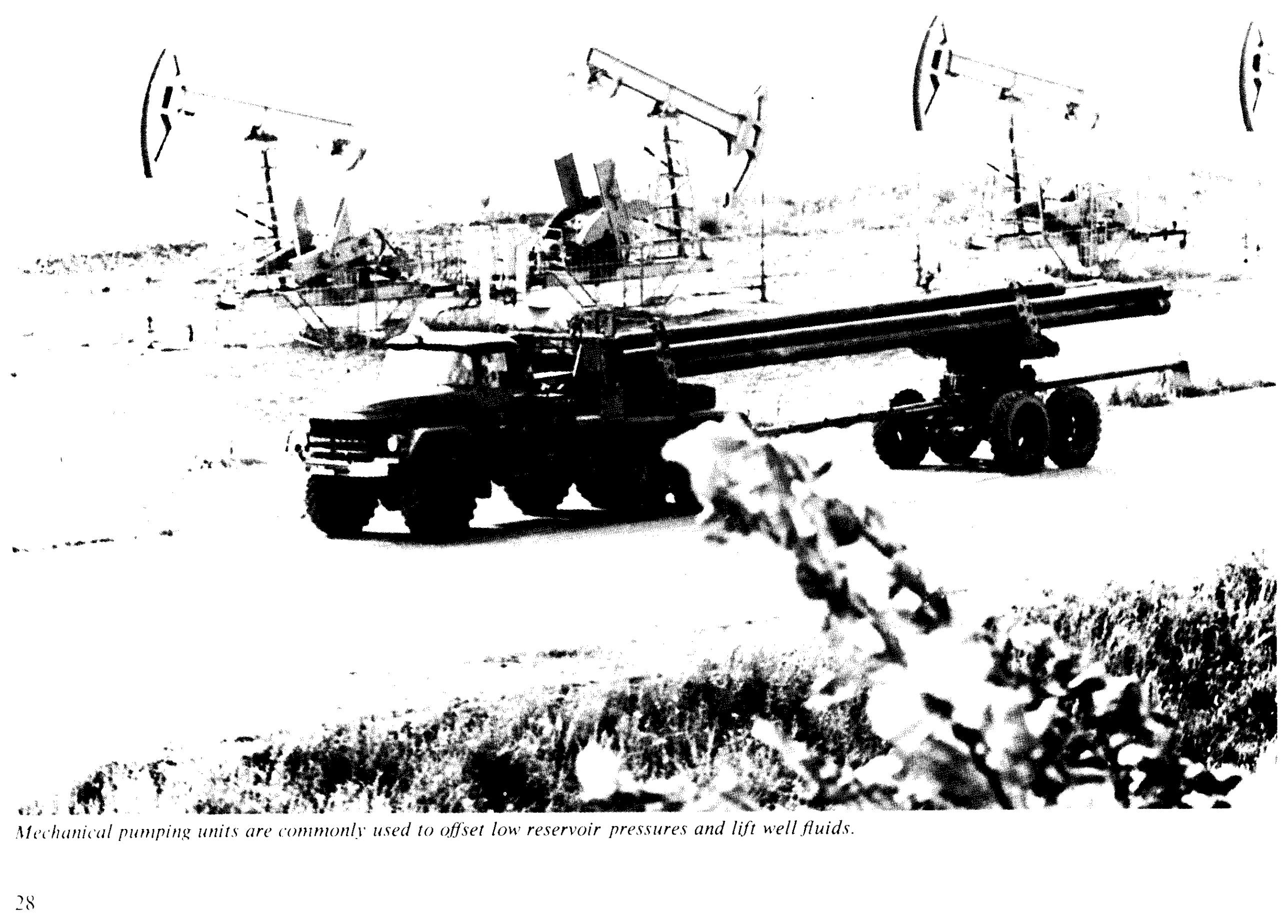
## Recovery

During the past decade the Soviets have found it increasingly difficult to locate new oil reserves, to increase development drilling, and to undertake offshore exploration. As a result, the rapid production growth of the postwar period began to slow in the late 1970s. Essentially, all of the important oil-producing regions in the country are confronted with difficulties: major oilfields have been intensively exploited and have reached peak production or are in decline, new fields are less productive and more difficult to develop, and discovery of new reserves has not kept pace with the growth of oil production.

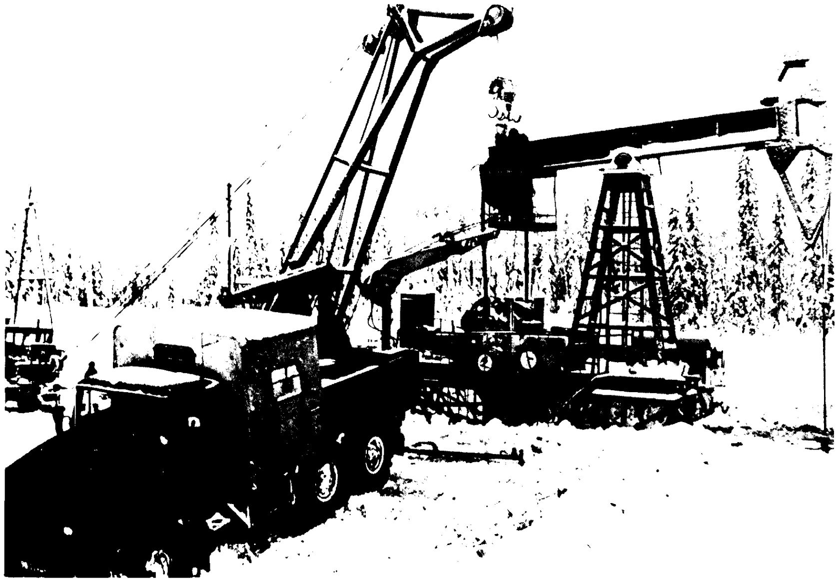
Although the Soviets produce most of their own petroleum equipment, domestic manufacturers have been unable to meet the accelerating demand of the oil industry for more and better equipment and techniques to improve oil recovery. The lack of sufficient high-quality equipment and technology has hampered efforts in several areas, including drilling in West Siberia, and the enhanced oil recovery program.

As a result of domestic production inadequacies, the USSR made selective purchases of Western equipment and technology in the 1970s. Among those oil recovery items imported were high-capacity electric submersible pumps; gas-lift equipment, including compressors and treatment units; well completion units; steam generators; and associated insulated tubing.

*Various secondary and enhanced recovery techniques are necessary to offset declining production at all major Soviet oilfields.*



*Mechanical pumping units are commonly used to offset low reservoir pressures and lift well fluids.*



*Periodic servicing is required to maintain mechanical sucker rod or beam pumping units.*

*Workmen waiting to lower sucker rods into well.*

## Recovery Methods

Primary recovery is the initial production of fluids from the reservoir using natural sources of energy to produce oil and gas. Once this method can no longer cause the oil and gas to flow through the porous rocks into the wells, various secondary methods including waterflooding, mechanical pumps, and gas lift are used to recover additional amounts of oil.

In the Soviet oil industry, waterflooding is applied at a very early stage of a field's producing life to maintain reservoir pressure and to increase oil recovery. As a result, in 1980 the water content amounted to 55 percent of fluids recovered. More than 85 percent of Soviet oil output is recovered by waterflooding. The high percentage of water in the oil has increased the demand for artificial lift equipment—submersible pumps, sucker-rod pumps, and gas-lift units—to maintain or increase oil production.

Pumping units—rod or beam pumps and electric centrifugal pumps—are brought on line as wells stop flowing because of low reservoir pressure or as the amount of water in the produced fluid becomes too high. Rod pumps are used for low-flow-rate wells, while the high-capacity centrifugal pumps are used to lift large volumes of fluid. During the 1970s the USSR purchased more than 1,200 high-capacity, downhole submersible pumps from the United States. In 1983 about 60 percent of all producing wells in the Soviet Union were on rod pumps, and 20 percent were on submersible pumps.

Gas lift—a process of lifting fluids from a well by a downhole injection of gas to lighten the fluid column so that the natural reservoir energy can lift the fluid—is an alternative to high-capacity, submersible pumps, although it costs considerably more to install. Soviet petroleum officials have become more interested in the use of the gas-lift process for lifting fluids in the oilfields because of the high frequency of repairs on downhole pumping equipment. In 1969 US gas-lift equipment was installed for the first time at the Pravdinsk field in West Siberia. As a follow-on, the Soviets installed gas-lift equipment at the Uzen' oilfield in Kazakhstan and at the supergiant Samotlor and Fedorovo oilfields in West Siberia.

The Soviets are also interested in using hydraulic pumps in their artificial lift program. These pumps are submerged and are driven by high-pressure fluid from equipment at the surface, instead of being powered by electricity as are conventional submersible pumps. Although the Soviet oil industry did not use hydraulic pumps in 1980, plans call for the use of 300 such pumps by 1985.

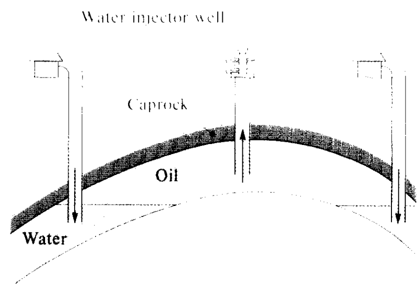
*Enhanced oil recovery (EOR)* refers to recovery of oil from a petroleum reservoir beyond that economically recoverable by conventional primary and secondary methods. Three general categories of EOR are chemical flooding, carbon dioxide miscible flooding, and thermal methods.

The Soviets have expressed high hopes for EOR techniques to increase oil recovery from older fields and to produce undeveloped fields that contain heavy oil. Although they have experimented with EOR programs in many fields and tested most of the available methods, only about 60,000 b/d can be attributed to enhanced recovery at present. This yield has primarily come from the application of steam or hot water injection and in situ combustion.

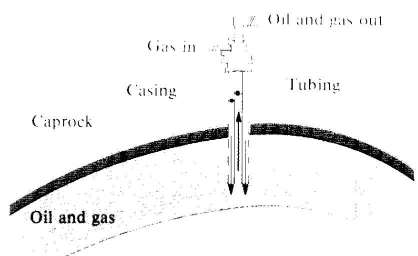
Soviet EOR efforts have been hampered by severe shortages of equipment and chemicals. The Soviets have not as yet been able to build the steam generators needed for thermal recovery or to produce sufficient amounts of surfactants or polymers for chemical and polymer flood programs. Continued efforts are being made to acquire Western technical assistance and equipment to promote EOR.

**Recovery Methods**

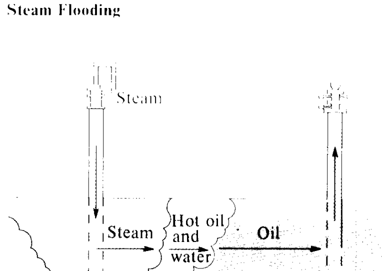
**Waterflooding**




**Gas Lift**




**Steam Flooding**



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## Oil Refining and Gas Processing

The rapid growth of oil and gas production in West Siberia during the 1970s has required major increases in Soviet crude-oil-refining and gas-processing capacity. Moscow is constructing new oil refineries and adding crude oil distillation units to existing refineries. A major effort is also under way to speed construction of gas-processing facilities to prepare increasing quantities of gas for domestic use and export. Although Soviet professional journals contain few production statistics, they occasionally have diagrams, flow charts, photo illustrations, and design capacities of crude oil distillation and gas-processing units.

### Oil Refining

In January 1983 there were 53 oil refineries operating in the Soviet Union. Although the Soviets do not publish the total crude oil distillation capacity of these refineries, it is believed to be in the neighborhood of 10.5 million b/d, second only to the approximately 16-million-b/d capacity of the 220 operating refineries in the United States. Four-fifths of the Soviet refineries are located near population and industrial centers west of the Ural Mountains. Many of these refineries are also located within large petrochemical-refinery complexes and provide feedstocks directly to the chemical processes.

Before the mid-1950s the Soviet petroleum industry consisted of about 30 refineries with small crude oil distillation units of less-than-20,000-b/d capacity. The only secondary processing units of consequence were thermal crackers designed to break down heavy oils. Between the mid-1950s and mid-1960s a concentrated effort was made to upgrade the industry, both in crude oil distillation capacity and in secondary processing. Several standardized crude oil distillation units with capacities of 20,000 to 60,000 b/d were constructed as well as a wide variety of secondary processing units such as catalytic crackers and reformers, delayed cokers, and hydrogen treating and lubricating oil units.

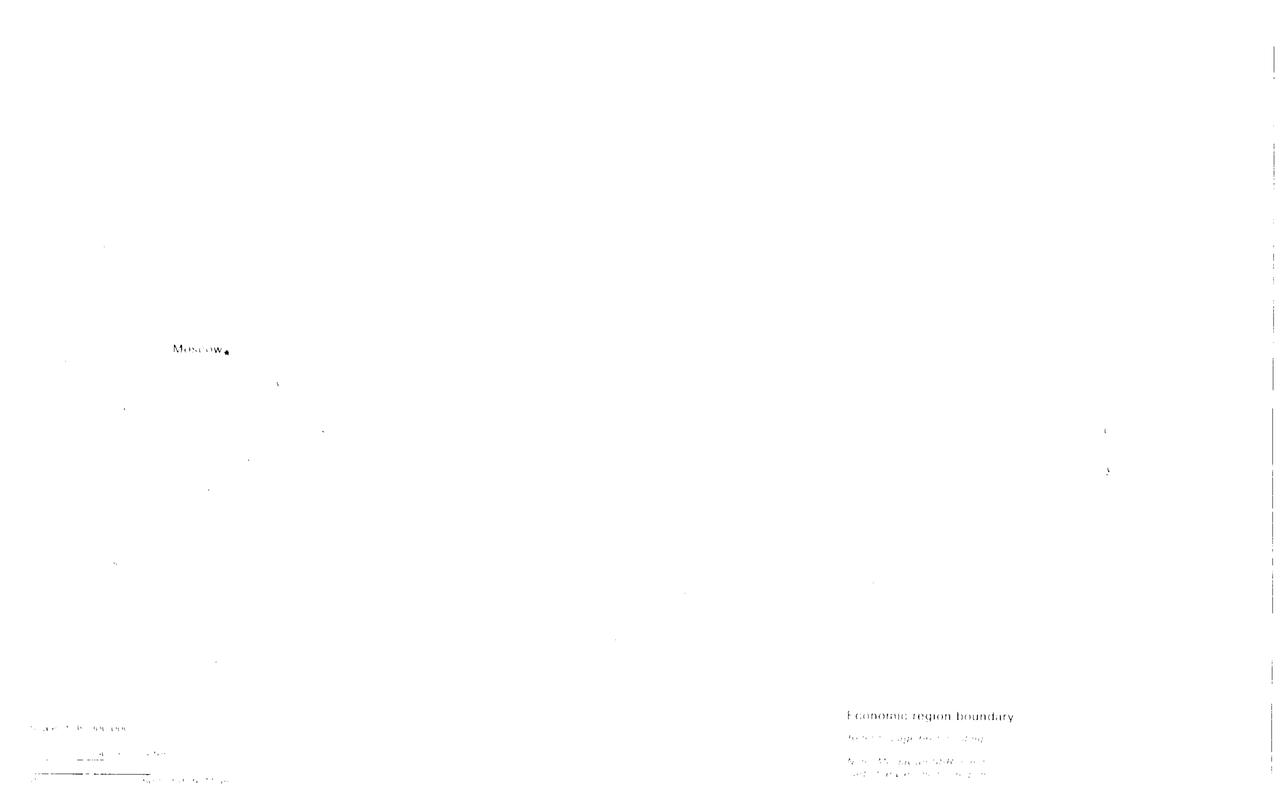
With the development of the Volga-Urals oil resources in the 1950s, the Soviets stopped concentrating refineries in the crude oil production areas and began locating them near points of regional consumption, such as Omsk, Kirishi, Kremenchug, and Angarsk. The refineries receive more than 90 percent of their crude oil from pipelines; most of the remaining is delivered by rail. Conversely, only about 10 percent of the refined products are transported by pipelines; about 90 percent are delivered by rail, water, and tank truck.

Since 1970 required increases in primary distillation capacity have been obtained through modernization or expansion of existing refineries and the construction of at least five new refineries. Modernization of refineries has included the dismantling of old, small refining units and replacing them with larger, more efficient units to upgrade and improve both the output and product mix.

The Soviet refining industry is reported to have major problems in areas such as sophistication of refining processes, variety of product mix, and quality of individual petroleum products. Specifically, Soviet refineries lack adequate processing units—especially cracking units,

*Section of Baku No. 2 Oil Refinery, Azerbaijan.*

## Oil Refineries




which break down heavier fuels into lighter fuels such as gasoline and kerosene.

The lack of adequate heavy-oil conversion capacity makes it difficult for Soviet refineries to produce high-octane gasoline and high-grade diesel fuel in the increasing volumes needed to meet growing domestic demand. Moreover, since a large share of the rising volume of heavy fuel oils cannot presently be further refined, they are primarily burned in electric power plants, thereby slowing Soviet attempts to balance fuel consumption by converting these plants to coal and natural gas.

All crude oil processed by refining must pass through an initial or primary distillation process where it is separated into gases, gasoline, kerosene, diesel fuels, and heavy fuels (mazut). These products are used as fuels or are further refined through secondary processes to produce lubricating oils, higher quality fuels, and other finished products.

Soviet refineries contain three basic types of crude oil distillation units. They range from early-design shell stills, through one-stage atmospheric pipe stills (AT), to current technology, two-stage atmospheric vacuum pipe stills (AVT). Some of the one- and two-stage units contain their own desalting section (ELOU), and some are built in combination with other types of units. The standard crude oil distillation units currently being constructed have a design capacity of 120,000 b/d.

Secondary refinery units provide a higher yield of light products and upgrade product quality after primary distillation. The most important secondary processes include reforming, catalytic cracking, hydrogen treating, hydrocracking, alkylation, and lubricating oil production. Other types of secondary processes produce specialty products, recover refinery byproducts, or treat crude oil prior to distillation or refined products prior to shipment.

### Natural Gas Processing

The processing of natural gas is becoming an important subsector of the Soviet oil and gas industry after many years of neglect. In an effort to reduce the wasteful flaring of gas that is a byproduct of oil production called associated gas, the USSR is vastly expanding its capacity to produce valuable natural gas byproducts such as propane, butane, sulfur, and stable condensate. These products are useful not only as fuels but also as feedstocks in the petrochemical industry.

The rapid development of West Siberia's oilfields—especially Samotlor—outstripped the USSR's ability to process the associated gas. Flaring of the region's excess gas probably reached its peak in 1975 when about 20 billion cubic meters had to be burned off. Recently completed gas-processing plants in the Tyumen' oil region have helped reduce flaring and raised associated gas-processing capacity to nearly 20 billion cubic meters in the region during 1982. Large gas-processing facilities have been constructed at Nizhnevartovsk, Belozersk, Surgut, Yuzhno-Balyk, and Lokosovo. New processing plants in the gas-producing regions of Orenburg and Central Asia have significantly increased sulfur removal capabilities, enabling output from high-sulfur fields to replace the region's declining low-sulfur gas production.

Processing of nonassociated gas by the Ministry of the Gas Industry has grown substantially since 1970 when only 3 billion cubic meters of gas were processed. The current five-year plan calls for processing about 75 billion cubic meters of natural gas, the production of about 1.6 million tons of sulfur, and more than 20,000 b/d of gas condensate in 1985.

Natural gas is processed by several gas ministry plants located throughout the gas-producing regions. The largest and newest facility is located at Urengoy. Whether because of technological deficiencies or simply a lack of domestic production capacity, much of the gas-processing equipment is imported from the West.

## Pipelines

The USSR has greatly expanded its pipeline network in recent years to transport oil and natural gas. The total length of oil and gas pipelines grew from fewer than 70,000 kilometers in 1965 to more than 231,000 kilometers by the end of 1983. During this period an average of about 6,000 kilometers of natural gas pipelines and 2,600 kilometers of oil pipelines were constructed each year.

The development of major new oil and gas fields at great distances from the economic heartland and increased gas exports are largely responsible for the massive Soviet pipeline construction program. Moscow has given high priority to the construction of pipelines from West Siberia to the industrialized areas of the USSR and to its border with Eastern Europe. At present 12 natural gas pipelines and five oil pipelines transport oil and gas from the producing areas of West Siberia.

Most pipelaying in West Siberia is accomplished when the ground is frozen during October through May. The Soviet press has emphasized the necessity of year-round pipelaying, but construction in swampy areas during the summer has been achieved only on a small scale. Activity in summer is primarily limited to areas of hard ground.

Relatively few pipelines have been built in the area of continuous permafrost. These few—the gas pipelines from the Medvezh'ye and Urengoy fields to Nadym and from Messoyakha to Noril'sk—are being built above ground to avoid trenching in permafrost and to prevent disruption of the permafrost by heat from pipelines.

### Oil Pipelines

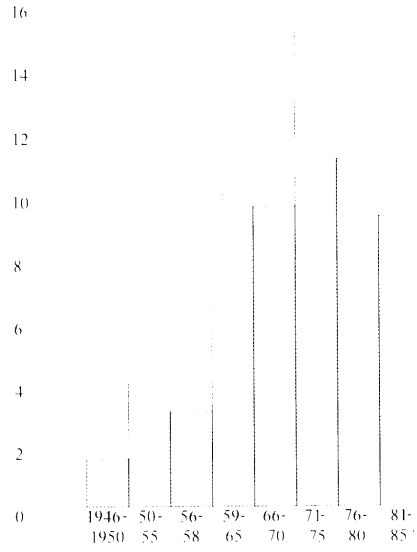
The USSR relies on pipelines to transport more than 90 percent of its crude oil production. About 83 percent of the Soviet Union's oil pipelines carry crude oil. The remaining pipelines transport refined products.

Most of the Soviet oil pipeline network is relatively new. Its growth has been dramatic—from 4,000 kilometers at the end of World War II to about 76,200 km in 1983—with half of the growth occurring between 1970 and 1983. About 20,000 km, including nearly 80 percent of the large-diameter 1,020-mm and 1,220-mm lines, were built during the 1970-80 period.

Crude oil pipeline construction has slackened appreciably in the 1980s, primarily as a result of slower growth in oil production. Only 9,200 km are scheduled for completion in the 1981-85 plan, and just two of the 16 planned pipelines are large-diameter interregional oil transmission lines: one from Pavlodar to Chimkent, completed in March 1983, and one from Kholmogory to Kuybyshev, scheduled for construction in 1984. During 1976-80, in contrast, the Soviets laid a number of major interregional lines: Nizhnevartovsk to Kuybyshev, Krasnoyarsk to Irkutsk, Kuybyshev to Kremenchug, and Surgut to Polotsk. All of these lines were 1,020 or 1,220 mm in diameter.

**USSR: Completion of Crude Oil Pipelines, by Plan Period**

Thousand kilometers

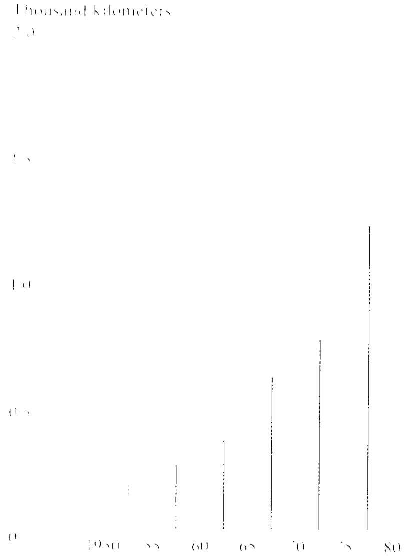



[a] Planned

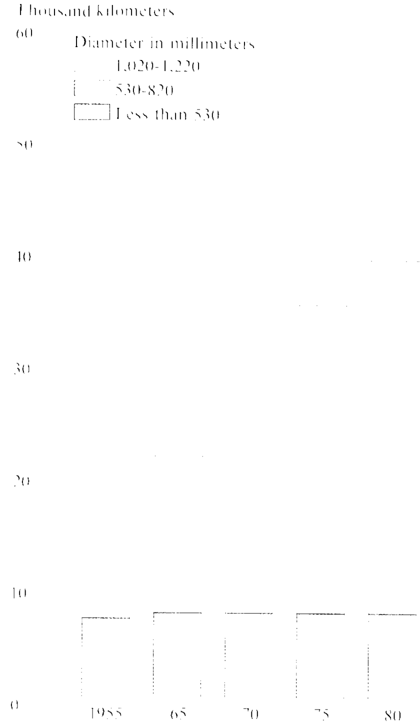
Unlike large-diameter gas pipeline construction, the Soviet oil pipeline industry is largely self-sufficient and does not depend on Western

### Major Oil and Gas Pipelines

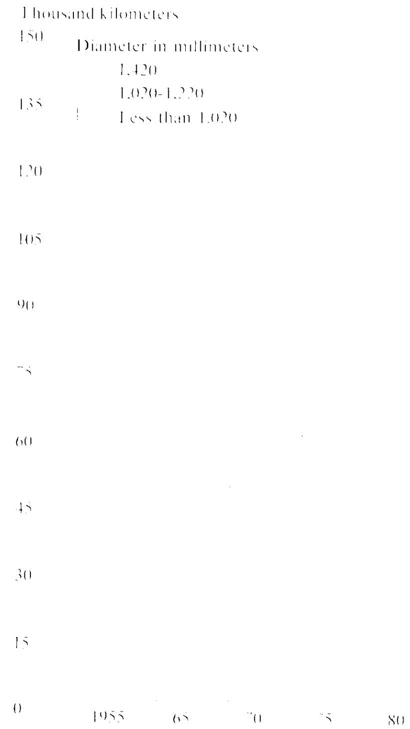
**USSR: Pipeline Transport of Crude Oil-Average Distance**




**USSR: Length of Crude Oil Pipeline Network, by Diameter of Pipe**




**USSR: Length of Natural Gas Pipeline Network, by Diameter of Pipe**




equipment and materials. Nevertheless, the Soviets do selectively import pipelayers, bulldozers, valves, and insulating materials to speed construction and to improve the operational capability and service life of their pipelines.

## Gas Pipelines

Several major natural gas pipeline corridors link the gas-rich regions of West Siberia, Central Asia, and the southern Urals with the industrial centers of the European USSR. The geographic distribution and large capacity of these domestic trunklines also provide a flexible network for gas exports to the West. New pipelines under construction represent a major extension of the Soviet gas transmission system, which has grown rapidly from 2,300 km in 1950 to 155,000 km at the end of 1983. Additional gas pipelines are scheduled for completion during 1984-85.

During the current five-year plan (1981-85), four large-diameter (1,420-mm) natural gas pipelines from the Urengoy field in West Siberia have been constructed, and two more are scheduled for completion. The fourth line completed during the plan, the much-publicized Siberia to Western Europe export pipeline, was reportedly partially operational in early 1984, and pipelaying on the fifth domestic line is complete. The operation of the six pipelines will bring to 12 the number of large-diameter gaslines transporting gas from West Siberia.

The addition of the six new pipelines involved building some 20,000 kilometers of main trunk pipelines and will allow the Soviet Union to transport the more than 350 billion cubic meters per year of West Siberian gas production planned by 1985 (200 billion cubic meters more than in 1980). Also planned for completion during the 1981-85 period is a pipeline to transport gas condensate from Urengoy to Surgut.

*Pipe is welded at storage area welding bases along the pipeline by crews using either manual arc techniques or semiautomatic units.*

While the majority of the new large-diameter gas pipelines will be constructed with domestically produced pipe and compressor station equipment of less-than-desired quality and reliability, the gas network will still have a first-rate array of Western equipment. The ambitious Soviet plans to increase gas production and transport capabilities envisage reduced reliance on imported pipe and should benefit from the new multilayer pipe production plant at Vyksa, southwest of Gor'kiy.

*Every year the USSR lays gas pipeline twice as long as the trans-Alaskan oil pipeline.*

# Coal

Coal follows oil and natural gas as a primary energy source in the Soviet Union. The Soviet coal industry dates back to the early 19th century. It remained the cornerstone of the Soviet energy industry and provided the Soviets fuel for their economic development and industrial growth until well into the Khrushchev era, when it was gradually eclipsed by oil and gas—a phenomenon that was simultaneously occurring in the United States and Western Europe. Today, the Soviet coal industry still employs more than a million workers and provides nearly 40 percent of the fuel used to generate electricity.

Most experts agree that abundant reserves will keep the Soviet Union self-sufficient in coal for the near future. Internationally, the USSR is second only to the United States in reserves and annual production of coal. Most energy specialists believe that potential Soviet coal reserves are the largest in the world.

Although coal's share of Soviet primary energy production dropped from two-thirds in 1950 to just over 50 percent in 1960 and to only 22 percent in 1983, coal remains critically important to the Soviet economy. With the cost of oil production rising rapidly, Soviet energy planners have become aware that coal must play a greater role in the total Soviet energy balance. They acknowledge, however, that investment in the coal industry has recently been insufficient both to develop new coal basins and to forestall production declines in older basins. Although substitution of coal for oil is a high Soviet priority, the Soviet coal industry will be poorly equipped to increase production sharply, at least through the 1980s.

**Coal at a Glance**

| | |
|---|---|
| **Reserves** | |
| Explored | 281 billion metric tons |
| World rank | Second |
| **Production** | |
| Record year | 1978—724 million metric tons |
| World rank | Third |
| 1983 | 716 million metric tons |
| By coal rank | Hard coal (anthracite and bituminous), 78 percent; lignite, 22 percent |
| By type of mining | Surface, 40 percent; underground, 60 percent |

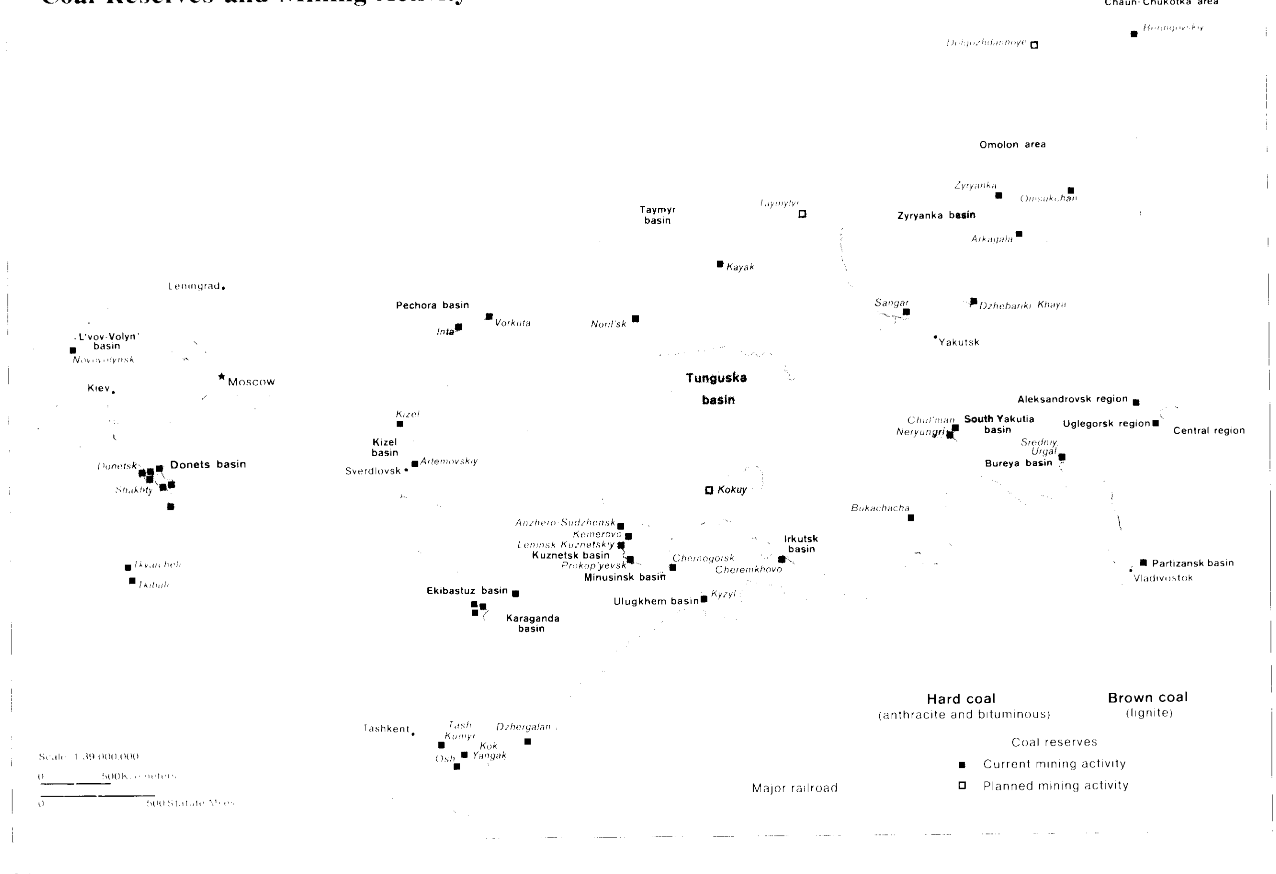
## Resources and Reserves

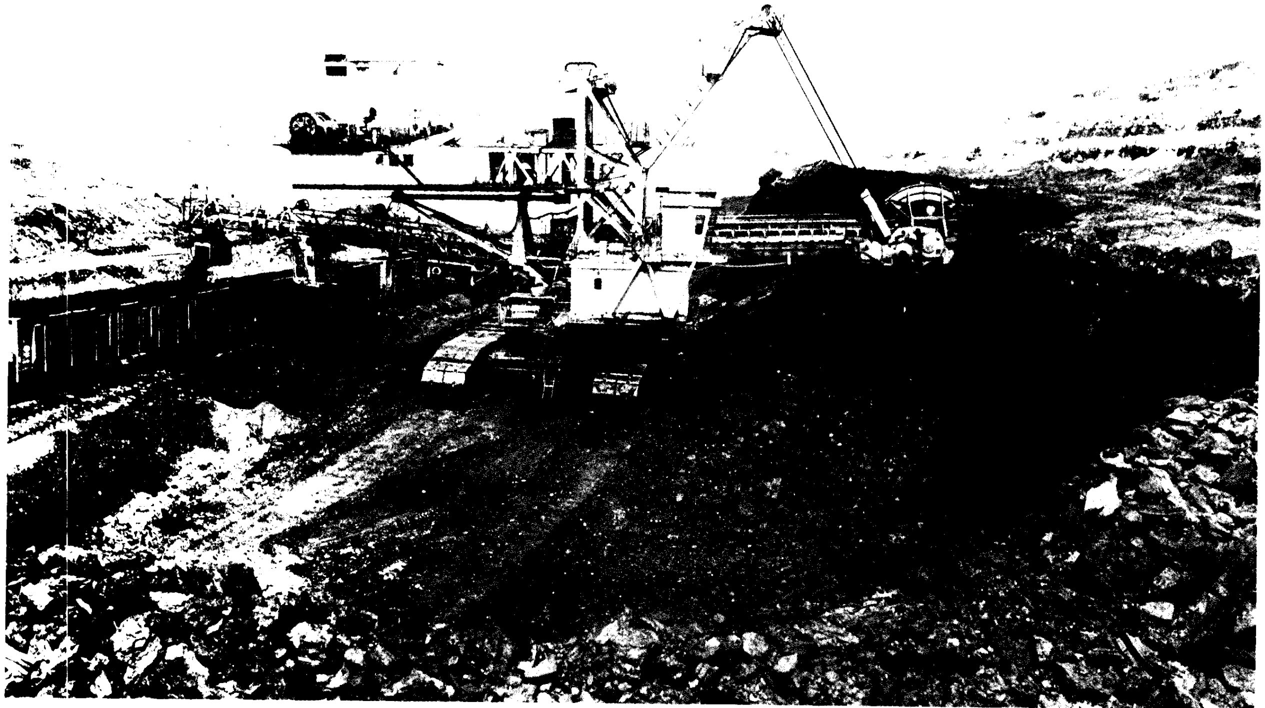
As of 1 January 1983 the Soviet Union estimated its coal resources at 6.8 trillion tons, about half of the world's total and nearly twice that of the United States. Only 4 percent of this total has been explored. Although the Soviets estimate the energy potential of their 281-billion-ton explored coal reserve to be four times greater than the combined potential of their oil and natural gas reserves, the easily accessible coal reserves of the European USSR have been seriously depleted and the remote Siberian reserves are proving to be much more expensive to develop. The portion of total reserves comprised by coking coal is also enormous—estimated at 65-70 billion tons.

Soviet coal reserves are widely dispersed. In the European USSR, the Donets basin contains high-quality anthracite and bituminous coal, much of which is suitable for coking and is close to major blast furnaces. However, increasing mine depths, thinness of coal seams, and high methane concentrations are making the Donets reserves increasingly difficult to exploit. Although production has fallen as a result, the Donets basin still accounts for almost 30 percent of total Soviet coal production. The lignite reserves in the European USSR, although high in moisture, sulfur, and ash content, have, until recent years, been successfully exploited because of their closeness to centers of consumption. The Pechora coal basin, the northernmost basin in the European USSR, has also been extensively developed, despite the severe climate, because of its proximity to markets and the high quality of its bituminous coking coals.

Nearly 75 percent of the Soviet Union's explored coal reserves is located east of the Ural Mountains—thousands of kilometers from the major industrial and population centers of the European USSR. In addition to the costly mine-to-market transportation problems involved, the quality of many of these remote coal reserves is poor because of undesirable levels of ash, water, and sulfur.

**Coal Reserves and Mining Activity**





*Until plant at Krasnoyarsk is completed, continued acquisition of foreign-made automated surface mining equipment will be required for development of eastern coal reserves.*

**Coal Resources**

*Billion metric tons*

| | Geological Resources | Economically Exploitable Reserves [a] | |
|---|---|---|---|
| | | Probable/ Possible | Explored |
| **Total USSR** | **6,806** | **5,609** | **281** |
| Hard coal [b] | 4,649 | 3,823 | 171 |
| Lignite | 2,157 | 1,786 | 110 |
| **European USSR (including Urals)** | **473** | **218** | **76** |
| Hard coal | 378 | 179 | 66 |
| Lignite | 95 | 39 | 10 |
| Donets basin | 141 | 108 | 56 |
| Moscow basin | 16 | NA | NA |
| Pechora basin | 265 | 61 | NA |
| **Kazakhstan** | **170** | **121** | **25** |
| Hard coal | 65 | 37 | 16 |
| Lignite | 105 | 84 | 9 |
| Ekibastuz basin | 10 | 7 | 7 |
| Karaganda basin | 45 | 25 | NA |
| Turgay basin | 51 | 48 | 6 |
| **Central Asia** | **44** | **38** | **4** |
| Hard coal | 37 | 33 | 1 |
| Lignite | 7 | 5 | 3 |
| **Siberia and Far East** | **6,119** | **5,232** | **176** |
| Hard coal | 4,169 | 3,574 | 88 |
| Lignite | 1,950 | 1,658 | 88 |
| Irkutsk basin | 77 | 33 | 7 |
| Kansk-Achinsk basin | 638 | 484 | 75 |
| Kuznetsk basin | 637 | 548 | 66 |
| Lena basin | 1,647 | 1,539 | 4 |
| South Yakutia basin | 44 | 40 | 4 |
| Tunguska basin | 2,299 | 1,967 | 2 |

[a] With present technology.
[b] Includes anthracite and bituminous coal.

Source: *Zapasy Ugley Stran Mira*, Moscow, Nedra 1983, pp. 93-102

Among explored reserves in the eastern USSR, Kuznetsk and Kansk-Achinsk in Siberia are the two largest basins, but Ekibastuz and Karaganda in Kazakhstan also contain relatively small but productive reserves. Siberia's Kuznetsk basin, the Soviet's second-largest producer after Donets—of both steam and coking coal, contains significant quantities of high-grade bituminous coal reserves with low ash and sulfur content. East of Kuznetsk and astride the Trans-Siberian Railroad, the Kansk-Achinsk basin contains huge lignite reserves. These coals, however, have a high moisture content and a low thermal energy content. Because the Kansk-Achinsk reserves are under shallow overburdens, they can be easily strip mined. The Soviets believe the Kansk-Achinsk deposit has the potential to become the USSR's largest coal-producing area by the year 2000.

Kazakhstan's coal reserves are concentrated in two basins, Ekibastuz and Karaganda. Although high in ash content, Ekibastuz subbituminous coal is an important source of steam coal for thermal power plants. Much of Karaganda's bituminous coal is used for coking.

In return for coking coal, Japan is helping the Soviet Union develop the smaller but higher quality and strippable reserves of the South Yakutia basin in Eastern Siberia. Exploitation of other large Siberian reserves will probably not begin in this century because of undeveloped rail transportation within the region and the inferior quality of the reserves. The huge Siberian coal-bearing areas of Lena and Tunguska basins represent unexplored reserves that will probably not be of commercial significance in the near future.



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## Production and Consumption

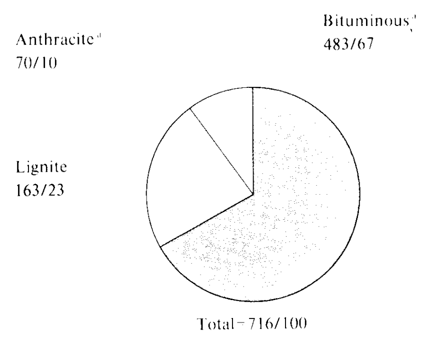
Between 1950 and 1975 the Soviets were notably successful in raising coal production. Annual output normally increased by an average of 4 percent each year, and production had reached more than 700 million tons by 1975. From the mid-1970s into the early 1980s, however, the Soviet coal industry experienced a leveling off and, subsequently, an actual decline in coal production. The record 1978 coal output of 724 million tons slipped to 704 million tons in 1981, then rose again to 718 million tons in 1982, but fell back to 716 million tons in 1983.

With the notable exception of the Ekibastuz basin in northern Kazakhstan, coal production from all major Soviet basins has been stagnant or in decline during much of the past decade. Production in the Donets basin—the country's largest producer of high-quality steam and metallurgical grade coal—is declining despite repeated Soviet efforts to maintain output. Donets production dropped by 29 million tons from its record 1978 level to 196 million tons in 1983. Output also fell in the smaller basins near Moscow and in the Urals. Together, annual production in western coal basins fell by about 32 million tons between 1977 and 1983.

Soviet planners had not anticipated a decline in production from the older basins so soon. The 1976-80 plan called for production to increase at the Donets basin by 10 million tons and at the Kuznetsk basin by 25 million tons; scheduled production at the Moscow and Karaganda basins was to remain unchanged. The plan succeeded only at Karaganda. The Soviets clearly hoped that declines in aggregate production from the older coal basins could be forestalled at least until the late 1980s, when the new coal basins of the eastern USSR would begin produc-

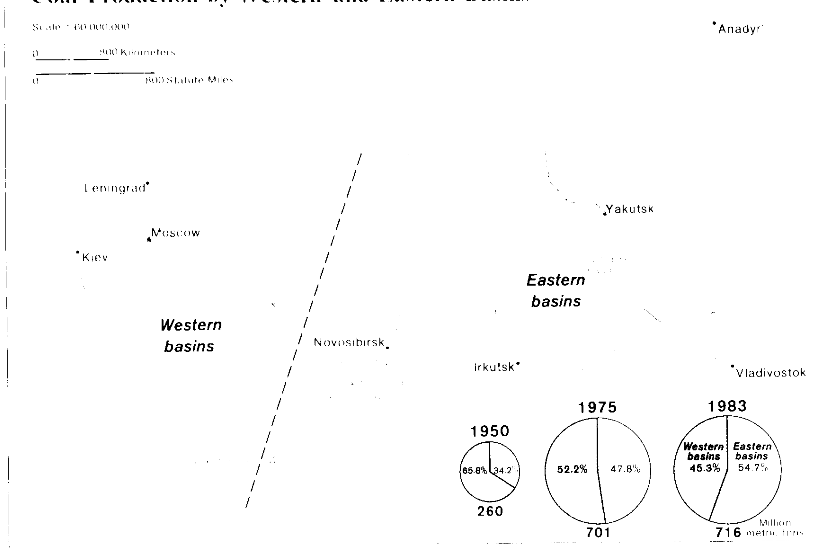
**USSR: Coal Production Rank, 1980**

Million metric tons/Percent



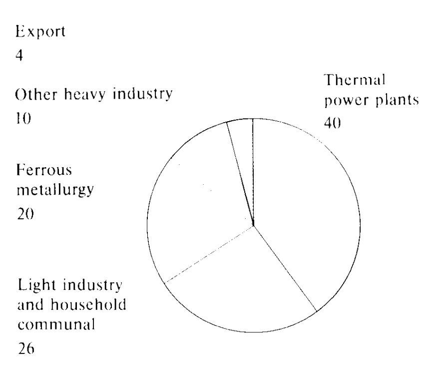

[a] Anthracite/bituminous breakdown is estimated.

**Coal Production by Western and Eastern Basins**




**USSR: Coal Consumption, 1980**[a]

Percent




[a] Estimated.

**Coal Production, by Basin** [a]

*Million metric tons*

| Basin | 1950 | 1955 | 1960 | 1965 | 1970 | 1975 | 1980 | 1981 | 1982 | 1983 | 1985[b] |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Total** | **260** | **390** | **510** | **578** | **624** | **701** | **716** | **704** | **718** | **716** | **775** |
| **Western USSR** | **171** | **255** | **327** | **351** | **355** | **366** | **338** | **326** | **330** | **324** | **341** |
| Donets | 95 | 141 | 188 | 206 | 217 | 223 | 204 | 198 | 200 | 196 | 210 |
| Moscow | 31 | 40 | 43 | 41 | 36 | 34 | 25 | 22 | 23 | 21 | 20 |
| Pechora | 9 | 14 | 18 | 18 | 21 | 24 | 28 | 28 | 28 | 28 | 28 |
| Urals | 33 | 47 | 59 | 62 | 54 | 45 | 44 | 43 | 44 | 44 | 45 |
| Other | 3 | 13 | 19 | 24 | 27 | 40 | 37 | 35 | 35 | 35 | 38 |
| **Eastern USSR** | **89** | **135** | **183** | **227** | **269** | **335** | **378** | **378** | **388** | **392** | **434** |
| Ekibastuz | | 2 | 6 | 14 | 23 | 46 | 67 | 68 | 70 | 72 | 84 |
| Karaganda | 16 | 25 | 26 | 31 | 38 | 46 | 48 | 49 | 49 | 49 | 50 |
| Kuznetsk | 38 | 58 | 84 | 96 | 113 | 138 | 144 | 144 | 148 | 147 | 154 |
| Kansk-Achinsk | 2 | 4 | 9 | 14 | 18 | 28 | 35 | 35 | 37 | 40 | 48 |
| South Yakutia | | | | | | 0 | 3 | 3 | 4 | 4 | 12 |
| Other | 33 | 46 | 58 | 72 | 77 | 77 | 81 | 79 | 80 | 80 | 86 |

[a] The eight largest coal basins account for more than 83 percent of annual coal production in the Soviet Union. Two of these basins, Donets and Kuznetsk, produce nearly 48 percent of Soviet coal.
[b] Soviet five-year plan.

tion. Moscow must now recognize that its planned 1985 output of 775 million tons is overly optimistic.

At least four major problems are hampering Soviet coal production:

- Conditions in underground mines are deteriorating rapidly, mine depth is increasing, seam thickness is decreasing, and methane concentrations are rising, particularly in the Donets and Kuznetsk basins. These basins account for about 50 percent of total coal production and about 75 percent of coking coal output.

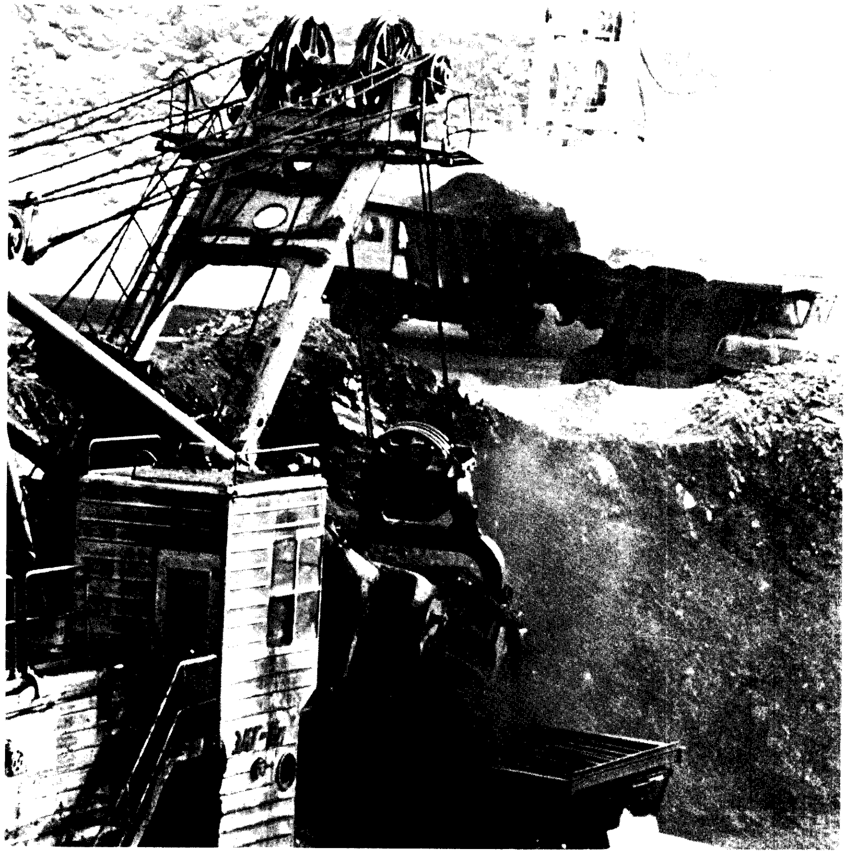
- Too little new capacity is coming on line to offset the stagnating or declining production in older coal basins.

- Shortages of labor and declines in productivity are becoming more acute, especially in the older coal basins in the western USSR.

- Development of the large basins east of the Urals is constrained by the poor quality of some deposits, slow progress of research on coal preparation, lack of transportation capacity for movement of coal, and unresolved technical problems relating to long-distance transmission of electricity from mine-mouth power stations to areas of consumption.

Oil and natural gas have replaced coal in many applications in industry, transport, and the household-communal sector. Nonetheless, about 40 percent of annual coal production is burned in thermal power plants, compared with about 70 percent in the United States. Ferrous metallurgy accounts for about one-fifth of total consumption — roughly the same share as Western Europe — with other industrial users, exports, and the household-communal sector accounting for the remainder.

Moscow expects that coal's share of total Soviet energy consumption will continue to decline through the 1980s. After supplying about 70 percent of the fuel used in power plants in 1960, coal accounted for just more than 40 percent in 1980. Although coal-fired plants are being built to meet increased energy needs east of the Urals and Central Asia, there has been only a limited effort to convert oil-fired power plants to coal.



*Much of the coal mined in South Yakutia's newly developed Neryungri deposit will be exported to the Far East.*

**USSR: Metallurgical or Coking Coal Production, by Basin** [a]

*Million metric tons*

| Basin | 1950 | 1955 | 1960 | 1965 | 1970 | 1975 | 1980 |
|---|---|---|---|---|---|---|---|
| **Total** | **52.0** | **78.0** | **110.0** | **139.0** | **164.8** | **180.7** | **178** |
| Donets | 28.4 | 44.4 | 64.9 | 80.4 | 84.3 | 88.5 | 74 |
| Kuznetsk | 14.9 | 21.4 | 28.5 | 37.5 | 46.9 | 56.1 | 60 |
| Karaganda | 5.5 | 6.7 | 8.3 | 11.0 | 16.9 | 18.1 | 22 |
| Pechora | 0.2 | 0.9 | 3.8 | 5.2 | 12.1 | 14.1 | 18 |
| Other | 3.0 | 4.6 | 4.5 | 4.9 | 4.6 | 3.9 | 4 |

[a] Four of the eight major basins provide 98 percent of the metallurgical or coking coal mined.

**USSR: Selected Characteristics of Major Coal Deposits**

| Deposit | Type of Coal | Type of Mining | Thickness of Seam *(meters)* | Average Depth of Mine *(meters)* | Average Calorific Value *(kilocalories/kilogram)* | Moisture Content *(percent)* | Ash Content *(percent)* |
|---|---|---|---|---|---|---|---|
| Donets | Anthracite, bituminous | Underground | 0.9 | 602 | 6,056 | 6.5 | 19.2 |
| Moscow | Lignite | Underground | 2.5 | 135 | 2,528 | 32.3 | 35.5 |
| Pechora | Bituminous | Underground | 2.4 | 487 | 5,217 | 8.3 | 25.1 |
| Ekibastuz | Subbituminous | Surface | 10-40 | | 4,028 | 7.7 | 50.0 |
| Karaganda | Bituminous | Underground | 2.5 | 418 | 5,139 | 7.5 | 28.8 |
| Kuznetsk | Bituminous | Underground and surface | 2.5 | 262 | 5,550 | 10.2 | 19.0 |
| Kansk-Achinsk | Lignite | Surface | 8.7 | 283 | 3,606 | 33.0 | 10.7 |

## Mining and Technology

The Soviet coal industry comprises nearly 900 mines located throughout the country. Although approximately 60 percent of annual coal output is currently mined underground, the Soviets expect most new production to come from large surface mines in the eastern regions, chiefly from Ekibastuz, Kuznetsk, Kansk-Achinsk, and South Yakutia.

Eighty-five percent of underground mining is done by mechanized longwall mining systems, as opposed to the room-and-pillar mining system most commonly used in the United States. Surface mining principally involves open pits with various kinds of excavators. Dipping coal seams in many of the shallow deposits, however, prevent widespread use of contour strip mining. To date, the Soviets have given little priority to reclamation and reforestation of lands that have been surface mined.

Although the level of mechanization is fairly high, Soviet coal-mining technology is generally less advanced than that in the West. This is especially true of surface-mining technology; for example, the largest domestically produced dragline buckets, trucks, and transporters are much smaller than their Western counterparts. For this reason, substantial amounts of surface-mining equipment must be imported, principally from East Germany. Although domestically produced coal excavating equipment is available, such as the surface mining machine plant being constructed at Krasnoyarsk, the Soviets still expect to import more advanced foreign-made equipment to process South Yakutia coal.

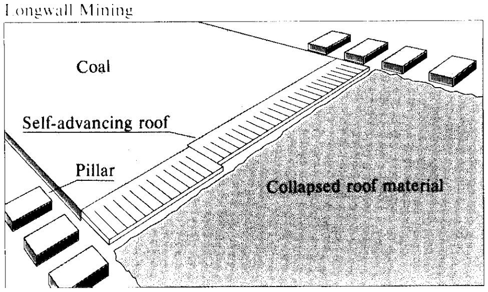
According to the Soviets, mine conditions—dust suppression, drinking water, lighting, and underground transportation of miners—are poor. Although health and accident statistics are not published, the Soviet coal industry is known to have a mediocre mining safety record compared with that of the United States.

To mine coal from deep and diffuse deposits, the Soviets are experimenting with alternate fuel extraction and transport methods. At Belovo in the Kuznetsk basin and also in the Donets basin, for example, some coal is mined by hydraulic methods; a pipeline for transporting the resultant coal slurry from the Belovo mine some 250 kilometers to Novosibirsk is under construction.

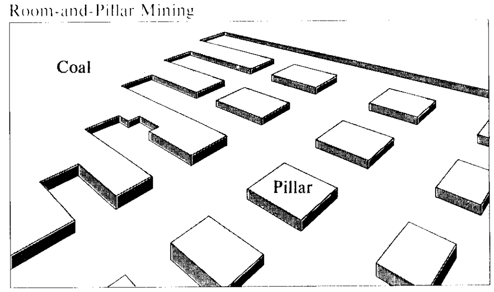
**Mining Methods**

**Underground Mining**

Longwall Mining

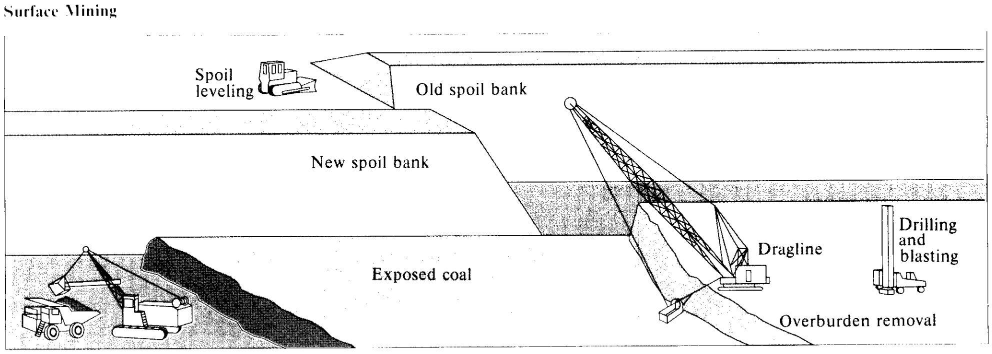



Room-and-Pillar Mining

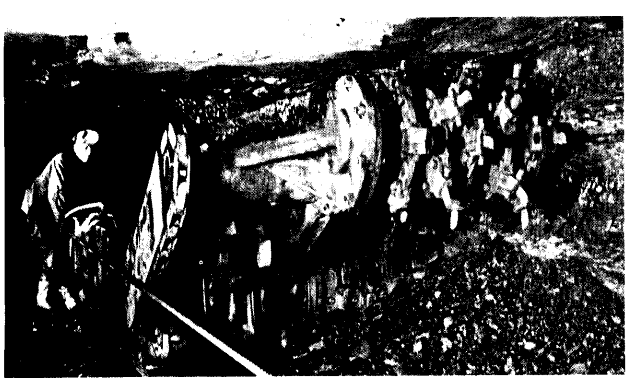



The longwall mining system is the principal underground technique used in the Soviet Union.

**Surface Mining**



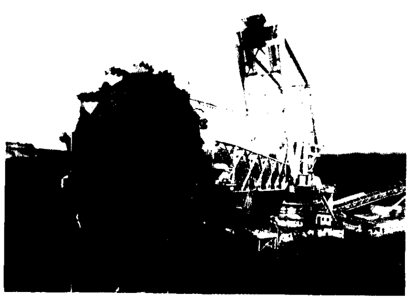

In surface mining, the earth is excavated to uncover the coal seam. The overburden is dumped in a previously mined area. In open pit surface mining, the overburden is piled beyond the actual mining area



*Room-and-pillar mining technique seen at Donets basin mine.*

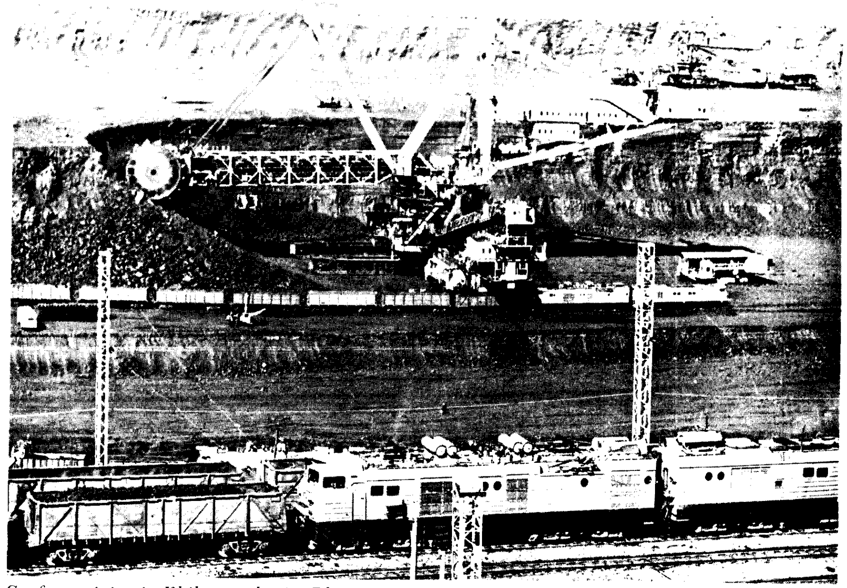
*The mechanized longwall mining system is the principal technique used in the Soviet Union.*

*Processing and shipping facilities above the Pechora underground Vorgashor coal mine, Komi ASSR.*



*A rotor excavator at the Ekibastuz coal basin.*

*P-1600 belt reloader being assembled at Ekibastuz.*



*Surface mining in Ekibastuz basin. The East German ERShRD-5000 powerful bucket-wheel excavator can remove 5,000 tons of coal per hour.*

## Transportation

The transport of coal from mining to consuming areas is a major problem for the Soviet Union. As coal reserves located near industrial centers in the western USSR have been increasingly depleted and the Soviets have been forced to go farther east to develop new reserves, the burden on the rail network has intensified. Coal is the leading freight item in terms of ton-kilometers on Soviet railroads; more than 95 percent of annual coal production is transported by rail.

Coal traffic is particularly heavy in West Siberia, northern Kazakhstan, and the Urals, as well as in parts of the Volga region and the Ukraine. In these regions much of the coal traffic must be channeled through a few already overburdened rail lines. The amount of coal shipped by rail from the Kuznetsk, Karaganda, and Ekibastuz basins to the Urals and beyond has more than doubled in the past decade to about 15 percent of total Soviet coal production. As a result, traffic slowdowns occur frequently, especially during late summer when harvested agricultural goods compete for space.

Crosshauling of fuels also adds to the burden of the railroads. Although large amounts of coal from the Kuznetsk basin in West Siberia are carried to power plants in the Ukraine, for example, coal from the Donets basin in the Ukraine is freighted to power plants in the Volga region, which is nominally within the Kuznetsk basin marketing zone. This is mainly a consequence of boiler design: the boilers in the

*Various sizes and grades of coal are awaiting shipment to consumers at the Karaganda coal-yard, Kazakhstan.*

## Coal Transport

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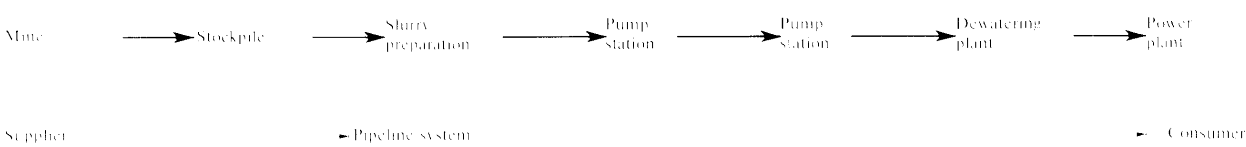
*A freight train transports South Yakutian coal southward to the Tynda Station on the Baikal-Amur Mainline.*

**Conventional Coal Slurry Pipeline System**




Ukraine plants that burn Kuznetsk coal were designed when similar coal was available from the Donets basin, which is now hard pressed to supply all of its former markets. To help reduce rail congestion, the Soviets plan to reequip some power plants at great cost to burn coal from closer sources. Crosshauling also occurs where coal preparation facilities are inadequate to process coal at minesites. Coal may be shipped long distances to processing plants, with associated rock and moisture adding unnecessary bulk and weight, and then shipped back to users.

Slurry pipeline transport is one of several mechanisms that Soviet engineers have proposed for movement of Siberian coal to thermal power plants in the Urals and European USSR. The Soviets have two less-than-15-kilometer slurry pipelines currently in operation in the Kuznetsk basin, and a 250-kilometer slurry pipeline from the Belovo mine in the Kuznetsk basin to Novosibirsk is reported to be under construction.

Soviet transport officials, seeking to reduce the burden on the railroads, have called for increased efforts to find new sources of coal closer to consumers. In response, Soviet officials are planning to increase production from small coal deposits in the southern Urals and in Central Asia—even though they have calculated that coal from Kuznetsk, for example, is cheaper to use in much of the European USSR than coal mined nearer by.

Inefficient railroad operating practices also contribute to fuel supply problems. For example, some 20 million tons of coal—nearly 3 percent of annual production—are lost to the economy each year, owing to underloading railcars, excessively long loading and unloading times, lack of protective coverings, and spillage from poorly maintained wooden coal gondolas. The Soviets plan eventually to have an all-metal gondola fleet.

The Soviets have particular problems dealing with coal mined in the Kansk-Achinsk fields. This coal tends to be highly pyrophoric and cannot be shipped long distances without significant risk of spontaneous combustion. Consequently, unless Kansk-Achinsk coal is processed, it must be burned in nearby furnaces and power plants.

Although Soviet transport officials stress the need to increase water transport of coal in regions of the European USSR where waterways parallel rail lines, barge transport on western rivers and canals accounts for only a small amount of coal traffic. Waterway transport, both river and coastal, is hampered by ice: virtually all waterways are frozen from three to nine months of the year. Moreover, most of the major rivers flow from south to north, which does not facilitate transport of coal from east to west.

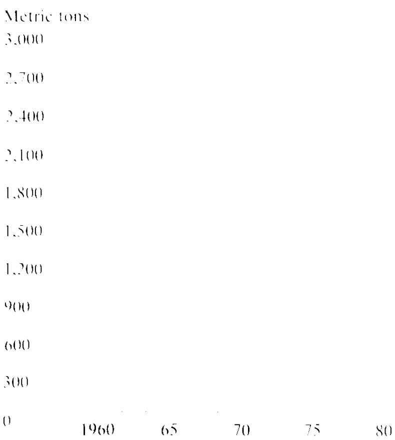
# Uranium and Thorium

The USSR has an ambitious and optimistic program for nuclear energy development. The Soviets plan to generate as much as 20 percent of their electricity from nuclear power by the year 1990 and up to 60 percent by the year 2000. Achievement of these ambitious goals will require large-scale exploitation of the nation's uranium and, to a much lesser extent, thorium resources.

Information on the Soviet uranium industry is a closely guarded state secret. Only limited data on uranium occurrences in the Soviet Union and minor details on reserves, mining, and processing operations have been published. However, according to Soviet geologic literature, almost every type of uranium deposit found elsewhere in the world has been found and exploited in the USSR. In addition, some of the uranium deposits described seem to have no Western counterparts. These include deposits associated with iron ores and albitites in Precambrian metamorphic rocks and those with phosphates in clays with detrital fishbones.

Uranium deposits in the Soviet Union are generally classified as either vein-type ores associated with metamorphic and intrusive-extrusive igneous rocks or hydrothermal deposits emplaced in sedimentary rocks. These two geologically distinct types, which seldom occur together, are roughly of equal importance as a uranium resource.

**Postulated[a] USSR Total Yellowcake ($U_3O_8$) Production for Nuclear Power**




[a] Western estimates

Uranium exploration and mining methods in the Soviet Union are essentially the same as those applied in the West. Exploration methods include geologic, geophysical, geochemical, aerial radiometric, and magnetic surveys. Mining methods include:

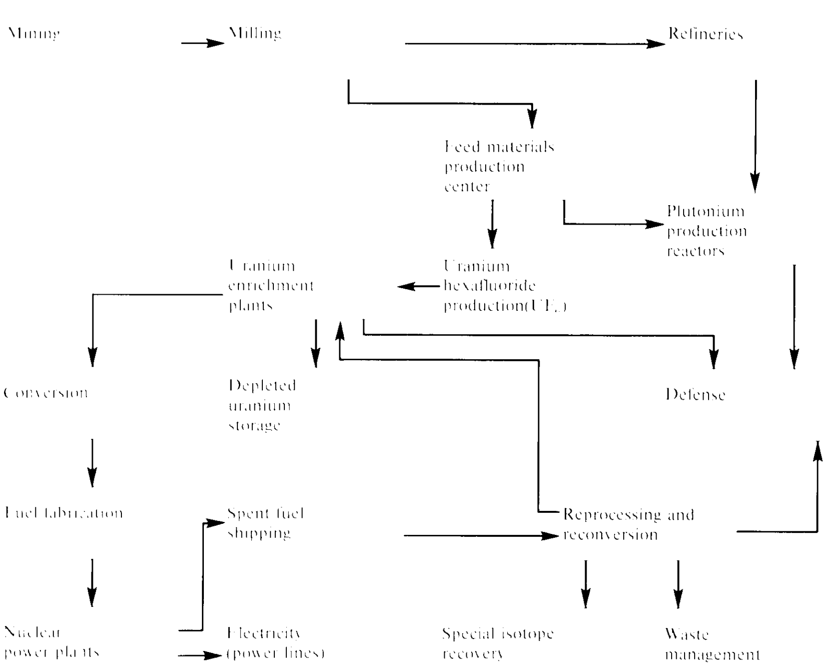
- Underground mining to recover high-grade, vein-type deposits at a depth of 200 meters or more.
- Open pit methods applicable for low-grade ores dispersed near the surface in large areas.

**USSR: Uranium-Thorium Deposits and Processing Centers**

| Deposit | Description |
|---|---|
| **European USSR** | |
| 1-Sillamäe | Uranium-phosphate rare earth association in clays with detrital fishbones. |
| | Uranium mining and milling operations. |
| 2-Zheltyye Vody Terny | Precambrian uranium-iron ore formation. |
| | Irregular stratiform albitized uranium bodies. |
| | Uranium in association with conglomerates. Uranium minerals include uraninite, pitchblende and nenadkevite. |
| | Uranium mining and milling. |
| 3-Lermontov | Uranium-molybdenum associated with volcanic rocks. |
| | Mining and milling operations. |
| 4-Chupa District | Uraniferous pegmatites in Precambrian gneisses. |
| | Uranium mineralization in paleovolcanic and intrusive rocks of Baltic shields. |
| 5-Lake Onega | Uranium and vanadium mineral in association with black graphitic marine shales, peat, and asphaltite. |
| 6-Lovozero Tundra | Thorium in phosphate and rare earths in syenite complex. |
| | Uranium with thorium minerals in alkalic rocks. |
| **Urals** | |
| 7-Vishnevogorsk | Uranium mineralization in nepheline syenite intrusions. |
| 8-Novogornyy | Uranium mineralization in nepheline syenite. |
| **Kazakhstan and Central Asia** | |
| 9-Aksuyek-Kiyakhty | Uranium mining. |
| 10-Koktas | Uranium associated with copper mining. |
| 11-Stepnogorsk | Possible in situ leaching of deep-seated uranium deposit. |
| | Uranium extraction as part of the "Tselinnyy Mining Complex." |
| 12-Ak-Tyuz-Bordunskiy | Uranium, thorium, and rare earths associated with lead mining. |
| 13-Chigirik | Uranium milling and processing facilities. |
| 14-Granitogorsk | Uranium possibly associated with lead mining, milling, and concentration center. |
| 15-Min-Kush | Uranium mining and milling operations associated with lignite in 1960s. |
| 16-Tyuya-Muyun | Uranium-vanadium association in metamorphic limestone interlayered with volcanic tuffs and breccia. |
| | Tyuyamuyunite, a uranium-vanadium mineral species that was named after this locality. |
| 17-Kyzyl-Dzhar | Uranium mining associated with gold production. |
| 18-Kadzhi-Say | Uranium associated with lignite mining. |
| 19-Taboshar | Uranium vanadium mining. |
| | $U_3O_8$ extraction plant. |
| 20-Chkalovsk | Possible uranium extraction and hexafluoride conversion site for Taboshar mine ore. |
| 21-Sumsar | Possible uranium mining. |
| 22-Uchkuduk | Uranium associated with gold mining at Kokpatas gold mine. |
| | Possible uranium extraction at Navoi Mining and Metallurgical Complex. |
| | Ore genetically similar to South African deposits. |
| 23-Naugarzan | Uranium-fluorite mining. Ore milling at Chigirik. |
| 24-Charkesar | Site of former uranium mining. |
| 25-Chavlisay-Krasnogorskiy-Yangiabad | Site of uranium mining operation. |
| 26-Kara-Balta | Uranium processing center. |
| **Siberia** | |
| 27-Vikhorevka | Possible uranium-thorium mining of vein-type deposits in ultrametamorphic Archean rocks. |
| 28-Krasnokamensk | Uranium-fluorspar association in Mesozoic volcanic basins. |
| 29-Slyudyanka | Pegmatites-uranium and rare earths. |
| | Mining reported in 1958 from Precambrian crystalline limestone. |
| 30-Aldan | Uranium, thorium, and rare earths associated with gold mining. |

## Uranium-Thorium Deposits and Processing Centers


**Production of Fissionable Materials for Electric Power Production and Military Defense**




- In situ leaching techniques that use sulfuric-acidified waters to exploit low-grade deposits that cannot be mined economically by open pit or underground methods.

As elsewhere in the world, uranium milling, leaching, and concentration processes in the Soviet Union are carried out in proximity of mining operations to facilitate the separation of relatively small quantities of $U_3O_8$ from large volumes of ore. Information about Soviet uranium processing is even less available than that on the distribution and production of uranium. However, there are three distinct stages in processing:

- Extraction of $U_3O_8$ at or near the mining site.
- Conversion of $U_3O_8$ to uranium tetrafluoride ($UF_4$) by reaction with fluoride.
- Reduction of $UF_4$ to metal for direct use in weapons or reactor fuel or for conversion to gaseous hexafluoride ($UF_6$) to permit enrichment in the uranium-235 isotope.

Several alternatives to the gaseous diffusion method of uranium enrichment have received attention in the Soviet Union, including experimentation with photochemical technology using lasers.



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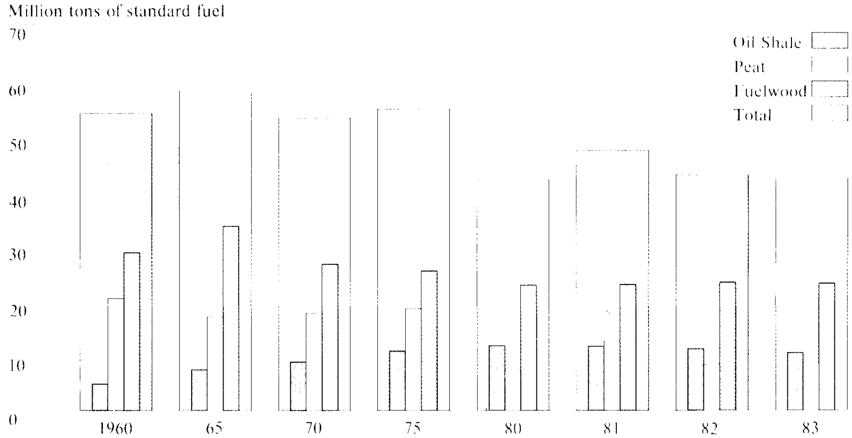
## Minor Fuel Resources

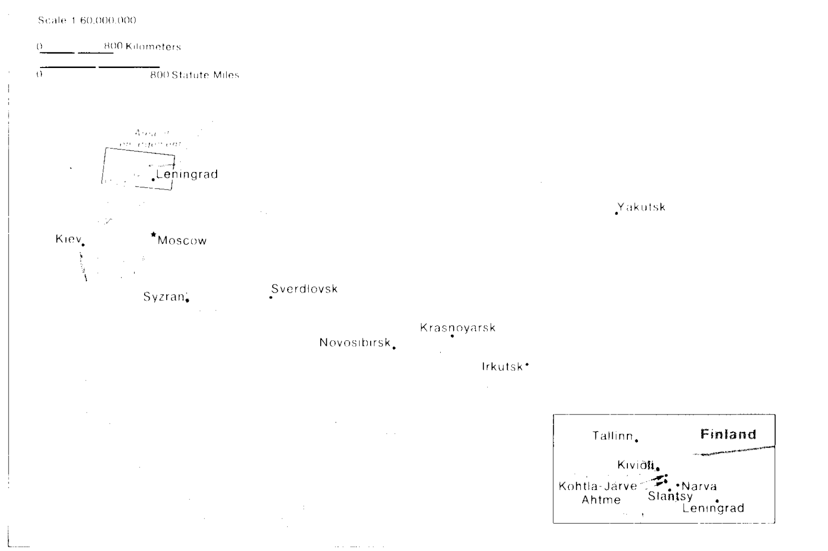
Minor fuels—oil shale, peat, and fuelwood—contributed 2 percent of total Soviet primary energy production in 1983, down from 7.2 percent in 1960. With the relative abundance of major fuel resources, production and use of the minor fuels have been largely confined to those areas of the country without close-at-hand supplies of oil, natural gas, or coal. In these areas, the Soviets have often found it more economical to burn peat, wood, and oil extracted from shale in their power plants and furnaces than to transport major fuels from distant producing regions.

The development of tar sand deposits—from which oil can be extracted—is still in the experimental stage in the USSR. Thus far, the high costs of recovery, refining, and transportation make extensive exploitation of these sands uneconomical during this century.

**USSR: Minor Fuels Production**




**Oil Shale Deposits**




## Oil Shale

The Soviet Union has substantial explored reserves of oil shale and leads the world in its exploitation as an energy source.[1] According to Soviet estimates, the total geological resources of oil shale in the USSR range from 190-220 billion tons. Of this amount, the Soviets believe 56 billion tons are economically recoverable using current technology. Thus far, however, only 6.5 billion tons of those reserves are in explored deposits.

The Estonian and Leningrad oil shale fields near the Baltic Sea, with 5 billion tons of explored shale reserves, yield about 97 percent of all Soviet production. In 1980 the Estonian field alone accounted for nearly 84 percent of the oil shale mined in the USSR. Currently, the only other commercial oil shale deposit is the Kashpirovka field near Syzran' on the Volga River.

*Loading oil shale at Oktyabr' mine, Estonia.*

In Estonia, oil shale has been used since the 1920s as fuel in various types of industrial furnaces and in locomotives. Today, approximately 70 percent of the shale produced in the USSR is burned directly as fuel in the furnaces of boiler units at power plants in Kiviõli, Tallinn, and near Narva. The two thermal power plants near Narva—the 1,610-MW Estonian State Regional Electric Power Plant (GRES) and 1,435-MW Baltic GRES—are the world's largest power plants that burn this fuel. Estonia, with more than 60 percent of its fuel demand supplied by shale, is the only republic of the USSR, and the only political entity in the world, where oil shale predominates in the fuel balance.

The USSR has an active and well-established industrial and technical base, with more than 50 years of experience, for mining, retorting, gasification, and direct combustion of Baltic oil shales. Virtually all current shale oil output is from 12 underground and four surface mines. Underground mining, using the room-and-pillar method, accounts for 60 percent of annual production. The nearly 30 percent of oil shale production not burned by combustion is processed at four sites located near the shale mines at Kohtla-Järve–Ahtme, Kiviõli, Slantsy, and Syzran'.

The Soviet Union uses two principal types of retorts to process raw shale: gas generators and solid heat carriers. The most significant methods are the Kiviter and Galoter processes. The Kiviter process produces shale oil, shale tars, and large quantities of heating gas (low-caloric gas) from lump shale. Until 1978 the largest gas generators could process about 400 tons of shale daily, but in that year a scaled-up Kiviter retort capable of processing 1,000 tons daily was installed near Kohtla-Järve–Ahtme at the V. I. Lenin Combine.

The Soviets refer to the Galoter process as the UTT process, and associated retort units (which have a unit maximum throughput capacity of 3,300 tons per day of Baltic oil shale) are referred to as UTT-3000 units. They first used the technique in 1980 in a pilot oil shale processing plant located adjacent to the Estonian Thermal Power Plant. The new UTT-3000 process uses solid heat retorts, and the temperature can be controlled to provide an optimum mix of oil, gas, and tars that are then either burned as fuel or further refined into numerous oil-based products. The Galoter process is the most advanced for industrial oil shale retorting in the USSR.

The Soviets also use some of the inorganic residual ash waste from the shale oil conversion process as building material and soil condition-

[1] Oil shale is sedimentary rock rich in kerogen, a fossil organic substance that yields oil, gas, and tar when heated.

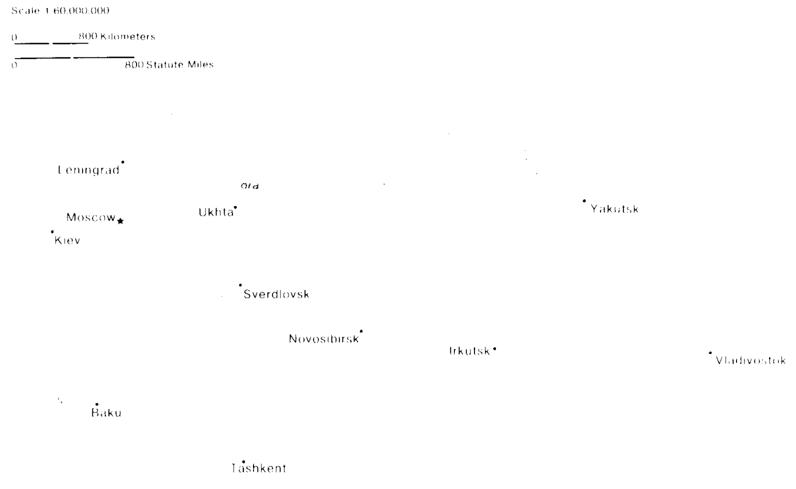
er. Despite these beneficial uses, spent shale presents a serious disposal problem. Large areas in the shale regions of the USSR have been despoiled by shale strip mining and dumping of processing waste. Although some areas have been restored through grading and planting, revegetation of open pit mines and spent shale dump sites is difficult because of the high alkalinity of the soil.

## Tar Sands

The USSR has more than 30 billion tons of potential oil reserves that could be extracted from tar sands. The largest concentration of tar sand deposits occurs in northwest Yakut ASSR. The best known of these is the Olenek tar sand deposit near the Lena River. Because of their remote location, the Soviets do not anticipate exploiting the Olenek or other East Siberian tar sands in the near future.

Currently, the Soviets have limited experimental development of tar sands to deposits in the Volga, Pechora, Transcaucasus, and Central Asia regions. The only significant Soviet oil production from tar sands comes from the Yarega field near Ukhta in the Pechora basin of northern Komi ASSR. Here, the Soviets recover heavy oils and bitumen sands via "oil mining." The oil is located at depths of 200 to 400 meters and requires heating to be recovered from seams 2 to 5 meters thick. The resulting heavy oils are refined into specialty oils, greases, and lubricants.

### Tar Sand Deposits



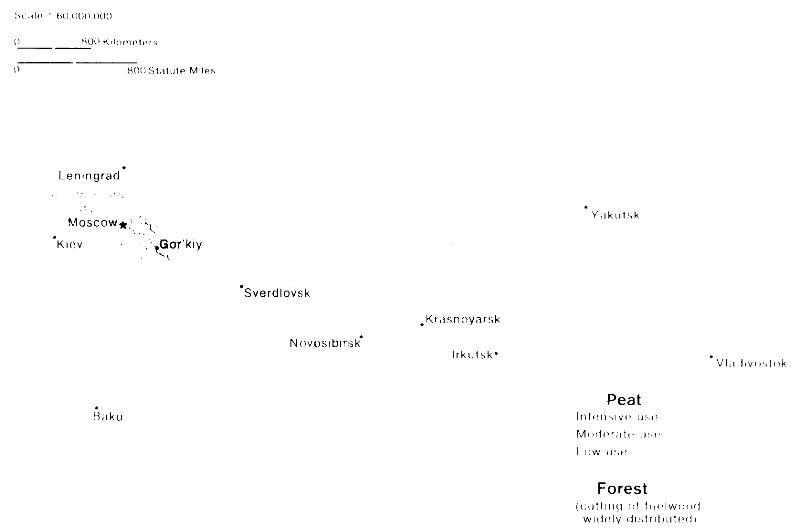

## Peat

The USSR has about 60 percent of the world's peat resources. Soviet geologists estimate their peat reserves at about 150 billion tons, which includes 30- to 40-percent moisture content. Peat is distributed throughout much of the country, but only the reserves in the Baltic republics, the Moscow-Gor'kiy area, and Belorussia are intensely exploited at this time.

The Soviet Union is the world's largest producer of peat, both for fuel and agriculture. Current peat production in the USSR is about 230 million tons per year. About two-thirds of the peat produced is used in agriculture and by the chemical industry for the production of methanol and synthetic natural gas (SNG). Of the remaining peat, nearly 40 percent is burned in several major thermal power plants in European USSR, 10 to 15 percent is formed into briquettes for home heating, and the rest is used in industrial boilers and in large heating plants.

For many years, the use of peat as an energy source has been declining. Peat now accounts for only 0.4 percent of total energy supply. Recent Soviet studies on the future of the peat industry have concluded that the amount of peat used as fuel will continue to decrease because of insufficient reserves in the primary consuming areas and increasing demand in the agricultural sector.

### Peat and Forest Reserves




## Fuelwood

Forests cover approximately one-third of the territory of the USSR. In 1983 the lumbering industry cut 356 million cubic meters of timber, of which about 23 percent was designated as fuelwood.[2] Production of fuelwood has been slowly decreasing in recent years, but wood still comprises up to 40 percent of the locally expended fuel in the northern forest regions and is also an important fuel in the central region. Overall, wood currently contributes slightly more than 1 percent of the national energy supply.

[2] These figures do not include fuelwood gathered by the populace. Occasional data indicate that the amount may nearly equal the fuelwood cut by the lumbering industry.

Fuelwood is principally used in home heating or as feedstock in the synfuel industry; it is rarely burned in power stations. The Soviets are able to produce automotive fuels and methanol from wood fibers and waste by using an acid hydrolysis process. This synthetic fuel is produced at a small demonstration plant near Krasnoyarsk, designated the SKR-10. The Soviets are increasing the volume of wood chips exported for use in producing synfuels and plan to construct industrial plants in Siberia that can convert 2 million tons per year of wood chips and waste into 40,000 tons per year of synfuel.

# Electric Power

Since 1920, when Lenin presented his dictum "Communism is Soviet power plus the electrification of the entire country," the Soviet Union has become a world leader in the generation of electric power. Virtually every settled area of the vast Soviet territory has now been electrified. But, even though the electric power base of the USSR has been growing rapidly for many years, much faster than the economy as a whole, there is still not enough electricity available to meet all Soviet industrial and communal needs.

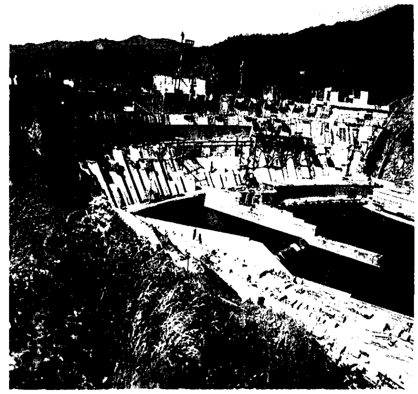
Industry is the principal consumer of electric power. Its share of the total electricity consumption has been gradually decreasing, but still amounted to 65 percent in 1983. Compared with other countries, the transportation sector receives a relatively large share, 9 percent, and is maintaining that share as the electrification of railroads expands and the electric power requirements of oil and gas production and distribution systems increase. Plans call for the share of power allocated for household, municipal, and agricultural use to grow from 20.5 percent in 1980 to 22 percent in 1985. This should improve the power supply for domestic and communal uses, which has long been inadequate. Exports of electric power amount to only 1.7 percent of production.

Despite the rapid growth of the power industry, insufficient generating capacity in the European part of the USSR where industry and population are concentrated, leads to chronic power shortages. Provision of additional capacity is impeded by inadequate local fuel and hydropower resources and the costs and difficulty of transporting fuel from elsewhere. As the growth rate of the labor force declines, economic growth is becoming more and more dependent on electric power to help increase labor productivity.

To increase its electric power supply, the USSR is promoting rapid growth of nuclear power and pumped-storage hydroelectric power plants in the European part of the country while continuing to build major hydropower plants on large Siberian rivers and large thermal power plants in the coal-rich eastern regions. It is also attempting to improve efficiency by concentrating power production in large regional power plants and installing larger generators. To improve the distribution of power, the Soviet Union is in the process of integrating the regional power networks via ultra-high-voltage (UHV) transmission lines to form a national power system. And it is developing alternative energy technologies to meet local small-scale and supplementary needs.

## Electric Power Administration

The Soviet Ministry of Power and Electrification, in effect, controls more than 90 percent of the country's installed electric power capacity and output. The remaining generating plants are either under the administration of various other ministries, such as metallurgy, machine building, transportation, and agriculture, or assigned to local authorities or industries. Transmission, however, is controlled by the Ministry of Power and Electrification. Like other energy ministries, the Ministry of Power and Electrification has an extensive array of subordinate enterprises and institutes, almost all of which are headquartered in Moscow.

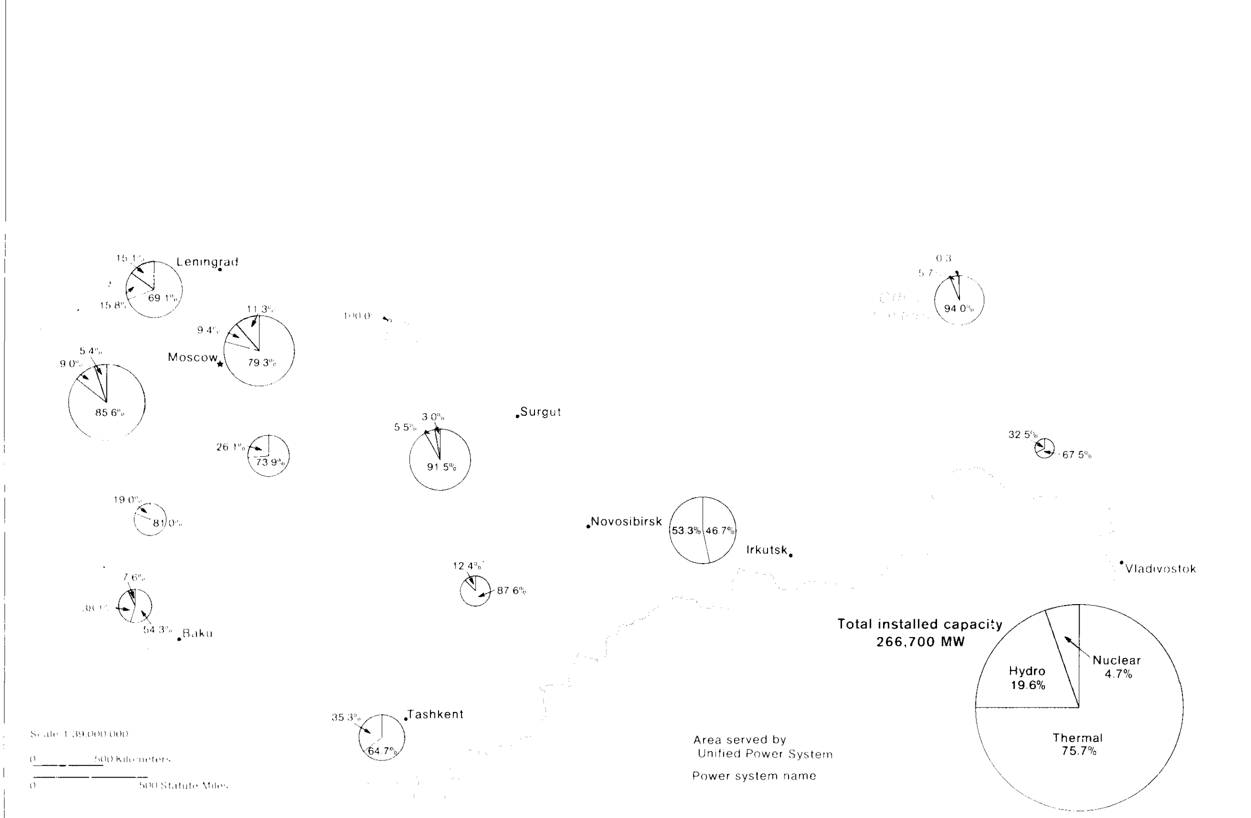


*The 6,400-MW Sayan-Shushenskoye Hydropower Dam across Yenisey River, East Siberia.*

## Production and Consumption

The Soviet Union is second only to the United States in the generation of electric power, although per capita production lags behind that of many industrialized countries. Power generation in the Soviet Union grew from less than 500 million kilowatt-hours (kWh) in 1920 to 1.42 trillion kWh in 1983 (about half the amount

### Regional Distribution of Installed Electric Power Capacity, 1980



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## USSR: Electric Power Acronyms

Like many American industries, the Soviet electric power industry uses acronyms for types of power plants and their components. Some of these acronyms have passed into general usage, and knowledge of them facilitates identification in Soviet publications.

| | |
|---|---|
| **Power generation** | |
| AES | Atomic/nuclear electric power plant |
| AKES | Atomic condensation electric power plant |
| AST | Atomic heat supply plant |
| ATETs | Atomic heat and electric power plant |
| DES | Diesel power plant |
| GAES | Pumped-storage electric power plant |
| GeoTES | Geothermal electric power plant |
| GES | Hydroelectric power plant |
| GRES | State regional electric power plant (thermal) |
| | Gas-turbine electric power plant |
| GTU | Gas-turbine installation |
| KES | Condensation electric power plant |
| MHD | Magnetohydrodynamic generators |
| MINENERGO | USSR Ministry of Power and Electrification |
| PES | Tidal electric power plant |
| PGU | Steam gas-turbine units |
| SES | Solar power plant |
| TETs | Heat and electric power plant |
| **Power transmission** | |
| AC | Alternating current |
| CEMA | Council for Mutual Economic Assistance |
| DC | Direct current |
| EHV | Extra-high-voltage (330- to 750-kV AC and 800-kV DC) |
| ES | District power system |
| GOELRO | State Plan for Electrification of the Soviet Union (1920) |
| GOSTANDART | State Committee for Standards |
| HV | High voltage (35- to 220-kV AC) |
| kV | Kilovolt |
| kW, kWh | Kilowatt, kilowatt-hours |
| LEP | Long-distance transmission line |
| MW | Megawatt |
| OES | Consolidated regional power system |
| VL | Overhead line |
| TEK | Fuel and power complex (KATEK—Kansk-Achinsk Fuel and Power Complex) |
| UHV | Ultrahigh voltage, voltages greater than 750-kV AC or 800-kV DC (1,150-kV AC and 1,500-kV DC) |
| LEP-500 | Overhead transmission line (number indicates voltage) |
| USSR YeES | Unified Power System of the Soviet Union |

### Installed Capacity of Electric Power Plants

*Thousand megawatts*

| | 1960 | 1965 | 1970 | 1975 | 1980 | 1983 | 1985 Plan |
|---|---|---|---|---|---|---|---|
| **Total** | **66.7** | **115.0** | **166.2** | **217.5** | **266.7** | **293.6** | **327.6** |
| Nuclear | NEGL | 0.3 | 0.9 | 4.7 | 12.5 | 20.2 | 33.8 |
| Hydro | 14.8 | 22.2 | 31.4 | 40.5 | 52.3 | 57.0 | 64.7 |
| Thermal | 51.9 | 92.5 | 133.9 | 172.3 | 201.9 | 216.4 | 229.1 |

### Electricity Production

*Billion kilowatt-hours*

| | 1960 | 1965 | 1970 | 1975 | 1980 | 1983 | 1985 Plan |
|---|---|---|---|---|---|---|---|
| **Total** | **292.3** | **506.7** | **740.9** | **1,038.6** | **1,293.9** | **1,418.1** | **1,555** |
| Nuclear | NEGL | 1.4 | 3.5 | 20.2 | 72.9 | 109.8 | 220 |
| Hydro | 50.9 | 81.4 | 124.4 | 126.0 | 183.9 | 180.4 | 230 |
| Thermal | 241.4 | 423.9 | 613.0 | 892.4 | 1,037.1 | 1,127.9 | 1,105 |

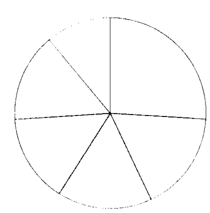
### Electricity Consumption

*Billion kilowatt-hours*

| | 1960 | 1965 | 1970 | 1975 | 1980 | 1983 | 1985 Plan |
|---|---|---|---|---|---|---|---|
| **Total** | **292.3** | **506.7** | **740.9** | **1,038.6** | **1,293.9** | **1,418.1** | **1,555** |
| Industry (including construction) | 216.4 | 361.3 | 503.4 | 678.0 | 799.2 | NA | 927 |
| Transport | 17.6 | 37.1 | 54.4 | 74.2 | 102.8 | 115.5 | 128 |
| Communal and municipal | 30.5 | 50.6 | 81.0 | 119.1 | 155.0 | NA | 190 |
| Agriculture | 10.0 | 21.1 | 38.6 | 73.8 | 110.9 | 126.6 | 157 |
| Exports | NEGL | 1.5 | 5.2 | 11.3 | 19.1 | 23.9 | 25 |
| Line losses | 17.8 | 35.1 | 58.3 | 82.2 | 106.9 | 115.3 | 128 |

### Principal Industrial Consumers of Electric Power, 1980

Percent




generated in the United States). This growth was achieved through heavy investment in power plant construction: since 1960, for example, the electric power industry has been allocated about 10 percent of the total capital investment in industry.

The 11th Five-Year Plan called for the installation of 68,900 megawatts (MW) of new capacity between 1981 and 1985, which would permit power production to increase an average of 3.7 percent annually and reach 1,555 billion kWh in 1985. If production continues to grow at a 4-percent annual rate, it would reach about 2,200 billion kWh in the mid-1990s, the level reached in the United States in 1976.

To increase generating capacity at the least cost, the Soviet Union is building fewer, but bigger power stations using larger, more efficient generating units. (Large power plants are generally more cost effective than small plants in both construction and operation.) The 6,000-MW Krasnoyarsk Hydroelectric Plant on the Yenisey River in Siberia is currently the largest hydroelectric power plant in the world, and the Sayan-Shushenskoye station, when the last two generating units are installed in 1985, will be even larger at 6,400 MW. The 4,000-MW Ekibastuz GRES-1 in Kazakhstan, which reached fully operational capacity in 1984, the 3,800-MW Reftinskiy Thermal Power Plant in the Urals, and the slightly smaller Zaporozh'ye and Uglegorsk plants in the Ukraine are among the largest thermal power plants in the world. Of the more than 900 major Soviet electric generating plants at the end of 1983, 57 were thermal power plants, 14 were hydroelectric power plants, and eight were nuclear power plants with capacities of 1,000 MW or more. These 79 large plants contributed about 163,000 MW, some 55 percent of the total Soviet power generating capacity.

The Soviet electric power industry is most developed in the European part of the country including the Urals. This region produces 72 percent of the national output of electricity. But 75 percent of the people and most of the industrial centers are located in the European USSR, and demand for power exceeds supply during peak hours. Voltage drops and brownouts are common; moreover, demand is rising steadily. Although additional large power plants are needed to fulfill peak demand requirements, the hydroelectric potential of the European rivers has already been almost fully exploited.

East of the Ural Mountains there is a better balance between power generation and demand. Major thermal and hydroelectric power plants have been built where population and industry are concentrated, mainly along the Trans-Siberia Railroad and in the Kuznetsk basin of West Siberia. The abundant coal and hydroelectric resources permit strong growth of the electric power industry in the eastern regions; between 1980 and 1985 production was scheduled to increase by more than 40 percent in the east compared to 30 percent in the European area. Eventually, as electric power production in the eastern regions exceeds demand, the Soviets plan to transmit the surplus to the energy-short European areas via UHV transmission lines.

# Thermal Power

Thermal power plants have always been the backbone of the Soviet electric power industry. In 1983 fossil-fuel-burning plants accounted for three-fourths of total Soviet power plant capacity and generated 80 percent of total electric power output.

Thermal power plants in the Soviet Union are built according to standard designs prepared by the All-Union State Institute for Planning Thermal Electric Power Stations. The generating units in these plants commonly range from 50 to 800 MW in output capacity and are combined into assemblies comprising one boiler, one turbine, one generator, and one transformer. Since 1963, when the first 300-MW units were put into operation, nearly 400 of these units have been installed, making them the standard generating units of large thermal power stations. In the last decade, twelve 500-MW units, eight 800-MW units, and one 1,200-MW unit have gone into operation. In the future, the 500-MW and 800-MW units should become the standard generating units of large thermal power plants, while 200-MW and 300-MW units will continue to be installed in medium-size power plants.

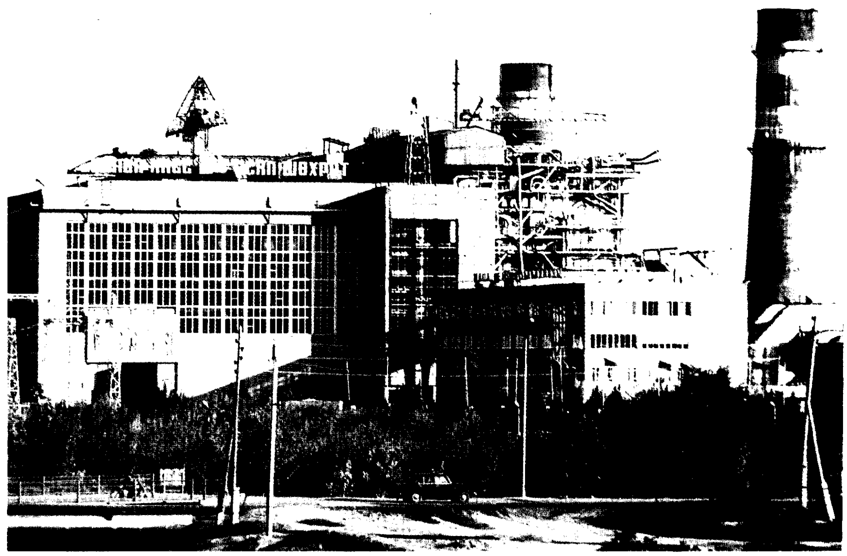
In keeping with the Soviets' shift in policy to locate power generation facilities near fuel resources, four 4,000-MW plants, each with eight 500-MW generating units, have been planned for northeastern Kazakhstan, near the Ekibastuz subbituminous coal deposits. By late 1984, all eight 500-MW units for the first Ekibastuz thermal power plant had been installed. Construction of the three additional plants at Ekibastuz and the one at Chiganak, in southern Kazakhstan, is considerably behind schedule. A similarly large plant (with eight 800-MW units) near the Berezovskoye mine in the Kansk-Achinsk brown coal basin has also been delayed and the first unit is now scheduled for startup in 1985.

State regional electric power plants (GRESs) provide central thermal power generation for large areas and for areas of high demand. At the beginning of 1983 there were 51 large GRESs with capacities of more than 1,000 MW; together they comprised almost half of the national thermal power generating capacity. Most of these large GRESs are located in European areas of the Soviet Union; among them are 12 in the Ukrainian Republic, seven in the Urals and six in the Central Moscow Power System. There are only 12 large GRESs in the eastern regions of the country—four in Central Asia, five in Siberia, and three in Kazakhstan.

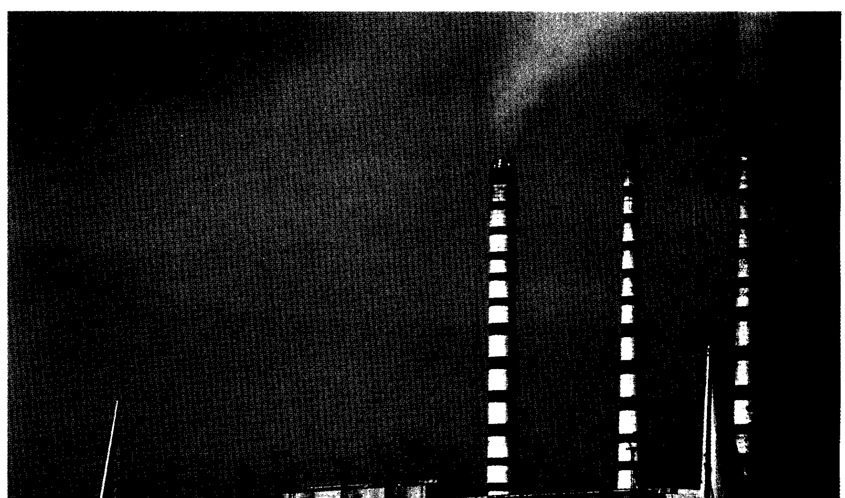
The cogeneration of electric power and heat—little practiced in Western countries—is common in the Soviet Union. At present there are more than 1,000 combination heat-and-power plants (TETs) in the USSR, all located in or near urban areas or at industrial plants. Besides electricity, they supply heat to residences and other indoor facilities and process steam to industrial enterprises. Even though less electricity is obtained per unit of fuel, cogeneration is a more efficient use of fuel than generation of electricity alone, because the heat of combustion is more fully exploited.

At the end of 1983 the total electric power generating capacity of all TETs in the Soviet Union was about 75,000 MW or 35 percent of total thermal power plant capacity. The TETs produced about 375 billion kWh of electricity and 1,200.3 million gigacalories of heat, the latter fulfilling 40 percent of the heating requirements of the cities. There are 12 TETs in Moscow alone, with total capacities of 5,100 MW of electricity and 22,000 gigacalories of heat per hour. The TETs-23 in Moscow is the largest TETs in the country; it can simultaneously generate 1,400 MW of electricity and 2,140 gigacalories per hour. Throughout the Soviet Union about 17,000 kilometers of heating mains have been installed, 2,200 kilometers in Moscow alone.

The generation of electric power from internal combustion engines (for example, diesel generators) has been widespread in the Soviet Union, especially in remote areas, but this practice is decreasing because internal combustion power generation is inefficient and relatively costly. Instead, where feasible, transmission networks centered on GRESs are being extended to remote areas.

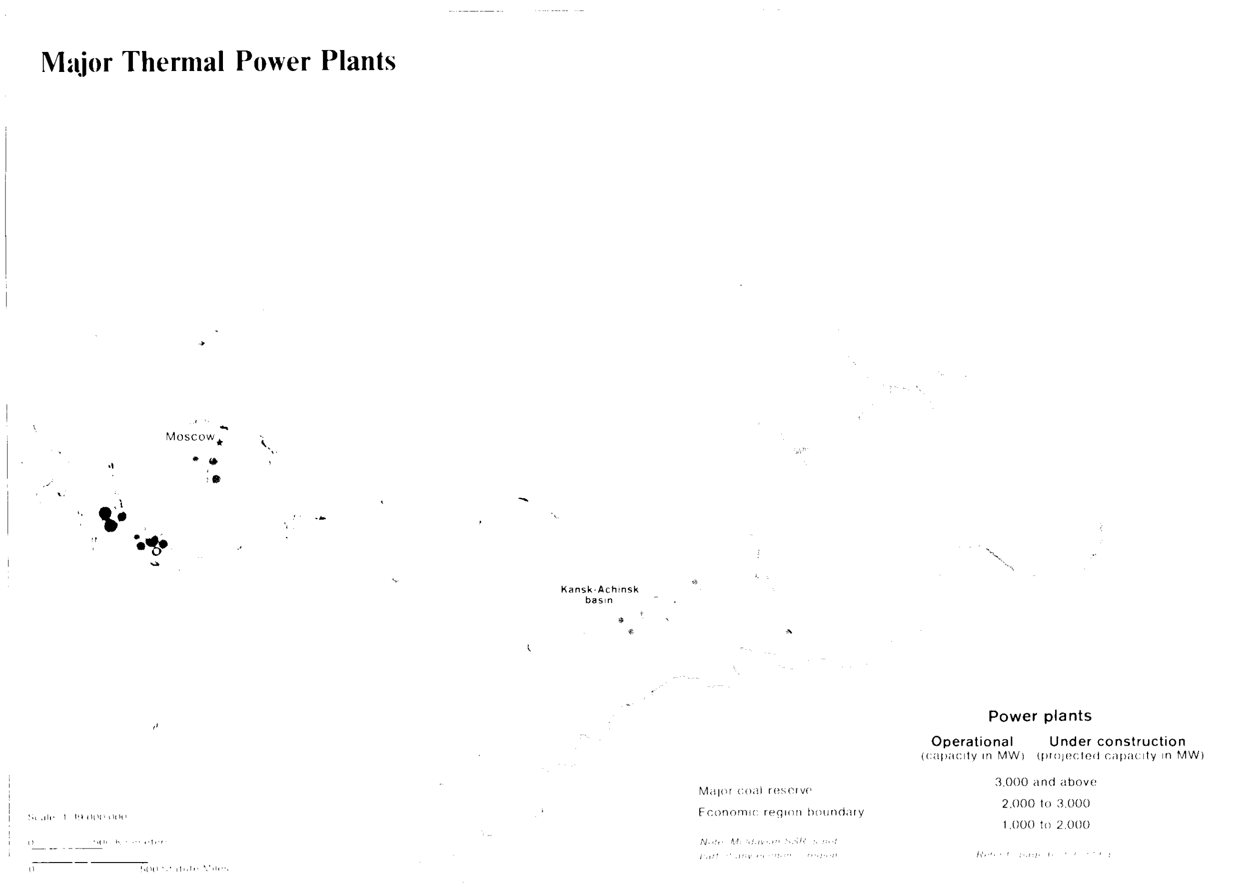


*Construction of the 1,260-MW Mary Thermal Power Plant, Central Asia.*



*The 2,400-MW Lukoml' Thermal Power Plant, Belorussia.*

## Major Thermal Power Plants

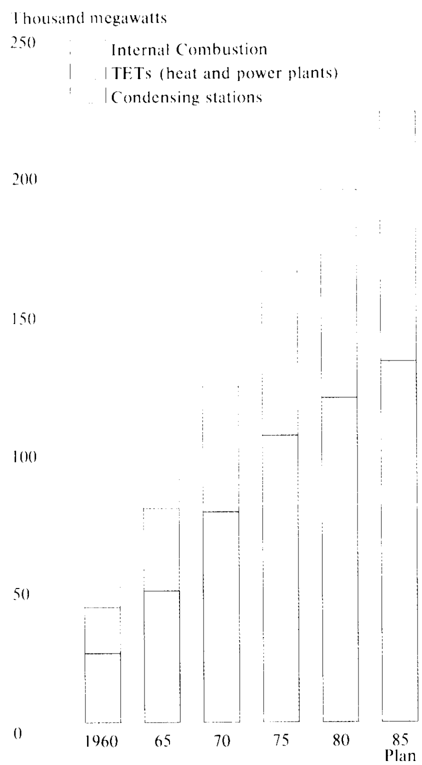



The average consumption of fuel at thermal power plants of the Ministry of Power and Electrification has been reduced through improved efficiency. This improvement in efficiency has been achieved through the replacement of many small, old generating units with fewer larger, modern units and the increased cogeneration of heat and electricity.

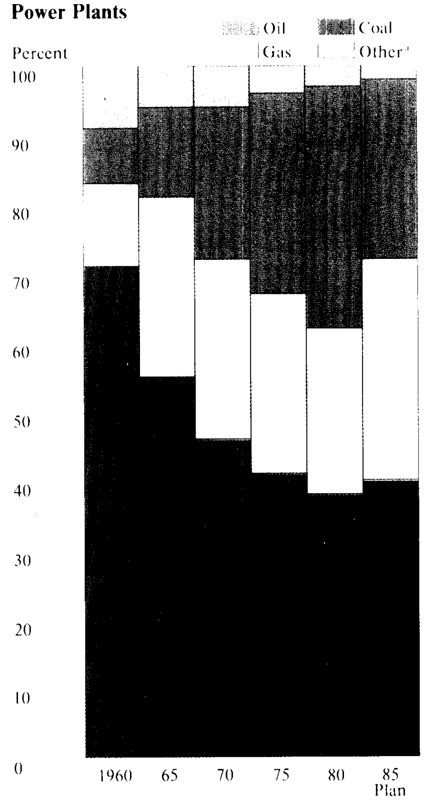
Coal has been the principal fuel used in thermal power plants in the USSR. In the early 1960s, however, a significant shift toward natural gas and fuel oil was initiated. At the time, these fuels were cheaper as well as cleaner than coal, and the cost of constructing a gas- or oil-fueled power plant was calculated to be significantly less than the cost of a coal-burning power plant. In the mid-1970s Soviet policies on fossil fuels changed again and coal again became the preferred fuel for Soviet power plants. Most new thermal power plants are gas or coal fired; very few oil-burning plants are being built. To conserve oil, some oil-burning power plants in the Urals and Volga regions have been converted to burn gas piped from the large West Siberian gas deposits. Because of a tight coal supply, even some coal-fired plants are being converted partly to gas.

Because they are usually located in cities, most TETs will continue to burn oil and gas, which produce fewer pollutants than coal. Currently, the primary method of controlling atmospheric pollutants (mainly sulfur dioxide and ash) from thermal power plants is the use of very tall smokestacks which disperse the effluents into the higher layers of air.

**Installed Capacity of Thermal Power Plants**




**Consumption of Fuel at Thermal Power Plants**




[a] Peat, oil shale and fuelwood.

# Hydroelectric Power

## Resources

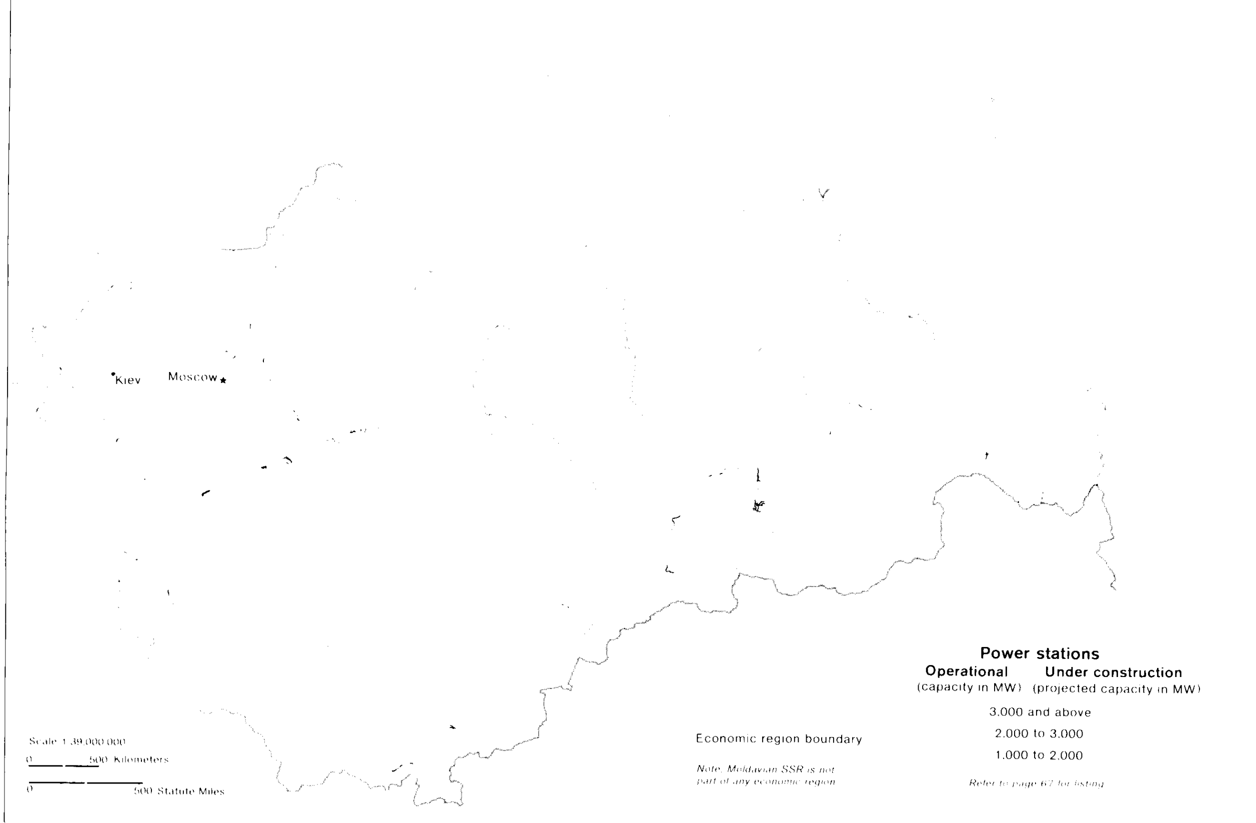
The Soviet Union has huge hydroelectric resources; only China has more. The Soviets have calculated that the economically exploitable portion of these resources has a potential generating capacity of 270,000 MW that could theoretically provide 1,095 billion kWh of electricity annually. Only 20 percent of that potential capacity had been installed by the end of 1983. (In comparison, the United States had exploited 36 percent of its estimated 186,000 MW of potential capacity.) About 66 percent of the Soviet hydropower resources is located in Siberia and the Far East, 18 percent is located in the European part of the country, and 16 percent is located in Kazakhstan and Central Asia.

## Hydroelectric Power Stations

The Soviet Union has built some of the world's largest hydroelectric power stations and, in the mountainous regions of the Caucasus and Central Asia, some of its highest dams. At the end of 1983 the total installed capacity of Soviet hydroelectric power plants was 57,000 MW, about 20 percent of total national electricity generating capacity. In contrast to the distribution of resources, about half of the installed hydropower capacity is located in the European USSR. The European share, however, is decreasing as large new hydropower plants are completed in the eastern regions. About two-thirds of the 12,400 MW of new hydropower generating capacity planned for 1981-85 was to be installed in eastern regions of the country.

The more than 400 hydropower stations administered by the Ministry of Power and Electrification account for virtually all Soviet hydroelectric capacity. Among these stations, which range in size from 6,000 to less than 5 MW, are 14 with capacities of 1,000 MW or more that by themselves account for more than 60 percent of total hydroelectric capacity.

**Major Hydroelectric Power Stations**



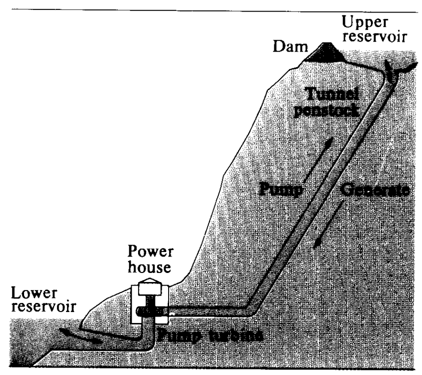

## Power Production

Power output from Soviet hydroelectric plants amounted to 180.4 billion kWh in 1983, more than 14 times output in 1950. From 1950 to 1970 production grew at an average annual rate of 12 percent, but since 1970 output of hydropower plants has grown much more slowly, at an average of 2.9 percent a year. During the 1960s hydropower plants provided about 17 percent of total electric power output, but by 1983 that share had dropped to less than 13 percent. The hydroelectric share of total electric power output is expected to remain stable for the rest of the decade.

In recent years, the growth of Soviet hydropower production has been constrained by a shortage of rainfall, increased allocations of water for irrigation, and increasing reliance on hydropower to meet peak demand.

The USSR has started building pumped-storage hydropower plants to help meet the demand for power during peak periods. The first Soviet pumped-storage plant (225-MW capacity) is already in operation on the Dnepr River near Kiev. A 1,200-MW plant is being built at

**Schematic of a Conventional Pump-Storage Facility**




Pump-storage plants have reversible turbines that generate hydroelectricity during peak hours and then use reserve power in the network to pump water back up into the reservoir at night.

Zagorsk, near Moscow, and a 1,600-MW plant at Kaisiadorys, in Lithuania. Another facility under construction will be used in conjunction with the South Ukraine Nuclear Power Station near Konstantinovka, on the Yuzhnyy Bug River.

## Regional Summary of Hydropower Development

### The European USSR

On many of the major rivers of the European USSR—Volga, Kama, and Dnepr—the Soviets have built hydroelectric dams in series to form cascades of large reservoirs, which, in addition to providing power, combine with canals to make deepwater river transport possible between five seas. Although only 40 percent of the hydroelectric potential of the European part of the country has been exploited, most of the sites in the European area where new hydropower plants could be built are in northern regions and in the mountains of the Caucasus, far from the areas of high power consumption.

More than half of the economic hydropower potential in Soviet Europe is concentrated in the basins of the Volga, Dnepr, Kura, and Pechora Rivers. Exploitation of the Dnepr and the Volga began in the early 1930s. The Dnepr Cascade has been virtually completed; it has six hydroelectric power stations with a total capacity of 3,575 MW. The eight-station Volga Cascade is also nearly finished. The last station, the Cheboksary Hydropower Station, began generating power in late 1980. When all of its 18 units are installed, the eight stations will provide 8,617 MW of generating capacity. Cascades of hydropower stations have also been built in Karelia, near the Kola Peninsula in the north, and in the mountainous region of the Caucasus. The Sevan-Razdan Cascade in Armenia consists of six diversion-type power plants, with tunnels and penstocks bringing the water down to the generating stations.

Because many of the western rivers are flanked by valuable urban, industrial, or agricultural land that would be flooded by additional hydropower reservoirs, little future expansion is likely, compared to that planned in other parts of the country. Consequently, in 1985 only 40 percent of total hydroelectric power production is to be generated in the European USSR including the Urals, a drop from 54 percent in 1970.

### Soviet Central Asia

Dams are especially important in the dry climate of Central Asia. Besides producing power for industrial development, they also provide water to irrigate the cottonfields and orchards.

In the Kirghiz and Tajik Republics several high dams have been built in difficult mountainous terrain; on the Vakhsh River in Tajikistan, the 2,700-MW Nurek power station is complete, and construction is under way on the 3,600-MW Rogun station; on the Naryn River in Kirgizia four hydroelectric stations are operating, the largest being the 1,200-MW Toktogul station. The total capacity of the hydroelectric power stations now under construction in the mountains of Central Asia will exceed 9,000 MW if all planned construction is completed.

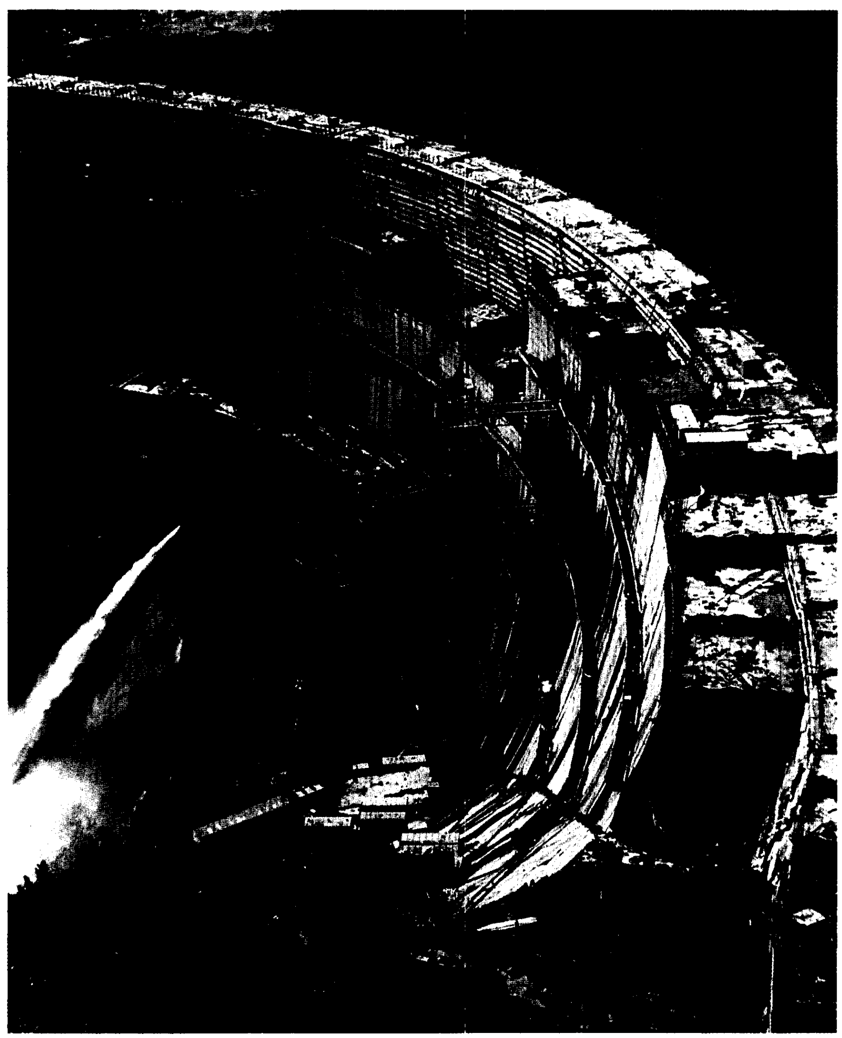
### Siberia and the Soviet Far East

The Siberian regions contain two-thirds of the total USSR hydropower potential, but little of it had been tapped until recently. In the past 20 years, however, massive construction projects in this remote, environmentally inhospitable area have led to steady growth in hydropower output.

The Angara-Yenisey basin in eastern Siberia alone contains one-fourth of the country's total hydroelectric resources, capable of producing more than 300 billion kWh of electricity annually. When completed in 1966, the 4,500-MW Bratsk station on the Angara River was the largest hydropower station in the world. Later, in 1971, the 6,000-MW Krasnoyarsk station on the Yenisey River achieved this distinction. An even larger hydroelectric power station, the Sayan-Shushenskoye Hydropower Station on the upper Yenisey River, with 6,400 MW, is to be completed in the mid-1980s. With the completion of other stations under construction or planned, the total capacity of the Angara-Yenisey Cascade could reach 46,700 MW by the end of the century.

Several large hydropower stations built on the Zeya and Bureya Rivers in the Soviet Far East are to provide power for new industry in the area, as well as for the eastern sector of the new Baikal-Amur Mainline (BAM) railroad.

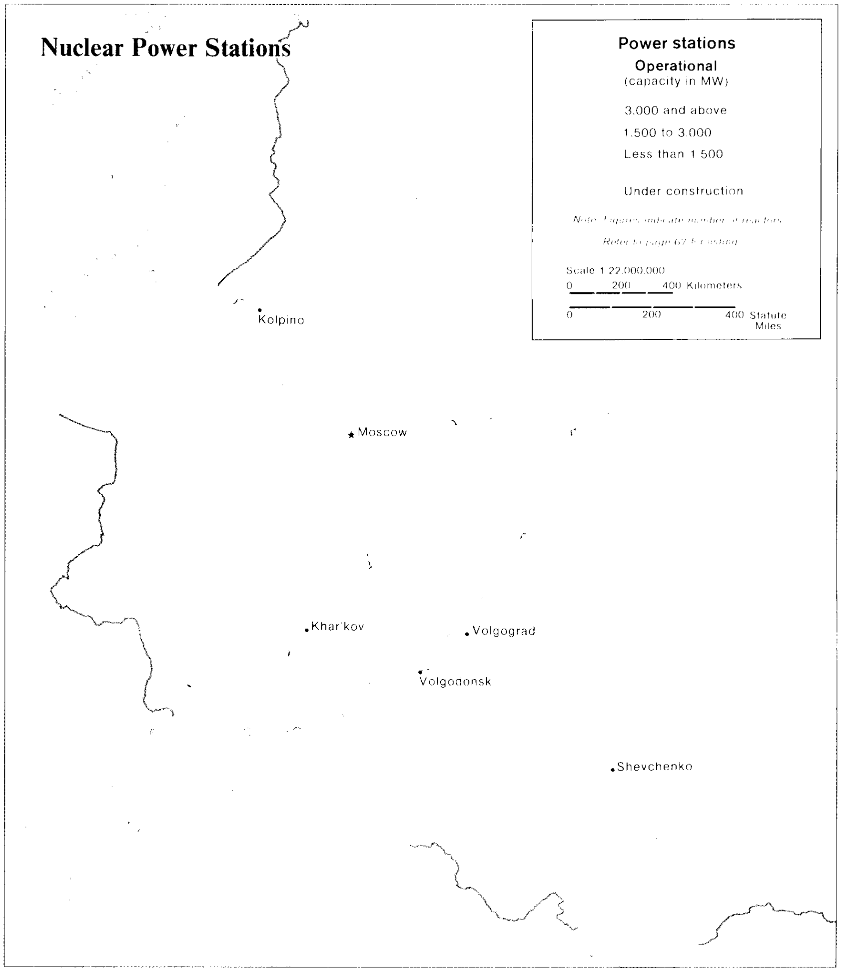
In the far northern regions the Soviets have built hydropower plants in the permafrost zone, where special construction techniques are required because of the unique characteristics of the ground surface and the rigors of the environment. The first plant in this region was built on the Vilyuy River in the Yakut ASSR, where winter temperatures drop to −60 degrees Celsius. A 900-MW hydropower plant is being built in the far northeast on the Kolyma River. It will greatly increase the power available in Magadan Oblast, where more than 1,000 scattered diesel generating stations now provide most of the power.



*Construction of 1,325-MW Inguri Hydropower Dam across Inguri River in the Caucasus Mountains, Georgian SSR.*

# Nuclear Power

In 1954 the Soviet Union became the first country to use nuclear power to generate electricity for commercial purposes. The Soviets were subsequently slow to capitalize on their strong start and made little progress until the mid-1970s. Since then, however, the pace of nuclear development has picked up rapidly despite the chronic construction delays that plague virtually all Soviet projects. Based on the aggressive program Moscow now has on the books to expand existing plants and add new ones, most informed observers expect that strong growth should continue throughout this decade and into the early 1990s, even with continuing construction bottlenecks.




Untroubled by antinuclear protests and increasingly supported by a sizable industry dedicated to the manufacture of nuclear reactor components, the Soviets now have one of the most active nuclear power construction programs in the world. The 11th Five-Year Plan (1981-85) projected the addition of 24,000 to 25,000 megawatts of nuclear capacity and a production of 220 billion kWh of electricity in 1985. At the beginning of 1984, the USSR had 12 nuclear power stations with one or more operating reactors, combining for a total electrical generating capacity of 20,168 MW, and additional reactors were still under construction at six of these operating stations. Electricity generated at these stations accounted for 8 percent of total Soviet electricity output in 1983. Additionally, 11 new nuclear power stations and two district heat stations were under construction.

Except for Bilibino in northeastern Siberia, and the noncommercial plant at Shevchenko in Kazakhstan, the Soviet Union's installed and

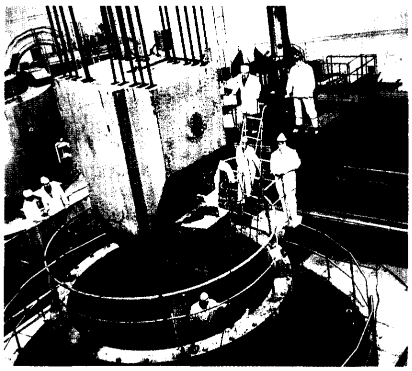
*Exterior view of 2,455-MW Novovoronezhskiy Atomic Power Station.*

planned nuclear power capacity is concentrated in the European USSR. Soviet policy for locating nuclear power plants is aimed at concentrating facilities in the country's most heavily populated and industrialized regions, which are characterized by a deficiency of fossil fuels and other forms of power relative to more remote and less populated regions of the country.

All nuclear power stations in the Soviet Union, and most of the existing and planned stations in the neighboring CEMA countries, are built around Soviet-designed reactors that use uranium fuel slightly enriched in the isotope uranium-235 (U-235). The Soviets have designed two types of power reactors: the pressurized water reactor (PWR) and the graphite-moderated pressure-tube (boiling water) reactor (GMPTR). The pressurized water reactor, designated VVER, comes in two main models, the VVER-440, a 440-megawatt (electrical) model, and the VVER-1000, a 1,000-megawatt (electrical) model. Two smaller prototypes or early demonstration models, the VVER-210 and the VVER-365, are also in operation. The graphite reactors are designated as RBMK. Of these, the RBMK-1000 model is the largest operational; however, the RBMK-1500 — a 1,500-megawatt model — started up in late 1983 at Ignalina, Lithuania.

The Soviets are also continuing development of a third type — a liquid-metal, fast-breeder reactor (LMFBR). Only two major Soviet breeder reactors are currently in operation: a 350-megawatt prototype at Shevchenko, designated BN-350 and a 600-megawatt prototype at Beloyarskiy, designated BN-600. Several small, research fast breeder reactors are also in use.

In addition to continuing emphasis on the expansion of domestic nuclear power generation, the USSR is committed to a joint venture with its CEMA partners in Europe to develop a unified nuclear power program. A total of 11 Soviet-designed, 440-megawatt, pressurized water reactors are already in operation in CEMA-member states, and many more are planned. A nuclear power station with two VVER-440s is currently operating in Finland. Construction has also begun on a Soviet-designed nuclear power station in Cuba.

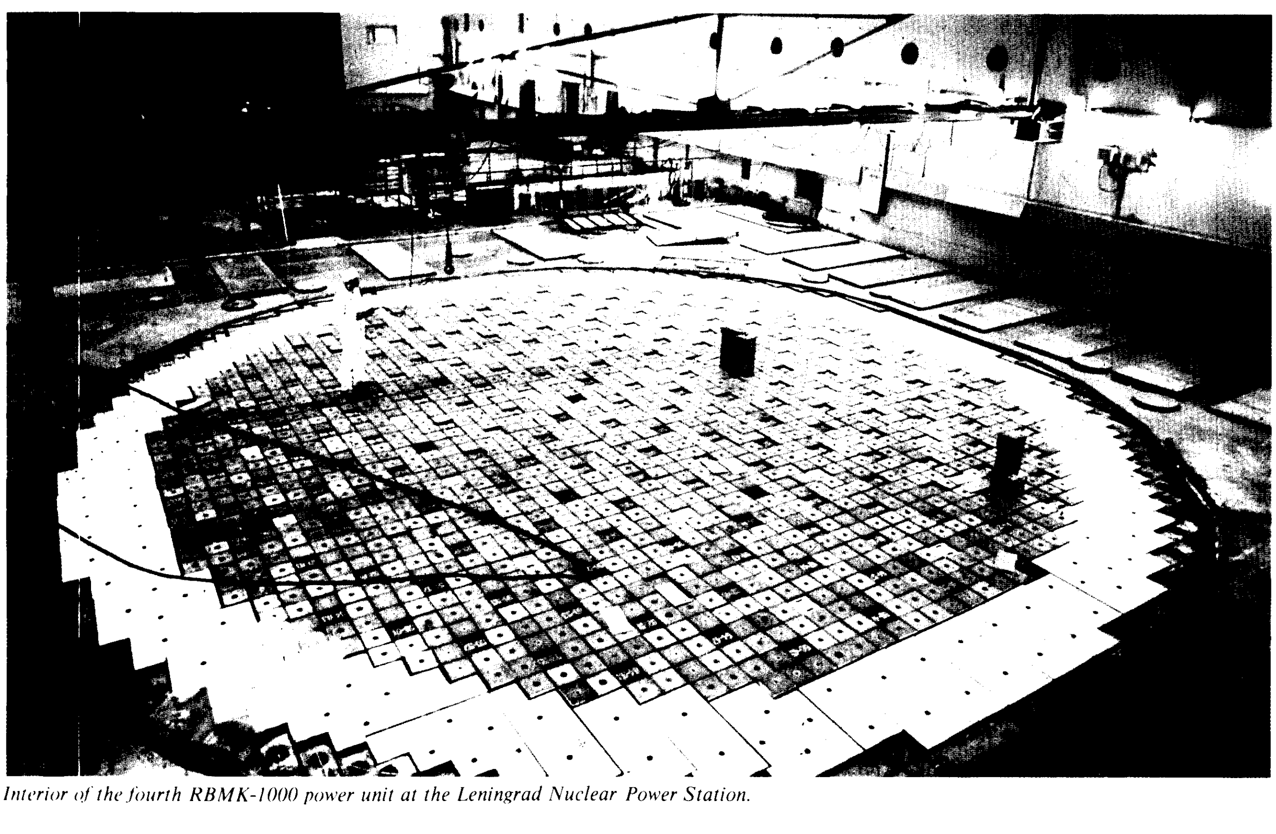


*Reactor being readied for startup at South Ukraine Nuclear Power Station.*

To meet its goals for domestic nuclear power growth and, at the same time, honor its commitments to CEMA partners, the Soviet Union is continuing to increase its capacity for manufacturing nuclear reactors, components, and equipment. The recently expanded Izhorskiy Heavy Equipment Plant at Kolpino near Leningrad and the newly constructed Volgodonsk Heavy Machine Plant, known as Atommash, are two of the largest nuclear component fabrication plants in the world. The location of the much-publicized Atommash plant along the Don River allows shipment of large reactor units by barge to sites throughout European USSR. Czechoslovakia, using components manufactured there and by other CEMA countries, assembles the Soviet-designed VVER-440 and has plans to produce the VVER-1000 reactors.

## District Heat Systems

The Soviets are constructing several nuclear stations whose function is to produce heat or both heat and electricity for homes and industries at nearby towns and cities. Two types of these facilities are currently under construction: the first type, designated AST, is a boiling water reactor. Through a three-loop thermal exchange process, heat generated by the reactor is transported into the town's district heating system. The Soviets are building stations of this type, each consisting of two reactors of 500 MW (thermal) at Gor'kiy and Voronezh. A second type, designated ATETs, is a modification of the existing VVER-1000 reactor. In this system, a portion of the steam, which is normally used to produce electricity in the turbines, is diverted and used as a heat source for the district heating system. Because of the high calorific content of the steam, it is possible to transmit heat 30 to 40 kilometers. Construction of stations of this second type has been started at Odessa and Minsk, and the Soviets have announced plans to construct others at Khar'kov and Volgograd.



*Interior of the fourth RBMK-1000 power unit at the Leningrad Nuclear Power Station.*

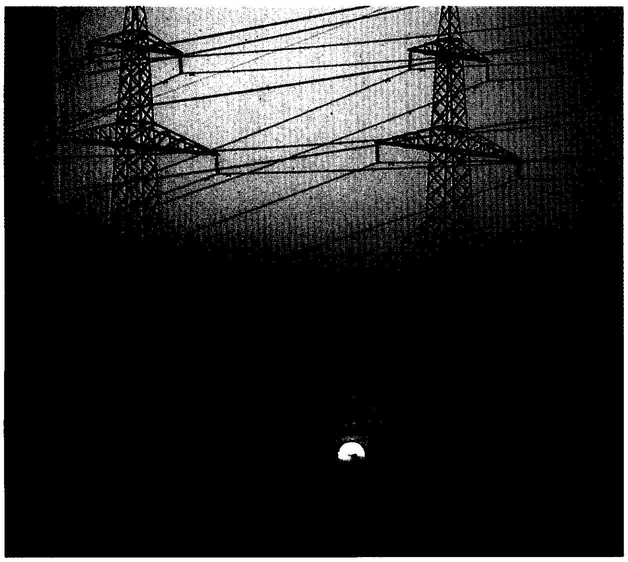
# Power Transmission

The USSR's unified power transmission system covers more area than any other power transmission system in the world. In 1983, 852,000 kilometers of high-voltage transmission lines interconnected more than 90 percent of the country's generating capacity. The basic units of the USSR's electricity transmission system are the 95 regional power networks called energos. Formed of 110- and 220-kV AC transmission lines, each network supplies power to a single administrative region (oblast, kray) or industrial region. Over the years most of these regional networks have been linked by 220-kV and 500-kV lines to form 11 consolidated regional power systems (OES).

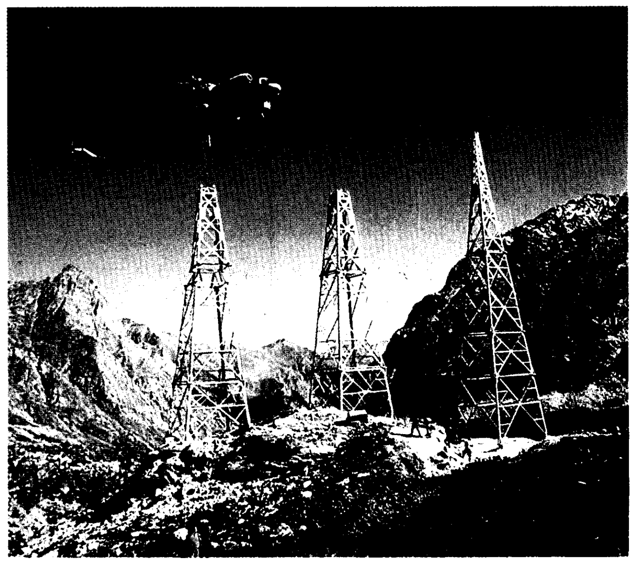
A merger of the regional systems began in the mid-1950s and is complete except for the independently operated consolidated systems of Central Asia and the Far East. These two isolated power systems are to be connected to the national network—known as the Unified Power System of the Soviet Union (USSR YeES)—by the end of the 12th Five-Year Plan (1986-90). The USSR YeES is also linked to the power systems of many neighboring countries: CEMA countries, Finland, Norway, and Turkey.

The integration of the OES into the USSR YeES has increased the flexibility of Soviet power supply; power can now be transferred between the linked systems, albeit at present only in small amounts. For example, only a 500-MW load can be transmitted from Siberia to Kazakhstan. The Soviets hope, however, eventually to be able to transmit large blocks of electricity—40 billion kWh and more—from the eastern regions, where energy resources are cheap and plentiful, to the power-hungry, but resource-poor European USSR. The transmission of so much power over so long a distance is unprecedented, in fact infeasible, until ultra-high-voltage (UHV) power transmission is perfected.

In general, the higher the voltage a transmission line can accept, the greater its capacity and efficiency and the farther it may be extended. Higher voltage transmission permits exploitation of hydropower resources far from

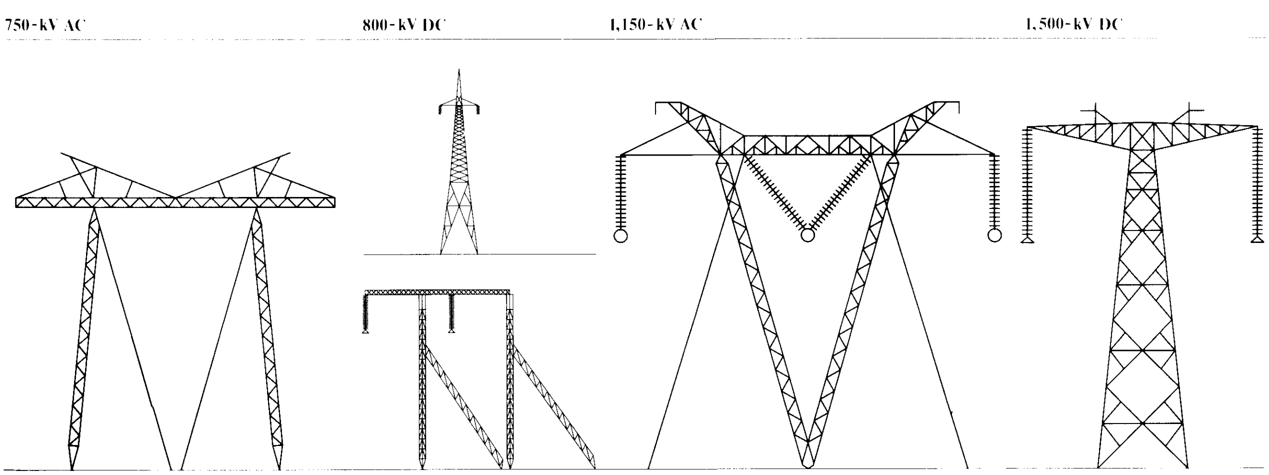


*More than 800,000 kilometers of high-voltage transmission lines interconnect more than 90 percent of Soviet generating capacity.*



*A helicopter is used to erect 500-kV AC transmission towers in the Caucasus Mountains.*

**Selected Types of Towers for Extra-High (EHV) and Ultrahigh-Voltage (UHV) Transmission**



consuming centers and of deposits of brown coal whose calorific value is too low to justify shipping it long distances. Spurred by such considerations, the Soviet Union has become a world leader in the development of UHV power transmission technology.

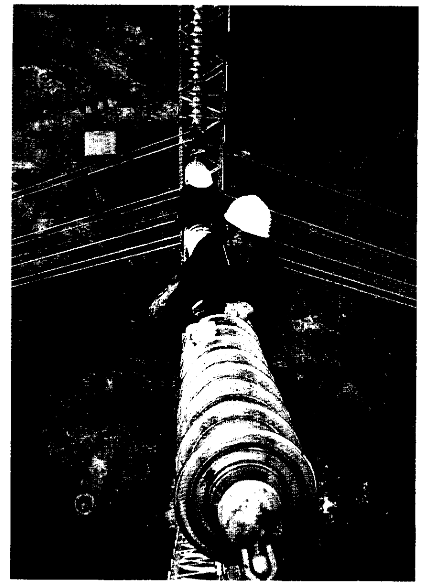
In the realm of UHV power transmission, Soviet engineers are proceeding on two fronts. They are continuing to develop UHV AC transmission but are also working on UHV DC transmission.

The USSR has announced that an experimental 1,150-kV AC powerline under construction in northern Kazakhstan will originate at the Ekibastuz-1 GRES and terminate at Chelyabinsk in the Urals. The first 600-km segment to Kokchetav was to be energized at 500 kV in late 1984. A 600-km eastward extension from the Ekibastuz-1 GRES to Barnaul in Siberia, and later to Novokuznetsk, is also under construction. Not only will the line greatly strengthen the tie between the Unified Power Systems of Siberia and north Kazakhstan, it will also tie in the major industrial cities in the Urals, to which it will carry power generated by the many new thermal power plants now in various phases of planning and construction in the Kansk-Achinsk and Ekibastuz coal basins.

Ultra-high-voltage DC transmission can move power over very long distances with lower line losses than AC transmission. Soviet development of DC transmission began in 1956 with the construction of an experimental 800-kV DC line between the Donets basin in the Ukraine and the Volgograd Hydropower Station some 473 kilometers away; it began operating in 1962. This line, which carries 750 MW, linked the OES of the Center and the South regions. The experience gleaned from this 800-kV DC line led the Soviets to begin construction in early 1980 of a 1,500-kV DC line from Ekibastuz to Tambov, south of Moscow, a distance of 2,400 kilometers. But work on this line ceased in 1981 when the entire UHV effort shifted to the 1,150-kV AC system.

Electrification of rural areas in the USSR has grown rapidly in the last two decades as a result of the vast expansion of the countrywide power transmission capacity and the consolidation and centralization of local power generation. In the early 1960s small local power stations supplied nearly 50 percent of the power used in the countryside. Since then most of these stations have been dismantled, and state power grids now supply most of the electricity consumed in rural areas. To carry the increased amount of centrally produced power, the rural transmission network has quadrupled in length since 1960. More than 92 percent of this network consists of small distribution lines of 20 kV or less; the remainder are 35-kV, 110-kV, and 220-kV main lines.

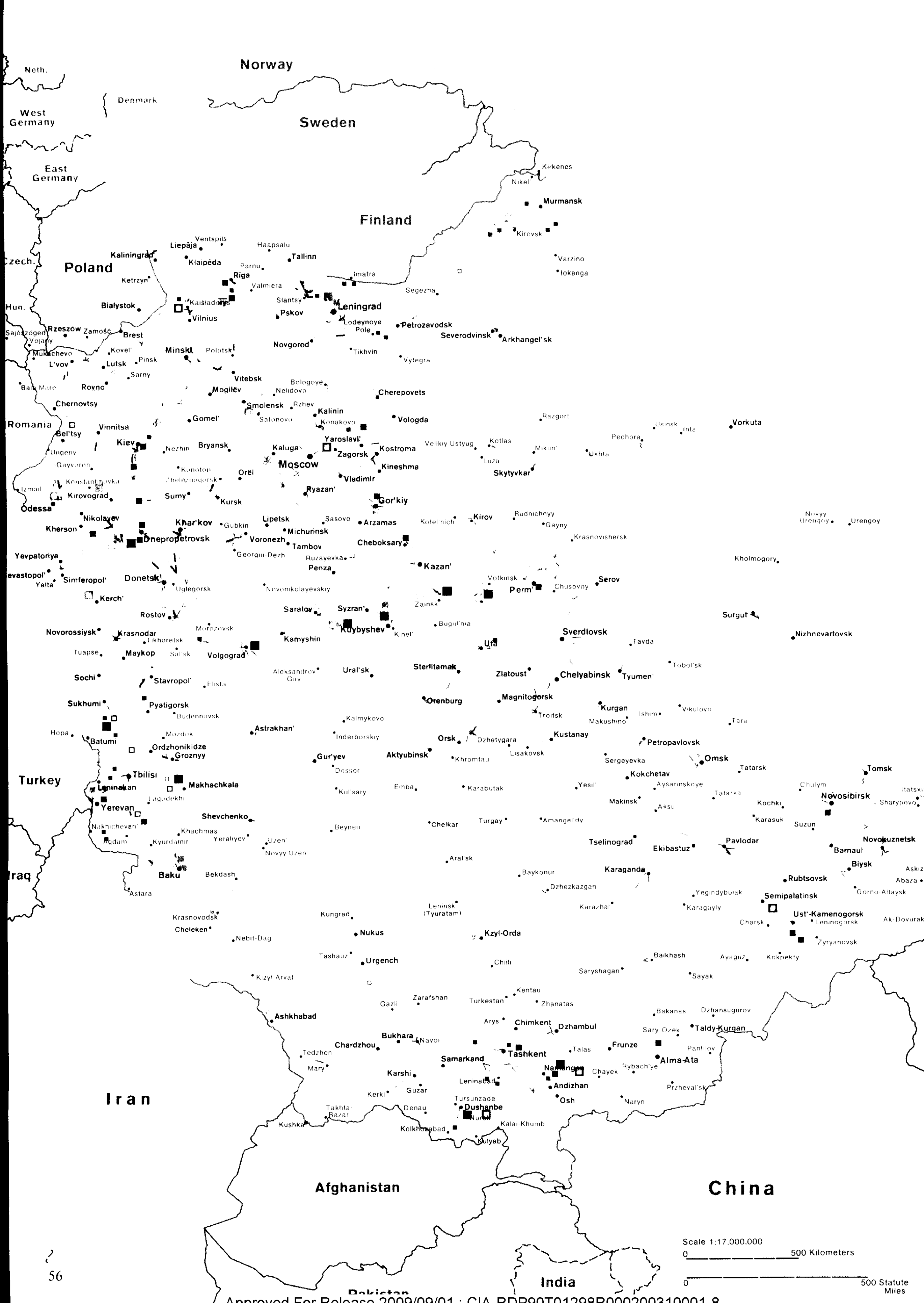
The rapid growth in rural electric power was designed to improve the efficiency of agriculture through mechanization and to raise the standard of living in the countryside, where powerlines now reach most farms.



*Workmen installing 1,150-kV AC transmission lines between Kazakhstan and the Urals.*

## Unified Power System

# Power Plants and Transmission Lines






Approved For Release 2009/09/01 : CIA-RDP90T01298R000200310001-8

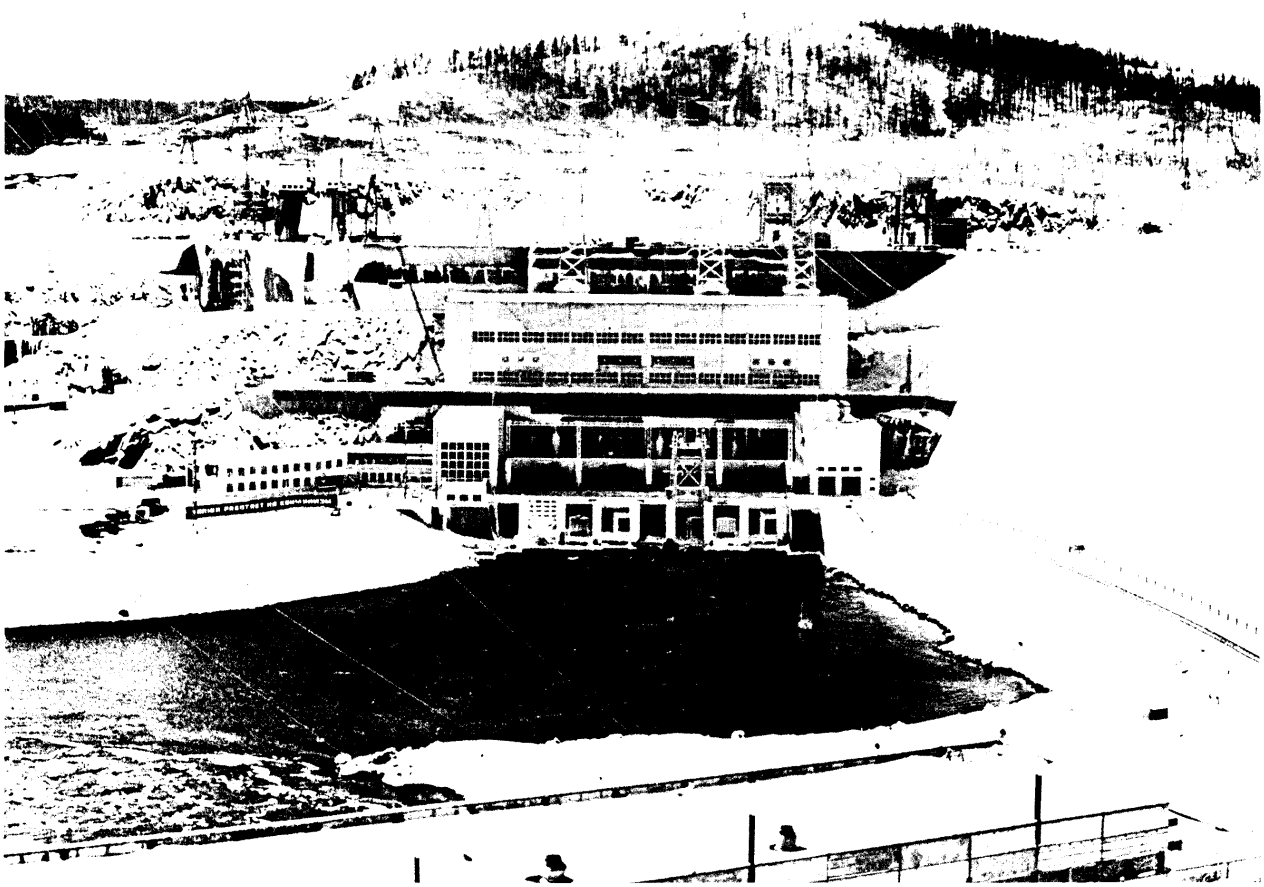

United States
Pevek
48 MW
Zelenyy Mys
Cherskiy
Tiksi
Verkhoyansk
Balagannakh
Ust' Nera
Ust' Taskan
Debin
Yagodnoye
Susuman
Arkagala
Sinegor'ye
Ust' Omchug
Palatka
Magadan
Noril'sk
Igarka
Petropavlovsk-Kamchatskiy
Pauzhetka
Aykhal
Yakutsk
Pokrovsk
Svetlyy
Chernyshevskiy
Mirnyy
Suntar
Lensk
Tommot
Aldan
Okha
Paromay
Nikolayevsk
Sakhalin
Aleksandrovsk Sakhalinskiy
Kropotkin
Chul'man
Neryungri
Mama
Mamakan
Kodinskiy
Boguchany
Ust' Ilimsk
Nazarovo
Achinsk
Krasnoyarsk
Bratsk
Ust' Kut
Zheleznogorsk Ilimskiy
North Muya (BAM) Tunnel
Nizhneangarsk
Tynda
Zolotaya Gora
Zeya
Skovorodino
Never
Oktyabr'skiy
Tygda
Poronaysk
Vakhrushev
Uglegorsk
Komsomol'sk
Chegdomyn
Novokiyevskiy Uval
Svobodnyy
Dolinsk
Yuzhno-Sakhalinsk
Kholmsk
Korsakov
Gornozavodsk
Tulun
Zima
Ust' Uda
Kachug
Abakan
Barguzin
Chernyshevsk
Sosnovo Ozerskoye
Chita
Kholbon
Talakan
Birobidzhan
Khabarovsk
Blagoveshchensk
Leninskoye
Bidzhan
Irkutsk
Ulan-Ude
Karymskoye
Priargunsk
Yasnogorsk
Borzya
Bikin
Petrovsk Zabaykal'skiy
Gusinoozersk
Zakamensk
Kyakhta
Lesozavodsk
Dal'negorsk
Kavalerovo
Chuguyevka
Kamen'-Rybolov
Spassk Dal'niy
Ol'ga
Ussuriysk
Nakhodka
Vladivostok
Khasan
Darhan
Mongolia
China
Japan
North Korea
South Korea
Power plants
Operational
Under construction
Capacity in megawatts (MW)
100-300
301-1,000
Over 1,000
Thermal
Hydro
Nuclear
Transmission lines
Operational
Under construction
Capacity in kilovolts (kV) AC
110
220
330
500

# Power for Remote Areas

Economic activity in the Soviet Union is concentrated mainly in the European part of the country and along narrow bands of relatively well-developed territory flanking major transportation routes such as the Trans-Siberian Railroad. These areas comprise far less than half of the total Soviet landmass. Enormous areas in the European north, in Siberia and the Soviet Far East, and in Kazakhstan and Soviet Central Asia are lightly populated and unserved by rail or powerline, hence undeveloped, although they contain vast quantities of natural resources needed for continued Soviet economic growth. From desert to steppe to taiga to tundra, exploitation of these resources requires electric power. Transmission lines have been extended from core areas to some major natural resource processing centers, but often this is not feasible—usually because of the sheer distance involved—and the needed power must be generated locally. Only 3 percent of all power produced in the country is generated in areas beyond the reach of regional power grids, but an estimated 5 million Soviet citizens depend on it.

When the demand justifies it, large power plants are built in isolated areas. Noril'sk, for example, with its population of 183,000 and its important copper, nickel, and platinum mining industries, is supported by three sizable power plants: two are thermal plants with a combined capacity of 825 MW fueled by natural gas from the Messoyakha field and the other is the nearby 441-MW Khantayka Hydropower Plant at Snezhnogorsk. The city of Yakutsk (population 175,000) in the heart of the Soviet Far East has a 165-MW power plant fueled from nearby gasfields. The 648-MW Vilyuy Hydroelectric Power Station at Chernyshevskiy supplies power to diamond-mining areas in the north and Mirnyy and Lensk (a Lena River port) in the south.

For isolated and remote areas of the Soviet Union where power requirements are small, electric power is generated by diesel-powered generators (DES) and to a lesser extent by gas-turbine generators (GTU). The Soviets have developed a full line of these, ranging from small units such as a 20-kV diesel generator made at the Kursk Mobile Unit plant for use by shepherds, to 12-MW units that can be grouped to supply power to entire towns. However, the current emphasis is to replace, where possible, these inefficient, relatively expensive portable generators with the more efficient transmission networks centered on large regional power plants.



*Vilyuy Hydroelectric Power Station in Eastern Siberia's Yakut ASSR is one of the northernmost in the USSR.*

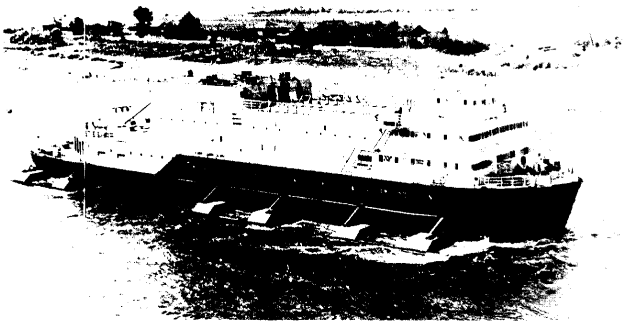
Where conditions permit, power stations may be mounted on trucks, trains, or ships. Mobile generating units mounted on railway cars have been used for many industrial construction projects in remote areas. A power train supported the construction of the Bratsk Hydropower Station, for example. A 24-MW power train incorporating two diesel-fueled gas-turbine generators was used at tunnel construction sites on the Baikal-Amur Mainline (BAM) railroad. An automated 500-kW diesel station mounted in a truck-drawn van was developed particularly for use by the builders of the BAM.

The responsibility for development and production of small, transportable power plants was centralized in 1947 with the formation of the State All-Union Production Trust for Mobile Power Plants. Besides development and production, the Trust is also responsible for maintenance and repair. The Trust is mandated to develop generating units that are even more economical, efficient, mobile, and rugged; some current models can operate at temperatures as high as 45 degrees and as low as −60 degrees Celsius.

During the 1970s, five floating gas-turbine (GTU) power stations, designated Severnoye Siyaniye (Northern Lights), were built at the Tyumen' Shipyard to seagoing specifications. These ship stations lack their own propulsion systems and have to be towed to the remote sites where they are used to generate electricity for industries, construction sites, mining, and petroleum exploitation. Each of the first three power ships had two 10-MW oil-fueled gas-turbine generators, while the fourth and fifth ships were equipped with two 12-MW gas-fueled generators. Subsequent power ships in this series are to have 48-MW generating capacities.

The development of electric power in the mining area (gold and other heavy metals) near the mouth of the Kolyma River illustrates the various ways in which power may be supplied to an isolated place. That very remote region on the Arctic Ocean in the Soviet Far East is served only by air and by the seasonal Soviet Northern Sea Route; neither roads nor rails connect it with other parts of the country, and the nearest regional power grid is more than 2,000 kilometers away. To supply power for the expansion of gold mining, a small, coal-fired thermal power plant at the port of Pevek was initially augmented by some diesel generators and a power train (delivered by ship). Then in 1970 Severnoye Siyaniye-1 arrived at the port of Zelenyy Mys on the lower Kolyma River. The floating power station provided more power for mining but also supported construction of the 48-MW nuclear TETs at Bilibino, which went into operation in 1973.

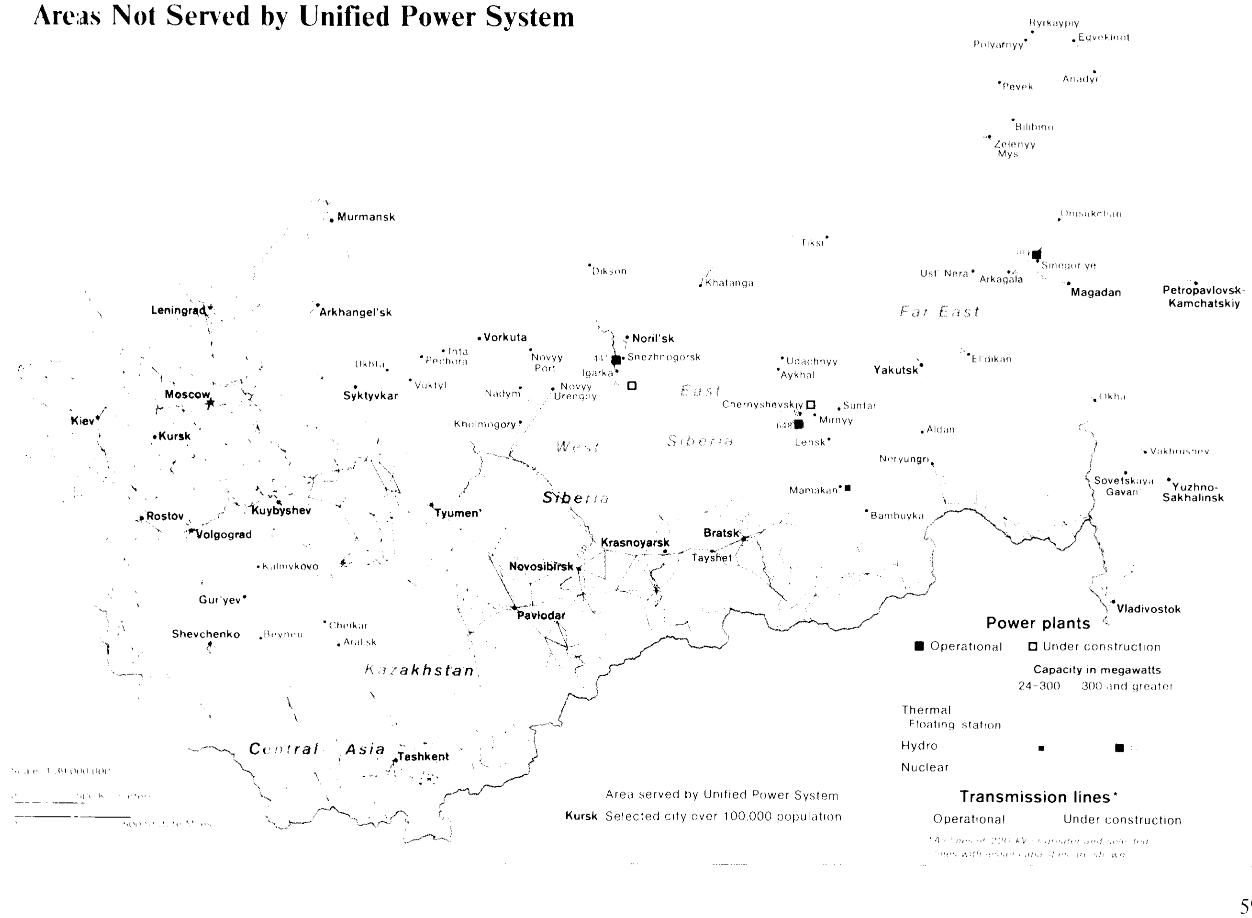
To free power consumers in remote areas from dependence on fuel supply, alternative energy sources are receiving attention. A 2-kW wind-driven power unit that can be carried by pack-horse has been developed for prospectors, shepherds, and mountain farmers. Solar power units have also been developed for such users. A modular nuclear power station specifically designed for use in remote areas is probably now in the testing stage. Its 15-ton modules are air transportable. Its reactor, which supplies steam to a 1.5-MW turbine generator, can operate five years on a single fueling of slightly enriched uranium.



*The Severnoye Siyaniye (Northern Lights) floating power station is one of five built at the Tyumen' Shipyard.*

*Neryungri Thermal Power Plant in the Yakut ASSR is being fueled by Neryungri coal.*

## Areas Not Served by Unified Power System



# Alternative Energy Sources and Technologies

Spurred by the spiraling costs of fuel production and transport, as well as the depletion of easily accessible fuel reserves, the Soviet Union is devoting increased attention to the exploitation of alternative energy sources and advanced energy technologies. Energy planners have long viewed the conversion of Siberian brown coal into synfuel derivatives as a major potential source of supplemental fuel. Various other methods of obtaining heat, electricity, and mechanical power from solar, wind, tidal, and geothermal energy are under study, as are vehicular engines that can burn liquefied gas, hydrogen, or alcohol. Magnetohydrodynamic (MHD) devices, which would greatly improve the fuel efficiency of conventional thermal power plants, are in the pilot-plant stage of development. Nuclear fusion is also under investigation as a potential source of a virtually limitless supply of electricity.

The Soviets, nonetheless, continue to view most alternative energy sources as too speculative and costly to justify major development efforts. Funding in these areas is still sufficient only for limited and selected technological investigation, construction of prototype equipment and pilot plants, and gradual introduction of small-scale applications. Even if given a strong push now, none of these energy sources would probably contribute significantly to the Soviet energy balance before the end of the century.

**USSR: Alternative and Advanced Energy Applications—A Speculative Sampler**

| Time Frame | Application | Energy Source | Device |
|---|---|---|---|
| Current to near term (0 to 10 years) | Building and greenhouse heating, water heating, crop drying | Low-temperature geothermal heat, solar radiation | Heat exchangers, absorption devices |
| | Water pumping | Low-velocity wind | Windmills |
| | | Solar radiation | Solar steam engines |
| | Cooking | Solar radiation | Solar cookstoves |
| | Water desalination | Solar radiation | Solar evaporators |
| | Smelting | Solar radiation | Solar furnaces |
| | Electricity (*KW*) | Solar radiation | Photovoltaic devices |
| | Electricity (*MW*) | Medium-temperature goethermal heat, solar radiation | Heat exchangers, solar concentrators driving binary-cycle generators |
| | | High-velocity wind | Wind turbine generators |
| Medium term (10 to 20 years) | Vehicular propulsion | Hydrogen, LNG, alcohol | New types of engines |
| | Electricity (*hundreds of MW*) (feasibility to be demonstrated) | Fossil fuels, especially coal | Magnetohydrodynamic (MHD) generators |
| | | High-temperature geothermal heat, solar radiation | Heat exchangers, solar concentrators driving steam turbines |
| Long term (beyond 20 years) | Electricity (*hundreds of MW*) (feasibility to be demonstrated) | Deuterium (isotope of hydrogen obtained from water) | Thermonuclear fusion reactors driving steam turbines |
| | | Ocean tides | Hydroelectric generators |

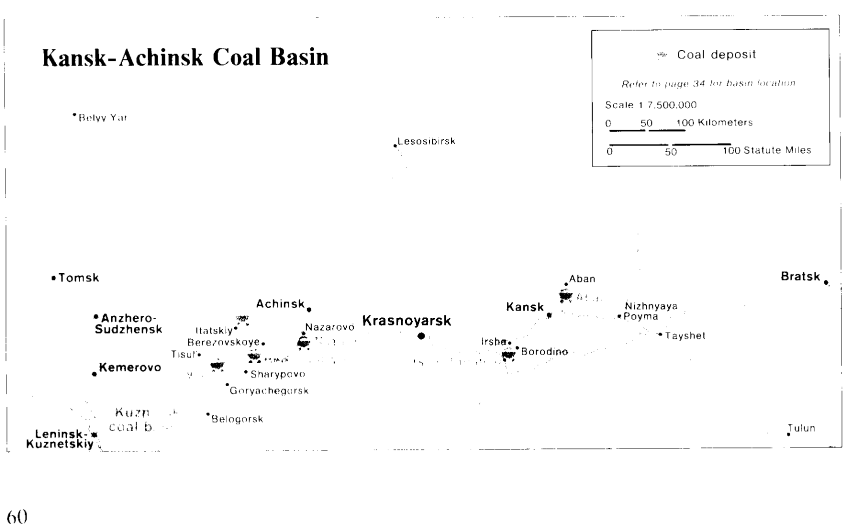
## Coal-Based Synfuels

The large and well-known disparities between the USSR's eastern energy resources and the fuel requirements for industrial development of the European USSR have caused the Soviets to focus increased attention on the brown coal (lignite) reserves of Siberia. Soviet scientists, engineers, and economists have devoted particular attention over the past 10 to 15 years to developing an economical technique to convert the brown coal reserves of Central Siberia's Kansk-Achinsk basin into better quality and more easily transportable liquid and solid fuels.

Kansk-Achinsk brown coal is an attractive source of energy for the European USSR if processing and transportation methods can be developed. This coal is readily extracted through low-cost, open-pit mining; however, its high moisture content (35 percent), low-heating value (3,300 kilocalories per kilogram), and variable physical and chemical characteristics render its direct shipment to power plants in European USSR highly uneconomical. Kansk-Achinsk brown coal also subject to spontaneous combustion in storage and transit and tends to freeze together in cold weather, making it difficult to handle.

Although commercial production of coal-derived fuels is difficult to justify economically, the Soviets still regard coal conversion as a promising potential means of exploiting their vast Central Siberian brown coal reserves. This is evidenced by Moscow's recent appointment of a coordinator for synfuels development and the construction of a demonstration facility for the pyrolysis of coal and a pilot plant for direct liquefaction.

**Kansk-Achinsk Coal Basin**




In 1976 the Soviets began construction of a high-speed pyrolysis demonstration plant at Krasnoyarsk in the Kansk-Achinsk basin. The stated objective of this plant is to extract semicoke (similar to charcoal), synthetic oil, and hydrocarbon gases from lignite.

Reportedly, the completion of the Krasnoyarsk demonstration plant has been delayed, and the Soviets are now showing increased interest in a number of other synfuel technologies. Most recently the Soviets announced construction of two developmental coal liquefaction facilities, one near the Belkovskaya lignite mine in the Moscow coal basin and a second at the Berezovskoye mine in the Kansk-Achinsk basin. The Belkovskaya pilot plant—based on the Soviet version of World War II, German standard direct liquefaction coal hydrogenation technology—is designed to produce 18 barrels of oil per day; the Berezovskoye pilot plant is reportedly designed for about 550 barrels per day. The Soviets are also seeking access to additional Western coal-conversion technology.

In the 1930s the USSR became the first country in the world to develop a successful program for converting underground coal into gas. Since then, however, their progress on underground coal gasification has been slow. Only two of the half-dozen pilot plants operating in the early 1960s remain in use. The much-publicized pilot underground coal gasification plant near Angren, southeast of Tashkent, and another plant at Yuzhno-Abinsk have yet to operate at an economical level. In spite of the apparent decline of interest in underground coal gasification, the Soviets are continuing to study economic ways to apply this and other techniques to exploit deep-lying coal deposits.

# Solar Energy

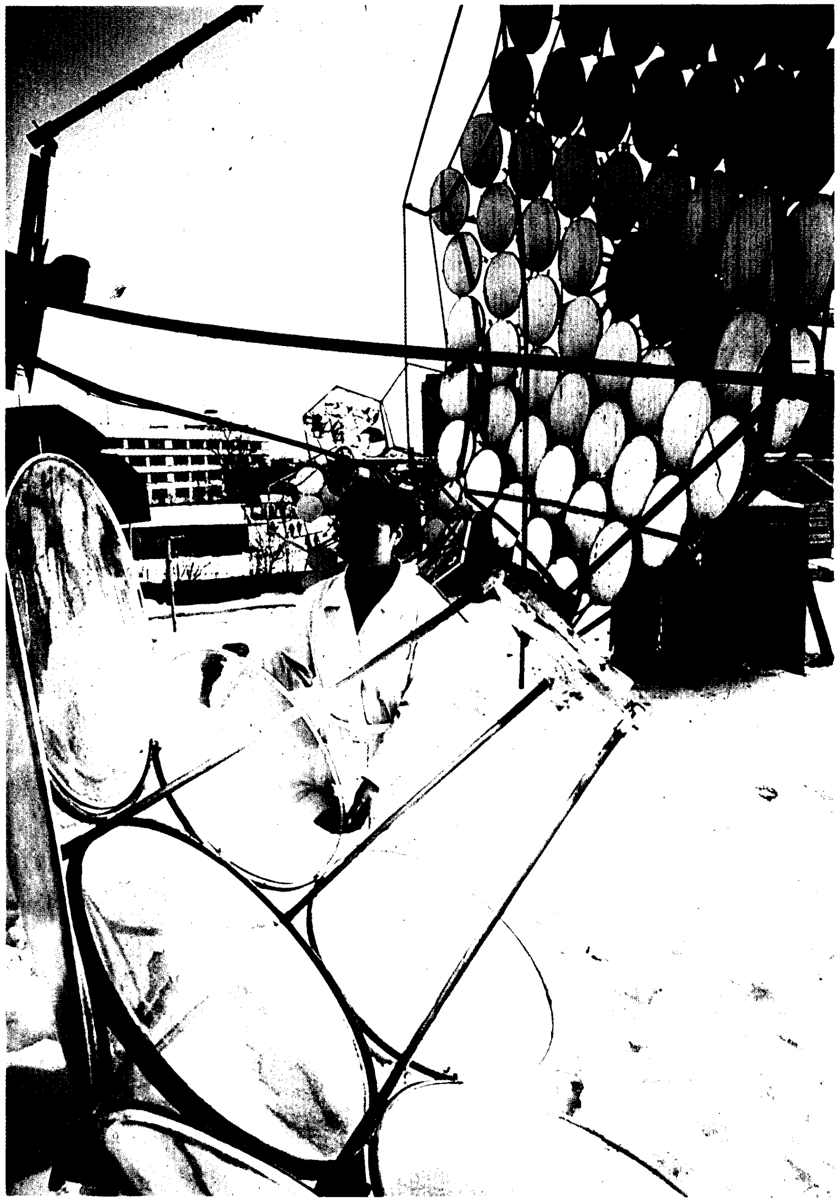
The USSR is developing solar energy for a wide variety of small-scale uses, such as heating and desalinating water, heating and cooling buildings, cooking food, and powering small steam engines, water pumps, and electric generators to serve consumers scattered throughout rural areas in the southern USSR. In these applications, the sun's radiant energy is used to heat water or air.

In addition, the Soviets are working on the conversion of solar energy to electricity using the photovoltaic effect, in which an electric current is generated between two tightly joined, dissimilar materials when they are exposed to light. Applying research that produced power cells for spacecraft, the Soviets are also developing small photovoltaic devices for more mundane uses—for example, to prevent corrosion of pipelines and to power navigation beacons. Reportedly, their largest photovoltaic device is a 500-watt motor.

Solar research is coordinated by the State Committee for Science and Technology and by the USSR Academy of Sciences. Research and testing are done primarily in institutes in the areas of the USSR south of the 50 degrees N latitude, where the technologies will be most used.

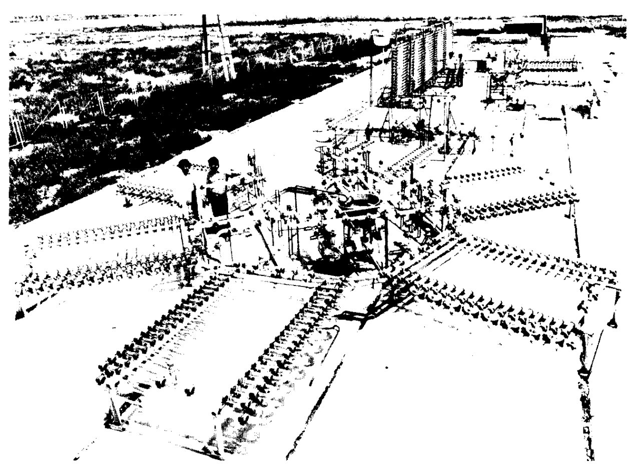
In 1979, at Bikrova, a suburb of Ashkhabad in Soviet Central Asia, the Turkmen SSR Academy of Sciences created the Solar Energy Institute (SOLNTSE), which is said to be the first in the country. A research and production corporation for solar energy equipment, SOLNTSE, is to develop devices to meet small-scale energy needs in desert areas.

The Uzbek SSR is the only republic reported to have officially directed that solar equipment be installed in some public buildings. In 1980 the Uzbek city of Chirchik claimed to have the nation's first residential building using solar energy to supply its hot water and heat. A small factory at Bukhara in the republic is the only known industrial producer of solar equipment in the USSR.

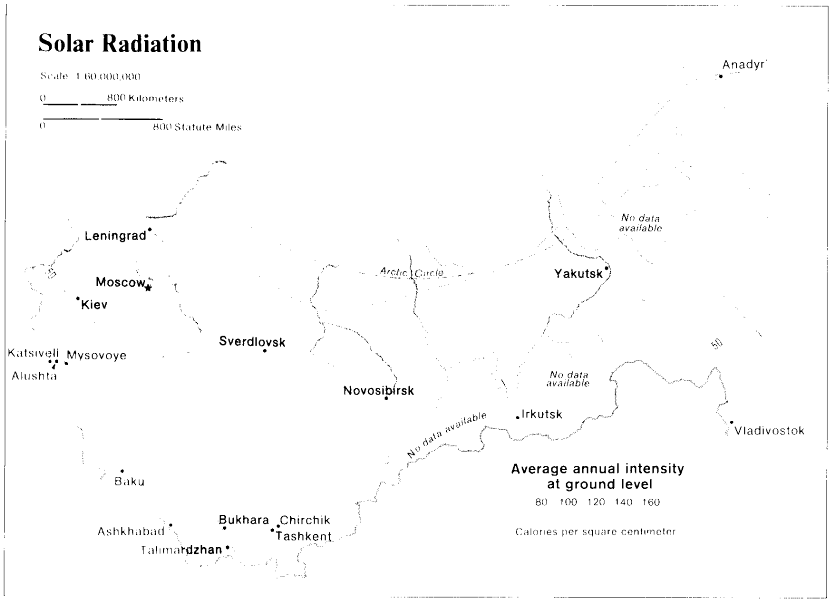


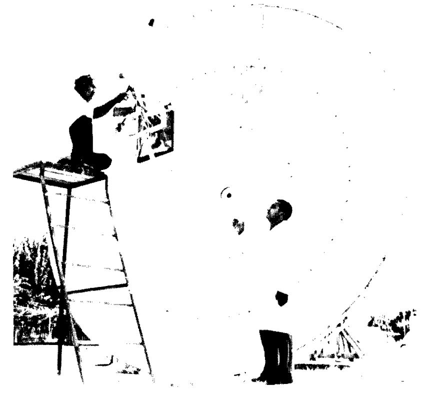
*Transforming solar energy into thermal and electric power is studied by workers at the Uzbek SSR Academy of Sciences.*

*A solar energy experiment to grow chlorella (a type of alga), near Ashkhabad, Turkmen SSR.*



*Solar power station at Bikrova, Turkmen SSR.*



*Engineers adjust solar thermoelectric generator at Turkmen Academy of Sciences research center.*

In the European USSR the Ukrainian Academy of Sciences is the primary agency for solar energy development. Several of its institutes are working on solar heating and cooling systems, and a research and testing center for such systems has been established at the Crimean resort city of Alushta on the Black Sea. Cooperating in this work are the USSR State Committee for Civil Construction and Architecture and the Solar Power Engineering Laboratory of the Krzhizhanovskiy Power Engineering Institute (ENIN) in Moscow. And, continuing the long-standing Soviet use of solar furnaces to study high-temperature processes, the Ukrainian Academy has also established a solar furnace facility at Katsiveli in the Crimea to produce pure metal alloys.

As for the large-scale production of solar electric power, the Soviets are still largely in the conceptual and planning stage. They claim to have designed a practical solar boiler and hope to complete a 5-MW solar power test facility by 1986 at Mysovoye, near Lenino in the Crimea. This facility is to have 1,600 heliostats—movable mirrors—each 5 meters square. The heliostats will focus the sun's rays on a boiler atop a tower 100 meters high to produce steam to drive an electric power generator.

A much larger (300-MW) solar power station has been designed for the same site, but its cost will make it economically uncompetitive with conventional power plants for a very long time. Soviet energy planners estimate that by century's end large solar power plants will come closest to being competitive in the Crimea and in the lower Volga region but will still not match costs in conventional plants. In the meantime, the Krzhizhanovskiy Institute has worked out an engineering concept that combines solar energy with a conventional fuel such as gas. The initial stage of such a project might involve 300 MW, using a 100-MW solar unit when solar energy is available and a 200-MW, gas-burning unit the rest of the time. Talimardzhan in the Uzbek SSR has been selected as a tentative site for the project.

# Wind Energy

Windpower has long been extensively exploited on farms in the USSR. Indeed, the Soviets claim that 250,000 windmills were in use in the rural areas of prerevolutionary Russia. Today, tens of thousands of homemade windmills are still used in the steppe regions, mainly to pump water. In the arid southern portions of the country and the remote regions of the north, windmills serve as alternative or auxiliary sources of mechanical and electrical power in areas beyond the reach of regional power grids.

Despite widespread recognition of the practical utility of the windmill, uncoordinated research on windpowered devices in laboratories of the agricultural, aeronautical, and electrical equipment ministries has produced few significant technical advances to date. One flurry of governmental interest just after World War II resulted in the production of some 40,000 wind engines, which were used with great effectiveness on farms. By the early 1970s, however, fewer than 9,000 of these were still in operation. Then in 1975 a national corporation named Tsiklon (cyclone) was created under the Ministry of Land Reclamation and Water Resources; its mission is to develop and introduce windpowered devices into the Soviet economy. Although the market for such items has been estimated to be at least 150,000 units, the 1976-80 Five-Year Plan called for an output of only 10,000 units, and by 1980 only 4,500 had been produced.

Most Soviet windpowered devices, whether of the propeller or vertical axis type, are small (15 to 20 kW). A 100-kW wind engine, however, was installed near Yalta in 1931; a 12-element, 400-kW auxiliary power plant was built in Kazakhstan in the 1950s; and, more recently, a 10-element, 400-kW power unit has been installed in Arkhangel'sk Oblast.

Reportedly, Tsiklon engineers have developed a series of windpowered, electricity-generating systems with capacities ranging from 1 to 100 kW. Series production of a 6-kW windpowered generator is under way, and other units with capacities up to 100 kW are in the test stage. The largest units are designed to supply power to small villages on the steppes of Kazakhstan and in the Far North, regions where sustained winds of 6 to 10 meters per second are common. The feasibility of developing still more powerful units with output capacities of 1 to 5 MW is being studied.

Because wind is only an intermittent energy source, windpowered generators must be integrated with other forms of generating equipment, such as diesel generators. Tsiklon is beginning to design such packages, but none is yet in serial production.

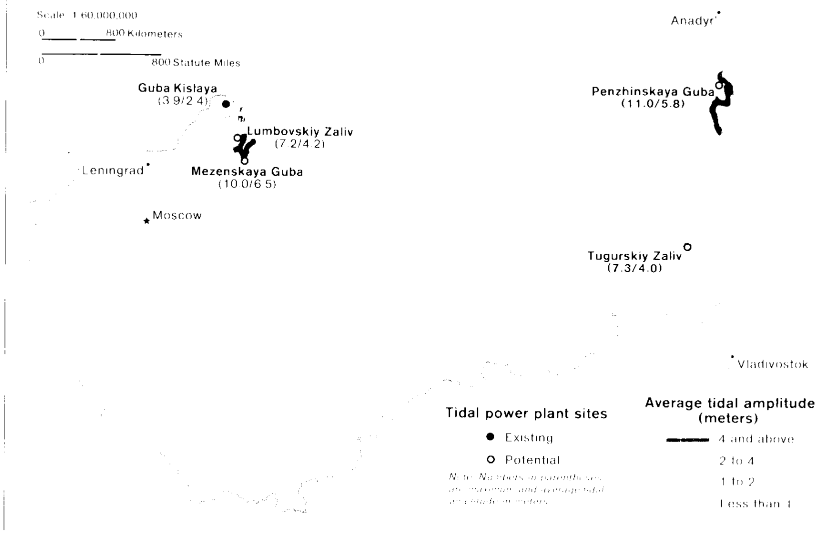
Tsiklon operates development and test facilities at Istra, near Moscow, and at Novorossiysk, a new national test center in the mountains on the Black Sea coast. The Novorossiysk area was chosen because of the frequent occurrence of a very strong local wind known as *bora*. Tsiklon-developed windpower pumps are also being tested by a wind engineering laboratory at the Kishinev Polytechnic Institute in Moldavia.

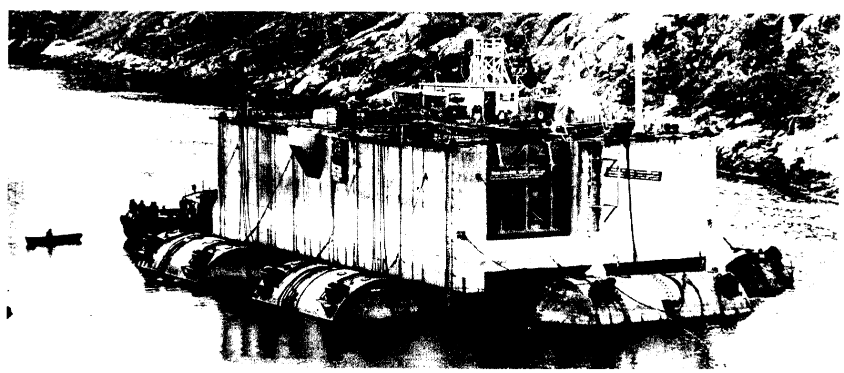
# Tidal Power

France, China, and the Soviet Union are the only nations now generating electricity from ocean tides. In 1968, with the help of French technology, the Soviets completed a 400-kW pilot tidal power station at Guba Kislaya on the Barents Sea, which feeds into the Kola electric grid. Although the amount of power generated by this initial effort is meager, Soviet engineers, operating under the auspices of the Ministry of Power and Electrification, believe that the potential of tides as a source of energy is great.

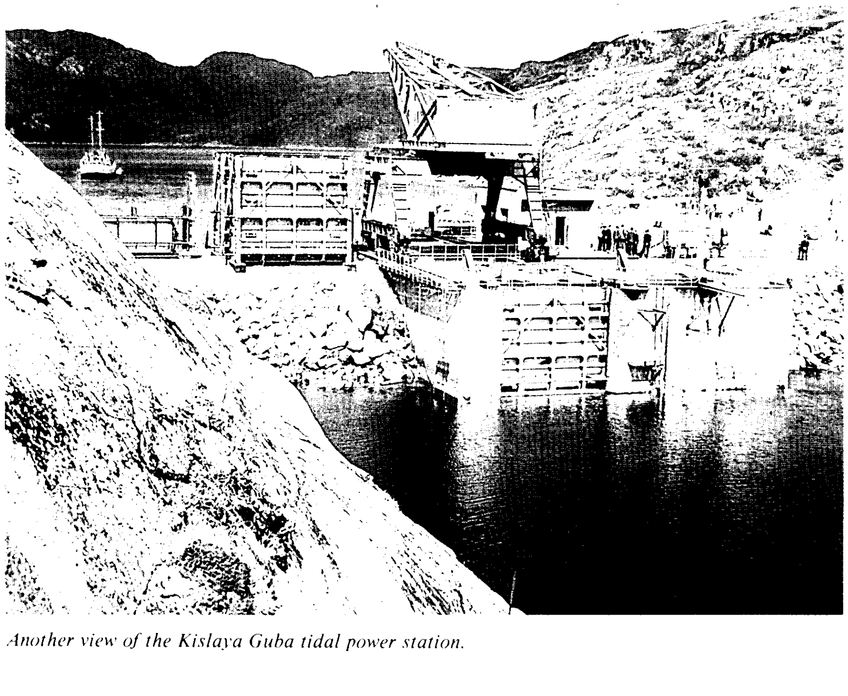
No additional construction has been commissioned, but some 20 sites have been identified where exploitation of tidal energy may be feasible, if not yet economically practicable. A number of the proposed installations are huge, such as a 10,000-MW tidal power station in Mezenskaya Guba that would involve building a dam 96 kilometers long. Even this project—which if constructed would be the world's largest and most expensive hydropower installation—would be dwarfed by the most ambitious of these schemes, a 100,000-MW tidal power station in Penzhinskaya Guba. By comparison, a relatively modest 300-MW tidal power station in Lumbovskiy Zaliv would contain 24 encapsulated hydrogenerators in two dams totaling 2.8 kilometers in length, making it a rather expensive way to obtain 300 MW of capacity. It is doubtful that the Soviets will build any major tidal power stations soon.

**Tides**



*Kislaya Guba tidal power station on the Kola Peninsula.*



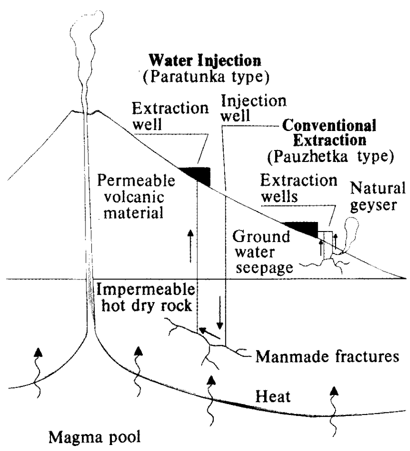
*Another view of the Kislaya Guba tidal power station.*

# Geothermal Energy

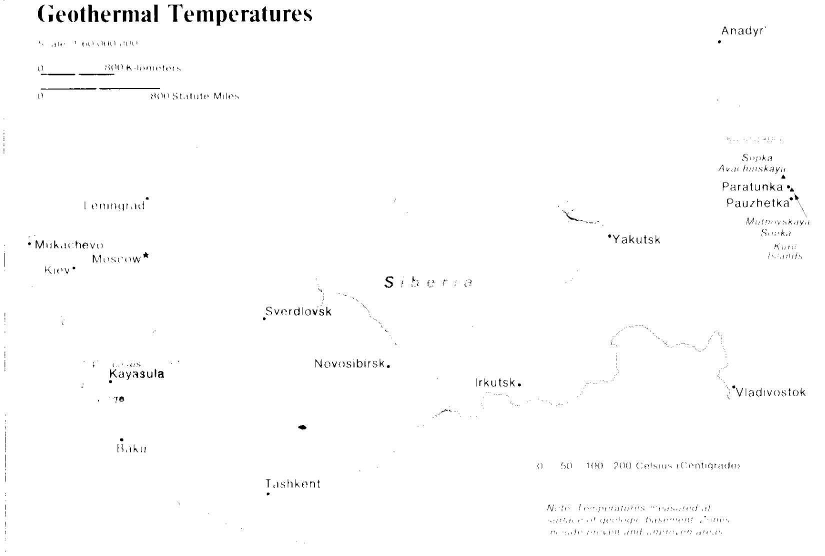
Even though the Soviet Union may have the largest undeveloped geothermal resources in the world, its geothermal research and development program lags similar programs in the United States, Japan, New Zealand, and Italy. According to some current Soviet estimates, hot rock and magma—from which heat energy above 100 degrees Celsius could be recovered—lie as close to the surface as 3,000 to 4,000 meters in almost half the territory of the Soviet Union, and hot water at lower temperatures can be found in more than one-fifth of the country. More than 50 sites where large geothermal resources could be developed have already been identified. Nevertheless, because of high developmental costs, the Soviets currently plan to exploit geothermal resources only in especially suitable areas lacking fossil fuel resources and in some remote regions.

The main use of geothermal energy will be to provide industrial and municipal heat and hot water. Geothermal hot water is already being used to heat homes, greenhouses, and industrial buildings and to process raw wool; it is being exploited in spas and sanatoriums; and it is being injected into oil reservoirs to enhance oil recovery. Such applications have been developed in Kamchatka, the Kuril Islands, Georgia, and the North Caucasus. In Siberia, water at 70 to 100 degrees Celsius will be used to prevent freezing in placer mining operations, opening the way for year-round mining.

**Geothermal Extraction Methods**




**Geothermal Temperatures**




The only currently functioning geothermal electric power plant using steam in the Soviet Union is at Pauzhetka on the Kamchatka Peninsula. This industrial pilot plant, which exploits a deposit of saturated steam, has a rated output of 5 MW but because of its poor condition had been operating intermittently at 3.5 MW. In mid-1981 the Soviets announced that a new borehole drilled to tap additional steam will increase the station's rated capacity to 11 MW.

A 750-kW experimental power plant using a binary-cycle generating system was installed in 1968 near Paratunka, also in Kamchatka. The freon-driven turbine system used geothermal water at 80 degrees Celsius as its heat source. Although operations at the plant ceased in 1975, apparently because the Soviets were unable to cope with the high salt content of the geothermal water, steam wells still supply heat to an adjacent greenhouse farm called Termal'nyy.

Both of these power plants were built to exploit existing deposits of geothermal steam or hot water. The Soviets estimate that such deposits in Kamchatka could eventually produce as much as 600 MW. But, they estimate further, the development of artificial circulation systems in the hot rock deposits of Kamchatka could produce another 3,000 MW. This would involve using underground explosions or hydraulic pressure to create fracture zones between water injection and extraction wells drilled to depths of 3,000 to 6,000 meters, where temperatures could reach 600 degrees Celsius.

Studies of the feasibility of using the energy of magma and hot rock to produce electricity have been done at several sites: in Kamchatka at the Avachinskaya and Mutnovskaya volcanoes, in the North Caucasus near Stavropol', and in the Carpathian Mountains near Mukachevo.

The only large-scale project now under consideration is a 200-MW installation at Mutnovskaya volcano in Kamchatka. Other ongoing geothermal projects include the development of small power plants at Kayasula (near Neftekumsk) and in Dagestan, a region where hot springs are common and where thermal waters have long been used for heating buildings. In the same region the Soviets plan to establish an Institute of Geothermal Power, which will study practical problems of building geothermal power plants.

# Magnetohydrodynamic Power

The magnetohydrodynamics (MHD) process of converting thermal energy of conductor fluids directly into electricity is potentially more efficient than conventional thermal power generation in which thermal energy is converted first into mechanical energy and then into electricity. During the past 25 years, scientists in many countries have tried to design and build an economically practical MHD generator that would use the partially ionized gas produced by burning fossil fuels as the conducting fluid. This objective proved unexpectedly difficult, however, and by 1970 MHD research in France, Great Britain, West Germany, and other countries had ceased because of the projected increased costs of oil, gas, and coal. MHD research continues, nevertheless, in countries that expect to have continuing access to large supplies of coal such as Japan, Poland, the United States, and—particularly—the Soviet Union.

The USSR presently has one of the world's largest and most advanced MHD research programs. Soviet scientists are currently operating two pilot MHD power plants, the U-02 and the U-25. The former is a 75-kW generator, built in 1964 at the Academy of Sciences Institute of High Temperatures in Moscow. It is used to test materials and components later incorporated into the U-25, built in 1971 at the same institute. Both generators burned natural gas, a clean fuel that minimizes fouling. Because it is cheaper, more abundant, and produces a more conductive gas than other fossil fuels, however, coal will eventually be the primary fuel in MHD facilities, should current difficulties in converting coal to a clean gas be overcome. The U-02 has already been converted to burn coal so that the effects of slag on generator performance may be investigated. Eventually, the U-25 could also be converted to burn coal.

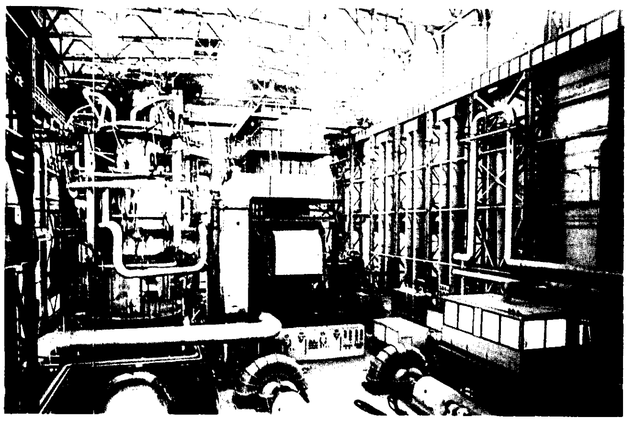
The United States and the Soviet Union worked closely during the 1970s on a major cooperative MHD experimental program using the Soviet facility and several US components. As part of the joint program, a second natural-gas-fired

MHD generator called the U-25B was built at the U-25 facility. It incorporated a US-made superconducting magnet and was used to evaluate problems associated with the use of such high-field magnets. (Magnetic fields of the strength that will be required in commercial MHD power plants can only be produced by superconducting magnets.)

The results of these investigations will help guide the design of the U-500, a large, natural-gas-fired commercial-demonstration facility. The plant design combines MHD with a conventional steam power plant now being built in Ryazan' jointly by the Institute of High Temperatures and the Ministry of Power and Electrification. Like all future MHD power plants, it will be a hybrid facility in which a conventional power generator exploits the substantial thermal energy remaining in the conducting fluid after it has passed through an MHD generating system. Scheduled for completion in 1985, the U-500 is to combine a 250-MW MHD generating system with a 250-MW combination gas-turbine/steam-turbine generating system to achieve a total output capacity of 500 MW. If successful, plans are to construct several larger (1,000 MW) natural-gas-fired plants in other cities.

After the current studies on coal-fired MHD technology have been completed, a 500- to 1,000-MW, coal-fired demonstration plant is to be built. If successful, the plant could serve as the prototype for large numbers of such plants to be built throughout the country. In mid-1983 the Soviets announced that a 25-MW MHD generator was under construction at Estonia's Kohtla-Järve thermal power station. Reportedly, the purpose is to test the best method to adapt MHD technology to burning oil shale at high temperatures.

According to Soviet scientists, MHD topping systems could result in energy conversion efficiencies approaching 60 percent in power plants producing only electricity and 90 percent in cogeneration plants (TETs), compared with the approximately 40 percent achievable now in steam-turbine systems. Their preliminary calculations suggest that incorporating an MHD topping cycle would add only 10 or 15 percent to the cost of building a conventional thermal power plant. Some observers, however, feel that the Soviets have underestimated the difficulty and costs of overcoming the many remaining technical obstacles as well as the likely efficiency of MHD power generation.



*MHD generator at the USSR Academy of Sciences Institute of High Temperatures, Moscow.*


*US-made MHD superconducting magnet at the Soviet Academy of Sciences Institute of High Temperatures.*

# Thermonuclear Fusion

The sun is so hot and dense that the matter inside it exists as a plasma of extremely rapidly moving atomic nuclei and electrons. When collisions among these nuclei are violent enough to overcome their mutual electrical repulsion, they fuse and give off highly energetic nuclear particles. Such "thermonuclear" reactions are the source of the huge energies emitted by the sun.

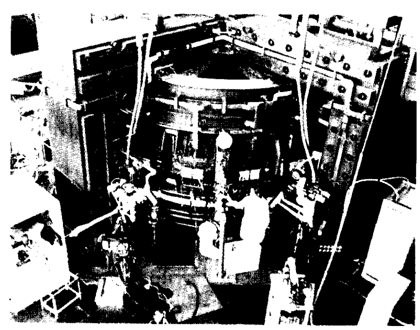
The awesome amounts of energy released by thermonuclear devices have attracted the interest of scientists seeking new sources of energy to generate electricity. If thermonuclear reactions could be harnessed to produce heat energy at a steady and appreciable rate in a controlled manner, fusion power plants could provide electricity virtually forever, because a prospective fuel—deuterium, an isotope of hydrogen—is in nearly inexhaustible supply. Advanced fusion research programs are under way in Western Europe, Japan, China, the United States, and the Soviet Union. Enormous technological difficulties, however, stand in the way of the economic exploitation of controlled thermonuclear reactions.

Many of the early advances in fusion research were made in the USSR; lately, however, the Soviet program has lost momentum and much of its high-level support, probably owing to the high costs associated with making further advances, coupled with the realization that the payoff, if any, is not likely to occur before the next century. Today's Soviet program, managed jointly by the Academy of Sciences and the State Committee for the Utilization of Atomic Energy, is generally less vigorous than the US program.

The essential problem in developing controlled fusion is to confine a plasma at about 100 million degrees Celsius for an extended period. Two general techniques of confinement are being pursued: *magnetic* confinement, in which a plasma is concentrated and isolated by magnetic fields; and *inertial* confinement, in which a fuel pellet is violently compressed, creating a plasma that is momentarily held together by the inertia of its inward-moving particles.

The most advanced magnetic confinement system is the *Tokamak*, a toroidal (doughnut-shaped) device invented in the USSR. Numerous Tokamaks have been built throughout the world. The Soviet Tokamaks, the T-7 and T-10, are soon to be succeeded by a larger one, the T-15. An experimental Tokamak of a size suitable for use in a thermonuclear power plant, however, would have to be much larger still.

Fusion power, if developed, will probably be used in hybrid units. Fusion produces a lot of high-energy neutrons; if these were used to breed fuel for nuclear-fission power plants, part of the cost of constructing fusion power plants could be borne by the fission power industry. Some Soviet energy engineers believe that a nuclear-fuel breeding system could be incorporated into a commercial fusion power plant around the turn of the century.



*Experimental Soviet Tokamak, T-10.*

## Measurement Conversion Factors

| To Convert From US Measure | To Soviet Measure | Multiply by: | To Convert From Soviet Measure | To US Measure | Multiply by: |
|---|---|---|---|---|---|
| Inches | Millimeters | 25.4 | Millimeters | Inches | 0.03937 |
| Feet | Meters | 0.3048 | Meters | Feet | 3.28084 |
| Miles (statute) | Kilometers | 1.609344 | Kilometers | Miles (statute) | 0.621371 |
| Pounds | Kilograms | 0.453592 | Kilograms | Pounds | 2.154623 |
| Tons (short) | Tons (metric) | 0.907185 | Tons (metric) | Tons (short) | 1.102311 |
| Barrels of oil | Tons of oil | 0.136986 | Tons of oil | Barrels of oil | 7.3 |
| Cubic feet | Cubic meters | 0.028317 | Cubic meters | Cubic feet | 35.314667 |
| Barrels of oil per day | Tons of oil per year | 50 | Tons of oil per year | Barrels of oil per day | 0.02 |
| Barrels per day oil equivalent | Tons coal equivalent (standard fuel) per year | 71.5 | Tons coal equivalent (standard fuel) per year | Barrels per day oil equivalent | 0.014 |
| Btu per pound | Kilocalories per kilogram | 1.8 | Kilocalories per kilogram | Btu per pound | 0.555556 |

## Ultimate Recoverable Oil and Gas Reserves

*The classification of Soviet oil and gas fields by size is based upon official USSR sources and Western estimates of ultimate recoverable reserves. Although the terms "supergiant" and "giant" are commonly used to quantify large oil and gas fields, there are no internationally accepted definitions of field sizes.*

**Supergiant fields**

**Oil (>5 billion barrels)**

| Field name | Region | Date of Discovery |
|---|---|---|
| Arlan | Volga-Urals | 1955 |
| Fedorovo | West Siberia | 1971 |
| Kotur-Tepe | Central Asia | 1956 |
| Romashkino | Volga-Urals | 1948 |
| Samotlor | West Siberia | 1966 |

**Gas (>10 trillion cubic feet)**

| Field name | Region | Date of Discovery |
|---|---|---|
| Bovanenko | West Siberia | 1971 |
| Kharasavey | West Siberia | 1974 |
| Medvezh'ye | West Siberia | 1967 |
| Shatlyk | Central Asia | 1968 |
| Sovetabad | Central Asia | 1974 |
| Urengoy | West Siberia | 1966 |
| Yamburg | West Siberia | 1969 |
| Zapolyarnoye | West Siberia | 1965 |

**Giant fields**

**Oil (500 million to 5 billion barrels)**

| Field name | Region | Date of Discovery |
|---|---|---|
| Agan | West Siberia | 1966 |
| Barsa-Gel'mes | Central Asia | 1962 |
| Bavly | Volga-Urals | 1946 |
| Kholmogory | West Siberia | 1973 |
| Mamontovo | West Siberia | 1965 |
| Megion | West Siberia | 1961 |
| Mukhanovo | Volga-Urals | 1945 |
| Nebit-Dag | Central Asia | 1934 |
| Neftyanyye Kamni | Transcaucasus | 1949 |
| Novoyelkhovo | Volga-Urals | 1955 |
| Ostrov Bulla | Transcaucasus | 1959 |
| Pokachi | West Siberia | 1970 |
| Pravdinsk | West Siberia | 1964 |
| Samgori | Transcaucasus | 1974 |
| Severnyy Pokur | West Siberia | 1964 |
| Severo-Var'yegan | West Siberia | 1971 |
| Shkapovo | Volga-Urals | 1953 |
| Sovetskoye | West Siberia | 1962 |
| Tuymazy | Volga-Urals | 1937 |
| Usinsk | Timan-Pechora | 1963 |
| Ust'-Balyk | West Siberia | 1961 |
| Uzen' | North Caspian | 1961 |
| Var'yegan | West Siberia | 1970 |
| Vata | West Siberia | 1961 |
| Vat"yegan | West Siberia | 1971 |
| Vozey | Timan-Pechora | 1972 |
| Yuzhno-Sukhokumskoye | North Caucasus | 1963 |
| Zhetybay | North Caspian | 1960 |

**Gas (3 to 10 trillion cubic feet)**

| Field name | Region | Date of Discovery |
|---|---|---|
| Achak | Central Asia | 1966 |
| Arkticheskiy | West Siberia | 1968 |
| Gazli | Central Asia | 1956 |
| Gubkin | West Siberia | 1965 |
| Gugurtli | Central Asia | 1965 |
| Kandym | Central Asia | 1966 |
| Kirpichli | Central Asia | 1972 |
| Komsomol | West Siberia | 1966 |
| Layavozh | Timan-Pechora | 1971 |
| Naip | Central Asia | 1970 |
| Nakhodka | West Siberia | 1974 |
| Neyto | West Siberia | 1975 |
| Novyy Port | West Siberia | 1964 |
| Nyda | West Siberia | 1972 |
| Orenburg | Volga-Urals | 1966 |
| Pelyatka | West Siberia | 1969 |
| Pestsovyy | West Siberia | 1974 |
| Russkaya | West Siberia | 1968 |
| Sakar | Central Asia | 1966 |
| Samantepe | Central Asia | 1964 |
| Semakov | West Siberia | 1971 |
| Severo-Komsomol | West Siberia | 1969 |
| Severo-Urengoy | West Siberia | 1970 |
| Solenaya | West Siberia | 1969 |
| Sredneyamal | West Siberia | 1972 |
| Urtabulak | Central Asia | 1963 |
| Vuktyl | Timan-Pechora | 1964 |
| Vyngapur | West Siberia | 1968 |
| Yamsovey | West Siberia | 1970 |
| Yetypur | West Siberia | 1971 |
| Yubileynyy | West Siberia | 1969 |
| Yuzhno-Russkaya | West Siberia | 1969 |
| Yuzhno-Tambey | West Siberia | 1974 |
| Zapadno-Tarkosale | West Siberia | 1972 |

## Petroleum Refineries, 1 January 1984

| Economic Region | Refinery Name |
|---|---|
| Baltic | Mažeikiai |
| Northwest | Kirishi |
| Northern | Ukhta |
| Belorussia | Mozyr' |
| | Novopolotsk |
| Central | Konstantinovskiy |
| | Moskva (Moscow) Lyubertsy |
| | Ryazan' |
| | Yaroslavl' |
| Ukraine | Drogobych No. 1 |
| | Drogobych No. 2 |
| | Kherson |
| | Kremenchug |
| | Lisichansk |
| | L'vov |
| | Nadvornaya |
| | Odessa |
| North Caucasus | Groznyy Group |
| North Caucasus (continued) | Groznyy No. 2 |
| | Groznyy No. 3 |
| | Krasnodar |
| | Tuapse |
| Transcaucasus | Baku No. 2 |
| | Baku Waterfront Group |
| | Batumi |
| Volga | Nizhnekamsk |
| | Novokuybyshevsk Lend Lease 3 |
| | Novokuybyshevsk No. 2 |
| | Saratov |
| | Syzran' |
| | Volgograd |
| Volga-Vyatka | Gor'kiy 26 Bakinskikh |
| | Gor'kiy (Kstovo) |
| Urals | Ishimbay |
| | Orsk |
| | Orsk 421 |
| Urals (continued) | Perm' |
| | Salavat |
| | Ufa Novo Chernikovsk |
| | Ufa Novo Ufimskiy |
| | Ufa Staro Ufimskiy |
| Kazakhstan | Chimkent (under construction) |
| | Gur'yev |
| | Pavlodar |
| Central Asia | Fergana |
| | Khamza |
| | Krasnovodsk |
| | Neftezavodsk (under construction) |
| West Siberia | Omsk |
| East Siberia | Achinsk |
| | Angarsk |
| Far East | Khabarovsk |
| | Komsomol'sk |

## Thermal Power Plants 1,000 MW or Larger, 1 January 1984

**Operational**

| Economic Region | Plant Name | Gross Installed Capacity (*MW*) |
|---|---|---|
| Baltic | Lithuanian | 1,800 |
| | Estonia | 1,610 |
| | Baltic | 1,435 |
| Northwest | Kirishi | 2,120 |
| Belorussia | Lukoml' | 2,400 |
| Central | Kostroma | 3,600 |
| | Ryazan' | 2,800 |
| | Konakovo | 2,400 |
| | Kashira | 2,000 |
| | Cherepet' | 1,500 |
| | TETs-23 Mosenergo Heat and Power | 1,400 |
| | TETs-22 Mosenergo Heat and Power | 1,250 |
| | TETs-21 Mosenergo Heat and Power | 1,180 |
| | Shatura | 1,020 |
| Ukraine | Zaporozh'ye | 3,600 |
| | Uglegorsk | 3,600 |
| | Krivoy Rog-2 | 3,000 |
| | Burshtyn | 2,400 |
| | Zmiyev (Gotval'd) | 2,400 |
| | Pridneprovsk | 2,400 |
| | Voroshilovgrad | 2,300 |
| | Starobeshevo | 2,300 |
| | Slavyansk | 2,100 |
| | Ladyzhin | 1,800 |
| | Tripol'ye | 1,800 |
| | Kurakhovo | 1,460 |
| Moldavia | Moldavian | 2,480 |
| North Caucasus | Novocherkassk | 2,400 |
| | Stavropol' | 2,100 |

| Economic Region | Plant Name | Gross Installed Capacity (*MW*) |
|---|---|---|
| | Nevinnomyssk | 1,380 |
| | Krasnodar Heat and Power | 1,105 |
| Transcaucasus | Tbilisi | 1,280 |
| | Razdan | 1,210 |
| | Ali-Bayramly | 1,100 |
| Volga | Zainsk | 2,400 |
| | Lower Kama-1 Heat and Power | 1,100 |
| Urals | Reftinskiy | 3,800 |
| | Troitsk | 2,500 |
| | Iriklinskiy | 2,400 |
| | Karmanovo | 1,800 |
| | Verkhniy Tagil | 1,575 |
| | Sredneural'sk | 1,198 |
| | Yuzhno-Ural'sk | 1,000 |
| Kazakhstan | Ekibastuz-1 | 3,500 |
| | Yermak | 2,400 |
| | Dzhambul | 1,230 |
| Central Asia | Syrdar'ya | 3,000 |
| | Tashkent | 1,950 |
| | Mary | 1,260 |
| | Navoi | 1,250 |
| West Siberia | Surgut-1 | 3,345 |
| | Tom'-Usa | 1,300 |
| | Belovo | 1,200 |
| East Siberia | Krasnoyarsk-2 | 1,340 |
| | Nazarovo | 1,300 |
| | Irkutsk-10 Heat and Power | 1,160 |
| | Kransnoyarsk Heat and Power | 1,115 |

**Under Construction**

| Economic Region | Plant Name |
|---|---|
| Ukraine | Zuyevka [a] |
| Transcaucasus | Azerbaijan [a] |
| Urals | Perm' |
| Kazakhstan | Ekibastuz-2 |
| | South Kazakhstan (Chiganak) |
| Central Asia | Novo-Angren [a] |
| | Talimardzhan |
| West Siberia | Surgut-2 |
| | Urengoy |
| East Siberia | Berëzovskoye-1 |
| | Gusinoozërsk [a] |
| | Kharanor |

[a] Currently operating at a capacity under 1,000 MW.

## Hydroelectric Power Stations 1,000 MW or Larger, 1 January 1984

**Operational**

| Station Name | Installed Capacity (*MW*) | River | Economic Region |
|---|---|---|---|
| Kransnoyarsk | 6,000 | Yenisey | East Siberia |
| Bratsk | 4,500 | Angara | East Siberia |
| Sayan Shushenskoye (expansion under way) | 3,840 | Yenisey | East Siberia |
| Ust' Ilimsk | 3,840 | Angara | East Siberia |
| Nurek | 2,700 | Vakhsh | Central Asia |
| Volga at Volgograd | 2,541 | Volga | Volga |
| Volga at Tol'yatti Zhigulevsk | 2,300 | Volga | Volga |
| Dnepr at Zaporozh'ye | 1,538 | Dnepr | Ukraine |
| Saratov | 1,360 | Volga | Volga |
| Inguri | 1,325 | Inguri | Transcaucasus |
| Zeya | 1,290 | Zeya | Far East |
| Toktogul' | 1,200 | Naryn | Central Asia |
| Lower Kama | 1,092 | Kama | Volga |
| Chirkey | 1,075 | Sulak | North Caucasus |
| Votkinsk | 1,010 | Kama | Urals |

**Under Construction**

| Station Name | River | Economic Region |
|---|---|---|
| Boguchany | Angara | East Siberia |
| Bureya | Bureya | Far East |
| Cheboksary [a] | Volga | Volga-Vyatka |
| Kaišiadorys (pump storage) | Neman, Strėva | Baltic |
| Rogun | Vakhsh | Central Asia |
| Shul'ba | Irtysh | Kazakhstan |
| Zagorsk (pump storage) | Kun'ya | Central |

[a] Currently operating at a capacity under 1,000 MW.

## Nuclear Power Stations, 1 January 1984

**Operational**

| Station Name | Gross Installed Capacity (*MW*) | Date of First Operation | Type | Operating Reactors | Soviet Designation |
|---|---|---|---|---|---|
| Leningrad | 4,000 | 1973 | GMPTR | 4 | RBMK-1000 |
| Chernobyl' | 4,000 | 1977 | GMPTR | 4 | RBMK-1000 |
| Kursk | 3,000 | 1976 | GMPTR | 3 | RBMK-1000 |
| Novovoronezhskiy | 2,455 | 1964 | PWR | 1 | VVER-210 |
| | | | PWR | 1 | VVER-365 |
| | | | PWR | 2 | VVER-440 |
| | | | PWR | 1 | VVER-1000 |
| Ignalina | 1,500 [a] | 1983 | GMPTR | 1 | RBMK-1500 [a] |
| Kola | 1,320 | 1973 | PWR | 3 | VVER-440 |
| Smolensk | 1,000 | 1982 | GMPTR | 1 | RBMK-1000 |
| South Ukraine | 1,000 | 1983 | PWR | 1 | VVER-1000 |
| Rovno | 880 | 1979 | PWR | 2 | VVER-440 |
| Armenian | 815 [b] | 1976 | PWR | 2 | VVER-440 [b] |
| Beloyarskiy | 900 | 1964 | GMPTR | 1 | RBMK-100 |
| | | | GMPTR | 1 | RBMK-200 |
| | | | LMFBR | 1 | BN-600 |
| Bilibino ATETs | 48 | 1974 | GMPTR | 4 | |
| **Total** | **20,168** [c] | | | | |

**Under Construction**

| Station Name |
|---|
| Balakovo |
| Bashkir |
| Crimean |
| Gor'kiy AST |
| Kalinin (started up in 1984) |
| Khmel'nitskiy |
| Kostroma |
| Minsk ATETs |
| Odessa ATETs |
| Rostov |
| Tatar |
| Voronezh AST |
| Zaporozhye (started up in 1984) |

[a] The RBMK-1500 represents full nameplate capacity. Of this, only one 750-MW turbogenerator was operational at the beginning of 1984.
[b] The two VVER 440 reactors are operating at 405 and 410 MW.
[c] Does not include experimental development reactors, such as Obninsk and Dimitrovgrad, or the Siberian AES and the Shevchenko AES, which do not produce commercial electric power.

# Gazetteer and Index

This gazetteer and index includes names in the Soviet Union and some hydrographic and physiographic features in nearby areas.

The spelling of geographic names is in accordance with decisions of the US Board on Geographic Names (BGN). Some physiographic names and textual references to administrative divisions, however, have been simplified, and abbreviations have been used for some administrative generic terms.

Names of oil and gas fields, other than major fields, and other energy-related facilities are not normally ruled on by BGN. Their spellings are based on prevailing usage in the industry and source material. Fields producing both oil and gas are classified and named according to their production of major importance.

Coordinates for regions or areal features are given near their centers or midpoints, and streams at their mouths or lower ends.

## Abbreviations

| | |
|---|---|
| AO | Avtonomnaya Oblast' |
| AOk | Avtonomnyy Okrug |
| ASSR | Avtonomnaya Sovetskaya Sotsialisticheskaya Respublika |
| SSR | Sovetskaya Sotsialisticheskaya Respublika |

## Glossary

The following terms appear as generic parts of names in this atlas. The meanings are derived from the BGN gazetteer on the Soviet Union.

| | |
|---|---|
| gory | mountains, mountain range |
| guba | bay |
| kanal | canal, channel, distributary |
| khrebet | mountains, mountain range, ridge |
| kryazh | ridge, hill, mountains |
| more | sea, sound |
| nagor'ye | upland, plateau, mountain range |
| nizmennost' | plain, lowland |
| ostrov(a) | island(s) |
| ozero | lake |
| peski | desert, sands |
| plato | plateau, upland |
| poluostrov | peninsula, spit |
| proliv | strait |
| sopka | volcano, mountain, mound, hill |
| stolovaya strana | plateau |
| uvaly | hills |
| vodokhranilishche | reservoir |
| vozvyshennost' | hills, upland, plateau |
| zaliv | gulf, bay, inlet, lagoon |
| zemlya | land, island(s) |

## Feature Designations

| | | | |
|---|---|---|---|
| admd | administrative division | rdge | ridge |
| bay | bay | reg | region |
| can | canal | resv | reservoir |
| coal | coal basin/deposit | rr | railroad |
| dst | desert | sea | sea |
| gasf | gasfield | stm | stream |
| gulf | gulf | strt | strait |
| hlls | hills | tars | tar sands deposit |
| hydp | hydroelectric power station | thep | thermal power plant |
| iron | iron ore deposit | upld | upland |
| isl(s) | island(s) | u/t | uranium/thorium deposit and processing center |
| lake | lake | volc | volcano |
| mts | mountains, mountain range | | |
| nucp | nuclear power station | | |
| oilf | oilfield | | |
| oils | oil shale deposit/field | | |
| pen | peninsula | | |
| petr | petroleum refinery | | |
| pipe | oil/gas pipeline | | |
| plat | plateau | | |
| pln | plain | | |
| ppl | populated place | | |

## Simplified Names

**Physiographic Features**

| Simplified | BGN |
|---|---|
| Alay Mountains | Alayskiy Khrebet |
| Aldan Upland | Aldanskoye Nagor'ye |
| Betpak-Dala Desert | Betpak-Dala |
| Buzachi Peninsula | Poluostrov Buzachi |
| Byrranga Mountains | Gory Byrranga |
| Caspian Lowland | Prikaspiyskaya Nizmennost' |
| Central Range | Sredinnyy Khrebet |
| Cherskiy Range | Khrebet Cherskogo |
| Chukotsk Upland | Chukotskoye Nagor'ye |
| Chukotsk Peninsula | Chukotskiy Poluostrov |
| Dnepr Lowland | Pridneprovskaya Nizmennost' |
| Dzhugdzhur Range | Khrebet Dzhugdzhur |
| Gydan Peninsula | Gydanskiy Poluostrov |
| Karakum Desert | Peski Karakumy |
| Kazakh Upland | Kazakhskiy Melkosopochnik |
| Kolyma Lowland | Kolymskaya Nizmennost' |
| Kolyma Mountains | Kolymskoye Nagor'ye |
| Koryak Mountains | Koryakskoye Nagor'ye |
| Kyzylkum Desert | Kyzylkum |
| Lake Balkhash | Ozero Balkhash |
| Lena Plateau | Prilenskoye Plato |
| Mangyshlak Peninsula | Poluostrov Mangyshlak |
| Muyunkum Desert | Peski Muyunkum |
| North Siberian Lowland | Severo-Sibirskaya Nizmennost' |
| Northern Hills | Severnyye Uvaly |
| Oka-Don Plain | Oksko-Donskaya Nizmennost' |
| Sikhote-Alin' Range | Sikhote-Alin' |
| Stanovoy Upland | Stanovoye Nagor'ye |
| Stanovoy Range | Stanovoy Khrebet |
| Taymyr Peninsula | Poluostrov Taymyr |
| Taz Peninsula | Tazovskiy Poluostrov |
| Timan Ridge | Timanskiy Kryazh |
| Turan Lowland | Turanskaya Nizmennost' |
| Turgay Plateau | Turgayskaya Stolovaya Strana |
| Upper Kama Upland | Verkhnekamskaya Vozvyshennost' |
| Ustyurt Plateau | Plato Ustyurt |
| Verkhoyansk Range | Verkhoyanskiy Khrebet |
| Volga Upland | Privolzhskaya Vozvyshennost' |
| Yablonovyy Range | Yablonovyy Khrebet |
| Yamal Peninsula | Poluostrov Yamal |

**Oblast-Level Administrative Divisions**

| Simplified | BGN |
|---|---|
| Abkhaz ASSR | Abkhazskaya Avtonomnaya Sovetskaya Sotsialisticheskaya Respublika |
| Adygey AO | Adygeyskaya Avtonomnaya Oblast' |
| Adzhar ASSR | Adzharskaya Avtonomnaya Sovetskaya Sotsialisticheskaya Respublika |
| Aginskiy Buryat AOk | Aginskiy Buryatskiy Avtonomnyy Okrug |
| Aktyubinsk Oblast | Aktyubinskaya Oblast' |
| Alma-Ata Oblast | Alma-Atinskaya Oblast' |
| Altay Kray | Altayskiy Kray |
| Amur Oblast | Amurskaya Oblast' |
| Andizhan Oblast | Andizhanskaya Oblast' |
| Arkhangel'sk Oblast | Arkhangel'skaya Oblast' |
| Ashkhabad Oblast | Ashkhabadskaya Oblast' |
| Astrakhan' Oblast | Astrakhanskaya Oblast' |
| Bashkir ASSR | Bashkirskaya Avtonomnaya Sovetskaya Sotsialisticheskaya Respublika |
| Belgorod Oblast | Belgorodskaya Oblast' |
| Brest Oblast | Brestskaya Oblast' |
| Bryansk Oblast | Bryanskaya Oblast' |
| Bukhara Oblast | Bukharskaya Oblast' |
| Buryat ASSR | Buryatskaya Avtonomnaya Sovetskaya Sotsialisticheskaya Respublika |
| Chardzhou Oblast | Chardzhouskaya Oblast' |
| Chechen-Ingush ASSR | Checheno-Ingushskaya Avtonomnaya Sovetskaya Sotsialisticheskaya Respublika |
| Chelyabinsk Oblast | Chelyabinskaya Oblast' |
| Cherkassy Oblast | Cherkasskaya Oblast' |
| Chernigov Oblast | Chernigovskaya Oblast' |
| Chernovtsy Oblast | Chernovitskaya Oblast' |
| Chimkent Oblast | Chimkentskaya Oblast' |
| Chita Oblast | Chitinskaya Oblast' |
| Chukotsk AOk | Chukotskiy Avtonomnyy Okrug |
| Chuvash ASSR | Chuvashskaya Avtonomnaya Sovetskaya Sotsialisticheskaya Respublika |
| Dagestan ASSR | Dagestanskaya Avtonomnaya Sovetskaya Sotsialisticheskaya Respublika |
| Dnepropetrovsk Oblast | Dnepropetrovskaya Oblast' |
| Donetsk Oblast | Donetskaya Oblast' |
| Dzhambul Oblast | Dzhambulskaya Oblast' |
| Dzhezkazgan Oblast | Dzhezkazganskaya Oblast' |
| Dzhizak Oblast | Dzhizakskaya Oblast' |
| Evenk AOk | Evenkiyskiy Avtonomnyy Okrug |
| Fergana Oblast | Ferganskaya Oblast' |
| Gomel' Oblast | Gomel'skaya Oblast' |
| Gor'kiy Oblast | Gor'kovskaya Oblast' |
| Gorno-Altay AO | Gorno-Altayskaya Avtonomnaya Oblast' |
| Gorno-Badakhshan AO | Gorno-Badakhshanskaya Avtonomnaya Oblast' |
| Grodno Oblast | Grodnenskaya Oblast' |
| Gur'yev Oblast | Gur'yevskaya Oblast' |
| Irkutsk Oblast | Irkutskaya Oblast' |
| Issyk-Kul' Oblast | Issyk-Kul'skaya Oblast' |
| Ivano-Frankovsk Oblast | Ivano-Frankovskaya Oblast' |
| Ivanovo Oblast | Ivanovskaya Oblast' |
| Kabardin-Balkar ASSR | Kabardino-Balkarskaya Avtonomnaya Sovetskaya Sotsialisticheskaya Respublika |
| Kalinin Oblast | Kalininskaya Oblast' |
| Kaliningrad Oblast | Kaliningradskaya Oblast' |
| Kalmyk ASSR | Kalmytskaya Avtonomnaya Sovetskaya Sotsialisticheskaya Respublika |
| Kaluga Oblast | Kaluzhskaya Oblast' |
| Kamchatka Oblast | Kamchatskaya Oblast' |
| Karachay-Cherkes AO | Karachayevo-Cherkesskaya Avtonomnaya Oblast' |
| Karaganda Oblast | Karagandinskaya Oblast' |
| Karakalpak ASSR | Karakalpakskaya Avtonomnaya Sovetskaya Sotsialisticheskaya Respublika |
| Karelian ASSR | Karel'skaya Avtonomnaya Sovetskaya Sotsialisticheskaya Respublika |
| Kashkadar'ya Oblast | Kashkadar'inskaya Oblast' |
| Kemerovo Oblast | Kemerovskaya Oblast' |
| Khabarovsk Kray | Khabarovskiy Kray |
| Khakas AO | Khakasskaya Avtonomnyy Oblast' |

**Oblast-Level Administrative Divisions (continued)**

| Simplified | BGN |
|---|---|
| Khanty-Mansi AOk | Khanty-Mansiyskiy Avtonomnyy Okrug |
| Khar'kov Oblast | Khar'kovskaya Oblast' |
| Kherson Oblast | Khersonskaya Oblast' |
| Khmel'nitskiy Oblast | Khmel'nitskaya Oblast' |
| Khorezm Oblast | Khorezmskaya Oblast' |
| Kirov Oblast | Kirovskaya Oblast' |
| Kirovograd Oblast | Kirovogradskaya Oblast' |
| Kiyev Oblast | Kiyevskaya Oblast' |
| Kokchetav Oblast | Kokchetavskaya Oblast' |
| Komi ASSR | Komi Avtonomnaya Sovetskaya Sotsialisticheskaya Respublika |
| Komi-Permyak AOk | Komi-Permyatskiy Avtonomnyy Okrug |
| Koryak AOk | Koryakskiy Avtonomnyy Okrug |
| Kostroma Oblast | Kostromskaya Oblast' |
| Krasnodar Kray | Krasnodarskiy Kray |
| Krasnovodsk Oblast | Krasnovodskaya Oblast' |
| Krasnoyarsk Kray | Krasnoyarskiy Kray |
| Krym (Crimean) Oblast | Krymskaya Oblast' |
| Kulyab Oblast | Kulyabskaya Oblast' |
| Kurgan Oblast | Kurganskaya Oblast' |
| Kurgan-Tyube Oblast | Kurgan-Tyubinskaya Oblast' |
| Kursk Oblast | Kurskaya Oblast' |
| Kustanay Oblast | Kustanayskaya Oblast' |
| Kuybyshev Oblast | Kuybyshevskaya Oblast' |
| Kzyl-Orda Oblast | Kzyl-Ordinskaya Oblast' |
| Leninabad Oblast | Leninabadskaya Oblast' |
| Leningrad Oblast | Leningradskaya Oblast' |
| Lipetsk Oblast | Lipetskaya Oblast' |
| L'vov Oblast | L'vovskaya Oblast' |
| Magadan Oblast | Magadanskaya Oblast' |
| Mangyshlak Oblast | Mangyshlakskaya Oblast' |
| Mari ASSR | Mariyskaya Avtonomnaya Sovetskaya Sotsialisticheskaya Respublika |
| Mary Oblast | Maryyskaya Oblast' |
| Minsk Oblast | Minskaya Oblast' |
| Mogilev Oblast | Mogilevskaya Oblast' |
| Mordva ASSR | Mordovskaya Avtonomnaya Sovetskaya Sotsialisticheskaya Respublika |
| Moscow Oblast | Moskovskaya Oblast' |
| Murmansk Oblast | Murmanskaya Oblast' |
| Nagorno-Karabakh AO | Nagorno-Karabakhskaya Avtonomnaya Oblast' |
| Nakhichevan' ASSR | Nakhichevanskaya Avtonomnaya Sovetskaya Sotsialisticheskaya Respublika |
| Namangan Oblast | Namanganskaya Oblast' |
| Naryn Oblast | Narynskaya Oblast' |
| Navoi Oblast | Navoiyskaya Oblast' |
| Nenets AOk | Nenetskiy Avtonomnyy Okrug |
| Nikolayev Oblast | Nikolayevskaya Oblast' |
| Novgorod Oblast | Novgorodskaya Oblast' |
| Novosibirsk Oblast | Novosibirskaya Oblast' |
| Odessa Oblast | Odesskaya Oblast' |
| Omsk Oblast | Omskaya Oblast' |
| Orel Oblast | Orlovskaya Oblast' |
| Orenburg Oblast | Orenburgskaya Oblast' |
| Osh Oblast | Oshskaya Oblast' |
| Pavlodar Oblast | Pavlodarskaya Oblast' |
| Penza Oblast | Penzenskaya Oblast' |
| Perm' Oblast | Permskaya Oblast' |
| Poltava Oblast | Poltavskaya Oblast' |
| Primorskiy Kray | Primorskiy Kray |
| Pskov Oblast | Pskovskaya Oblast' |
| Rostov Oblast | Rostovskaya Oblast' |
| Rovno Oblast | Rovenskaya Oblast' |
| Ryazan' Oblast | Ryazanskaya Oblast' |
| Sakhalin Oblast | Sakhalinskaya Oblast' |
| Samarkand Oblast | Samarkandskaya Oblast' |
| Saratov Oblast | Saratovskaya Oblast' |
| Semipalatinsk Oblast | Semipalatinskaya Oblast' |
| Severo-Kazakhstan Oblast | Severo-Kazakhstanskaya Oblast' |
| Severo-Ossetin ASSR | Severo-Osetinskaya Avtonomnaya Sovetskaya Sotsialisticheskaya Respublika |
| Smolensk Oblast | Smolenskaya Oblast' |
| Stavropol' Kray | Stavropol'skiy Kray |
| Sumy Oblast | Sumskaya Oblast' |
| Surkhandar'ya Oblast | Surkhandar'inskaya Oblast' |
| Sverdlovsk Oblast | Sverdlovskaya Oblast' |
| Syrdar'ya Oblast | Syrdar'inskaya Oblast' |
| Talas Oblast | Talasskaya Oblast' |
| Taldy-Kurgan Oblast | Taldy-Kurganskaya Oblast' |
| Tambov Oblast | Tambovskaya Oblast' |
| Tashauz Oblast | Tashauzskaya Oblast' |
| Tashkent Oblast | Tashkentskaya Oblast' |
| Tatar ASSR | Tatarskaya Avtonomnaya Sovetskaya Sotsialisticheskaya Respublika |
| Taymyr AOk | Taymyrskiy Avtonomnyy Okrug |
| Ternopol' Oblast | Ternopol'skaya Oblast' |
| Tomsk Oblast | Tomskaya Oblast' |
| Tselinograd Oblast | Tselinogradskaya Oblast' |
| Tula Oblast | Tul'skaya Oblast' |
| Turgay Oblast | Turgayskaya Oblast' |
| Tuva ASSR | Tuvinskaya Avtonomnaya Sovetskaya Sotsialisticheskaya Respublika |
| Tyumen' Oblast | Tyumenskaya Oblast' |
| Udmurt ASSR | Udmurtskaya Avtonomnaya Sovetskaya Sotsialisticheskaya Respublika |
| Ul'yanovsk Oblast | Ul'yanovskaya Oblast' |
| Ural'sk Oblast | Ural'skaya Oblast' |
| Ust'-Ordynskiy Buryat AOk | Ust'-Ordynskiy Buryatskiy Avtonomnyy Okrug |
| Vinnitsa Oblast | Vinnitskaya Oblast' |
| Vitebsk Oblast | Vitebskaya Oblast' |
| Vladimir Oblast | Vladimirskaya Oblast' |
| Volgograd Oblast | Volgogradskaya Oblast' |
| Vologda Oblast | Vologodskaya Oblast' |
| Volyn' Oblast | Volynskaya Oblast' |
| Voronezh Oblast | Voronezhskaya Oblast' |
| Voroshilovgrad Oblast | Voroshilovgradskaya Oblast' |
| Vostochno-Kazakhstan Oblast | Vostochno-Kazakhstanskaya Oblast' |
| Yakut ASSR | Yakutskaya Avtonomnaya Sovetskaya Sotsialisticheskaya Respublika |
| Yamalo-Nenets AOk | Yamalo-Nenetskiy Avtonomnyy Okrug |
| Yaroslavl' Oblast | Yaroslavskaya Oblast' |
| Yevrey AO | Yevreyskaya Avtonomnaya Oblast' |
| Yugo-Ossetin AO | Yugo-Osetinskaya Avtonomnaya Oblast' |
| Zakarpatskaya Oblast | Zakarpatskaya Oblast' |
| Zaporozh'ye Oblast | Zaporozhskaya Oblast' |
| Zhitomir Oblast | Zhitomirskaya Oblast' |

| Name | Feature | Latitude | Longitude | Page |
|---|---|---|---|---|
| A | | | | |
| Abakan | ppl | 53 43N | 091 26E | 57,RM |
| Aban | ppl | 56 41N | 096 04E | 60,RM |
| Aban coal deposit | coal | 56 30N | 096 00E | 60 |
| Abaza | ppl | 52 39N | 090 06E | 56,RM |
| Abkhazskaya ASSR | admd | 43 00N | 041 30E | 79 |
| Achak | gasf | 40 59N | 061 02E | 21,66 |
| Achinsk | ppl | 56 17N | 090 30E | 57,RM |
| Achinsk | petr | NA | NA | 31,66 |
| Achisu | oilf | 42 26N | 047 45E | 21 |
| Adygeyskaya AO | admd | 45 00N | 040 00E | 79 |
| Adzharskaya ASSR | admd | 41 40N | 042 00E | 79 |
| Agan | stm | 61 23N | 074 35E | 16,19 |
| Agan | oilf | 61 28N | 076 11E | 16,66 |
| Agdam | ppl | 39 59N | 046 57E | 56,RM |
| Aginskiy Buryatskiy AOk | admd | 51 00N | 114 30E | 79 |
| Aginskoye | ppl | 51 06N | 114 32E | RM |
| Agul | stm | 55 44N | 095 41E | 60 |
| Ahtme | ppl | 59 18N | 027 28E | 44,RM |
| Ak-Dovurak | ppl | 51 11N | 090 36E | 56,RM |
| Ak-Tyuz Bordunskiy uranium, thorium deposit | u/t | NA | NA | 42,43 |
| Akhtubinsk | ppl | 48 16N | 046 10E | RM |
| Aksenovo-Zilovskoye | ppl | 53 04N | 117 32E | RM |
| Aksu | ppl | 52 30N | 071 59E | 56,RM |
| Aksuyek | ppl | 44 45N | 074 21E | RM |
| Aksuyek Kiyakhty uranium deposit | u/t | NA | NA | 42,43 |
| Aktas | oilf | 43 07N | 051 57E | 21 |
| Aktogay | ppl | 46 57N | 079 40E | RM |
| Aktyubinsk | ppl | 50 17N | 057 10E | 56,79,RM |
| Aktyubinskaya Oblast' | admd | 48 00N | 058 00E | 79 |
| Aktyuz | ppl | 42 54N | 076 07E | RM |
| Al'met'yevsk | ppl | 54 53N | 052 20E | 20,RM |
| Alapayevsk | ppl | 57 50N | 061 41E | RM |
| Alay Mountains | mts | 39 45N | 072 00E | RM |
| Alazeya | stm | 70 51N | 153 34E | RM |
| Aldan | ppl | 58 37N | 125 24E | 11,57,59,RM |
| Aldan | stm | 63 28N | 129 35E | 11,RM |
| Aldan uranium, thorium deposit | u/t | NA | NA | 42,43 |
| Aldan Upland | upld | 57 00N | 127 00E | 11,RM |
| Alekhin | oilf | 62 26N | 071 30E | 16 |
| Aleksandriya | ppl | 48 40N | 033 07E | RM |
| Aleksandriya coal deposit | coal | 48 39N | 033 03E | 34 |
| Aleksandrov Gay | ppl | 50 09N | 048 34E | 32,56,RM |
| Aleksandrovsk coal region | coal | 50 00N | 142 45E | 34 |
| Aleksandrovsk-Sakhalinskiy | ppl | 50 54N | 142 10E | 57,RM |
| Alekseyevka | oilf | 52 34N | 051 07E | 20 |
| Alenkin | oilf | 60 29N | 077 10E | 16 |
| Aleysk | ppl | 52 28N | 082 45E | RM |
| Ali-Bayramly | ppl | 39 55N | 048 56E | RM |
| Ali-Bayramly | thep | NA | NA | 49,67 |
| Alma-Ata | ppl | 43 15N | 076 57E | 32,55,56,79,RM |
| Alma-Atinskaya Oblast' | admd | 44 00N | 076 00E | 79 |
| Almalyk | ppl | 40 50N | 069 35E | RM |
| Altai Mountains | mts | 48 00N | 090 00E | RM |
| Altayskiy Kray | admd | 52 30N | 083 00E | 79 |
| Alushta | ppl | 44 40N | 034 25E | 62,RM |
| Alyab'yevo | oilf | 53 15N | 053 48E | 20 |
| Alytus | ppl | 54 24N | 024 03E | RM |
| Amangel'dy | ppl | 50 10N | 065 13E | 56,RM |
| Amderma | ppl | 69 45N | 061 39E | RM |
| Amga | stm | 62 38N | 134 32E | 11,RM |
| Amgun' | stm | 52 56N | 139 38E | 11,RM |
| Amu Darya | stm | 43 40N | 059 01E | 21,RM |
| Amur | stm | 52 56N | 141 10E | 11,RM |
| Amursk | ppl | 50 14N | 136 54E | RM |
| Amurskaya Oblast' | admd | 54 00N | 128 00E | 79 |
| Anabar | stm | 73 08N | 113 36E | RM |
| Anadyr' | ppl | 64 45N | 177 29E | 57,59,RM |
| Anadyr' | stm | 64 54N | 176 13E | RM |
| Anadyr' coal basin | coal | 65 00N | 174 00E | 34,40 |
| Anadyr' coal deposit | coal | 65 00N | 177 30E | 34 |
| Anadyrskiy Zaliv | gulf | 64 00N | 178 00W | RM |
| Andizhan | ppl | 40 45N | 072 22E | 56,79,RM |
| Andizhanskaya Oblast' | admd | 40 45N | 072 00E | 79 |
| Andropov | ppl | 58 03N | 038 50E | 32,RM |
| Angara | stm | 58 06N | 093 00E | 50,51,60,67,RM |
| Angarsk | ppl | 52 34N | 103 54E | RM |
| Angarsk | petr | NA | NA | 31,66 |
| Angren | ppl | 41 01N | 070 12E | 60,RM |
| Angren coal deposit | coal | 41 09N | 070 00E | 34 |
| Anzhero-Sudzhensk | ppl | 56 07N | 086 01E | 60,RM |
| Anzhero-Sudzhensk coal deposit | coal | 56 10N | 086 00E | 34 |
| Apatity | ppl | 67 34N | 033 22E | RM |
| April 28 | oilf | 39 52N | 050 50E | 21 |
| Aral Sea | sea | 45 00N | 060 00E | RM |
| Aral'sk | ppl | 46 48N | 061 40E | 56,59,RM |
| Aras | stm | 39 59N | 048 20E | 21 |
| Arenets | gasf | 64 51N | 057 43E | 20 |
| Argun | stm | 53 20N | 121 28E | RM |
| Ariadnoye | ppl | 45 09N | 134 21E | RM |
| Arkagala | ppl | 63 09N | 146 47E | 57,59,RM |
| Arkagala coal deposit | coal | 63 25N | 147 00E | 34 |
| Arkalyk | ppl | 50 13N | 066 50E | 79,RM |
| Arkhangel'sk | ppl | 64 34N | 040 32E | 56,59,79,RM |
| Arkhangel'skaya Oblast' | admd | 64 00N | 044 00E | 79 |
| Arkticheskiy | gasf | 69 46N | 070 49E | 16,66 |
| Arlan | oilf | 55 59N | 054 13E | 20,22,66 |
| Armavir | ppl | 45 00N | 041 08E | RM |
| Armenian | nucp | NA | NA | 52,67 |
| Armenian SSR | admd | 40 00N | 045 00E | 21,79 |
| Arsen'yev | ppl | 44 10N | 133 15E | RM |
| Artëm | ppl | 43 22N | 132 13E | RM |
| Artëm | oilf | 40 28N | 050 22E | 21 |
| Artëm coal deposit | coal | 43 30N | 132 19E | 34 |
| Artëmovsk | ppl | 54 21N | 093 26E | 57,RM |
| Artëmovskiy coal deposit | coal | 57 30N | 061 30E | 34 |
| Arys' | ppl | 42 26N | 068 48E | 56,RM |
| Arzamas | ppl | 55 23N | 043 50E | 56,RM |
| Asar | gasf | 43 30N | 052 33E | 21 |
| Ashkhabad | ppl | 37 57N | 058 23E | 21,56,61,79,RM |
| Ashkhabadskaya Oblast' | admd | 39 00N | 059 00E | 79 |
| Asino | ppl | 57 00N | 086 09E | RM |
| Askiz | ppl | 53 08N | 090 32E | 56,RM |
| Astara | ppl | 38 26N | 048 53E | 21,56,RM |
| Astrakhan' | ppl | 46 21N | 048 03E | 21,25,55,56,79,RM |
| Astrakhan' | gasf | 46 58N | 048 16E | 21,23 |
| Astrakhanskaya Oblast' | admd | 47 00N | 048 00E | 79 |
| Atabay | gasf | 39 54N | 058 33E | 21 |
| Atbasar | ppl | 51 48N | 068 20E | RM |
| Atlasovo | ppl | 46 01N | 142 09E | RM |
| Avachinskaya, Sopka | volc | 53 15N | 158 49E | 64,RM |
| Ay Pim | oilf | 62 17N | 071 06E | 16 |
| Ay Yuan | oilf | 59 27N | 072 45E | 16 |
| Ayaguz | ppl | 47 56N | 080 23E | 56,RM |
| A (continued) | | | | |
| Aykhal | ppl | 66 00N | 111 30E | 57,59,RM |
| Ayon, Ostrov | isl | 66 50N | 168 40E | RM |
| Aysarinskoye | ppl | 53 16N | 071 46E | 56,RM |
| Azerbaijan | thep | NA | NA | 49,67 |
| Azerbaijan SSR | admd | 40 30N | 047 30E | 21,22,79 |
| Azov, Sea of | sea | 46 00N | 036 00E | RM |
| B | | | | |
| Bagadzha | gasf | 39 00N | 062 40E | 21 |
| Bagdarin | ppl | 54 26N | 113 36E | RM |
| Baikal-Amur Mainline (BAM) | rr | 56 30N | 118 00E | 11,RM |
| Baikal, Lake | lake | 54 00N | 109 00E | RM |
| Bakanas | ppl | 44 50N | 076 15E | 56,RM |
| Bakhar | oilf | 40 00N | 050 00E | 21 |
| Baku | ppl | 40 23N | 049 51E | 21,32,55,56,79, RM |
| Baku No. 2 | petr | NA | NA | 30,31,66 |
| Baku Waterfront Group | petr | NA | NA | 31,66 |
| Balagannakh | ppl | 64 30N | 143 50E | 57,RM |
| Balakovo | ppl | 52 02N | 047 47E | RM |
| Balakovo | nucp | NA | NA | 52,67 |
| Balashov | ppl | 51 32N | 043 08E | RM |
| Balkhash | ppl | 46 50N | 074 58E | 56,RM |
| Balkhash, Lake | lake | 46 00N | 074 00E | RM |
| Baltic | thep | NA | NA | 49,67 |
| Baltic oil and gas region | reg | 55 00N | 022 00E | 14,25,32 |
| Baltic oil shale deposit | oils | 59 04N | 028 17E | 44 |
| Baltic Economic Region | reg | 56 00N | 025 00E | 79 |
| Baltic Sea | sea | 56 00N | 018 00E | RM |
| Baltiysk | ppl | 54 39N | 019 55E | RM |
| Bambuyka | ppl | 55 48N | 115 47E | 59,RM |
| Bamovskaya | ppl | 54 08N | 123 42E | 11,RM |
| Barabinsk | ppl | 55 21N | 078 21E | RM |
| Baranovichi | ppl | 53 08N | 026 02E | RM |
| Barents Sea | sea | 74 00N | 036 00E | RM |
| Barguzin | ppl | 53 37N | 109 37E | 57,RM |
| Barinovka | oilf | 52 58N | 050 43E | 20 |
| Barnaul | ppl | 53 22N | 083 45E | 55,56,79,RM |
| Barsa-Gel'mes | oilf | 39 04N | 054 00E | 21,66 |
| Bashkir | nucp | NA | NA | 52,67 |
| Bashkirskaya ASSR | admd | 54 00N | 056 00E | 20,79 |
| Bastryk | oilf | 55 23N | 052 21E | 20 |
| Batagay | ppl | 67 38N | 134 38E | RM |
| Batumi | ppl | 41 38N | 041 38E | 21,32,56,79,RM |
| Batumi | petr | NA | NA | 31,66 |
| Batyrbay | oilf | 56 49N | 055 55E | 20 |
| Bavly | oilf | 54 30N | 053 11E | 20,66 |
| Baydaratskaya Guba | bay | 69 00N | 067 30E | 16 |
| Baykal | ppl | 51 53N | 104 47E | RM |
| Baykonur | ppl | 47 50N | 066 03E | 56,RM |
| Bayram-Ali | gasf | 37 50N | 062 06E | 21 |
| Bekabad | ppl | 40 13N | 069 14E | RM |
| Bekdash | ppl | 41 34N | 052 32E | 56,RM |
| Bel'kovskiy, Ostrov | isl | 75 32N | 135 44E | RM |
| Bel'tsy | ppl | 47 46N | 027 56E | 56,RM |
| Belaya | stm | 55 54N | 053 33E | 20,RM |
| Belaya Tserkov' | ppl | 49 47N | 030 07E | RM |
| Belebey | oilf | 54 10N | 053 55E | 20 |
| Belgorod | ppl | 50 36N | 036 34E | 79,RM |
| Belgorod-Dnestrovskiy | ppl | 46 12N | 030 21E | RM |
| Belgorodskaya Oblast' | admd | 50 45N | 037 30E | 79 |
| Belogorsk | ppl | 50 55N | 128 28E | RM |
| Belogorsk | ppl | 55 02N | 088 28E | 60,RM |
| Belokurikha | ppl | 51 59N | 084 59E | RM |
| Belomorsk | ppl | 64 32N | 034 48E | RM |
| Beloretsk | ppl | 53 58N | 058 24E | RM |
| Belorussia Economic Region | reg | 53 00N | 028 00E | 79 |
| Belorussian oil shale deposit | oils | 53 46N | 029 14E | 44 |
| Belorussian SSR | admd | 53 00N | 028 00E | 79 |
| Belovo | ppl | 54 25N | 086 18E | 38,RM |
| Belovo | thep | NA | NA | 49,67 |
| Beloyarskiy | ppl | 56 45N | 061 24E | RM |
| Beloyarskiy | ppl | 63 43N | 066 40E | 16,RM |
| Beloyarskiy | nucp | NA | NA | 52,67 |
| Belyy Yar | ppl | 58 26N | 085 01E | 60,RM |
| Belyy, Ostrov | isl | 73 10N | 070 45E | RM |
| Bendery | ppl | 46 49N | 029 29E | RM |
| Bennetta, Ostrov | isl | 76 21N | 148 56E | RM |
| Benoy | oilf | 42 42N | 046 29E | 21 |
| Berdsk | ppl | 54 47N | 083 02E | RM |
| Berdyansk | ppl | 46 45N | 036 47E | RM |
| Berdyanskoye | gasf | 51 14N | 055 05E | 20 |
| Berezniki | ppl | 59 24N | 056 46E | RM |
| Berëzovo | ppl | 63 56N | 065 02E | 16,23,RM |
| Berëzovo | gasf | 63 36N | 064 24E | 16 |
| Berëzovo oil shale deposit | oils | 65 32N | 062 48E | 44 |
| Berëzovskoye | ppl | 55 50N | 089 36E | 60,RM |
| Berëzovskoye coal deposit | coal | 55 45N | 089 15E | 34,60 |
| Berëzovskoye-1 | thep | NA | NA | 49,60,67 |
| Berëzovyy | ppl | 51 40N | 135 42E | RM |
| Bering Sea | sea | 60 00N | 175 00W | RM |
| Bering Strait | strt | 66 00N | 169 00W | RM |
| Beringovskiy | ppl | 63 03N | 179 19E | RM |
| Beringovskiy coal deposit | coal | 63 00N | 178 40E | 34 |
| Berkakit | ppl | 56 34N | 124 48E | 11,RM |
| Beshkul' | oilf | 46 13N | 046 34E | 21 |
| Bestyakh | ppl | 61 24N | 128 50E | 32,RM |
| Betpak-Dala Desert | dst | 46 00N | 070 00E | RM |
| Beurdeshik | gasf | 39 17N | 060 36E | 21 |
| Beyneu | ppl | 45 11N | 055 06E | 21,32,56,59,RM |
| Bezmein | ppl | 38 05N | 058 12E | 21,RM |
| Bidzhan | ppl | 47 58N | 131 56E | 57,RM |
| Bikin | ppl | 46 48N | 134 16E | 57,RM |
| Bikin coal deposit | coal | 46 53N | 134 14E | 34 |
| Bilibino | ppl | 68 03N | 166 20E | 57,59,RM |
| Bilibino ATETs | nucp | NA | NA | 52,67 |
| Binagadi tar sands deposit | tars | 40 05N | 048 57E | 45 |
| Birobidzhan | ppl | 48 48N | 137 57E | 57,RM |
| Biryusa | stm | 57 43N | 095 24E | 60 |
| Biya | stm | 52 25N | 085 00E | RM |
| Biysk | ppl | 52 34N | 085 15E | 56,RM |
| Black Sea | sea | 43 00N | 035 00E | RM |
| Blagoveshchensk | ppl | 50 16N | 127 32E | 79,RM |
| Blagoyevo | ppl | 63 25N | 074 56E | RM |
| Bobrovka | oilf | 52 32N | 051 36E | 20 |
| Bobruysk | ppl | 53 09N | 029 14E | RM |
| Bodaybo | ppl | 57 51N | 114 10E | RM |
| Boguchany | ppl | 58 23N | 097 29E | RM |
| Boguchany | hydp | NA | NA | 50,67 |
| Bol'shaya Kuonamka | stm | 70 45N | 113 24E | RM |
| Bol'shevik, Ostrov | isl | 78 40N | 102 30E | RM |
| Bol'shoy Anyuy | stm | 68 30N | 160 49E | RM |
| Bol'shoy Begichëv, Ostrov | isl | 74 20N | 112 30E | RM |

B (continued)

| Name | Feature | Latitude | Longitude | Page |
|---|---|---|---|---|
| Bol'shoy Lyakhovskiy, Ostrov | isl | 73 35N | 142 00E | RM |
| Bol'shoy Pit | stm | 59 01N | 091 44E | 60 |
| Bol'shoy Yugan | stm | 61 01N | 073 24E | 16,RM |
| Bologoye | ppl | 57 24N | 034 02E | 56,RM |
| Bondyuzhskiy | oilf | 55 58N | 052 25E | 20 |
| Bor | ppl | 56 22N | 044 03E | RM |
| Borisoglebsk | ppl | 51 23N | 042 06E | RM |
| Borisov | ppl | 54 15N | 028 30E | RM |
| Borodino | ppl | 55 55N | 094 55E | 60,RM |
| Borovichi | ppl | 58 24N | 033 55E | RM |
| Borovka | oilf | 54 07N | 051 19E | 20 |
| Borzya | ppl | 50 24N | 116 31E | 57,RM |
| Bovanenko | gasf | 70 25N | 068 19E | 15,16,17,23,66 |
| Bovtyshka (Boltyshka) oil shale deposit | oils | 48 37N | 033 29E | 44 |
| Bratsk | ppl | 56 21N | 101 55E | 55,57,59,60,RM |
| Bratsk | hydp | NA | NA | 50,51,58,67 |
| Bratskoye Vodokhranilishche | resv | 56 05N | 101 50E | 60,RM |
| Brest | ppl | 52 06N | 023 42E | 32,56,79,RM |
| Brestskaya Oblast' | admd | 52 30N | 025 30E | 79 |
| Brezhnev | ppl | 55 42N | 052 19E | RM |
| Bryansk | ppl | 55 15N | 034 22E | 56,79,RM |
| Bryanskaya Oblast' | admd | 53 00N | 033 30E | 79 |
| Budennovsk | ppl | 44 46N | 044 12E | 56,RM |
| Bugul'ma | ppl | 54 33N | 052 48E | 56,RM |
| Buguruslan | ppl | 53 39N | 052 26E | RM |
| Buguruslan | oilf | 53 39N | 052 32E | 20 |
| Bukachacha | ppl | 52 59N | 116 55E | RM |
| Bukachacha coal deposit | coal | 53 00N | 117 00E | 34 |
| Bukhara | ppl | 39 48N | 064 25E | 21,56,61,62,79 |
| Bukharskaya Oblast' | admd | 41 00N | 064 00E | 79 |
| Bulla-More | gasf | 39 45N | 049 49E | 21 |
| Buor-Khaya, Guba | bay | 71 30N | 131 00E | RM |
| Bureya | stm | 49 27N | 129 30E | 50,51,67 |
| Bureya | hydp | NA | NA | 50,67 |
| Bureya coal basin | coal | 51 00N | 132 30E | 34,40 |
| Burkand'ya | ppl | 63 19N | 147 30E | RM |
| Burshtyn | ppl | 49 16N | 024 38E | RM |
| Burshtyn | thep | NA | NA | 49,67 |
| Buryatskaya ASSR | admd | 53 00N | 109 00E | 79 |
| Buy | ppl | 58 29N | 041 30E | RM |
| Buzachi Peninsula | pen | 45 00N | 052 00E | 21,RM |
| Buzuluk | ppl | 52 47N | 052 15E | RM |
| Byrranga Mountains | mts | 75 00N | 104 00E | RM |
| Bystrin | oilf | 61 37N | 072 53E | 16 |
| Bytantay | stm | 68 46N | 134 20E | RM |

C

| Name | Feature | Latitude | Longitude | Page |
|---|---|---|---|---|
| Carpathian Mountains | mts | 47 00N | 025 30E | RM |
| Caspian Lowland | pln | 48 00N | 052 00E | RM |
| Caspian Sea | sea | 42 00N | 050 00E | 21,RM |
| Caucasus Mountains | mts | 42 00N | 045 00E | 21,RM |
| Center power system | reg | 54 00N | 038 00E | 46,55 |
| Central coal region | coal | 48 00N | 142 15E | 34 |
| Central Asia oil and gas region | reg | 40 00N | 060 00E | 14,15,21,22,23, 25,32 |
| Central Asia power system | reg | 40 00N | 068 00E | 46,55 |
| Central Asia Economic Region | reg | 39 00N | 066 00E | 79 |
| Central Chernozem Economic Region | reg | 51 00N | 040 00E | 79 |
| Central Economic Region | reg | 56 00N | 038 00E | 79 |
| Central Range | mts | 56 00N | 158 00E | RM |
| Central Russian Upland | upld | 52 00N | 038 00E | RM |
| Central Siberian Plateau | plat | 66 00N | 106 00E | RM |
| Chadan | ppl | 51 17N | 091 35E | RM |
| Chaladidi | oilf | 42 06N | 041 49E | 21 |
| Chany, Ozero | lake | 54 50N | 077 30E | RM |
| Chara | stm | 60 22N | 120 50E | RM |
| Chardzhou | ppl | 39 06N | 063 34E | 21,56,79,RM |
| Chardzhouskaya Oblast' | admd | 39 00N | 063 00E | 79 |
| Charkesar uranium deposit | u/t | NA | NA | 42,43 |
| Charsk | ppl | 49 34N | 081 05E | 56,RM |
| Chaun-Chukotka coal area | coal | 66 30N | 178 00E | 34 |
| Chavlisay-Krasnogorskiy-Yangiabad uranium deposit | u/t | NA | NA | 42,43 |
| Chayek | ppl | 41 55N | 074 30E | 56,RM |
| Chaykovskiy | ppl | 56 47N | 054 09E | RM |
| Chayvo | oilf | 52 31N | 143 46E | 11 |
| Chebach'ye | oilf | 60 27N | 078 47E | 16 |
| Cheboksary | ppl | 56 09N | 047 15E | 56,79,RM |
| Cheboksary | hydp | NA | NA | 50,51,67 |
| Checheno-Ingushskaya ASSR | admd | 43 15N | 045 30E | 21,79 |
| Chegdomyn | ppl | 51 10N | 133 05E | 57,RM |
| Chekmagush | oilf | 55 12N | 054 44E | 20 |
| Cheleken | ppl | 39 26N | 053 07E | 56,RM |
| Cheleken | oilf | 39 14N | 053 27E | 21 |
| Chelkar | ppl | 47 50N | 059 36E | 56,59,RM |
| Chelny | ppl | 48 53N | 136 02E | RM |
| Chelyabinsk | ppl | 55 10N | 061 24E | 32,55,56,79,RM |
| Chelyabinsk coal basin | coal | 52 00N | 062 15E | 34 |
| Chelyabinskaya Oblast' | admd | 54 00N | 060 30E | 79 |
| Cheremkhovo | ppl | 53 09N | 103 05E | 57,RM |
| Cheremkhovo coal deposit | coal | 53 00N | 102 30E | 34 |
| Cheremkhovo oil shale deposit | oils | 53 59N | 101 41E | 44 |
| Cheremshan | oilf | 54 44N | 051 28E | 20 |
| Cherëmushki | ppl | 52 52N | 091 24E | RM |
| Cherepet' | ppl | 54 07N | 036 23E | RM |
| Cherepet' | thep | NA | NA | 49,67 |
| Cherepovets | ppl | 59 08N | 037 54E | 56,RM |
| Cherkasskaya Oblast' | admd | 49 00N | 031 00E | 79 |
| Cherkassy | ppl | 49 26N | 032 04E | 79,RM |
| Cherkessk | ppl | 44 14N | 042 03E | RM |
| Chermoz | oilf | 58 49N | 056 00E | 20 |
| Chernigov | ppl | 51 30N | 031 18E | 79,RM |
| Chernigovskaya Oblast' | admd | 51 00N | 032 00E | 79 |
| Chernobyl' | ppl | 51 16N | 030 14E | RM |
| Chernobyl' | nucp | NA | NA | 52,67 |
| Chernogorsk | ppl | 53 49N | 091 18E | RM |
| Chernogorsk coal deposit | coal | 53 45N | 091 00E | 34 |
| Chernovitskaya Oblast' | admd | 48 15N | 026 00E | 79 |
| Chernovskiye Kopi coal deposit | coal | 52 05N | 112 45E | 34 |
| Chernovtsy | ppl | 48 18N | 025 56E | 56,79,RM |
| Chernyakhovsk | ppl | 54 38N | 021 49E | RM |
| Chernyayevo | ppl | 52 46N | 125 59E | RM |
| Chernyshevsk | ppl | 52 32N | 117 00E | 57,RM |
| Chernyshevskiy | ppl | 62 59N | 112 35E | 57,58,59,RM |
| Cherskiy | ppl | 68 45N | 161 18E | 57,RM |
| Cherskiy Range | mts | 65 00N | 144 00E | RM |
| Chervonograd | ppl | 50 23N | 024 14E | RM |
| Chëshakaya Guba | bay | 67 30N | 046 30E | 20,RM |
| Chib'yu | oilf | 63 56N | 053 44E | 20 |
| Chiganak | ppl | 45 06N | 073 58E | 48,RM |
| Chigirik uranium processing center | u/t | NA | NA | 42,43 |
| Chiili | ppl | 44 10N | 066 45E | 56,RM |
| Chimkent | ppl | 42 18N | 069 36E | 32,56,79,RM |

C (continued)

| Name | Feature | Latitude | Longitude | Page |
|---|---|---|---|---|
| Chimkent | petr | NA | NA | 31,66 |
| Chimkentskaya Oblast' | admd | 43 00N | 068 00E | 79 |
| Chirchik | ppl | 41 29N | 069 35E | 61,62,RM |
| Chirkey | hydp | NA | NA | 50,67 |
| Chistopol' | ppl | 55 21N | 050 37E | RM |
| Chita | ppl | 52 03N | 113 30E | 57,79,RM |
| Chitinskaya Oblast' | admd | 52 00N | 117 00E | 79 |
| Chkalovsk uranium deposit/processing center | u/t | NA | NA | 42,43 |
| Chokurdakh | ppl | 70 38N | 147 55E | RM |
| Chu | ppl | 43 36N | 073 42E | 56,RM |
| Chuguyevka | ppl | 44 10N | 133 52E | 57,RM |
| Chukchi Sea | sea | 69 00N | 174 00W | RM |
| Chukotsk Peninsula | pen | 66 00N | 174 00W | RM |
| Chukotsk Upland | mts | 67 00N | 176 00E | RM |
| Chukotskiy AOk | admd | 67 30N | 170 00E | 79 |
| Chul'man | ppl | 56 52N | 124 52E | 11,57,RM |
| Chul'man coal deposit | coal | 56 45N | 125 00E | 11,34 |
| Chulym | ppl | 55 06N | 080 58E | 56,RM |
| Chulym | stm | 57 43N | 083 51E | 60,RM |
| Chuna | stm | 57 47N | 094 37E | 60,RM |
| Chuna tar sands deposit | tars | 57 35N | 097 12E | 45 |
| Chunya | stm | 61 36N | 096 30E | RM |
| Chupa | ppl | 66 16N | 033 04E | RM |
| Chupa District uranium deposit | u/t | NA | NA | 42,43 |
| Chupal'skoye | oilf | 60 04N | 072 38E | 16 |
| Chusovaya | stm | 58 13N | 056 22E | 20 |
| Chusovoy | ppl | 58 17N | 057 49E | 56,RM |
| Chutyr' | oilf | 57 26N | 053 12E | 20 |
| Chuvashskaya ASSR | admd | 55 30N | 047 00E | 79 |
| Chuya | stm | 50 24N | 086 39E | RM |
| Crimea | nucp | NA | NA | 52,67 |
| Crimean Peninsula | pen | 45 00N | 034 00E | RM |

D

| Name | Feature | Latitude | Longitude | Page |
|---|---|---|---|---|
| Dagestanskaya ASSR | admd | 43 00N | 047 00E | 21,64,79 |
| Dal'mamedly | oilf | 40 40N | 045 59E | 21 |
| Dal'negorsk | ppl | 44 35N | 135 35E | 57,RM |
| Dal'nerechensk | ppl | 45 55N | 133 40E | RM |
| Dalakhay | ppl | 50 50N | 102 48E | RM |
| Danilov | ppl | 58 12N | 040 10E | RM |
| Danilov | oilf | 60 56N | 064 05E | 16 |
| Daugava | stm | 57 00N | 024 00E | RM |
| Daugavpils | ppl | 55 53N | 026 32E | RM |
| De-Kastri | ppl | 51 28N | 140 47E | RM |
| Debin | ppl | 62 22N | 150 12E | 57,RM |
| Dekabr'skoye | oilf | 62 08N | 070 06E | 16 |
| Dëma | stm | 54 42N | 056 00E | 20 |
| Demskoye | oilf | 53 40N | 054 11E | 20 |
| Denau | ppl | 38 16N | 067 54E | 56,RM |
| Dengizkul' | gasf | 39 28N | 064 40E | 21 |
| Deputatskiy | ppl | 69 18N | 138 54E | RM |
| Derbent | ppl | 42 03N | 048 18E | RM |
| Desna | stm | 50 33N | 030 32E | RM |
| Desovskoye iron ore deposit | iron | 57 30N | 124 15E | 11 |
| Dikson | ppl | 73 30N | 080 35E | 59,RM |
| Dimitrovgrad | ppl | 54 14N | 049 33E | RM |
| Dimitrovgrad | nucp | NA | NA | 67 |
| Dmitriya Lapteva, Proliv | strt | 73 00N | 142 00E | RM |
| Dnepr | stm | 43 30N | 032 18E | 50,51,67,RM |
| Dnepr at Zaporozh'ye | hydp | NA | NA | 50,67 |
| Dnepr coal basin | coal | 48 00N | 032 00E | 34,40 |
| Dnepr Lowland | pln | 50 00N | 032 00E | RM |
| Dnepr Upland | upld | 49 00N | 028 00E | RM |
| Dnepropetrovsk | ppl | 48 27N | 034 59E | 56,79,RM |
| Dnepropetrovskaya Oblast' | admd | 48 30N | 035 00E | 79 |
| Dnestr | stm | 46 18N | 030 17E | RM |
| Dno | ppl | 57 50N | 029 59E | RM |
| Dolgozhdannoye coal deposit | coal | 68 00N | 172 30E | 34 |
| Dolina | ppl | 48 58N | 024 01E | RM |
| Dolinsk | ppl | 47 21N | 142 48E | 57,RM |
| Don | stm | 47 04N | 039 18E | 53,RM |
| Donets coal basin | coal | 48 00N | 039 00E | 34,35,36,37,38 40,41 |
| Donetsk | ppl | 48 00N | 037 48E | 55,56,79,RM |
| Donetsk coal deposit | coal | 47 50N | 037 50E | 34 |
| Donetskaya Oblast' | admd | 48 00N | 037 30E | 79 |
| Dorokhovka | oilf | 56 38N | 056 57E | 20 |
| Dossor | ppl | 47 32N | 053 00E | 56,RM |
| Dossor | oilf | 47 34N | 052 56E | 21 |
| Drogobych No. 1 | petr | NA | NA | 31,66 |
| Drogobych No. 2 | petr | NA | NA | 31,66 |
| Drovyanaya | ppl | 51 53N | 113 02E | RM |
| Druzhba | ppl | 45 17N | 082 30E | RM |
| Dubinino | ppl | 55 40N | 089 06E | 60,RM |
| Dudinka | ppl | 69 25N | 086 15E | 16,57,RM |
| Dukat | ppl | 62 45N | 155 15E | RM |
| Dulgalakh | stm | 67 44N | 133 12E | RM |
| Dunay | ppl | 42 52N | 132 22E | RM |
| Dushanbe | ppl | 38 33N | 068 48E | 55,56,79,RM |
| Dzerzhinsk | ppl | 56 15N | 043 24E | RM |
| Dzh'yer | oilf | 63 17N | 054 58E | 20 |
| Dzhalal-Abad | ppl | 40 56N | 073 00E | RM |
| Dzhalinda | ppl | 53 29N | 123 54E | 11,RM |
| Dzhambul | ppl | 42 54N | 071 22E | 56,79,RM |
| Dzhambul | thep | NA | NA | 49,67 |
| Dzhambulskaya Oblast' | admd | 44 00N | 072 00E | 79 |
| Dzhansugurov | ppl | 45 24N | 079 29E | 56,RM |
| Dzhebariki-Khaya coal deposit | coal | 62 25N | 136 30E | 34 |
| Dzhebol' | gasf | 62 26N | 056 30E | 20 |
| Dzhergalan coal deposit | coal | 42 33N | 079 03E | 34 |
| Dzhetygara | ppl | 52 11N | 061 12E | 56,RM |
| Dzhezkazgan | ppl | 47 47N | 067 46E | 56,59,RM |
| Dzhezkazganskaya Oblast' | admd | 47 30N | 071 00E | 79 |
| Dzhizak | ppl | 40 06N | 067 50E | 79,RM |
| Dzhizakskaya Oblast' | admd | 40 30N | 067 40E | 79 |
| Dzhugdzhur Range | mts | 58 00N | 136 00E | RM |
| Dzhul'fa | ppl | 38 57N | 045 38E | RM |

E

| Name | Feature | Latitude | Longitude | Page |
|---|---|---|---|---|
| East Kamchatka coal area | coal | 56 00N | 162 00E | 34 |
| East Siberia Economic Region | reg | 61 00N | 099 00E | 79 |
| East Siberian oil and gas region | reg | 64 00N | 126 00E | 14,15,25,32 |
| East Siberian Sea | sea | 74 00N | 166 00E | RM |
| Egvekinot | ppl | 66 19N | 179 10W | 57,59,RM |
| Ekibastuz | ppl | 51 40N | 075 22E | 55,56,RM |
| Ekibastuz coal basin | coal | 51 30N | 075 30E | 34,35,36,37,38 39,40 |
| Ekibastuz-1 | thep | NA | NA | 47,48,49,55,67 |
| Ekibastuz-2 | thep | NA | NA | 49,67 |
| El'dikan | ppl | 60 48N | 135 11E | 59,RM |
| El'ginskiy | ppl | 64 35N | 141 47E | RM |

| Name | Feature | Latitude | Longitude | Page |
|---|---|---|---|---|
| E (continued) | | | | |
| Elista | ppl | 46 16N | 044 14E | 21,56,79,RM |
| Emba | ppl | 48 50N | 058 08E | 56,RM |
| Emba | stm | 46 38N | 053 14E | 21 |
| Emba/Caspian tar sands deposit | tars | 47 47N | 050 10E | 45 |
| Engel's | ppl | 51 30N | 046 07E | RM |
| Erozionnyy | ppl | 65 46N | 149 44E | RM |
| Erzin | ppl | 50 15N | 095 10E | 57,RM |
| Estonia | thep | NA | NA | 44,49,67 |
| Estonian oil shale field | oils | 59 07N | 027 23E | 44 |
| Estonian SSR | admd | 59 00N | 026 00E | 79 |
| Evenkiyskiy AO | admd | 65 00N | 095 00E | 79 |
| Export pipeline | pipe | 55 45N | 049 00E | 10,11,20,32,33 |
| F | | | | |
| Far East power system | reg | 51 00N | 134 00E | 46,55 |
| Far East Economic Region | reg | 63 00N | 143 00E | 79 |
| Farab | gasf | 39 16N | 063 27E | 21 |
| Fedorovo | oilf | 61 40N | 073 32E | 16,17,22,29,66 |
| Fergana | ppl | 40 23N | 071 46E | 79,RM |
| Fergana | petr | NA | NA | 31,66 |
| Fergana Valley tar sands deposit | tars | 42 41N | 073 21E | 45 |
| Ferganskaya Oblast' | admd | 40 30N | 071 30E | 79 |
| Fevral'sk | ppl | 52 28N | 130 43E | RM |
| Finland, Gulf of | gulf | 60 00N | 027 00E | RM |
| Fominovka | oilf | 54 13N | 053 09E | 20 |
| Fort-Shevchenko | ppl | 44 31N | 050 16E | RM |
| Franz Josef Land | isls | 81 00N | 055 00E | RM |
| Franz Josef Land tar sands deposit | tars | 80 30N | 049 00E | 45 |
| Frolovo | ppl | 49 46N | 043 40E | RM |
| Frunze | ppl | 42 54N | 074 36E | 55,56,79,RM |
| G | | | | |
| Gayny | ppl | 60 18N | 054 19E | 56,RM |
| Gayvoron | ppl | 48 21N | 029 51E | 56,RM |
| Gazli | ppl | 40 14N | 063 24E | 56,RM |
| Gazli | gasf | 40 04N | 063 21E | 21,66 |
| Genriyetty, Ostrov | isl | 77 06N | 156 30E | RM |
| Georga, Zemlya | isl | 80 30N | 049 00E | RM |
| Georgian SSR | admd | 42 00N | 043 30E | 21,79 |
| Georgiu-Dezh | ppl | 50 59N | 039 30E | 56,RM |
| Georgiyevsk | ppl | 44 09N | 042 28E | RM |
| Geral'd, Ostrov | isl | 71 23N | 175 40W | RM |
| Gilyuy | stm | 53 58N | 127 28E | 11,RM |
| Glazov | ppl | 58 09N | 052 40E | RM |
| Gogran'dag | gasf | 38 44N | 054 27E | 21 |
| Gomel' | ppl | 52 25N | 031 00E | 56,79,RM |
| Gomel'skaya Oblast' | admd | 52 00N | 030 00E | 79 |
| Gonam | stm | 57 21N | 131 14E | 11 |
| Gor'kiy | ppl | 56 20N | 044 00E | 32,56,79,RM |
| Gor'kiy (Kstovo) | petr | NA | NA | 31,66 |
| Gor'kiy AST | nucp | NA | NA | 52,53,67 |
| Gor'kiy 26 Bakinskikh | petr | NA | NA | 31,66 |
| Gor'kovskaya Oblast' | admd | 56 00N | 045 00E | 79 |
| Gori | ppl | 41 48N | 044 07E | RM |
| Gorlovka | ppl | 48 18N | 038 03E | RM |
| Gorno-Altaysk | ppl | 51 58N | 085 58E | 56,RM |
| Gorno-Altayskaya AO | admd | 51 00N | 086 00E | 79 |
| Gorno-Badakhshanskaya AO | admd | 38 00N | 073 00E | 79 |
| Gornozavodsk | ppl | 46 34N | 141 49E | 57,RM |
| Gornyak | ppl | 51 00N | 081 29E | RM |
| Goryachegorsk | ppl | 55 24N | 088 55E | 60,RM |
| Gotval'd | ppl | 49 41N | 036 21E | RM |
| Gozhan | oilf | 56 31N | 055 08E | 20 |
| Grakhovo | oilf | 56 04N | 051 55E | 20 |
| Granitogorsk | ppl | 42 44N | 073 27E | RM |
| Granitogorsk uranium deposit/processing center | u/t | NA | NA | 42,43 |
| Greem-Bell, Ostrov | isl | 81 10N | 064 00E | RM |
| Gremikha | oilf | 56 52N | 053 48E | 20 |
| Grodnenskaya Oblast' | admd | 53 30N | 024 30E | 79 |
| Grodno | ppl | 53 41N | 023 50E | 79,RM |
| Groznyy | ppl | 43 20N | 045 42E | 21,56,79,RM |
| Groznyy tar sands deposit | tars | 44 23N | 044 44E | 45 |
| Groznyy Group | petr | NA | NA | 31,66 |
| Groznyy No. 2 | petr | NA | NA | 31,66 |
| Groznyy No. 3 | petr | NA | NA | 31,66 |
| Gryazi | ppl | 52 30N | 040 00E | RM |
| Gubino | oilf | 53 18N | 048 41E | 20 |
| Gubkin | ppl | 51 17N | 037 32E | 56,RM |
| Gubkin | gasf | 64 45N | 077 14E | 16,66 |
| Gubkin | gasf | 39 33N | 052 22E | 21 |
| Gudermes | oilf | 43 05N | 046 20E | 21 |
| Gugurtli | gasf | 40 04N | 062 16E | 21,66 |
| Gulistan | ppl | 40 29N | 068 46E | 79,RM |
| Gun"yegan | oilf | 61 41N | 077 46E | 16 |
| Gur'yev | ppl | 47 07N | 051 53E | 21,32,56,59,79,RM |
| Gur'yev | petr | NA | NA | 31,66 |
| Gur'yevskaya Oblast' | admd | 45 00N | 053 00E | 79 |
| Gus' Khrustal'nyy | ppl | 55 37N | 040 40E | RM |
| Gusinoozërsk | ppl | 51 17N | 106 30E | 57,RM |
| Gusinoozërsk | thep | NA | NA | 49,67 |
| Gusinoozërsk coal deposit | coal | 51 30N | 106 00E | 34 |
| Guzar | ppl | 38 36N | 066 15E | 56,RM |
| Gydan Peninsula | pen | 70 50N | 079 00E | 16,RM |
| H | | | | |
| Haapsalu | ppl | 58 56N | 023 33E | 56,RM |
| Habomai Islands | isls | 43 30N | 146 10E | RM |
| Hiiumaa | isl | 58 50N | 022 40E | RM |
| I | | | | |
| Igarka | ppl | 67 28N | 086 35E | 57,59,RM |
| Ignalina | ppl | 55 21N | 026 10E | 53,RM |
| Ignalina | nucp | NA | NA | 52,53,67 |
| Igrim | gasf | 62 58N | 064 13E | 16 |
| Ik | stm | 55 55N | 052 36E | 20 |
| Il'pyrskiy | ppl | 59 56N | 164 10E | RM |
| Ili | stm | 45 24N | 074 08E | RM |
| Imeni Poliny Osipenko | ppl | 52 25N | 136 29E | RM |
| Inderborskiy | ppl | 48 33N | 051 47E | 56,RM |
| Indigirka | stm | 70 48N | 148 54E | RM |
| Ingoda | stm | 51 42N | 115 48E | RM |
| Inguri | stm | 42 24N | 041 33E | 50,51,67 |
| Inguri | hydp | NA | NA | 50,51,67 |
| Inta | ppl | 66 05N | 060 08E | 56,59,RM |
| Inta coal deposit | coal | 65 30N | 059 46E | 34 |
| Inya | stm | 54 59N | 082 59E | 60 |
| Inza | ppl | 53 51N | 046 21E | RM |
| Iokanga | ppl | 68 00N | 039 41E | 56,RM |
| I (continued) | | | | |
| Iony, Ostrov | isl | 56 26N | 143 25E | RM |
| Irbit | ppl | 57 41N | 063 03E | RM |
| Iriklinskiy | ppl | 51 39N | 058 38E | RM |
| Iriklinskiy | thep | NA | NA | 49,67 |
| Irkutsk | ppl | 52 16N | 104 20E | 32,55,57,79,RM |
| Irkutsk coal basin | coal | 53 00N | 102 30E | 34,35,40 |
| Irkutsk-10 Heat and Power | thep | NA | NA | 49,67 |
| Irkutskaya Oblast' | admd | 56 00N | 106 00E | 79 |
| Irsha | ppl | 55 55N | 094 48E | 60,RM |
| Irsha-Borodino coal deposit | coal | 55 45N | 095 13E | 34,60 |
| Irtysh | stm | 61 04N | 068 52E | 16,50,67,RM |
| Isakov | oilf | 64 30N | 056 03E | 20 |
| Ishim | ppl | 56 09N | 069 27E | 56,RM |
| Ishim | stm | 57 42N | 071 12E | RM |
| Ishimbay | ppl | 53 28N | 056 02E | RM |
| Ishimbay | oilf | 53 24N | 065 01E | 20 |
| Ishimbay | petr | NA | NA | 31,66 |
| Iskine | oilf | 47 10N | 052 38E | 21 |
| Iskitim | ppl | 54 37N | 083 24E | RM |
| Islim | gasf | 35 30N | 062 04E | 21 |
| Issyk-Kul', Ozero | lake | 42 25N | 077 15E | RM |
| Issyk-Kul'skaya Oblast' | admd | 42 30N | 078 00E | 79 |
| Istok | oilf | 58 47N | 057 00E | 20 |
| Istra | ppl | 55 55N | 036 52E | 62,RM |
| Itatskiy | ppl | 56 04N | 089 05E | 56,60,RM |
| Itatskiy coal deposit | coal | 56 15N | 089 00E | 34,60 |
| Iturup, Ostrov | isl | 45 00N | 148 00E | RM |
| Iul'tin | ppl | 67 50N | 178 48W | 57,RM |
| Ivano-Frankovsk | ppl | 48 56N | 024 43E | 79,RM |
| Ivano-Frankovskaya Oblast' | admd | 48 30N | 024 30E | 79 |
| Ivanovo | ppl | 57 00N | 040 59E | 79,RM |
| Ivanovskaya Oblast' | admd | 57 00N | 042 00E | 79 |
| Ivdel' | ppl | 60 42N | 060 24E | RM |
| Iya | stm | 55 33N | 102 07E | 60 |
| Izberbash | oilf | 42 13N | 047 58E | 21 |
| Izhma | stm | 65 19N | 052 54E | 20,RM |
| Izmail | ppl | 45 21N | 028 50E | 32,56,RM |
| Izvestkovyy | ppl | 48 59N | 131 33E | RM |
| Izyum | ppl | 49 12N | 037 19E | RM |
| J | | | | |
| Japan, Sea of | sea | 43 30N | 135 45E | RM |
| Jelgava | ppl | 56 39N | 023 42E | RM |
| Jūrmala | ppl | 56 58N | 023 34E | RM |
| K | | | | |
| Kabardino-Balkarskaya ASSR | admd | 43 30N | 043 30E | 79 |
| Kachug | ppl | 53 58N | 105 52E | 57,RM |
| Kadzhi-Say | ppl | 42 08N | 077 10E | RM |
| Kadzhi-Say uranium deposit | u/t | NA | NA | 42,43 |
| Kafan | ppl | 39 12N | 046 24E | RM |
| Kaišiadorys | ppl | 54 52N | 024 27E | 51,56,RM |
| Kaišiadorys | hydp | NA | NA | 50,67 |
| Kalach-na-Donu | ppl | 48 43N | 043 31E | RM |
| Kalai-Khumb | ppl | 38 28N | 070 46E | 56,RM |
| Kalamkas | oilf | 45 11N | 052 07E | 21 |
| Kalinin | ppl | 56 52N | 035 55E | 56,79,RM |
| Kalinin | nucp | NA | NA | 52,67 |
| Kaliningrad | ppl | 54 43N | 020 30E | 56,79,RM |
| Kaliningradskaya Oblast' | admd | 54 45N | 021 30E | 79 |
| Kalininskaya Oblast' | admd | 57 00N | 035 00E | 79 |
| Kalmykovo | ppl | 49 02N | 051 50E | 56,59,RM |
| Kalmytskaya ASSR | admd | 40 30N | 045 30E | 79 |
| Kaluga | ppl | 54 31N | 036 16E | 56,79,RM |
| Kalush | ppl | 49 01N | 024 22E | RM |
| Kaluzhskaya Oblast' | admd | 54 30N | 035 30E | 79 |
| Kama | stm | 55 25N | 050 40E | 20,50,51,67,RM |
| Kamchatka | stm | 56 15N | 162 30E | RM |
| Kamchatka Peninsula | pen | 56 00N | 160 00E | 64,RM |
| Kamchatskaya Oblast' | admd | 55 00N | 160 00E | 79 |
| Kamen' | ppl | 53 47N | 081 20E | RM |
| Kamen'-Rybolov | ppl | 44 45N | 132 04E | 57,RM |
| Kamenets-Podol'skiy | ppl | 48 40N | 026 34E | RM |
| Kamenka | ppl | 58 33N | 095 51E | RM |
| Kamenka | oilf | 65 03N | 056 31E | 20 |
| Kamennoye | oilf | 61 33N | 067 20E | 16 |
| Kamensk-Ural'skiy | ppl | 56 25N | 061 54E | RM |
| Kamskoye Vodokhranilishche | resv | 58 52N | 056 15E | 20 |
| Kamyshin | ppl | 50 06N | 045 24E | 56,RM |
| Kamyshldzha | oilf | 38 16N | 054 07E | 21 |
| Kan | stm | 56 31N | 093 47E | 60 |
| Kandry | oilf | 54 42N | 054 15E | 20 |
| Kandym | gasf | 39 27N | 063 31E | 21,66 |
| Kanin, Poluostrov | pen | 68 00N | 045 00E | RM |
| Kansk | ppl | 56 13N | 095 41E | 57,60,RM |
| Kansk-Achinsk coal basin | coal | 56 30N | 093 00E | 34,35,36,37,38,40,41,60 |
| Kansu | gasf | 42 45N | 054 30E | 21 |
| Kapchagay | ppl | 43 50N | 077 05E | RM |
| Kapustin Yar | ppl | 48 34N | 045 45E | RM |
| Kara Sea | sea | 76 00N | 080 00E | RM |
| Kara-Balta uranium processing center | u/t | NA | NA | 42,43 |
| Kara-Balty | ppl | 42 50N | 073 52E | RM |
| Kara-Bogaz-Gol, Zaliv | gulf | 41 00N | 053 15E | RM |
| Karaarn | oilf | 46 10N | 053 23E | 21 |
| Karabagly | oilf | 39 22N | 049 05E | 21 |
| Karabil' | gasf | 36 09N | 062 46E | 21 |
| Karabula | ppl | 58 02N | 097 23E | RM |
| Karabulak | oilf | 43 12N | 044 35E | 21 |
| Karabutak | ppl | 49 59N | 060 14E | 56,RM |
| Karacha-Yelga | oilf | 55 16N | 055 09E | 20 |
| Karachaganak | gasf | 51 16N | 053 27E | 20,23 |
| Karachayevo-Cherkesskaya AO | admd | 44 00N | 042 00E | 79 |
| Karachop | gasf | 35 20N | 062 28E | 21 |
| Karadag | oilf | 40 10N | 049 33E | 21 |
| Karaganda | ppl | 49 50N | 073 10E | 56,79,RM |
| Karaganda coal basin | coal | 49 45N | 073 00E | 34,35,36,37,40 |
| Karagandinskaya Oblast' | admd | 48 00N | 070 00E | 79 |
| Karagayly | ppl | 49 22N | 075 58E | 56,RM |
| Karaginskiy, Ostrov | isl | 58 50N | 164 00E | RM |
| Karakalpakskaya ASSR | admd | 43 00N | 059 00E | 79 |
| Karakum | gasf | 39 03N | 065 35E | 21 |
| Karakum Desert | dst | 39 00N | 060 00E | RM |
| Karakumskiy Kanal | can | 37 35N | 065 43E | RM |
| Karamov | oilf | 63 37N | 074 37E | 16 |
| Karashaganak | ppl | 51 27N | 053 25E | RM |
| Karasuk | ppl | 53 44N | 078 02E | 56,RM |
| Karatal | stm | 46 26N | 077 10E | RM |
| Karaton | oilf | 46 25N | 053 20E | 21 |
| Karazhal | ppl | 48 02N | 070 49E | 56,RM |
| Karazhanbas | oilf | 45 00N | 051 35E | 21 |

K (continued)

| Name | Feature | Latitude | Longitude | Page |
|---|---|---|---|---|
| Karel'skaya ASSR | admd | 64 00N | 032 30E | 79 |
| Kargaly | oilf | 54 37N | 054 45E | 20 |
| Karkaralinsk | ppl | 49 26N | 075 30E | RM |
| Karmanovo | ppl | 56 14N | 054 33E | RM |
| Karmanovo | thep | NA | NA | 49,67 |
| Karpinsk | ppl | 59 45N | 060 01E | RM |
| Karpogory | ppl | 63 59N | 044 27E | RM |
| Karsakpay | ppl | 47 50N | 066 45E | RM |
| Karshi | ppl | 38 53N | 065 48E | 56,79,RM |
| Karskiye Vorota, Proliv | strt | 70 30N | 058 00E | RM |
| Kartaly | ppl | 53 03N | 060 40E | RM |
| Kartashevka | oilf | 54 27N | 056 31E | 20 |
| Kartop'ya | oilf | 61 13N | 065 30E | 16 |
| Karymskoye | ppl | 51 37N | 114 21E | 57,RM |
| Kashira | ppl | 54 51N | 038 10E | RM |
| Kashira | thep | NA | NA | 49,67 |
| Kashkadar'inskaya Oblast' | admd | 39 00N | 066 00E | 79 |
| Kashpirovka oil shale deposit | oils | 52 44N | 049 20E | 44 |
| Kasimov | ppl | 54 56N | 041 24E | RM |
| Kaspiyskiy | oilf | 45 13N | 047 15E | 21 |
| Katangli | ppl | 51 42N | 143 14E | RM |
| Katsiveli | ppl | 44 25N | 034 03E | 62,RM |
| Kattakurgan | ppl | 39 55N | 066 15E | RM |
| Katun' | stm | 52 25N | 085 00E | RM |
| Katyl'ga | oilf | 59 18N | 077 08E | 16 |
| Kaunas | ppl | 54 54N | 023 54E | RM |
| Kavalerovo | ppl | 44 16N | 135 05E | 57,RM |
| Kayak coal deposit | coal | 67 30N | 104 00E | 34 |
| Kayakent | oilf | 41 57N | 048 12E | 21 |
| Kayasula | ppl | 44 19N | 045 00E | 64,RM |
| Kazakh SSR | admd | 48 00N | 068 00E | 20,21,22,79 |
| Kazakh Upland | reg | 49 00N | 072 00E | RM |
| Kazakhstan Economic Region | reg | 48 00N | 068 00E | 79 |
| Kazan' | ppl | 55 45N | 049 08E | 20,32,56,79,RM |
| Kazanbulak | oilf | 40 27N | 046 19E | 21 |
| Kazanchi | oilf | 56 17N | 056 22E | 20 |
| Kazantsevo | gasf | 69 47N | 083 18E | 16 |
| Kelif | ppl | 37 21N | 066 18E | 21,RM |
| Kemerovo | ppl | 55 20N | 086 05E | 60,79,RM |
| Kemerovo coal deposit | coal | 55 30N | 087 00E | 34 |
| Kemerovskaya Oblast' | admd | 55 00N | 086 00E | 79 |
| Kempendyay | ppl | 62 02N | 118 37E | RM |
| Kenderlyk oil shale deposit | oils | 47 15N | 084 15E | 44 |
| Kentau | ppl | 43 32N | 068 36E | 56,RM |
| Kerch' | ppl | 45 21N | 036 28E | 56,RM |
| Kerki | ppl | 37 50N | 065 12E | 56,RM |
| Kerkichi | ppl | 37 51N | 065 14E | RM |
| Ket' | stm | 58 55N | 081 32E | 60,RM |
| Khabarovsk | ppl | 48 30N | 135 06E | 55,57,79,RM |
| Khabarovsk | petr | NA | NA | 31,66 |
| Khabarovsk coal basin | coal | 45 45N | 135 00E | 34,40 |
| Khabarovskiy Kray | admd | 55 00N | 134 00E | 79 |
| Khachmas | ppl | 41 28N | 048 48E | 56,RM |
| Khakasskaya AO | admd | 53 00N | 090 00E | 79 |
| Khal'mer-Yu | ppl | 67 58N | 064 50E | 16,RM |
| Khampa | ppl | 63 43N | 122 59E | 32,RM |
| Khamza | ppl | 40 25N | 071 30E | RM |
| Khamza | petr | NA | NA | 31,66 |
| Khandagayty | ppl | 50 44N | 092 03E | RM |
| Khandyga | ppl | 62 40N | 135 36E | RM |
| Khanka, Lake | lake | 45 00N | 132 24E | RM |
| Khantayka | hydp | NA | NA | 58 |
| Khanty-Mansiysk | ppl | 61 00N | 069 06E | RM |
| Khanty-Mansiyskiy AOk | admd | 62 00N | 072 00E | 17,79 |
| Khapcheranga | ppl | 49 42N | 112 24E | RM |
| Khar'kov | ppl | 50 00N | 036 15E | 52,53,56,79,RM |
| Khar'kovskaya Oblast' | admd | 49 30N | 036 30E | 79 |
| Khar'yaga | oilf | 67 10N | 056 21E | 20 |
| Kharanor | thep | NA | NA | 49,67 |
| Kharanor coal deposit | coal | 50 15N | 117 00E | 34 |
| Kharasavey | gasf | 71 15N | 066 52E | 15,16,17,23,66 |
| Khasan | ppl | 42 25N | 130 40E | 57,RM |
| Khasavyurt | ppl | 43 15N | 046 36E | RM |
| Khatanga | ppl | 71 58N | 102 30E | 59,RM |
| Khatanga | stm | 75 55N | 106 00E | RM |
| Khayankort | oilf | 43 15N | 045 27E | 21 |
| Kherson | ppl | 46 38N | 032 36E | 32,56,79,RM |
| Kherson | petr | NA | NA | 31,66 |
| Khersonskaya Oblast' | admd | 46 30N | 034 00E | 79 |
| Khiva | ppl | 41 24N | 060 22E | 21,32,RM |
| Khmel'nitskaya Oblast' | admd | 49 30N | 027 00E | 79 |
| Khmel'nitskiy | ppl | 49 25N | 027 00E | 79,RM |
| Khmel'nitskiy | nucp | NA | NA | 52,67 |
| Khokhryakov | oilf | 62 01N | 079 28E | 16 |
| Kholbon | ppl | 51 53N | 116 15E | 57,RM |
| Kholmogory | ppl | 63 06N | 074 18E | 16,32,56,59,RM |
| Kholmogory | oilf | 63 06N | 074 18E | 16,66 |
| Kholmsk | ppl | 47 03N | 142 03E | 57,RM |
| Khonuu | ppl | 66 27N | 143 06E | RM |
| Khopër | stm | 49 36N | 042 19E | RM |
| Khorezmskaya Oblast' | admd | 41 30N | 060 30E | 79 |
| Khorog | ppl | 37 30N | 071 36E | RM |
| Khromtau | ppl | 50 17N | 058 27E | 56,RM |
| Kiev | ppl | 50 26N | 030 31E | 55,56,59,79,RM |
| Kinel' | ppl | 53 14N | 050 39E | 56,RM |
| Kineshma | ppl | 57 28N | 042 07E | 56,RM |
| Kinzebulatovo | oilf | 53 27N | 056 10E | 20 |
| Kirensk | ppl | 57 46N | 108 08E | RM |
| Kirghiz SSR | admd | 41 00N | 075 00E | 79 |
| Kirishi | ppl | 59 27N | 032 02E | 32,RM |
| Kirishi | thep | NA | NA | 49,67 |
| Kirishi | petr | NA | NA | 31,66 |
| Kirov | ppl | 58 33N | 049 42E | 55,56,79,RM |
| Kirov | ppl | 54 05N | 034 20E | RM |
| Kirovabad | ppl | 40 41N | 046 22E | RM |
| Kirovakan | ppl | 40 48N | 044 30E | RM |
| Kirovo-Chepetsk | ppl | 58 33N | 050 01E | RM |
| Kirovograd | ppl | 48 30N | 032 18E | 56,79,RM |
| Kirovogradskaya Oblast' | admd | 48 30N | 032 00E | 79 |
| Kirovsk | ppl | 67 37N | 033 40E | 56,RM |
| Kirovskaya Oblast' | admd | 58 00N | 050 00E | 79 |
| Kirpichli | gasf | 39 46N | 061 14E | 21,66 |
| Kiselevsk | ppl | 54 00N | 086 39E | RM |
| Kishinëv | ppl | 47 00N | 028 50E | 79,RM |
| Kislaya, Guba | bay | 69 22N | 033 04E | 63 |
| Kislovodsk | ppl | 43 55N | 042 43E | RM |
| Kiviõli | ppl | 59 21N | 026 57E | 44,RM |
| Kiya | stm | 56 52N | 086 39E | 60 |
| Kiyengop | oilf | 57 18N | 053 20E | 20 |
| Kiyevskaya Oblast' | admd | 50 15N | 030 30E | 79 |
| Kizel | ppl | 59 03N | 057 40E | RM |
| Kizel coal basin | coal | 58 30N | 058 00E | 34 |
| Kizel coal deposit | coal | 59 02N | 057 49E | 34 |
| Kizyl-Arvat | ppl | 38 58N | 056 15E | 56,RM |
| Klaipėda | ppl | 55 43N | 021 07E | 56,RM |
| Klin | ppl | 56 20N | 036 44E | RM |
| Klintsy | ppl | 52 45N | 032 14E | RM |
| Klyuchevskoye | oilf | 59 03N | 077 29E | 16 |
| Kochki | ppl | 54 20N | 080 29E | 56,RM |
| Kodinskiy | ppl | 58 40N | 099 12E | 57,RM |
| Kogalym | oilf | 62 24N | 074 24E | 16 |
| Kohtla-Järve | ppl | 59 24N | 027 15E | 44,65,RM |
| Kok-Yangak coal deposit | coal | 41 00N | 073 19E | 34 |
| Kokand | ppl | 40 30N | 070 57E | RM |
| Kokchetav | ppl | 53 17N | 069 30E | 55,56,79,RM |
| Kokchetavskaya Oblast' | admd | 53 30N | 070 00E | 79 |
| Kokpekty | ppl | 48 45N | 082 24E | 56,RM |
| Koktas | ppl | 47 30N | 070 54E | RM |
| Koktas uranium deposit | u/t | NA | NA | 42,43 |
| Koktuma | ppl | 45 52N | 081 39E | RM |
| Kokuy coal deposit | coal | 58 00N | 096 05E | 34 |
| Kola | nucp | NA | NA | 52,67 |
| Kola Peninsula | pen | 67 20N | 037 00E | RM |
| Kolguyev, Ostrov | isl | 69 05N | 049 15E | RM |
| Kolik"yegan | oilf | 61 18N | 079 05E | 16 |
| Kolkhozabad | ppl | 37 35N | 068 40E | 56,RM |
| Kolomna | ppl | 55 05N | 038 47E | RM |
| Kolomyya | ppl | 48 32N | 025 02E | RM |
| Kolpashevo | ppl | 58 20N | 082 50E | RM |
| Kolpino | ppl | 59 45N | 030 36E | 52,53,RM |
| Kolyma | stm | 69 30N | 161 00E | 50,51,59,RM |
| Kolyma Lowland | pln | 68 30N | 154 00E | RM |
| Kolyma Mountains | mts | 63 00N | 160 00E | RM |
| Komandorskiye Ostrova | isls | 55 00N | 167 00E | RM |
| Komi ASSR | admd | 64 00N | 054 00E | 15,20,22,79 |
| Komi-Permyatskiy AOk | admd | 60 00N | 054 30E | 79 |
| Kommunarsk | ppl | 48 30N | 038 47E | RM |
| Komsomol | gasf | 64 20N | 076 39E | 16,66 |
| Komsomol'sk | ppl | 50 35N | 137 02E | 11,32,55,57,RM |
| Komsomol'sk | petr | NA | NA | 31,66 |
| Komsomol'skiy | ppl | 69 10N | 172 42E | RM |
| Komsomolets, Ostrov | isl | 80 30N | 095 00E | RM |
| Konakovo | ppl | 56 42N | 036 46E | 55,56,RM |
| Konakovo | thep | NA | NA | 49,67 |
| Konechnaya | ppl | 50 46N | 078 36E | RM |
| Konitlor | oilf | 62 25N | 072 29E | 16 |
| Konosha | ppl | 60 58N | 040 15E | RM |
| Konotop | ppl | 52 33N | 036 01E | 56,RM |
| Konstantinovka | ppl | 48 32N | 037 43E | RM |
| Konstantinovka | ppl | 47 50N | 031 09E | 51,56,RM |
| Konstantinovskiy | ppl | 57 50N | 039 36E | RM |
| Konstantinovskiy | petr | NA | NA | 31,66 |
| Kopeysk | ppl | 55 07N | 061 37E | RM |
| Kopeysk coal deposit | coal | 55 01N | 061 51E | 34 |
| Korf coal deposit | coal | 60 45N | 166 00E | 34 |
| Korkino | ppl | 54 54N | 061 23E | RM |
| Korkodon | stm | 64 44N | 154 00E | RM |
| Korosten' | ppl | 50 57N | 028 39E | RM |
| Korsakov | ppl | 46 38N | 142 46E | 57,RM |
| Koryak Mountains | mts | 62 30N | 172 00E | RM |
| Koryakskiy AOk | admd | 62 00N | 166 00E | 79 |
| Koryazhma | ppl | 61 18N | 047 11E | RM |
| Koschagyl | oilf | 46 48N | 053 42E | 21 |
| Kostomuksha | ppl | 64 41N | 030 49E | RM |
| Kostroma | ppl | 57 46N | 040 55E | 56,79,RM |
| Kostroma | thep | NA | NA | 49,67 |
| Kostroma | nucp | NA | NA | 52,67 |
| Kostromskaya Oblast' | admd | 58 30N | 044 00E | 79 |
| Kotel'nich | ppl | 58 19N | 048 20E | 56,RM |
| Kotel'nyy, Ostrov | isl | 75 45N | 138 44E | RM |
| Kotlas | ppl | 61 16N | 046 35E | 20,56,RM |
| Kotur-Tepe | oilf | 39 14N | 053 49E | 21,66 |
| Kotuy | stm | 71 55N | 102 05E | RM |
| Kotuy-Maymecha tar sands deposit | tars | 69 41N | 100 25E | 45 |
| Kovdor | ppl | 67 34N | 030 24E | RM |
| Kovel' | ppl | 51 13N | 024 43E | 56,RM |
| Kovrov | ppl | 56 25N | 041 18E | RM |
| Koyun-Sharlyk | gasf | 39 39N | 058 47E | 21 |
| Kozubay | oilf | 57 53N | 056 03E | 20 |
| Kramatorsk | ppl | 48 43N | 037 32E | RM |
| Krasnaya Sopka | ppl | 55 42N | 090 02E | RM |
| Krasnoarmeysk | ppl | 48 31N | 044 32E | RM |
| Krasnodar | ppl | 45 02N | 039 00E | 56,79,RM |
| Krasnodar | petr | NA | NA | 31,66 |
| Krasnodar Heat and Power | thep | NA | NA | 49,67 |
| Krasnodarskiy Kray | admd | 45 00N | 040 00E | 21,79 |
| Krasnogorsk | ppl | 48 24N | 142 06E | RM |
| Krasnokamensk uranium deposit | u/t | NA | NA | 42,43 |
| Krasnokamsk | ppl | 58 04N | 055 48E | RM |
| Krasnokamsk | oilf | 58 02N | 055 39E | 20 |
| Krasnoleninskiy | ppl | 61 38N | 067 42E | 16,RM |
| Krasnotur'insk | ppl | 59 46N | 060 12E | RM |
| Krasnovishersk | ppl | 60 23N | 057 03E | 56,RM |
| Krasnovodsk | ppl | 40 00N | 053 00E | 21,56,79,RM |
| Krasnovodsk | petr | NA | NA | 31,66 |
| Krasnovodskaya Oblast' | admd | 40 00N | 055 30E | 79 |
| Krasnoyarsk | ppl | 56 01N | 092 50E | 32,38,45,57,59,<br>60,79,RM |
| Krasnoyarsk | hydp | NA | NA | 47,50,67 |
| Krasnoyarsk Heat and Power | thep | NA | NA | 49,67 |
| Krasnoyarsk-2 | thep | NA | NA | 49,67 |
| Krasnoyarskiy Kray | admd | 67 00N | 100 00E | 16,79 |
| Krasnoyarskoye Vodokhranilishche | resv | 55 00N | 091 05E | 60,RM |
| Kremenchug | ppl | 49 04N | 033 25E | 32,RM |
| Kremenchug | petr | NA | NA | 31,66 |
| Krivoy Rog | ppl | 47 55N | 033 21E | RM |
| Krivoy Rog-2 | thep | NA | NA | 49,67 |
| Kropotkin | ppl | 45 26N | 040 34E | RM |
| Kropotkin | ppl | 58 30N | 115 17E | 57,RM |
| Krymskaya Oblast' | admd | 45 00N | 034 00E | 79 |
| Kstovo | ppl | 56 11N | 044 11E | RM |
| Kuban' | stm | 45 20N | 037 22E | 21,RM |
| Kubiyazy | oilf | 56 19N | 056 39E | 20 |
| Kuchukovka | oilf | 56 16N | 053 04E | 20 |
| Kudymkar | ppl | 59 01N | 054 39E | RM |
| Kukhtuy | stm | 59 24N | 143 16E | RM |
| Kul'sary | ppl | 46 59N | 054 01E | 56,RM |
| Kul'sary | oilf | 46 58N | 054 05E | 21 |
| Kul'tyubino | oilf | 54 58N | 057 01E | 20 |
| Kuleshovka | oilf | 52 49N | 051 08E | 20 |
| Kultuk | ppl | 51 44N | 103 42E | 57,RM |
| Kulunda | ppl | 52 35N | 078 57E | RM |
| Kulyab | ppl | 37 55N | 069 46E | 56,79,RM |
| Kulyabskaya Oblast' | admd | 38 00N | 069 50E | 79 |
| Kum-Dag | oilf | 38 54N | 054 37E | 21 |
| Kumertau | ppl | 52 46N | 055 47E | RM |

| Name | Feature | Latitude | Longitude | Page |
|---|---|---|---|---|
| K (continued) | | | | |
| Kumertau coal deposit | coal | 52 43N | 055 39E | 34 |
| Kun'ya | stm | 56 31N | 038 12E | 50,67 |
| Kunashir, Ostrov | isl | 44 10N | 146 00E | RM |
| Kungrad | ppl | 43 02N | 058 49E | 21,56,RM |
| Kungur | ppl | 57 19N | 056 49E | RM |
| Kuoyka tar sands deposit | tars | 69 38N | 121 22E | 45 |
| Kupino | ppl | 54 22N | 077 18E | RM |
| Kupyansk | ppl | 49 42N | 037 38E | RM |
| Kur'ya | gasf | 61 46N | 057 33E | 20 |
| Kura | stm | 39 24N | 049 19E | 21,50,51,RM |
| Kurakhovo | ppl | 47 59N | 037 16E | RM |
| Kurakhovo | thep | NA | NA | 49,67 |
| Kureyka | stm | 66 30N | 087 12E | RM |
| Kurgan | ppl | 55 26N | 065 18E | 56,79,RM |
| Kurgan-Tyube | ppl | 37 50N | 068 47E | 79,RM |
| Kurgan-Tyubinskaya Oblast' | admd | 37 40N | 068 40E | 79 |
| Kurganskaya Oblast' | admd | 55 30N | 064 00E | 79 |
| Kuril Islands | isls | 46 10N | 152 00E | RM |
| Kursk | ppl | 51 42N | 036 12E | 56,58,59,79,RM |
| Kursk | nucp | NA | NA | 52,67 |
| Kurskaya Oblast' | admd | 51 30N | 036 00E | 79 |
| Kushka | ppl | 35 16N | 062 20E | 21,56,RM |
| Kushkul' | oilf | 55 28N | 056 13E | 20 |
| Kushmurun coal deposit | coal | 52 30N | 065 00E | 34 |
| Kustanay | ppl | 53 10N | 063 35E | 55,56,79,RM |
| Kustanayskaya Oblast' | admd | 51 00N | 064 00E | 79 |
| Kutaisi | ppl | 42 15N | 042 40E | RM |
| Kuybyshev | ppl | 55 27N | 078 19E | RM |
| Kuybyshev | ppl | 53 12N | 050 09E | 20,27,32,55,56,59,79,RM |
| Kuybyshevskaya Oblast' | admd | 53 00N | 050 00E | 20,79 |
| Kuybyshevskoye Vodokhranilishche | resv | 53 40N | 049 00E | 20 |
| Kuydzhik | gasf | 39 03N | 054 42E | 21 |
| Kuyeda | oilf | 56 26N | 055 33E | 20 |
| Kuzbayevo | oilf | 56 03N | 055 10E | 20 |
| Kuznetsk | ppl | 53 07N | 046 36E | RM |
| Kuznetsk coal basin | coal | 54 30N | 087 00E | 34,35,36,37,38,40,41,60 |
| Kyakhta | ppl | 50 20N | 106 30E | 57,RM |
| Kyrtayel' | oilf | 63 53N | 054 48E | 20 |
| Kysyl-Syr | ppl | 63 53N | 122 46E | RM |
| Kyurdamir | ppl | 40 21N | 048 11E | 56,RM |
| Kyurovdag | oilf | 39 35N | 049 04E | 21 |
| Kyursangya | oilf | 39 27N | 049 16E | 21 |
| Kyzyl | ppl | 51 42N | 094 27E | 57,79,RM |
| Kyzyl coal deposit | coal | 51 28N | 094 44E | 34 |
| Kyzyl-Dzhar uranium deposit | u/t | NA | NA | 42,43 |
| Kyzyl-Kiya coal deposit | coal | 40 16N | 072 15E | 34 |
| Kyzyl'kum | gasf | 39 11N | 054 32E | 21 |
| Kyzylkum Desert | dst | 42 00N | 064 00E | RM |
| Kyzyltal coal deposit | coal | 51 30N | 065 30E | 34 |
| Kzyl-Orda | ppl | 44 48N | 065 28E | 56,79,RM |
| Kzyl-Ordinskaya Oblast' | admd | 45 00N | 065 00E | 79 |
| L | | | | |
| L'vov | ppl | 49 50N | 024 00E | 55,56,79,RM |
| L'vov | petr | NA | NA | 31,66 |
| L'vov-Volyn' coal basin | coal | 50 30N | 024 30E | 34 |
| L'vovskaya Oblast' | admd | 50 00N | 024 00E | 79 |
| La Perouse Strait | strt | 45 45N | 142 00E | RM |
| Labytnangi | ppl | 66 39N | 066 21E | 16,17,18,RM |
| Ladoga, Lake | lake | 61 00N | 031 30E | RM |
| Ladyzhin | ppl | 48 40N | 029 15E | RM |
| Ladyzhin | thep | NA | NA | 49,67 |
| Lagodekhi | ppl | 41 49N | 046 16E | 56,RM |
| Lake Onega uranium deposit | u/t | NA | NA | 42,43 |
| Lam | gasf | 39 12N | 052 31E | 21 |
| Langepas | ppl | 61 13N | 075 17E | 16,RM |
| Laptev Sea | sea | 76 00N | 126 00E | RM |
| Latvian SSR | admd | 57 00N | 025 00E | 79 |
| Lavavozh | gasf | 67 44N | 054 51E | 20,66 |
| Lazarev | ppl | 52 13N | 142 32E | RM |
| Ledovoye | oilf | 59 51N | 076 54E | 16 |
| Lem''yu | oilf | 64 15N | 055 22E | 20 |
| Lem'ya | oilf | 60 57N | 063 12E | 16 |
| Lena | stm | 72 25N | 126 40E | RM |
| Lena coal basin | coal | 63 00N | 123 00E | 34,35,40 |
| Lena Plateau | upld | 60 45N | 125 00E | RM |
| Lena-Tungusk oil and gas region | reg | 58 00N | 107 00E | 14,25,32 |
| Leninabad | ppl | 40 17N | 069 37E | 79,RM |
| Leninabadskaya Oblast' | admd | 40 00N | 069 10E | 79 |
| Leninakan | ppl | 40 48N | 043 50E | 56,RM |
| Leningrad | ppl | 59 55N | 030 15E | 32,55,56,59,79,RM |
| Leningrad | nucp | NA | NA | 52,53,67 |
| Leningrad oil shale field | oils | 59 01N | 029 11E | 44 |
| Leningradskaya Oblast' | admd | 60 00N | 032 00E | 79 |
| Leninogorsk | ppl | 54 36N | 052 30E | RM |
| Leninogorsk | ppl | 50 22N | 083 32E | 56,RM |
| Leninsk (Tyuratam) | ppl | 45 40N | 063 20E | 56,RM |
| Leninsk-Kuznetskiy | ppl | 54 38N | 086 10E | 60,RM |
| Leninsk-Kuznetskiy coal deposit | coal | 54 45N | 086 00E | 34 |
| Leninskoye | ppl | 47 56N | 132 38E | 57,RM |
| Lensk | ppl | 60 43N | 114 55E | 57,58,59,RM |
| Lermontov | ppl | 44 06N | 042 57E | RM |
| Lermontov uranium deposit/processing center | u/t | NA | NA | 42,43 |
| Lesosibirsk | ppl | 58 20N | 092 20E | 57,60,RM |
| Lesozavodsk | ppl | 45 28N | 133 27E | 57,RM |
| Lida | ppl | 53 53N | 025 18E | RM |
| Liepāja | ppl | 56 31N | 021 01E | 56,RM |
| Lipetsk | ppl | 52 37N | 039 35E | 56,79,RM |
| Lipetskaya Oblast' | admd | 52 30N | 039 00E | 79 |
| Lisakovsk | ppl | 52 39N | 062 45E | 56,RM |
| Lisichansk | ppl | 48 55N | 038 26E | RM |
| Lisichansk | petr | NA | NA | 31,66 |
| Listvenka | oilf | 57 08N | 053 36E | 20 |
| Listvyanka | ppl | 51 52N | 104 51E | RM |
| Lithuanian | thep | NA | NA | 49,67 |
| Lithuanian SSR | admd | 56 00N | 024 00E | 79 |
| Little BAM | rr | 56 30N | 124 50E | 11 |
| Livanov | gasf | 39 41N | 051 58E | 21 |
| Lobanovo | oilf | 57 45N | 056 13E | 20 |
| Lodeynoye Pole | ppl | 60 44N | 033 33E | 56,RM |
| Lokosovo | oilf | 61 11N | 075 06E | 16 |
| Lomovoye | oilf | 59 34N | 077 09E | 16 |
| Longa, Proliv | strt | 70 20N | 178 00E | RM |
| Lovozero | ppl | 68 00N | 035 00E | RM |
| Lovozero-Tuncra uranium, thorium deposit | u/t | NA | NA | 42,43 |
| Lower Kama | hydp | NA | NA | 50,67 |
| Lower Kama - Heat and Power | thep | NA | NA | 49,67 |
| Luchegorsk | ppl | 46 29N | 134 12E | 57,RM |
| Luga | ppl | 58 44N | 029 52E | RM |
| L (continued) | | | | |
| Lugovoy | ppl | 42 56N | 072 45E | RM |
| Lukoml' | ppl | 54 42N | 029 09E | RM |
| Lukoml' | thep | NA | NA | 48,49,67 |
| Lumbovskiy Zaliv | gulf | 67 48N | 040 27E | 63 |
| Lutsk | ppl | 50 45N | 025 20E | 56,79,RM |
| Luza | ppl | 60 39N | 047 10E | 56,RM |
| Luza | oilf | 65 00N | 055 33E | 20 |
| Lyantor | oilf | 61 36N | 072 01E | 16 |
| M | | | | |
| Magadan | ppl | 59 34N | 150 48E | 57,59,79,RM |
| Magadanskaya Oblast' | admd | 65 00N | 160 00E | 79 |
| Magnitogorsk | ppl | 53 27N | 059 04E | 56,RM |
| Mago | ppl | 53 15N | 140 13E | RM |
| Makarikha | oilf | 66 34N | 058 17E | 20 |
| Makarov coal region | coal | 49 00N | 143 00E | 34 |
| Makat | ppl | 47 39N | 053 19E | 21,RM |
| Makeyevka | ppl | 48 02N | 037 53E | RM |
| Makhachkala | ppl | 42 58N | 047 30E | 56,79,RM |
| Makhachkala | gasf | 42 46N | 047 31E | 21 |
| Makinsk | ppl | 52 37N | 070 26E | 56,RM |
| Makushino | ppl | 55 13N | 067 13E | 56,RM |
| Malgobek | oilf | 43 24N | 044 37E | 21 |
| Malochernogorsk | oilf | 61 10N | 077 17E | 16 |
| Malorechensk | oilf | 60 33N | 077 08E | 16 |
| Maloyamal | gasf | 68 20N | 071 49E | 16 |
| Mama | ppl | 58 18N | 112 54E | 57,RM |
| Mamakan | ppl | 57 48N | 114 01E | 57,59,RM |
| Mamontovo | ppl | 60 46N | 072 47E | 16,17,RM |
| Mamontovo | oilf | 60 39N | 072 37E | 16,22,66 |
| Mana | stm | 55 57N | 092 28E | 60 |
| Mancharovo | oilf | 55 24N | 054 28E | 20 |
| Mangut | ppl | 49 42N | 112 40E | RM |
| Mangyshlak Peninsula | pen | 44 18N | 051 00E | 21,RM |
| Mangyshlakskaya Oblast' | admd | 44 00N | 054 00E | 79 |
| Manzurka | ppl | 53 30N | 106 04E | RM |
| Margilan | ppl | 40 27N | 071 42E | RM |
| Mariyskaya ASSR | admd | 56 30N | 048 00E | 79 |
| Markha | stm | 63 28N | 118 50E | RM |
| Markovo | ppl | 64 40N | 170 25E | RM |
| Martyshi | oilf | 47 11N | 050 44E | 21 |
| Mary | ppl | 37 36N | 061 50E | 21,32,55,56,79,RM |
| Mary | thep | NA | NA | 48,49,67 |
| Maryyskaya Oblast' | admd | 37 00N | 062 30E | 79 |
| Matyushkin | oilf | 60 08N | 076 57E | 16 |
| Maya | stm | 60 24N | 134 30E | RM |
| Mayak | oilf | 57 25N | 055 40E | 20 |
| Maykop | ppl | 44 35N | 040 10E | 56,RM |
| Maykop | oilf | 59 00N | 055 58E | 20 |
| Maykuben coal deposit | coal | 50 45N | 076 00E | 34 |
| Mayna | ppl | 53 00N | 091 28E | RM |
| Mayskoye | gasf | 37 20N | 062 05E | 21 |
| Mažeikiai | ppl | 56 19N | 022 20E | RM |
| Mažeikiai | petr | NA | NA | 31,66 |
| Medvezh'i Ostrova | isls | 70 52N | 161 26E | RM |
| Medvezh'ye | gasf | 66 08N | 074 09E | 15,16,17,18,23,32,66 |
| Megion | ppl | 61 03N | 076 06E | 16,17,19,RM |
| Megion | oilf | 60 58N | 076 20E | 16,66 |
| Melitopol' | ppl | 46 50N | 035 22E | RM |
| Messoyakha | gasf | 68 59N | 082 58E | 16,32,59 |
| Mezen' | ppl | 65 50N | 044 16E | RM |
| Mezen' | stm | 66 11N | 043 59E | 20,RM |
| Mezenskaya Guba | bay | 66 40N | 043 45E | 63 |
| Mezhdurechensk | ppl | 53 42N | 088 03E | RM |
| Mezhdurechenskiy | ppl | 59 36N | 065 56E | 16,RM |
| Miass | ppl | 54 59N | 060 06E | RM |
| Michayu | oilf | 64 00N | 055 47E | 20 |
| Michurinsk | ppl | 52 54N | 040 30E | 56,RM |
| Middle Olenëk tar sands deposit | tars | 68 12N | 121 15E | 45 |
| Middle Volga power system | reg | 54 00N | 048 00E | 46,55 |
| Mikhaylovka | ppl | 50 04N | 043 15E | RM |
| Mikhaylovskiy | ppl | 51 49N | 079 45E | RM |
| Mikun' | ppl | 62 21N | 050 06E | 56,RM |
| Min-Kush | ppl | 41 41N | 074 28E | RM |
| Min-Kush uranium deposit/processing center | u/t | NA | NA | 42,43 |
| Mingechaur | ppl | 40 45N | 047 03E | RM |
| Minsk | ppl | 53 54N | 027 34E | 53,55,56,79,RM |
| Minsk ATETs | nucp | NA | NA | 52,67 |
| Minskaya Oblast' | admd | 54 00N | 028 00E | 79 |
| Minusinsk | ppl | 53 43N | 091 42E | RM |
| Minusinsk coal basin | coal | 53 30N | 091 15E | 34 |
| Mirbashir | oilf | 40 12N | 046 52E | 21 |
| Mirnyy | ppl | 62 33N | 113 53E | 57,58,59,RM |
| Mirzaani | oilf | 41 19N | 046 05E | 21 |
| Mishkino | oilf | 57 08N | 054 03E | 20 |
| Mishovdag | oilf | 39 48N | 049 11E | 21 |
| Modar | gasf | 39 24N | 057 55E | 21 |
| Mogilëv | ppl | 53 54N | 030 21E | 56,79,RM |
| Mogilëvskaya Oblast' | admd | 54 00N | 030 45E | 79 |
| Mogoyto | ppl | 54 25N | 110 27E | RM |
| Moldavian | thep | NA | NA | 49,67 |
| Moldavian SSR | admd | 47 00N | 029 00E | 79 |
| Mollaker | gasf | 37 05N | 061 20E | 21 |
| Molodechno | ppl | 54 19N | 026 51E | RM |
| Monchegorsk | ppl | 67 56N | 032 58E | RM |
| Mondy | ppl | 51 40N | 100 59E | RM |
| Mordovskaya ASSR | admd | 54 30N | 044 00E | 79 |
| Morozovsk | ppl | 48 22N | 041 51E | 56,RM |
| Morshansk | ppl | 53 26N | 041 49E | RM |
| Mortym'ya-Teterev | oilf | 60 33N | 064 38E | 16 |
| Moscow | ppl | 55 45N | 037 35E | 32,55,56,59,79,RM |
| Moscow coal basin | coal | 54 30N | 036 00E | 34,35,36,37,40 |
| Moskal'vo | ppl | 53 35N | 142 30E | 11,RM |
| Moskovskaya Oblast' | admd | 55 45N | 037 30E | 79 |
| Moskva | stm | 55 05N | 038 51E | RM |
| Moskva (Moscow) Lyubertsy | petr | NA | NA | 31,66 |
| Moyynty | ppl | 47 14N | 073 20E | RM |
| Mozdok | ppl | 43 44N | 044 40E | 56,RM |
| Mozyr' | ppl | 52 03N | 029 16E | RM |
| Mozyr' | petr | NA | NA | 31,66 |
| Mubarek | ppl | 39 16N | 065 10E | 21,RM |
| Mubarek | gasf | 39 21N | 065 28E | 21 |
| Mugun coal deposit | coal | 54 00N | 100 30E | 34 |
| Mukachevo | ppl | 48 27N | 022 43E | 56,64,RM |
| Mukhanovo | oilf | 53 21N | 051 24E | 20,66 |
| Multanovo | oilf | 60 06N | 073 14E | 16 |
| Mulym'ya | oilf | 60 15N | 064 37E | 16 |
| Muna | stm | 67 52N | 123 06E | RM |
| Muna tar sands deposit | tars | 67 07N | 122 27E | 45 |
| Munalyk | oilf | 46 45N | 054 49E | 21 |

M (continued)

| Name | Feature | Latitude | Longitude | Page |
|---|---|---|---|---|
| Muradkhanly | oilf | 39 46N | 047 51E | 21 |
| Murgab | stm | 38 18N | 061 12E | RM |
| Murmansk | ppl | 68 58N | 033 05E | 55,56,59,79,RM |
| Murmanskaya Oblast' | admd | 68 00N | 034 00E | 79 |
| Murom | ppl | 55 34N | 042 02E | RM |
| Musina | oilf | 53 04N | 055 45E | 20 |
| Mutnovskaya Sopka | volc | 52 27N | 158 11E | 64,RM |
| Muyunkum Desert | dst | 44 30N | 070 00E | RM |
| Mys Shmidta | ppl | 68 56N | 179 27W | RM |
| Mysovoye | ppl | 45 27N | 035 50E | 62,RM |

N

| Name | Feature | Latitude | Longitude | Page |
|---|---|---|---|---|
| Nadvornaya | ppl | 48 38N | 024 34E | RM |
| Nadvornaya | petr | NA | NA | 31,66,RM |
| Nadym | ppl | 65 32N | 072 32E | 16,17,19,32,59, RM |
| Nadym | stm | 66 12N | 072 00E | 16,19,RM |
| Nadym | gasf | 65 36N | 073 00E | 16 |
| Naftalan | oilf | 40 23N | 046 38E | 21 |
| Nagorno-Karabakhskaya AO | admd | 40 00N | 046 35E | 79 |
| Nagumanskoye | gasf | 51 00N | 055 02E | 20 |
| Naip | gasf | 40 42N | 061 31E | 21,66 |
| Nakhichevan' | ppl | 39 12N | 045 24E | 56,79,RM |
| Nakhichevanskaya ASSR | admd | 39 15N | 045 30E | 79 |
| Nakhodka | ppl | 42 48N | 132 52E | 57,RM |
| Nakhodka | gasf | 68 04N | 077 59E | 16,66 |
| Nal'chik | ppl | 43 29N | 043 37E | 79,RM |
| Namangan | ppl | 41 00N | 071 40E | 56,79,RM |
| Namanganskaya Oblast' | admd | 41 00N | 071 30E | 79 |
| Namtsy | ppl | 62 43N | 129 37E | RM |
| Nar'yan-Mar | ppl | 67 39N | 053 00E | 20,RM |
| Narva | ppl | 59 23N | 028 12E | 44,RM |
| Naryn | ppl | 41 26N | 075 58E | 56,79,RM |
| Naryn | ppl | 38 17N | 068 55E | RM |
| Naryn | stm | 41 08N | 072 05E | 50,51,67,RM |
| Narynkol | ppl | 42 43N | 080 12E | RM |
| Narynskaya Oblast' | admd | 41 30N | 075 30E | 79 |
| Natanebi tar sands deposit | tars | 42 44N | 042 39E | 45 |
| Naugarzan uranium deposit | u/t | NA | NA | 42,43 |
| Naushki | ppl | 50 22N | 106 07E | RM |
| Navoi | ppl | 40 09N | 065 22E | 56,79,RM |
| Navoi | thep | NA | NA | 49,67 |
| Navoiyskaya Oblast' | admd | 42 00N | 064 30E | 79 |
| Nazarovo | ppl | 56 01N | 090 26E | 57,60,RM |
| Nazarovo | thep | NA | NA | 49,67 |
| Nazarovo coal deposit | coal | 55 50N | 090 30E | 34 |
| Nebit-Dag | ppl | 39 30N | 054 22E | 32,56,RM |
| Nebit-Dag | oilf | 39 06N | 054 18E | 21,66 |
| Nebit-Dag tar sands deposit | tars | 40 23N | 053 57E | 45 |
| Neftechala | oilf | 39 06N | 049 09E | 21 |
| Neftekamsk | ppl | 56 05N | 054 16E | RM |
| Neftekumsk | oilf | 44 20N | 044 37E | 21 |
| Nefteyugansk | ppl | 61 05N | 072 42E | 16,17,19,RM |
| Neftezavodsk | petr | NA | NA | 31,66 |
| Neftyanyye Kamni | oilf | 40 06N | 050 43E | 21,66 |
| Nelidovo | ppl | 56 13N | 032 46E | 56,RM |
| Nelidovo coal basin | coal | 56 15N | 033 04E | 34 |
| Neman | stm | 55 18N | 021 23E | 50,67 |
| Nenetskiy AOk | admd | 67 30N | 054 00E | 20,79 |
| Nenoksa | ppl | 64 38N | 039 11E | RM |
| Neryungri | ppl | 56 41N | 124 39E | 11,57,59,RM |
| Neryungri | thep | NA | NA | 11,59 |
| Neryungri coal deposit | coal | 56 40N | 124 15E | 11,34 |
| Never | ppl | 53 59N | 124 10E | 11,57,RM |
| Nevinnomyssk | ppl | 44 38N | 041 57E | RM |
| Nevinnomyssk | thep | NA | NA | 49,67 |
| New Siberian Islands | isls | 75 00N | 142 00E | RM |
| Neyto | gasf | 70 03N | 070 08E | 16,66 |
| Nezhin | ppl | 51 03N | 031 53E | 56,RM |
| Nikel' | ppl | 69 24N | 030 12E | 56,RM |
| Nikol'skiy | ppl | 47 58N | 067 33E | RM |
| Nikol'skoye | oilf | 52 52N | 053 05E | 20 |
| Nikolayev | ppl | 46 58N | 032 00E | 56,79,RM |
| Nikolayevsk | ppl | 53 08N | 140 44E | 57,RM |
| Nikolayevskaya Oblast' | admd | 47 15N | 032 00E | 79 |
| Nikolayevskoye | oilf | 44 56N | 041 34E | 21 |
| Nikopol' | ppl | 47 34N | 034 24E | RM |
| Nizhneangarsk | ppl | 55 47N | 109 33E | 57,RM |
| Nizhnekamsk | ppl | 55 36N | 051 47E | RM |
| Nizhnekamsk | petr | NA | NA | 31,66 |
| Nizhneomra | oilf | 62 38N | 056 20E | 20 |
| Nizhnesortym | oilf | 62 39N | 070 57E | 16 |
| Nizhneudinsk | ppl | 54 54N | 099 03E | 57,RM |
| Nizhnevartovsk | ppl | 60 56N | 076 38E | 16,17,18,19,31, 32,56,RM |
| Nizhneyansk | ppl | 71 26N | 136 04E | RM |
| Nizhniy Bestyakh | ppl | 61 58N | 129 56E | RM |
| Nizhniy Tagil | ppl | 57 55N | 059 57E | RM |
| Nizhnyaya Poyma | ppl | 56 11N | 097 13E | 60,RM |
| Nizhnyaya Tunguska | stm | 65 48N | 088 04E | RM |
| Nizhnyaya Tura | ppl | 58 37N | 059 49E | 32,RM |
| Noginsk | ppl | 55 51N | 038 27E | RM |
| Noginsk | ppl | 64 32N | 091 10E | RM |
| Noril'sk | ppl | 69 20N | 088 06E | 16,32,57,58,59, RM |
| Noril'sk coal deposit | coal | 68 45N | 087 30E | 34 |
| Norio | oilf | 41 57N | 044 45E | 21 |
| North Caspian oil and gas region | reg | 57 00N | 054 00E | 14,21,25,32 |
| North Caucasus oil and gas region | reg | 45 00N | 045 00E | 14,15,21,22,25,32 |
| North Caucasus power system | reg | 46 00N | 043 00E | 46,55 |
| North Caucasus Economic Region | reg | 45 00N | 042 00E | 79 |
| North Kazakhstan power system | reg | 50 00N | 073 00E | 46,55 |
| North Siberian Lowland | pln | 72 00N | 104 00E | RM |
| Northern Economic Region | reg | 64 00N | 045 00E | 79 |
| Northern Hills | hlls | 59 30N | 049 00E | RM |
| Northern Lights pipeline | pipe | 57 00N | 035 00E | 10,20 |
| Northwest power system | reg | 59 00N | 031 00E | 46,55 |
| Northwest Economic Region | reg | 59 00N | 031 00E | 79 |
| Novaya Sibir', Ostrov | isl | 75 00N | 149 00E | RM |
| Novaya Zemlya | isls | 74 00N | 057 00E | RM |
| Novgorod | ppl | 58 31N | 031 17E | 56,79,RM |
| Novgorodskaya Oblast' | admd | 58 30N | 032 30E | 79 |
| Novikovo | ppl | 46 22N | 143 22E | RM |
| Novo-Angren | thep | NA | NA | 49,67 |
| Novoagansk | ppl | 61 57N | 076 41E | 16,17,RM |
| Novoaltaysk | ppl | 53 24N | 083 55E | RM |
| Novoasharovo | oilf | 53 27N | 053 15E | 20 |
| Novocheboksarsk | ppl | 58 08N | 047 30E | RM |
| Novocherkassk | ppl | 47 25N | 040 06E | RM |
| Novocherkassk | thep | NA | NA | 49,67 |
| Novogornyy | ppl | 55 37N | 060 47E | RM |
| Novogornyy uranium deposit | u/t | NA | NA | 42,43 |

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| Name | Feature | Latitude | Longitude | Page |
|---|---|---|---|---|
| Novokadeyevka | oilf | 54 43N | 056 24E | 20 |
| Novokazalinsk | ppl | 45 50N | 062 10E | RM |
| Novokiyevskiy Uval | ppl | 51 40N | 128 57E | 57,RM |
| Novokuybyshevsk | ppl | 53 07N | 049 58E | RM |
| Novokuybyshevsk Lend Lease 3 | petr | NA | NA | 31,66 |
| Novokuybyshevsk No. 2 | petr | NA | NA | 31,66 |
| Novokuznetsk | ppl | 53 45N | 087 06E | 32,55,56,RM |
| Novomoskovsk | ppl | 54 05N | 038 13E | RM |
| Novonikolayevskiy | ppl | 50 58N | 042 22E | 56,RM |
| Novopolotsk | ppl | 55 32N | 028 39E | RM |
| Novopolotsk | petr | NA | NA | 31,66 |
| Novopskov | ppl | 49 33N | 039 05E | 32,RM |
| Novorossiysk | ppl | 44 43N | 037 47E | 32,56,62,RM |
| Novoshakhtinsk | ppl | 47 47N | 039 56E | RM |
| Novosibirsk | ppl | 55 02N | 082 55E | 18,32,55,56,59,79 |
| Novosibirskaya Oblast' | admd | 55 00N | 080 00E | 79 |
| Novotroitsk | ppl | 51 12N | 058 20E | RM |
| Novovolynsk coal deposit | coal | 50 42N | 024 13E | 34 |
| Novovoronezhskiy | ppl | 51 19N | 039 13E | RM |
| Novovoronezhskiy | nucp | NA | NA | 52,67 |
| Novoyelkhovo | oilf | 54 59N | 052 02E | 20,66 |
| Novyy Port | ppl | 67 40N | 072 52E | 16,59,RM |
| Novyy Port | gasf | 67 53N | 072 21E | 16,66 |
| Novyy Urengoy | ppl | 66 05N | 076 42E | 16,17,18,19,32 55,56,59,RM |
| Novyy Uzen' | ppl | 43 18N | 052 48E | 56,RM |
| Noyabr'sk | ppl | 63 08N | 075 22E | 16,17,RM |
| Nozhovka | oilf | 57 09N | 054 49E | 20 |
| Nukus | ppl | 42 29N | 059 38E | 56,79,RM |
| Nurek | ppl | 38 23N | 069 21E | 56,RM |
| Nurek | hydp | NA | NA | 50,51,67 |
| Nurlat | oilf | 54 37N | 050 54E | 20 |
| Nurmin | gasf | 69 02N | 071 41E | 16 |
| Nyakh | ppl | 62 09N | 065 27E | 16,RM |
| Nyamed | gasf | 63 16N | 054 15E | 20 |
| Nyandoma | ppl | 61 40N | 040 12E | RM |
| Nyda | ppl | 66 36N | 072 54E | 16,19,RM |
| Nyda | gasf | 66 37N | 073 49E | 16,66 |
| Nysh | ppl | 51 33N | 142 46E | RM |
| Nyukzha | stm | 56 35N | 121 36E | 11 |
| Nyurba | ppl | 63 17N | 118 20E | RM |
| Nyuya | stm | 60 32N | 116 14E | RM |

O

| Name | Feature | Latitude | Longitude | Page |
|---|---|---|---|---|
| Ob' | stm | 66 45N | 069 30E | 16,19,60,RM |
| Obninsk | ppl | 55 05N | 036 37E | RM |
| Obninsk | nucp | NA | NA | 67 |
| Obozërskiy | ppl | 63 29N | 040 19E | RM |
| Obshchiy Syrt oil shale deposit | oils | 51 40N | 055 53E | 44 |
| Obskaya Guba | bay | 69 00N | 073 00E | 16,RM |
| Odessa | ppl | 46 28N | 030 44E | 32,53,56,79,RM |
| Odessa | petr | NA | NA | 31,66 |
| Odessa ATETs | nucp | NA | NA | 52,67 |
| Odesskaya Oblast' | admd | 47 00N | 030 00E | 79 |
| Odoptu | oilf | 53 20N | 143 49E | 11 |
| Oka | stm | 56 42N | 031 05E | RM |
| Oka-Don Plain | pln | 53 00N | 040 30E | RM |
| Okarem | oilf | 37 53N | 053 57E | 21 |
| Okha | ppl | 53 34N | 142 56E | 11,32,57,59,RM |
| Okhotsk | ppl | 59 23N | 143 18E | RM |
| Okhotsk coal area | coal | 59 45N | 147 00E | 34 |
| Okhotsk, Sea of | sea | 55 00N | 150 00E | 11,RM |
| Oktyabr'sk | ppl | 49 28N | 057 25E | RM |
| Oktyabr'sk | ppl | 53 10N | 048 42E | RM |
| Oktyabr'skiy | ppl | 52 40N | 156 14E | RM |
| Oktyabr'skiy | ppl | 39 06N | 066 49E | RM |
| Oktyabr'skiy | ppl | 54 28N | 053 28E | RM |
| Oktyabr'skiy | ppl | 53 01N | 128 37E | 57,RM |
| Oktyabr'skoy Revolyutsii, Ostrov | isl | 79 30N | 097 00E | RM |
| Oktyabr'skoye | ppl | 62 28N | 066 03E | RM |
| Ol'doy | stm | 53 33N | 123 21E | 11 |
| Ol'ga | ppl | 43 45N | 135 18E | 57,RM |
| Ol'khovka | oilf | 58 41N | 056 41E | 20 |
| Olëkma | stm | 60 22N | 120 42E | 11,RM |
| Olëkminsk | ppl | 60 24N | 120 24E | RM |
| Olen'ye | oilf | 59 31N | 076 36E | 16 |
| Olenëk | ppl | 68 33N | 112 18E | RM |
| Olenëk | stm | 73 00N | 119 55E | RM |
| Olenëk oil shale deposit | oils | 67 30N | 119 22E | 44 |
| Olenëk tar sands deposit | tars | 71 17N | 122 23E | 45 |
| Olenëkskiy Zaliv | gulf | 73 20N | 121 00E | RM |
| Oleynikov | oilf | 45 31N | 046 30E | 21 |
| Olovyannaya | ppl | 50 56N | 115 35E | RM |
| Oloy | stm | 66 29N | 159 29E | RM |
| Olyutorskiy Poluostrov | pen | 60 15N | 170 12E | RM |
| Omolon | stm | 68 42N | 158 36E | RM |
| Omolon coal area | coal | 64 45N | 159 30E | 34 |
| Omsk | ppl | 55 00N | 073 24E | 18,32,56,79,RM |
| Omsk | petr | NA | NA | 31,66 |
| Omskaya Oblast' | admd | 56 00N | 073 00E | 79 |
| Omsukchan | ppl | 62 32N | 155 48E | 57,59,RM |
| Omsukchan coal deposit | coal | 62 30N | 156 15E | 34 |
| Onega | ppl | 63 54N | 038 08E | RM |
| Onega, Lake | lake | 61 30N | 035 45E | RM |
| Onon | stm | 51 42N | 115 50E | RM |
| Opukha coal area | coal | 62 00N | 173 30E | 34 |
| Or'ya | oilf | 56 06N | 054 44E | 20 |
| Ordzhonikidze | ppl | 43 00N | 044 40E | 21,56,79,RM |
| Orël | ppl | 52 55N | 036 05E | 56,79,RM |
| Orenburg | ppl | 51 45N | 055 06E | 10,20,32,55,56, 79,RM |
| Orenburg | gasf | 51 45N | 054 47E | 15,20,23,66 |
| Orenburgskaya Oblast' | admd | 52 00N | 056 00E | 20,79 |
| Orlovskaya Oblast' | admd | 53 00N | 036 15E | 79 |
| Orsha | ppl | 54 31N | 030 26E | RM |
| Orsk | ppl | 51 12N | 058 34E | 32,56,RM |
| Orsk | petr | NA | NA | 31,66 |
| Orsk 421 | petr | NA | NA | 31,66 |
| Osa | oilf | 57 14N | 055 25E | 20 |
| Osh | ppl | 40 32N | 072 48E | 56,79,RM |
| Osh coal deposit | coal | 40 30N | 073 00E | 34 |
| Oshmarino | ppl | 71 47N | 082 50E | RM |
| Oshskaya Oblast' | admd | 40 00N | 073 00E | 79 |
| Osinniki | ppl | 53 37N | 087 21E | RM |
| Ostrov Bulla | oilf | 40 04N | 049 37E | 21,66 |
| Oymyakon | ppl | 63 28N | 142 49E | RM |
| Ozek-Suat | oilf | 44 29N | 044 47E | 21 |
| Ozërnyy | gasf | 70 29N | 085 06E | 16 |

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| Name | Feature | Latitude | Longitude | Page |
|---|---|---|---|---|
| Pakhachi | ppl | 60 34N | 169 03E | RM |
| Pal'yanovo | oilf | 61 50N | 066 41E | 16 |
| Palana | ppl | 59 07N | 159 58E | RM |
| Palatka | ppl | 60 06N | 150 54E | 57,RM |
| Palyavaam | stm | 68 50N | 170 45E | RM |
| Pamirs | mts | 38 00N | 073 00E | RM |
| Panevėžys | ppl | 55 44N | 024 21E | RM |
| Panfilov | ppl | 44 10N | 080 01E | 56,RM |
| Pangody | ppl | 65 51N | 074 30E | 16,17,RM |
| Paramushir, Ostrov | isl | 50 25N | 155 50E | RM |
| Paratunka | ppl | 52 57N | 158 14E | 57,64,RM |
| Pärnu | ppl | 58 24N | 024 32E | 56,RM |
| Paromay | ppl | 52 50N | 143 02E | 57,RM |
| Partizansk | ppl | 43 07N | 133 05E | RM |
| Partizansk coal basin | coal | 43 15N | 133 00E | 34 |
| Pashnya | oilf | 63 16N | 056 20E | 20 |
| Patara | oilf | 41 09N | 046 26E | 21 |
| Pauzhetka | ppl | 51 28N | 156 48E | 57,64,RM |
| Pavlodar | ppl | 52 18N | 076 57E | 32,56,59,79,RM |
| Pavlodar | petr | NA | NA | 31,66 |
| Pavlodarskaya Oblast' | admd | 52 00N | 076 00E | 79 |
| Pavlograd | ppl | 47 00N | 035 03E | RM |
| Pavlovskoye | oilf | 56 34N | 056 06E | 20 |
| Pechenga | ppl | 69 33N | 031 12E | RM |
| Pechora | ppl | 65 25N | 057 02E | 20,32,56,59,RM |
| Pechora | stm | 68 13N | 054 15E | 20,50,51,RM |
| Pechora coal basin | coal | 67 00N | 062 00E | 34,35,36,37,39,40 |
| Pechora-Kozhva | gasf | 65 15N | 056 58E | 20 |
| Pechorskoye More | sea | 70 00N | 054 00E | RM |
| Peipus, Lake | lake | 58 45N | 027 30E | RM |
| Pelyatka | gasf | 69 44N | 081 53E | 16,66 |
| Peno | ppl | 56 55N | 032 45E | RM |
| Penza | ppl | 53 13N | 045 00E | 56,79,RM |
| Penzenskaya Oblast' | admd | 53 00N | 044 30E | 79 |
| Penzhina | stm | 62 28N | 165 18E | RM |
| Penzhinskaya Guba | bay | 61 00N | 162 00E | 63,RM |
| Peregrebnoye | ppl | 62 58N | 065 05E | RM |
| Perm' | ppl | 58 00N | 056 15E | 20,32,56,79,RM |
| Perm' | thep | NA | NA | 49,67 |
| Perm' | petr | NA | NA | 31,66 |
| Permskaya Oblast' | admd | 59 00N | 056 00E | 20,79 |
| Permyakov | oilf | 61 27N | 079 30E | 16 |
| Pervomaysk | ppl | 48 03N | 030 52E | RM |
| Pervomaysk | ppl | 46 26N | 141 57E | RM |
| Pervomayskoye | oilf | 59 09N | 076 14E | 16 |
| Pervoural'sk | ppl | 56 54N | 059 58E | RM |
| Pestsovyy | gasf | 67 02N | 075 21E | 16,66 |
| Petropavlovsk | ppl | 54 52N | 069 06E | 56,79,RM |
| Petropavlovsk-Kamchatskiy | ppl | 53 01N | 158 39E | 57,59,79,RM |
| Petrovsk | ppl | 52 19N | 045 23E | 32,RM |
| Petrovsk-Zabaykal'skiy | ppl | 51 17N | 108 50E | 57,RM |
| Petrozavodsk | ppl | 61 49N | 034 20E | 56,79,RM |
| Pevek | ppl | 69 42N | 170 17E | 57,59,RM |
| Pikhtovka | ppl | 56 00N | 082 42E | RM |
| Pilyugino | oilf | 53 23N | 052 18E | 20 |
| Pinega | stm | 64 08N | 041 54E | RM |
| Pinsk | ppl | 52 07N | 026 07E | 56,RM |
| Pionerskoye iron ore deposit | iron | 57 30N | 125 05E | 11 |
| Plesetsk | ppl | 62 43N | 040 17E | RM |
| Pobedino | ppl | 49 51N | 142 49E | RM |
| Podkamennaya Tunguska | ppl | 61 36N | 090 09E | RM |
| Podkamennaya Tunguska | stm | 61 36N | 090 18E | RM |
| Pogranichnyy | ppl | 44 25N | 131 24E | RM |
| Pokachi | oilf | 61 42N | 074 59E | 16,66 |
| Pokosnyy | ppl | 55 31N | 101 04E | 57,RM |
| Pokrovka | oilf | 52 49N | 049 39E | 20 |
| Pokrovka | oilf | 53 01N | 052 47E | 20 |
| Pokrovsk | ppl | 61 29N | 129 06E | 57,RM |
| Polazna | oilf | 58 15N | 056 25E | 20 |
| Poles'ye | reg | 52 00N | 027 00E | RM |
| Polevskoy | ppl | 56 26N | 060 11E | RM |
| Polotsk | ppl | 55 29N | 028 47E | 32,56,RM |
| Poltava | ppl | 49 35N | 034 34E | 79,RM |
| Poltavskaya Oblast' | admd | 49 30N | 034 00E | 79 |
| Poludennoye | oilf | 60 07N | 078 09E | 16 |
| Polyarnyy | ppl | 69 38N | 178 44E | 59,RM |
| Pomary | ppl | 55 58N | 048 21E | 10,20,RM |
| Ponomarevka | oilf | 53 18N | 054 04E | 20 |
| Ponoy | stm | 66 59N | 041 17E | RM |
| Popigay | stm | 72 54N | 106 36E | RM |
| Poronaysk | ppl | 49 13N | 143 07E | 57,RM |
| Pos'yet | ppl | 42 39N | 130 48E | RM |
| Potanay | oilf | 61 15N | 065 56E | 16 |
| Poti | ppl | 42 09N | 041 40E | RM |
| Povkh | oilf | 62 28N | 075 51E | 16 |
| Poyarkovo | ppl | 49 36N | 128 41E | RM |
| Pravdinsk | oilf | 60 51N | 071 47E | 16,29,66 |
| Pravobereg | gasf | 62 13N | 056 38E | 20 |
| Priargunsk | ppl | 50 24N | 119 06E | 57,RM |
| Pridneprovsk | ppl | 48 24N | 035 07E | RM |
| Pridneprovsk | thep | NA | NA | 49,67 |
| Priluki | ppl | 50 36N | 032 24E | RM |
| Primorskiy Kray | admd | 45 00N | 135 00E | 79 |
| Primorsko-Akhtarsk | ppl | 46 03N | 038 10E | RM |
| Pripyat' | stm | 51 10N | 030 30E | RM |
| Prokop'yevsk | ppl | 53 53N | 086 45E | RM |
| Prokop'yevsk coal deposit | coal | 54 15N | 086 45E | 34 |
| Promyshlennyy | ppl | 67 35N | 063 55E | RM |
| Pron'kino | oilf | 52 47N | 052 34E | 20 |
| Prorva | oilf | 45 51N | 053 20E | 21 |
| Provideniya | ppl | 64 23N | 173 18W | RM |
| Przheval'sk | ppl | 42 29N | 078 24E | 56,79,RM |
| Pskov | ppl | 57 50N | 028 20E | 56,79,RM |
| Pskovskaya Oblast' | admd | 57 30N | 029 00E | 79 |
| Pugachëv | ppl | 52 02N | 048 49E | RM |
| Punga | gasf | 62 40N | 064 11E | 16 |
| Pur | stm | 67 31N | 077 55E | 16,19,RM |
| Pushkino | ppl | 51 14N | 046 59E | RM |
| Pyasina | stm | 73 50N | 087 10E | 16,RM |
| Pyatigorsk | ppl | 44 01N | 043 05E | 56,RM |
| Pyt'-Yakh | ppl | 60 45N | 072 50E | 16,17,RM |

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| Name | Feature | Latitude | Longitude | Page |
|---|---|---|---|---|
| Radayevka | oilf | 53 52N | 050 57E | 20 |
| Raduzhnyy | ppl | 62 06N | 077 31E | 16,17,RM |
| Rassokha | gasf | 61 52N | 057 19E | 20 |
| Raychikhinsk coal basin | coal | 51 30N | 128 00E | 34,40 |
| Razdan | ppl | 40 29N | 044 46E | RM |
| Razdan | thep | NA | NA | 49,67 |
| Razgort | ppl | 63 29N | 048 42E | 56,RM |
| Rechitsa | ppl | 52 22N | 030 23E | RM |
| Reftinskiy | ppl | 57 00N | 061 30E | RM |

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| Name | Feature | Latitude | Longitude | Page |
|---|---|---|---|---|
| Reftinskiy | thep | NA | NA | 47,49,67 |
| Revda | ppl | 56 48N | 059 57E | RM |
| Riga | ppl | 56 57N | 024 06E | 32,56,79,RM |
| Riga, Gulf of | gulf | 57 30N | 023 35E | RM |
| Rogun | ppl | 38 47N | 069 52E | RM |
| Rogun | hydp | NA | NA | 50,51,67 |
| Romanovka | ppl | 53 14N | 112 46E | RM |
| Romashkino | oilf | 54 50N | 052 32E | 17,20,22,66 |
| Romny | ppl | 50 45N | 033 28E | RM |
| Roslavl' | ppl | 53 57N | 032 52E | RM |
| Rossokha tar sands deposit | tars | 71 07N | 111 02E | 45 |
| Rossosh' | ppl | 50 12N | 038 26E | RM |
| Rostov | ppl | 57 11N | 039 25E | 55,56,59,79,RM |
| Rostov | nucp | NA | NA | 52,67 |
| Rostovskaya Oblast' | admd | 47 00N | 042 00E | 79 |
| Rovenskaya Oblast' | admd | 51 00N | 026 30E | 79 |
| Rovno | ppl | 50 37N | 026 15E | 56,79,RM |
| Rovno | nucp | NA | NA | 52,67 |
| Rtishchevo | ppl | 52 15N | 043 47E | RM |
| Rubtsovsk | ppl | 51 30N | 081 15E | 55,56,RM |
| Rudnichnyy | ppl | 59 38N | 052 26E | 56,RM |
| Rudnyy | ppl | 52 57N | 063 07E | RM |
| Russian Soviet Federated Socialist Republic | admd | 60 00N | 100 00E | 79 |
| Russkaya | gasf | 66 40N | 080 33E | 16,66 |
| Russkaya tar sands deposit | tars | 66 56N | 080 45E | 45 |
| Russkiy Khutor | oilf | 44 15N | 045 19E | 21 |
| Rustavi | ppl | 41 33N | 045 03E | RM |
| Ruzayevka | ppl | 54 04N | 044 56E | 56,RM |
| Ryazan' | ppl | 54 38N | 039 44E | 56,65,79,RM |
| Ryazan' | thep | NA | NA | 49,67 |
| Ryazan' | petr | NA | NA | 31,66 |
| Ryazanskaya Oblast' | admd | 54 15N | 040 30E | 79 |
| Rybach'ye | ppl | 42 26N | 076 12E | 56,RM |
| Rybinskoye Vodokhranilishche | resv | 58 30N | 038 25E | RM |
| Ryrkaypiy | ppl | 68 56N | 179 26W | 59,RM |
| Rzhev | ppl | 56 15N | 034 20E | 56,RM |

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| Name | Feature | Latitude | Longitude | Page |
|---|---|---|---|---|
| Saaremaa | isl | 58 25N | 022 30E | RM |
| Safonovo | ppl | 55 09N | 033 13E | 56,RM |
| Safonovo coal deposit | coal | 55 15N | 033 09E | 34 |
| Sagiz | oilf | 47 26N | 053 21E | 21 |
| Sakar | gasf | 38 54N | 063 35E | 21,66 |
| Sakhalin | isl | 51 00N | 143 00E | 11,RM |
| Sakhalin oil and gas region | reg | 52 00N | 143 00E | 11,14,25,32 |
| Sakhalin tar sands deposit | tars | 53 58N | 142 47E | 45 |
| Sakhalinskaya Oblast' | admd | 52 00N | 142 30E | 79 |
| Sakmara | stm | 51 46N | 055 01E | 20 |
| Sal'sk | ppl | 46 28N | 041 33E | 56,RM |
| Salaush | oilf | 55 59N | 052 57E | 20 |
| Salavat | ppl | 53 21N | 055 55E | 20,RM |
| Salavat | petr | NA | NA | 31,66 |
| Salekhard | ppl | 66 33N | 066 40E | 16,RM |
| Salym | oilf | 60 47N | 071 12E | 16 |
| Salyukino | oilf | 66 52N | 058 43E | 20 |
| Samantepe | gasf | 38 59N | 063 53E | 21,66 |
| Samara | stm | 53 10N | 050 04E | 20 |
| Samarkand | ppl | 39 40N | 066 58E | 56,79,RM |
| Samarkandskaya Oblast' | admd | 40 00N | 067 00E | 79 |
| Samgori | oilf | 41 34N | 045 09E | 21,66 |
| Samotlor | oilf | 61 14N | 076 39E | 16,17,19,22,29,66 |
| Sangar coal deposit | coal | 64 30N | 128 00E | 34 |
| Sannikova, Proliv | strt | 74 30N | 140 00E | RM |
| Saran' | ppl | 49 46N | 072 52E | RM |
| Saransk | ppl | 54 11N | 045 11E | 79,RM |
| Sarapul | ppl | 56 28N | 053 48E | RM |
| Saratov | ppl | 51 34N | 046 02E | 32,56,79,RM |
| Saratov | hydp | NA | NA | 50,67 |
| Saratov | petr | NA | NA | 31,66 |
| Saratovskaya Oblast' | admd | 51 30N | 047 00E | 20,79 |
| Sarny | ppl | 51 20N | 026 36E | 56,RM |
| Sartang | stm | 67 44N | 133 12E | RM |
| Sary-Ozek | ppl | 44 22N | 077 59E | 56,RM |
| Saryshagan | ppl | 46 06N | 073 36E | 56,RM |
| Sasovo | ppl | 54 20N | 041 55E | 56,RM |
| Savuy | oilf | 61 54N | 073 42E | 16 |
| Sayak | ppl | 47 00N | 077 24E | 56,RM |
| Sayan Mountains | mts | 52 45N | 096 00E | RM |
| Sayan-Shushenskoye | hydp | NA | NA | 46,47,50,51,67 |
| Sayanogorsk | ppl | 53 05N | 091 25E | 55,57,RM |
| Saygat | oilf | 61 22N | 072 09E | 16 |
| Segezha | ppl | 63 44N | 034 19E | 56,RM |
| Selemdzha | stm | 51 42N | 128 53E | RM |
| Semakov | gasf | 69 11N | 076 02E | 16,66 |
| Semenovka | oilf | 53 41N | 050 34E | 20 |
| Semipalatinsk | ppl | 50 28N | 080 13E | 56,79,RM |
| Semipalatinskaya Oblast' | admd | 49 00N | 080 00E | 79 |
| Serafimovskiy | oilf | 54 33N | 053 35E | 20 |
| Serdobsk | ppl | 52 28N | 044 13E | RM |
| Sergeyevka | ppl | 53 51N | 067 25E | 56,RM |
| Sergeyevka | oilf | 54 50N | 055 41E | 20 |
| Sergino | ppl | 62 30N | 065 38E | 16,17,18,RM |
| Serov | ppl | 59 36N | 060 35E | 56,RM |
| Serpukhov | ppl | 54 55N | 037 25E | RM |
| Sevan, Ozero | lake | 40 20N | 045 20E | RM |
| Sevastopol' | ppl | 44 36N | 033 32E | 56,RM |
| Severnaya Dvina | stm | 64 32N | 040 30E | RM |
| Severnaya Sos'va | stm | 64 11N | 065 27E | 16,RM |
| Severnaya Zemlya | isls | 79 30N | 098 00E | RM |
| Severnyy Pokur | oilf | 60 48N | 078 27E | 16,66 |
| Severo-Achak | gasf | 41 06N | 061 38E | 21 |
| Severo-Balkui | gasf | 39 55N | 061 36E | 21 |
| Severo-Buzachi | oilf | 45 09N | 051 50E | 21 |
| Severo-Gugurtli | gasf | 40 25N | 062 01E | 21 |
| Severo-Kamsk | oilf | 58 07N | 056 08E | 20 |
| Severo-Kazakhstanskaya Oblast' | admd | 54 30N | 069 00E | 79 |
| Severo-Komsomol | gasf | 64 46N | 076 08E | 16,66 |
| Severo-Mylva | oilf | 62 17N | 055 59E | 20 |
| Severo-Naip | gasf | 40 42N | 061 48E | 21 |
| Severo-Osetinskaya ASSR | admd | 43 00N | 044 00E | 79 |
| Severo-Pokur | oilf | 61 12N | 075 48E | 16 |
| Severo-Urengoy | gasf | 67 34N | 076 32E | 16,66 |
| Severo-Var'yegan | oilf | 62 26N | 077 25E | 16,66 |
| Severobaykal'sk | ppl | 55 38N | 109 19E | RM |
| Severodvinsk | ppl | 64 34N | 039 50E | 56,RM |
| Severomorsk | ppl | 69 05N | 033 27E | RM |
| Severoural'sk | ppl | 60 09N | 059 57E | RM |
| Seymchan | ppl | 62 53N | 152 26E | RM |
| Seyrab | gasf | 38 40N | 062 40E | 21 |
| Shadrinsk | ppl | 56 05N | 063 38E | RM |
| Shaim | ppl | 60 21N | 064 10E | 16,RM |
| Shakhpakhty | gasf | 42 49N | 057 22E | 21 |

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|---|---|---|---|---|
| Shakhtinsk | ppl | 49 41N | 072 36E | RM |
| Shakhty | ppl | 47 42N | 040 13E | RM |
| Shakhty coal deposit | coal | 47 37N | 040 22E | 34 |
| Shantarskiye Ostrova | isls | 55 00N | 137 36E | RM |
| Shapkina | oilf | 67 18N | 054 17E | 20 |
| Sharypovo | ppl | 55 33N | 089 12E | 55,56,60,RM |
| Shashkin | oilf | 55 01N | 056 07E | 20 |
| Shatlyk | gasf | 37 20N | 061 27E | 21,66 |
| Shatura | ppl | 55 34N | 039 32E | RM |
| Shatura | thep | NA | NA | 49,67 |
| Shchuchinsk | ppl | 52 56N | 070 12E | RM |
| Shelikhova, Zaliv | gulf | 59 45N | 158 00E | RM |
| Shevchenko | ppl | 43 39N | 051 12E | 21,32,52,53, 56,59,79,RM |
| Shevchenko AES | nucp | NA | NA | 67 |
| Shiikh-Darvaza | gasf | 40 09N | 058 21E | 21 |
| Shikotan-Tō | isl | 43 47N | 146 45E | RM |
| Shilka | stm | 53 20N | 121 26E | RM |
| Shingino | oilf | 58 31N | 078 23E | 16 |
| Shkapovo | oilf | 53 58N | 054 02E | 20,66 |
| Shmidta, Ostrov | isl | 81 08N | 090 48E | RM |
| Shorkel' | gasf | 37 03N | 061 40E | 21 |
| Shostka | ppl | 51 52N | 033 29E | RM |
| Shugurovo | oilf | 54 28N | 052 05E | 20 |
| Shul'ba | hydp | NA | NA | 50,67 |
| Shurab coal deposit | coal | 40 08N | 070 27E | 34 |
| Shurtan | gasf | 38 30N | 066 02E | 21 |
| Siauliai | ppl | 55 56N | 023 19E | RM |
| Siazan | oilf | 41 00N | 048 54E | 21 |
| Siberia power system | reg | 55 00N | 097 00E | 46,55 |
| Siberian AES | nucp | NA | NA | 67 |
| Sibiryakova, Ostrov | isl | 72 50N | 079 00E | RM |
| Sikhote-Alin' Range | mts | 48 00N | 138 00E | RM |
| Sillamaë | ppl | 59 24N | 027 45E | RM |
| Sillamaë uranium deposit/processing center | u/t | NA | NA | 42,43 |
| Simferopol' | ppl | 44 51N | 034 06E | 56,79,RM |
| Simushir, Ostrov | isl | 46 58N | 152 02E | RM |
| Sinegor'ye | ppl | 62 04N | 150 28E | 57,59,RM |
| Siren'kino | oilf | 54 53N | 056 15E | 20 |
| Skovorodino | ppl | 53 59N | 123 55E | 11,57,RM |
| Slantsy | ppl | 59 06N | 028 04E | 44,56,RM |
| Slavgorod | ppl | 53 00N | 078 40E | RM |
| Slavyansk | ppl | 48 52N | 037 37E | RM |
| Slavyansk | thep | NA | NA | 49,67 |
| Slavyansk-na-Kubani | ppl | 45 15N | 038 08E | RM |
| Slobodskoy | ppl | 58 42N | 050 12E | RM |
| Slyudyanka | ppl | 51 38N | 103 42E | RM |
| Slyudyanka uranium deposit | u/t | NA | NA | 42,43 |
| Smela | ppl | 49 14N | 031 53E | RM |
| Smolensk | ppl | 54 47N | 032 03E | 56,79,RM |
| Smolensk | nucp | NA | NA | 52,67 |
| Smolenskaya Oblast' | admd | 55 00N | 033 00E | 79 |
| Snezhnogorsk | ppl | 68 10N | 087 30E | 57,58,59,RM |
| Sochi | ppl | 43 35N | 039 45E | 56,RM |
| Sofiysk | ppl | 51 33N | 139 54E | 11,RM |
| Sogo coal deposit | coal | 71 15N | 128 15E | 34 |
| Sol'-Iletsk | ppl | 51 10N | 054 59E | RM |
| Solenaya | gasf | 69 08N | 081 56E | 16,66 |
| Soligorsk | ppl | 52 48N | 027 32E | RM |
| Solikamsk | ppl | 59 39N | 056 47E | RM |
| Solnechnyy | ppl | 60 19N | 137 35E | RM |
| Solnecknyy | ppl | 50 35N | 137 02E | RM |
| Sololi tar sands deposit | tars | 70 36N | 125 23E | 45 |
| Solov'yevsk | ppl | 49 55N | 115 42E | RM |
| Sosnogorsk | ppl | 63 37N | 053 51E | RM |
| Sosnovo-Ozërskoye | ppl | 52 31N | 111 34E | 57,RM |
| South power system | reg | 49 00N | 032 00E | 46,55 |
| South Kazakhstan (Chiganak) | thep | NA | NA | 4 9,67 |
| South Ukraine | nucp | NA | NA | 50,52,53,67 |
| South Yakutia coal basin | coal | 56 30N | 126 00E | 11,34,35,36,38,40 |
| Sovetabad | gasf | 36 41N | 061 23E | 21,66 |
| Sovetsk | ppl | 55 05N | 021 53E | RM |
| Sovetskaya Gavan' | ppl | 48 58N | 140 18E | 11,59,RM |
| Sovetskiy | ppl | 61 24N | 063 31E | 16,RM |
| Sovetskoye | oilf | 60 48N | 077 05E | 16,66 |
| Soyuz (Orenburg) pipeline | pipe | 49 46N | 043 40E | 10,20 |
| Spassk-Dal'niy | ppl | 44 37N | 132 48E | 57,RM |
| Srednechernogorsk | oilf | 61 15N | 077 06E | 16 |
| Srednekolymsk | ppl | 67 27N | 153 41E | RM |
| Sredneural'sk | ppl | 56 59N | 060 28E | RM |
| Sredneural'sk | thep | NA | NA | 49,67 |
| Srednevasyugan | oilf | 59 25N | 078 24E | 16 |
| Sredneyamal | gasf | 69 21N | 071 05E | 16,66 |
| Sredniy Urgal coal deposit | coal | 51 13N | 132 59E | 34 |
| Sretensk | ppl | 52 15N | 117 43E | RM |
| Stakhanovo | oilf | 54 24N | 053 43E | 20 |
| Stanovoy Range | mts | 56 20N | 126 00E | 11,RM |
| Stanovoy Upland | mts | 53 30N | 115 00E | RM |
| Staraya Russa | ppl | 58 00N | 031 23E | RM |
| Starobeshevo | ppl | 47 44N | 038 03E | RM |
| Starobeshevo | thep | NA | NA | 49,67 |
| Staryy Nadym | ppl | 65 35N | 072 42E | 16,17,18,RM |
| Staryy Oskol | ppl | 51 17N | 037 51E | RM |
| Stavropol' | ppl | 46 37N | 042 15E | 21,55,56,79,RM |
| Stavropol' | thep | NA | NA | 49,67 |
| Stavropol'skiy Kray | admd | 45 00N | 044 00E | 21,79 |
| Stepanakert | ppl | 39 50N | 046 46E | RM |
| Stepanovo | oilf | 53 40N | 052 15E | 20 |
| Stepnogorsk uranium deposit | u/t | NA | NA | 42,43 |
| Sterlitamak | ppl | 53 37N | 055 58E | 56,RM |
| Stolbovoy, Ostrov | isl | 74 05N | 136 00E | RM |
| Strelka | ppl | 58 05N | 093 01E | RM |
| Strêva | stm | 54 48N | 024 15E | 50,67 |
| Strezhevoy | ppl | 60 42N | 077 34E | 16,17,19,RM |
| Sukhona | stm | 60 46N | 046 24E | RM |
| Sukhumi | ppl | 43 00N | 041 02E | 56,79,RM |
| Sulak | stm | 43 20N | 047 34E | 50,67 |
| Sultangulovo | oilf | 53 33N | 052 47E | 20 |
| Sulyukta coal deposit | coal | 39 51N | 069 35E | 34 |
| Sumgait | ppl | 40 36N | 049 38E | RM |
| Sumsar | ppl | 41 18N | 071 19E | RM |
| Sumsar uranium deposit | u/t | NA | NA | 42,43 |
| Sumskaya Oblast' | admd | 51 00N | 034 00E | 79 |
| Sumy | ppl | 50 54N | 034 48E | 56,79,RM |
| Suntar | ppl | 62 10N | 117 40E | 57,59,RM |
| Supsa | oilf | 41 51N | 042 00E | 21 |
| Sura | stm | 56 06N | 046 00E | RM |
| Surgut | ppl | 61 14N | 070 32E | 16,17,18,19,31, 32,33,55,56,RM |
| Surgut-1 | thep | NA | NA | 49,67 |
| Surgut-2 | thep | NA | NA | 49,67 |
| Surkhandar'inskaya Oblast' | admd | 38 00N | 067 30E | 79 |
| Susuman | ppl | 62 47N | 148 10E | 57,RM |

S (continued)

| Name | Feature | Latitude | Longitude | Page |
|---|---|---|---|---|
| Sutormin | oilf | 64 01N | 074 58E | 16 |
| Suzun | ppl | 53 47N | 082 19E | 56,RM |
| Suzun | gasf | 68 10N | 083 52E | 16 |
| Sverdlovsk | ppl | 56 51N | 060 36E | 26,55,56,79,RM |
| Sverdlovskaya Oblast' | admd | 58 00N | 062 00E | 79 |
| Svetlogorsk | ppl | 52 38N | 029 46E | RM |
| Svetlogorsk | ppl | 66 55N | 088 23E | 57,RM |
| Svetlyy | ppl | 62 43N | 064 17E | 16,RM |
| Svetlyy | ppl | 63 15N | 113 45E | 57,RM |
| Svobodnyy | ppl | 51 24N | 128 08E | 55,57,RM |
| Svobodnyy coal deposit | coal | 51 30N | 127 45E | 34 |
| Syktyvkar | ppl | 61 40N | 050 48E | 56,59,79,RM |
| Sylva | stm | 57 39N | 056 54E | 20 |
| Synya | ppl | 65 22N | 058 02E | RM |
| Synya | gasf | 65 25N | 058 14E | 20 |
| Syrdar'inskaya Oblast' | admd | 41 00N | 067 15E | 79 |
| Syrdar'ya | stm | 46 03N | 061 00E | RM |
| Syrdar'ya | thep | NA | NA | 49,67 |
| Syzran' | ppl | 53 11N | 048 27E | 20,44,56,RM |
| Syzran' | oilf | 53 12N | 048 20E | 20 |
| Syzran' | petr | NA | NA | 31,66 |

T

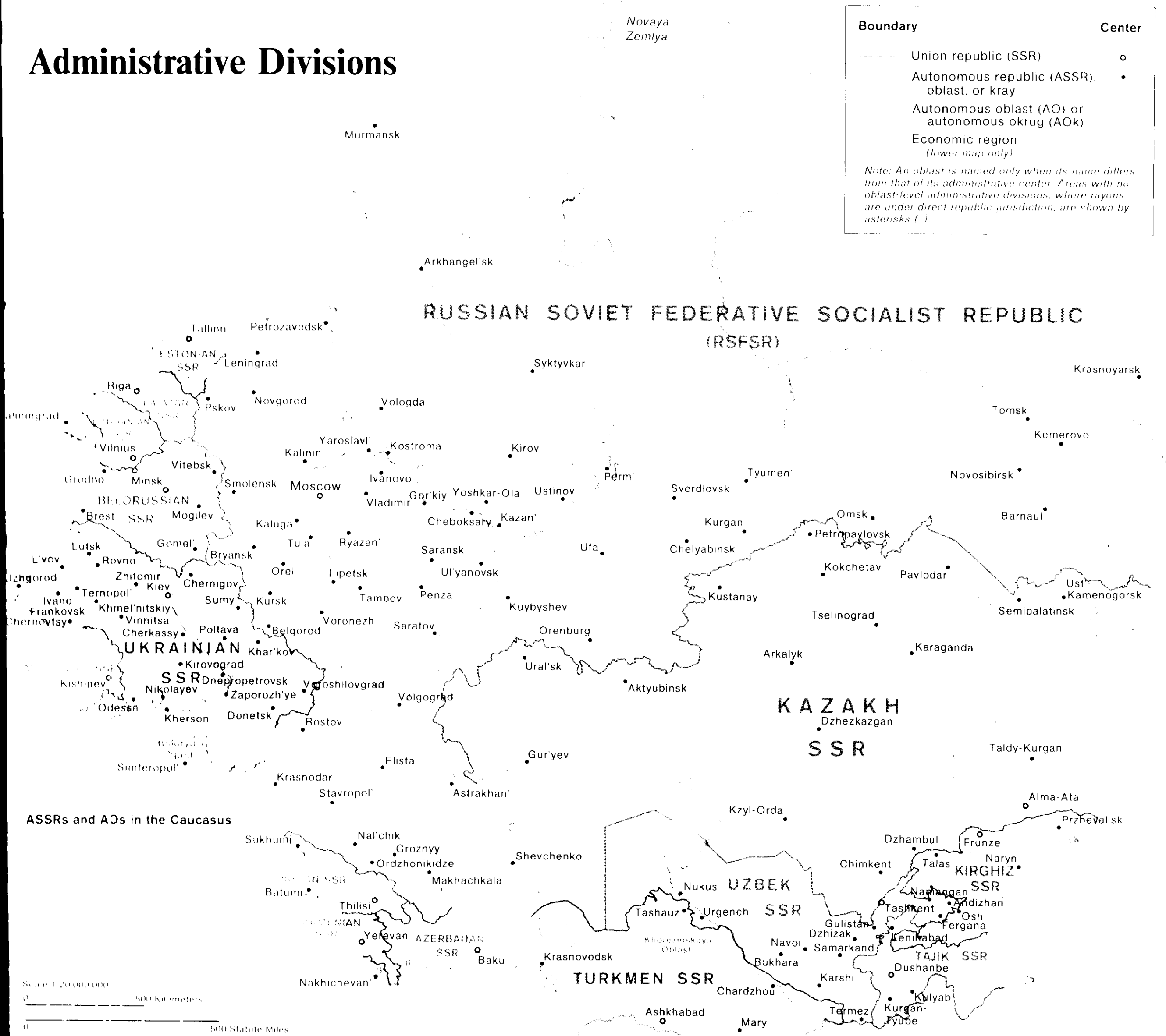
| Name | Feature | Latitude | Longitude | Page |
|---|---|---|---|---|
| Taboshar uranium deposit/processing center | u/t | NA | NA | 42,43 |
| Taganrog | ppl | 47 12N | 038 56E | RM |
| Tagrinskoye | oilf | 62 23N | 078 15E | 16 |
| Tajik SSR | admd | 39 00N | 071 00E | 79 |
| Takhta-Bazar | ppl | 35 57N | 062 50E | 56,RM |
| Talakan | ppl | 50 19N | 130 22E | 57,RM |
| Talas | ppl | 42 32N | 072 14E | 56,79,RM |
| Talasskaya Oblast' | admd | 42 20N | 072 10E | 79 |
| Taldy-Kurgan | ppl | 45 00N | 078 24E | 56,79,RM |
| Taldy-Kurganskaya Oblast' | admd | 45 00N | 079 00E | 79 |
| Talimardzhan | ppl | 38 23N | 065 37E | 62,RM |
| Talimardzhan | thep | NA | NA | 49,67 |
| Talinskoye | oilf | 62 05N | 065 55E | 16 |
| Tallinn | ppl | 59 25N | 024 45E | 32,44,55,56,79, RM |
| Talnakh | ppl | 69 30N | 088 11E | RM |
| Talon | ppl | 59 48N | 148 38E | RM |
| Tambov | ppl | 52 43N | 041 27E | 55,56,79,RM |
| Tambovskaya Oblast' | admd | 52 45N | 041 30E | 79 |
| Tanyp | oilf | 56 43N | 056 07E | 20 |
| Tara | ppl | 56 54N | 074 22E | 56,RM |
| Taribani | oilf | 41 08N | 045 54E | 21 |
| Tarkhan | oilf | 53 32N | 053 07E | 20 |
| Tarko-Sale | ppl | 64 55N | 077 49E | RM |
| Tartu | ppl | 58 23N | 026 43E | RM |
| Tas-Tumus | ppl | 64 12N | 126 37E | RM |
| Tas-Yuryakh | ppl | 61 47N | 113 01E | RM |
| Tasbulat | gasf | 43 05N | 052 20E | 21 |
| Taseyeva | stm | 58 06N | 094 01E | 60 |
| Tash-Kumyr coal deposit | coal | 41 16N | 072 05E | 34 |
| Tashanta | ppl | 49 43N | 089 11E | RM |
| Tashauz | ppl | 41 50N | 059 58E | 21,56,79,RM |
| Tashauzskaya Oblast' | admd | 41 10N | 058 50E | 79 |
| Tashkent | ppl | 41 20N | 069 18E | 55,56,59,79,RM |
| Tashkent | thep | NA | NA | 49,67 |
| Tashkentskaya Oblast' | admd | 41 00N | 069 30E | 79 |
| Tashkuduk | gasf | 39 54N | 063 27E | 21 |
| Tashtagol | ppl | 52 47N | 087 53E | RM |
| Tatar | nucp | NA | NA | 52,67 |
| Tatar Strait | strt | 50 00N | 141 00E | RM |
| Tatarian tar sands deposit | tars | 56 18N | 055 48E | 45 |
| Tatarka | ppl | 53 58N | 075 03E | 56,RM |
| Tatarsk | ppl | 55 13N | 075 58E | 56,RM |
| Tatarskaya ASSR | admd | 55 00N | 051 00E | 20,79 |
| Tavda | ppl | 58 03N | 065 15E | 56,RM |
| Tavtimanovo | oilf | 54 49N | 056 45E | 20 |
| Tayëzhnoye iron ore deposit | iron | 57 41N | 125 23E | 11 |
| Taymurzino | oilf | 55 29N | 054 53E | 20 |
| Taymylyr coal deposit | coal | 72 30N | 122 00E | 34 |
| Taymyr coal basin | coal | 74 30N | 097 00E | 34,40 |
| Taymyr Peninsula | pen | 76 00N | 104 00E | RM |
| Taymyr, Ozero | lake | 74 30N | 102 30E | RM |
| Taymyrskiy AOk | admd | 72 00N | 095 00E | 79 |
| Tayshet | ppl | 55 57N | 098 00E | 57,59,60,RM |
| Taz | stm | 67 32N | 078 40E | 16,RM |
| Taz | gasf | 67 23N | 079 13E | 16 |
| Taz Peninsula | pen | 68 35N | 076 00E | 16,17,RM |
| Tazhigali | oilf | 46 17N | 053 15E | 21 |
| Tazovskiy | ppl | 67 28N | 078 42E | RM |
| Tbilisi | ppl | 41 42N | 044 45E | 21,32,55,56,79, RM |
| Tbilisi | thep | NA | NA | 49,67 |
| Tedzhen | ppl | 37 23N | 060 31E | 56,RM |
| Tedzhen | gasf | 37 09N | 060 46E | 21 |
| Tekeli | ppl | 44 48N | 078 57E | RM |
| Temirtau | ppl | 50 05N | 072 56E | RM |
| Tenge | ppl | 43 15N | 052 48E | 21,RM |
| Tenge | gasf | 43 04N | 052 41E | 21 |
| Tengiz | oilf | 46 01N | 053 27E | 21 |
| Tengutinskoye | oilf | 45 33N | 046 01E | 21 |
| Teplov | oilf | 60 41N | 072 12E | 16 |
| Terekla | oilf | 53 09N | 055 55E | 20 |
| Teren'uzyuk | oilf | 46 25N | 053 43E | 21 |
| Termez | ppl | 37 14N | 067 16E | 79,RM |
| Termez tar sands deposit | tars | 37 56N | 066 34E | 45 |
| Ternopol' | ppl | 49 33N | 025 35E | 79,RM |
| Ternopol'skaya Oblast' | admd | 49 30N | 025 30E | 79 |
| Tevlin | oilf | 62 33N | 073 26E | 16 |
| Tien Shan | mts | 42 00N | 080 00E | RM |
| Tikhoretsk | ppl | 45 51N | 040 07E | 21,32,56,RM |
| Tikhvin | ppl | 59 39N | 033 31E | 56,RM |
| Tiksi | ppl | 71 36N | 128 48E | 57,59,RM |
| Timan Ridge | rdge | 65 00N | 051 00E | RM |
| Timan-Pechora oil and gas region | reg | 65 00N | 056 00E | 14,20,25,32 |
| Timashevsk | ppl | 45 37N | 038 57E | RM |
| Timpton | stm | 58 43N | 127 12E | 11 |
| Tiraspol' | ppl | 46 50N | 029 37E | RM |
| Tisul' | ppl | 55 45N | 088 19E | 60,RM |
| Tkibuli coal deposit | coal | 42 21N | 042 59E | 34 |
| Tkvarcheli coal deposit | coal | 42 51N | 041 41E | 34 |
| Tobol | stm | 58 10N | 068 12E | RM |
| Tobol'sk | ppl | 58 12N | 068 16E | 18,32,56,RM |
| Tokmak | ppl | 42 52N | 075 18E | RM |
| Toktogul' | hydp | NA | NA | 50,51,67 |
| Tol'yatti | ppl | 53 31N | 049 26E | RM |
| Tolum | oilf | 60 41N | 065 10E | 16 |
| Tom' | stm | 56 50N | 084 27E | 60 |
| Tom'-Usa | thep | NA | NA | 49,67 |
| Tommot | ppl | 58 58N | 126 19E | 57,RM |

| Name | Feature | Latitude | Longitude | Page |
|---|---|---|---|---|
| T (continued) | | | | |
| Tomsk | ppl | 56 30N | 084 58E | 56,60,79,RM |
| Tomskaya Oblast' | admd | 58 00N | 083 00E | 16,24,79 |
| Topordzhul'ba | gasf | 40 00N | 058 27E | 21 |
| Tortay | oilf | 45 38N | 053 13E | 21 |
| Torzhok | ppl | 57 03N | 034 58E | 32,RM |
| Trans Siberian Railroad | rr | 57 30N | 111 00E | 11,RM |
| Transcaucasus oil and gas region | reg | 40 00N | 048 00E | 14,21,25,32 |
| Transcaucasus power system | reg | 41 00N | 046 00E | 46,55 |
| Transcaucasus Economic Region | reg | 41 00N | 046 00E | 79 |
| Trekhozernoye | oilf | 60 28N | 064 57E | 16 |
| Tripol'ye | ppl | 50 07N | 030 46E | RM |
| Tripol'ye | thep | NA | NA | 49,67 |
| Troitsk | ppl | 54 06N | 061 35E | 55,56,RM |
| Troitsk | thep | NA | NA | 49,67 |
| Troitsko-Pechorsk | ppl | 62 42N | 056 13E | RM |
| Troitsko-Pechorsk | gasf | 63 00N | 056 01E | 20 |
| Troitskoye | ppl | 52 58N | 084 40E | RM |
| Tselinograd | ppl | 51 10N | 071 30E | 55,56,79,RM |
| Tselinogradskaya Oblast' | admd | 51 00N | 070 00E | 79 |
| Tskhinvali | ppl | 42 14N | 043 57E | RM |
| Tuapse | ppl | 44 05N | 039 06E | 56,RM |
| Tuapse | petr | NA | NA | 31,66 |
| Tugurskiy Zaliv | bay | 54 00N | 137 00E | 63 |
| Tukan | oilf | 59 52N | 072 25E | 16 |
| Tul'skaya Oblast' | admd | 54 00N | 037 30E | 79 |
| Tula | ppl | 54 12N | 037 37E | 79,RM |
| Tula coal deposit | coal | 53 53N | 037 43E | 34 |
| Tulun | ppl | 54 35N | 100 33E | 57,60,RM |
| Tulun coal deposit | coal | 54 30N | 100 43E | 34 |
| Tunguska coal basin | coal | 64 00N | 100 00E | 34,35,40 |
| Tuostakh | stm | 67 50N | 135 24E | RM |
| Tura | ppl | 64 17N | 100 15E | RM |
| Tura | stm | 57 12N | 066 56E | RM |
| Turan | ppl | 52 08N | 093 55E | RM |
| Turan Lowland | pln | 42 00N | 061 00E | RM |
| Turgay | ppl | 49 38N | 063 30E | 56,RM |
| Turgay coal basin | coal | 51 00N | 065 00E | 34,35,40 |
| Turgay Plateau | plat | 50 30N | 061 50E | RM |
| Turgayskaya Oblast' | admd | 50 20N | 066 00E | 79 |
| Turinsk | ppl | 58 03N | 063 42E | RM |
| Turiy Rog | ppl | 45 14N | 131 58E | RM |
| Turka | ppl | 52 57N | 108 13E | RM |
| Turkestan | ppl | 43 20N | 068 15E | 56,RM |
| Turkmen SSR | admd | 40 00N | 060 00E | 21,79 |
| Tursunzade | ppl | 38 30N | 068 14E | 56,RM |
| Turukhansk | ppl | 65 49N | 087 59E | RM |
| Turukhansk tar sands deposit | tars | 66 11N | 089 29E | 45 |
| Tuvinskaya ASSR | admd | 51 30N | 095 00E | 79 |
| Tuymazy | oilf | 54 42N | 053 22E | 20,66 |
| Tyb'yu | gasf | 62 01N | 056 36E | 20 |
| Tygda | ppl | 53 07N | 126 20E | 57,RM |
| Tymovskoye | ppl | 50 51N | 142 39E | RM |
| Tynda | ppl | 55 10N | 124 43E | 11,57,RM |
| Tyubedzhik | oilf | 44 13N | 050 59E | 21 |
| Tyukalinsk | ppl | 55 52N | 072 12E | RM |
| Tyumen' | ppl | 57 09N | 065 26E | 18,56,58,59,79, RM |
| Tyumen' | oilf | 61 36N | 078 08E | 16 |
| Tyumenskaya Oblast' | admd | 63 00N | 072 00E | 15,16,17,24,79 |
| Tyuya-Muyun uranium deposit | u/t | NA | NA | 42,43 |
| TETs-21 Mosenergo Heat and Power | thep | NA | NA | 49,67 |
| TETs-22 Mosenergo Heat and Power | thep | NA | NA | 49,67 |
| TETs-23 Mosenergo Heat and Power | thep | NA | NA | 49,67 |
| U | | | | |
| Ubezhenskoye | oilf | 45 01N | 041 20E | 21 |
| Ubin | oilf | 60 56N | 064 48E | 16 |
| Uchadzhi | gasf | 38 30N | 062 58E | 21 |
| Uchkuduk | ppl | 42 10N | 063 31E | RM |
| Uchkuduk uranium deposit | u/t | NA | NA | 42,43 |
| Uchkyr | gasf | 40 03N | 063 00E | 21 |
| Uchur | stm | 58 48N | 130 35E | 11,RM |
| Uda | stm | 54 42N | 135 14E | RM |
| Udachnyy | ppl | 62 33N | 113 53E | 57,59,RM |
| Udmurtskaya ASSR | admd | 57 00N | 053 00E | 20,79 |
| Udzha tar sands deposit | tars | 70 13N | 117 40E | 45 |
| Uelen | ppl | 66 10N | 169 48W | RM |
| Ufa | ppl | 54 44N | 055 56E | 20,32,79,RM |
| Ufa Novo-Chernikovsk | petr | NA | NA | 31,66 |
| Ufa Novo-Ufimskiy | petr | NA | NA | 31,66 |
| Ufa Staryy-Ufimskiy | petr | NA | NA | 31,66 |
| Uglegorsk | ppl | 49 05N | 142 02E | 57,RM |
| Uglegorsk | ppl | 48 19N | 038 17E | 56,RM |
| Uglegorsk | thep | NA | NA | 47,49,67 |
| Uglegorsk coal region | coal | 49 00N | 142 15E | 34 |
| Ukhta | ppl | 63 33N | 053 40E | 20,32,56,59,RM |
| Ukhta | petr | NA | NA | 31,66 |
| Ukraine oil and gas region | reg | 49 00N | 030 00E | 14,15,23,25,32 |
| Ukraine Economic Region | reg | 49 00N | 032 00E | 79 |
| Ukrainian SSR | admd | 49 00N | 032 00E | 79 |
| Ul'yanovsk | ppl | 54 20N | 048 24E | 20,79,RM |
| Ul'yanovskaya Oblast' | admd | 54 00N | 048 00E | 79 |
| Ulan-Ude | ppl | 51 50N | 107 37E | 57,79,RM |
| Ulugkhem coal basin | coal | 51 15N | 094 30E | 34,40 |
| Ungeny | ppl | 47 12N | 027 48E | 56,RM |
| Upper Kama Upland | upld | 58 30N | 054 00E | RM |
| Ur'yeva | oilf | 61 20N | 076 05E | 16 |
| Ural | stm | 47 00N | 051 48E | 20,RM |
| Ural Mountains | mts | 60 00N | 060 00E | 20,RM |
| Ural'sk | ppl | 51 14N | 051 22E | 20,56,79,RM |
| Ural'skaya Oblast' | admd | 50 00N | 050 00E | 20,79 |
| Urals power system | reg | 57 00N | 062 00E | 46,55 |
| Urals Economic Region | reg | 56 00N | 059 00E | 79 |
| Uray | ppl | 60 08N | 064 48E | 16,17,RM |
| Urengoy | ppl | 65 58N | 078 25E | 16,17,56,RM |
| Urengoy | gasf | 66 54N | 076 45E | 10,11,15,16,17, 18,23,32,33,66 |
| Urengoy | thep | NA | NA | 49,67 |
| Urgal | ppl | 51 12N | 132 58E | RM |
| Urgench | ppl | 41 33N | 060 38E | 56,79,RM |
| Urtabulak | gasf | 39 08N | 064 32E | 21,66 |
| Urup, Ostrov | isl | 46 00N | 150 00E | RM |
| Uryupinsk | ppl | 50 47N | 042 00E | RM |
| Usa | stm | 65 57N | 056 55E | 16,20,RM |
| Ushakova, Ostrov | isl | 80 48N | 079 25E | RM |
| Usinsk | ppl | 65 55N | 057 25E | 32,56,RM |
| Usinsk | oilf | 66 07N | 057 11E | 20,66 |
| Usol'ye-Sibirskoye | ppl | 52 45N | 103 41E | RM |
| Ussuri | stm | 48 28N | 135 02E | RM |
| Ussuriysk | ppl | 43 48N | 131 59E | 55,57,RM |
| Ust'-Kamenogorsk | ppl | 49 58N | 082 40E | 55,56,79,RM |
| Ust'-Balyk | oilf | 61 03N | 072 33E | 16,66 |
| U (continued) | | | | |
| Ust'-Barguzin | ppl | 53 27N | 108 59E | RM |
| Ust'-Ilimsk | ppl | 58 03N | 102 39E | 55,57,RM |
| Ust'-Ilimsk | hydp | NA | NA | 50,67 |
| Ust'-Kamchatsk | ppl | 56 15N | 162 30E | RM |
| Ust'-Kureyka | ppl | 66 30N | 087 15E | RM |
| Ust'-Kut | ppl | 56 46N | 105 40E | 57,RM |
| Ust'-Maya | ppl | 60 25N | 134 32E | RM |
| Ust'-Nera | ppl | 64 34N | 143 12E | 57,59,RM |
| Ust'-Olenëk | ppl | 73 00N | 119 48E | RM |
| Ust'-Omchug | ppl | 61 09N | 149 38E | 57,RM |
| Ust'-Ordynskiy | ppl | 52 48N | 104 45E | RM |
| Ust'-Ordynskiy Buryatskiy AOk | admd | 53 30N | 104 00E | 79 |
| Ust'-Port | ppl | 69 40N | 084 26E | RM |
| Ust'-Taskan | ppl | 62 40N | 150 52E | 57,RM |
| Ust'-Uda | ppl | 54 24N | 103 17E | 57,RM |
| Ustinov | ppl | 56 51N | 053 14E | 20,79,RM |
| Ustyurt Plateau | upld | 43 00N | 056 00E | RM |
| Uzbek SSR | admd | 41 00N | 064 00E | 21,79 |
| Uzen' | ppl | 43 27N | 053 10E | 21,56,RM |
| Uzen' | oilf | 43 20N | 052 59E | 21,29,66 |
| Uzhgorod | ppl | 48 37N | 022 18E | 10,11,32,79,RM |
| Uzhur | ppl | 55 18N | 089 50E | RM |
| V | | | | |
| Vakh | stm | 60 45N | 076 45E | 16,19,RM |
| Vakh | oilf | 60 52N | 078 56E | 16 |
| Vakhrushev | ppl | 48 59N | 142 58E | 57,59,RM |
| Vakhrushev coal deposit | coal | 49 01N | 142 48E | 34 |
| Vakhsh | stm | 37 06N | 068 18E | 50,51,67 |
| Valdai Hills | hlls | 57 00N | 033 30E | RM |
| Valmiera | ppl | 57 33N | 025 24E | 56,RM |
| Valuyki | ppl | 50 14N | 038 08E | RM |
| Van"yegan | oilf | 61 52N | 077 11E | 16 |
| Vaneyvis | gasf | 67 43N | 054 02E | 20 |
| Vanino | ppl | 49 05N | 140 15E | RM |
| Vankarem | ppl | 67 51N | 175 50W | RM |
| Var'yegan | oilf | 62 06N | 077 34E | 16,66 |
| Varzino | ppl | 68 21N | 038 23E | 56,RM |
| Vashka | stm | 64 53N | 045 47E | 20,RM |
| Vasil'kov | gasf | 68 00N | 053 46E | 20 |
| Vasil'yevskoye | oilf | 58 23N | 055 56E | 20 |
| Vasyugan | stm | 59 07N | 080 46E | 16,RM |
| Vat"yegan | oilf | 62 19N | 074 55E | 16,66 |
| Vata | oilf | 61 12N | 076 05E | 16,66 |
| Vaygach, Ostrov | isl | 70 00N | 059 30E | RM |
| Vel'sk | ppl | 61 05N | 042 08E | RM |
| Vel'yu | oilf | 63 37N | 056 16E | 20 |
| Velikiy Ustyug | ppl | 60 48N | 046 18E | 56,RM |
| Velikiye Luki | ppl | 56 20N | 030 32E | RM |
| Ventspils | ppl | 57 24N | 021 31E | 32,56,RM |
| Verkhne | oilf | 63 37N | 053 06E | 20 |
| Verkhne-Anabar tar sands deposit | tars | 69 57N | 112 22E | 45 |
| Verkhnegrubeshor | oilf | 66 52N | 054 45E | 20 |
| Verkhnelyamin | oilf | 62 14N | 070 27E | 16 |
| Verkhnesalym | oilf | 60 01N | 071 01E | 16 |
| Verkhneshasha | oilf | 60 51N | 070 20E | 16 |
| Verkhniy Tagil | ppl | 57 22N | 059 56E | RM |
| Verkhniy Tagil | thep | NA | NA | 49,67 |
| Verkhnyaya Salda | ppl | 58 02N | 060 33E | RM |
| Verkhnyaya Taymyra | stm | 74 15N | 099 48E | RM |
| Verkhoyansk | ppl | 67 35N | 133 27E | 57,RM |
| Verkhoyansk Range | mts | 67 00N | 129 00E | RM |
| Vesenneye | oilf | 59 22N | 076 24E | 16 |
| Veslyanka | oilf | 57 12N | 056 41E | 20 |
| Vidim | ppl | 56 25N | 103 12E | RM |
| Vikhorevka | ppl | 56 05N | 101 15E | RM |
| Vikhorevka uranium/thorium deposit | u/t | NA | NA | 42,43 |
| Viktoriya, Ostrov | isl | 80 10N | 036 45E | RM |
| Vikulovo | ppl | 56 49N | 070 37E | 56,RM |
| Vil'kitskogo, Proliv | strt | 77 55N | 103 00E | RM |
| Vilnius | ppl | 54 41N | 025 19E | 56,79,RM |
| Vilyuy | stm | 64 24N | 126 26E | 50,51,RM |
| Vilyuy | hydp | NA | NA | 58 |
| Vilyuysk | ppl | 63 45N | 121 35E | RM |
| Vilyuyskoye Vodokhranilishche | resv | 62 55N | 111 00E | RM |
| Vinnitsa | ppl | 49 14N | 028 29E | 56,79,RM |
| Vinnitskaya Oblast' | admd | 49 00N | 029 00E | 79 |
| Vishera | stm | 59 55N | 056 25E | RM |
| Vishnëvogorsk | ppl | 56 00N | 060 40E | RM |
| Vishnëvogorsk uranium deposit | u/t | NA | NA | 42,43 |
| Vitebsk | ppl | 55 12N | 030 11E | 56,79,RM |
| Vitebskaya Oblast' | admd | 55 00N | 029 30E | 79 |
| Vitim | ppl | 59 28N | 112 34E | RM |
| Vitim | stm | 59 26N | 112 34E | RM |
| Vize, Ostrov | isl | 79 30N | 077 00E | RM |
| Vladimir | ppl | 56 10N | 040 25E | 56,79,RM |
| Vladimirskaya Oblast' | admd | 56 00N | 040 30E | 79 |
| Vladivostok | ppl | 43 08N | 131 54E | 57,59,79,RM |
| Vol'sk | ppl | 52 02N | 047 23E | RM |
| Volga | stm | 45 55N | 047 52E | 20,21,50,51,67, RM |
| Volga at Tol'yatti-Zhigulëvsk | hydp | NA | NA | 50,67 |
| Volga at Volgograd | hydp | NA | NA | 50,55,67 |
| Volga Economic Region | reg | 52 00N | 046 00E | 79 |
| Volga Upland | upld | 52 00N | 046 00E | RM |
| Volga-Urals oil and gas region | reg | 55 00N | 053 00E | 14,15,20,22,25,32 |
| Volga-Vyatka Economic Region | reg | 57 00N | 048 00E | 79 |
| Volgodonsk | ppl | 47 32N | 042 09E | 52,53,RM |
| Volgograd | ppl | 48 45N | 044 25E | 26,52,53,55,56, 59,79,RM |
| Volgograd | petr | NA | NA | 31,66 |
| Volgogradskaya Oblast' | admd | 49 00N | 044 00E | 79 |
| Volkhov | ppl | 59 55N | 032 20E | RM |
| Volochayevka Vtoraya | ppl | 48 35N | 134 34E | RM |
| Vologda | ppl | 59 13N | 039 54E | 56,79,RM |
| Vologodskaya Oblast' | admd | 60 00N | 042 00E | 79 |
| Volynskaya Oblast' | admd | 51 00N | 025 00E | 79 |
| Volzhsk | ppl | 55 53N | 048 20E | RM |
| Volzhskiy | ppl | 48 49N | 044 44E | RM |
| Vorkuta | ppl | 67 30N | 064 00E | 16,56,59,RM |
| Vorkuta coal deposit | coal | 67 13N | 063 35E | 34 |
| Voronezh | ppl | 51 38N | 039 12E | 56,79,RM |
| Voronezh AST | nucp | NA | NA | 52,53,67 |
| Voronezhskaya Oblast' | admd | 51 00N | 040 00E | 79 |
| Voroshilovgrad | ppl | 48 34N | 039 20E | 79,RM |
| Voroshilovgrad | thep | NA | NA | 49,67 |
| Voroshilovgradskaya Oblast' | admd | 49 00N | 039 00E | 79 |
| Voskresenskoye | oilf | 53 14N | 056 12E | 20 |
| Vostochno-Kazakhstanskaya Oblast' | admd | 49 00N | 084 00E | 79 |
| Vostochno-Pal'yu | gasf | 62 30N | 056 55E | 20 |
| Vostochno-Tarkosale | gasf | 64 56N | 078 54E | 16 |
| Vostochno-Tedzhen | gasf | 37 05N | 061 05E | 21 |

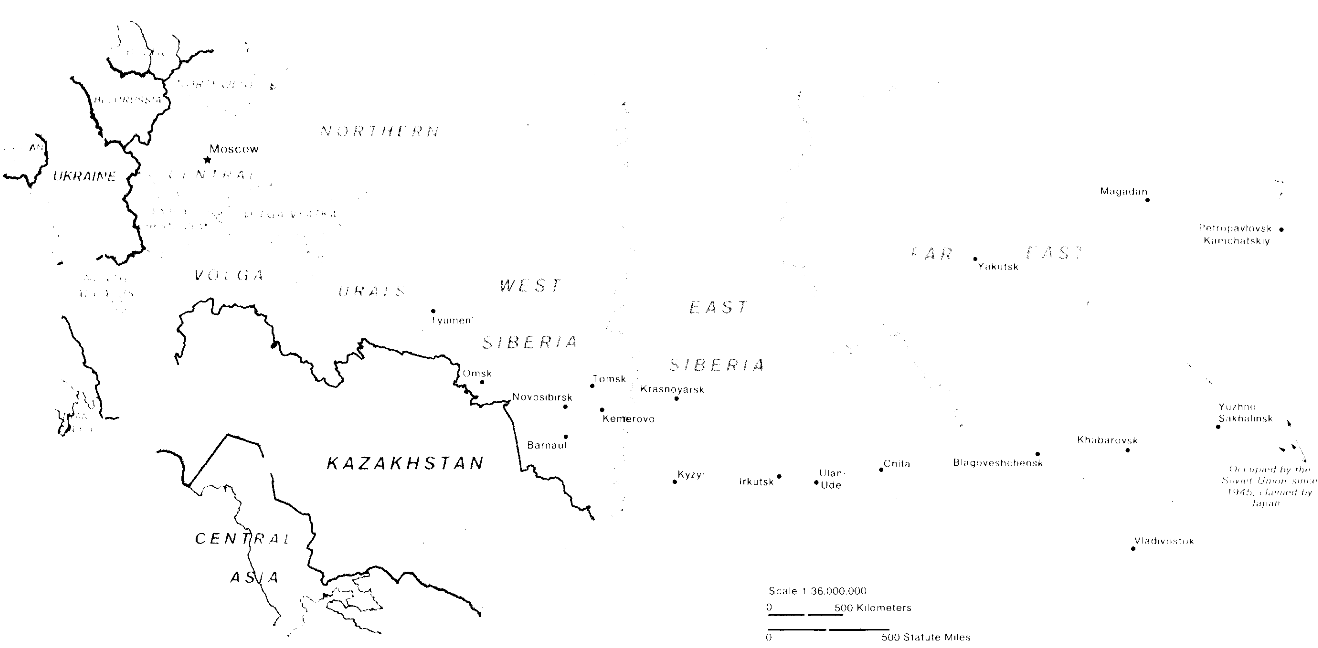
| Name | Feature | Latitude | Longitude | Page |
|---|---|---|---|---|
| V (continued) | | | | |
| Votkinsk | ppl | 57 03N | 053 59E | 56,RM |
| Votkinsk | hydp | NA | NA | 50,67 |
| Voyvozh | ppl | 64 21N | 055 06E | RM |
| Vozey | oilf | 66 42N | 056 47E | 20,66 |
| Vuktyl | ppl | 63 40N | 057 20E | 59,RM |
| Vuktyl | gasf | 63 49N | 057 18E | 15,20,23,66 |
| Vyatka | stm | 55 36N | 051 30E | 20,RM |
| Vyaz'ma | ppl | 55 13N | 034 18E | RM |
| Vyborg | ppl | 60 42N | 028 45E | 25,RM |
| Vychegda | stm | 61 18N | 046 36E | 20,RM |
| Vyksa | ppl | 55 18N | 042 11E | 33,RM |
| Vym' | stm | 62 13N | 050 25E | 20 |
| Vyngapur | gasf | 63 10N | 076 46E | 16,23,66 |
| Vyshniy Volochek | ppl | 57 35N | 034 34E | RM |
| Vytegra | ppl | 61 00N | 036 27E | 56,RM |
| W | | | | |
| West Kamchatka coal area | coal | 57 30N | 157 30E | 34 |
| West Siberia oil and gas region | reg | 64 00N | 075 00E | 14,15,16,17,18, 19,22,23,25,32,33 |
| West Siberia Economic Region | reg | 60 00N | 076 00E | 79 |
| West Siberian Plain | pln | 60 00N | 075 00E | RM |
| White Sea | sea | 65 30N | 038 00E | RM |
| Wrangel Island | isl | 71 00N | 179 30W | RM |
| Y | | | | |
| Yablonovyy Range | mts | 53 30N | 115 00E | RM |
| Yagodnoye | ppl | 62 33N | 149 40E | 57,RM |
| Yagtydin | oilf | 62 38N | 056 18E | 20 |
| Yakushkino | oilf | 53 54N | 051 31E | 20 |
| Yakutsk | ppl | 62 00N | 129 40E | 32,57,58,59,79, RM |
| Yakutskaya ASSR | admd | 65 00N | 130 00E | 79 |
| Yalta | ppl | 44 30N | 034 10E | 56,62,RM |
| Yamal Peninsula | pen | 70 00N | 070 00E | 16,17,RM |
| Yamalo-Nenetskiy AOk | admd | 66 00N | 076 00E | 17,79 |
| Yamarovka | ppl | 50 38N | 110 16E | RM |
| Yamashi | oilf | 55 05N | 051 47E | 20 |
| Yamburg | gasf | 68 06N | 076 18E | 15,16,17,23,66 |
| Yamsovey | gasf | 65 30N | 075 56E | 16,66 |
| Yana | stm | 71 31N | 136 32E | RM |
| Yangikazgan | gasf | 40 38N | 062 37E | 21 |
| Yangiyul' | ppl | 41 06N | 069 03E | RM |
| Yanskiy Zaliv | gulf | 71 50N | 136 00E | RM |
| Yaransk | ppl | 57 19N | 047 54E | RM |
| Yarayner | oilf | 63 09N | 077 48E | 16 |
| Yarega | oilf | 63 24N | 053 28E | 20 |
| Yarega tar sands deposit | tars | 65 43N | 056 41E | 45 |
| Yareyyu | gasf | 67 59N | 055 15E | 20 |
| Yarino | oilf | 58 26N | 056 31E | 20 |
| Yarkino | ppl | 59 08N | 099 23E | RM |
| Yaroslavl' | ppl | 57 37N | 039 52E | 56,79,RM |
| Yaroslavl' | petr | NA | NA | 31,66 |
| Yaroslavskaya Oblast' | admd | 58 00N | 039 30E | 79 |
| Yasnogorsk | ppl | 50 51N | 115 45E | 57,RM |
| Yaun-Lor | oilf | 61 27N | 072 43E | 16 |
| Yefremov | ppl | 53 09N | 038 07E | RM |
| Yegindybulak | ppl | 49 45N | 076 23E | 56,RM |
| Yelets | ppl | 52 37N | 038 30E | 32,RM |
| Yelizarovo | oilf | 61 27N | 067 42E | 16 |
| Yelizovo | ppl | 53 11N | 158 23E | 57,RM |
| Yelkino | oilf | 57 37N | 056 56E | 20 |
| Yem-Yegov | oilf | 61 58N | 066 06E | 16 |
| Yenisey | stm | 71 50N | 082 40E | 16,50,51,60,67, RM |
| Yeniseysk | ppl | 58 27N | 092 10E | 57,RM |
| Yenoruskino | oilf | 54 56N | 050 45E | 20 |
| Yeraliyev | ppl | 43 12N | 051 39E | 56,RM |
| Yerevan | ppl | 40 11N | 044 30E | 56,79,RM |
| Yergach | oilf | 57 23N | 056 39E | 20 |
| Yermak | ppl | 52 02N | 076 55E | RM |
| Yermak | oilf | 60 47N | 076 10E | 16 |
| Yermak | thep | NA | NA | 49,67 |
| Yermakovo | ppl | 66 37N | 086 13E | RM |
| Yermentau | ppl | 51 38N | 073 10E | RM |
| Yesil' | ppl | 51 28N | 066 24E | 56,RM |
| Yetypur | gasf | 64 01N | 077 42E | 16,66 |
| Yevpatoriya | ppl | 45 12N | 033 22E | 56,RM |
| Yevreyskaya AO | admd | 48 30N | 132 00E | 79 |
| Yeysk | ppl | 46 42N | 038 17E | RM |
| Yoshkar-Ola | ppl | 56 40N | 047 55E | 79,RM |
| Yubileynyy | gasf | 66 05N | 075 56E | 16,66 |
| Yugo-Osetinskaya AO | admd | 42 20N | 044 00E | 79 |
| Yugomash | oilf | 56 16N | 055 31E | 20 |
| Yugorsk | oilf | 61 37N | 077 27E | 16 |
| Yurga | ppl | 55 42N | 084 51E | RM |
| Yurkharov | gasf | 67 47N | 077 19E | 16 |
| Yushkozero | ppl | 64 45N | 032 07E | RM |
| Yuzhno-Balyk | oilf | 60 29N | 072 28E | 16 |
| Yuzhno-Myl'dzhino | oilf | 58 45N | 078 05E | 16 |
| Yuzhno-Russkaya | gasf | 66 04N | 080 36E | 16,66 |
| Yuzhno-Sakhalinsk | ppl | 46 57N | 142 44E | 11,57,59,79,RM |
| Yuzhno-Shapkina | oilf | 67 11N | 054 25E | 20 |
| Yuzhno-Sukhokumskoye | oilf | 44 30N | 045 13E | 21,66 |
| Yuzhno-Surgut | oilf | 61 08N | 072 57E | 16 |
| Yuzhno-Tambey | gasf | 71 37N | 071 57E | 16,66 |
| Yuzhno-Ural'sk | ppl | 54 26N | 061 15E | RM |
| Yuzhno-Ural'sk | thep | NA | NA | 49,67 |
| Yuzhno-Zhetybay | gasf | 43 15N | 052 09E | 21 |
| Yuzhnyy Bug | stm | 46 59N | 031 58E | 50,51 |

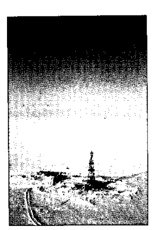
| Name | Feature | Latitude | Longitude | Page |
|---|---|---|---|---|
| Z | | | | |
| Zabaykal'sk | ppl | 49 38N | 117 19E | RM |
| Zagorsk | ppl | 56 18N | 038 08E | 51,56,RM |
| Zagorsk | hydp | NA | NA | 50,67 |
| Zainsk | ppl | 55 18N | 052 04E | 56,RM |
| Zainsk | thep | NA | NA | 49,67 |
| Zakamensk | ppl | 50 23N | 103 17E | 57,RM |
| Zakarpatskaya Oblast' | admd | 48 20N | 023 00E | 79 |
| Zamankul | oilf | 43 18N | 044 20E | 21 |
| Zapadno-Erdekli | gasf | 38 44N | 053 33E | 21 |
| Zapadno-Izkos'gora | gasf | 62 55N | 054 41E | 20 |
| Zapadno-Soplesk | gasf | 64 17N | 057 14E | 20 |
| Zapadno-Surgut | oilf | 61 22N | 073 04E | 16 |
| Zapadno-Tarkosale | gasf | 64 47N | 077 49E | 16,66 |
| Zapadnyy Tebuk | oilf | 63 42N | 054 54E | 20 |
| Zapolyarnoye | gasf | 66 55N | 079 14E | 15,16,17,23,66 |
| Zaporozh'ye | ppl | 47 53N | 035 05E | 79,RM |
| Zaporozh'ye | thep | NA | NA | 47,49,67 |
| Zaporozh'ye | nucp | NA | NA | 52,67 |
| Zaporozhskaya Oblast' | admd | 47 30N | 035 30E | 79 |
| Zarafshan | ppl | 41 31N | 064 15E | 56,RM |
| Zavolzh'ye | ppl | 56 39N | 043 24E | RM |
| Zaysan | ppl | 47 28N | 084 52E | RM |
| Zaysan, Ozero | lake | 48 00N | 084 00E | RM |
| Zayskoye Vodokhranilishche | resv | 54 25N | 127 45E | 11,RM |
| Zelenodol'sk | ppl | 55 51N | 048 33E | RM |
| Zelënyy Mys | ppl | 68 48N | 161 24E | 57,59,RM |
| Zeya | ppl | 53 45N | 127 16E | 11,55,RM |
| Zeya | stm | 50 15N | 127 35E | 11,50,51,57,67, RM |
| Zeya | hydp | NA | NA | 50,67 |
| Zhanatala | oilf | 47 10N | 050 09E | 21 |
| Zhanatas | ppl | 43 34N | 069 45E | 56,RM |
| Zhanazhol | oilf | 48 35N | 058 00E | 21 |
| Zhannetty, Ostrov | isl | 76 43N | 158 00E | RM |
| Zharyk | ppl | 48 52N | 072 51E | RM |
| Zhdanov | ppl | 47 06N | 037 33E | RM |
| Zhdanov | gasf | 39 16N | 052 58E | 21 |
| Zheleznodorozhnyy | ppl | 62 35N | 050 55E | RM |
| Zheleznogorsk | ppl | 52 19N | 035 12E | 56,RM |
| Zheleznogorsk-Ilimskiy | ppl | 56 34N | 104 08E | 57,RM |
| Zhëltyye Vody | ppl | 48 21N | 033 32E | RM |
| Zhëltyye Vody-Terny uranium deposit/processing center | u/t | NA | NA | 42,43 |
| Zhetybay | oilf | 43 20N | 052 18E | 21,27,66 |
| Zhigalovo | ppl | 54 48N | 105 08E | RM |
| Zhigansk | ppl | 66 45N | 123 20E | RM |
| Zhigulevsk | oilf | 53 27N | 049 30E | 20 |
| Zhiloy | oilf | 40 21N | 050 35E | 21 |
| Zhitomir | ppl | 50 15N | 028 40E | 79,RM |
| Zhitomirskaya Oblast' | admd | 50 30N | 028 30E | 79 |
| Zhokhova, Ostrov | isl | 76 04N | 152 40E | RM |
| Zima | ppl | 53 55N | 102 04E | 57,RM |
| Zimniy | gasf | 69 24N | 085 08E | 16 |
| Zlatoust | ppl | 55 10N | 059 40E | 56,RM |
| Zmiyëv (Gotval'd) | thep | NA | NA | 49,67 |
| Zol'noye | oilf | 53 27N | 049 46E | 20 |
| Zolotaya Gora | ppl | 54 16N | 126 38E | 57,RM |
| Zuyevka | ppl | 48 04N | 038 15E | RM |
| Zuyevka | thep | NA | NA | 49,67 |
| Zvenigorodka coal deposit | coal | 48 58N | 031 10E | 34 |
| Zyryanka | ppl | 65 45N | 150 50E | RM |
| Zyryanka coal basin | coal | 66 00N | 146 00E | 34,40 |
| Zyryanka coal deposit | coal | 66 00N | 150 20E | 34 |
| Zyryanovsk | ppl | 49 43N | 084 20E | 56,RM |

# Administrative Divisions




Note: The Ukraine Economic Region is normally divided into three regions: Donets-Dnepr, South, and Southwest, by the Soviets. These regions have been combined for simplification. Moldavian SSR is not part of any economic region.





**USSR Energy**
**Atlas**

Central Intelligence Agency