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KYRGYZSTAN ENERGY PRICING AND TAXATION STUDY

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for USAID

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ACRONYMS AND ABBREVIATIONS

A.I.D.	U.S. Agency for International Development
bcm	billion cubic meters
BSHE	Bishkek Heating System Enterprise
EEC	European Economic Community
EPK	"Energy Program of Kyrgyzstan", report, 1992
FSU	former Soviet Union
GOK	Government of Kyrgyzstan
GNP	Gross National Product
GWh	Gigawatt hour
HV	High Voltage
Kcal	Kilocalorie
Km	Kilometers
KSEC	Kyrgyzstan State Energy Company
KNP	Kyrgyzneftetproduct
KTS	Kyrgyztopsnab
LDC	lesser developed country
LPG	Liquified Petroleum Gas
LV	Low Voltage
mcf	thousand cubic feet
mcm	thousand cubic meters
MEF	Ministrty of Economy and Finance
MIS	management information systems

ACRONYMS AND ABBREVIATIONS

MMR	million rubles
MT	Thousand metric tons
MMt	million metric tons
NIS	Newly Independent States
OECD	Organization for Economic Cooperation and Development
O&M	operation and maintenance
R or Rb	rubles; unit of currency in the NIS Republics - as of May 1993, 820 R=US$1.
T	metric ton
tfe	tons of fuel equivalent
toe	tons of oil equivalent
TPS	Thermal Power Station
TWh	Terawatt hour
VAT	value-added taxes

Executive Summary

of the

KYRGYZSTAN ENERGY PRICING AND TAXATION STUDY

The Kyrgyzstan Energy Pricing and Taxation Study was sponsored by the U.S. Agency for International Development's (A.I.D.) Office of Infrastructure for the Newly Independent States, in cooperation with the World Bank's Office of Infrastructure , Energy and Environment Operations for Europe and Central Asia. This assessment is part of the broader energy sector technical assistance to Kyrgyzstan offered by A.I.D., the World Bank and EBRD. This study is based on missions taken to Bishkek in March, May and July of this year by the consultants, Dr. Richard E. Browning (team leader), Mr. Rutherford Poats, and Mr. Glenn Lovin. Several ministries and enterprises, but primarily the Ministry of Economics & Finance, Ministry of Energy, and the State Energy Company participated in the preparation of this study. The preliminary results and recommendations of this study were discussed with several individuals in the Ministry of Energy and the State Energy Company in July and were presented at a seminar to government officials on September 9, 1993 in Bishkek. This study is based primarily on data and information compiled through the first five months of 1993. Changes have occurred since May 1993 that are not fully reflected in this study. A final report, including an appendix of over sixty tables related to the energy sector that have been completed as part of this study, will be distributed to U.S. A.I.D., the World Bank, and the Government of Kyrgyzstan in October, 1993. The consultants wish to express their appreciation to the Government of Kyrgyzstan and the many ministries and enterprises for the cooperation and assistance rendered to us during the preparation of this study.

Overview

Since it's declaration of independence in 1991, Kyrgyzstan has emerged as a model of reform for not only the Central Asian republics but for the entire NIS. The Government has been successful at adopting reform legislation that includes price liberalization, privatization of state assets, enterprise reform, foreign trade and investments, and a social safety net. However, Kyrgyzstan's current economic conditions remain quite grave as supply disruptions, shortages of inputs, sharp increases in petroleum product and natural gas prices, and declines in trade between the republics of the former Soviet Union continue. Real output is estimated to have declined 5% in 1991, 25% in 1992 and has declined further in this year's first half. The republic's current account also deteriorated sharply in 1992 as a result of the end of transfers from the Union and a sharp rise in energy import costs. Longer term economic prospects for Kyrgyzstan are more promising as the country has significant potential resources in hydroelectric energy, important minerals, and tourism. The exploitation of these resources will require domestic and foreign capital and continued technical assistance. The resumption of economic growth, low inflation and a stable currency are preconditions for the generation of

adequate levels of domestic and foreign capital. Since the Government's introduction of the som in May 1993, the som's official rate had declined almost 40% in value relative to the dollar by September.

Historically Kyrgyzstan has been a major net importer of energy, especially petroleum products, since no refining capacity exists within the republic. Among energy sources Kyrgyzstan is a net exporter only of electricity. This study has focused on petroleum products and electricity because of their critical linkage to current and future economic conditions..The republic's current account is now substantially tied to the costs of imported petroleum products and natural gas. While oil and gas are unlikely to ever play as dominant a role in energy supply and demand as hydroelectricity, every effort should be made to develop oil and gas resources because the potential for discoveries of significant value to Kyrgyzstan remains good, and the value to the energy and trade balances would be highly beneficical. Electricity can be a major source of economic growth and hard currency earnings through increased exports. A key issue is the extent and pace at which the Government can afford to electrify the economy, thereby justifying new investments in hydro power plants.

Pricing

In early 1992, energy prices were extremely low compared to world "free market" prices. Since January 1992 Kyrgyzstan has made significant progress in raising coal prices and petroleum product and natural gas prices, on average to about 30% and 60%, respectively, of international equivalent March 1993 price levels, measured on a netback basis and assuming the March market exchange rate. The Government has steadily raised electricity prices such that the average tariff in March , calculated as a weighted average of tariffs by consumer category,was approximately 13% of an international equivalent level. Also, the latest tariffs approved on July 23rd not only increased tariffs enough to offset the substantial change in the exchange rates since the first quarter of this year, but also substantially reduced the gap between households and industrial consumers. Electricity tariffs for the urban and rural population have now risen by a factor of over 4 since January 1993 compared to a 30% increase in industrial tariffs. Based on a small sample of district heat prices in the U.S., district heat tariffs, as of the July 23rd decree, are about 12% of an average U.S. equivalent level.

Since 1992 the Government of Kyrgyzstan has placed a high priority on the adoption of the following basic energy pricing principles:

1) fully recovering marginal costs of energy production to ensure the financial viability of the enterprise; in the short-term to include all variable operating costs, and in the longer term to include fixed costs, inclusive of a fair market return for investment capital;

2) pricing to reflect the full border price equivalent of available import and export markets, fully accounting for transportation and distribution costs and quality differentials, appropriately measured;

3) allowing the free flow of energy supplies and capital to the extent practicable in response to price and investment incentives and the marginal value of the energy resource from the consumer or processor.

Kyrgyzstan's pricing guidelines over the next several years should focus on:(1) restructuring relative prices among the energy types consistent with international, free market and internal cost price relationships and (2) progressively moving towards world equivalent levels. Shown below are preliminary price guidelines through 2000 based on import prices of crude oil, diesel fuel, and natural gas, and domestic prices of coal at the minemouth and an average electricity tariff. These projections are based on first quarter 1993 real prices at a fixed exchange rate of 700 rubles per U.S. dollar. Future import prices for hydrocarbons will continue to be determined primarily by the rate at which Russia and neighboring republics increase their domestic prices towards world levels. In the guidelines below, hydrocarbon prices are assumed to reach 100% of world netback levels by 1995. Also, it is premised that Turkmenistan develops additional control over the pricing of its gas exports by 1995. Domestic coal prices are increased to 60% and 100% of world netback levels by 1995 and 2000, respectively. Electricity tariffs are raised to a level in 2000 which should recover operating and fixed costs and remain competitive with fossil fuel plants in the neighboring republics.

	Price Guidelines		
	1993:q1	1995	2000
Import Prices			
Crude Oil (R/T)	22,334	67,000	75,000
Diesel Fuel (R/T)	52,323	83,775	88,775
Natural Gas (R/MCM)	20,000	40,775	50,000
Domestic Prices			
Coal (R/T)	5,089	9,775	16,000
Electricity (R/KWh)	5.36	16	28

It must be emphasized that these projections are presented as real (1993) prices and assume an exchange rate of 700 R/U.S.$. In 2000 these real prices, converted to dollars, would be: $107/MT for crude oil, $127/MT for diesel fuel, $71/MCM for gas, $23/MT for coal, and $.04/KWH for electricity. Given the projected sharp increase in prices, effective tax collection and reasonably accurate ongoing determination of production costs are important in order to collect and recycle tax revenues, to avoid major pricing and profit distortions, and to achieve desired investment targets.

A number of broader guidelines for determining the desired rate of energy price increases are presented below, specifically as potential constraints to an accelerated schedule, but also as standards to establish a more acceptable path of rising prices.

1) The rate of energy price increases should not exceed an average maximum acceptable percentage of household income spent on energy, and in the case of key economic sectors (e.g., agriculture) on the basis of the maximum acceptable percent of total operating costs accounted for by energy. Price liberalization should not out-pace the ability of Kyrgyzstan to measure, analyze and develop a reliable response strategy to the income and social effects it generates.

2) The rate of price increases should not out-pace the ability of (and the costs themselves) key operating enterprises and policy-makers to measure real production costs, including capital investment and replacement costs, so that prices will be set to recover long-run marginal costs without allowing excess profits to develop untaxed.

3) The rate of price increases should also not proceed so rapidly as to worsen the energy payment and collection process and threaten the liquidity of the financial system which supports the payment process, and ultimately the quality and quantity of energy service provided.

Taxation

Since 1991, the Government has adopted a tax system which is typical of those found in the West. The major taxes include an income tax, profits tax, VAT, and excise taxes. In 1992, these four taxes accounted for 89% of total revenue collected by the Government and, based on initial estimates, 6% of total taxes were collected from the energy sector. The Parliament has continued to adopt measures aimed at broadening the tax base and achieving a high level of tax collection. The largest challenge at this time appears to be effective implementation, especially in the areas of collection and enforcement. Taxes should not be imposed unless they can be thoroughly enforced. Inconsistent enforcement will lead to an uneven competitive environment, penalizing legitimate enterprises at the expense of illegitimate, corrupt participants, reducing the reinvestment and self-sustaining growth potential of the economy. In order to improve its record of collection and enforcement, the Government should consider the following measures:(1) impose severe penalties for tax fraud or evasion and provide performance incentives to tax collectors and (2) provide incentives for prompt tax payment in the form of tax credits or lower interest charges on outstanding payments.

The Government of Kyrgyzstan should place a high priority on the following recommendations and principles as its tax system continues to evolve:

1) Impose taxes at their point of lowest collection cost and greatest enforceability and which can be uniformly enforced at relatively low administrative costs as a percent of proceeds.

2) Adjust profits tax rates to reflect the degree of competition and freedom of entry into a particular business activity.

3) Use excise taxes to shift end-use priorities among fuels and consuming sectors(e.g. raise taxes on jet fuel consumption while maintaining a lower rate on diesel fuel used primarily for agriculture and public transportation).

4) Impose targeted, fuel-specific user taxes to create a revenue pool which can assist in promoting a renewal of economic growth or self-sustaining growth. For example, dedicate the revenues from the 15% excise tax on petroleum products to financing electric appliance manufacturing and distribution enterprises, critical coal mining equipment imports, etc.

5) Provide tax concessions and exemptions to investments related to self-sustaining energy production or fuel efficiency, including exempting equipment imported for such activities.

6) Balance risk and reward exposures between foreign investors and the republic in establishing oil and gas exploration and development concessions.

7) Encourage the use of investment tax credit incentives to stimulate domestic and foreign enterprise investments, utilizing a credit scheme to limit opportunities for tax abuse by non-productive enterprises. Investment tax credits should be allowed for investing in equipment related to efficiency improvements and for measurement equipment to more accurately account for fuel consumption vs. processing or transportation system loss or theft.

Energy Demand Outlook

Forecasts of energy demand are critical inputs to strategic planning by the Government's ministries and enterprises, especially in setting investment priorities. Reflecting conditions in formerly planned economies, the structure of Kyrgyz energy demand is substantially different from that of Western industrialized countries. Over the longer term, restructuring and expected efficiency improvements in Kyrgyzstan will reduce the share of industrial energy use and higher personal incomes and economic growth will increase the share of transport fuel use. Economic restructuring, together with market oriented energy pricing and efficiency improvements, will result in patterns of energy growth very different from extrapolations of past trends. The level of demand in the year 2000 and beyond will be significantly affected by the 1) timing of resumed economic growth, 2) the average growth rate experienced during the next 7 years, and 3) the extent to which efficiency improvements are implemented. With such major uncertainties, it would be prudent to undertake a study of Kyrgyzstan's long term energy demand which develops alternative projections of demand, incorporating different assumptions of key variables. Such a study would complement the work presented in the Government of Kyrgyzstan's report, " The Energy Program of Kyrgyzstan", which presents only one set of projections that, in general, appear overly optimistic.

Recommendations

During the preparation of this study, on several occasions ministries and enterprises requested that a list of recommendations, beyond pricing and taxation, be included in the final report. Presented below for the consideration of the Government of Kyrgyzstan are several recommendations, some general in nature while others are sector specific. In most cases, the Government of Kyrgyzstan can request additional technical assistance from U.S. A.I.D., the World Bank and other international agencies in order to take the next steps necessary to implement these and other recommendations presented in this Executive Summary.

General

1) The proposed rapid and substantial price and cost changes in the energy sector necessitate establishing timely, consistent and reliable information systems for accurately measuring and monitoring costs of production, distribution and transportation, prices, apparent margins over costs and taxes. Effective price and taxation policy will depend on timely and reasonable interpretation of cost and related operational data, including the costs of capital investment, as traditionally captured in plant or capital depreciation rates, asset replacement and upgrade costs. Ongoing access to market developments through proper data reporting and management information systems would establish the quantitative building blocks around which better pricing, rate-making, revenue forecasting and taxation decisions can be based.

2) Undertake an immediate, simultaneous survey of household, public, commercial and industrial sector energy consumption, appropriately stratified by region and urban vs. rural and other demographic and economic characteristics in order to establish a more reliable data base on which to base a number of energy policy decisions and emergency strategies, such as establishing energy efficiency standards and identifying the characteristics of the current stock of electric appliances.

3) Establish standards for efficient energy use per unit measure, such as appliance ownership, square footage, household or enterprise size (employees), etc., so that energy use efficiency standards can be developed on the basis of such numerical indicators and incentive programs can be designed around these standards.

4) Establish "seasonal" pricing strategies for all fuels (including electricity from hydro production) which maximizes the export revenue potential during periods of domestic surplus, but which maintains incentives for conservation and effective sectoral subsidy management during periods of high use.

5) Develop a strategy for eliminating the arrears problem including: (a) establishing a time line for projecting the potential growth of the problem and solutions for its reduction, (b) pursuing new incentives such as providing discounts for prompt payment, (c) building arrears costs into the rate base (for heat, electricity and gas), and (d) establishing a formal customer credit facility for financing and paying down arrears.

6) Develop an overall strategy and timetable for eliminating fuel-specific fuel cost subsidies by consumer class, based on realistic projected fuel costs and tax revenue "recycling" (subsidization) strategies by consumer class.

7) Allow final sales prices of coal and refined petroleum products to vary regionally in an amount which reflects, at a minimum, the transport cost differentials.

8) Speed up the tariff approval process and create an automatic Fuel Adjustment Clause (FAC) to pass on higher gas, electricity and heat prices more expediently.

9) A central cost recovery issue for all fuels is the accurate costing of transportation, whether by rail, truck, or pipeline. Data suggest that cost recovery is substantially

understated with respect to the primary means of transportation in Kyrgyzstan. A cost of service analysis for the movement of coal and oil products by rail, trucks and barge is recommended. Such a study will permit Kyrgyzstan to appropriately establish the cost of service for each of these means of transportation and to evaluate intermodal transportation.

10) Prioritize training needs, linked to investment and sectoral reform strategies, and develop a plan to establish in-depth training programs, including exchange programs, with immediate funding requested from donor agencies.

Oil & Petroleum Products

1) Increase petroleum prices to levels which fully reflect import prices of fuels, and impose taxes at least sufficient to capture the additional cost of infrastructure improvements, expansions and other Government goals.

2) Create strategic reserves of refined petroleum products, especially jet fuel and aviation gasoline reserves to maintain regular commercial air traffic between Bishkek and Osh and other key cities. Reserves of other products could be used for emergency heating, transport and power generation needs, as well as advance purchases for anticipated peak use periods. The aviation reserve could not only be self-financed but possibly serve as a source of revenue, if handled properly, while the other product reserves could be financed from a variety of sources.

3) Take the following steps to reduce Kyrgyzstan's captive position with respect to its limited crude oil supplies and total dependency on imported products:

   (a) Offer Western firms concessions or joint venture terms under which development and exploration programs in the Ferghana and Tien Shan basins would be expedited.
   (b) Construct a small (100,000 to 200,000 MT/year) field-based refinery in the Ferghana Valley which would provide Kyrgyzstan with some leverage in negotiating the terms of future imports of petroleum products. Initial analysis of the terms of the Kyrgyz crude oil for refined product trade with the Uzbeks compared to a fully installed refinery indicates a rapid payoff if additional crude oil supplies allowed a 200,000 MT/year refinery be built.
   (c) Participate in the proposed Chimkent - Almaty refined product pipeline project by constructing a spur line of about 60 km into Bishkek. This line would significantly improve the reliability and reduce the delivered cost of products over time.

4) Reestablish the state's role in securing and storing petroleum products by requiring increased border surveillance and tax collection and by enforcing petroleum product registration. The full cost to the economy of un-reported fuel imports should not be overlooked. Substantial amounts of the decline in reported deliveries through Kyrgyznefteproduct are probably unreported sales at untaxed prices. One option is to lease or sell part of Kyrgyznefteproduct's under-utilized assets to registered companies, or to sell licenses to those private firms willing to operate as registered firms.

Natural Gas

1) Initiate a comprehensive tariff study which establishes cost estimates based on sector, location and use characteristics, so that gas service costs (including capital costs) can be allocated among consumer classes, and the degree of cross-subsidization can be quantified. Immediately include in the rate base the cost of credit and recovery cost of investments such as metering and compressor station needs.

2) Seek to upgrade Kyrgyzgas' infrastructure by allowing foreign investment (particularly from Turkmen, Uzbek, Kazakh or Russian sources), possibly through offering portions of the distribution network for sale, thereby assuring the supplier of gas increased market outlets.

3) Consider allowing direct contract negotiation between large industrial buyers and foreign suppliers of gas as a means of lowering delivered prices.

Coal

1) Coal prices should be set at a level which fully recoup transportation, production and upgrading investment costs. Each coal mine must be evaluated in terms of its production costs, distance and transportation costs to the power plant or other end user, and its competitive position to supply a particular end use market.

2) Commercialize the existing coal enterprises, concentrating on modernizing and expanding the most economic mines, while closing the uneconomic mines. The Ministry of Energy has suggested that Tash-Kumyr, Kyzil-Kiysk, Suluktinsk, and Kok-Yanghak are the most valuable mines. The ability of each mine to expand its capacity to a minimum economic threshold level is critical. Permitting customers to organize their own transport and purchase directly from the mines at the minemouth might lead to better operating results.

3) After these mines are operating profitably, a royalty tax of 5-10% at the mine mouth should be assessed.

4) The undeveloped Uzgen basin needs to be evaluated for its export potential.

5) A cost-effective method of agglomerating coal fines is critical to increase coal supply to the rural population. Roll type briquetting machines are available in capacities ranging from 5 to 50 tons per hour. Samples of coal deposits, especially the Karakiche deposit, need to be supplied to potential manufacturers in order to arrange appropriate laboratory tests and to evaluate the benefits and costs of briquetting.

Electricity and District Heat

1) The total weighted average tariff should be set at a minimum to immediately recover short-run marginal costs (all ongoing operating costs and maintenance and system

repair and higher depreciation and finance charges), and in the longer term (e.g., 2000), tariffs should recover full long-run marginal costs, including capital costs, peak service costs, and debt service. Rates should be varied according to seasonal demands and export market tolerances, and adjustments should be made to reflect peak service requirements, time of use and associated sytems costs.

2) Prices (tariff structure and level) should be based on economic costs and set in order to insure financial viability of the operating enterprise. A large majority of the total costs of a network energy system is capital and at this time there is a great uncertainty in estimating the capital costs. An effort must be made to estimate future capital costs recognizing the uncertainties associated with the sources (traditional former Soviet, higher cost Western or lower costs international sources) and the performance characteristics of the equipment. A methodology must be employed which includes the capital costs of providing incremental capacity of the entire system: generation, transmission, and distribution. The average incremental cost methodology, a proxy for long run marginal cost, is, therefore, recommended in developing long run pricing guidelines for the State Energy Company.

3) Not only are substantial increases in the tariff level of electricity and heat needed but a shift in relative prices is needed even more dramatically. Household (low voltage) tariffs are now about 55% of the average industrial tariff compared to about 15% in January. Over time as cost of service is incorporated into the tariff structure, low voltage tariffs will be about 50% higher than industrial high voltage tariffs based on current conditions in most OECD economies. In the case of poor households and those on fixed incomes, a special "life-line" consumer category offering lower rates for limited service is warranted.

4) A comprehensive tariff study should be undertaken for both electricity and heat. The emphasis should be on methodology and institutionalization of the methodological capability within the State Energy Company.

5) As the Government pursues an accelerated electrification of its economy, the following measures should be considered as part of its overall strategy: (a) survey of potential market for electric appliances for heating, cooking, and hot water systems, (b) establish incentives for purchase of electric appliances and needed insulation materials for buildings, residences and appliances, (c) establish tax and other cost subsidy and market sales incentives to support electric appliance supply firms in order to insure adequate access to appliances, and (d) carefully document and assess the investments needed to strengthen the transmission and distribution systems, focussing on one region with a high expected rate of return on such T&D investments.

6) To provide a growing market for Kyrgyzstan's substantial hydro-electricity potential, Kyrgyzstan's policies should be structured to provide incentives for electricity-intensive mining and industrial operations to locate in Kyrgyzstan and to expand export markets. Inexpensive electricity combined with tax and repatriation incentives should be combined to expand this domestic industrial base. In the short term, Kyrgyzstan must aggressively pursue long term contracts to supply power to southern Kazakhstan and with other neighboring republics in the more distant future. The development of the Xinjiang region of China as a growing export market remains a goal.

7) Based on the information compiled as part of this study, priority should be placed on the following investments:(a) Kambar Ata No.2 , with an interim capacity of 240 MW, (b) upgrading the distribution system, and (c) upgrading the transmission system, including substations and lines.

Considering the needs and resources of other Central Asian republics, the strategic planning for electricity and water use should be done on a regional basis, if possible.

I. INTRODUCTION

A. Context and Scope of Work

1.0 The Kyrgyzstan Energy Pricing and Taxation Study was sponsored by the U.S. Agency for International Development's (A.I.D.) Office of Energy Infrastructure for the Newly Independent States, in cooperation with the World Bank's Office of Infrastructure, Energy and Environment Operations for Europe and Central Asia.* This assessment is part of the broader energy sector technical assistance to Kyrgyzstan offered by both A.I.D. and the World Bank. The work supplements the World Bank's country energy sector review activities and A.I.D.'s energy efficiency and policy analysis activities also executed under contract with International Resources Group.

1.1 A.I.D. and the World Bank are providing technical assistance in a number of sectors to the Government of Kyrgyzstan to assist in its program of rapid economic reform. The energy sector is important in the Republic of Kyrgyzstan as Kyrgyzstan possesses substantial energy resources, especially hydro power, and as the collapse of the Soviet Union and its integrated energy trade and subsidized energy pricing has created energy price and supply pressures which threaten to destabilize the entire economy. Energy pricing and taxation reform are crucial in Kyrgyzstan's program of economic reform. The Government of Kyrgyzstan places a high priority on energy pricing and taxation reform and on liberalization of markets. Price reform involves letting prices rise to economic, world levels. Market liberalization includes institutional reforms that abolish the central decision-making by the government and allows decision-making by a large number of enterprises and consumers.

1.2 Increased energy prices will provide incentives for more efficient use of energy and greater self-financing of investments. Kyrgyzstan ranks near the bottom in energy efficiency in the CIS, (2.2 times below average), and 5 to 7 times lower than Western economies. The energy sector can eventually be a significant source of revenue for the national budget. However, there are significant macro-economic constraints to the speed at which prices should be permitted to rise to world levels.

1.3 The primary responsibilities of the prime contractor, International Resources Group, in executing this study included the following tasks:

- To meet with Kyrgyz officials to gain an overall understanding of Kyrgyzstan's approach to energy pricing and taxation policies;
- To review existing petroleum (crude oil and petroleum products), natural gas, coal, and electricity pricing and taxation practices in Kyrgyzstan;
- To work with the appropriate ministries and institutions to formulate guidelines for the pricing and taxation of petroleum, gas, coal and electricity;
- To present via a seminar the findings and recommendations to energy sector officials and specialists.

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* This report may not be published or quoted as representing views of USAID or the World Bank, nor do USAID or World Bank accept responsibility for its accuracy or completeness.

B. Organization of the Report

1.4 The study reviews recent price and tax developments, stresses key guidelines and principles of pricing in Kyrgyzstan and makes recommendations for pricing and taxation of the primary fuels and electricity. **Section 2** provides an extensive review of the primary fuel and electricity price and taxation developments in 1992-93 as well as presenting inter-fuel and international price comparisons. **Section 3** discusses key principles of pricing, focussing on cost recovery and commodity price relationships and proposes guidelines for moving domestic Kyrgyz prices to world-equivalent levels. **Section 4** presents both general and sector specific recommendations.

1.5 Perhaps the key distinguishing characteristic of this undertaking was the extensive effort and priority given to establishing a functional data base of detailed price, volume, production and transportation cost data. A substantial body of original and supplementary price, cost and volumetric data was collected in the performance of this work, much of which provides a framework for continued tracking and updating of energy price, cost and tax developments in Kyrgyzstan and neighboring republics.

1.6 In addition to the tables presented in the body of the report, **Appendix 3** contains detailed back-up tables, the majority of which are original forms prepared by the study team and completed by the highly responsive Kyrgyz ministries and enterprises. The need to develop consistency and structure in data reporting is especially great in an economy undergoing rapid transformation, both organizationally and systemically. Previously, centralized reporting responsibility primarily focussed on relatively stable volume flows, rather than on price, cost and "margin" variables. The latter have become quite dynamic in the process of the radical transition towards a market-responsive system.

C. Background

1.7 Kyrgyzstan is currently in the midst of an economic and energy price and supply situation approaching, if not already in, a crisis condition. Industrial production fell by roughly 25 percent in 1992, led by coal which declined by 35 percent between 1991 and 1992, and by more than 40 percent between 1990 and 1992. Inflation, imported from Russia, is at hyper-rates of 20-30 percent monthly, and real wage rates have declined to the point that average salaried workers must spend the majority of their income on basic subsistence items such as food, shelter and energy. Energy price increases are indicative of, and indeed driving, the level of hyper-inflation, creating an inflationary spiral and massive build-up in energy payment arrears, elaborate subsidy needs, and worsening Kyrgyzstan's foreign trade deficit.

1.8 As with the other Republics of the Former Soviet Union (FSU), Kyrgyzstan's energy sector was developed as part of the overall integrated system of the FSU, so that individual Republic self-sufficiency goals were subordinate to the goal of unified regional development within the FSU. Kyrgyzstan's fossil fuel potential was never fully developed relative to the comparatively (or perceived) lower cost coal, oil and gas resources from neighboring republics. As a result, Kyrgyzstan has been highly dependent on: 1) fossil fuel imports, particularly oil and gas; 2) equipment and material imports needed to stem the decline in coal output and power plant operations, and 3) recently declining inter-Republic demand for Kyrgyzstan's surplus

electric power production (largely hydro) through the Integrated Power System of Central Asia. A summary profile of Kyrgyzstan's energy balances for 1992 is provided in **Table 1**.

1.9 Table 1 demonstrates Kyrgyzstan's high dependence on high-priced fossil fuel imports, and the dominance of relatively low-cost electric power production among domestic fuel sources. Coal imports actually increased by 30 percent in 1992, while production declined 35 percent, a critical trend which must be reversed as part of both an immediate and transitional energy strategy. Coal imports are obtained largely from Russia and Kazakhstan, oil imports from Russia, Kazakhstan and Uzbekistan, and gas imports from Turkmenistan and Uzbekistan. Over the period 1990-92 overall energy consumption declined by 18 percent, compared to a 17 percent decline in available energy resources (indigenous and net imports). However, the rate of decline has accelerated in the winter of 1992-93 as energy price levels increased rapidly in late 1992, and economic activity declined further. Petroleum imports for the winter of 1992-93 were reportedly down by 50 percent or more from the previous winter for most major products (i.e., gasoline, diesel, and mazut), and natural gas imports had declined even further, as Kyrgyzstan consumers were simply unable to afford the new "world market equivalent" prices from Turkmenistan and Uzbekistan.

Table 1-1
Kyrgyzstan: Summary Energy Trade Balances, 1992
(thousand tons of standard fuel equivalent*)

Source:	Consumption	Prod.	Imports	Exports	Net Bal. (Ex - Im)
Electric Power	3,172	3,946	1,170	1,944	+774
Coal	2,150	1,125	1,764	737	-1,025**
Petroleum	2,325	188	2,325***	188	-2,137
Natural Gas	2,239	78	2,161	-	-2,161
Total (est.)****	9,886	5,337	7,420	2,869	-4,549
vs.					
Total Reported (By Government)	10,249	5,805	7,269	2,825	-4,444

Notes:

* Conversion factors to "thousand tons of fuel equivalent" (tfe) are assumed as follows:
Electric Power at 0.325 Million KWH/tfe.
Coal consumption & production at 0.5 tfe/tce, coal imports & exports at 0.63 tfe/tce.
Petroleum at 1.5 toe/tfe.
Natural gas at 1.15 mcm/tfe.

** Slight rounding (-2 tfe) in order to equal with consumption-production difference.

*** All refined products, as Kyrgyzstan has no domestic oil refinery.

**** Estimated quantities based on summation of individual fuel conversions, using conversion factors cited above, versus actual Government-reported levels for total fuels, but not broken down or converted to common (tfe) unit by fuel type.

Source: The Kyrgyzstan Energy Program, Government of Kyrgyzstan, Bishkek, 1992, Table 1, p.7.

1.10 **Table 2** presents how the shares of energy production and energy consumption have changed between 1990 and 1992.

Table 1-2
Energy Shares
(in percent of total)

	Production		Consumption	
	1990	1992	1990	1992
Electric Power	79.58%	73.94%	32.63%	31.80%
Coal	18.87%	21.08%	26.47%	21.55%
Natural Gas	1.54%	1.46%	20.15%	22.45%
LPG	0.00%	0.00%	1.40%	0.89%
Crude Oil and Petroleum Products	2.70%	3.52%	19.36%	23.31%

Source: "The Energy Program of Kyrgyzstan", pg. 7
Date: December 1992

1.11 Spiraling imported fuel price levels have financially strained not only individual and enterprise budgets, but also the national economy, as the nation's current account deficit with Russia has soared. The degree of price and energy price escalation by major fuel group over the past 15 months is summarized in **Table 3**, which shows that the rate of fuel price escalation has soared over the past year, accelerating in late 1992 and early 1993. The most dramatic increase as of March 1993 was in the price of gasoline, although the rise in natural gas prices has also been particularly severe. Coal prices have risen "only" by a factor of about 20 times (2,000 percent) over the past year, and remain low on a comparative basis, underlining the need to reverse the recent severe production decline in order to maximize domestic coal and hydro power output in place of expensive and increasingly unaffordable oil and gas imports.

Table 1-3
Fuel Price Escalation In Kyrgyzstan: 1992-93

Fuel and Type of Sale:	Monthly Avg. Prices: Jan. 1992	June 1992	Oct. 1992	Jan. 1993	Mar. 1993
Coal: (R/ton)					
at Mine-mouth	381	738	1,745	4,412	5,089
to Industry	452	2,018	3,889	8,667	9,167
to Households	603	2,691	5,186	11,569	12,223
Gasoline: (R/ton) (Local Sales Price)	1,750	11,500	32,306	40,526	106,250
Natural Gas: (R/mcm)					
Uzbek Border	870	4,000	5,500 19,200	24,000	
Industrial Sales	1,142	1,142	5,406 31,500	31,500	
Household Sales	320	320	2,930 16,714	16,714	

Source: Ministry of Economy and Finance, Kyrgyzgas and Kyrgyznefteproduct.

1.12 While price-motivated fuel conservation and efficiency investments are desirable to some extent[1], the high payback potential from energy efficiency measures does not offer enough immediate relief to stabilize a deteriorating situation. This situation is explained by the enormity of the efficiency investment required, the lack of financial resources and domestic production capacity to make these investments, and the more pressing need to simply insure energy resources are available to prevent people from freezing next winter and enterprises from closing down in the immediate future.

1.13 Ultimately, energy efficiency and conservation measures, coupled with the development of hydro power and the selective exploitation of promising coal, oil and gas resources and technologies, will lead Kyrgyzstan towards a less import-dependent energy future. However, the immediate focus of energy policy is first to make it through next winter, and then to stabilize the operations of energy production, consumption, processing and importing activities to enable Kyrgyzstan to begin to implement a longer-term energy development and conservation strategy. This involves immediately activating a transitional adjustment program (including legal, price tax and related investment incentives). Central elements of the strategy for short-term "survival" and the early phase of the transition plan include: 1) expanding hydro power capacity; 2) immediate

[1] Energy resource utilization in Kyrgyzstan is reportedly 2.2 times below the average level for the CIS and 5 to 7 times lower than the average for the developed world, according to the "National Energy Program" report (p.6).

electrification of household and commercial consumers to displace expensive fossil fuels, and 3) arresting the decline in domestic coal output and increasing coal use through a variety of process applications (coal fine recovery, pelleting, gasification), equipment acquisition and labor incentives. All of these strategies will require outside technical assistance, technology and investment.

1.14 The leadership of Kyrgyzstan has prepared a thorough study of its energy needs, which include a full range of energy sector strategies from a transitional to an effective long-run development plan.[2] However, the immediate need is to stimulate investments which address the short-term survival and critical transitional steps in order to insure a degree of economic and social stability which will then enable the longer term policy and investment plans to be pursued.

D. Government Organizations

1.15 During the spring of 1993, the Government of Kyrgyzstan reorganized the enterprises and ministries involved in energy operations as shown in the figure on the next page. With the exception of the negotiation of inter-republic trade agreements and the marketing and distribution of petroleum products, all other energy related operations come under the Ministry of Energy. The primary function of each of the organizations reporting to the Ministry of Energy is indicated parenthetically below the organization's name.

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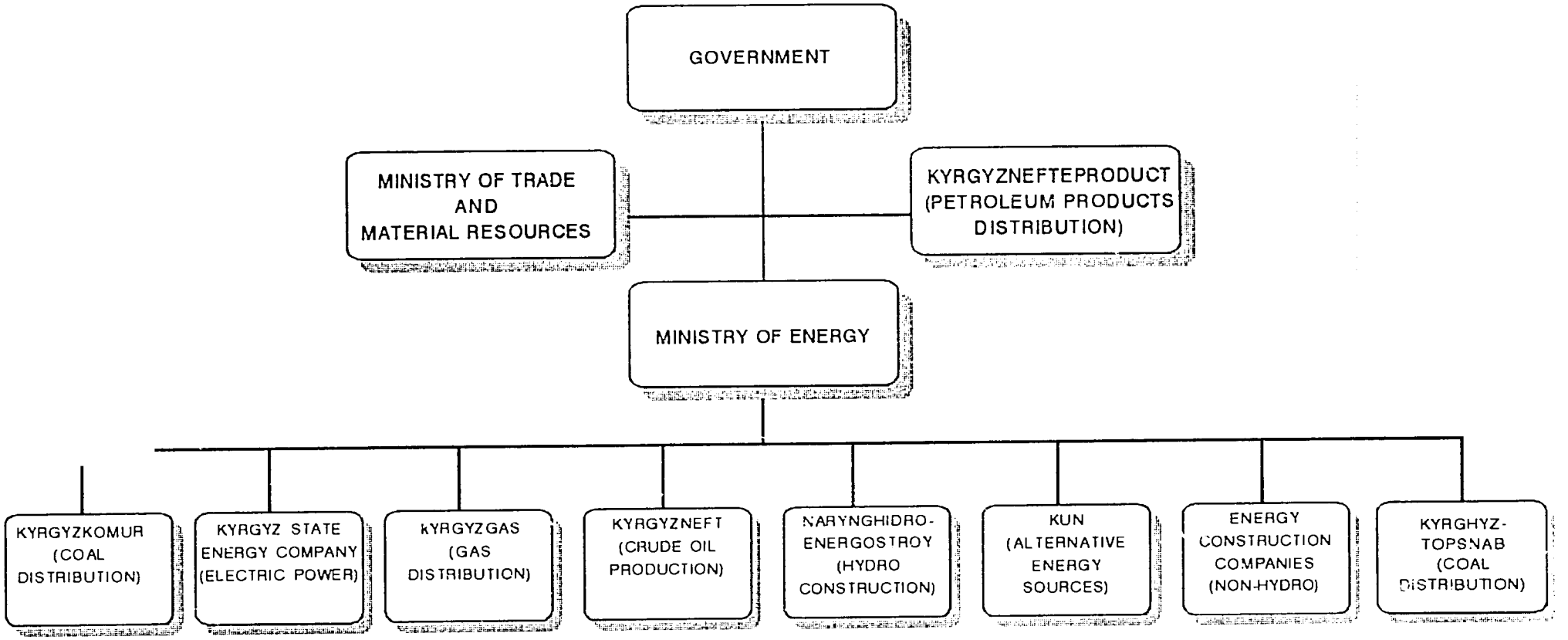
[2] The Government of Kyrgyzstan had recently completed a detailed and well-organized report entitled "The Energy Program of Kyrgyzstan". This report was created under the direction of the Minister of Economy and Finance (Mr. A.M. Muraliyev), the President of the State Energy Company of Kyrgyzstan (Mr. Zh. T. Tuleberdiev) and a team of the Republic's top energy experts and scientists. The expert leader of this creative team was Mr. N.A. Amanaliev (Deputy Head of the Industry Department, Ministry of Economy and Finance), who also ably served as the team's formal liaison during the mission, along with Mr. B.A. Botbaev, Executive Director of Economy for the State Energy Company.

ENERGY ORGANIZATIONS* AND THEIR SUBORDINATION
REPUBLIC OF KYRGYZSTAN



* NOTE: Explanatory description shown parenthetically

II. THE CURRENT STATUS OF FOSSIL FUELS PRICES AND TAXATION

A. Crude Oil and Refined Products

Summary Production and Import Volume Data

2.0 The petroleum sector plays a relatively small but important role in Kyrgyzstan's overall energy economy. Annual domestic crude oil output, which totaled 125 MT tons in 1992[3], represents three percent of total domestic energy production. However, Kyrgyzstan is a sizeable importer of refined petroleum products. In 1992 total refined product imports were reported at 1,470 MT[4], or about 23 percent of Kyrgyzstan's total energy consumption on a net fuel equivalent basis. The largest sectoral consumer is agriculture, which accounts for nearly half of total consumption, followed by the power sector.

2.1 Lacking any domestic refining capacity, Kyrgyzstan is entirely dependent on refined product imports to meet indigenous petroleum demand. According to the Ministry of Economy and Finance, imports are obtained primarily from Kazakhstan, but also from Russia, Uzbekistan and, lesser amounts from Turkmenistan. The recent trend in petroleum product consumption and imports is summarized in **Table 2-1**. Light transportation fuels, particularly gasoline, diesel fuels and aviation kerosene, represent about 55 percent of total consumption, with fuel oil and other products (e.g., lube oils, asphalt, petroleum coke) accounting for the balance[5]. Kazakhstan is shown to be an increasingly important source of refined products, as their share now approaches 50 percent of total imports. The decline in reliance on Russian, Uzbek and Turkmen volumes reflects the worsening relative price terms offered from these sources. However, precise data on import volumes by source and product vary substantially depending on the source. Specifically, Kyrgyznefteproduct reports a substantially greater reliance on petroleum product imports from Russia (see Table 2-1 vs. 2-3).

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[3] "The Energy Program of Kyrgyzstan", Bishkek, 1992, p.7. (Hereinafter referred to as "EPK", 1992.

[4] "EPK", 1992, p.75.

[5] Kyrgyzstan reports liquified petroleum gas (LPG) imports separately, as LPGs are handled by the gas transmission and distribution company, Kyrgyzgas, while most refined products are imported by the state petroleum product distribution and marketing company, Kyrgyznefteproduct.

Table 2-1
Kyrgystsan's Basic Indicators of Petroleum Products Supplies From 1990 to 1992 (in thousands of tons)

	Years 1990	1991	1992	92 vs 90 %	92 vs 91 %
Consumption, total	2678	2385	1470	55.0	61.6
of which					
Automotive Gasoline	707	566	370	52.3	65.4
Diesel Fuel	599	562	390	65.1	69.3
Fuel Oil	1009	887	570	56.1	64.3
Aviation Kerosene	116	105	60	51.7	57.1
Others	247	265	80	32.4	30.2
Petroleum Products Imports, total of which	2675	2385	1470	55.0	61.6
Russia	900	720	520	57.8	72.2
Kazakhstan	1080	1045	730	67.6	70.0
Uzbekistan	605	410	180	29.8	44.0
Turkmenistan	90	210	40	44.4	19.0

Source: Energy Program of Kyrgyzstan

2.2 Petroleum consumption has fallen precipitously in 1992, corresponding to the dramatic increase in import prices beginning in 1992 (see Table 2.5). As shown in Table 2-1, official estimates place the decline at nearly 39 percent between 1991 and 1992, and 45 percent between 1992 and 1990. Based on the dramatic price escalation which has continued through the first half of 1993, a further decline in petroleum imports and consumption should be expected for 1993.

2.3 Data on petroleum product imports and consumption have become quite unreliable since the end of Kyrgyznefteproduct's monopoly control of imports in 1992. Prior to 1992, petroleum imports to direct end-users were allowed only to agricultural cooperatives and a few other end-users. Otherwise, all volumes were supposed to remain under Kyrgyznefteproduct's control. However, with the liberation of import rules in 1992[6], and the development of substantial price and taxation incentives to increase "unreported" petroleum imports in 1992, an increasingly larger share of petroleum product imports and consumption fell outside of the Kyrgyznefteproduct system. This trend is evidenced in **Table 2-2**, which highlights the difference in reported petroleum import volumes from two sources: 1) the Kyrgyzstan Energy Program (EPK) Report compiled largely by the Ministry of Economy and Finance (MEF), attempting to account for total preliminary import volumes in 1992, and 2) Kyrgyznefteproduct (KNP), reporting only its actual 1992 import volumes.

[6] In 1992, imports privileges were extended to other enterprises, including a wider range of end-users and "registered" intermediary (reseller) parties

Table 2-2
Reported Petroleum Product Import Volumes: 1991-1992
(MT)

	1991: MEF	KNP	DIFF. (%)	(ABS)	1992: MEF	KNP	DIFF. (%)	(ABS)
Gasoline	566	623	+10	+57	370	303	-18	-67
Diesel	562	568	+1	+6	390	284	-27	-106
Fuel Oil	887	897	+1	+10	570	363	-36	-107

Sources: Kyrgyzstan Energy Program, 1992 (by the MEF) and Kyrgyznefteproduct, May 1993.

2.4 The marked difference between reported Kyrgyznefteproduct and estimated (by the MEF in the EPK Report) total import volumes in 1991 versus 1992 reflects a fundamental trend: namely, in 1992 Kyrgyznefteproduct lost, and likely continues to lose, substantial market share to other importers, both of the legitimate and illegitimate variety. Based on these data, and additional data reported on sectoral consumption (see Table 2-4), the greatest amount of un-reported petroleum product sales appears to be occurring with fuel oil, followed by diesel fuel. This result is not surprising, given that these products are typically sold directly to end-users via bulk stations, many of which are legitimate importers, but for whom an incentive may exist to import beyond their direct consumption needs. By contrast, gasoline is sold through retail stations, still largely controlled by Kyrgyznefteproduct, so that illegal volumes are more difficult to distribute to end-users.

2.5 The difference in reported sources of petroleum product imports is perhaps more difficult to explain, but may relate to inconsistencies in documenting the original source vs. final seller. **Table 2-3** provides a detailed profile of petroleum product import volumes as reported by Kyrgyznefteproduct. These product-specific reported import volumes can be compared to the data shown (for all products) in Table 2-1 to demonstrate the apparent differences in recorded sources. For example, Kyrgyznefteproduct reports total 1992 Russian imports of 542 MT, and 311 MT from Kazakhstan. This compares to 520 and 730 MT, respectively from Russia and Kazakhstan, reported by the Ministry of Economy and Finance. Thus, a large source of the difference between estimated and reported volumes seems to originate from Kazakhstan. Similarly, only about half of the volumes reported by the MEF as originating from Uzbekistan appear to be captured by Kyrgyznefteproduct, and even a smaller proportion from Turkmenistan.

2.6 These data discrepancies all point to the need for the Government of Kyrgyzstan to assert greater control over petroleum product imports and marketing. Actions needed include stricter enforcement of import licensing, stronger penalties against un-reported imports, and the

Table 2 - 3

Kyrgyzstan Petroleum Supply and Demand Balances

1991-93 (000 tons)

Year:	1991	(% Total)	1992	(% Total)	Full Year 1993 (Proj.)	(% Total)	1st Qt. 1993 (Est.)	
Gasoline:								
Indigenous Supply	0		0		0			
Imports... Russia	418,340	67.2	231,720	76.4	250,000	74.6	42,200	85.4
Kazakhstan	141,576	22.7	60,194	19.8	30,000	9.0	7,200	14.6
Uzbekistan	45,227	7.3	10,448	3.4	55,000	16.4	0	0.0
Turkmenistan	17,491	2.8	1,124	0.4	0	0.0	0	0.0
Consumption	622,634	100.0	303,486	100.0	335,000	100.0	49,400	100.0
Diesel Fuel:								
Indigenous Supply	0		0		0			
Imports... Russia	10,741	1.9	130,718	46.1	70,000	33.3	17,700	56.9
Kazakhstan	347,201	61.2	125,444	44.2	55,000	26.2	13,400	43.1
Uzbekistan	160,733	28.3	27,020	9.5	85,000	40.5	0	0.0
Turkmenistan	48,873	8.6	651	0.2	0	0.0	0	0.0
Consumption	567,548	100.0	283,833	100.0	210,000	100.0	31,100	100.0
Mazut:								
Indigenous Supply	0		0		0			
Imports... Russia	165,724	18.5	179,920	49.5	160,000	31.2	3,900	8.0
Kazakhstan	482,549	53.8	125,243	34.5	70,000	13.7	800	1.7
Uzbekistan	155,140	17.3	47,996	13.2	265,000	51.7	0	0.0
Turkmenistan	93,098	10.4	10,070	2.8	17,500	3.4	43,750	90.3
Consumption	896,511	100.0	363,229	100.0	512,500	100.0	48,450	100.0
Total:								
Indigenous Supply	0							
Imports... Russia	594,805	28.5	542,358	57.1	480,000	45.4	63,800	49.5
Kazakhstan	971,326	46.5	310,881	32.7	155,000	14.7	21,400	16.6
Uzbekistan	361,100	17.3	85,464	9.0	405,000	38.3	0	0.0
Turkmenistan	159,462	7.6	11,845	1.2	17,500	1.7	43,750	33.9
Consumption	2,086,693	100.0	950,548	100.0	1,057,500	100.0	128,950	100.0

Source: Kyrgyznefteproduct, March 1993.

adoption of more rigorous and consistent reporting requirements on all bona fide importers. As petroleum product prices approach world levels, these actions are increasingly important in order to capture the larger tax share for the Government, and to encourage the development of a competitive and effective supplier market.

2.7 Looking further at Table 2-3, wide differences are also apparent in the level of projected (1993) and actual (1st quarter 1993) import levels. Annual projections are for gasoline and mazut (fuel oil) volumes to rise considerably over 1992 levels; gasoline led by Russian supplies, and mazut from Uzbekistan. The annual projections are based, in part, on the cooperative trade agreements negotiated among the CIS republics. The actual levels reported for the first quarter of 1993 sharply vary from these projected annual volumes. This, in turn, reflects the disrupted nature of intra-CIS trade, and the increasing uncertainty surrounding likely sources and costs of petroleum product imports. Prior to 1992, inter-Republic trade volumes and price relationships were relatively stable, and normally adhered to once set by a trade agreement. The recent environment puts greater emphasis on immediate price and payment terms, including payment terms.

2.8 Of particular note in Table 2-3 is the lack of petroleum product imports reported from Uzbekistan in the first quarter for 1993 relative to expected annual levels. In the case of Uzbekistan, this discrepancy reflects the fact that, effective January 1993, Kyrgyznefteproduct was no longer responsible for Uzbek product imports under the exchange arrangement with Uzbekistan. This responsibility has been now been assumed by the Ministry of Energy. The agreement covers all domestically produced Kyrgyz crude oil which is exported to Uzbekistan by pipeline in return for a negotiated slate of Uzbek (Fergana Valley refinery) refined products. The terms of the this oil trade arrangement are discussed in Chapter 3 and in greater detail in Appendix II.

2.9 Sectoral consumption data, as reported by Kyrgyznefteproduct, also reveal substantial variance with reported total petroleum product imports. **Table 2-4** presents Kyrgyznefteproduct's reported sectoral sales data for 1991 vs. 1992. The absolute decline in consumption is shown to be severe, particularly for mazut, and notably in the agriculture and power sectors. Total 1992 demand is indicated to have fallen by over 50 percent from 1991 levels. This is a substantially larger reported decline in demand than shown in Table 2-1, using preliminary 1992 data. Moreover, the 1991 levels reported by Kyrgyznefteproduct in Table 2-4 start from a substantially lower base than the "EPK" data: specifically, the 1,486 MT of total petroleum product demand for 1991 reported by Kyrgyznefteproduct compares to a level of 2,385 reported in the "EPK" report. Similarly, 1992's total consumption of 723 MT reported by Kyrgyznefteproduct compares to an MEF estimated level of 1,470, or roughly 50 percent.

2.10 Although on-road gasoline use is clearly not included in these Kyrgyznefteproduct data, the large discrepancies between total and Kyrgyznefteproduct-reported volumes indicate that Kyrgyznefteproduct's control of total supplies has fallen to as little as 50 percent, and that a significant portion of this reduction is comprised of illegal (un-reported) petroleum imports. As with the comparison of reported import volumes, which suggested a large illegal market share in diesel fuel and mazut, the sectoral consumption data reported by Kyrgyznefteproduct also reveal the greatest shortfall in mazut and diesel fuel. This can be seen by comparing Table 2-4's

Table 2 - 4
Sectoral Consumption of Petroleum Products
(000 Tons/Annum)

	1991		1992	
		(% Total)		(% Total)
Gasoline:				
Agriculture	269,800	68.2	148,000	54.6
Railroad	na	na	na	na
Truch Transport	115,900	29.3	69,000	25.5
Power Plants	10,000	2.5	54,000	19.9
% 1991			68.5	
Diesel Fuel:				
Agriculture	359,700	76.4	195,800	78.0
Railroad	na	na	na	na
Truck Transport	83,000	17.6	44,000	17.5
Power Plants	27,900	5.9	11,100	4.4
Total	470,600	100.0	250,900	100.0
% 1991			53.3	
Mazut:				
Agriculture	286,900	46.3	129,000	52.1
Railroad	na	na	na	na
Truck Transport	11,100	1.8	2,000	0.8
Power Plants	321,500	51.9	116,400	47.0
Total	619,500	100.0	247,400	100.0
% 1991			39.9	
Total:				
Agriculture	916,400	61.7	472,800	65.3
Railroad	na	na	na	na
Truck Transport	210,000	14.1	118,000	16.3
Power Plants	359,400	24.2	132,900	18.4
Total	1,485,800	100.0	723,700	100.0
% 1991			48.7	

Source: Kyrgyznefteproduct, March 1993.

percentage decline in fuel consumption over the period 1992 vs. 1991, with the same percentage decline values (for the major product groupings), as reported by the MEF in Table 2-1. The difference between Table 2-1's and Table 2-4's reported annual decline is most pronounced for mazut, followed by diesel fuel.

Price and Tax Structure Developments

2.11 Since January 1992 crude oil and petroleum product prices have risen rapidly, generally in line with the increases occurring throughout the former Soviet Union, and specifically Russian price levels adjusted for transportation costs to the Kyrgyzstan border. However, a feature of this trend has been for light refined product prices, notably gasoline, to rise more rapidly than crude oil and, to a lesser extent, fuel oil prices. This, in part, reflects Kyrgyzstan's poor negotiating leverage resulting from not having indigenous refining capacity. Kyrgyzstan's limited domestic crude oil production is locked into a limited export market to the Uzbekistan Fergana Valley refinery, and in turn Kyrgyzstan is totally dependent on refined product imports.

2.12 **Table 2-5** summarizes the increase in petroleum prices, taxes (value-added) and average transport rates for Kyrgyzstan over the period Jan. 1992 - March 1993. The price increases for crude oil lagged the rise in petroleum product prices. Gasoline prices have risen both relatively and absolutely more than any other product. Indeed, by September 1993, retail gasoline prices had reportedly reached western-equivalent levels of approximately 37.5 cents/litre. Effective March 1993, diesel fuel had reached a netback-equivalent free market price of around 84,000 Rb, using an exchange rate of 700 Rb/$. By contrast, domestic crude oil price remained at approximately 33 percent of their free world netback value equivalent. This means that opportunity costs of not having a refinery are increasing.

2.13 The tax structure for petroleum product sales is based largely on the Value Added Tax (VAT), which was formerly set at 28 percent of the pre-tax local sales price, but reduced to 20 percent effective January 1993, consistent with Kyrgyzstan's other CIS trading partners. The VAT is currently the primary source of revenue from petroleum product and crude oil sales. For the entire energy sector, the VAT accounts for approximately 60 percent of total tax revenues. Additional sources of tax revenue, not directly included in the price "build-up", are the profits tax of 35 percent, an income tax on enterprise dividend disbursements, a road tax (for infrastructure refurbishment) and a modest 15% excise tax, which has recently been enacted on petroleum products, but with limited success. (As of Sept. 1993, the excise tax was being replaced with a duty on petroleum products.)

2.14 The projected first quarter 1993 road tax revenues are 96.1[7] million rubles, relative to Kyrgyznefteproduct reported transport fuel sales of approximately 80 MT, and as much as double this volume in total. This suggests a road tax of approximately 600-1,200 Rb/ton, or only about 2-to-4 Rb/gallon, a minor amount with the rouble now well above 1,000 per dollar. Clearly, the road tax will have to increase if it is to keep pace with real infrastructure costs.

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[7] As reported by the Ministry of Economy and Finance.

Table 2 - 5
Petroleum Pricing
(Rb/Ton)

		Jan.	June	Sep.	Dec.	Mar.
		1992	1992	1992	1992	1993
Crude Oil:	(Producer's Price)	594	594	2398	13824	17867
Tax		230	230	930	5376	4467
Total Price		824	824	3328	19200	22334
Gasoline:						
Local Sales Price		1750	11500	15640	40526	106250
Tax		383	2217	3016	7786	16373
Transport Expense		51	51	460	698	1420
Net Price to Supplier		1316	9232	12164	32042	88457
Diesel Fuel:						
Local Sales Price		1644	10300	13250	38775	85000
Tax		360	2138	2751	7410	14170
Transport Expense		51	51	460	698	1420
Net Price to Supplier		1233	8111	10039	30667	69410
Mazut:						
Indus./Comm. Sales Price		808	3870	5805	29532	42500
Tax		177	246	1271	6186	7085
Transport Expense		51	51	460	698	1420
Net Price to Supplier		580	3573	4074	22648	33995

Source: Kyrgyznefteproduct, March 1993.

2.15 The excise tax on energy has produced first quarter revenues of just 55.1[8] million rubles, or substantially less than the road tax on a per unit transport fuel basis. This tax has apparently not been widely applied nor recognized, based on our preliminary inquiries. Because some form of an excise tax should form the cornerstone of future petroleum product tax and pricing policy, a full scale effort should be undertaken develop alternative rate structures and collection procedures for excise taxes. In western economies the excise tax is usually most effectively collected at the end-use or wholesale level. Given the well-documented problems in un-reported petroleum product imports and abuses in illegal resale, the importance of volume documentation and effective licensing and tax collection must be effectively resolved if excise taxes are to play a major role as a revenue source and pricing tool. A sharp increase in excise taxes should only occur after reporting and enforcement mechanisms are proven to be effective. Eventually, excise tax levels might be increased to levels approaching the VAT (20 percent) for gasoline and aviation fuel, but maintained at lower levels for diesel and residual fuel oil (mazut) in order to send the appropriate price and tax burden signals. (During the September 9, 1993 Pricing Seminar, it was suggested that the excise tax was being replaced by an import tax/duty).

2.16 Another feature of Kyrgyzstan's petroleum product pricing structure is the ostensibly fixed flat price throughout the country, regardless of location and associated differing import and transport costs. This nominal regionally flat pricing pattern is shown in Appendix III, Table 8. In fact, since late 1992, the prices paid for petroleum product imports have differed widely by source and product, as shown in **Table 2-6**. The specific pattern is for lowest prices to be available from Kazakhstan, followed by Russian supplies, and a significantly higher price for Uzbek supplies. The premium of Russian over Kazakh and Uzbek over both sources is significantly higher for diesel fuel and mazut in relation to gasoline. The Russian gasoline price "premium" closely reflects transport costs. However, for diesel fuel, the difference far exceeds reported transport costs (of 1,560 Rb/ton; see Appendix III, Table 12. Assuming a fully "costed", western equivalent transport cost difference of approximately five cents/gallon, or about 15,000 Rb/ton, the differences observed between Russian and Kazakh mazut prices, could be accounted for, and possibly even the diesel fuel import prices, although the latter may also be quality related.

2.17 The large price premium associated with Uzbek supplies is explained by the higher crude costs incurred by the Uzbek refinery and the captive market which the Uzbeks enjoy over south central Kyrgyzstan. The Ferghana refinery in Uzbekistan sits at the end of the Siberian-Pavlodar-Chimkent-Ferghana crude oil pipeline. Crude oil delivered to this refinery is priced well above the delivered priced to the Chimkent (Kazakhstan) refinery, reflecting both higher transport costs and closer trade relations between Russia and Kazakhstan relative to Russia and Uzbekistan. The higher crude price to Uzbekistan insures that petroleum products refined in Russia can be priced competitively on a delivered cost basis. The prices charged by the Uzbeks would seem to insure this even if full western costing of transport costs were assumed. Because the south central area of Kyrgyzstan (Osh) is isolated geographically from the north, overland transport costs through the mountains are quite high, potentially as high as the price spreads observed between the Uzbek and Kazakh or Russian supplies.

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[8] Ibid.

Table 2 - 6
Comparative Prices Paid for Petroleum Imports
(Rb/Ton)

	Jan.	June	Sep.	Dec.	Mar.
	1992	1992	1992	1992	1993
Gasoline:					
Kazakhstan	1352	10199	13600	44438	8220
Russia	1352	8840	12500	32268	8500
Uzbekistan	1750	11500	15640	60000	11815
Diesel Fuel:					
Kazakhstan	na	8077	na	43431	5013
Russia	na	7138	na	32000	6800
Uzbekistan	na	10300	na	99074	9907
Mazut:					
Kazakhstan	521	4255	4287	21180	2390
Russia	600	3808	3808	na	3400
Uzbekistan	na	3870	5659	27701	7188

Source: Kyrgyznefteproduct, March 1993.

2.18 In fact, the recently large premium reported for Uzbek supplies may also reflect the terms of trade under which Kyrgyzstan provides crude oil to the Fergana Valley refinery, and receives product back. Specifically, the crude oil delivered to the refinery (approximately 120 MT/annum) is valued at 60 percent of a free market equivalent. Products returned to Kyrgyzstan are, in turn priced at the local Uzbek refinery gate price, which closely approximates a western market equivalent netback value-based estimate. A nominal transport cost is added (400 Rb/ton for light products, and 760 Rb/ton for mazut). Effective March of 1993, for diesel fuel, this value was calculated at 84,000 Rb/ton, assuming an exchange rate of 700 Rb/$. The Uzbek price of 99,000 Rb/ton equates to a market-based netback assessment assuming an exchange rate of 825 Rb/$, a reasonable assumption given the deterioration in the exchange rate and possible payment delays[9].

2.19 In the face of these widely different regional price and supply alternatives, a policy of unitary regional pricing of petroleum products should not be maintained. Indeed, this decree

[9] An analysis of the potential payout from Kyrgyzstan investing in a small domestic refinery (e.g., 2,000 - 4,000 B/D capacity) is discussed in Chapter 3, and presented in detail in Appendix II.

has been ignored, at least by the entrepreneurial marketers not bound to enforcement as is Kyrgyznefteproduct. As a result, the state distribution and marketing company is placed at a disadvantage in attempting to compete for or retain new customers because of its inability to differentiate price according to regional economics, and its requirement to pay all taxes, while much of the "outside" trade in petroleum occurs at un-taxed prices. This emerging "dual-market" environment is also enabled by the widespread re-selling of volume allocations to critical users (e.g., farmer cooperatives, other critical users) who pay a flat, official price and then resell at a higher commercial price. Excessively high quotas for farm users are particularly responsible for this sort of abuse. Indeed, a major class of petroleum product marketer is now the farmer or cooperative with storage capacity, making it available for un-reported marketers who may own or lease small tank trucks.

2.20 Thus, part of the enforcement problem relates to the lack of data collected on actual fuel use, its storage, transport and resale within Kyrgyzstan. If a tax and pricing policy are to be effective, efforts to document and otherwise regulate or monitor the peripheral import and domestic petroleum product distribution and storage system are needed. One first step may be to assert greater control on petroleum product movements and storage for purposes of testing to insure quality integrity. By requiring quality certification, and imposing large fines or desist orders on those not reporting volumes stored or delivered, petroleum supplies can be more precisely tracked, thereby supporting efforts to collect taxes and eliminate illegitimate suppliers.

Crude Oil Development Prospects

2.21 As reported by the Government of Kyrgyzstan[10], 81 percent of Kyrgyzstan's oil reserves are estimated to lie in low permeable reservoirs and are, therefore, difficult to recover. The largest producing fields are in a declining stage of production, suffering from water encroachment and natural reservoir depletion. The key issue is then how to stem the decline in oil (and gas) production,and to open up new areas to exploration and development. Several prospective areas have been identified as having promising geologic characteristics, including the Fergana Basin, the southern Tien Shan Basin near China, the Eastern Chuysk and the Issyk Kul Basins, and possibly the Naryn, At-Bashi and Aksay Basins as well. However, domestic resources needed to properly explore and develop these areas are lacking. Therefore, planning has begun to turn towards developing possible terms for joint ventures with foreign firms as well as designing a reasonable exploratory drilling program. A legal framework must be developed to create acceptable concession agreements.

2.22 The estimated cost of an initial exploration and drilling program was placed at around 800-900 million rubles in late 1992, or about $2 million, given an effective exchange rate of approximately 400-450 Rb/$. This estimate closely matches the projected 1993 annual operating costs for Kyrgyzneft, which are placed at 1.78 billion rubles, or about $1.78 million, given an average exchange rate of 1,000 Rb/$. This annual operating budget is about 70 times higher than the nominal 1992 Kyrgyzneft operating budget (of 25,402 rubles), and about 14 times higher in real ($-denominated) terms, assuming an average 1992 exchange rate of 200 Rb/$. On a per ton basis, Kyrgyzneft's annual operating costs were equivalent to about $5.60/ton in 1992, using an exchange rate of 200 Rb/$, and projected to rise to $14.24/ton in 1993. Clearly,

[10] See "EPK" Report, Chapter 7.

a higher netback value for crude oil and gas, even greater than the 60 percent standard set by the Ferghana refinery terms of trade, will be necessitated to justify this expenditure level.

2.23 A detailed breakout of Kyrgyzneft's annual operating budget is shown in **Table 2-7**. (As operating cost data were obtained second hand over the telephone, and the reported cost levels changed dramatically over the 1992-93 period, the accuracy of the Kyrgyzneft cost data needs to be confirmed). The largest single increase was reported in material costs, which increased by a factor of nearly 14 times. However, a portion of this increase likely includes maintenance and current repair costs which (perhaps erroneously) were forecast to decline between 1992 and 1993. Assuming this is the case, then all non-labor costs are projected to increase by at least a factor of 10 (nominally), with the exception of interest expenses (shown as zero - i.e., fully financed). Labor costs are shown to escalate by only a factor of 5-10 times, or roughly even with inflation and currency devaluation rates.

2.24 Compared to the previous $2 million estimate, the cost of an initial exploration and development program is now likely to be far higher, reflecting not only the rapidly devaluing currency, but also the higher non-labor and logistic costs associated with acquiring and moving equipment and materials to these remote locations. Kyrgyzneft is located in the Osh District, an area which can be very difficult to travel to given current limitations on jet fuel and aviation gasoline availability.

2.25 One approach under consideration by Kyrgyzneft is to link the desired development of a domestic refinery to the issuance of an exclusive (albeit time-limited) exploration and development concession to a company with capabilities to both manage the refinery construction and develop the field potential[11]. The resulting incremental oil production would then be exclusively dedicated to the refinery's feedstock, along with the current output (of 110-120 MT/annum). Preliminary analysis of this approach[12] suggests that an incremental 50-100 MT/annum (1,000-2,000 B/D) would be needed to achieve significant scale economies in the refinery size and a positive return on investment. On the other hand, a refinery sized at current flow rates (120 MT/annum) could recover investment costs of between $5-$6 million, assuming either a discount rate of approximately 18 percent, or some worsening of the terms with Uzbekistan on the crude oil for refined product trade agreement. Given the otherwise captive state of current Kyrgyz crude oil output, and the resulting high relative prices for refined products supplied by Uzbekistan, an approach which links a field-scale refinery to new production is desirable.

2.26 Elements of the Government's plan to develop its oil and gas production potential[13] include: 1) the establishment of a Council to coordinate oil and gas operations, approve programs and geologic exploration projects; 2) the development of a comprehensive exploration and development program covering the period 1993-2000; 3) the organization of training for petroleum and gas engineers; 4) the design and pursuit of efforts to attract foreign investors;

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[11] Discussions have been underway with one American firm on this subject for nearly one year now.

[12] See Appendix II.

[13] "EPK", p.67.

Table 2 – 7

Kyrgyzneft
ANNUAL OPERATING COSTS*
(thous. rubles, except where noted)

	1992	projected 1993
Material Costs**	127.445	1777.887
Delivery expenses	8.802	115.213
Losses	10.04	50.357
Wages/Labor payments***	20.122	151.932
Social Security Payment	6.993	56.215
Taxes	45.929	506.385
VAT	–	–
Profit	–	–
Land	–	–
Property/building	–	–
Road	–	–
Employment fund	–	–
Maintenance and current repair	25.094	690.125
Rental payment for buildings	47	591
Insurance expenses	–	4.323
Depreciation of equipment and buildings	3.81	317.212
Interest Expenses (Cost of financing)	38	–
TOTAL COSTS	333.235	4260.649
Volume of production, thousand tons	113	125

Note: * estimated values based on preliminary data
** excluding delivery/transportation expenses
*** excluding social security, taxes, etc.

Source: Ministry of Energy / Kyrgyzneft
Date: May 1993

5) constructing a domestic crude refinery; and 6) financing centralized oil and gas operations from revenues, at a level of at least $2-$3 million annually.

Downstream Market Organization and "Infrastructure" Investment Needs

2.27 Kyrgyznefteproduct (KNP) is organized into five regional oblasts. Until 1992, KNP enjoyed a monopoly on all petroleum product distribution and marketing. In 1992 commercial enterprises, approved at the oblast level, were allowed to engage in petroleum product importing, distribution and marketing. (These enterprises should also be registered with the State Committee on Pricing and Anti-Monopoly.) KNP owns a total of 190 retail stations where gasoline is marketed primarily. These volumes, however, represented only about 10 percent of KNP's total annual sales. KNP, at the oblast level, also holds exclusive control over bulk storage under its ownership. However, even before 1992, other commercial enterprises, such as agricultural enterprises, auto transport companies, TES (the power plant), sugar, cement and other critical industries were given the authority to directly acquire petroleum products, and to hold inventories on site. These end-users, which number around 1,100, historically accounted for as much as 60-70 percent of KNP's annual sales volumes, and additionally purchased some supplies directly.

2.28 With the removal of KNP's monopoly position, and the emergence of an entrepreneurial class of marketers, price and supply incentives are such that the bona fide end-users have a strong incentive to team with independent marketers to re-sell a large portion of their normal supplies, and to make storage and other facilities available to them in the process. This activity has occurred at the direct expense of KNP, which has seen its final sales volumes drop from 2.4 MMT in 1991 to 1.1 MMT in 1992, a 54 percent decline, or nearly the amount represented by the former direct sales to bona fide end-users.

2.29 In addition to the competitive disadvantages facing KNP in trying to compete with both legitimate and illegitimate resellers (see paras 2.19 - 2.20), KNP bears the additional burden of having to carry increasingly large arrears from some of its largest customers and current competitors, including agricultural enterprises and the auto transport companies. Reportedly, arrears were averaging six months or more of usage for major consumer groups effective March 1993. Actions have been taken to require advance payment from certain users, but the extent and cost of the problem has not yet been documented. In contrast, the "unofficial" market participants operate largely on a cash payment basis.

2.30 In light of the drastic decline, and reduced profitability of KNP's operations owing to higher unit costs spread over reduced volumes, efforts should be undertaken to sell off KNP's assets to bona fide marketers, and to otherwise consolidate their operations to reflect existing market realities. This effort should be undertaken simultaneously with efforts to register marketers and enforce tax and import reporting, as discussed in para. 2.20.

2.31 Other downstream system "rationalization" efforts should be directed at evaluating the transport systems and the long-term benefits vs. costs of alternative petroleum product storage and transport investments. According to KNP, the vast majority of its petroleum product imports are via rail. The independent sector relies more heavily on truck transport in smaller lot sizes for short-haul movements (i.e., from Kazakhstan and Uzbekistan), but rail access can also be secured through the Ministry of Railways. Rail transport costs were reported to average 1,560

Rb/ton from Russia and 400 from Uzbekistan for light products, and 760 Rb/ton for mazut. (Transport costs are included in the price reported from Kazakhstan.) Average distances from Uzbekistan's Ferghana Valley into the Osh District of Kyrgyzstan are only 100-150 km compared to roughly 1500 km from Russian refineries into the Bishkek area. At 400 rubles per ton and assuming an exchange rate of 700 Rb/$ this is equivalent to about 8¢/barrel, or 0.2¢/gallon for a 100-150 km (60-90 mile) haul. This is approximately one tenth the level of a typical western rate. Similarly, owing to economies of scale in long-haul rail transport, the 1,560 Rb/ton average rate from Russia in March 1993, converts to about $0.32/barrel or 0.8¢/gallon. This is about 10-20 percent of a western-equivalent rate for a similar trip length.

2.32 As oil prices approach world market levels, operating costs will eventually follow, perhaps with some lag until such time that major capital expenditures are required to upgrade the system. The most promising immediate alternative to eventually paying these higher rail costs, and upgrading its own system to maintain reliable oil product supply service, is represented by the proposed regional petroleum product pipeline linking the Chimkent refinery (located approximately 200 km from Bishkek) with Dzamboul to the west and Almaty to the east. This proposed regional pipeline system is likely to be evaluated for World Bank funding. The incremental cost of connecting via a spur line directly into Bishkek (of approximately 50 km in length) is likely to be minor in comparison to the benefits achieved over time, both in reduced delivered costs and more reliable supply service. A basic structure for this analysis is presented in Appendix II.

2.33 Another action related to supply security which warrants priority attention is the re-establishment of working and emergency reserve inventories for key petroleum products within the major regional centers: Bishkek and Osh. Specifically, KNP, in combination with the appropriate end-user government and enterprise organizations (e.g., the Air Board), need to re-establish critical regional inventory levels for such vital fuels as jet fuel, aviation gasoline, motor gasoline, diesel fuel and mazut. Methods to finance such inventory-building are discussed in Chapter 3. In brief, the potential cost of carrying such inventories could be financed from user charges, taxes or through normal inventory turnover and price escalation alone. Importantly, a functioning petroleum inventory system is a prerequisite to further sectoral and broader economic development.

B. Natural Gas

Supply and Demand Balances

2.34 Like oil, natural gas is a minor contributor to Kyrgyzstan's total energy production, but a sizeable portion (nearly 23 percent in 1992) of final energy consumption. As a result, natural gas policy is largely one of managing the higher cost of gas imports, and of rationalizing a system which is likely to experience continued change in its consumption and cost structure by sector and region.

2.35 **Table 2-8** presents a supply-demand balance for natural gas in Kyrgyzstan for the period 1991-1992. Note that domestic production accounts for less than four percent of usage, all of which is consumed in the south. Northern Kyrgyzstan, which accounts for about three quarters of Kyrgyzstan's total natural gas demand, is supplied exclusively by the Bakhara-Tashkent-

Bishkek-Alamty (BTBA) pipeline system, which delivers largely Turkmen gas to the Chuysk Valley of northern Kyrgyzstan. The Uzbek imports move primarily into the south, where the transmission and distribution network is separate from the northern system serving the Chuysk Valley. Despite their sharp decline in 1992, imports from Turkmenistan still account for over 90 percent of total gas supplies.

Table 2-8
Kyrgyzstan Natural Gas Supply & Demand Balances
1991-1992
(mil. cu. meters)

	1991	1992 (Preliminary)	% Total	% Change
Supply:				
Domestic (all in south)	70	68	3.5	-2.9
Imports (Total)	2144	1879	96.5	-12.4
• from Turkmenistan	2071	1768	90.8	-14.6
• from Uzbekistan	73	111	5.7	+52.1
Demand:				
Total	2214	1947		-12.1
• In North	1712	1482	76.1	-13.4
• In South	502	465	23.9	- 7.4
By Sector:				
Fossil Plants	1040	900	46.2	-13.5
Industrial	731	658	33.8	-10.0
Transport	8	7	0 4	-12.5
Services/Municipal	106	91	4.7	-14.2
Household	139	139	7.1	0.0
Other	191	152	7.8	-20.4

Source: "The Energy Program of Kyrgyzstan", Dec. 1992, p. 71, and Kyrgyzgas.

2.36 The decline in consumption between 1991 and 1992 has been most pronounced in the more industrialized north, falling an estimated 13.4 percent, versus 7.4 percent in the south. However, these 1992 estimates are somewhat preliminary in that they were created prior to the end of the year, and prior to the full measure of rising gas prices and declining economic conditions which undercut demand in late 1992.

2.37 A more recent assessment of 1992 total demand[14], **Table 2-9**, shows total domestic natural gas demand totalling just 1,773 mcm, with a significant decline over the second half of the year. This is some nine percent below the preliminary figure shown in Table 2-8. In addition, the sectoral distribution of this demand differs somewhat from the figures shown in Table 2-8. Much of this difference is attributable to the allocation of the fossil plant component, which Kyrgyzgas places largely in the category of industrial use.

2.38 A seasonal and sectoral profile of Table 2-9's natural gas demand data is shown in **Figure 2-1**. Industrial usage (a large portion of which is fossil plant) exhibits substantial seasonal swings, owing to the large fossil plant component. Household demand also exhibits seasonally trends, peaking in the first and fourth quarters. Despite these large seasonal consumption swings, and the different delivered cost structures to the distribution networks serving the north and south, gas pricing within Kyrgyzstan is uniform. No regional distinctions are made according to delivery costs or class of service.

Gas Pricing

2.39 Gas prices in Kyrgyzstan are driven primarily by the import price charged by Turkmenistan and Uzbekistan. These, in turn, are dictated by the netback price of gas relative to a world (export) market alternative: that is, the highest value that the gas will fetch in other alternative markets, netted back for the cost of transportation to the Kyrgyz border from these alternative markets. We estimate this level at around 15,200 Rb/mcm effective March 1993, assuming an exchange rate of Rb 700/$. At 1,000 Rb/$, representative of late second quarter market conditions, this price rises to around 22,000 Rb/mcm, or very close to the 24,000 Rb/mcm border price then in effect from Uzbekistan (and Turkmenistan)[15].

2.40 A recent history of the natural gas supply cost and sales prices is provided in **Table 2-10**. In January 1992, the border price of gas was just 870 Rb/mcm, equivalent to about $0.25/Mcf at existing exchange rates. This price included a 28 percent VAT. A pipeline transport cost of 91 Rb/mcm also carried a 28 percent VAT, bringing the total delivered price to 961 Rb/mcm. By September of 1992, gas import prices nearly quintupled in nominal terms, responding both to currency devaluation and the ability to achieve higher export value into the Russian pipeline system extending into Eastern Europe. Transport fees also increased, by a factor of roughly three. A further minor increase in gas prices followed in December 1992. The major increases were delayed until early 1993, in part to avert a total collapse in Kyrgyzstan's ability to pay for gas supplies, and a resulting severe gas shortage in mid-winter.

2.41 The effort to blunt the impact of rising gas prices on consumers is evidenced by the maintenance of gas sales prices in Kyrgyzstan at September 1992 levels through the end of the year, despite a 35 percent increase in import costs. However, by early 1993, Uzbek (and Turkmen) gas prices were near world "netback-equivalent" levels (based on sales into Europe),

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[14] Provided by Kyrgyzgas, May 1993.

[15] While import price data were only available from Uzbekistan, effective January 1993 the Turkmen and Uzbek import gas prices were equal, according to Kyrgyzgas.

Table 2–9
KYRGYZSTAN NATURAL GAS SALES BY SECTOR
millioncubic meters

	Quarter I, 92	Quarter II, 92	Quarter III, 92	Quarter IV, 92	Quarter I, 93	Quarter II, 93
Industrial uses	429.8	352.8	268.2	290.1	375.6	465.5
Transportation	0.8	0.9	1.2	1.1	0.8	1.9
Municipal needs public	38.4	12.2	10.5	26	27.7	14.9
Households	79	48.8	37.6	87.4	83	51.6
Other uses	28.8	21.8	16.7	21.3	25.6	28.1
Total	576.8	436.1	334.2	425.9	512.7	562

	First half, 92	Second Half, 92	First Half, 93
Industrial uses	782.6	558.3	841.1
Transportation	1.7	2.3	2.7
Municipal needs public	50.6	36.5	42.6
Households	127.8	125	134.6
Other uses	50.6	38	53.7
Total	1012.9	760.1	1074.7

Source: Kyrgyzgas
Date: May 1993

FIGURE 2-1

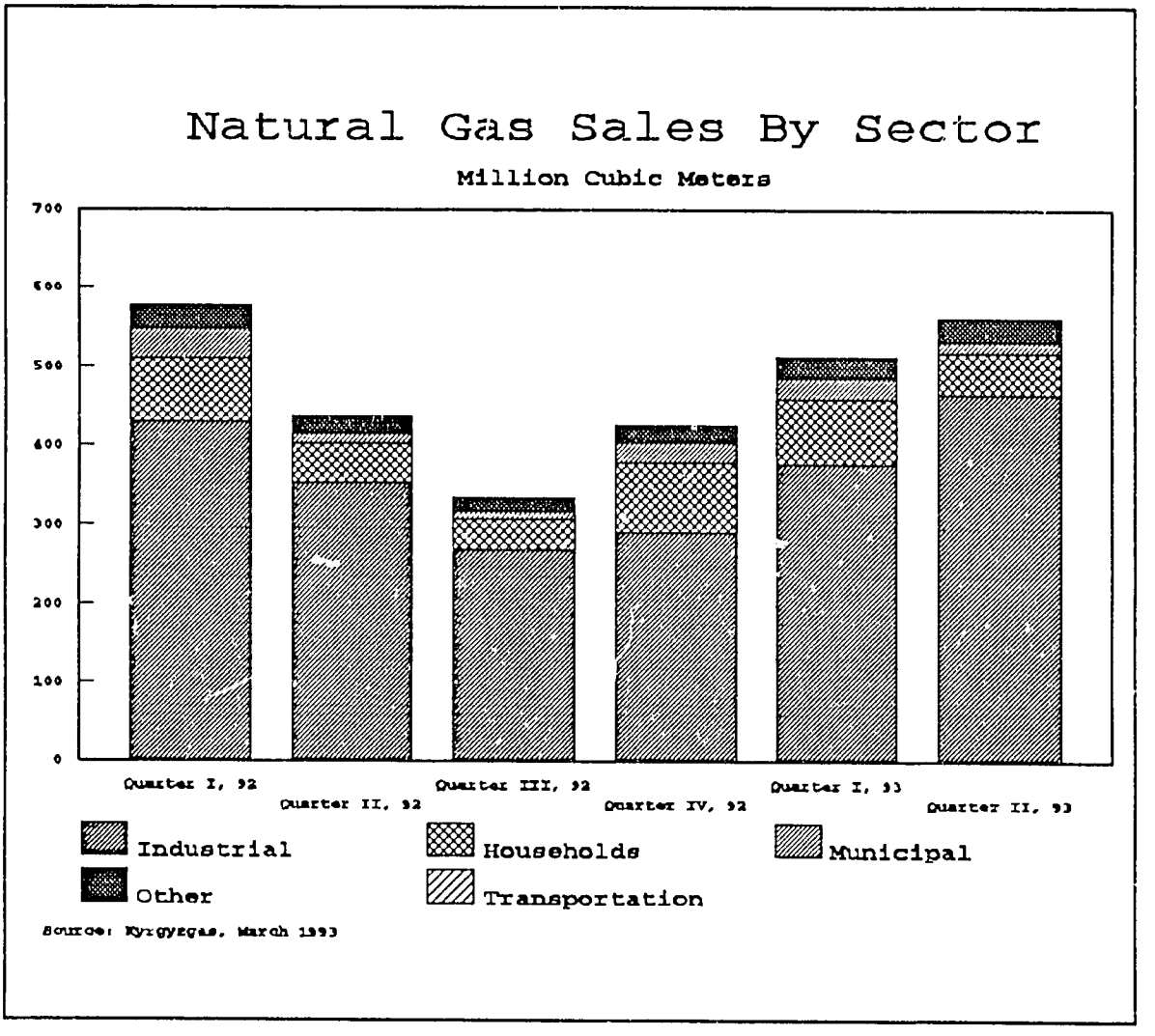
Natural Gas Sales By Sector
Million Cubic Meters
700
600
500
400
300
200
100
0
Quarter I, 92
Quarter II, 92
Quarter III, 92
Quarter IV, 92
Quarter I, 93
Quarter II, 93
Industrial
Households
Municipal
Other
Transportation
Source: Kyrgyzgas, March 1993

Table 2-10
Gas Purchase and Sale Prices in Kyrgyzstan

	Natural gas from Uzbekistan, Rb/1000 cm				
	Jan 92	Sep 92	Dec 92	Mar 93	Jun 93
Border Purchase Price	870	4000	5500	24000	24000
including tax	190	875	1203	4000	4000
Transportation expenses	91	312	312	1721	1721
including tax	20	72	72		
Total	961	4312	5812	25721	25721
Sale price:					
for industrial consumers	1142	5406	5406	31500	31500
including tax	250	1182	1182	5250	5250
municipal needs and everyday	1142	5406	5406	18593	18593
necessities including tax	250	1182	1182	3099	3099
for people inhabitants	320	2930	2930	16174	16174
including tax	70	640	640	2696	2696

Source: Kyrgyzgas
Date: March 1993

and a more dramatic cross- subsidy scheme among final sales prices was required to enable customers to afford gas[16]. Beginning in early 1993, the full cost of gas was only passed on to industrial consumers, as these parties are assumed to recoup and pass this higher price on in the form of higher prices for their products output. Subsidies to municipal buildings were begun, at about 40 percent of total average delivered cost, while household consumers were subsidized to slightly over 50 percent of average gas costs. Despite these subsidies, gas prices nominally rose by nearly 13,000 Rb/mcm to each of these user groups, or three-to-five times their previous levels for municipal and household users, respectively. A profile of the gas sharp price escalation occurring in late 1992 through early 1993 is shown in **Figure 2-2**.

2.42 Two minor tax policy changes helped to dampen the price increase somewhat. First, the VAT on gas sales, including imports to Kyrgyzgas, and their sales to final consumers, was reduced from 28 to 20 percent. Second, the VAT on transport services was dropped entirely. Gas prices in Kyrgyzstan are not subject to any excise tax, nor is such a tax likely to be applied in the near future. Rather, efforts are likely to be directed at enabling Kyrgyzgas to recover a greater portion of its costs to become more financially self-sufficient, and self-sustaining in pursuing some of its immediate investment needs.

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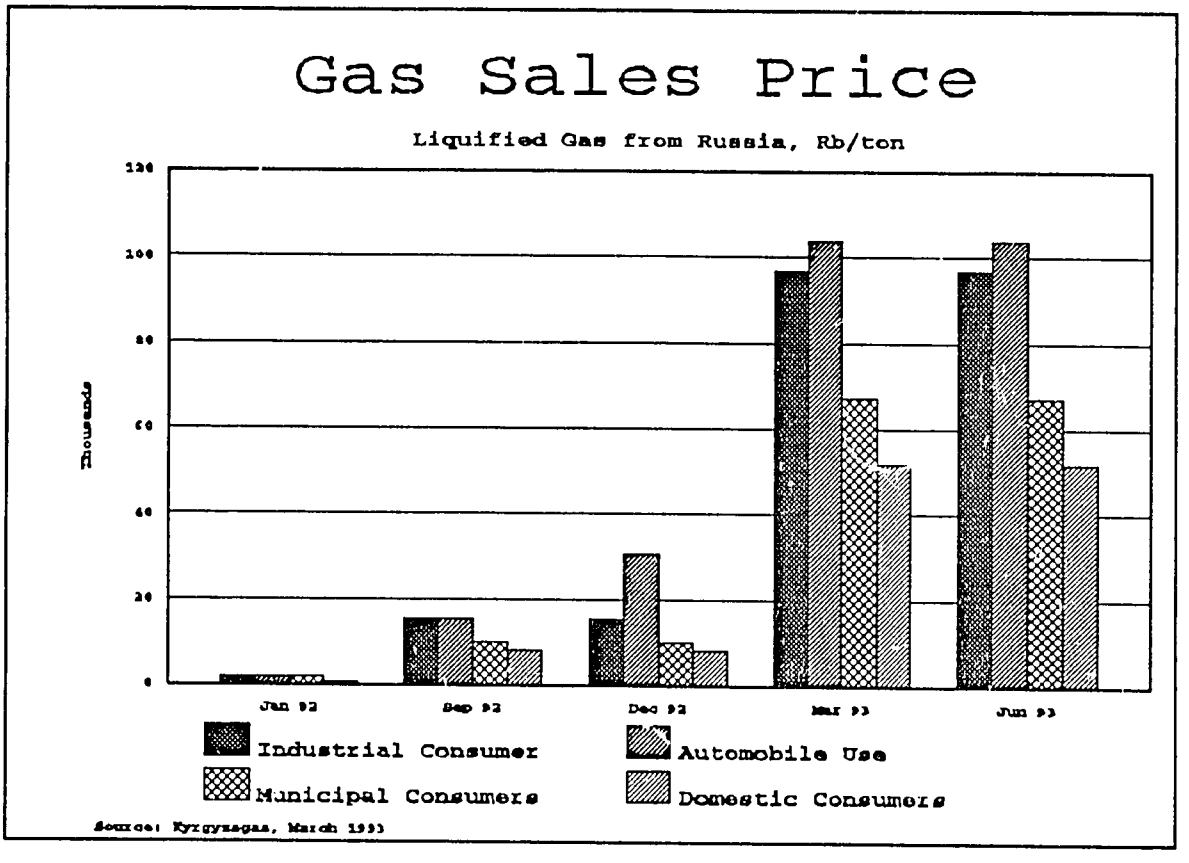
16 For the month of February 1993 alone, arrears came to 6 billion rubles. At a 50 percent+ state-controlled rate of interest, the credit cost alone of the arrears problem threatened to bankrupt Kyrgyzgas, particularly since it was not allowed to recover these financing costs in its price to customers.

FIGURE 2-2



Production Costs and Investment Needs

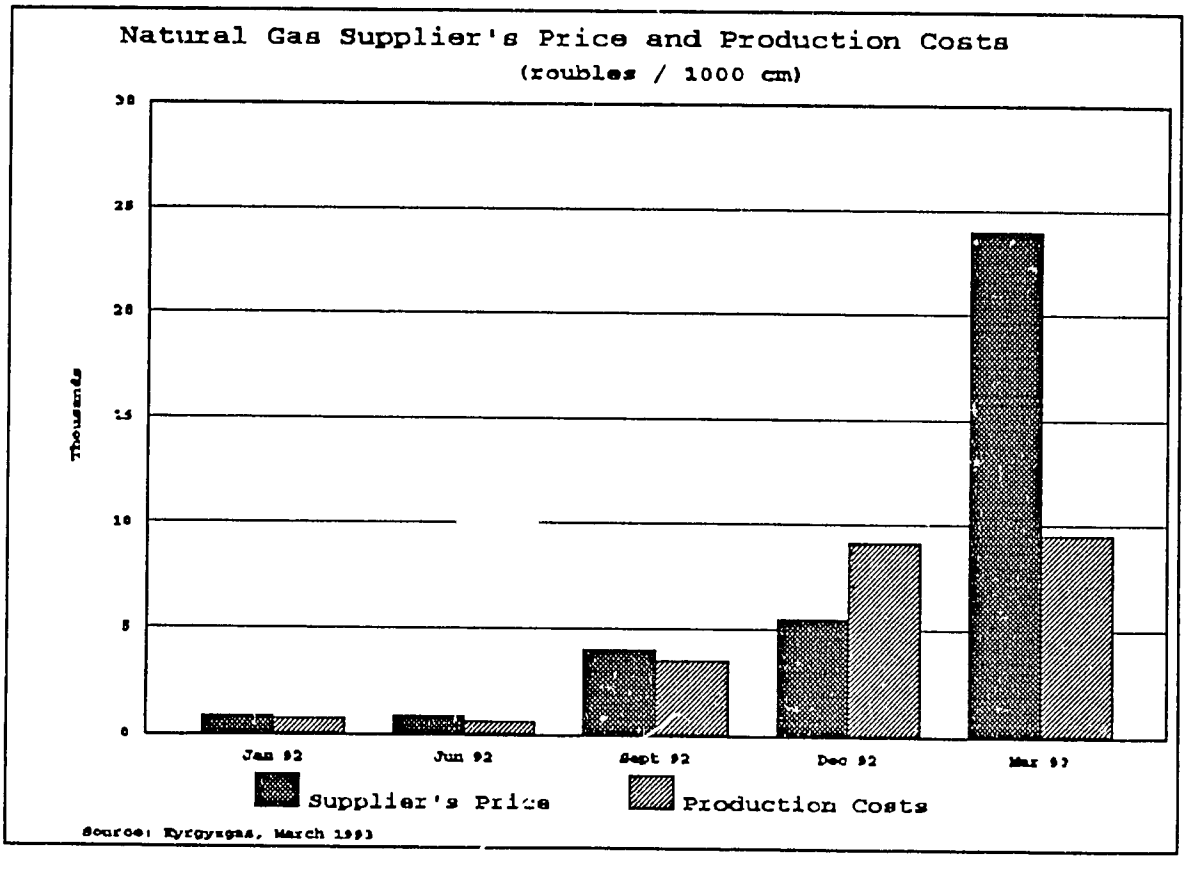
2.43 The cost structure of imported natural gas can be compared to the cost structure of domestically produced gas in order to gain a better understanding of the comparative economics behind the two supply sources. **Table 2-11** presents the recent history of Kyrgyzstan's domestic gas wellhead prices and production costs, shown pictorially in **Figure 2-3.** Through September 1992, domestic gas prices and production costs were maintained at a reasonable relationship, allowing a modest level of profitability to Kyrgyzneft (the producing organization). Wellhead prices were identical to Uzbek import border prices. In December 1992, production costs rose dramatically, yet wellhead prices were suppressed and not allowed to recover these higher costs, reflecting the "political" need to maintain gas service at an affordable level and to avoid complete system loss of system liquidity in the midst of the peak demand period. Note that the Uzbek price also reflected this political imperative. By March 1993, wellhead prices had again been allowed to reach import parity levels, which substantially exceeded production costs.

Table 2-11
Kyrgyzstan Natural Gas Domestic Price and Cost in rubles/1000 cubic meter

	Jan 92	Jun 92	Sept 92	Dec 92	Mar 93
Supplier's Price	870	870	4000	5500	24000
Product Costs	702	615	3508	9180	9550
Transport Expenses	91	91	312	312	1721
Note: Production	1992	1993			
in mcm	72.4	60			

Source: Kyrgyzneft
Date: March 1993

FIGURE 2-3



2.44 A detailed view of Kyrgyzgas' estimated vs. actual cost structure for 1992 in its entirety and the fourth quarter separately is shown in **Tables 2-12(a&b)**. Note that the quantity of actual sales lagged expected sales levels by nearly 20 percent, with most of this decline taking place during the third quarter (see Table 2-11). However, data inconsistencies may explain some of this deviation, as the annual and fourth quarter volume totals shown in Table 2-12 do not precisely match those shown in Table 2-11's review of final sales, also reported by Kyrgyzgas.

2.45 In evaluating Tables 2-12 a and b, several important observations emerge:

- Volumes of gas were down substantially on an annual basis, but above expected levels in the fourth quarter. This reflects substantial anticipatory buying in advance of the huge (400 percent +) price increases on imported gas in January 1993. In addition, it explains at least some of the difference between reported final sales volumes and pipeline purchase volumes, with the difference accounted for by stored gas.

- The average production cost of gas more than doubled in the fourth quarter over its annual average level. About half of the annual total commodity costs were incurred in the fourth quarter.

- Material and labor costs also increased rapidly over the fourth quarter, reflecting overall inflation levels. Roughly 60 percent of total labor payments were incurred over the fourth quarter, in an effort to adjust wages (+ year-end bonuses) to keep pace with the cost of living. However total labor costs for both the entire year and the fourth quarter alone fell below expected levels. This suggests either massive layoffs, an inability to afford labor payments in line with the cost of living, or a combination of these two factors. In short, Kyrgyzgas serves as a microcosm of the overall economy in that cost cutting reduces employment and real income, which increase the need to maintain life-line subsidies in the face of rampant inflation, particularly for critical commodities.

- Nearly 90 percent of total short-term credit costs were accumulated over the fourth quarter, reflecting the sudden increase in arrears as import prices were hiked and economic conditions began to rapidly decay in September 1992.

- The one cost item which lagged noticeably during the fourth quarter was the absolute and expected level for depreciation. Allowable depreciation rates are set[17] according to the original equipment's base cost, not its replacement cost. In a highly inflationary environment this reduced real allowance for capital depreciation provides a significant dis-incentive to recover future system replacement, upgrade or expansion costs.

2.46 Furthermore, Kyrgyzgas' rate structure does not allow for recovery of capital investment costs. These must be paid from profits. Of course, if rising material and credit costs eat up any potential profit, as rates are not increased as fast as costs, then no funds are left for capital investment. This fundamental problem facing Kyrgyzgas is the need for immediate rate reform in the natural gas transmission and distribution systems.

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[17] Set by an independent board.

Table 2-12a

Natural Gas Production Costs
Kyrgyzstan
(Roubles except where noted)

Expense Item	1992: Fourth Quarter estimated cost	actual cost	deviation	estimated unit cost	actual unit cost
Quantity of gas (Mcm)	435.4	483.93	48.53	NA	NA
Sale to other consumers	0	0	0	NA	NA
Total production cost	1429672000	2029886801	600214801	3283583	4194588
including*:					
Material costs	1387819656	1966654326	578834670	3187459	4063923
Gas purchase	1334249760	1927925690	593675930	3064423	3983894
Losses	40755700	30302035	-10453665	93605	62617
Depreciation of permanent equipment	37398	3524	-33874	86	7
Labor payments (including bonus expenses)	9027800	7850311	-1177489	20735	16222
Social security deductions (37 % of labor payments)	3448646	2898876	-549770	7921	5990
Total other expenses	29338500	52479764	23141264	67383	108445
Short-term credit payments to savings bank	28411800	47436146	19024346	65254	98023

Note: * Includes major cost items only

Table 2-12b

Natural Gas Production Costs
Kyrgyzstan
(Roubles except where noted)

Expense Item	1992 – entire year estimated cost	actual cost	deviation	estimated unit cost	actual unit cost
Quantity of gas (Mcm)	1790.7	1441.14	-349.56	NA	NA
Sale to other consumers	0	0	0	NA	NA
Total production cost	2711419707	2908852026	197432319	1514167	2018438
including*:					
Material costs	2653460733	2827964281	174503548	1481801	1962311
Gas purchase	2567952960	2762855482	194902522	1434050	1917132
Losses	67703970	51232585	-16471385	37809	35550
Depreciation of permanent equipment	1494598	1413177	-78421	833	981
Labor payments (including bonus expenses)	15410036	14765199	-644837	8606	10246
Social security deductions (37 % of labor payments)	5801100	5465513	-335587	3240	3792
Total other expenses	34372240	59243856	24871616	19195	41109
Short-term credit payments to savings bank	32731543	49438714	16707171	18279	34305

Note: * Includes major cost items only

Source: Kyrgyzsgas, May 1993

2.47 From the "upstream" or production perspective, the recent "spread" between wellhead prices and production costs should be capitalized on by providing tax incentives to Kyrgyzneft for capital re-investment in gas production or needed gas storage and transportation infrastructure. Since border prices are now very close to netback-equivalent levels, it is unlikely that they will increase more rapidly than production costs. Therefore, tax incentives will be needed to insure continued investment in gas production and transmission.

2.48 In the south, an immediate increase in the supply of gas will require construction of a gas storage facility at the Malyi-Say field held jointly with Uzbekistan. In addition, some modernization of the Khovant-Fergana transmission line will be required. Domestically, gas production can best be encouraged by Kyrgyzneft directing its exploration and production efforts at fields with reasonably high gas potential.

2.49 In the north, the primary investment need is the completion of the second line of the BTBA regional gas pipeline system. This line was tentatively scheduled for completion by late 1993, including a compressor station at Dzhamboul and Lugovoj. The use of this potential capacity, however, may be quite limited in light of the declining demand for natural gas in Kyrgyzstan, particularly in the north where the industrial demand decline has been most pronounced. This northern regional gas pipeline currently connects to 62 plants and 178 public buildings (housing 179,000 apartments) in the Chuysk Valley of northern Kyrgyzstan. However, gas demand will not increase in this region, lessening the need for this additional capacity unless price and supply terms become more responsive to the economics of these industrial plants.

2.50 Given the mutual interest of Uzbekistan and Turkmenistan of maintaining and expanding gas sales into Kyrgyzstan (particularly with potential competition from Kazakhstan as an eventual net exporter), a significant share of these system expansions and upgrades in the south and north should be shared by these countries, perhaps through a crediting scheme against the gas purchase price. Negotiations on gas pricing and shared system financing should also be considered in the broader context of regional discussions on power and water supply, pricing and other trade issues.

2.51 Another approach to officially link the interests of the producing countries with Kyrgyzstan's gas sector development need, is to consider allowing large industrial users to negotiate directly with the foreign suppliers, utilizing price terms which are more reflective of their opportunity fuel costs, in the case of short term contracts, or long-run marginal costs, in the case of firm supply term contracts. This would place Kyrgyzgas in the position of being a gas transporter primarily, and could provide motivation for it to develop a legal and regulatory structure to price gas delivery services according to rigorous cost-of-service and open access contract terms, while maintaining its crucial supply role to households and municipal users.

Liquified Petroleum Gas (LPGs)

2.52 Kyrgyzgas also manages Kyrgyzstan's importation and distribution of LPGs, where the large majority of consumption is in the municipal and household sectors. The price to the household sector is subsidized from higher prices charged the industrial and transport sectors. Of total estimated 1992 LPG use of 107,000 tons in 1992, approximately three quarters of his volume went to public buildings and households, two-to-three percent to industrial users and

22-23 percent to motor vehicle use. The total usage of 107 mt actually exceeded expected consumption levels[18] by over 30 percent, but was still well below 1991 LPG consumption of 125 mt. As with natural gas, one reason for the late year surge in consumption was the large increase in prices scheduled for early 1993. In fact, prices increased by 900 percent in early 1993, an event widely anticipated.

2.53 **Table 2-13** details LPG's price and tax structure developments over the past 18 months. As noted, the Russian border price increased by about nine times in early 1993. The increase in rail transport costs was even greater on a percentage basis. Effective December 1992, the CIS nations adopted a VAT-origin policy, so that the VAT was not incurred at the border, but only upon final sale. Like the other energy commodities, this rate fell from 28 to 20 percent in 1993. The 54,400 border price of LPG, after adding transportation costs of 9,067/ton, approximates the Btu-equivalency price of Russian gasoline imports, price at 85,000 Rb/ton, and diesel fuel at 68,000 Rb/ton. However, the price charged to the final consumers differs widely by sector. LPG prices to the transport sector are comparable to gasoline price levels (on a Btu-adjusted basis), and bear the large share of the cross-price subsidy to the household sector. Prices to the household sector are subsidized by at least 20,000 Rb/ton, after accounting for distribution costs. Nevertheless, LPG prices, at an equivalent of 44,000 Rb/mcm, are still nearly double the delivered price of natural gas.

2.54 **Figure 2-4** pictures the evolution of LPG prices over the past 18 months. The Government's emerging cross-subsidy policy is evident from this trend. In particular, transport use bore most of the burden of the higher prices in December, as industrial and heating uses of LPG are peaking, but a more balanced cost-price relationship between transport and industrial uses had been re-established by March of 1993. A relatively consistent proportionate subsidy has been maintained for the municipal and household users, although the absolute degree of this subsidy has been increased with the large price hike in 1993. Given the high relative cost of LPG, and therefore the high cost of maintaining this subsidy, fossil fuel displacement strategies aimed at the household and municipal sectors should be concentrated on the current LPG user community. Currently, about 553,000 apartments and 605 industrial plants are using LPG[19].

2.55 The cost structure of total LPG sales within Kyrgyzgas is shown in **Table 2-14a & 2-14b**, which reports the major line item costs. Storage and distribution costs are not included in these data, but can be deduced in part from the relatively minor difference between total production costs and the other costs itemized. Of these, the largest category is labor costs, which account for about 10 percent of total production costs. Not surprisingly, labor costs were reduced substantially from expected levels, despite pressures to increase wage rates. This reflects the cost pressure under which Kyrgyzgas and other enterprises are operating, necessitating a sizeable reduction in work force. Somewhat surprisingly, short-term credit payments actually declined to zero in the fourth quarter, reflecting the need to pay cash for LPG imports.

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[18] As provided in "EPK", p. 72.

[19] "EPK", p. 69.

Table 2-13
Gas Purchase and Sale Prices in Kyrgyzstan

	Liquified gas from Russia, Rb/ton				
	Jan 92	Sept 92	Dec 92	Mar 93	Jun 93
Russian border price	665.6	6400	6400	54400	54400
including tax	145.6	1400	*		
Transportation expenses	846	4230	4230	9067	9067
Total	1511.6	10630	10630	63467	63467
Sale price:					
for industrial consumers	1693	15446	15446	96682	96682
including tax	370	3379	3379	16114	16114
automobile gas filling	1920	15446	30720	103680	103680
including tax	420	3379	6720	17280	17280
for municipal consumers	1693	10094	10094	67392	67392
including tax	370	2208	2208	11232	11232
for people inhabitants	806.4	8284	8284	51901	51901
including tax	176.4	1812	1812	8650	8650

*End of tax reflects adoption of origin - based VAT byKyrgyzstan and its CIS trading partners

Source: Kyrgyzgas
Date: March 1993

Figure 2-4

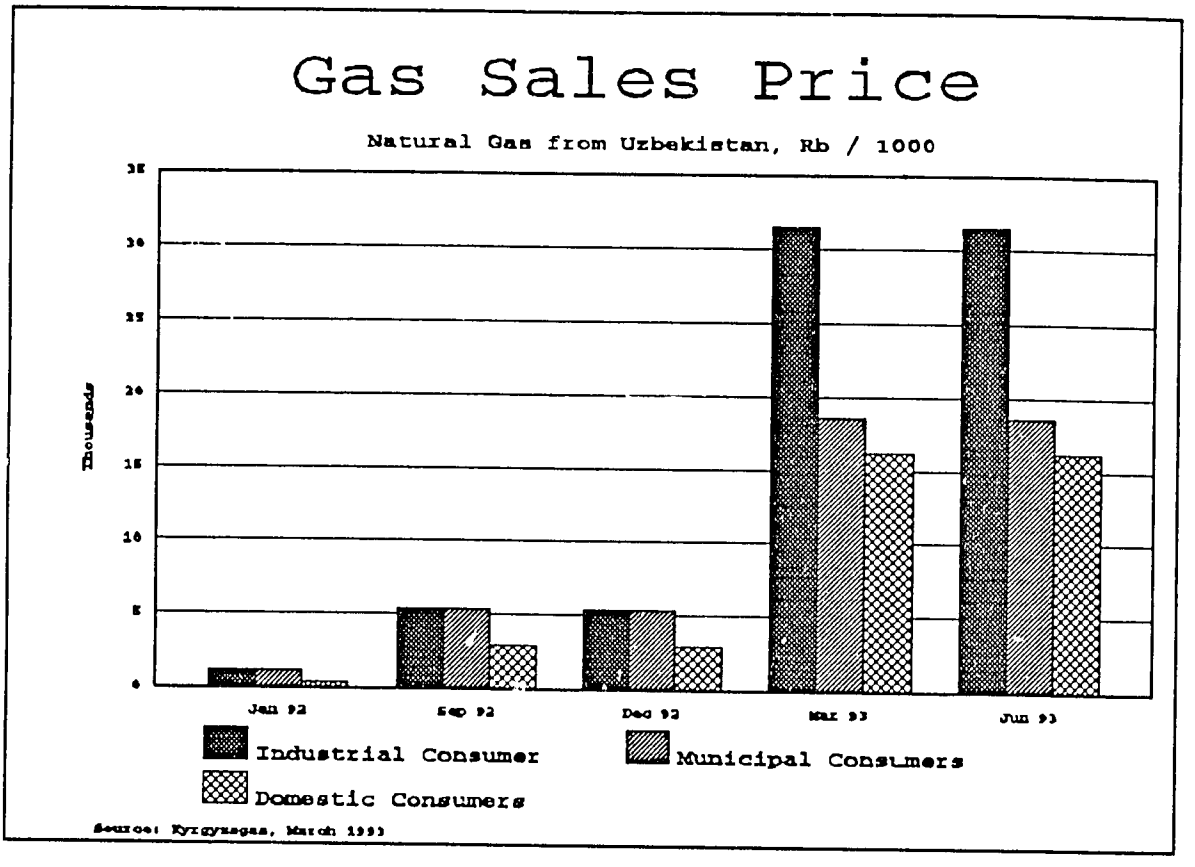
Gas Sales Price
Natural Gas from Uzbekistan, Rb / 1000
Thousands
35
30
25
20
15
10
5
0
Jan 92
Sep 92
Dec 92
Mar 93
Jun 93
Industrial Consumer
Municipal Consumers
Domestic Consumers
Source: Kyrgyzgaz, March 1993

Table 2-14 a

KYRGYZSTAN
Liquid Gas Production Costs
(Roubles except where noted)

Expense Item	1992: Fourth Quarter estimated cost	actual cost	deviation	estimated unit cost	actual unit cost
Quantity of gas (Thou. tons)	32150	27318	-4832	NA	NA
Sale to other consumers	6273	5083	-1190	NA	NA
Production cost-total, rubles	318619700	279151921	-39467779	9910	10219
including*:					
Material costs	277086250	234917226	-42429024	3617	8599
Gas purchase	178092000	144656747	-33435253	5539	5295
Losses	965300	1012580	47280	30	37
Depreciation of permanenet equipment	297550	457707	160157	9	17
Labor payments (including bonus)	29298700	28299381	-999319	911	1036
Social security deductions (37% of labor payments)	9237450	12453479	3216029	287	456
Total Other expenses	2739750	3028681	288931	85	111
Short-term credit payments	434500	0	-434500	14	0

Note: * Includes major items only

Table 2-14 b

KYRGYZSTAN
Liquid Gas Production Costs
(Roubles except where noted)

Expense Item	1992: Entire year estimated cost	actual cost	deviation	estimated unit cost	actual unit cost
Quantity of gas (Thou. tons)	126442	107423	-19019	NA	NA
Sale to other consumers	34058	28429	-5629	NA	NA
Production cost-total, rubles	824854145	695610620	-129243525	6524	6475
including*:					
Material costs	736933099	609628593	-127304506	5828	5675
Gas purchase	515731000	423626972	-92104028	4079	3944
Losses	2839900	2665775	-174125	22	25
Depreciation of permanenet equipment	1120759	1208951	88201	9	11
Labor payments (including bonus)	58414184	55738880	-2675304	462	519
Social security deductions (37% of labor payments)	19925472	22825393	2899921	158	212
Total Other expenses	5990640	6219352	228712	47	58
Short-term credit payments	928400	592703	-335697	7	6

Note: * Includes major items only

Source: Kyrgyzgaz
Date: March 1993

C. Coal Sector

Supply and Demand Balances

2.56 Coal is Kyrgystan's second most important source of domestically produced energy, accounting for slightly over 15 percent of production and 18 percent of consumption in 1992 on a tons of fuel equivalent (tfe) basis. Domestic production, under the control of Kyrgyzkomur, suffered a massive decline in 1992, falling by 35 percent. Paralleling this, labor productivity fell by an estimated 32 percent, and capacity utilization rates were at 60-65 percent.[20] Final 1992 consumption levels were projected to decline by only about nine percent, necessitating a large increase in imports. Regionally, most production and imports, approximately 70 percent, come from the north[21]. Most of the increased imports were obtained from Russia, as the higher quality hard Kazakh coal (from the Karaganda mine), which primarily serves household demand, became less affordable.

2.57 A summary of Kyrgyzstan's supply and demand balances for coal is provided in **Table 2-15**. The data for 1992 are estimated. Fourth quarter figures were not yet final as of the time of the source report's publication. In addition to the drastic decline in production and resulting increase in imported supplies, key trends which emerged in 1992 included the sharp decline in surface mining and the decline in large and medium grade coals. Most of this grade coal is of higher quality, suggesting that high-quality, low cost coal resources are being depleted rapidly. The Ministry of Industry describes the coal industry as "the weakest link" in the Kyrgyz energy economy[22], with deteriorating working conditions, declining real wage rates and the lack of equipment and appropriate technology to effectively exploit the coal beds.

2.58 The urgency to correct Kyrgyzstan's declining coal output situation was recognized early and given priority to find immediate solutions via a decree of June 5, 1992 (No. 275), "Concerning Priority Measures to Stabilize the Operation of the Republic's Coal Operations and Facilitate the Long-Term Development of the Coal Industry for 1992-93." This decree granted Kyrgyzkomur the authority to set wholesale coal prices on the basis of production and development costs, coal quality and market conditions. This effectively frees coal prices, at least to the industrial sector, which had previously enjoyed subsidies under price controls. A number of other tax, investment and related development incentives were included in this decree, and are discussed later in this section. A subsequent decree dated Feb. 4, 1993, established a domestic production target of 3,500 Mt, compared to a level of 3,742 Mt in 1990 and as low as 2,250 Mt in 1992. However, in order to sustain this level, coal demand will have to be reversed, notably export sales.

2.59 As seen in Table 2-15, despite the higher costs resulting from coal price decontrol, industrial and district heating demand actually increased in 1992 over 1991 levels. Fossil plant consumption (mostly the BHSE) remained stable, largely due to substitution of coal for

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[20] "EPK", p.49.

[21] "EPK", p.51.

[22] "EPK", p. 49.

expensive gas and oil imports. Household and municipal demand (presumably captured in the "other" category) have declined, despite lower relative price levels, and the continuation of subsidies to low income consumers. The most dramatic "consumption" decline has been in the export market, where Kyrgyzstan has been hurt relatively by its sharp fall in production and resulting ioss of supply reliability. In addition, Kyrgyzstan is dis-advantaged by its less favorable location and coal qualities, and by sharp internal reductions in coal demand among its neighboring trading partners, notably Kazakhstan and Uzbekistan. According to Kyrgyztopsnab, the potential (i.e., their estimated) 1993 coal supply requirement is 5.4 MMt. However, owing to production constraints, total supplies, including imports and domestic production, are expected to only reach 4.5 MMt. Thus, in Kyrgyztopsab's view, the domestic coal market is supply-constrained, as opposed to demand-constrained. Efforts to reverse this decline in supply need to focus first on increasing production and the reliability of supply for export, but also on efforts

Table 2-15
Kyrgyzstan's Supply & Demand Balances for Coal for 1991 - 1992 (000 tons)

		1991	1992	% Change
A.	Productive Capacity:	4,050	4,100	+1.2
	Underground	2,150	2,220	+2.3
	Surface	1,880	1,880	0.0
B.	Coal Production:	3,483	2,250	-35.4
	Underground	1,648	1,200	-27.2
	Surface	1,835	1,050	-42.8
	(By Grade):			
	Large & Medium	1,071	675	-37.0
	Fines	2,412	1,575	-14.2
C.	Disposition:			
	Exports	1,749	1,050	-40.0
	Domestic	1,740	1,200	-31.0
D.	Imports:	2,157	2,800	+29.8
	Russia	260	600	+300.0
	Kazakhstan	2,370	2,200	-7.2
	Other	27	-----	-----
E.	Consumption:	4,400	4,000	-9.0
	Fossil Plants	1,000	1,000	0.0
	Indus. & DH Boilers	700	800	+14.3
	Households	2,542	2,060	-19.0
	Other	150	140	-6.7

Source: "The Energy Program of Kyrgyzstan", 1992, pp. 50-51.

to tie coal import volumes to reciprocal export trade, or as barter payment for urgently needed supplies and technology.

2.60 A more detailed overview of Kyrgyzstan's coal trade, production and consumption balances by major coal quality grouping is shown in **Table 2-16**, provided by the Ministry of Energy (MOE). This table, based on actual data (reported in May 1993), indicates that 1992 consumption of 2,348 Mt fell well below the 4,000 Mt consumption figures shown in Table 2-15 which relied on incomplete fourth quarter data. The discrepancy suggests that actual fourth quarter 1992 demand fell well below expected levels, as coal prices, particularly import prices, rose substantially. At the same time, real income, industrial and utility output levels declined precipitously. Movements into coal storage[23] also may account for some of the apparent discrepancy, but a more fundamental problem concerns the reliability of forecasting, or even actual data estimates, in the midst of an unprecedented level of market turmoil. (This difficulty is further evidenced in Figure 2-5's conflicting projections of 1993 coal supplies purchased by Kyrgyztopsnab). From the supply side, the MOE data points to substantially lower import levels from Kazakhstan as the key balancing item, relative to 1991 totals or the "expected" level suggested in Table 2-15. Again, a sharp fourth quarter decline likely accounts for a good portion of this discrepancy. The sharp decline in Kazakh coal imports in turn is attributable to higher prices and eroding overall demand levels, as well as Kyrgyzstan's difficulty in meeting Kazakhstan's demands for prompt payment.

2.61 Table 2-16 also provides a useful breakdown of coal volumes by general grade classification. The large majority of high grade coal production goes to the household and municipal sectors, although many industrial users also burn the "hard" coals. Coal fines are consumed largely in power and district heat generation. Both domestic and imported high grade volumes are projected to increase (relative to fines), with a notable increased reliance on Russian supplies, reflecting the large January 1993 price hike in high grade Kazakh coal from the Karaganda mine. The shift towards Russian imports is explained by **Table 2-17**'s average price comparison which reveals a substantial price advantage to Russia, despite its larger portion of high grade coals relative to fines. High grade consumption is, similarly, projected to increase substantially in 1993, reflecting perhaps an over-optimistic view of household. municipal and (limited) industrial demand.

2.62 The discrepancy in coal demand estimates and forecasts for 1992-1993 is evidenced in **Figure 2-5**, based on reported actual and projected coal volumes handled by Kyrgyztopsnab. Recall that Kyrgyztopsnab only handles non-direct sales, consisting primarily of sales to the household and municipal users. The "estimated" amount for 1992, based only on 1st quarter data, is only slightly higher than previously projected volumes. A similar comparison which extrapolates first quarter volumes vs. projected levels for 1993 reveals a far larger difference. Latest Ministry of Economy and Finance projections place the expected 1993 levels somewhere between these extremes, around 2.8 MMt. Uncertainty in forecasting apparent consumption levels leads to uncertainty in production planning, trade and revenue forecasts. Clearly, a more consistent procedure for forecasting coal demand levels is needed in order for the Government of Kyrgystan to make better planning and pricing decisions.

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[23] Kyrgyztopsnab operates 29 storage "houses", among its 22 local distribution enterprises.

Table 2 – 16
Kyrgyzstan Coal Production, Consumption, Import and Export Volumes By Major Grade / Quality
(in thous. m. tons)

	1992	%	1993 (projected)	%
A. Production	2150.5	100.00%	3300	100.00%
nigh grade	623.6	29.00%	1127	34.15%
fines	1526.9	71.00%	2173	65.85%
B. Import	1139	100.00%	2360	100.00%
from Russia	195	17.12%	800	33.90%
high grade	191	16.77%	800	33.90%
fines	4	0.35%	–	0.00%
from Kazakhstan	944	82.88%	1560	66.10%
high grade	296	25.99%	412	17.46%
fines	648	56.89%	1148	48.64%
C. Consumption	2348	100.00%	4504	100.00%
high grade	712	30.32%	1737	38.57%
fines	1636	69.68%	2767	61.43%
D. Export	1021.4	100.00%	1183	100.00%
into Uzbekistan	394	38.57%	406.5	34.36%
high grade	83.7	8.19%	45	3.80%
fines	310.3	30.38%	361.5	30.56%
into Kazakhstan	574.2	56.22%	675.1	57.07%
high grade	5.7	0.56%	5.7	0.48%
fines	568.5	55.66%	669.4	56.58%
into Tadjikistan	34	3.33%	64.4	5.44%
high grade	23.8	2.33%	48.4	4.09%
fines	10.2	1.00%	16	1.35%
into Turkmenistan	19.2	1.88%	37	3.13%
high grade	15	1.47%	21.6	1.83%
fines	4.2	0.41%	15.4	1.30%

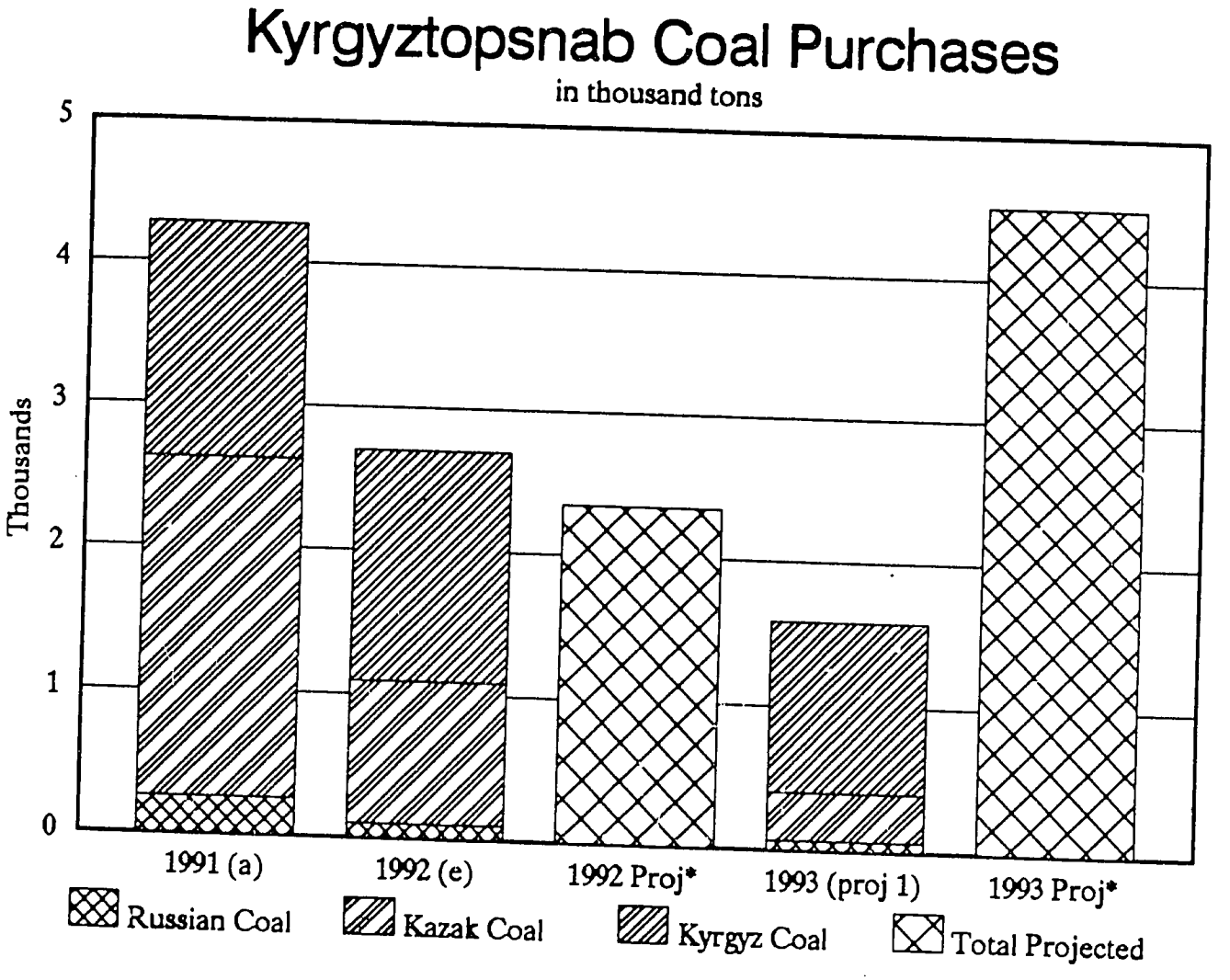
Source: Ministry of Energy
Date: May 1993

Table 2-17
Kirghiz Domestic Coal Sales: Prices, Costs, and Taxes

	Jan 92	Jun 92	Sept 92	Dec 92	Mar 93
Import from Kazakhstan					
Average price, excl tax	231	1500	2100	4500	9450
Tax	65	420	588	1260	2500
Transportation expenses	50	300	400	700	1170
Import from Russia					
Average price, excl tax	217	1316	1400	2100	2200
Tax	61	368	392	588	1455
Transportation expenses	180	800	100	1500	2790
Export to Uzbekistan					
Average price, excl tax	381	738	816	1797	5089
Tax	107	207	228	503	1018
Transportation expenses	15	30	35	100	180
Export to Kazakhstan					
Average price, excl tax	381	738	186	1797	5089
Tax	107	207	228	503	1018
Transportation expenses	45	100	150	500	900

Source: Ministry of Economy and Finance
Date: March 1993

Figure 2 - 5



Note: (a) actual annual, (e) estimated based on 1st Qtr Data, (proj 1) based only on 1st Qtr 1993 data extrapolation, * Ministry of Energy Projection

Source: Kyrgyztopsnab, unless otherwise stated.

Prices, Production & Transport Costs and Taxation Levels:

2.63 The price and tax structure of Kyrgyzstan's coal imports shown in Table 2-17 and graphically in **Figure 2-6** explain why Kyrgystan's overall trade volumes and balances with Kazakhstan have been eroding, relative to Russian supplies. This is occurring despite rising transport costs, led by the long-haul route from Russia, and despite a higher reported tax burden on Russian imports. Kyrgyzstan is facing credit problems in financing coal imports, particularly from Kazakhstan, which seeks advance payment. Both major end-user's and Krygyztopsnab's credit lines are already over-extended to their customers, affording little credit for purchases. Higher operating costs and high interest rates (officially set at 59 percent annualy by the National Bank of Kyrgystan) have also cut into the operating enterprises' ability to finance coal purchases, as well as investments and basic supplies.[24]

2.64 The increase in transport costs to date have been remarkably consistent with overall coal price increases, with the notable exception of Russia, whose pricing strategy is intended to maintain or increase market share. Russia's subsidized transport costs and coal prices are unlikely to prevail for the long term. This suggests that a more aggressive bartering strategy (coal for desperately needed equipment and supplies) may be most successfully pursued with Russia, owing to the likely reduced price advantage that Russian coals are likely to offer, as market pressures to reduce subsidy levels increase.

2.65 Krgyzstan's comparative summary economics of domestic coal production are shown in **Table 2-18** and Figure 2-7. Average mine mouth price levels have increased commensurate with production costs, a trend which should continue in 1993 and beyond, given the decontrol of domestic prices established by the June 1992 decree on coal stabilization policies. Kyrgyzstan's average (value added) tax level reflects the weighted average of high grade and fine production volumes. The average VAT rate decreased from 28 percent in 1992 to 20 percent in 1993, reducing some of the burden of higher prices and costs. The VAT is only applicable to non-population sales. The household and municipal sectors are exempt[25].

2.66 Coal prices to end-users have also increased commensurately with the cost of production, while maintaining a consistent price spread between hard coal and fines. Average sales prices to industrial users and households are shown in **Figure 2-7**. The pace of upward price adjustment increased in early 1993, reflecting the pace of price inflation and ruble devaluation. Higher prices to the household sector are based on Kyrgyztopsnab's higher average unit delivery and operating costs associated with this customer base. However, the June 1992 decree on coal sector policy maintains subsidies to low income households. The fiscal burden for this subsidy is to be incurred at the regional level.

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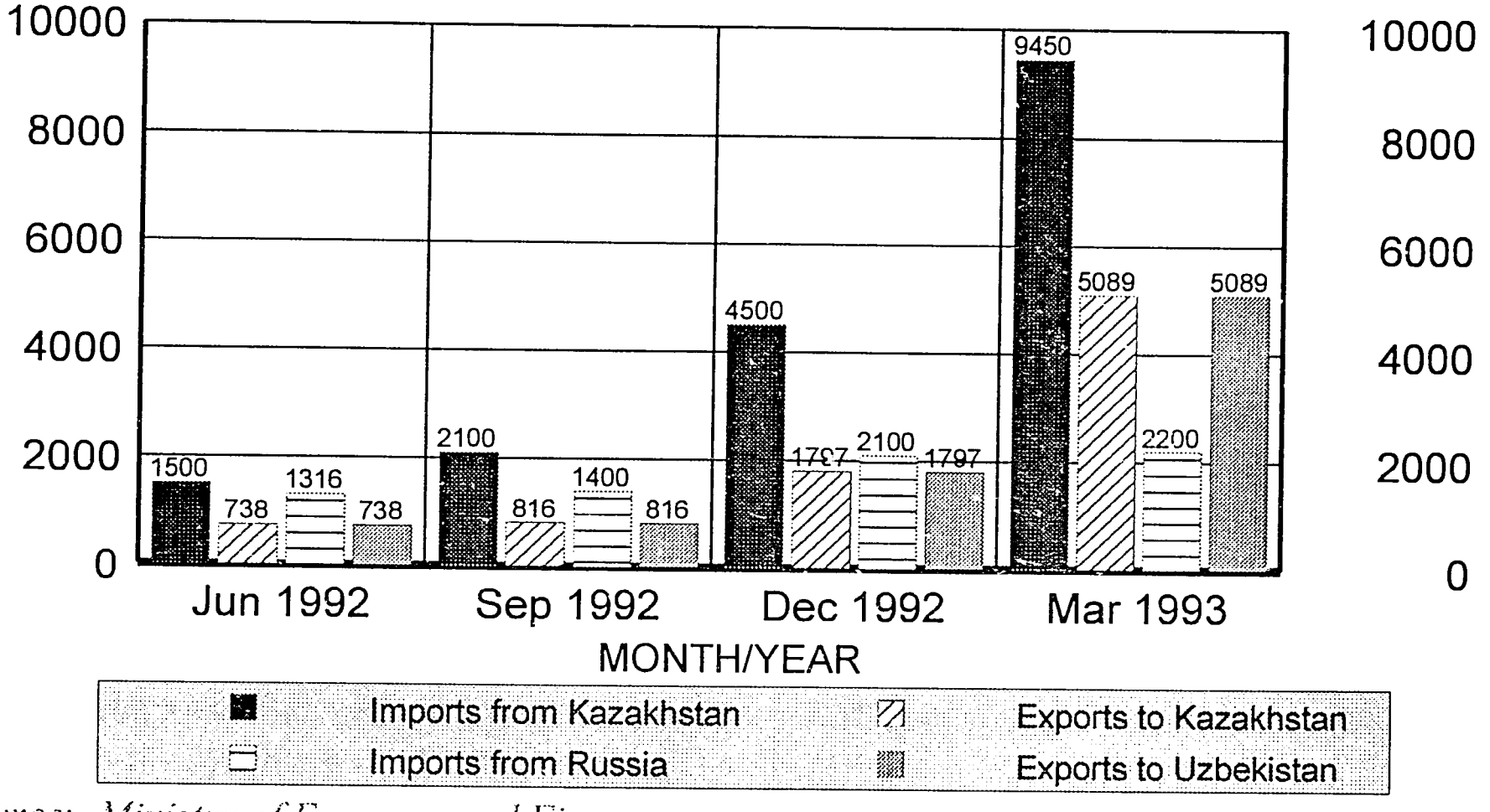
[24]Interview with Kyrgyztopsnab, May 1993.

[25]"EPK", p.62.

Figure 2-6

Kirghyz Coal Import and Export Prices

Rb/Ton



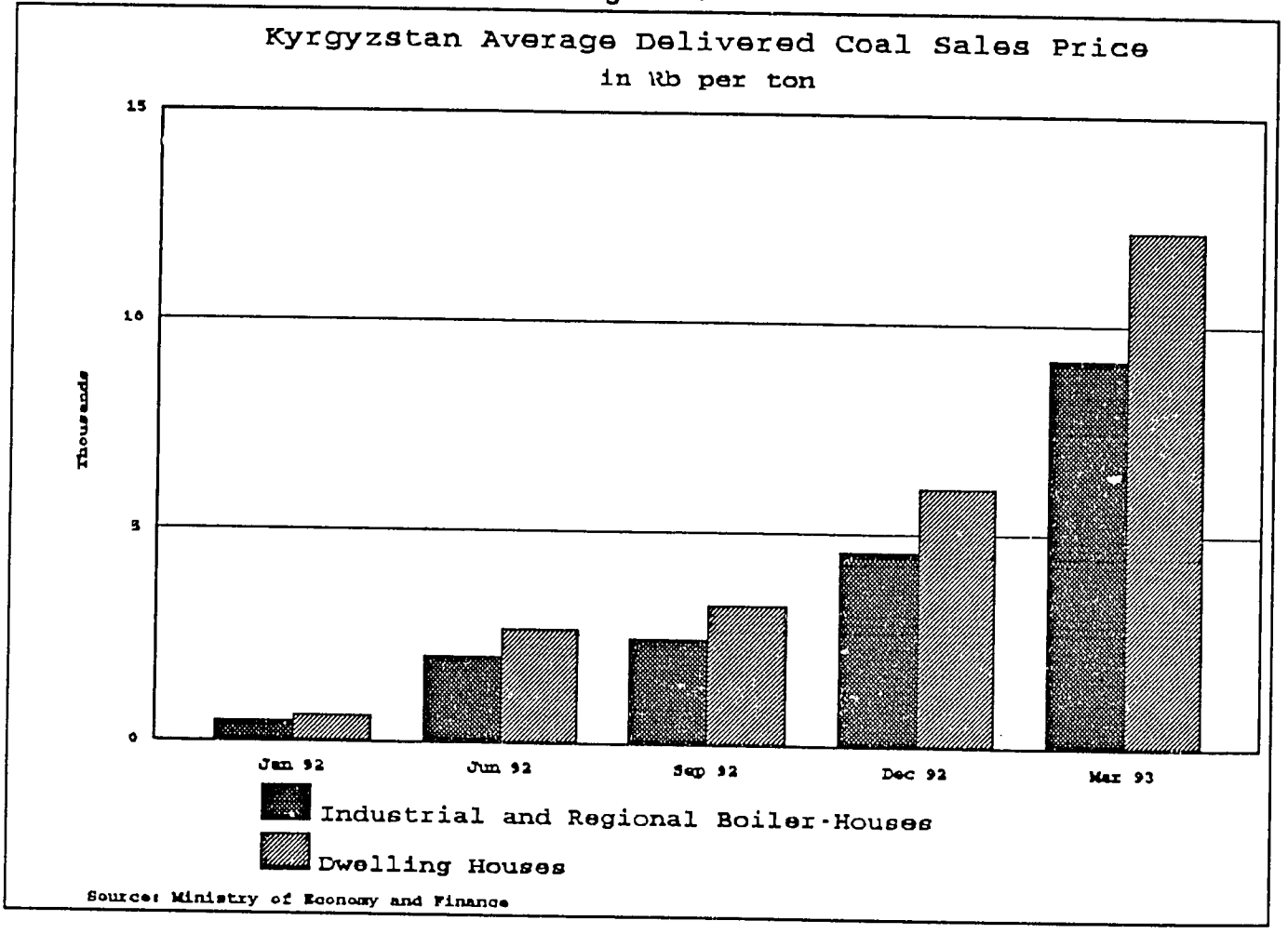
Source: Ministry of Economy and Finance

Table 2-18
Kirghiz Domestic Coal Sales: Prices, Costs, and Taxes

	Jan 92	Jun 92	Sept 92	Dec 92	Mar 93
Coal price at wellhead, excl tax	381	738	816	1797	5089
Of high grade	533	1033	1200	2516	6000
Fines	343	664	755	1617	4500
Taxes	107	207	228	503	1018
Transportation expenses	20	200	250	350	900
Production costs	358	694	734	1617	4580

Source: Ministry of Economy and Finance
Date: March 1993

Figure 2-7



2.67 The pace of coal price escalation is projected to slow over the balance of 1993, at least in real terms. **Table 2-19** provides both a comparison of coal prices to the major fossil fuel plant (Bishkek TPS) and the State Energy Company's projection of prices for the balance of 1993. Note that the prices are shown in tons of oil equivalent, for which coal's coefficient is assumed at 50 percent. The price data demonstrate that coal remains the preferable fuel to the thermal power sector, with an adjusted price equal to one third the delivered gas price, and one sixth of the mazut equivalent. Projected levels for the balance of 1993 are flat, but likely to increase somewhat in line with inflation and currency devaluation. Here, owing to Kyrgyzstan's adoption of the som in May of 1993, erosion of the som relative to the ruble could reduce the coal advantage somewhat. However, it is unlikely that coal prices will rise much higher than the netback equivalent level estimated at between 17,000 -20,000 rubles per ton, based on a rouble/dollar rate of 700 (See Section 3.2 to 3.4's netback calculations in Table 3-1.) Delivered coal prices to fossil fuel plants are slightly lower than the average prices to industrial and boiler customers, based on both lower average quality and lower average delivery costs.

2.68 Unlike oil and natural gas, coal prices differ according to geographic locale, even in the same consumer class. An example of this regional price differentiation is shown in **Table 2-20**, which compares different delivered price series to the Bishkek and Issyk Kul thermal power stations. The average delivered price levels to the Bishkek TPS are quite similar for the basket of average coal volumes and the specific supply from the Kok Yanghak mine. The average prices the Bishkek plant are consistently lower than the Issyk Kul plant, owing both to its more proximate location and lower quality mix. A more pronounced difference is apparent in the Kok Yanghak delivered price as a result of location advantages to the Bishkek plant. This mine is located approximately 1295 kilometers by road from Bishkek, vs. 1405 from Issyk Kul. The one aberration was March 1993, which reflects both a change in average coal quality mix, and the possible lower price received by Issyk Kul as a result of contract prices fixed partially in advance of the March 1993 coal price increase. (Coal price negotiations between Kyrgyzkomur and either Kyrgyztopsnab or end-users directly are subject to the oversight and ultimate approval of the Kyrgyzstan Pricing Committee, but otherwise are decontrolled).

2.69 Despite the apparent rationalization of coal prices to reflect coal production and transportation costs, preliminary data suggest that coal quality differences are not consistently reflected in mine mouth prices charged. **Table 2-21** and **Figure 2-8** document this condition, based on a sample of six different coal mine prices compared with the four different quality characteristics of each of the coals. The expectation would be for higher mine mouth price levels to be associated with the most favorable average quality rank (extreme right-hand column). Here, price and coal heat content are ranked from highest to lowest, while coal contaminants (moisture, ash and sulphur) are ranked highest for low readings (i.e., a rank of 1 indicates the lowest level of coal contaminant). Thus, the expectation would be for the number 1 price rank to be associated with the number one quality ranking, and similarly for subsequent price rankings (2-6) to be associated with progressively lower quality characteristics. The results can be seen graphically by comparing the second column of Table 2-21 with the last column, as plotted in Figure 2-8. The expected scatter path would be a descending 45 degree line with the higher prices shown on the Y axis associated with lower numerical ranks on the quality scale (x axis). In fact, with the exception of the Kyzil-Kiysk coal strip mine (upper right value) and the Kok Yanghak mine (lower left value) the linkage between price and quality appears fairly consistent. With these particular "outlier" mines, the discrepancy may be attributable to either

Table 2-19
Inter-fuel Price Comparison for Bishkek TPS
(in tonnes of oil equivalent)

		Actual				Projected	
	Jan 92	Jun 92	Sept 92	Dec 92	Mar 93	Jun 93	Dec 93
Coal	94	731	1,137	3,155	8,658	10,698	10,698
Natural Gas	729	1,579	5,089	5,090	31,627	31,627	31,627
Mazut	317	848	3,531	7,786	62,398	62,398	62,398

Source: Kyrgyz State Energy Company

Table 2-20
Regional Coal Prices Delivered to Power Plant
(Roubles per ton)

			Actual				Projected	
Source	Plant	Jan 92	Jun 92	Sep 92	Dec 92	Mar 93	Jun 93	Dec 93
Kyrgyzstan (Avg):	Bishkek TPS	67	352	838	1,662	5,947	5,950	5,950
	Issyk Kul	309		1,843	2,937	5,157	8,136	8,136
Kyrgyzstan (Kok-Yanghak):	Bishkek TPS	58		838	1,687	5,886	5,950	5,950
	Issyk Kul	259		1,969		3,289	7,612	7,612

Source: State Energy Co. of Kyrgyzstan

Table 2-21
Estimated Coal Prices vs Quality Characteristic Comparative Ranking Order, 1st quater 1993
Kyrgyzstan Republic

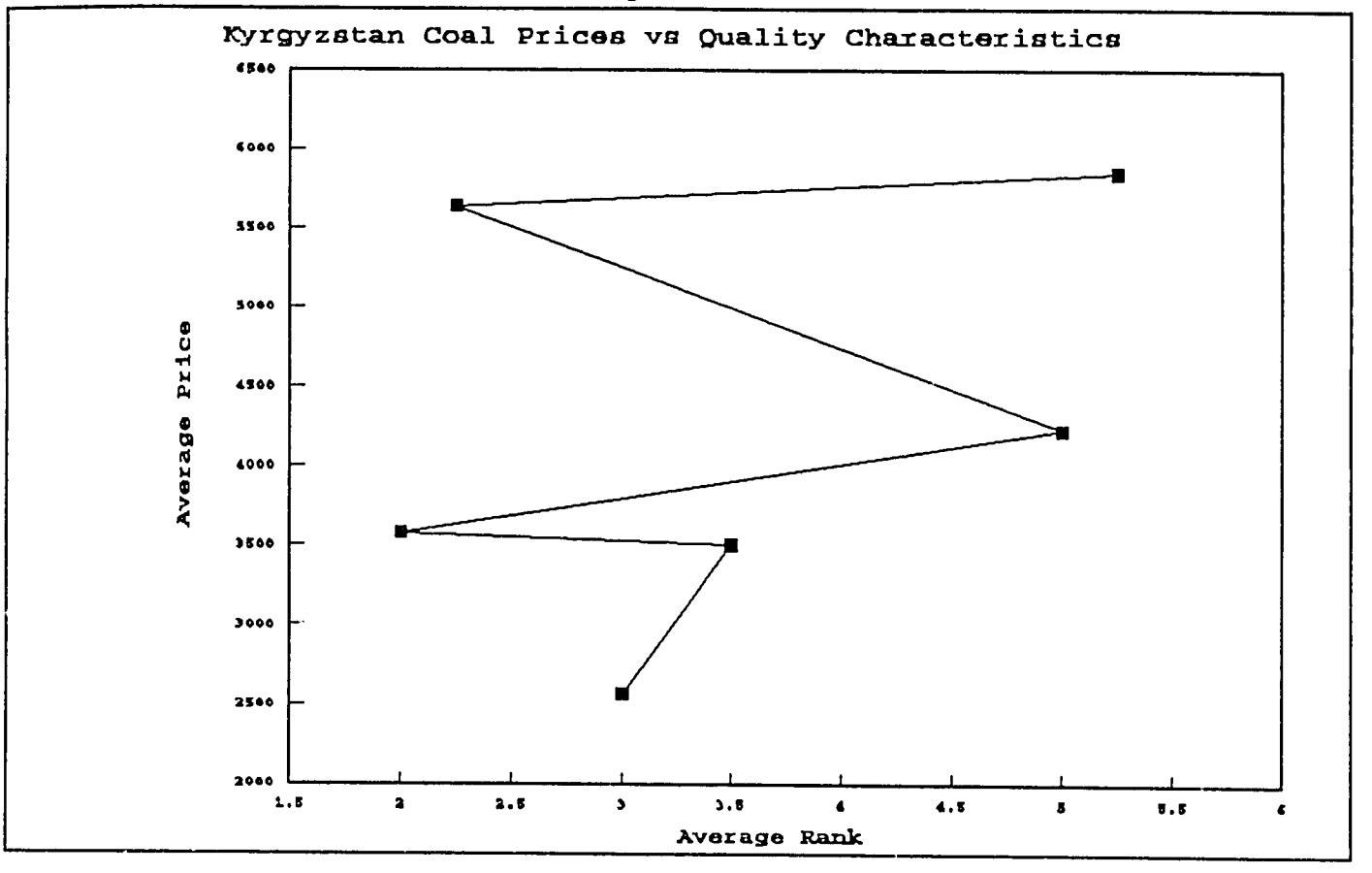
Domestic Mine

	Actual Price	Price*	Moisture	Ash	Sulphur Heat	Heat Content*	Average
Kyzil - Kiysk mines	5845	1	6	4	5	6	5.25
Suluktinsk mines	5635	2	4	1	1	3	2.25
Almalyk coal strip	4228	3	5	5	6	4	5.00
Kok - Yanghak mine	3576	4	1	3	3	1	2.00
Tash - Kumyr mines	3503	5	2	6	4	2	3.50
Aghulak coal strip	2563	6	3 -	2	2	5	3.00

Note: *1 = Highest, others 1 = Lowest

Source: Ministry of Economy
Date: March 1993

Figure 2-8



differing production costs, or a significant location differential. In the case of Kok Yanghak, the high transport costs would lower its mine mouth price, while the Kyzil-Kiysk mine's proximity to osh might raise its value, but not to the degree suggested unless justified by higher production costs.

2.70 In the future, a closer relationship between coal quality and price differentials is likely to develop as price liberalization progresses and if coal output levels can be restored to their pre-1992 levels (e.g., 3.5 MMt annually); and possibly increasing to the 5-6 MMt range currently forecasted by the Kyrgyz Government[26]. Increased supplies will heighten competition for customers, and quality concerns will increase as environmental costs are eventually internalized.

2.71 Regional differences in imported coal costs are pronounced, based on both location and customer base, hence coal quality. **Table 2-22** presents average regional purchase and sales prices among the three primary regions of Kyrgyzstan: Bishkek, in the north, with a sizeable industrial and utility base; the Naryn region in east central Kyrgyzstan, an extremely mountainous and isolated region with largely a household customer base; and Osh in west central Kyrgyzstan, with a mix of industrial, agricultural, and household users. The absolute increase in import prices and inter-regional price "spreads" are shown to have increased substantially between first quarter 1992 and 1st quarter 1993. The most pronounced increase

[26]"EPK", p.60.

Table 2-22
Purchase and Sales Price of Imported Kazak Coal: Regional Difference

	Q1 1991	Q1 1992	Q1 1993
Bishkek			
Purchase Price	31	227	3748
Sales Price	11.5	115	4498
Naryn			
Purchase Price	31	358	16368
Sales Price	14	200	18333
Osh			
Purchase Price	31	335	6400
Sales Price	17	200	7680
Regional Difference of Purchase Prices			
Naryn - Bishkek	0	131	12620
Osh - Bishkek	0	108	2652
Naryn - Osh	0	23	9968
Regional Difference of Sales Prices			
Naryn - Bishkek	2.5	85	13835
Osh - Bishkek	5.5	105	3182
Naryn - Osh	- 3	-20	10653

Source: Kyrgyztopsnab
Date: May 1993

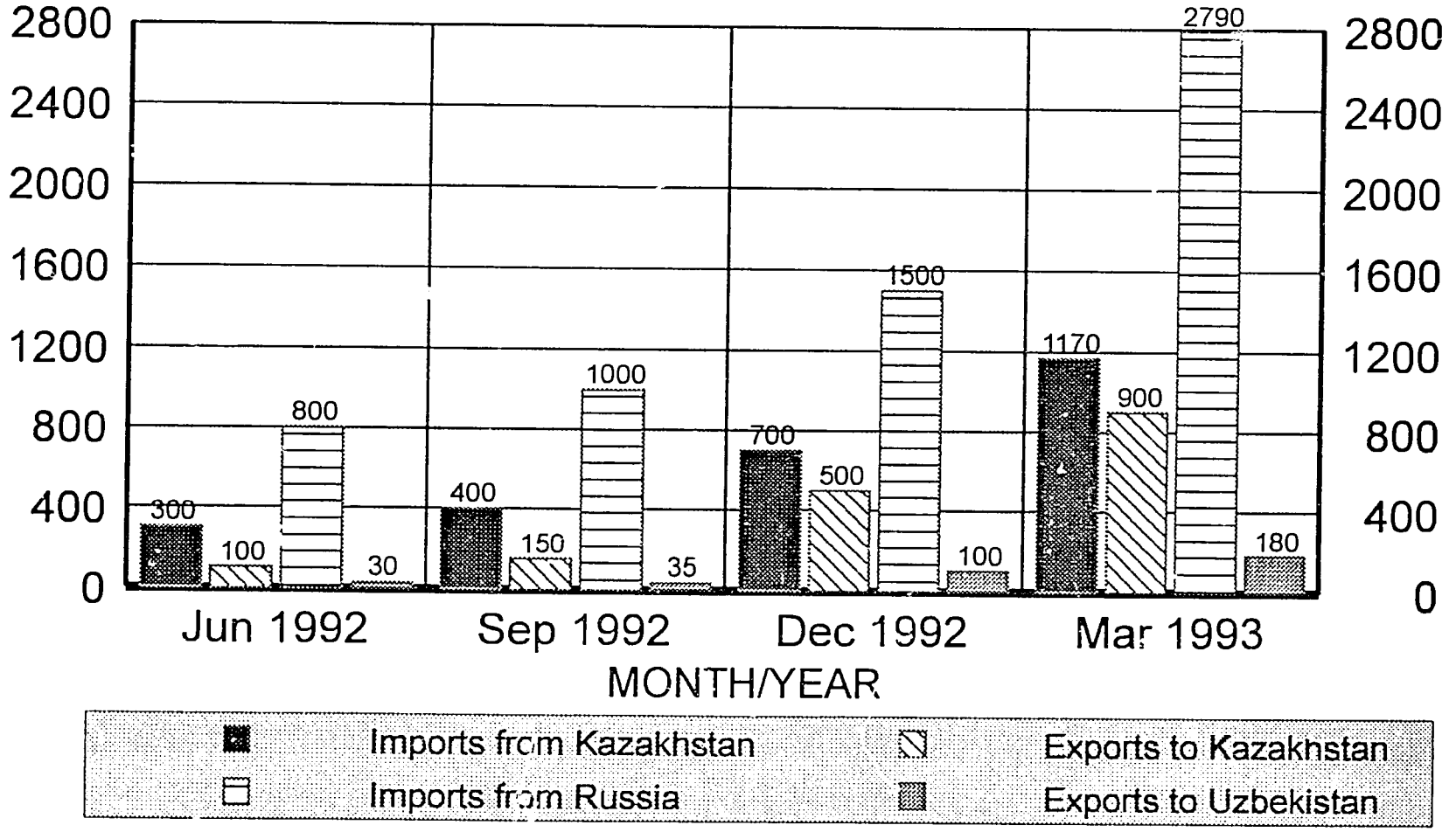
has occurred in the Naryn region, where rising hard coal prices and transportation costs have driven their absolute and relative prices up far more rapidly than in the more industrial, proximate Osh and Bishkek regions. The high import costs to the Naryn region demonstrate the importance of increasing local production, particularly of hard coals (or via coal briquetting of fines), to displace expensive imports to the household and municipal consumer.

2.72 Pressure to displace imports with local production, and possibly to increase export market shares in the near future, are evident from the recent trend in coal transportation costs with Kyrgyzstan's primary trade partners. As shown in **Figure 2-9**, the relative (on a percentage basis) relationship between transport costs underlying Kyrgyzstan's coal trade have been relatively consistent, even through the recent large price and cost increases. However, on an absolute basis higher import costs for Russian coal, in particular should not only reduce the attractiveness of Russian coals to Kyrgyzstan, but also to its trading partners in Uzbekistan and Kazakhstan. Kyrgyzstan's relatively low transport costs associated with its export trade should be capitalized on to increase market share, and further increases in real transport rates will necessarily be constrained by rate adjustments in Russia and the neighboring republics. Longer term, Kyrgyzstan's plans to electrify the rail system could present a significant transport cost

Figure 2-9

Kirghyz Coal Transportation Costs Quarterly:

Domestic and Imported Supplies (Rb/Ton)



Source: Ministry of Economy and Finance

advantage, which should be capitalized on to increase export market penetration. As with electricity, plans for domestic coal expansion can only be justified if the market exists to absorb the new supplies. Therefore, the return on many major coal sector investment projects will be linked to forecasted cost advantages obtainable relative to evolving coal import economics.

2.73 The importance of rationalizing transport rates and identifying cost advantages, particularly in coal transport (but for other rail-dependent commodities as well) is evident from **Figure 2-10**'s projected annual average cost for rail transport, relative to actual levels in place for December 1992 and March 1993. The data underlying the right-most bars showing annual average transport costs was obtained from Kyrgyztopsnab. In 1992, this level was compatible with a weighted average of domestic and import market transport costs, particularly once the annual average level shown for 1992 is adjusted for the cost increases which occurred late in the year. However, the projected annual average transport cost for 1993 suggests a far greater disparity between current and projected costs. Kyrgyztopsnab projects the annual average level for 1993 to increase by more than a factor of 13 over 1992 levels. This compares to an increase through March of 1993 of less than 100 percent from December levels. In short, according to Kyrgyztopsnab's projections, transport cost levels will be a major component of absolute delivered price escalation, and introduce cost discrepancies which will significantly affect realized prices, and potential market penetration; hence the return on current production and planned investment projects.

Enterprise Operating Costs:

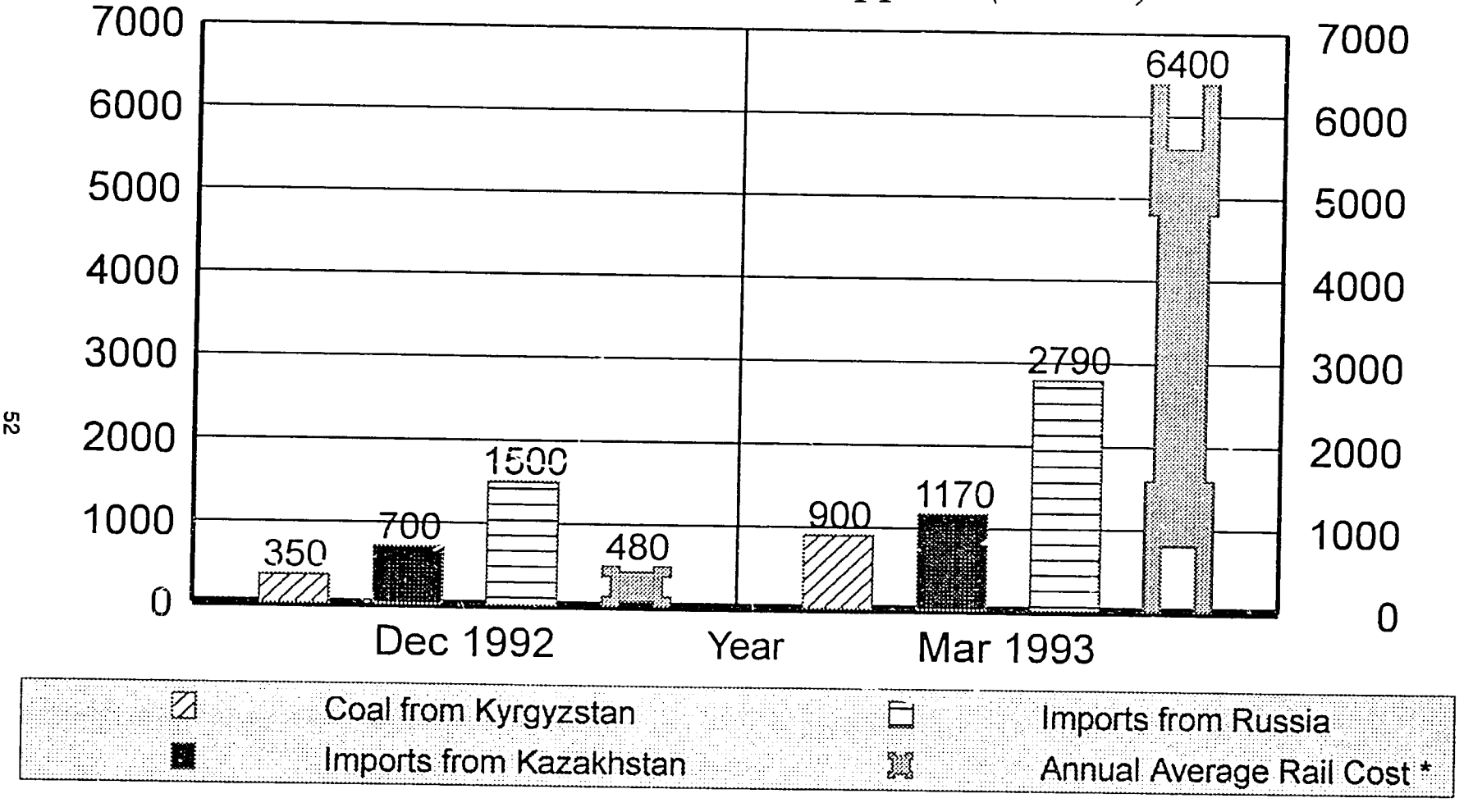
2.74 Operating costs at the Kyrgyzkomur (producing) and Kyrgyztopsnab (distribution) companies have also been increasing commensurate with general inflation levels, although the rate of escalation differs markedly by cost category. (As the operating cost data for Kyrgyzkomur were obtained second hand over the telephone, and the reported cost components changed dramatically over the 1992-1993 period, the accuracy of the Kyrgyzkomur cost data needs to be confirmed). These data are summarized in **Figures 2-11** and **Figure 2-12** for Kyrgyzkomur and Kyrgyztopsnab, respectively. Looking first at Figure 2-11, the most dramatic cost escalation has occurred in the non-labor and non-transport expense categories. In particular, material costs are projected to increase by a factor of over 13 times in 1993, compared to just 5-to-6 times for labor, transport (delivery) and depreciation cost items. The latter is particularly low if one considers the high capital cost likely to be associated with bringing in new technology and automating coal production operations or otherwise upgrading and re-furbishing existing antiquated operations. By contrast, tax and other costs are projected to increase by a multiple of 36-to-38 times. The higher tax projection is based on a projected sales price which substantially exceeds projected operating costs for 1993 relative to 1992. The tax line item includes both VAT (roughly 40 percent of total taxes) and the profits tax. The projected increase in each is roughly equal for 1993 over 1992. This profits tax component of the higher tax base is projected despite the new policy allowing an exemption on profits re-invested in coal development[27]. The "other" cost category which is also forecast to rise precipitously, includes profits, property, land and road expenses, as well as insurance and interest expenses. All are projected to increase considerably, with the largest contributor being profit.

[27]This tax policy was reported by the Ministry of Energy to be effective January 1993.

Figure 2-10

Kirghiz Coal Transportation Expenses:

Domestic and Imported Supplies (Rb/Ton)



Source: Ministry of Economy and Finance

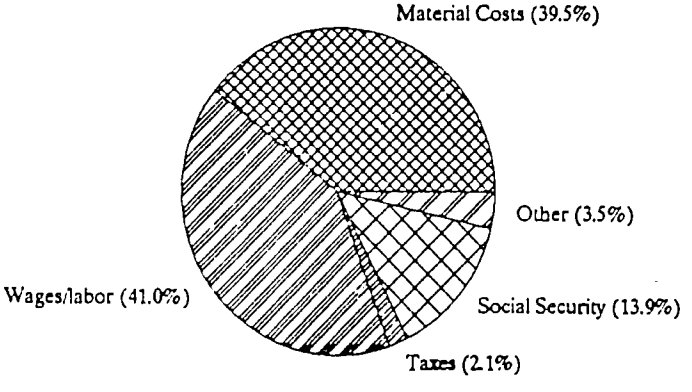
**** Kyrgyztopsnab (1992 Actual and 1993 Projected)***

Figure 2 – 11
Kyrgyzkomor Annual Operating Costs
in thousand rubles

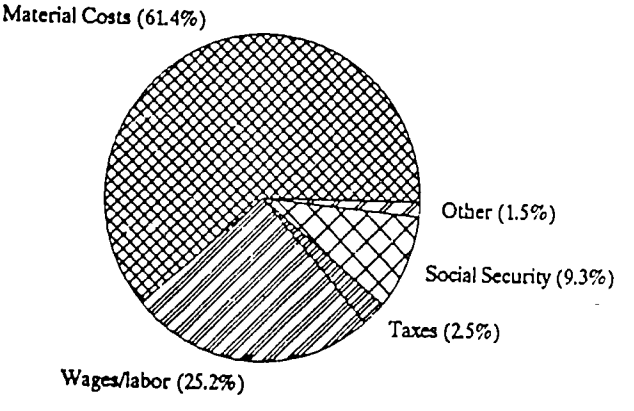
		1992 Est.	1993 Proj.
Material Costs		480487	6281972
Wages/labor		498652	2578880
Taxes		24947	257821.8
Social Security		169468	954185
Other		43153	150761.6
Total		1216707	10223620.4
Rb/ton		540	3855
Estimated Tonnage	thoutons	2253	2652

Note: 1993 data needs verification

1992 Estimated

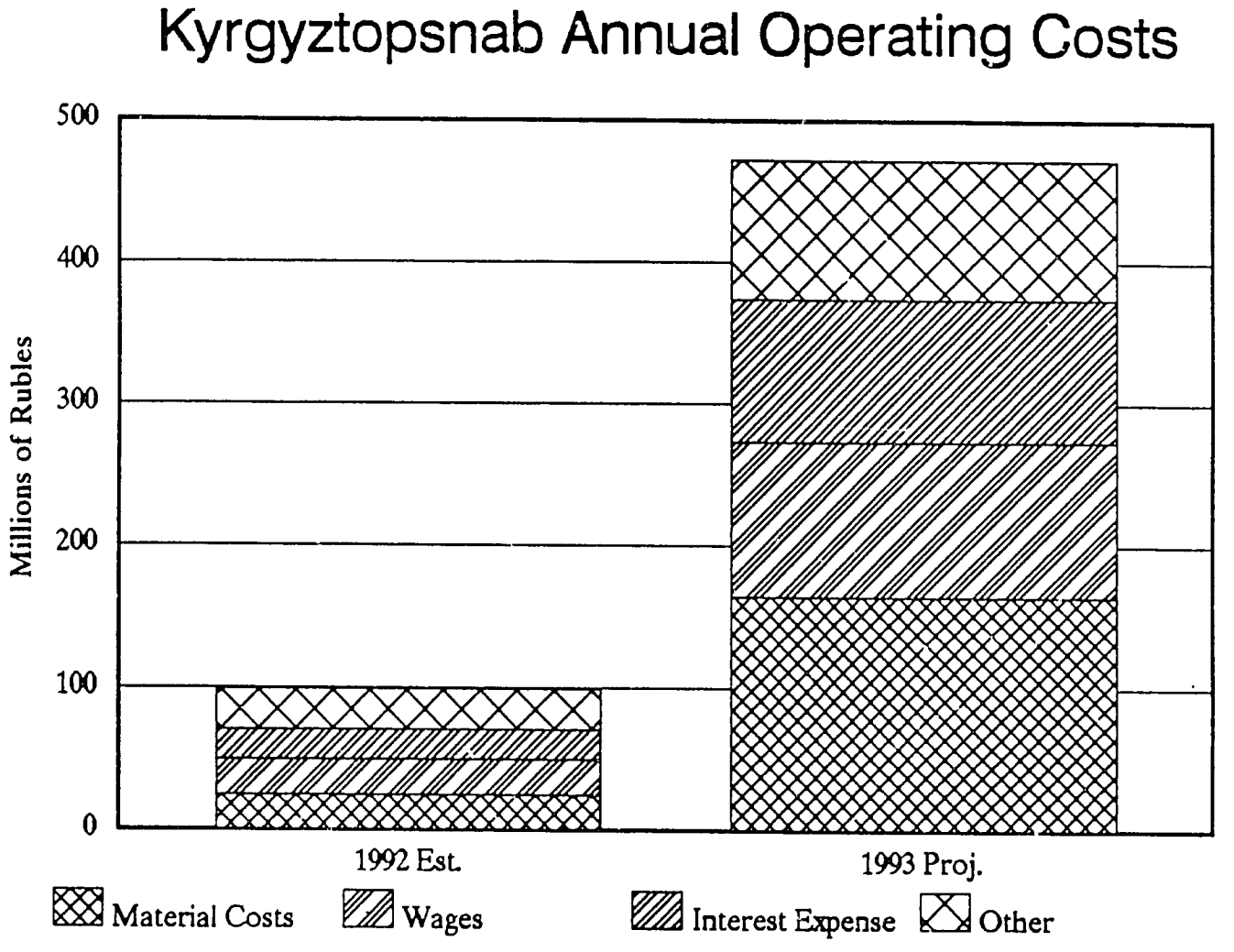


1993 Projected



Source: Ministry of Energy / Kyrgyzkomor
Date: May 1993

Figure 2 – 12



	1992 Est.	1993 Proj.
Material Costs	24346	163895
Wages	25508	109910
Interest Expense	20636	100000
Other	28363	97595
Total	98853	471400

Note: All numbers in thousands of rubles

Source: Kyrgyztopsnab
Date: May 1993

2.75 Kyrgyztopsnab's 1992 vs. projected 1993 cost structure (Figure 2-12) provides a more consistent relationship among cost items. Escalation factors range from 3.4 for "other" (including various insurance, amortization, emergency fund and service items) to a high of 6.7 for material costs. As with Kyrgyzkomur, labor and interest expense forecasts are moderate at factors of 4.3 to 4.8. However, Kyrgyztopsnab's absolute interest expenses are about 10 times higher than Kyrkyzkomur's, reflecting the greater dependence on credit to the "population" sector, vs. Kyrgyzkomur's direct sales to large industrial and utility accounts and sales to Kyrgyztopsnab for whom payment is relatively prompt. On a per ton basis, Kyrgyztopsnab's operating costs are projected to increase at a level which parallels the margin on sales prices over average coal costs. Kyrgyztopsnab's operating income is somewhat constrained by the total 20 percent mark-up allowed on its purchase price from Kyrgyzkomur or imported supplies. It is not clear if this level is fixed for all 22 of its local enterprises. However, some restructring of Kyrgyztopsnab's operations is advisable to encourage greater profitability at the enterprise level, based on more efficient operations.

Development Objectives and Constraints

2.76 The objectives for development of the coal sector, with primary responsibility falling on Kyrgyzkomur under the direction of the Ministries of Economy and Finance and Energy, are clearly established in the framework of three time periods: 1) an immediate objective of stabilizing the recent production decline and "stabilizing" domestic coal output at a minimum of 3.5 MMt/annum over the period 1993-95; 2) an intermediate target over the period 1995-2000 of adding sufficient capacity to achieve self-sufficiency, estimated at 5.3 - 5.5. MMt/annum; and 3) an increase in long-term productive capacity to 5.5 - 7.0 MMt/annum over the period 2001-2010, accommodating expected underlying demand growth related to overall economic expansion. It should be noted, however, that these plans were established in late 1992, prior to the major price increases and acceleration of the ruble devaluation in early 1993[28]. As of July 1993, these production targets were considered to be too high by the Ministry of Energy.

2.77 In the initial phase, the stabilization process is based on Kyrgyzkomur achieving the ability to self-finance its investment needs. In this regard, Kyrgyzkomur has the authority now to price its coal inclusive of its development costs or needs. In the short-term, these are oriented largely towards acquiring supplies needed to support current production (e.g., lumber, lubes, fuel, etc.) and more modern equipment to allow production processes to be automated and otherwise updated with more effective modern technology, such as hydraulic mining.

2.78 In the second phase, most of the productive capacity additions are expected to come from the Kara-Keche and Kum Bel surface mines, and the Tegenek and Besh Burkhan underground mines. (This is the view expressed in the "EPK" report effective late 1992. More recent recommendations from the Ministry of Energy suggest that the Tash-Kumyr, Kyzil-Kysk, Suluktinsk and Kok Yanghak mines will be the most economic source of additional output). Funding requirements for only the on-site new construction and modernization of equipment for these developments were estimated (in late 1992 assuming a F[illegible] exchange rate of around 400) at 300, 660 and 1,000 million rubles for 1993, 1994 and 199[illegible] respectively. This converts to $0.75, $1.65, and $2.5 million, respectively at the assumed effective exchange rate. However,

[28]"EPK", pp. 56-57.

in addition to these on-site development costs, off-site non-industrial construction costs were projected to require an additional 2,150 million rubles over this three-year period, or about $5.4 million at the assumed exchange rate. Based on these projected cost figures, the annual average investment costs per ton of coal production would come to about $1/ton for total production, but at least $6.50-$7.00/ton for just the incremental volumes, assuming production is increased from about 2.5 MMt in 1992 to 3.75 MMt in 1995.

2.79 Technological developments and the economics of their application in Kyrgyzstan will largely determine the potential increase in coal output. For example, increased use of coal screenings from surface mines may rely heavily on coal briquetting technology, currently being promoted by Turkish and other regional interests, possibly including China. A fundamental problem in developing Kyrgyzstan's coal resources is the relatively small size of the deposits and deeper mining required to exploit mine reserves. This is currently a labor-intensive operation for which automation and updated equipment is needed to substantially increase productivity. The other fundamental problem concerns the thickness of the over-burden rock and the distances involved in moving equipment to mines and coal to market. In light of the Central Government's commitment to fund coal development activities, (separate from the tax incentives provided to Kyrgyzkomur), an overall strategy on coal development is needed. This should include: 1) supportive research and development; 2) technology imports for domestic production; and 3) enticements for trade and foreign investment. Two strategies which have been discussed include: 1) providing credits, valued in coal exports, for equipment purchases; and 2) approaching the foreign investment community with a strategy of linking concessions to develop select coal deposits to concessions for potentially promising mineral deposits[29]. The latter may provide a sufficient portfolio enticement to investors to overcome the risk inherent in coal development projects.

D. ELECTRICITY:

Supply and Demand Balances

2.80 Electric power, notably from hydro generation, is the largest and most important component of Kyrgyzstan's energy sector. Both immediate and longer-term strategies for improving Kyrgyzstan's energy sector performance center largely around the potential role of hydro-based electric power in displacing more expensive fossil fuel and improving Kyrgyzstan's net energy trade balance. In 1992, electric energy consumption was estimated to comprise approximately one third of Kyrgyzstan's total energy use. However, electric power represents approximately three quarters of Kyrgyzstan's total indigenous energy output, with about 80 percent of this total electric supply produced by hydro plants. Kyrgyzstan generated a net positive trade balance in electricity estimated at 2,380 GWh in 1992, down from 4,293 GWh in 1991 and 3,978 GWh in 1990. Therefore, the two-pronged energy strategy for Kyrgyzstan revolves largely around increasing domestic electricity consumption to displace fossil fuel, and at the same time re-establishing its traditional export sales volumes as a means of earning highly needed foreign currency to offset their negative trade balance in fossil fuels. However, significant investment in hydro productive capacity, transmission and distribution systems will

[29] "EPK", p.62.

and technical limitations faced by the State Energy Company in speeding up electrification and converting heating systems to electricity.

2.81 A summary of Kyrgyzstan's electric power supply and demand balances is presented in **Table 2-23**. Total internal demand for electric energy, unlike the other sources, has continued to grow during 1991-1993. In 1992, total gross internal demand was reported[30] to average 9,680 million kilowatt hours, the same as in 1991, but higher than the 9177 GWh recorded in 1990. However, the flattening of demand growth represents a significant break in the electric power growth trend in effect since 1985. This is not surprising, in light of the reduction in economic growth and decline in real household incomes which accelerated in late 1992. Room for continued improvements in energy efficiency will continue to dampen further growth, whether driven by the economy, increased connections or conversions. Energy resource utilization efficiency is reported to be 2.2 times below the average for the entire CIS, and five to seven times lower than the average for developed countries. Rate reform will eventually provide substantial incentive to improve energy use efficiency.

2.82 Hydro plants account for about 80 percent of total generation capacity, but slightly less in terms of actual power generation or indicative of relatively low effective capacity factors given the physical and market configuration of the sector. Indeed, relative to the rated hydro generation capacity of 2,740 GW, the 9,340 GWh output suggests a utilization rate of just 39 percent. However, available and operating capacities are well under installed levels. Total available capacity is reported at 3,052.2 GW (vs. 3,387.3 installed) and total operating capacity at just 2,291.5. Assuming that the ratios are consistent between hydro and thermal generation sources, the actual hydro-electric output suggest a capacity factor of 58 percent. The large difference between available and operating capacities indicates a substantial need for plant repair and equipment. In fact, as shown in **Table 2-24**, thermal plant utilization rates have dropped both absolutely and relatively compared to hydro plants. Thermal output was off 33.5 percent in 1992 compared to hydro's 8.6 percent decline. Thus, overall capacity factors for hydro output are higher than the averages indicated, owing to the steeper decline in thermal plant operations.

2.83 The reported moderate growth in total electric consumption has not occurred in all sectors. Industrial consumption has declined dramatically from 3468 GWh in 1990 to 2958 in 1992. (See **Table 2-25**.) Most of the growth has occurred in the residential sector, reflecting the government's policy to encourage electrification of the rural population and the steep rise in fuel prices, from which this sector had largely been buffered by subsidized tariffs. Domestic consumption has risen from 1,111 GWh in 1990 to about 1,950 GWH in 1992. As shown in **Figure 2-13**, a good portion of this growth occurred over the last two months of the year; a trend which is accelerating in early 1993. As of September 1993, the government was forecasting total internal demand to increase about 3% to 9980 GWh in 1993. Continued rapid growth in the domestic sector in the short term will be restrained by the capacity of the transmission and distribution systems and the increase in tariff levels needed to keep pace with rising costs and (self-financed) investment needs. In addition, the July 1993 decree eliminated the preferential tariff for the rural population compared to the urban population, which will limit rural growth among the existing customer base (see Table 2-27's tariff changes).

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[30] "EPK", p.21.

Table 2-23
Basic Electrical Power Production Indicators

Indicator	Unit of Measurement	1990	1991	1992	1992 vis a vis 1990, %	1992 vis a vis 1991, %
1. Installed electric plant capacity, total	thous. MW	3424	3384	3414	99.4	100.9
Of which:						
a) power-and-heating	thous. MW	724	674	674	93.1	100.0
b) hydropower	thous. MW	2710	2710	2740	101.1	101.1
2. Electricity generation, total	mil. kW hrs	13155	13972	12060	91.6	86.3
Of which:						
a) power-and-heating	mil. kW hrs	4202	3914	2720	64.7	69.6
b) hydropower	mil. kW hrs	8953	10058	9340	104.4	92.8
3. Thermal energy generation, total	thous. Gcal.	5725	5805	6100	106.6	105.1
4. Domestic consumption of electricity	mil. kW hrs	9177	9680	9680	105.5	100.0
5. Transmission of electrical power to:						
- IPSCASK*	mil. kW hrs	7198	8416	5980	83.1	71.1
- PRC**	mil. kW hrs	----	----	1.0		
6. Acquisition of electrical power from IPSCAK	mil. kW hrs	3220	4123	3600	111.8	87.3
7. Net transfer	mil. kW hrs	3978	4293	2380	59.8	55.4

* Integrated Power System of Central Asia and Southern Kazakhstan
** People's Republic of China
Source: State Energy Company
Date: May 1993

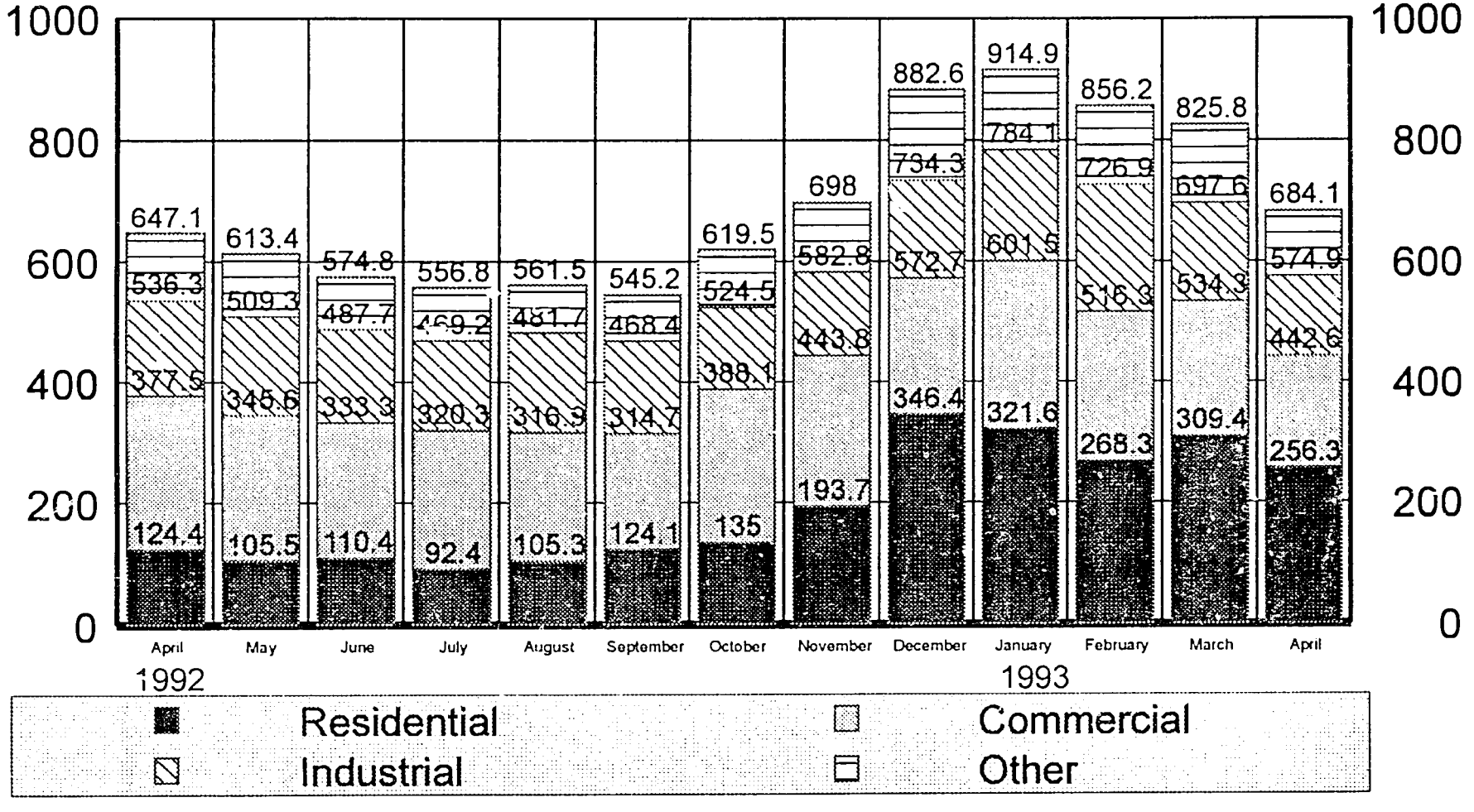
Table 2–24
Implementation of the annual target for electricity and heat outputs

	No. of Turbines / Thou. KW	1991 Actual	1992 Actual	1992 v 1991 % comparison
Electricity Output (MnKw)		13972.3	11792.7	–15.60%
Thermo Electric:				
Bishkek power plant	10 / 624	3685.2	2391.6	–35.10%
Osh power plant	2 / 50	228.8	204.8	–10.49%
Total		3914	2596.4	–33.66%
Hydro Power:				
Toktogul	4 / 1200	5300.1	4605.7	–13.10%
Kurpsai	4 / 800	3309.2	3063	–7.44%
Tashkumyr	3 / 450	286.3	339.2	18.48%
Uch–Kurgan	4 / 180	920	936.5	1.79%
At–Bashi	4 / 40	123.4	139.3	12.88%
Alamedin	18 / 31.26	79	67.4	–14.68%
Bystrovka	3 / 8.7	40.3	39.2	–2.73%
Total		10058.3	9190.3	–8.63%
Heat Out put Sales				
Total		5806.3	5157.5	–11.17%
Bishkek th. power plant	24 / 4250	4461.6	4049.6	–9.23%
Osh th. power plant	3 / 375	1030	795.5	–22.77%
Issyk–Kul Boiler–house		246.9	248.6	0.69%
Kyzyl–Kiya Boiler–house		44.9	42.5	–5.35%
Komsomol Boiler–house		22.9	21.3	–6.99%

Source: State Energy Company
Date: May 1993

Figure 2-13

ELECTRICITY SALES (million kWh)



Source: State Energy Company
Date: May 1993

Table 2-25
Consumption of Electricity By Sector (mln. kWh)

	Actual 1991	Actual 1992	1992:91 (%)
Industry	3508.8	2957.6	84.3
Agriculture	1985.7	1871.9	94.3
Minicipal Economy (utilities)	1179.4	1331.3	112.9
Residential:			
Urban	573.1	819.4	142.2
Rural	881.7	1131.1	128.3
Total	8128.7	8111.3	99.8

Source: State Energy Company
Date: May 1993

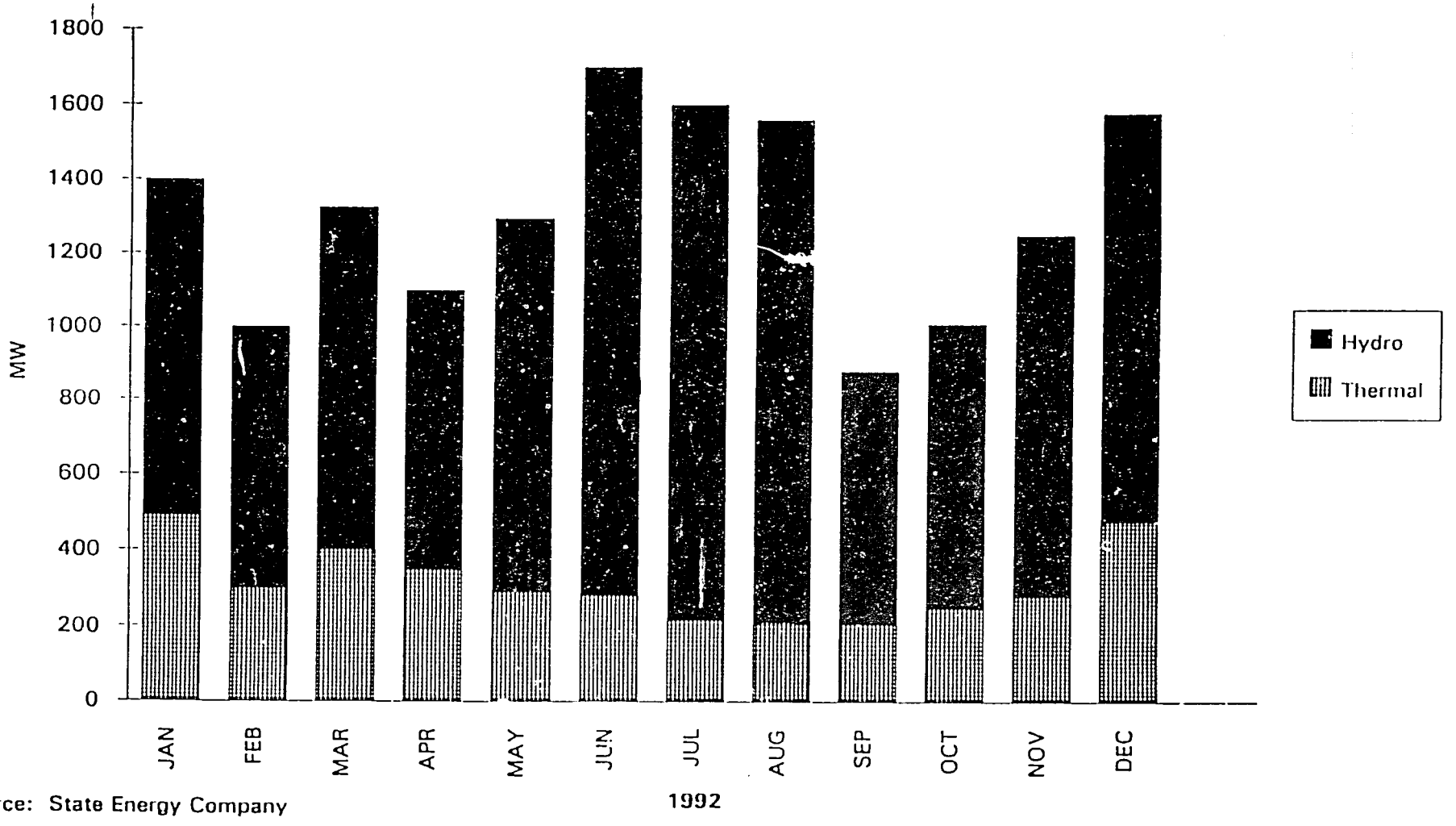
2.84 Kyrgyzstan's major hydro electric plants are located on the Naryn River[31], and are regulated by the Toktogul reservoir to optimize irrigation release to Uzbekistan's Fergana Valley. The Naryn River hydro plants generate little electricity in the winter when the country's demand peaks, but substantial surge in the summer when the irrigation needs are the greatest. A profile of the average monthly load for **all** of Kyrgyzstan's electric power plants is provided in **Figure 2-14**. The surge in hydro output in the June-August period exceeds the average winter output by approximately 75 percent. Without the generation from the Central Asian grid, Kyrgyzstan's electric power system would be substantially unbalanced because of the extreme swings in seasonality associated with the hydro plants. (This grid includes Kyrgyzstan, Turkmenistan, Uzbekistan, Tadjikistan and southern Kazakhstan.) Currently in general, the existing Central Asian grid, in its totality, is in balance: the summer surpluses of hydro power located in Kyrgyzstan and Tadjikistan being offset by the winter surpluses of thermal generation located in Uzbekistan and Kazakhstan. As seen in Figure 2-14 and in Table 2-24, Kyrgyzstan's thermal plants have born a decreasing share of this seasonal load balancing, putting greater pressure on domestic hydro generation and imports to meet the shortfall. This has worsened Kyrgyzstan's terms of trade in the Integrated Power System.

2.85 The electric energy transfers between the members of the Central Asian Integrated Power System (IPS) grid are currently regulated through bilateral agreements, as shown for 1993 in **Table 2-26**. In general, these agreements are based on a transfer price being set at around 60% of the average world price of electric energy, or about 3 cents per kilowatt hour. The partial data in Table 2-26 show only the negotiated net export volumes to Kazakhstan: net trade with the other republics is not shown, since the electric trade with Uzbekistan is linked to water (for irrigation) sales, and had yet to be fixed for 1993. The projected 1993 net surplus of 1,260 GWh with Kazakhstan is heavily weighted to the second and third quarter output related to irrigation demand and spring run-off.

[31] A complete inventory of the Kyrgyzstan's power plants is provided in Appendix 2.

Figure 2-14

AVERAGE MONTHLY LOAD FOR ALL ELECTRIC PLANTS



Source: State Energy Company
Date: May 1993

Table 2.26
Inter-Republican Bilateral Agreements for Sale/Purchase of Electric Energy for 1993, Quarter (GWH)

	Total 1993	First Qtr	Second Qtr	Third Qtr	Fourth Qtr
Energy Exports					
From Kyrgyzstan					
to Kazakhstan	1260	20	580	560	100
From Turkmenistan					
to Kazakhstan (via Uzbekistan)	4090	1485	800	690	1115
From Uzbekistan					
to Kazakhstan	500	200	0	0	300
to Tadjikistan	200	200	100	-1000	900
Total Uzbekistan	700	400	100	-1000	1200
Total Exports	6050	1905	1480	250	2415
Energy Imports					
To Kazakhstan					
From Turkmenistan	4090	1485	800	690	1115
From Uzbekistan	500	200	0	0	300
From Kyrgyzstan	1260	20	580	560	100
Total Kazakhstan	5850	1705	1380	1250	1515
To Tadjikistan					
From Uzbekistan	200	200	100	-1000	900
Total Imports	6050	1905	1480	250	2415

SRC: EBRD Preliminary Report, August 1993.

2.86 As shown in Table 2-23, total net exports of Kyrgyzstan's electric energy have fallen dramatically from 3,978 GWh in 1990 and 4,293 GWh in 1991 to 2,380 GWh in 1992. External demand for Kyrgyz electric power over the next few years will be determined largely by its current major export market, southern Kazakhstan. Total net exports for 1993 are forecasted to decline 4% or more. Net exports are not likely to increase until economic conditions improve significantly in southern Kazakhstan. A conservative estimate would be for exports to begin to rise in 1996. Meanwhile, the Government of Kyrgyzstan is developing an export market in the Xinjiang region of China and expects exports to average about 150 GWh by 1995 (compared to 1 GWh in 1992). Other long range export markets being discussed include Pakistan and Iran.

2.87 Kyrgyzstan's geography makes it necessary to divide the power system into northern and southern halves, connected by a single 500 kV overhead line running from the Toktogul Hydro Plant to the Bishkek substation in the north. The southern half of the power system offsets shortages in the north. In 1991 a new 500 kV line was connected from Dzhambul (southern Kazakhstan) to the Bishkek substation. This boosted the transmission capacity of the IPS to the north to 1200 MW, and increased power reliability within the Almaty and Bishkek region.

Tariffs and Operating Costs

2.88 Average tariff levels in place by mid-1993 represent a nominal increase of nearly 16 times (+ 1,600 percent) over average 1992 levels. Currency devaluation and inflation account for perhaps 1,000 percent of this increase. The balance reflects Kyrgyzstan's efforts to reduce previously highly subsidized rates, and to improve the overall system's ability to self-finance its future investment needs.

2.89 The average tariff level of 54 kopecks/kWh in 1992, compares to a current estimated weighted average of 826 kopecks/KWh, effective August 1, 1993. By late 1992, the Government of Kyrgyzstan had adopted a policy of adjusting tariff levels to reflect increasing material costs. However, the frequency of rate adjustments was slow relative to cost developments (e.g., quarterly). Moreover, cross- subsidies remained severe, particularly with respect to the cost vs. rate structure of domestic population service versus industrial service. In March of 1993 the accounting staff of the Kyrgyzstan State Energy Company (KSEC) estimated that the rate vs. cost structure for "population" vs. industrial service were inverted. That is, the cost of serving the population sector was estimated at 10 times that of the industrial base, although the rate structure was roughly the opposite.

2.90 A fundamental goal of the electric power sector development plan is to rationalize rate structures, subject to realistic economic and social constraints, including the ability of the populace to afford electricity and the need to retain market share in the face of developing export market resistance. Although cost-of-service and time-of-day rate-making are still longer term objectives, KSEC's progress towards reducing the degree of cross-price subsidization in rates has been quite encouraging over the first half of 1993. This progress is evidenced in **Table 2-27**, which shows a substantial reduction in the gap between industrial, household and public rates. Table 2-27 starts with average first quarter 1993 rates, and then moves through two proposed rate structures under the assumption of: 1) the profits tax being dropped from the rate base, and 2) with the profits tax still included. KSEC was seeking relief from the profits tax in early 1993, which would have reduced some pressure on (un-subsidized) industrial tariffs most immediately. In fact, a partial reduction in the profits tax for re-investments was allowed.

Table 2 – 27
Electric Power Tariff for 1993
(in copecks / kwh)

	1993 (Qtr 1)*	Without Profit Tax	With Profit Tax	Effective 8/1/93
Industrial & equated consumers	660 / 836	919	1224	1090
Budget organizations which attend to population	235 / 381	456	456	600
Urban population	60 / 150	60	60	600
Rural population	40 / 120	40	40	600
Public Transit / Trolleys	500			755
Agriculture	496			750
Export Sales	1716			
Average supply tariff (copecks/kwh)	427.6	645.1	734.1	826
Electric power production cost (copecks/kwh)	235	455.9	455.9	NA

Note: * Reflects two different periods within 1 st. Qtr. 1993

Source: State Energy Company, March 1993
First Vice Prime Minister, July 1993

What resulted was a modest increase in industrial rates, but a sizeable increase in urban and rural population rates. This "closing of the gap" is necessary in order to reduce the incentive to illegally resell electricity through residential "wholesalers". However, in increasing the residential rate rapidly, incentives to illegally tap lines increases, resulting in an increased level of reported power losses.

2.91 The current estimated average tariff of 8.26 Rb/KWh converts to approximately 0.5-to-0.7¢/KWh at effective (early August 1993) exchange rates, or roughly one tenth of average western tariff levels. However, Kygyzstan is blessed with relatively low cost hydropower resources, placing it on the lower end of the international cost scale. As previously noted, electricity export prices are being set at around 60 percent parity with world levels, or around 3¢/KWh. The gap between domestic and international standards is expected to narrow by 1995-96, as Kyrgyzstan's net export volumes reach their nadir. However, full western cost and rate parity is not likely before the year 2000. (See Chapter 3's discussion of the price path to free market levels.)

2.92 As shown in **Table 2-28**, the primary operating costs, driving electricity production, transmission and distribution costs higher, include: fuel, equipment, plant and maintenance expenses. Effective early 1993, the total projected cost of operating the generation, transmission and distribution system was around 45 billion rubles. At then-current exchange rates, this came to about $60 million. In 1992 KSEC was able to operate at a surplus of 3.08 billion rubles, largely because of funding from the central budget. In the future, escalating costs and the pressing need to add both generation and distribution capacity will require a greater portion of total operating costs to be weighted towards funding system development.

2.93 In order for Kyrgyzstan to properly plan and finance its electrical energy development strategies, the increasing role of development costs must be built into the rate structure. For example, an immediate priority is to complete the Kambar Ata plant No. 2 (240 MW) by 1999 in order to stem a projected shortfall in electric supply about this time. This hydro plant's location above the Toktogul reservoir would reduce the reliance on irrigation demand, making it a larger contributor to firm supply needed to maximize both domestic winter service and potential export market demand. The cost of Kambar Ata 2 (240 MW) has recently been estimated at about $250 million, or about one third of the total plant construction budget projection shown by KSEC in Table 2-29, assuming an effective exchange rate of 500 Rb/$. Given the 4-to-5 year completion time for this facility (reportedly about one third complete already), the incremental investment (annualized over a 15 year period) will add approximately 10 percent to the total current generation cost base. Other (e.g., fossil fuel, smaller hydro) plant construction, electrical distribution grids, transmission sub-stations and related equipment and support facilities could double this amount. The expected distribution and estimated level of investment (effective early 1993) is shown in **Table 2-29**, which projects KSEC's investment needs by construction category within four different time horizons. Note that the generation investments are approximately one half of the total financing requirement in the 1993-95 period, falling progressively (on a percentage basis) in the more distant time horizons. Assuming that the ratios, if not the absolute level of T&D investment needs, are accurate, then an additional 10% of current costs provides a reasonable standard for T&D investment costs over time. There costs cam reasonably be assumed to esclate in response to real increases in the price of fuel, equipment and materials.

Table 2–28
Costs of Electric Power Production, Transmission and Distribution in Kyrgyzstan
inmillion rubles

Cost estimate items	1993	% of Total
Fuel for basic needs	23769	52.80%
Water for basic needs	125	0.28%
Fixed salary of industrial worker	988	2.19%
Extra salary of industrial worker	105	0.23%
Deductions to socail security from salary of industrial workers	416	0.92%
Equipment maintenance expenses including:	8169	18.15%
– depreciation of industrial equipment	2160	4.80%
– deductions to repair fund	5564	12.36%
– expenses for basic systems serviced by housing opearation organization	6	0.01%
Start up expenses	142	0.32%
Shop expenses	1763	3.92%
Plant expenses	8841	19.64%
Discharge payments within normal value	8	0.02%
Purchase energy	687	1.53%
Total production costs	45013	
Useful supply, mln.kwh	10990	
Production cost, 1 cop/kwh	409.58	

Source: State Energy Company
Date: March 1993

Table 2-29
Required Investment in Power System Construction
(Billions of Rubles in 1993 Prices)

Type of Construction	Total for 1993-2010	Years 1993-1995	1996-2000	2001-2005	2006-2010
Hydropower plant construction	345	26	71	129	120
Construction of fossil fuel plants, boiler, and heating systems	36	5	11	12	8
Construction of electrical grids	91	12	28	25	26
Construction of other facilities	58	6	13	17	22
Total	531	49	123	183	176

Source: Kyrgyzstan State Energy Company
Date: May 1993

2.94 As discussed in Chapter 3 (Section D), a useful standard for anticipating the future path of electricity tariff levels is to look at overall energy (i.e., competing fuel) price movements, and to posit a parallel average electric tariff level which moves towards the free market equilibrium price over some reasonable time period. As seen in Table 2-28, the linkage of average tariff rates to overall fuel price levels is reasonable, given the high share of basic fuel costs in the overall cost structure. Furthermore, the movement to free market costs linked to fuel is similarly mirrored by the movement of equipment, supply and labor costs to such a standard over time. Therefore, our basic approach to forecasting tariff rates is to assume a cost ratio linkage to fossil fuel prices, and then to add in an additional investment cost needed to keep the system in reasonable balance, at least through the year 2,000.

2.95 In the case of hot water and steam heat tariffs, the degree of cross-price subsidization is even more pronounced than for electric power. However, this distortion in rates has been substantially reduced effective August 1993. The recent developments in steam heat and hot water tariffs are shown in **Table 2-30**. The first quarter 1993 rates represent an average increase of nearly 12 times late 1992 rates. Thus, the absolute increase has been comparable to electricity. During the first quarter of 1993, household, and to a lesser extent municipal and agriculture (hot house), consumers were sharply subsidized relative to industrial consumers. However, the rate structure changed dramatically in August as hot-house and budget organization rates were brought up to or near industrial rate levels. The remaining cross-subsidization is to household consumers. Overall, however, the rate structure allows the system

Table 2 – 30

Tariff Changes for Thermal Energy Produced by Heat Power Stations

Consumers	Yearly distribution of heat energy th.GCal	Prices for Jan 1, 1993 Tariffs on thermal energy, R/GCal	Prices for August 1, 1993 projected Tariffs on thermal energy, R/GCal
Industrial and equated non–industrial consumers	2122	9550	9550
People	2244	100	1000
Hot–houses	246	1373	9550
Budget enterprises and organiz.	994	800	8025
Total distribution of thermal energy	5606	3857	5857

Source: Kyrghyz State Energy Company
Date: May 1993

to be nearly self-financing, at least for the present. The challenge for KSEC will be to continue to cover costs, particularly with arrears and investment costs pushing current levels upward, while recovering future energy cost increases, and reducing the degree of cross subsidization to the household sector.

2.96 As the largest thermal heat generating plant in Kyrgyzstan, the Bishkek Heating Systems Enterprise (BHSE) offers a useful case study in the limitations of the current tariff structure. The primary deficiencies in BHSE's tariff structure include its lack of full cost recovery of the plant's depreciation costs based on replacement value, and the fact that the plant is partially subsidized by KSEC via the purchase of electric power at rates above the allowed level at which KSEC can resell. Therefore, like KSEC, the BHSE and other steam plants need to adopt a rate structure which will more completely recover system upgrade and refurbishment costs. Other operational improvements needed include the ability to more rapidly adjust rates in response to rising costs (i.e., rather than the rigid quarterly schedule), including credit costs; the ability to automate billing and provide rate incentives for prompt payment; and improved arrears identification and collection procedures.

2.97 A quarterly progression of BHSE's cost structure is shown in **Table 2-31**, covering a one year period. As with electric power operating costs, the largest line item is the cost of fuel, followed by maintenance expenses and equipment, which is increasingly priced on the basis of an external free market cost standard. The table shows the basis for the 11-to-12 fold increase in costs from late 1992 to the second quarter of 1993. Maintenance (shop) expenses and depreciation have recently increased as a portion of total operating costs, however rates have not increased sufficiently to afford major upgrade and efficiency investments needed in this and other thermal plants.

Table 2 – 31
Production Cost Calculation
Heat Energy, its Transmission and Distribution
(millions of rubles)

Cost Items	From 3/1/92 to 7/10/92	From 7/10/92 to 1/1/93	From 1/1/93 to 4/1/93	From 4/1/93 Projected
Fuel for basic needs	1345	2796	18510	25703
Water for basic needs	9	23	69	96
Fixed wages of industrial workers	19	52	317	439
Extra wages for industrial workers	1	5	31	43
Deductions for social security from wages of industrial workers	8	21	132	182
Equipment maintenance expenses including:	101	113	558	1484
– depreciation of industrial equipment	9	8	20	330
– deductions to repair fund	32	55	307	887
– expenses for housing operation serviced by housing opearation organiz.	1	2	10	2
Preparation and start up expenses	3	9	27	84
Shop expenses	13	27	130	3637
Plant expenses	19	48	1241	3637
Discharge payments within normal value	3	3	9	9
Purchase energy	9	19	600	974
Total production cost (full cost)	1532	3116	21624	32935
Sales, th. GCal	5718.1	5718.1	5606.4	5606.4
Production cost (R / Gcal)	268	544.99	3857	5875

Source: Bishkek Heating System Enterprise
Date: March 1993

Development Objectives

2.98 Kyrgyzstan's electricity sector is the central component of its mid and longer term energy development strategy. If Kyrgyzstan is to achieve greater energy self-sufficiency, electricity will have to lead the way. Kyrgyzstan's electricity sector development strategy includes three components. First, greater electrification of the country's economy, particularly its household and agricultural sectors, will be needed to displace a significant share of current fossil fuel use. In addition to this direct displacement, new and converted industrial and commercial operations will need to be powered by reliable supplies of relatively low-cost electricity. Second, significant new hydro power generation capacity will need to be brought on line by the end of the century in order to meet projected domestic demand and to maintain Kyrgyzstan's historic position as an electricity exporter. Third, in order to accommodate greater generation and electrification, the transmission and distribution system must be substantially upgraded and expanded.

2.99 Given Kyrgyzstan's relatively limited domestic resource base from which to fund these developments, various financial incentives and sources of revenues must be mobilized. The financing sources established over the past year include: 1) higher nominal and real electric power rates to increase the system's ability to self-finance needed investments; 2) reduced profit tax rates, particularly for funds re-invested in the power sub-sector, 3) central government funding, including the use of general or targeted revenue streams to provide major project financial leverage and to fund such programs as appliance manufacturing and meter installation; 4) bank loans from commercial, government and multi-lateral bank sources; and 5) the planned creation of KSEC as a joint stock energy company in 1994, eventually to be offered for public sale. Of these financial sources, perhaps the most important is the immediate need for rate reform, followed by external financing.

2.100 Baseline projections of Kyrgyzstan's electricity supply and demand balances suggest that Kyrgyzstan will evolve into a net importer of electric power by the period 1998-2000 unless some drastic actions are taken to increase Kyrgyzstan's new generation capacity. Demand projections, however, may be biased to the high side owing to the previously low underlying tariff and overly-optimistic macroeconomic assumptions. A substantial range exists among the forecasts prepared by western consultants. For example, a recent EBRD mission establishes a potential demand range of 10.8 TWh to 17.4 TWh by the year 2000, or a range of more than 50 percent. The high end of this forecast approaches the internal (KSEC)[32] demand projections made approximately one year ago, at a time when rate structures and macro-economic assumptions were far more supportive of a buoyant demand outlook. In particular, export demand is likely to remain rather soft through at least 1996, and domestic demand for electricity displacing fossil fuels will be limited by distribution system capacity and the availability of electric appliances.

2.101 Recognizing the limited financial resources with which Kyrgyzstan has to proceed with its power sector development, and the uncertain indigenous and export market demand for Kyrgyzstan's power output, the priority of generation projects must be carefully considered for their overall value to the energy and economy. A recent EBRD evaluation of potential

[32] Total electricity demand (including exports) was projected to reach 19.815 TWh in 2000, as reported in "EPK", page 24.

generation projects in Kyrgyzstan resulted in a recommendation of the Kambar-Ati Plant No. 2 as the highest priority generation project. This plant is estimated to be one third complete, with the additional 240 MW projected to cost approximately $250 million. Other generation projects which rank relatively high among immediate development priorities include the completion of Shamalday-Say on the Lower Naryn cascade (240 MW), the addition of 90 MW of turbine generator capacity to the BHSE plant, and in the longer term the construction of the Upper Naryn Cascade (approx 350 MW in total), Kambar-Ati No. 1 (1900 MW), BHSE No. 2 (180 MW) and a variety of small hydro power projects,starting with Orto-Tokoy (western tip of Lake Issyk Kul) and Kirov (on Talas River in northwest Kyrgyzstan). With respect to the latter, western experience indicates that small hydropower development is best undertaken by independent power producers. Given the vast undeveloped hydropower resources in Kyrgyzstan[33], the potential additions from this sub-sector are significant, and efforts should be undertaken immediately to create the contractual and regulatory structure needed to begin serious consideration of outside investor proposals to build and operate generating capacity under long-term contracts with the State Energy Company (KSEC). This process could be initiated under the supervision of independent advisors who have structured and managed independent power acquisition in the west.

2.102 The overall capacity objectives established by KSEC call for installed generating capacity to reach 7.8 GW by 2005, with output of 25,614 GWh, implying continued low overall capacity factors. The comparable values for the year 2000 are 6.25 GW and 19,185 GWh of output. In light of revised demand projections (KSEC's 17,410 GWh demand forecast for the year 2000, compares to medium and low case scenarios which range from 11,000 - 14,000 GWh) resulting from regional economic decline and higher than expected cost and rate structures, the pressure to reach these capacity levels should be reduced, but efforts to improve capacity utilization rates need to be intensified. Therefore, the immediate pressure to relieve a projected supply shortfall is not as great as the pressure to insure that current and planned generation, transmission and distribution capacity is economic and effectively utilized.

2.103 Kyrgyzstan is currently operating at slightly below a 40 percent capacity factor, based on total nameplate capacity. Based on available operating capacity, utilization rates are still well below 60 percent. To some degree this reflects the weakness of underlying demand, but also the structural limitations imposed by the linkage of power supply to the irrigation season which is counter-seasonal to Kyrgyzstan's domestic and export market peak winter requirements. In general, future generation investments must be carefully selected for their ability to achieve higher capacity factors in order to serve Kyrgyzstan's peak winter domestic and export markets. Thermal generation will increasingly be called on to increase its contribution to seasonal balancing requirements. Realistically, significant increases in thermal generation are not likely until 1996 at the earliest, based on higher fuel prices and continued weak demand levels. In the short term , efforts should be focussed on improving the efficiency of existing plants and establishing rate structures which accurately reflect costs of service.

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[33] The State Energy Company has estimated that only 8-10-10 percent of Kyrgyzstan's hydro power capacity has been developed.

2.104 Total (internal and export) electricity demand levels for 1993 are likely to end up lower than 1992's totals[34]. However, the sectoral mix continues to shift dramatically, with rapid growth in the domestic/household sector nearly offsetting a severe decline in industrial demand. This shifting sectoral distribution of demand reflects Kyrgyzstan's policy of maintaining relatively low (lifeline) rates to household consumers, and subsidizing these rates from higher industrial and commercial levels. The absolute and relative level of subsidization to the household sector has been reduced significantly effective mid-1993, but substantial rate reform is still needed to remove the implicit subsidy, based on unit costs of service to each sector.

2.105 Meanwhile, continued growth in household and rural demand will be linked to Kyrgyzstan's ability to increase transmission and distribution (T&D) service capacity to the population. Presently, any significant increase in generation capacity is limited by looming bottlenecks in the T&D infrastructure. The most immediate transmission line investment need will be linked to the development of the Kambar-Ati 2 generating station. By 1996-1997 a 500 kV overhead line and sub-station will be needed to distribute power from Kambar-Ati 2 to the Kemin substation on up to Bishkek, and directly to the substation in the Osh region. More immediate T&D investments include 220 and 110-35 kV transmission lines linking regional grids to the major sub-stations and, at the local level, 0.4-10.0 kV lines to electrify households and small commercial and public buildings in currently un-served areas. The T&D grid construction costs are estimated to be about 40-50 percent of the level of the necessary expenditure on new hydro generation capacity over the period 1993-2000. Therefore, assuming a $250 million budget for immediate hydro capacity additions, a conservative estimate of $100 million for T&D investments over the next seven years is not unrealistic.

2.106 In addition to the generation and T&D requirements, a significant investment is needed in sub-station facilities, including switches, relays and metering equipment. Also, a whole domestic manufacturing industry in electrical appliances needs to be created if electric power substitution is to reach its minimal target of +30 percent (of current fossil fuel use) by the end of the decade. This local enterprise investment could be funded in part from KSEC revenues, particularly if the current 0.5 percent fee for energy conservation technology, research and development is increased to create a revenue pool to allow funding of local electrical appliance manufacture (or provide credits for appliance imports).

2.107 The importance of electricity to future economic growth provides a strong rationale for Kyrgyzstan to take all necessary steps to improve its level of electrification. Despite its vast potential for electric power development, Kyrgyzstan ranks low on most measures of electrification. For example, per capita electricity consumption in 1990 was just 32.7 percent of the former Soviet Union's average level. Electricity input per unit of national income was just 52 percent of the FSU average, and electric power per industrial worker just 42 percent[35]. Household electrification in Kyrgyzstan was four times below the average for the developed world. Therefore, the focus on electrification of the domestic and rural sectors is appropriate, but should be pursued in a manner consistent with overall investment needs in power

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34 For example, the EBRD recently (August 1993) estimated a total decline in 1993 electricity demand of 15 percent from 1992 totals.

35 "EPK", p. 41.

generation, T&D and sub-station investments, including extensive metering, and the creation of an appliance manufacturing industry. In pursuit of its electrification objectives, the Government of Kyrgyzstan needs to regularly re-visit the objectives established in both its Feb. 4, 1993 decree on "Measures for Prioritized Development of the Energy Sector" and its April 9, 1991 decree "On Measures to Develop Rural Electrification". Each of these decrees establishes worthy objectives which need to be addressed in the context of current economic and financial conditions, resource constraints and priorities.

III. GUIDELINES AND PRINCIPLES OF PRICING AND TAXATION APPLIED TO KYRGYZSTAN

A. Pricing Principles

3.0 A number of basic energy pricing principles are relevant to Kyrgyzstan as it evolves towards a more open, free-market economy. Among these are the basic concepts of:

1) fully recovering marginal costs of energy production to ensure the financial viability of the enterprise; in the short-term to include all variable operating costs, and in the longer term to include fixed costs, inclusive of a fair market return for investment capital;

2) pricing to reflect the full border price equivalent of available import and export markets, fully accounting for transportation costs and quality differentials, appropriately measured;

3) achieving international free market price parity for commodities which are truly accessible to these markets, adjusting for the full cost of transportation and quality differentials;

4) allowing the free flow of energy supplies and capital to the extent practicable in response to price and investment incentives and the marginal value of the energy resource from the consumer or processor.

B. Establishing a Price Ramp to Free Market Equivalent Levels

3.1 A number of broader guidelines for determining the desired rate of full energy price and trade liberalization are presented below, specifically as potential constraints to an accelerated liberalization schedule, but also as standards to establish a more acceptable path of price and trade liberalization.

a. Rapid price decontrol could so strain personal/household incomes as to create a major slowdown in economic activity and increase the risk of civil unrest and ultimately political turmoil, discouraging badly needed foreign investment. One macro-policy guideline, therefore, is to evaluate the rate of energy price increases in terms of an average maximum acceptable percentage of household income spent on energy, and in the case of key economic sectors (e.g., agriculture) on the basis of the maximum acceptable percent of total operating costs accounted for by energy. These ratios could serve as guidelines for assessing the necessary degree and duration of subsidies to the household and key economic sectors, and suggest the necessary data to collect to make an informed assessment of energy subsidy policy and costs under alternative energy price decontrol paths. Complete price decontrol should not out-pace the ability of Kyrgyzstan to measure, analyze and develop a reliable response strategy to the income and social effects it generates.

b. In the process of decontrolling absolute price levels, it is important that a decontrol path for each major fuel be set which is compatible with the maintenance of realistic relative

price levels among the fuels so distorting price signals which would mis-allocate resource investments will not be sent on either an inter-fuel or inter-regional basis. Such distortions affect the potential economic return on pipeline and transmission line investments, site and fuel selection for major end-use plants, processing or resource development projects. Price decontrol should not proceed without a better understanding of its likely impact on relative price levels, and the range of tax and tariff policies needed to correct perceived distortions.

c. Price decontrol should not out-pace the ability of key operating enterprises and policy-makers to measure real production costs, including capital investment and replacement costs, so that prices will be set to recover long-run marginal costs without allowing excess profits to develop untaxed. Price increases should at a minimum recover changes in marginal operating costs, and quickly seek to accurately measure and account for longer term investment requirements.

d. Price decontrol should also not proceed so rapidly as to worsen the energy payment and collection process. Price increases can negatively impact the quantity and quality of an energy supply service by worsening cash flow and the ability of the system to measure energy use and loss. Cash flow is needed to fund basic operating and maintenance activities and, secondarily, capital investments for upgrades and system expansion. In short, price increases should not out-run and threaten the liquidity of the financial system which supports the payment process, and ultimately the quality and quantity of energy service provided. If too rapid, the price increase will not produce the intended result of improved efficiency, capacity and revenue flow to (and from) the energy sector.

C. Netback Prices

3.2 **Table 3.1** provides a detailed analysis of representative "netback" values of key fuels to a Kyrgyzstan wellhead/mine mouth or border price equivalent, based on hard currency border prices at key world market pricing points, netted back by the cost of transport, related services, fees (e.g., storage, and export fees, where appropriate), loss and representative quality differentials between the "world" standard utilized in column 2 when estimable. In **Table 3.1** two currency conversion assumptions are utilized throughout: (3b) posits a 500 R/$ "purchasing parity" exchange rate, while (3c) utilizes the 700 R/$ "market" exchange rate in effect in March 1993.

3.3 Looking first at crude oil, the estimated $16.70/barrel crude oil price FOB Novorossiysk is netted back to $96/ton ($12.94/barrel) at Osh, and compared to the current official domestic price of 22,334 R/ton to arrive at the alternative "world market netback to domestic price ratios" shown in columns (3b)/(4) and (3c)/(4). A similar process was followed for diesel fuel; in this

Table 3.1

CRUDE OIL, DIESEL FUEL, NATURAL GAS & COAL PRICES COMPARISON OF WORLD NETBACK PRICES TO KYRGYZ "DOMESTIC PRICES"

Energy Type	World Price Assumption	US$/mt or US$/mcm	R/mt* or R/mcm*	R/mt** or R/mcm**	R/mt or R/mcm	Ratios	
(1)	(2)	(3a)	(3b)	(3c)	(4)	(3b)/(4)	(3c)/(4)
Crude Oil	Urals FOB Black Sea	Netback to Osh from Novorrossiysk			Domestic Price****		
	$16.70/b	$96***	47885	67038	22334	2.1	3.0
Diesel Fuel	Rotterdam Gasoil	Netback to Osh from Rotterdam			Domestic Price		
	$171/mt	$120	59839	83774	52323	1.1	1.6
Natural Gas	Estimated Russian Price to Germany's PL System	Netback to Osh from Germany's PL System			Uzbekistan Import Price		
	$85/mcm	$21.71	10857	15200	20000	.5	.8
Natural Gas	Turkish Price for Electric Power	Netback to Osh from Istanbul			Uzbekistan Import Price		
	$153/mcm	$58.22	29108	40751	20000	1.5	2.0
Steam Coal*****	EEC Import Price	Netback to Osh from Ukraine			Domestic Price		
	$46/mt	$24.26	12131	16983	5089	2.4	3.3

* 500 R/US$: Representative of purchasing power parity rate.
** 700 R/US$: Approximate Market Rate in March 1993.
*** Equivalent to $12.94/barrel.
**** As of March 1993.
***** No adjustment has been made for differences in calorific values.

case utilizing a representative Rotterdam price netted back through the Baltic port of Ventspils and after deducting representative[36] rail transport costs. The resulting netback produced lower ratios of the estimated foreign netback to prevailing domestic price for diesel fuel, as would have been the case for any refined product given the lack of a more cost-effective pipeline transport system, as available for crude oil. For natural gas, two estimates were calculated. First, a "delivered German pipeline system" price estimate of $85/mcm was utilized and netted back for comparison with the Uzbek border price of 20,000 R/mcm effective March 1993. This calculation also includes a five percent pipeline loss factor. Second, a delivered Turkish electric power plant price of $153/mcm was utilized. Choosing an end use market in Turkey rather than Germany resulted in a substantially higher netback price.

3.4 The coal calculations were based on average EEC import prices. However, no adjustment was made for differing calorific or other quality levels between the EEC standard for steam coal and the typical energy and quality feature of Kyrgyz coal. As a result, the netback values and ratios shown are somewhat over-stated. In addition, it should be noted that the per ton mile rail tariff utilized to net back to the mine mouth in Kyrgyzstan was the lowest long-haul rate available in the U.S. Utilization of average rail rates would move the netbacks well below zero. Thus, on balance, the analysis underlines the need for Kyrgyzstan to improve its coal export quality and lower its transport cost, as rail costs are likely to rise towards at least the low end of international standards, and Kyrgyzstan' s distance from large consuming markets in the West places it at a disadvantage to Russia and other Eastern European producers, in part because of the latter's preferred access to rail systems.

3.5 International price comparisons are useful as a proxy for opportunity costs. Table 3.1 presented international price levels for all of the major fuels, relating their world market levels to netback-equivalent levels at the border of Kyrgyzstan. **Table 3.2** presents representative international costs of electricity supply. Hydro-based generation cost range between 1.95 cents to 3.5 cents per kilowatt hour. The 1.95 cents per kilowatt hour is based on Hydro Quebec's generation cost, some of the lowest in the world. It can be anticipated that Kyrgyzstan's hydro plants' major competitors for the long term will be coal-based generation plants. Coal-based generation costs vary, in general, between 2.5 cents per kilowatt hour to 4.5 cents per kilowatt hour depending on individual plant operating costs and differing levels of pollution control equipment. Table 3.2 also suggests representative international transmission and distribution costs. Based on a world-wide representative sample, the low end of the range of the total cost to high voltage customers will be about 3.95 cents compared to 6.95 cents for low voltage customers.

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[36] The rail tariff estimates utilized included actual published data where available, and otherwise incorporated "low end" unit distance cost estimates representative of western rate structures.

Table 3.2 **Representative Costs of Electricity Supply*** **(US cents/Kwh)**		
Generation Cost (hydro-based)	1.95	3.50
Transmission	2.00	3.00
Cost to HV customer	3.95	6.50
Distribution & Connection	3.00	5.00
Cost to LV customer	6.95	11.50
Generation Cost (coal-based)	2.50	4.50

Note: *Assuming efficient operations and low loss levels
Source: Hydro Quebec reports and deLucia & Associates' estimates as presented in briefing report for The World Bank.

3.6 Because the cost structure for electric power generation, its transmission and distribution in Kyrgyzstan, is still quite different from these international cost standards, a more realistic approach to projecting average costs of electric power service may be to assume that electricity prices rise in parallel fashion with primary fuel prices as they move towards world market equivalent levels. These, in turn, are assumed to be reflected by an international border "netback" price equivalent by the year 2000. As noted in Chapter 2, Section D, this approach is supported by the observed propensity of fuel prices to act as the primary determinant of electric power generation cost developments. Therefore, the approach followed, as shown in **Table 3.3**, is to establish the initial ratio of domestic coal prices to their world market (border netback) equivalent level, then to assume that the cost of electricity, expressed as an initial fixed high-low range of 8-10 Rb/KWh in 1993[37], will increase commensurately with the increase in the price of coal. The initial border to netback equivalent coal price ratio is assumed to move from its 1993 estimated levels to 70 percent of the world equivalent level by 1995 and 100 percent by the year 2,000. Coal prices are selected as the appropraite link to future electricity prices for several reasons: first, coal-fired generation serves as the primary competitive fuel to hydro generation in the broader IPS region. Second, the greater rate of increase suggested for coal prices under this approach (given coal's low starting point) captures some of the substantial capital investment costs needed to meet future demand. These are conservatively estimated at $350 million over the next 5-to-10 years, with the completion of Kambar-Ata 2 (240 MW) the primary generation plant cost over this period. Finally, the rate of escalation in oil and gas prices towards world equivalent levels is likely to occur more rapidly than for coal, and the political pressure to adjust electricity rates will, similarly, result in a more controlled rate of escalation, as the objective of full cost recovery defers to socio-economic and political imperatives for relatively low cost electric power.

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[37] This reflects the average expected 1993 tariff level to the industrial consumer class, an un-subsidized tariff category.

Table 3-3

Proposed Real Elec. Price Path for Kyrgyzstan*
(Based on Moving to Free Market Border Price Parity in Relation to Coal Price)

	Current Ratio	1993 Adj.**		1995		2000****	
		Low	High	Low	High	Low	High
Coal Price Ratio	0.30	0.44	0.44	0.70	0.70	1.00	1.00
Elec. Price (Rb/kWh)	***	8.00	10.00	14.09	17.27	21.73	26.27
" " ($/KWh)		0.0114	0.0143	0.0201	0.0247	0.0310	0.0375

* Assumes flat real prices in world market.
** Based on ratio of consumer/border price.
*** Real, 1993, value.
**** Any change in border price, as well as currency devaluation would require a correponding adjustment in these projected levels.

3.7 Preliminary price path guidelines through 2,000 are shown in **Table 3.4**, based on import prices of crude oil, diesel fuel, and natural gas, and domestic prices of coal at the mine mouth and an average electricity tariff. These projections are based on first quarter 1993 real prices at a fixed exchange rate of 700 rubles per U.S. dollar. Future import prices for hydrocarbons will continue to be determined primarily by the rate at which Russia and neighboring republics increase their domestic prices towards world levels. In the guidelines below, hydrocarbon prices are assumed to reach 100% of world netback levels by 1995. Also, it is premised that Turkmenistan develops additional control over the pricing of its gas exports by 1995, assuming an alternative route from the current trans-Russia alternative is available. Domestic coal prices are increased to 60% and 100% of world netback levels by 1995 and 2000, respectively.

3.8 Electricity tariffs are raised to a level in 2000 which should recover operating and fixed costs and remain competitive with fossil fuel plants in the neighboring republics. As shown in Table 3-4, the resulting projected average electricity tariffs (in real 1993 rubles) rise from an average of 5.36 Rb/KWh in 1993, to 16.4 (2.34¢/KWh) in 1995 and 28 Rb/KWh (4.0¢/KWh) in 2,000. Within this total, we have assumed a total immediate investment cost (generation of $250 million + T&D of $100 million) over the next eight years. Based on projected average demand levels of approximately 15 TWh (terawatt hours) over the next eight years, and assuming an average financing cost of 15 percent, the incremental investment cost component comes to

approximately 10 percent of this total average projected rate (i.e., 0.3-0.4¢/KWh). This projected tariff level of 4.0¢/Kwh in 2000 compares favorably with a preliminary estimate reported in a preliminary study by the European Bank for Reconstruction and Development, which indicated that requisite generation tariff needed to recover the cost of Kambar-Ata 2 could range from 3.8-4.5¢/KWh[38].

Table 3.4

Kyrgyzstan Price Guidelines (1)

	1993:Q1	1995	2000
Crude Oil (R/MT)	22,334	67,038	74,808 (2)
Diesel Fuel (R/MCM)	52,323	83,774	88,674 (3)
Natural Gas (R/MCM)	20,000	40,751	49,817 (4)
Coal (R/MT)	5,089	9,660 (5)	16,100
Electricity (R/KWH)	5.36	16.40 (6)	28.00 (7)

(1) Based on real 1st Qt. 1993 prices, at fixe exchange rate of Rb 700/$.
(2) Reflects higher crude netback (border price) once export pipeline from Kazakhstan is built.
(3) Reflects higher crude price, stricter product quality requirements by 2000.
(4) Reflects slight increase in order for natural gas to stay at 85% Btu parity with crude oil price.
(5) Reflects 60% parity with border price netback estimate and quality adjustment.
(6) Reflects 60% parity with full rate, based on our coal/ratio approach and adding the $250 MM G&T and est. $100 MM Distr. Investment over 8 years.
(7) Reflects full 100% equivalent based on coal ratio and conservative Gen. + Trans ($250 MM) and Distr. Investment ($100) over 8 year horizon.

Note: These price guidelines have been "rounded off" in the Executive Summary table on page 3.

[38] The range shown reflects different ratios of concession vs. consensus financing and different repayment periods (i.e., 15 vs. 30 years).

3.9 It must be emphasized that these projections are presented as real (1993) prices and assume an exchange rate of 700 R/U.S.$. In 2000 these real prices, converted to dollars, would be: $107/MT for crude oil, $127/MT for diesel fuel, $71/MCM for gas, $23/MT for coal, and $.04/KWH for electricity. Given the projected sharp increase in prices, effective tax collection and reasonably accurate ongoing estimation of production costs are important aspects of this adjustment process, in order to collect and recycle tax revenues, to avoid major pricing and profit distortions, and to achieve desired investment targets.

D. International Price Comparisons

3.10 Two additional approaches to making international price comparisons are demonstrated in **Tables 3-5 and 3-6**. **Table 3-5** focusses on "vertical" price ratios among each major fuel group in Kyrgyzstan relative to a Western competitive market standard (in this case the U.S.) This analytic structure is intended to demonstrate the relative size of intermediate transport, processing or tax costs between major stages of the fuel delivery chain. In the case of petroleum, this difference reflects transport, storage, refining and distribution costs as crude oil moves from the wellhead to the refinery and on to the final consumer. The prices selected are representative of first quarter 1993 levels, and are therefore less indicative of actual average values for Kyrgyzstan than for the U.S.

3.11 The 22,334 R/ton wellhead price for crude oil is an official level, based on the price received from Uzbekistan in the crude for refined product terms of trade. This price translates to an estimated 26 percent of the average U.S. level, compared to a 0.38 ratio for the retail gasoline sales price. The retail price of gasoline in Kyrgyzstan includes a VAT, reduced from 28 to 20 percent effective January 1993. In addition, the state marketing/distribution company, Kyrgyznefteproduct, is given a modest increase (i.e., less than 10 percent) and recovery of transport costs. These additions are somewhat offset from the U.S. side where federal and state gasoline taxes are included in the U.S. retail, adding approximately 25¢/gallon ($10.50/barrel), on average, to the final price. In addition, the higher U.S. quality standard for gasoline (unleaded with 93 octane-equivalent vs. Kyrgyzstan's 76 grade) provides an additional reason to expect a lower ratio of Kyrgyz vs. U.S. retail gasoline prices. The net result demonstrates that on a comparative international basis, Kyrgyzstan's refined product vs. crude oil price spread is relatively high, as shown in line 3. This result is attributable to the relatively high cost of imported products relative to the received value of the crude oil. Should Kyrgyzstan's market position for negotiation improve (see Appendix II), this ratio should decline toward more indicative western standards.

3.12 For natural gas, the comparison between wellhead gas and average delivered plant costs reflects the relatively efficient transportation structure in the U.S. By contrast, the Kyrgyz relationship is not based on economic costs, but reflects the difference between the official wellhead price, as charged by Kyrgyzgas, and the weighted average import cost of gas delivered to a utility. The difference is not directly related to transportation costs between the domestic producer and the next customer (i.e., the distributor or end-user). As transportation costs rise in Kyrgyzstan, this ratio, as shown in line 6, is more likely to move closer to the U.S. standard.

Table 3-5

Comparative Energy Prices and Ratios of Producer vs. Final Sales Price (Kyrgyzstan vs. U.S., Eff. March 1993)

		Kyrgyzstan	U.S.	% of US
1.	Wellhead/Imported Crude Oil:			
	(Rb/ton)	22,334		
	($/bbl.) @ 700 Rb/$	$4.31	$16.82	26.0
2.	Retail Gasoline:			
	(Rb/ton)	106,250		
	($/bbl.)	$17.86	$46.74	38.2
3.	**Oil Ratio (2)/(1)**	**4.76**	**2.78**	
4.	Wellhead/Imported Natural Gas:			
	(Rb/mcm)	24,000		
	($/toe)	$41.49	$90.0 (e)	46.6
5a.	Power Plant Gas:			
	(Rb/mcm)	26,250		
	($/toe)	$45.38	$108.70	41.8
5b.	Industrial Gas:			
	(Rb/mcm)	31,500		
	($/toe)	$54.45	$137.70	39.5
6.	**Natural Gas Ratios:**			
	(5a)/(4)	**1.09**	**1.21**	
	(5b)/(4)	**1.31**	**1.53**	
7.	Mine mouth Coal:			
	(Rb/ton)	5,089		
	($/ton)	$7.27	$24.0 (e)	30.0
8.	Power Plant Coal:			
	(Rb/ton)	6,061		
	($/ton)	$8.66	$32.01	27.1
9.	**Coal Ratio:**			
	(8)/(7)	**1.19**	**1.33**	

Source: Government of Kyrgyzstan; OECD, IEA Statistics, "Energy Prices and Taxes, First Quarter 1993", and miscellaneous U.S. Government sources.

(e) = estimated

Table 3-6 1st Quarter 1993 Fuel Prices for Comparision of Electricity Generation: Kyrgyzstan vs. Turkey (Local Currency/TOE)		
	Kyrgyzstan	**Turkey**
(1) Heavy Fuel Oil	19,839	1,559,375
(2) Natural Gas	31,763	1,586,404
(3) Steam Coal	10,102	677,135
Ratios:		
$^{(1)}/_{(2)}$	0.62	0.98
$^{(1)}/_{(3)}$	1.96	2.70
$^{(2)}/_{(3)}$	3.14	2.34

3.13 The coal price comparisons (lines 7-9) also reveal as much about the unique features of each market as the appropriateness of the ratios. Here, the mine mouth vs. delivered coal prices utilized are those reported by a major power plant consumer. As the average rail rate rises, the mine mouth to delivered utility spread will begin to rise towards the U.S. standard. This rail cost adjustment process has already begun in earnest in Russia.

3.14 Table 3-6 applies the ratio approach to international inter-fuel price comparisons, rather than vertical price analysis among the same fuels. The market selected is Turkey and the comparative pricing point is fuel delivered to an electric power generating plant. All prices are shown in the local currency and TOE (tons of oil equivalent), thereby precluding the need for currency conversions. The ratios produced suggest that: 1) delivered heavy fuel oil prices are relatively low compared to natural gas (line 4); 2) delivered fuel oil prices are somewhat low compared to coal (line 5); and 3) delivered natural gas prices are relatively high compared to coal (line 6). A caveat should be noted, however, concerning coal price and quality differences in Kyrgyzstan relative to average levels in Turkey. Average quality levels in Turkey exceed those in Kyrgyzstan (mostly fines to power plants). Despite this, Turkey's relatively low fuel oil to steam coal price ratio reflects Turkey's location advantage regarding access to fuel oil supplies.

3.15 From a policy perspective, the value of monitoring such international and inter-fuel price comparisons is for the purpose of evaluating comparative prices in countries which represent market outlets and potential trade and investment partners. Any nominal comparison of price levels is subject to numerous qualifying adjustments. Nevertheless, through diligent examination

of the underlying costs and perceived economic value attributed to various energy price and tax levels, such price relationships offer a useful guide for rationalizing price and tax levels internally and maintaining a competitive position in the international market. Moreover, as the resource development and related infrastructure funds are increasingly obtained from foreign sources at international cost levels, the cost-basis for balancing energy price relationships will force some of the current "transitional" distortions to more closely reflect international standards. This process will necessitate the development of timely and accurate price and cost data, including data needed for performing tariff studies, and for developing management information systems to document and monitor energy price and taxation levels internally and in the surrounding republics.

E. Taxation Principles

3.16 Since 1991, the Government has adopted a tax system which is typical of those found in the West. The major taxes include an income tax, profits tax, VAT, and excise taxes. In 1992, these four taxes accounted for 89% of total revenue collected by the Government and, based on initial estimates, 6% of total taxes were collected from the energy sector. The Parliament has continued to adopt measures aimed at broadening the tax base and achieving a high level of tax collection.

3.17 A number of basic taxation principles are relevant to Kyrgyzstan as it evolves to a more open, free-market economy. Among these are to:

1. Utilize the tax regime as a means of registering bona fide commercial enterprises and establishing administrative oversight control over commerce in a particular good or service.

2. Only impose taxes which can be uniformly enforced at a relatively low administrative cost (as a percent of proceeds).

3. Impose taxes at their point of lowest collection cost and greatest enforceability, usually at either the point of production or consumption, with the exception of customs.

4. Do not impose taxes unless they can be thoroughly enforced. Inconsistent enforcement will lead to an uneven competitive environment, penalizing legitimate enterprises at the expense of illegitimate/corrupt participants, reducing the re-investment and self-sustaining growth potential of the economy.

5. Impose severe penalties for tax fraud, evasion, and provide performance incentives to tax collectors and their agencies.

6. Provide incentives for prompt payment in the form of tax credits and lower interest charges on outstanding payments.

7. Automate tax collection and cross-check routines to improve the timeliness of tax collection, and the reliability of accusations of fraud and abuse.

8. Design and utilize taxes to internalize environmental and other economic costs or "externalities" which otherwise are not fully priced by the marketplace (e.g., emission costs, balance of payments costs, employment loss, etc.)

9. Impose targeted (i.e., fuel-specific) user taxes to create a revenue pool which can lead to self-sustaining growth. For example, dedicate the revenues from a potential excise tax on petroleum products to financing electric appliance manufacturing and distribution enterprises, projects in coal pelleting, coal mining equipment imports or manufacture, electricity distribution system investments, etc.

10. Provide tax concessions, exemptions to activities which represent a direct productive investment in a self-sustaining energy production or fuel efficiency activity, including oil and gas exploration and production, coal utilization, power service expansion or diversification. This includes exempting equipment imports for this purpose.

11. In order to stimulate foreign investment without losing control of valued national assets, create an investment tax structure which balances investor exploration and development risk and costs against expected return profiles indicative of competing international risk-adjusted rates of return. (For example, the long term expected rate of return for E&P in the U.S. may be around 5-6%, whereas in Kyrgyzstan, a risk-adjusted rate of 20-25% may have to be maintained to offset the unique political and operating risks associated with such an investment in Kyrgyzstan).

12. Utilize investment tax credits to stimulate domestic enterprise investments as well, utilizing a declining credit scheme to limit opportunities for tax abuse by non-productive enterprises.

13. Among the investment tax credit incentives, consider an initial tax holiday period, a declining tax loss carry-forward schedule, and a sliding royalty and resource tax rate, which increases with the success rate achieved.

14. Establish a VAT system which provides uniform rates and calculation methodology, including the consistent treatment of all sectors (production, processing, distribution), based on: 1) the principle of either an export - based (exports taxable and imports exempt) or import - based (imports taxable, exports exempt) incidence; 2) a consistent method for tax computation; 3) the sectors or firms exempt; and 4) the procedure for exempting a firm

15. Augment the VAT through revenue sharing and targeted development funds, rather than attempting to differentiate the VAT among regions or sectors.

16. Utilize zero-rating rather than pure exemptions for critical sectors (e.g., agriculture, health) or services for which the value added is difficult to quantify (e.g, the financial services sector).

17. Consider restricting the VAT to the pre-retail stage if it is dominated by a large number of small business (e.g., agriculture).

18. Adjust profits tax levels to reflect the degree of competition and freedom of entry into the particular business activity.

19. Use excise taxes to shift end-use priorities among fuels and consuming sectors (e.g., raise taxes on jet fuel consumption in order to finance strategic jet fuel reserves, while maintaining a relatively low rate on diesel fuel used primarily for agriculture and public transportation).

20. Maintain border tax parity via adjustments in response to changing exchange rates, but avoid "duplicative" or discriminatory tax rates with traditional trade partners.

IV. RECOMMENDATIONS

4.0 During the preparation of this study, ministries and enterprises on several occasions requested that a list of recommendations, beyond pricing and taxation, be included in the final report. Presented below for the consideration of the Government of Kyrgyzstan are several recommendations, some general in nature while others are sector specific. In most cases, the Government of Kyrgyzstan can request additional technical assistance from U.S.A.I.D., the World Bank and other international agencies in order to take the next steps necessary to implement these recommendations.

A. General Recommendations

4.1. Undertake an immediate, simultaneous survey of household, public, commercial and industrial sector energy consumption, appropriately stratified by region and urban vs. rural and other demographic and economic characteristics in order to establish a more reliable data base or "reference set" on which to base a number of immediate (emergency) and longer term energy supply and pricing strategies. These data on sectoral use would support the following types of policy decisions and emergency strategies:

a. Identify fuel mix and appliance ownership and use characteristics in order to understand the economic and physical capital stock "basis" for either switching from one fuel to another, or achieving improvements in existing appliances, or to recommend investment programs to introduce alternative fuel or more efficient (same fuel) appliances.

b. Evaluate sectoral and regional income levels in order to have a more reliable basis for making fuels price subsidy, emergency supply, targeted investment and related social protection programs in each sector, particularly the household and agriculture sectors.

c. Establish standards for efficient energy use per unit measure, such as appliance ownership, square footage, household or enterprise size (employees), etc. so that energy use efficiency standards can be developed on the basis of such numerical indicators, and so incentive programs can be designed around these standards.

d. Establish mandatory standards for weatherization, boiler efficiency, heat recovery systems, metering and heat regulatory systems, (e.g., thermostats and valves) at all industrial and large scale public and commercial buildings, including annual audits and staff training.

4.2. Establish immediate mandatory energy conservation measures such as:

a. providing credits for the purchase price of more efficient energy use technology, including appliances and meters,

b. providing free material and installation of insulation material for buildings, residences and appliances (e.g., hot water heaters),

c. creating teams of energy auditors to make field visits and advise consumers on low cost, quick pay-back investments, and increase awareness of energy benefits, including programs suggested above.

d. creating an energy efficiency center designed to promote and act as a central point for financing investments in the energy efficiency supply industry, removing tariffs on energy efficiency equipment imports and providing tax incentives, (i.e., holidays and other financial incentives, loan guarantees, low interest loans, accelerated depreciation, etc.), to bona fide domestic energy supply company operations.

4.3. Create incentives for energy use efficiency by reducing arrears obligations in proportion to the degree of energy use efficiency achieved over a given time period, relative to previous years.

Thus, if an enterprise is able to reduce consumption levels by, for example, 25% from the previous year's level over the same period, a reduction in either the absolute outstanding amount of the arrears owed, or the interest rate associated with late payment would be offered. This assumes metering capabilities, or otherwise reasonably reliable estimates of previous vs. current year usage. Such measures could be adjusted for degree days or, in the case of an enterprise, some measure of energy use per-unit output.

4.4 Examine extensive use of investment tax credits to stimulate necessary equipment and expansion needs for the energy sector, including low-end items such as meters and simple efficiency investments, and special incentives for critical end-use and supply sectors, including coal conversion, transportation and storage investments.

4.5 Develop a strategy for eliminating the arrears problem including: (a) establishing a time line for projecting the potential growth of the problem and solutions for its reduction, (b) pursuing new incentives such as providing discounts for prompt payment, (c) building arrears costs into the rate base (for heat, electricity and gas), and (d) establishing a formal customer credit facility for financing and paying down arrears.

4.6 Develop an overall strategy and timetable for eliminating fuel-specific cost subsidies by consumer class, based on realistic projected fuel costs and tax revenue "recycling" (subsidization) strategies by consumer class.

4.7 Establish "seasonal" pricing strategy for all fuels (including electricity from hydro production) which maximizes the export revenue potential during periods of domestic surplus, but which maintains incentives for conservation and effective sectoral subsidy management during periods of high use.

4.8 Allow a fixed percentage of energy cost increases to automatically flow-through gas, heat and electricity tariffs in order to avoid delays in recovering energy costs.

4.9 Energy and broad interdependence with Russia and other Central Asian republics should be recognized and cooperative trade polices should be coordinated among these partners.

4.10 The Government of Kyrgyzstan should undertake a variety of training courses and initiate formal energy data reporting and MIS procedures intended to improve reliability and to assist the tax collection and prospective revenue evaluation process.

4.11 Prioritize training needs, linked to investment and sectoral reform strategies, and develop a plan to establish in-depth training programs, including exchange programs, with immediate funding requested from donor agency grants.

4.12. The following studies are recommended:

- Re-examine fuel and electricity demand forecasts in light of recent actual price and output changes and a reasonable range of sectoral output, price and income elasticity estimates.

- Develop energy tax revenue projections using a five year time horizon, and alternative price and demand scenarios, focussing on explaining why actual revenue streams differ from forecasted levels.

- Examine depreciation methodologies, including the need to move towards a "replacement cost" base, modifications to the straight-line method, and accelerated rate structures.

- Examine the effects of the energy sector reforms, especially price liberalization, on the overall economy.

B. Crude Oil and Petroleum Products Recommendations

4.13 Create a strategic jet fuel and aviation gasoline reserve at the Bishkek, Osh and other strategic airports equal to at least one month of anticipated consumption. Finance these reserves through one or a combination of user fees on commercial jet traffic, customs duties on jet fuel imports, excise taxes on jet fuel, critical import loans from the IMF and World Bank.

4.14 The rationale for this recommendation is very basic, but its conduciveness to self-financing may not be completely evident. First, an aviation fuel reserve is desperately needed if Kyrgyzstan is to be able to entice serious international investor interest, and even interest for its most basic trade and services, such as tourism, light exports, etc. Second, Kyrgyzstan must

not be dependent on its neighboring republics for access by foreign visitors and many types of trade. A priority should be placed on renewing commercial access by air on a regular basis (e.g., at least twice weekly), and on supporting indigenous business and official travel within the country to support Kyrgyzstan's basic development and investment needs. Put simply, investors must have access to Kyrgyzstan's resources, the numerous site visits and logistic planning obviate the need for aviation fuel to allow for indigenous travel and supply movements, particularly in a nation characterized by largely mountainous terrain and long (or often blocked) overland routes.

4.15 The reserve's financing could be not only self-sufficient, but possibly a source of revenue if handled properly, and if supported by market conditions. To demonstrate this, assume that Kyrgyzstan pays a market price for imported jet fuel of (e.g., 90,000 Rs/ton), relative to a free market equivalent of approximately 200,000 Rs/ton (or $0.62/gallon). By charging foreign travellers the full difference for in-country commercial plane and helicopter use of aviation fuel, a substantial portion if not all, of the carrying cost (storage + interest) could be covered. Any difference could be covered by a fixed user charge on air traffic or a fuel tax of as little as 10-20 percent over the market price. Assuming that the 30 day reserve of aviation fuel turns over in inventory at least twice monthly, such a fee (or its equivalent) should at least cover monthly carrying costs on the inventory. Furthermore, because fuel prices are only likely to escalate over the next few years, the appreciation in the price of the fuel alone (e.g., for non-foreign consumption) is likely to finance a good portion of the reserve's carrying cost. We view this as a vital and immediate need to take control of a particular fuel supply and its pricing structure to support Kyrgyzstan's immediate development objectives across a number of sectors.

4.16 Utilize the revenues resulting from a customs duty on refined product imports, or an excise tax on all (non exempt) domestic refined products to finance the creation of strategic reserves for other refined products, such as gasoline, diesel fuel and mazut.

4.17 These reserves would have a variety of uses, including provision for emergency heating, transport and power generation needs, but would not be restricted to such uses. In particular, the reserves could be resold (at higher prices) to commercial or foreign consumers, and could be used to effect location exchanges around the country to optimize sales value relative to transport costs and local market conditions. For example, supplies could be offered in Bishkek in exchange for an equal volume in Osh, then resold to commercial users in Osh at a higher (than official price) in order to generate a return on the inventory holding. In essence, this is the function of the black market in a price-controlled fuel economy. We simply recommend that the Government of Kyrgyzstan (e.g., through Kyrgyzneftiprodukt) get involved in this sort of market optimization for select commercial applications. As with the aviation reserve, financing could come from a variety of sources other than the fees suggested, including IFI loans and revenues generated from inventory appreciation. Such a reserve should also be utilized to buy fuel in advance of anticipated peak use periods (e.g., winter for mazut, spring for transport fuels).

4.18 Take drastic measures to regain control of the petroleum product import markets by requiring documentation and proof of tax payment, imposing stiff fines and terminating license privileges for non-compliant operators and end-users, and by providing incentives to customs or other Government agents in enforcing petroleum product registration.

4.19 Given the total dependence on imported petroleum supplies, it is imperative that the GOK fully internalize this cost of dependency through tax and related measures to insure market and fiscal discipline. Over the past 18 months Kyrgyzneftiprodukt has lost significant market share to independent operators and end-users importing directly. These actions are motivated by the need to acquire petroleum supplies at the lowest possible price and in the most expedient manner. These objectives alone are understandable. However, the full cost to the economy of un-reported fuel imports should not be overlooked. Indeed, effective border surveillance and duty collection is crucial to developing a self-financing petroleum supply policy to meet both emergency needs and longer term development requirements.

4.20 Lease or sell Kyrgyzneftiproduct's under-utilized or strategically less important storage, transport and distribution assets on a regional (oblast) basis to registered companies in order to logically down-size and rationalize the cost structure of "KNP's" operations, while at the same time introducing a larger "documentable" private sector role in petroleum product distribution and marketing.

4.21 This effort to move more of KNP's assets into the legitimate private sector should improve operational efficiencies, provide the GOK with a more reliable tax base for collections from the private supply sector, and will provide income to the GOK to finance some of the immediate oil purchase and storage functions identified.

4.22 Negotiate improved terms of trade with Fergana Refinery for the ongoing crude oil for petroleum product trade arrangement, whereby Kyrgyzstan sells the Fergana refinery roughly 100-120 MT/annum of crude oil priced at 60% of world equivalent prices and receives back 45-50 MT/annum,priced at official Uzbek refinery gate prices.

4.23 The product volume and quality slate of these "returned" barrels are not sufficient to bring the terms of trade to an equal value basis, and steps must be taken to reduce Kyrgyzstan's captive condition with respect to its limited crude oil market outlets and totally dependency on imported products. The estimated cost of this "captivity" is high. Two simultaneous approaches are recommended to overcome this situation:

- link the terms of trade to the provision of water supply and electricity pricing terms;

- solicit a variety of bids for a proposed domestic field-site refinery sized to process current production levels, up to potential regional production levels. This action should be taken to introduce a measure of competition into the terms currently proposed by Aztec Four Star of the U.S. (reportedly with refinery construction contingent on oil field concessions and the dedicated access to produced volumes in excess of current levels).

4.24 A spreadsheet analysis of the current terms of trade and potential return on a field-sized (2,000 -6,000 B/D) refinery is shown in Appendix II. The analysis demonstrates that the "implicit" cost of the petroleum trade approaches $2 million per year at current volumes. Relative to this annual "costs", the estimated economics of various field-sized refinery investments are assessed, assuming a 10 year financing period and various discount rates. At current production levels, the annualized cost of a refinery investment is estimated to break even at an implied discount

rate of about 18 percent. However, if the volume of crude oil production were increased appropriately (e.g. doubled to 4,000 B/D), the annual benefit exceeds the annualized cost by a safe margin, even at high (20 - 25 percent) discount rates. Therefore, the recommendation to re-negotiate also recognizes the need to link the refinery investment decision to E&P production incentives, as is currently being considered with at least one U.S. company.

4.25 Pursue a feasibility study which examines the oil production potential of the Osh district, coupled with a costing and sizing study to examine the optimal size and configuration of a small scale field refinery. See Appendix II.

4.26 Undertake a detailed evaluation of the potential returns achievable from Kyrgyzstan's participation in the proposed Chimkent-Almaty refined product pipeline project.

4.27 This analysis will involve an assessment of the appropriate size, potential fuel mix, volumes and unit transport cost reductions (on a life cycle cost basis) of the proposed system, focussing on the spur line into Bishkek. The incremental cost of this spur line should be modest in comparison to the overall project cost, given the distances required (50-75 km) off the main line into Bishkek, relative to the total project size (approximately 700 km). Benefits are quantifiable in terms of reduced transport expenses and improved product supply access and reliability terms. The latter would result in improved tax collection and inventory planing. Reductions in transport cost have to be evaluated on the basis of projected rail and truck transport rates relative to the expected pipeline tariff needed to recover the spur and associated main line capital and O&M costs.

4.28 A sample spreadsheet analysis of the proposed pipeline (spur line and storage) project economics is also provided in Appendix II. The analysis assumes 10,000 B/D of light product capacity operating at a 50 percent utilization level. Current overland (truck and rail) transport costs are assumed to rise to 60 percent parity with comparable western standards. Life cycle costs of the proposed spur line and Bishkek -- based breakout storage are assumed to be covered by the associated tariff. The cost is compared to the overland cost alternative to arrive at an annual estimated potential savings (benefit). The resulting net gains are positive from the first year under this analytic structure, with total investment costs recovered by gross cumulative savings by year six.

4.29 Increase petroleum prices to levels which fully reflect the import purity price of fuels, and impose taxes at least sufficient to capture the additional cost of infrastructure improvements, expansions and the additional economic costs of import dependency.

C. Natural Gas Recommendations

4.30 Include the cost of credit and allow capital investment cost recovery, including crucial metering and compressor station needs, in the natural gas tariff/rate base.

4.31 Provide rate incentives to municipal and domestic gas users based on gas use/conservation progress, equal to some portion of the difference between industrial and domestic gas tariffs.

4.32 Develop gas service cost estimates based on use sector, location, use characteristics so that gas service costs (including capital infrastructure costs) can be allocated among consumer classes, and the degree of cross-subsidization will be more quantifiable.

4.33 Once this cost allocation is know, initiate a tariff structure based on cost of service, with the goal of lowering industrial relative to domestic prices, and encouraging growth in industrial gas demand.

4.34 Seek to upgrade Kyrgyzgas' infrastructure by allowing foreign investment (particularly from Turkmen, Uzbek, Kazakh or Russian sources) in Kyrgyzgas, possibly through offering portions of the distribution network for sale, thereby creating a mutual interest in maintaining market outlets and infrastructure through an integrated operations perspective. Also, consider allowing direct contract negotiation between large industrial buyer's and foreign suppliers of gas as a means of lowering delivered prices.

D. Coal Recommendations

4.35 Commercialize the existing coal enterprises concentrating on modernizing and expanding the most economic mines while closing the uneconomic mines. The aim is to create viable coal mining companies driven by the incentive to make profits. Operation of costly and uneconomic mines must be stopped. The following additional information is required to evaluate the economics of all of the major Kyrgyz's coal mines: capacity, reserves, employment and the type of mining method employed at each mine. An evaluation of the cost of the distribution system needs to be examined more carefully. The potential for each mine expanding its capacity to a minimum threshold level is critical. A coal mine must have sufficient reserves to amortize and pay a competitive rate of return on the required investment. Also this evaluation should take into account the fact that the largest single customer is likely to continue to be the Bishkek Power Plant. The effects of a royalty tax of 5-10% at the mine mouth should be assessed.

4.36 Coal prices should be based on the principles of full cost recovery. Coal prices should be set at a level which fully recoup transportation, production and upgrading investment costs. Each coal mine must be evaluated in terms of its production costs, distance and transportation costs to the power plant or other end user, and its competitive position to supply a particular end use market.

4.37 A central cost recovery issue for all fuels is the accurate costing of transportation, whether by rail, truck, or pipeline. Data suggest that recovery is substantially understated with respect to the primary means of transportation in Kyrgyzstan. A cost of service analysis for the movement of coal and oil products by rail, trucks and barge is recommended. Such a study will permit Kyrgyzstan to appropriately cost a service of each of these means of transportation as well as to evaluate intermodal transportation investment priorities.

4.38 Due to the relatively small amount of coal reserves in Kyrgyzstan compared to Kazakhstan and Russia, and poor average quality, export potential of Kyrgyzstan's indigenous coal supply is somewhat limited. The most important external markets appear to be Uzbekistan and potentially China. A cost effective method of agglomerating coal fines is critical to assist

in supplying an increasing amount of coal to the rural population. Binderless briquetting of coal fines offers a practical method of transforming low value coal fines into more desirable, valuable and shippable forms. Bituminous and sub-bituminous coals can be briquetted without a binder provided the proper conditions of temperature, moisture content and particle size are maintained. Roll type briquetting machines are available in capacities ranging from 5 to 50 tons per hour. Samples of coal fines need to be supplied to potential manufacturers in order to arrange appropriate laboratory tests. An evaluation of purchasing briquetting machinery needs to be undertaken immediately. Undertake a feasibility study to evaluate the economics and potential regional and sectoral penetration of such a briquette production and marketing initiative. Shown below are some preliminary estimates:

Machine capacity	Machine cost in Illinois	Total Maximum Process Installation Cost in U.S.
1 to 5 Tons per hour	$ 75,000	$ 300,000
5 to 10 Tons per hour	$200,000	$ 600,000
10 to 20 Tons per hour	$450,000	$1,800,000

4.39 Pursue strategies to ensure the availability of the necessary equipment and supplies critical to the ongoing operation of coal mines. Last year 40% of the mines were idle due to a lack of wood supports, lubricants and other equipment. One option would be to allocate a portion of the rehabilitation loans to the purchase of critical supplies. A second option would be to develop mutually beneficial trade relations with neighboring countries, including China. An exchange of Kyrgyz electricity for the required critical equipment and supplies from China should be assessed.

4.40 Establish an exchange program between the Consortium for Fossil Fuel Liquefaction Science in the United States and the appropriate university in Kyrgyzstan. The principle goal of this consortium would be to develop new and improved methods of converting coal to liquid transportation fuels, focussing on direct coal liquification. This exchange program could be arranged with either the consortium directly or with other exchange and scholarship programs being funded by the United States Government, including the United States Information Agency.

E. Electric Power Recommendations

4.41 Kyrgyzstan's energy sector is characterized by a relatively low level of electrification relative to hydro electric power production capacity and potential. As a result, substantially more fossil fuels are used for direct heat and related needs in rural and household settings than is necessary. In the short term, the GOK (through the State Energy Company) should increase domestic and rural/agriculture sector electrification, financing this effort from general revenues and higher electric tariffs. Rates to the household sector, in particular, should be raised, absolutely and in relation to industrial users, and a general investment tax credit across the board should be considered to finance an accelerated electrification effort.

4.42 Initial plans are to electrify 100,000 households over the period of 1993-95, displacing 500,000 tons of coal and 20,000 TOE of natural gas. Ultimately, the objective is to electrify an additional 30 percent of the population, or close to 270,000 households, assuming an average

of five persons per household. The potential payout from this accelerated electrification can be gained by evaluating the cost of displaced fossil fuels to the household and agriculture sector, taking into account the volume of fossil fuel displaced on a net useful energy basis, and the additional economic benefits related to electrification. Additional analysis needs to be performed on the cost and efficiency of electric appliances relative to the displaced fossil fuel units, and the potential market for electric appliances for heating, cooking and hot water systems.

4.43 Parallel to the intensified electrification effort, financial incentives in support of electric appliance supply companies should be established in order to insure that electrification is accompanied by adequate accesses to appliances. The initial cost of these appliances could be subsidized, then recovered through increased tariff charges over their useful life.

4.44 In order to accommodated a larger electric distribution network, priority should also be placed on constructing small sub-stations, transmission lines, installing local transformers and associated facilities. The materials to support this effort should be viewed as critical imports, and the cash flow needed to repay these costs should also be shared between general revenues and higher tariffs.

4.45 To provide a market for Kyrgyzstan's substantial hydro-electricity potential, and to ease in the distribution of the costs of electrification, Kyrgyzstan's industrial policy should be structured to provide incentives for electricity-intensive mining and industrial operations to locate in Kyrgyzstan. Examples include gold, cesium and other rare metals, including uranium, mercury, textiles, food processing, consumer and electrical appliances. Low electricity prices, combined with tax and repatriation incentives should be combined to expand the industrial base, and create a larger, self-sustaining market for potential large and medium scale hydro plants.

4.46 Efforts to specify the cost and potential market and return on large, capital-intensive priority hydro generation projects should be undertaken immediately so that the project economics and potential financial returns to the State Energy Company, as well as outside investors can be realisticly appraised. These efforts, initially directed at the completion of Shamaldy-Say, and the two unfinished units of Kambar-Ati, should combine engineering assessments of optimal configuration, and supportive transmission system investment needs, with economic assessments of the necessary tariff rate recovery required to make the projects ultimately self-financing.

4.47 The projected growth in Kyrgyzstan's hydro-electric demand, and the potential export market volumes are threatened by a looming bottleneck in transmission system capacity. Outside investors should also be encouraged to participate in the construction and finance of the large substations and transmission lines needed to support electrification and a larger export market. These projects should also be preceded by extensive project feasibility analysis, utilizing external funding sources when possible. An immediate opportunity, for example, is provided by the increased sizing of the export line into China.

4.48 Tariff reform should immediately begin in Kyrgyzstan with an increase in the allowable depreciation rate and the utilization of replacement costs in order to more fully reflect the cost of continued service and the system expansion needs outlined above. Particular attention

should be given to balancing the rate between household and industrial customers, and supporting this effort with customer class-based cost accounting. As an intermediate goal, the total weighted average tariff should at least recover short-run marginal costs (including higher depreciation and finance charges), and in the longer term (e.g., 2000), the objective should be to recover full long-run marginal costs, including capital costs, peak service costs, debt service, foreign currency costs and externalities.

4.49 Within this overall objective, rates should be varied according to seasonal costs, including the opportunity costs represented by export markets and the need to supplement hydropower with thermal generation to meet peak requirements. Time of use tariff adjustments should also be introduced simultaneously with an information campaign on energy costs and efficiencies of use (e.g., corresponding to the electrification and appliance manufacturing initiatives).

4.50 Customers of the State Energy Company, including the large thermal plants in Bishkek and Osh should be required to pay a full commercial price for electric power (and to receive this price in return). This cost should be recovered through higher rates and more efficient operation of the thermal (district heating) plants.

4.51 Prices (tariff structure and level) should be based on economic costs and insure financial viability of the operating enterprise. A large majority of the total costs of a network energy system is capital and at this time there is a great uncertainty in estimating the capital costs. An effort must be made to estimate future capital costs recognizing the uncertainties associated with the sources (traditional former Soviet, higher cost Western or lower costs international sources) and the performance characteristics of the equipment. Another uncertainty is demand for electricity and whether in the near to medium term whether there will be any need for additional generation capacity. However, at some point the existing system will have to be replaced and/or increased. Consequently, a methodology must be developed to include the capital costs of providing incremental capacity for the entire system: generation, transmission, and distribution. The average incremental costs methodology, a proxy for long run marginal cost, should be employed in developing long run pricing guidelines for the State Energy Company.

4.52 Kyrgyzstan's tariffs, for both electricity and district heat, are well below international prices and in the case of households, dramatically below. Not only are increases in the tariff level needed but a shift in structure in relative prices needed to be even more dramatic. Household (low voltage) tariffs have recently been increased to about 55 percent of the average industrial tariff. Over time as a cost of servicing is incorporated into the tariff structure, low voltage tariffs will be about 50 percent higher than industrial high voltage tariffs based on current conditions in most OECD economies. Tariffs will clearly increase as Kyrgyzstan continues to pursue greater market liberalization. Tariff increases in any one year should not result in network energy costs exceeding some percentage of representative household income. In the case of poor households and those on fixed incomes, a special consumer category offering lower rates for limited service is warranted.

4.53 A comprehensive tariff study should be undertaken for both heat and electricity. The emphasis should be on methodology and institutionalization of the methodological capability within the State Energy Company. Until this study is undertaken, the immediate pricing strategy

should be to set tariffs such that the following items are included: all ongoing operating costs, maintenance, system replacement and repair, but not expansion costs. This will permit financial viability without deferring any necessary repairs or replacements such that system capacity decreases by default.

4.54 Kyrgyzstan should immediately pursue long term contacts to supply power to southern Kazakhstan and with other neighboring republics in the more distant future. The development of the Xinjiang region of China as a growing export market should also remain a goal.

APPENDIX I
KYRGYZSTAN ENERGY DEMAND

Energy Demand Outlook

Forecasts of energy demand are critical inputs to strategic planning by the Government's ministries and enterprises, especially in setting investment priorities. Reflecting conditions in formerly planned economies, the structure of Kyrgyz energy demand is substantially different from that of Western industrialized countries. Over the longer term, restructuring and expected efficiency improvements in Kyrgyzstan will reduce the share of industrial energy use and higher personal incomes and economic growth will increase the share of transport fuel use. Economic restructuring, together with market oriented energy pricing and efficiency improvements, will result in patterns of energy growth very different from extrapolations of past trends.

The level of demand in the year 2000 and beyond will be significantly affected by the 1) timing of resumed economic growth, 2) the average growth rate experienced during the next 7 years, and 3) the extent to which efficiency improvements are implemented. With such major uncertainties, it would be prudent to undertake a study of Kyrgyzstan's long term energy demand which develops alternative projections of demand, incorporating different assumptions of key variables. Such a study would complement the work presented in the Government of Kyrgyzstan's report, " The Energy Program of Kyrgyzstan", which presents only one set of projections that, in general, appear overly optimistic. As shown in Table 1, all of the projections for energy demand between 1993-2010 are largely extrapolations of past trends.

Long term projections of energy demand can be developed by using either a bottoms-up or top-down approach. The bottoms-up approach is based on the compilation of substantial detail at a micro level while the top-down approach is based on using ~~some~~ a simple ratio methodology. One top-down approach is based on combining projections of consumption per capita with projections of population. The other approach is based on projecting consumption per unit of gross domestic product and projecting gross domestic product. During this period of extreme structural changes and collapse in the overall economy in Kyrgyzstan, probably the better top-down approach to use is the former.

Table 2 presents consumption ratios in tons of oil equivalent per person for electricity, coal and oil products for Hungary, Mexico,. Pakistan and Kyrgyzstan. Table 2 suggests that energy consumption per capita, with the possible exception of electricity, will decline for the next few years until economic conditions stabilize and economic growth resumes.

As shown in Table 3 the Ministry of Economy and Finance has lowered, in a September update, its energy demand projections for electric power, petroleum products, coal, and natural gas. Also, as shown in Table 3, other forecasts done by consultants for the European Bank for Reconstruction and Development and by the Harza Corporation suggest that electric power demand in 2000 will be considerably lower than the original projection suggested in the Kyrgyz Energy Program report.

Each sector will also have special factors influencing long-term demand. Electricity

demand will be affected by the rate of electrification of households and by the development of electric intensive industries in the overall economy. Coal demand will be affected also by the rate of electrification and the long-term, base load operations at the Bishkek PHP#1. Petroleum product demand will largely be affected by increases in personal wealth, increased mobility and the accessibility of petroleum products. Finally, natural gas demand will be affected by government policies, including foreign ownership and participation in the delivery and distribution of natural gas.

Table 1
KYRGYZSTAN ENERGY DEMAND*

	1980	1990	1991	1992	1993	1995	2000	2010
Electric Power, mil Kwh	6237	9257	9762	9760	10240	11817	17410	27768
Coal, thous tons	4370	4880	4400	4300	4300	4700	5300	6400
Natural Gas, mil cubic meters	1149	2136	2214	1947	2200	2600	3200	3200
Liquified Natl. Gas, thous tons	67	116	125	80	80	110	130	150
Petroleum Products, thous tons	2047	2675	2385	1470	1660	2070	2350	2750

Note: * As presented in Energy Program of Kyrgyzstan, 1992

Table 2
Consumption Ratios (in toe per person)

	1980	1987	1988	1989	1990	1991
Electricity per capita						
Hungary	201.71	260.90	261.63	263.91	258.14	242.94
Mexico	67.95	87.28	90.79	90.85	91.96	92.78
Pakistan	11.86	24.15	25.32	27.06	27.56	28.14
Kyrgyzstan	0.15	–	0.18	0.18	0.18	0.19
Coal per capita						
Hungary	824.88	802.60	776.56	692.67	651.89	624.18
Mexico	35.60	44.48	41.13	44.46	42.32	39.50
Pakistan	11.84	17.19	18.18	17.29	16.96	17.36
Kyrgyzstan	0.85	–	0.76	0.77	0.78	0.70
Oil/Oil Product per capita						
Hungary	1077.23	1036.29	888.77	823.38	809.31	719.25
Mexico	903.34	913.96	902.41	942.46	946.18	995.58
Pakistan	64.49	88.28	92.66	94.14	99.54	97.28
Kyrgyzstan	0.58	–	0.60	0.60	0.62	0.55

Source: OECD/IEA
Date: August 1993

Table 3
KYRGYZSTAN ENERGY DEMAND

	1993	1995	2000
Electric Power, mil Kwh			
Kyrgyz Energy Program	10240	11817	17410
Ministry Update	9980	10350	
EBRD	7954	8700	11000
Harza			12000
Petroleum Products, thous tons			
Kyrgyz Energy Program	1660	2070	2350
Ministry Update	1300	1450	
Coal, thous tons			
Kyrgyz Energy Program	4300	4700	5300
Ministry Update	3000	3500	
Natural Gas, mil cubic meters			
Kyrgyz Energy Program	2200	2600	3200
Ministry Update	1354	1545	

Source: Energy Program of Kyrgyzstan, Ministry of Economy and Finance
Date: Sept 1993

APPENDIX II
PETROLEUM PROJECT ECONOMICS

Evaluation of Prospective Economics of a "Field Scale" Refinery (Relative to Current Crude for Products Terms of Trade Between Kyrgyzstan and Uzbekistan).

Cost Structure of Proposed Small Refinery

Cost Item:	Unit Capacity: (barrels/day) (ton/annum)	2,000 98,649	4,000 197,297	6,000 295,946
Initial Capital Exp.:				
Topping Plant		2,500,000	3,100,000	3,500,000
Naphtha Stabilizer		2,000,000	2,400,000	3,000,000
Total Cap. Exp.		4,500,000	5,500,000	6,500,000
Transport Costs:				
Vessel		400,000	500,000	600,000
Train		80,000	100,000	120,000
Total Transport		480,000	600,000	720,000
Site Prep. & Unit Erection Costs ($850/day over 4+ mos. + travel,per diem)		109,200	117,700	126,200
Total Fixed Cost		5,089,200	6,217,700	7,346,200
Amortized Over 10 Years at Discount Rate (DR):				
0.15		763,380	932,655	1,101,930
0.20		1,017,840	1,243,540	1,469,240
0.25		1,272,300	1,554,425	1,836,550
Operating and Maintenance Cost		190,845	233,164	275,483
Total Annual Costs (@ 0.15 DR)				
0.15		954,225	1,165,819	1,377,413
0.20		1,208,685	1,476,704	1,744,723
0.25		1,463,145	1,787,589	2,112,033
vs. Benefits @ Alt. Assumed Volumes:				
B/D s/Annum				
	MB/D	2	4	6
	Tons/Annu	100	200	300
	Annual Benefit	1,057,500	2,115,000	3,172,500

Conclusion: Attractive to Build at 2 MB/D, assuming a DR of <= 17%, or if crude oil production volumes can substantially exceed 2 MB/D, enabling move to a larger refinery unit.

Evaluation of Prospective Economics of a "Field Scale" Refinery
(Relative to Current Crude for Products Terms of Trade Between Kyrgyzstan and Uzbekistan)

Structure of Crude Oil for Refined Product Trade Between Kyrgyzstan and Uzbekistan

Crude Oil to Uzbekistan:

Volume:	(mt/year)	100,000	120,000
Price:* ($/ton)		Value:	
$71.05		$7,105,000	$8,526,000

Products from Uzbekistan:

	Price** ($/mt)	Value:	
Total:		45,000	50,000
Yields:			
Light Ends (30-35%)	126	$1,980,000	$1,885,714
Mazut (45%)	71	$1,437,750	$1,597,500
Bitumen (4%)	80	$144,000	$160,000
Lube Oils (4%)	90	$162,000	$180,000
Other (8%)	85	$306,000	$340,000
Loss (4%)	0	$0	$0
Total Value		$4,029,750	$4,163,214
(Per ton)		$90	$83
Opportunity Value***		$8,955,000	$10,408,036
(Per ton)		$199	$208
vs. Crude Cost		$1,850,000	$1,882,036
Implicit "Processing Fee"			
(Per ton)		$41	$38
vs. Free Market Standard		$17.50/ton	$17.50/ton
Implicit Annual Cost of Trade****:			
(per ton)		$23.50	$20.50
(total)		$1,057,500	$1,025,000

* Assumes world price equivalent of $16/barrel. Kyrgyzstan receives 60% of this value.

** Assumes exchange rate of 700 Rs/$. Price = Uzbek import price less transport cost.

*** Assumes full crude yield volumes retained at price = Uzbek refinery gate price.

**** Makes no adjustment for relative transportation cost incurre for crude oil moved to Uzbekistan vs products into Kyrgyzstan

Rudimentary Refined Product Pipeline Project Economics: Spur Line from Kazakstan (Chimkent–Almaty) to Bishkek

Assumptions:

1. 50 km spur
2. Capacity designed for 10,000 b/d (8–10" line), roughly 90% of 1992 light product import volumes from Russia and Kazakhstan, and about 10% of Chimkent refinery output.
3. System operates at an avg. of just 5,000 b/d (222,000 tons/annum).
4. Truck and rail costs currently 1,000 Rs/ton, or roughly $1/ton or $0.15/barrel = about 10% of western standard, costed at 60% of western standard starting 1994.
5. Pipeline tariff = 1.9 cents/gallon or $0.80/barrel, reflecting requisite cost recovery, including breakout storage cost ($0.21/bbl.)
6. Pipeline installed cost estimated at 20% of U.S. standard of $330,000/mile.
7. Difference in fully costed pipeline vs. truck/rail alternative = $0.46/barrel, assuming 60% of western cost standard for rail & truck.
8. Results in six-year payback period under these assumptions.

Analysis of Kyrgzstan Pipeline Spur from Proposed Chimkent–Almaty System

Year	Pipeline Investment $	Storage Facilities $	Total Levelized Payment $/Annum	O&M (@10%) $/Annum	Volumes Per Annum (Tons)	Total Cost Levelized (Per Ton)	(Per bbl.)	vs.	Fully Costed Truck & Rail Alternative (Per bbl.) (60% of west)	Savings (Per bbl.)	(Total)	Cum. Savings	Cum. Outlays	Net Gain
Initial	2,860,000	1,500,000	4,360,000		222,973									
1994	429,000	225,000	654,000	65,400	222,973	3.23	0.46		1.26	0.80	1,318,491	1,318,491	719,400	599,091
1995	429,000	225,000	654,000	65,400	222,973	3.23	0.46		1.26	0.80	1,318,491	2,636,983	1,438,800	1,198,183
1996	429,000	225,000	654,000	65,400	222,973	3.23	0.46		1.26	0.80	1,318,491	3,955,474	2,158,200	1,797,274
1997	429,000	225,000	654,000	65,400	222,973	3.23	0.46		1.26	0.80	1,318,491	5,273,966	2,877,600	2,396,366
1998	429,000	225,000	654,000	65,400	222,973	3.23	0.46		1.26	0.80	1,318,491	6,592,457	3,597,000	2,995,457
1999	429,000	225,000	654,000	65,400	222,973	3.23	0.46		1.26	0.80	1,318,491	7,910,949	4,316,400	3,594,549
2000	429,000	225,000	654,000	65,400	222,973	3.23	0.46		1.26	0.80	1,318,491	9,229,440	5,035,800	4,193,640
2001	429,000	225,000	654,000	65,400	222,973	3.23	0.46		1.26	0.80	1,318,491	10,547,931	5,755,200	4,792,731

APPENDIX III
ENERGY SECTOR DATA

APPENDIX III

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Table 1

Macroeconomic indicators and estimated household energy expenditures

	Units	1991	1992	1993 projected
Gross National Product	Bn Rb	28.6	210	1065
Personal Income	Rb/capita	2500	10597	43102
Population	Th.people	4421	4484	4545
Estimated household coal expenditures	Rb/capita	28	600	10800
Estimated household liquiefied gas expenditures	Rb/capita	4.7	80	690
Estimated household natural gas expenditures	Rb/capita	12.1	95.4	754.6
Estimated household electric power expenditures	Rb/capita	13.16	65.3	970
Estimated household heat expenditures	Rb/capita	80	333	1800
Estimated household petroleum products expenditures	Rb/capita	9	188	2517

Source: Ministry of Economy
Date: May 1993

TABLE 2

Production of Krygystan Energy

	unit	1990	1991	1992	1993 projected
Electric power	mil.kwt	13370	13972	11791	12436
Crude oil	thous.ton	155	142.7	113	120
Natural gas	mil.cubic m.	96	83.1	72.4	55
Coal	thous. m	3742	3483	2151	3300

Source: Ministry of Energy
Date: May 1993

Table 3

Petroleum and other fuels imported into Kryrghyzstan under the Trade & Economy Cooperation International Agreement for 1993

Product	Units	Russia	Tatarst.	Bash- Kirstan	Kazakhstan	Uzbekistan	Tajikistan	Turkmenistan	Azerbaijan	Total
Motor gasoline	T.Th	250	-	150	50	55	-	-	-	505
Diesel fuel	T.Th	70	50	150	90	85	-	-	-	445
Mazut	T.Th	160	100	149	105	265	-	17.5	-	796.5
Jet fuel	T.Th	6	-	3	25	5	-	-	-	39
Automobile oil	T.Th	-	-	3.8	-	2	-	-	-	5.8
Diesel oil	T.Th	6.5	-	3	-	0.055	-	-	5	14.555
A Oil	T.Th	0.2	-	-	-	-	-	-	-	0.2
Natural gas	BCM	-	-	-	-	-	-	2.26	-	2.26
Liquefied gas	T.Th	50.8	-	-	-	-	-	-	-	50.8
Coal	T.Th	400	-	-	1560	26	13.9	-	-	1999.9

Source: Ministry of Trade and Material Resources
Date: May 1993

Table 4

Taxes and other payments
(Actual receipts in Mn of Roubles)

	1992	01-Apr-93
VAT - Total	7854.1	6673.3
energy sector	656.4	699.3
Profit tax	7501	6417
energy sector	479.9	327.3
Income tax collected by enterprises	2482.8	1639.6
energy sector	111.8	103.8
Property tax	-	35.2
energy sector	-	9.6
Road tax	1003.8	927.8
energy sector	16	96.1
Additional incomes tax	5.9	15.4
energy sector		
Excise tax	2825.2	1155.9
energy sector	123.1	55.1
Forestry Tax	0.4	0.6
energy sector		
Profit tax from collective farms	50.4	251.9
energy sector		
Tax imposed on owners of transport	8.2	1.7
energy sector		
Labor Tax imposed on collective farmers	99.4	-
Income tax imposed by Tax Inspections	38	16.1
energy sector		
State duty	128.6	30.7
Payments for water	7	3.8
Land tax	123.1	55.1
energy sector	0.9	0.04
Turnover tax	628.5	-
Sales tax	180.7	
Fees and non-tax payments	398.8	221

Source: Ministry of Economy
Date: May 1993

Table 5

Kyrgyz Crude Oil (Rb/ton)

	Jan 92	Jun 92	Sep 92	Oct 92	Nov 92	Dec 92	Jan 93	Feb 93	Mar 93
Suppliers Price	594	594	2398	2398	2398	13824	22334	22334	22334
Tax	230	230	930	930	930	5376	4467	4467	4467
Production Costs							9567		
Transport Expenses	4.7	26.8	89.42	68.81	63.26	857.37 *	250	250	250

* includes year–end charges

Source: Kyrgyzneft
Date: March 1993

Table 6

"Kyrgyzneft" Production Association's
Oil Certificate of quality characteristics

1. Temperature at oil selection	40	Degree C
2. Density at selection	861	kg/cu m
3. Chlorine salt content	40	g/liter
4. Water Content	0.1	%
5. Mechanical admixture content	0.02	%
6. Sulfur content	Trace	
7. Pressure of saturated steam 1756–52 mm, merc (column), GOST*	103.82	

Oil Group, GOST–9965–76

* GOST – State All–Union standard

Source: Ministry of Energy / "Kyrgyzneft" Production Association
Date: May 1993

Table 7

Petroleum Products
ruble/ton except as noted

	Jan 92	Jun 92	Sep 92	Oct 92	Nov 92	Dec 92	Jan 93	Feb 93	Mar 93
Gasoline									
I. Purchase price* from Kazakhstan	1352	10199	13600	30273	30273	44438	58761	82200	82200
tax	260	2232	2976	6622	6622	9723	9795	13700	13700
transportation expenses	–	–	–	–	–	–	–	–	–
II. Purchase price from Russia	1352	8840	12500	22645	24345	32265	85000	85000	85000
tax	260	1657	2400	4230	3312	6229	11724	11724	11724
transportation expenses	–	–	360	780	780	780	1560	1560	1560
III. Purchase price Uzbekistan	–	–	–	43783	43783	60000	118154	118154	118154
tax	–	–	–	8392	8392	8392	21483	21483	21483
transportation expenses	–	–	–	200	200	200	400	400	400
IV. Local sale price	1750	11500	15640	32306	33700	40526	40526	106250	106250
tax	383	2217	3016	5469	6368	7786	7786	16373	16373
storage expenses	–	–	–	–	–	–	–	–	–
transportation expenses	51	51	460	698	698	698	1420	1420	1420
Diesel Fuel									
I. Purchase price from Kazakhstan	–	8077	–	24700	27724	43431	56640	50138	50138
tax	–	1767	–	5404	6064	9568	9442	7960	7960
transportation expenses	–	–	–	–	–	–	–	–	–
II. Purchase price from Russia	–	7138	–	19376	25000	32000	68000	68000	68000
tax	–	1345	–	3629	4575	5928	11336	11336	11336
transportation expenses	–	–	–	780	780	780	1560	1560	1560
III. Purchase price from Uzbekistan	–	–	–	37711	37711	54000	99074	99074	99074
tax	–	–	–	7252	7252	12461	18013	18013	18013
transportation expenses	–	–	–	200	200	200	400	400	400
IV. Local sale price	1644	10300	13250	27220	33780	38775	38775	85000	85000
tax	360	2138	2751	4689	5960	7410	7410	14170	14170
transportation expenses	51	51	460	698	698	698	1420	1420	1420
V. Industrial/Commercial sale price	1644	10300	13250	27220	33780	38775	38775	85000	85000
tax	360	2138	2751	4689	5960	7410	7410	14170	14170
storage expenses	–	–	–	–	–	–	–	–	–
transportation expenses	51	51	160	698	698	698	1420	1420	1420
Mazut (fuel oil)									
I. Purchase price from Kazakhstan	521	4255	4287	–	11049	21180	–	23909	23909
tax	114	931	938	–	2417	4634	–	3985	3985
II. Purchase price from Russia	600	3808	3808	–	11766	–	34000	34000	34000
tax	131	833	833	–	2574	–	5670	5670	5670
transportation expenses	–	–	360	–	780	–	1560	1560	1560
III. Purchase price from Uzbekistan	–	–	5659	–	20000	27701	71880	71880	71880
tax	–	–	1244	–	4615	5327	13069	13069	13069
transportation expenses	–	–	60	–	380	380	760	760	760
IV. Industrial/Commercial sale price	808	3870	5805	14708	17632	29532	29532	42500	42500
tax	177	246	1271	3218	3858	6186	6186	7085	7085
storage expenses	–	–	–	–	–	–	–	–	–
transportation expenses	51	51	460	698	698	698	1420	1420	1420

* Note: Purchase price includes tax

Source: Kyrgyzneftproduct
Date: March 1993

Table 8

Regional Petroleum Product Prices
(Roubles/mn ton)

	Jan 92	June 92	Sep 92	Dec 92	Jan 93	Mar 93	June 93
Gasoline							
Bishkek	1750	11500	15640	40526	40526	106250	
Osh	1750	11500	15640	40526	40526	106250	
Diesel Fuel							
Bishkek	1644	10300	13250	38775	38775	85000	
Osh	1644	10300	13250	38775	38775	85000	
Mazut							
Bishkek	808	3870	5805	29532	29532	42500	
Osh	808	3870	5805	29532	29532	42500	

Source: Kyrgyznefteproduct
May 1993

Table 9

Petroleum Product deliveries from 6 major refineries
(Mn tons/year)

Refineries	Gasoline		Diesel Fuel		Mazut	
	1992 total	1993 quarter 1	1992 total	1993 quarter 1	1992 total	1993 quarter 1
Russia (Ufa, Omsk, Angarsk, Achinsk)	231.7	42.2	130.7	17.7	179.9	3.9
Uzbekistan (Fergana)	10.5	–	27	–	48	–
Turkmenistan (Krasnovodsk, Chardzou)	1.1	–	0.6	–	10	175
Kazakhstan (Chimkent, Pavlodar)	60.2	7.2	125.5	13.4	125.2	0.8

Source: Kyrgyznefteproduct
Date: May 1993

Table 10

Sectorial Petroleum Product Consumption
supplied by RPA "Kyrghyznefteproduct"

Sector	Gas (thous. tons)		Diesel fuel (thous. ton)		Mazut (thous. ton)		Total	
	1991	1992	1991	1992	1991	1992	1991	1992
Agriculture	269.8	148	359.7	195.8	286.9	129	916.4	472.8
Railroad transportation	–	–	–	–	–	–	–	–
Truck transporation	115.9	69	83	44	11.1	2	210	115
Energetics/power plants	10	5.4	27.9	11.1	321.5	116.4	359.4	132.9
Total	622.6	303.5	566.5	283.8	897.1	363.2	2086.2	950.5

Source: Kyrgyzneftproduct
Date: March 1993

Table 11

Oil Products of Kyrgyzstan

(thousand tons)

	gasoline	diesel fuel	mazut	aviation kerosine
Import from Russia				
1991	418340	10741	165724	
1992	231720	130718	179920	
1993 (projected)	250000	70000	160000	
Import from Kazakhstan				
1991	141576	347201	482549	
1992	60194	125444	125243	
1993 (projected)	30000	55000	70000	
Import from Uzbekistan				
1991	45227	160733	155140	
1992	10448	27020	47996	
1993 (projected)	55000	85000	265000	
Import from Turkmenistan				
1991	17491	48873	93098	
1992	1124	651	10070	
1993 (projected)	–	–	17500	

Source: Kyrgyzneftproduct

Date: March 1993

Table 12

Petroleum Product Transport costs
(Roubles/m ton)

Means of transportation	Dec 92	March 93
Railroad	190	910
Trucks	60	905
Pipelines	–	–

Crude Oil Transport Cost
(Roubles/m ton)

Means of transportation	1992
Pipelines	1020

Source: Kyrgyznefteproduct/Ministry of Energy
Date: May 1993

Table 13

Transport Rates and
Fossil Fuel Transportation Costs
as of April 10, 1993
(in rubles)

Fuel	Rates for transporataion from Lugovaya to Bishkek (150 km)	EXTRA FEES Station of loading	EXTRA FEES Station of unloading
Oil and Petroleum products (gasoline, kerosine, oils, disel, mazut, others)	1 cistern – 60 tons	For spotting & Cleaning Cars 2401.00	For spotting & Cleaning Cars 2401.00
		Providing a car over & above the plan 15000.00	Notification of arrival 260.00
		Order transmission about over & above plan loading – 2472.00	
		Total 19873.00	Total 2661.00
Coal of all grades	1 car – 70 tons	For spotting & Cleaning Cars 2401.00	For spotting & Cleaning Cars 2401.00
		Providing a car over & above the plan 38750.00	Notification of arrival 260.00
		Order transmission about over & above plan loading – 2472.00	
		Total 43623.00	Total 2661.00

Source: Railway Board
Date: May 1993

Table 14

Kyrgyzneft
ANNUAL OPERATING COSTS*
(thous. rubles, except where noted)

	1992	projected 1993
Material Costs**	127.445	1777.887
Delivery expenses	8.802	115.213
Losses	10.04	50.357
Wages/Labor payments***	20.122	151.932
Social Security Payment	6.993	56.215
Taxes	45.929	506.385
VAT	–	–
Profit	–	–
Land	–	–
Property/building	–	–
Road	–	–
Employment fund	–	–
Maintenance and current repair	25.094	690.125
Rental payment for buildings	47	591
Insurance expenses	–	4.323
Depreciation of equipment and buildings	3.81	317.212
Interest Expenses (Cost of financing)	38	–
TOTAL COSTS	333.235	4260.649
Volume of production, thousand tons	113	125

Note: * estimated values based on preliminary data
** excluding delivery/transportation expenses
*** excluding social security, taxes, etc.

Source: Ministry of Energy / Kyrgyzneft
Date: May 1993

Table 15

Kyrgyzstan Natural Gas (rubles / 1000 cubic meters)

	Jan 92	Jun 92	Sept 92	Oct 92	Nov 92	Dec 92	Jan 93	Feb 93	Mar 93
Supplier's Price	870	870	4000	5500	5500	5500	19200	19200	24000
Tax									
Production Costs	701.89	614.56	3508.3	1526.06	1862.43	9180.42	9556.85	9550	9550
Transport Expenses	91	91	312	312	312	312	1721	1721	1721

Note: Production	1992	1993 (projected)
in mcm	72.4	60

Source: Kyrgyzneft
Date: March 1993

Table 16

Gas Purchase and Sale Prices in Kyrgyzstan

	Jan 92	Jun 92	Sep 92	Oct 92	Nov 92	Dec 92	Jan 93	Feb 93	Mar 93	Jun 93
				Liquified gas from Russia, Rb / ton						
Russian border price	665.6	665.6	6400	6400	6400	6400	53504	53504	54400	54400
including tax	145.6	145.6	1400							
Transportation expenses	846	846	4230	4230	4230	4230	8917	8917	9067	9067
Sale price:										
for industrial consumers	1693	1693	15446	15446	15446	15446	96682	96682	96682	96682
including tax	370	370	3379	3379	3379	3379	16114	16114	16114	16114
automobile gas filling	1920	1920	15446	15446	30720	30720	103680	103680	103680	103680
including tax	420	420	3379	3379	6720	6720	17280	17280	17280	17280
for municipal consumers	1693	1693	10094	10094	10094	10094	67392	67392	67392	67392
including tax	370	370	2208	2208	2208	2208	11232	11232	11232	11232
for people (inhabitants)	806.4	806	8284	8284	8284	8284	51901	51901	51901	51901
including tax	176.4	176	1812	1812	1218	1812	8650	8650	8650	8650
				Natural gas from Uzbekistan, Rb / 1000 cm						
Border purchase price	870	870	4000	5500	5500	5500	19200	19200	24000	24000
including tax	190	190	875	1203	1203	1203	3200	3200	4000	4000
Transportation expenses	91	91	312	312	312	312	1721	1721	1721	1721
including tax	20	20	72	72	72	72				
Sale price:										
for industrial consumers	1142	1142	5406	5406	5406	5406	31500	31500	31500	31500
including tax	250	250	1182	1182	1182	1182	5250	5250	5250	5250
municipal needs and everyday necessities	1142	1142	5406	5406	5406	5406	18593	18593	18593	18593
including tax	250	250	1182	1182	1182	1182	3099	3099	3099	3099
for people (inhabitants)	320	320	2930	2930	2930	2930	16174	16174	16174	16174
including tax	70	70	640	640	640	640	2696	2696	2696	2696

Source: Kyrgyzgas
Date: March 1993

Table 17

NATURAL GAS SALES BY SECTOR (million cubic meters)	Quarter I, 92	Quarter II, 92	Quarter III, 92	Quarter IV, 92	Quarter I, 93	Quarter II, 93	First half, 92	Second Half, 92	First Half, 93
Industrial uses	429.8	352.8	268.2	290.1	375.6	465.5	782.6	558.3	841.1
Transportation	0.8	0.9	1.2	1.1	0.8	1.9	1.7	2.3	2.7
Municipal needs (public)	38.4	12.2	10.5	26	27.7	14.9	50.6	36.5	42.6
Households	79	48.8	37.6	87.4	83	51.6	127.8	125	134.6
Other uses	28.8	21.8	16.7	21.3	25.6	28.1	50.6	38	53.7
Total	576.6	436.1	334.2	425.9	512.7	562	1012.9	760.1	1074.7

Source: Kyrgyzgas
Date: May 1993

Table 18

Kyrgyzstan
Natural Gas Production Costs
(Roubles except where noted)

Expense Item	1992 – entire year				
	estimated cost	actual cost	deviation	estimated unit cost	actual unit cost
001 Quantity of gas, Mcm	1790.7	1441.14	-349.56	1	1
002 sale to other consumers	0	0	0	0	0
160 Production cost – total, rubles	2711419707	2908852026	197432319	1514167.48	2018438.2
161 Material costs	2653460733	2827964281	174503548	1481800.82	1962310.59
161.1 Gas purchase	2567952960	2762855482	194902522	1434049.79	1917131.91
161.2 Railroad rate (includes loading, unloading, cleaning)	8000	4586	-3414	4.47	3.18
161.3 Delivery expenses (includes expenses for additionaly serviced transport)	22500	28754	6254	12.56	19.95
161.4 Maintenance expenses (equipment, buildings, construction spare parts for repair needs)	252860	230483	-22377	141.21	159.93
161.5 Accessory materials	2687150	1587989	-1099161	1500.61	1101.9
161.6 Maintenance & current repair of cylinders	0	0	0	0	0
161.7 Overalls and special high-caloric diet	189846	82254	-107592	106.02	57.08
161.8 Deductions to saving-banks	96350	319465	223115	53.81	221.68
161.9 Labor protection	61800	13579	-48221	34.51	9.42
161.10 Wear of non-valuable and fast worn-out equipment and stock	1017910	475623	-542287	568.44	330.03
161.11 Printing-work expenditures	575000	115181	57681	32.11	79.92
161.12 Filling of Kirghizgaz transport	497100	698130	201030	277.6	484.43
161.13 Personnel training	114500	89195	-25305	63.94	61.89
161.14 Losses	67703970	51232585	-16471385	37808.66	35550.04
161.15 Motor transport maintenance	298000	401390	103390	166.42	278.52
161.16 Payment for water	238950	174965	-63985	133.44	121.41
161.17 Payment for power energy	2952500	2942108	-10392	1648.8	2041.51
161.18 Fuel	524700	428903	-95797	293.01	297.61
161.19 Radio stations operation expenses	11100	23898	12798	6.2	16.58
161.20 Postage and telegraph expenses	200100	257177	57077	111.74	178.45
161.21 Other expenses (to enumerate)	8572937	5951504	-2621433	4787.48	4129.72
162 Depreciation of permanenet equipment expenses for full recovery	1494598	1413177	-78421	832.97	980.6
170 Labor payments (including bonus expenses), (corresponds to report 1-t,p.1)	15410036	14765199	-644837	8605.59	10245.5
180 Social security deductions (37% of labor payments)	5801100	5465513	-335587	3239.57	3792.49
181 Other expenses: TOTAL	34372240	59243856	24871616	19194.86	41109.02
181.1 Insurance of property	167	133	-34	0.09	0.09
181.2 Environment control expenses	1000	8391542	8390542	0.56	5822.85
181.3 Medical insurance	2000	77	-1923	1.12	0.05
181.4 Repair of computer engineering techniques	45660	20035	-25625	25.5	13.9
181.5 Renumeration for rationalization and invention	0	0	0	0	0
181.6 Short-term credit payments to the saving-bank	32731543	49438714	16707171	18278.63	34305.28
181.7 Travelling allowance	306600	204464	-102136	171.22	141.88
181.8 Payments for fire safety and watch guard to other organizations	83200	47524	-35676	46.46	32.98
181.9 Payment for buildings, construction transport, etc, rent)	7000	0	-7000	3.91	0
181.10 Repair fund (capital repair of permanent equipment)	961400	814166	-147234	536.89	564.95
181.11 Deductions to the employment fund	232720	200999	-31721	129.96	139.47
181.12 Land tax	0	0	0	0	0
181.13 Tax for buildings	950	135362	134412	0.53	93.93

Source: Kyrgyzgas
Date: March 1993

Table 18 a

Kyrgyzstan
Natural Gas Production Costs
(Roubles except where noted)

Expense Item	1992 – entire year				
	estimated cost	actual cost	deviation	estimated unit cost	actual unit cost
001 Quantity of gas, Mcm	1790.7	1441.14	-349.56	1	1
002 sale to other consumers	0	0	0	0	0
160 Production cost – total, rubles	2711419707	2908852026	197432319	1514167.48	2018438.2
161 Material costs	2653460733	2827964281	174503548	1481800.82	1962310.59
161.1 Gas purchase	2567952960	2762855482	194902522	1434049.79	1917131.91
161.2 Railroad rate (includes loading, unloading, cleaning)	8000	4586	-3414	4.47	3.18
161.3 Delivery expenses (includes expenses for additionaly serviced transport)	22500	28754	6254	12.56	19.95
161.4 Maintenance expenses (equipment, buildings, construction spare parts for repair needs)	252860	230483	-22377	141.21	159.93
161.5 Accessory materials	2687150	1587989	-1099161	1500.61	1101.9
161.6 Maintenance & current repair of cylinders	0	0	0	0	0
161.7 Overalls and special high-caloric diet	189846	82254	-107592	106.02	57.08
161.8 Deductions to saving-banks	96350	319465	223115	53.81	221.68
161.9 Labor protection	61800	13579	-48221	34.51	9.42
161.10 Wear of non-valuable and fast worn-out equipment and stock	1017910	475623	-542287	568.44	330.03
161.11 Printing-work expenditures	573000	115181	57681	32.11	79.92
161.12 Filling of Kirghigaz transport	497100	698130	201030	277.6	484.43
161.13 Personnel training	114500	89195	-25305	63.94	61.89
161.14 Losses	67703970	51232585	-16471385	37808.66	35550.04
161.15 Motor transport maintenance	298000	401390	103390	166.42	278.52
161.16 Payment for water	238950	174965	-63985	133.44	121.41
161.17 Payment for power energy	2952500	2942108	-10392	1648.8	2041.51
161.18 Fuel	524700	428903	-95797	293.01	297.61
161.19 Radio stations operation expenses	11100	23898	12798	6.2	16.58
161.20 Postage and telegraph expenses	200100	257177	57077	111.74	178.45
161.21 Other expenses (to enumerate)	8572937	5951504	-2621433	4787.48	4129.72
162 Depreciation of permanenet equipment expenses for full recovery	1494598	1413177	-78421	832.97	980.6
170 Labor payments (including bonus expenses), (corresponds to report 1-t,p.1)	15410036	14765199	-644837	8605.59	10245.5
180 Social security deductions (37% of labor payments)	5801100	5465513	-335587	3239.57	3792.49
181 Other expenses: TOTAL	34372240	59243856	24871616	19194.86	41109.02
181.1 Insurance of property	167	133	-34	0.09	0.09
181.2 Environment control expenses	1000	8391542	8390542	0.56	5822.85
181.3 Medical insurance	2000	77	-1923	1.12	0.05
181.4 Repair of computer engineering techniques	45660	20035	-25625	25.5	13.9
181.5 Renumeration for rationalization and invention	0	0	0	0	0
181.6 Short-term credit payments to the saving-bank	32731543	49438714	16707171	18278.63	34305.28
181.7 Travelling allowance	306600	204464	-102136	171.22	141.88
181.8 Payments for fire safety and watch guard to other organizations	83200	47524	-35676	46.46	32.98
181.9 Payment for buildings, construction transport, etc, rent)	7000	0	-7000	3.91	0
181.10 Repair fund (capital repair of permanent equipment)	961400	814166	-147234	536.89	564.95
181.11 Deductions to the employment fund	232720	200999	-31721	129.96	139.47
181.12 Land tax	0	0	0	0	0
181.13 Tax for buildings	950	135362	134412	0.53	93.93

Source: Kyrgyzgas
Date: March 1993

Table 19

KYRGYZSTAN
Liquid Gas Production Costs
(Roubles except where noted)

Expense Item	1992: Entire year estimated cost	actual cost	deviation	estimated unit cost	actual unit cost
001 Quantity of gas, tons	126442	107423.27	-15018.73	1	1
002 sale to other consumers, tons	34058	28429.28	-5628.72	0.27	0.26
160 Production cost-total, rubles	824854145	695610620	-129243525	6523.58	6475.42
161 Material costs	736933099	609628593	-127304506	5828.23	5675.01
161.1 Gas purchase	515731000	423626972	-92104028	4078.8	3943.53
161.2 Railroad rate (includes loading, unloading, cleaning)	163502480	122043768	-41458712	1293.1	1136.1
161.3 Delivery expenses (includes expenses for additionaly serviced transport)	19086050	14998033	-4088017	150.95	139.62
161.4 Maintenance expenses (equipment, buildings, construction spare parts for repair needs)	2847754	3468913	621159	22.52	32.29
161.5 Accessory materials	3824000	3583820	-240180	30.24	33.36
161.6 Maintenance & current repair of cylinders	1433800	633303	-800497	11.34	5.9
161.7 Overalls and special high-caloric diet	311600	353485	41885	2.46	3.29
161.8 Deductions to saving-banks	357150	554068	196918	2.82	5.16
161.9 Labor protection	232100	272092	39992	1.84	2.53
161.10 Wear of non-valuable and fast worn-out equipment and stock	569600	624745	55145	4.5	5.82
161.11 Printing-work expenditures	1030400	1424561	394161	8.15	13.26
161.12 Filling of Kirghigaz transport	8859846	9754694	894848	70.07	90.81
161.13 Personnel training	135250	102935	-32315	1.07	0.96
161.14 Losses	2839900	2665775	-174125	22.46	24.82
161.15 Motor transport maintenance	1106300	2423753	1317453	8.75	22.56
161.16 Payment for water	1046050	867056	-178994	8.27	8.07
161.17 Payment for power energy	2609050	2787755	178705	20.63	25.95
161.18 Fuel	3834000	6873701	3039701	30.32	63.99
161.19 Radio stations operation expenses	40500	16187	-24313	0.32	0.15
161.20 Postage and telegraph expenses	647370	788228	140858	5.12	7.34
161.21 Other expenses (to enumerate)	6888899	11312373	4423474	54.48	105.31
162 Depreciation of permanenet equipment expenses for full recovery	1120750	1208951	88201	8.86	11.25
170 Labor payments (including bonus expenses), (corresponds to report 1-t,p.1)	58414184	55738880	-2675304	461.98	518.87
180 Social security deductions (37% of labor payments)	19925472	22825393	2899921	157.59	212.48
181 Other expenses: TOTAL	5990640	6219352	228712	47.38	57.9
181.1 Insurance of property	50000	922	-49078	0.4	0.01
181.2 Environment control expenses	64800	55947	-8853	0.51	0.52
181.3 Medical insurance	1.1	946	-12154	0.1	0.01
181.4 Repair of computer engineering techniques	54900	100549	45649	0.43	0.94
181.5 Renumeration for rationalization and invention	17100	2533	-14567	0.14	0.02
181.6 Short-term credit payments to the saving-bank	928400	592703	-335697	7.34	5.52
181.7 Travelling allowance	487951	710845	222894	3.86	6.62
181.8 Payments for fire safety and watch guard to other organizations	1400700	1452379	51679	11.08	13.52
181.9 Payment for buildings, construction transport, etc, rent)	28000	96278	68278	0.22	0.9
181.10 Repair fund (capital repair of permanent equipment)	2575337	2428122	-147215	20.37	22.6
181.11 Deductions to the employment fund	321452	649830	328378	2.54	6.05
181.12 Land tax	11500	19664	8164	0.09	0.18
181.13 Tax for buildings	37400	30828	-6572	0.3	0.29

Source: Kyrgyzgas
Date: March 1993

Table 19 a

KYRGYZSTAN
Liquid Gas Production Costs
(Roubles except where noted)

Expense Item	1992: Entire year estimated cost	actual cost	deviation	estimated unit cost	actual unit cost
001 Quantity of gas, tons	126442	107423.27	-19018.73	1	1
002 sale to other consumers, tons	34058	28429.28	-5628.72	0.27	0.26
160 Production cost-total, rubles	824854145	695610620	-129243525	6523.58	6475.42
161 Material costs	736933099	609628593	-127304506	5828.23	5675.01
161.1 Gas purchase	515731000	423626972	-92104028	4078.8	3943.53
161.2 Railroad rate (includes loading, unloading, cleaning)	163502480	122043768	-41458712	1293.1	1136.1
161.3 Delivery expenses (includes expenses for additionaly serviced transport)	19086050	14998033	-4088017	150.95	139.62
161.4 Maintenance expenses (equipment, buildings, construction spare parts for repair needs)	2847754	3468913	621159	22.52	32.29
161.5 Accessory materials	3824000	3583820	-240180	30.24	33.36
161.6 Maintenance & current repair of cylinders	1433800	633303	-800497	11.34	5.9
161.7 Overalls and special high-caloric diet	311600	353485	41885	2.46	3.29
161.8 Deductions to saving-banks	357150	554068	196918	2.82	5.16
161.9 Labor protection	232100	272092	39992	1.84	2.53
161.10 Wear of non-valuable and fast worn-out equipment and stock	569600	624745	55145	4.5	5.82
161.11 Printing-work expenditures	1030400	1424561	394161	8.15	13.26
161.12 Filling of Kirghigaz transport	8859846	9754694	894848	70.07	90.81
161.13 Personnel training	135250	102935	-32315	1.07	0.96
161.14 Losses	2839900	2665775	-174125	22.46	24.82
161.15 Motor transport maintenance	1106300	2423753	1317453	8.75	22.56
161.16 Payment for water	1046050	867056	-178994	8.27	8.07
161.17 Payment for power energy	2609050	2787755	178705	20.63	25.95
161.18 Fuel	3834000	6873701	3039701	30.32	63.99
161.19 Radio stations operation expenses	40500	16187	-24313	0.32	0.15
161.20 Postage and telegraph expenses	647370	788228	140858	5.12	7.34
161.21 Other expenses (to enumerate)	6888899	11312373	4423474	54.48	105.31
162 Depreciation of permanenet equipment expenses for full recovery	1120750	1208951	88201	8.86	11.25
170 Labor payments (including bonus expenses), (corresponds to report 1-t,p.1)	58414184	55738880	-2675304	461.98	518.87
180 Social security deductions (37% of labor payments)	19925472	22825393	2899921	157.59	212.48
181 Other expenses: TOTAL	5990640	6219352	228712	47.38	57.9
181.1 Insurance of property	50000	922	-49078	0.4	0.01
181.2 Environment control expenses	64800	55947	-8853	0.51	0.52
181.3 Medical insurance	1.1	946	-12154	0.1	0.01
181.4 Repair of computer engineering techniques	54900	100549	45649	0.43	0.94
181.5 Renumeration for rationalization and invention	17100	2533	-14567	0.14	0.02
181.6 Short-term credit payments to the saving-bank	928400	592703	-335697	7.34	5.52
181.7 Travelling allowance	487951	710845	222894	3.86	6.62
181.8 Payments for fire safety and watch guard to other organizations	1400700	1452379	51679	11.08	13.52
181.9 Payment for buildings, construction transport, etc, rent)	28000	96278	68278	0.22	0.9
181.10 Repair fund (capital repair of permanent equipment)	2575337	2428122	-147215	20.37	22.6
181.11 Deductions to the employment fund	321452	649830	328378	2.54	6.05
181.12 Land tax	11500	19664	8164	0.09	0.18
181.13 Tax for buildings	37400	30828	-6572	0.3	0.29

Source: Kyrgyzgas
Date: March 1993

Table 20

Kirghiz Coal Sales: Prices, Manufacturing costs and taxes (R/ton)	Jan 92	Jun 92	Sep 92	Oct 92	Nov 92	Dec 92	Jan 93	Feb 93	Mar 93
Coal from Kyrgyzstan (domestic coal)									
Coal price at mine, excl tax	381	738	816	1745	1745	1797	4412	4412	5089
Of high grade	533	1033	1200	2220	2220	2516	4711	4711	6000
Fines	343	664	755	1058	1058	1617	2448	2448	4500
Tax	107	207	228	489	489	503	882	882	1018
Transportation expenses	20	200	250	300	320	350	850	850	900
Production costs	358	694	734	1571	1571	1617	3971	3971	4580
Import from Kazakhstan									
Average price, excl tax	231	1500	2100	3500	4500	4500	9450	9450	9450
Tax	65	420	588	980	1260	1260	2500	2500	2500
Transportation expenses	50	300	400	500	700	700	1000	1100	1170
Import from Russia									
Average price, excl tax	217	1316	1400	2000	2000	2100	2200	2200	2200
Tax	61	368	392	560	560	588	1455	1455	1455
Transportation expenses	180	800	1000	1200	1500	1500	2400	2500	2790
Export to Uzbekistan									
Average price, excl tax	381	738	816	1745	1745	1797	4412	4412	5089
Tax	107	207	228	489	489	503	882	882	1018
Transportation expenses	15	30	35	70	70	100	180	180	180
Export to Kazakhstan									
Average price, excl tax	381	738	816	1745	1745	1797	4412	4412	5089
Tax	107	207	228	489	489	503	882	882	1018
Transportation expenses	45	100	150	300	400	500	900	900	900

Source: Ministry of Economy and Finance
Date: March 1993

Table 21

Estimated Coal Prices, 1st quarter, 1993
Kyrgyzstan republic

Domestic Mine	Commercial coal (thous. tons)	Trade mark & grade of coal	Value of Shipments (thous. rubles)	Estimated price (without VAT) (rub/ton)
Republic	850.86		3753359	4417
	478.46		2409183	5037
	10		69063	6907
	14		44436	3174
	55		318762	5796
	111.09		614771	5534
	20		45360	2268
	245.4		1260558	5137
	22.97		56223	2449
	372.4		1344676	3611
	15		70665	4711
	70		262593	3751
	287.4		1011413	3519
Kyzil-Kiyak mines (management)	142		830000	5845
	7		56000	8000
	21		147000	7000
	114		627000	5500
Suluktinsk mines (management)	173		977427	5650
	10		69053	6907
	26		163894	6304
	53		305702	5767
	84		433763	5164
Tash-Kumyr mines (management)	227		795193	3503
	34		129180	3800
	193		666013	3451
Kok-Yanghak mine	120.4		430557	3576
	15		70665	4711
	28		100138	3576
	77.4		259754	3356
Almalyk coal strip	89.4		377941	4227
	22		98868	4494
	31		134664	4344
	36.4		144409	3967
Aghulak coal strip	56.97		146024	2564
	14		44436	3174
	20		45360	2268
	22.97		56228	2449
Tzentralnaya mine	17.09		77791	4550
	6.09		27405	4500
	11		50365	4577
Dzherghalan mine	25		118926	4760
	8		33280	4160
	17		85646	

Notes:

Ash index: for each higher or lower ash percent in altogether and graded coals, products of enrichment and coal briquettes – 2.5

Mass moisture share index: for each higher or lower percent:
a) in altogether and graded black coals – 1.3
b) in altogether and graded brown coals and products of coal enrichment – 2.0

Source: Ministry of Economy and Finance
Date: March 1993

Table 22

Quality Data of Coal Products Supplied to Consumers by Domestic Coal – Mining Enterprises of the Republic of Kyrgyztan (Valid from March 1, 1990 to March 1, 1995)

Mine (M) Cut (C) Coal – Preparation Plant (CPP)	Normative document	Specification Production Group	Class, Grade, Size mm	Quality Data: Moisture Neutral	Moisture Max.	Ash Neutral	Ash Max.	Sulphur Neutral	Sulphur Max	Volatile matter escape neutral	Heat of Combustion Highest Max. (Kcal/J)	Heat of Combustion Lowest Average (Kcal/J)	Mass Contents Mineral addition Max.	Mass Contents Fines Max.	Thickness of plastic layer Average
Kyzyl – Kiya mines	NDC-12-29	3BC*	50-100	26	27.5	14.1	16	1.2	–	37	5805	4401	3	15	–
Kyzyl – Kiya mines		3BN&S**	13-50	26	27.5	20.4	21	1.5	–	35	5700	3954	3	20	–
Kyzyl – Kiya mines		3BS&S***	0-13	26	28.5	22.5	27	1.8	–	41	5700	3606	–	–	–
Abshir cut		3BC	50-100	26	27.5	15.5	16	1.6	–	43	5800	3400	3	15	–
Abshir cut		3BN&S	13-50	26	27.5	20.4	21	1.9	–	40	5800	3250	3	20	–
Abshir cut		3BN&S	0-13	26	27.5	22.5	27	2.3	–	42	5400	3200	–	–	–
Suluktinsk mine		3BS@	100-200	23	25.5	6.1	8.3	0.3	–	27	7000	4850	3	12	–
Suluktinsk mine		3BC	50-100	23	25.5	9	11.5	0.4	–	28	6900	4640	3	15	–
Suluktinsk mine		3BN&S	13-50	23	25.5	15.8	18.2	0.4	–	27	6700	4160	3	20	–
Suluktinsk mine		3BS&S	0-13	22.5	25	20	22.5	0.7	–	28	6650	3880	–	–	–
Almalyk cut		3BN&S	13-50	23.8	26	26.3	27	1.9	–	46.5	6800	3410	3	20	–
Almalyk cut		3BS&S	0-13	24.3	26	27.5	29	2	–	46.5	6700	3250	–	–	–
Almalyk cut		3BC	50-100	22.5	26	23.5	26	1	–	44	6600	3415	3	15	–
Agulak cut		3BSLN@@	50-300	19	20.6	12.5	14.5	0.7	–	34.5	5800	5130	3	15	–
Agulak cut		3BNSS&S./	-50	19.7	22	17.7	21	0.7	–	34.5	5800	4550	3	–	–
Agulak cut		3BU+	0-300	18.5	21.5	14.7	18	0.7	–	34.5	5350	4770	3	–	–
Agulak cut, Yuzh-Mulda		3BU	0-300	22.5	25	20.5	22.5	1.6	–	35	5350	4540	3	–	–
Agulak cut, K-Keche		3BU	0-300	25.5	29	11.7	13.5	1	–	35	6170	4890	3	–	–
Agulak cut, K-Keche		3BSLN	25-300	25.5	29	11	13	1	–	35	7915	4900	3	30	–
Central Mine		3BN&S	13-50	18	20	13.8	16.8	0.5	–	43	6900	5200	2	20	–
Central Mine		3BS&S	0-13	18.5	20.5	15	18	0.7	–	43	6900	5080	–	–	–
Tash-Kumyr mine		1JN&S++	13-50	14.5	15	17.8	20.5	1.1	–	40	7100	4320	3	20	–
Tash-Kumyr mine		1JS&S+++	0-13	15	17	36	42	1.2	–	39.5	6600	3560	–	–	–
Kok-Yangak mine		1JL+++	50-100	9.8	13.5	12.3	14.5	1.1	–	33	7600	6090	2	15	–
Kok-Yangak mine		1JN&S	13-50	9.8	13.5	17.7	20	1.1	–	35	7400	5525	2	10	–
Kok-Yangak mine		JS&S	0-13	9.8	13.5	24.2	25	1.1	–	36	7200	4731	–	–	–
Jergalan mine		1JN&S	13-50	9	11	10	11.5	0.8	–	39	7600	5860	2	20	–
Jergalan mine		JS&S	0-13	13	15	14	16	0.9	–	39	7500	5130	–	–	–
Jergalan mine		1JU	0-200	12.5	14.5	13	15	0.9	–	39	7500	5180	2	–	–

Notes:

NDC – Normative Data Catalog
* Brown Coal, Group 3
** Brown nut-sized coal with slack coal, Group 3
*** Brown seed-sized coal with stib, Group 3
@ Brown slab coal, Group 3
@@ Brown slab, lump, nut coal, Group 3
./ Brown nut coal, slack coal, seed coal with stib Group 3
+ Brown ungraded coal, Group 3
++ Jet (long-flame), nut-sized coal with slack coal, Group 1
+++ Jet coal, seed-sized, with snib, Group 1
+++ Jet, lump coal, Group 1

Source: Ministry of Energy
Date: May 1993

Table 23

Average production cost of eight Kyrgyz coal mine
(rubles/ton)

Mines/Cuts	Distance to Bishkek – km	Average production cost on Nov.1, 1992	1993: 2nd Qtr
1. "Kyzyl–kiya" mine	1157	1999	2346
2. "Suluktinskaya" mine	1002	2457	2660
3. "Toli–Kumyrskaya" mine	1217	983	1062
4. "Kok–Yantak" mine	1295	1257	1438
5. "Tsentralnaya"(Central) mine	300	1819	2263
6. "Jergalan" mine	410	1649	1912
7. "Almalyk" cut	1054	2269	1729
8. "Agulak" cut	390	1224	1302
National Average		1703	2198

Source: Ministry of Economy
Date: May 1993

Table 24

Petrography of Black Coal mined in Middle Asia and coal codes (International Codification)
(Stratum Tests)

Mines	Coal Specifications	Properties	Vitrinite Reflection % RO	Reflection Performance Std. Dev.	Form
Jerlagan mine, Stratum Y	1 JC*	fr – 1500	0.48	0.0394	Not Fractured
Kok – Yangak mine	1 JC	fr – 1500	0.61	0.0586	Not Fractured

	Maceration Components Vitrinite	Listinite	Inertinite	Swelling Index SI	Gas egress % at 900 C	Dry ash %	Total Sulphur %	Peak Heat of Combustion MJ/Kg
Jerlagan mine, Stratum Y	25	2	73	0.5	39.6	10.2	1.14	31.24
Kok – Yangak mine	52	1	47	0	32.6	10	0.32	32.6

	Coal Code (Intern. Codification)
Jerlagan mine, Stratum Y	4070038101131
Kok – Yangak mine	6040032100332

Note: * Group 1, Jet (long – flame) coal

Source: Ministry of Energy
Date: May 1993

Table 25
Coal Average sale price, including delivery expenses
(R/ton)

	Jan 92	Jun 92	Sep 92	Oct 92	Nov 92	Dec 92	Jan 93	Feb 93	Mar 93
Consumer									
Industrial and regional boiler–houses	452	2018	2475	3889	4510	4588	8667	8716	9167
Dwelling houses	603	2691	3300	5186	6014	6117	11569	11661	12223

Source: Ministry of Economy and Finance
Date: March 1993

Table 26

Kyrgyzstopsbat's Regional Purchase and Sales Prices of Coal

1991 First Quarter (Rb/mton)	Bishkek Region		Chu Region		Issyk-kul Region		Naryn Region		Osh Region		Talas Region		Jala-abad Region	
	price	including tax	price	including tax	price	including tax	price	including tax	price	including tax	price	including tax	price	including tax
Purchase Price														
Imported coal														
Russia	35	–	35	–	–	–	–	–	–	–	35	–	–	–
Kazakhstan	31	–	31	–	31	–	31	–	31	–	31	–	31	–
Uzbekistan	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Tajikistan	–	–	–	–	–	–	–	–	–	–	–	–	–	–
within the republic														
Kyrgyzstan	–	–	–	–	21	–	15	–	23	–	–	–	25	–
Sales Price														
Imported coal														
Russia	14.5	–	14.5	–	–	–	–	–	–	–	15.5	–	–	–
Kazakhstan	11.5	–	11.5	–	16.5	–	14	–	17	–	–	12.5	–	22
Uzbekistan	10.5	–	10.5	–	–	–	–	–	12	–	–	–	–	–
Tajikistan	–	–	–	–	–	–	–	–	–	–	–	–	–	–
within the republic														
Kyrgyzstan	–	–	–	–	14	–	14	–	15.5	–	–	–	–	14.5

Note: Before 1992 "Kyrgbyzstopsnab" Association system was planned and unprofitable, actual losses were covered by susidies from the Republican Budget

Table 26

Kyrgyzstopsbat's Regional Purchase and Sales Prices of Coal

	Bishkek Region		Chu Region		Issyk-kyl Region		Naryn Region		Osh Region		Talas Region		Jala-abad Region	
	price	including tax	price	including tax	price	including tax	price	including tax	price	including tax	price	including tax	price	including tax
For the first quarter of 1992 (R/m ton)														
Purchase Price														
Imported coal														
Russia	284	62	284	62	–	–	–	–	–	–	385	84	–	–
Kazakhstan	227	50	227	50	248	54	358	78	335	73	264	58	342	75
Uzbekistan	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Tajikistan	–	–	–	–	–	–	–	–	–	–	–	–	–	–
within the republic														
Kyrgyzstan	–	–	–	–	317	69	–	–	246	54	–	–	280	61
Sales Price														
Imported coal														
Russia	145	–	150	–	–	–	–	–	–	–	90	–	–	–
Kazakhstan	115	–	120	–	208	–	200	–	220	–	75	–	220	–
Uzbekistan	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Tajikistan	–	–	–	–	–	–	–	–	–	–	–	–	–	–
within the republic														
Kyrgyzstan	–	–	–	–	195	–	–	–	135	–	–	–	120	–

Note: On the decision of the government of Kyrghyzstan the "Kyrghyzstopsnab" association was granted a subsidy in the 1st quarter 1992 for actual losses recovery
In compliance with the decree 45, of July 15 1992, of the Kyrghyz Republic State Committee for Prices and Antimonopoly Policy, solid fuel delivery expenses (before the fuel is taken into the store-house) are included into the suppliers contractual price (purchase price plus transportation expenses)

Table 26

Kyrgyzstan's Regional Purchase and Sales Prices of Coal

For the first quarter of 1993	Bishkek Region		Chu Region		Issyk-kul Region		Naryn Region		Osh Region		Talas Region		Jala-abad Region	
	price	including tax	price	including tax	price	including tax	price	including tax	price	including tax	price	including tax	price	including tax
Purchase Price														
Imported coal														
Russia	11680	1947	11618	1936	–	–	–	–	–	–	–	–	–	–
Kazakhstan	3748	625	5679	946	13299	2216	16368	2728	6400	1067	5839	973	6791	1132
Uzbekistan	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Tajikistan	–	–	–	–	–	–	–	–	–	–	–	–	–	–
within the republic														
Kyrgyzstan	8850	1475	8800	1467	10395	1732	6263	1044	7825	1305	8086	1348	7750	1292
Sales Price														
Imported coal														
Russia	13320	1640	13361	1743	–	–	–	–	–	–	–	–	–	–
Kazakhstan	4493	750	6815	1136	15294	1995	18333	1965	7680	1280	7321	1482	8149	1358
Uzbekistan	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Tajikistan	–	–	–	–	–	–	–	–	–	–	–	–	–	–
within the republic														
Kyrgyzstan	10620	1770	10560	1760	12474	2079	7515	1252	9390	1560	9703	1617	9300	1550

Note: 1. Average prices are determined by operation calculations as for the available coal remains or the last receipts calculations
2. Price fluctuations depend on the coal marks and grades

Source: Kyrgyzstopsnab
Date: May 1993

Table 27
Kyrgyzstan Coal Production, Consumption, Import and Export Volumes By Major Grade / Quality
(in thous. m. tons)

	1992	%	1993 (projected)	%
A. Production	2150.5	100.00%	3300	100.00%
high grade	623.6	29.00%	1127	34.15%
fines	1526.9	71.00%	2173	65.85%
B. Import	1139	100.00%	2360	100.00%
from Russia	195	17.12%	800	33.90%
high grade	191	16.77%	800	33.90%
fines	4	0.35%	–	0.00%
from Kazakhstan	944	82.88%	1560	66.10%
high grade	296	25.99%	412	17.46%
fines	648	56.89%	1148	48.64%
C. Consumption	2348	100.00%	4504	100.00%
high grade	712	30.32%	1737	38.57%
fines	1636	69.68%	2767	61.43%
D. Export	1021.4	100.00%	1183	100.00%
into Uzbekistan	394	38.57%	406.5	34.36%
high grade	83.7	8.19%	45	3.80%
fines	310.3	30.38%	361.5	30.56%
into Kazakhstan	574.2	56.22%	675.1	57.07%
high grade	5.7	0.56%	5.7	0.48%
fines	568.5	55.66%	669.4	56.58%
into Tadjikistan	34	3.33%	64.4	5.44%
high grade	23.8	2.33%	48.4	4.09%
fines	10.2	1.00%	16	1.35%
into Turkmenistan	19.2	1.88%	37	3.13%
high grade	15	1.47%	21.6	1.83%
fines	4.2	0.41%	15.4	1.30%

Source: Ministry of Energy
Date: May 1993

Table 28

Kyrgyzstan Coal Demand by Sector and Quality
(thousand tons)

	1992		1993 (projected)	
	high grade	fines	high grade	fines
Fossil fuel power plants		1084.6		2086
Industrial and district boiler units		551.4		681
Households	712		1737	
Other purposes				
Total	712	1636	1737	2767 *

Note: * Year to date through april 1993 was 762.1

Source: Ministry of Energy
Date: May 1993

Table 29

Coal Deliveries in Kyrgyzstan
by rail, trucks and mixed (rail + barges)
(thousand tons)

	Projected 1993			
	Means of transport			TOTAL
	rail	trucks	mixed	
Region:				
Bishkek	220			220
Chu	400			400
Talas*	120			120
Issyk–Ky	100	30	160	290
Naryn		140		140
Osh	140	170		310
Jalal–Abad	150	107		257
Total	1130	447	160	1737

Note: * coal that is up to 120,000 tons, is transported into Talas oblast by trucks and railway

Source: Kyrgyztopsnab
Date: May 1993

Table 30

Coal purchase by Kyrgyztopsnab
(thousand tons)

	Total			Bishekek Region			Chu region			Talas Region		
	1991	Q1 1992	Q1 1993	1991	Q1 1992	Q1 1993	1991	Q1 1992	Q1 1993	1991	Q1 1992	Q1 1993
Imported coal	2654	374	103	698	142	86	920	137	15	179	18	–
Russia	262	26	17	97	6	10	145	13	7	20	5	–
Kazakhstan	2368	346	85	601	134	761	761	122	7	159	13	–
Uzbekistan	14	2	1	–	–	–	14	2	1	–	–	–
Tadjikistan	10	–	–	–	–	–	–	–	–	–	–	–
Domestic coal												
Kyrgyzstan	1643	404	293	485	125	110	–	–	2		2	4
TOTAL	4297	778	396	1183	267	196	920	137	17	179	20	4

	Issy-Kul Region			Naryn Region			Osh Region			Jalal-Abad Region		
	1991	Q1 1992	Q1 1993	1991	Q1 1992	Q1 1993	1991	Q1 1992	Q1 1993	1991	Q1 1992	Q1 1993
Imported coal	348	50	2	143	15	–	216	9	–	150	3	–
Russia	–	–	–	–	–	–	–	–	–	–	–	–
Kazakhstan	348	50	2	143	15	–	206	9	–	150	3	–
Uzbekistan	–	–	–	–	–	–	–	–	–	–	–	–
Tadjikistan	–	–	–	–	–	–	10	–	–	–	–	–
Domestic coal												
Kyrgyzstan	244	35	37	64	40	26	509	131	55	341	71	59
TOTAL	592	85	39	207	55	26	725	140	55	491	74	59

Source: Kyrgyztopsnab
Date: May 1993

Table 31

Coal Purchases by Kyrgyztopsnab

First quarter for 1991

(Thou tons)

Imported	
Kazakhstan	593
Russian	66
Tadjikistan	3
Uzbekistan	4
Domestic	
Kyrgyzstan	409
Total Coal	1075

Source: Kyrgyztopsnab

Date: May 1993

Table 32

Coal Transportation costs

(Rb/ton, on average)

Means of Transportation	1992	1993
Rail	480	6400
Trucks	790	10700
Barge	156	736

Note: 3 – 3.5 times rise of transportation rates is expected in connection with rising lubricant prices

Source: Kyrgyztopsnab

Date: May 1993

Table 33

KYRGYZKOMOR
ANNUAL OPERATING COSTS
(thous. rubles, except where noted)

	1992	1993 projected
Material Costs*	480487	6281972
Delivery expenses	13412	7263
Losses	–	–
Wages/Labor payments**	498652	2578880
Social Security Payment	169468	954185
Taxes	3794	1415471
VAT	21153	1162747
profit	3935	198466
land	3138	718
property/building	4893	22252
road	4821	24826
employment fund		
Maintenance and current repair	–	–
Rental payment for buildings	–	–
Insurance expenses	–	13
Depreciation of equipment and buildings	11255	65791
Interest Expenses	1699	10052
TOTAL	1216707	12722636
Production Volumes (Mtons)	121.2913	113.80281

Note: * excluding delivery/transportation expenses
** excluding social security, taxes, etc.

Source: Ministry of Energy / Kyrgyzkomor
Date: May 1993

PRELIMINARY DATA NEEDS VERIFICATION

Table 34

"Kyrgyztonsnab"
Annual Operating Costs (Thousand Roubles excepted where noted)

	1992	1993 projected
Material cost		
a. Purchased things (store parts, paper, forms);	5160	20640
writing off working clothes, stock of little value	8000	62555
b. Fuel (lubricants, fuel for industrial and admin. & government buildings)	3850	40400
c. Electric power		
d. Payment for water	1150	4000
e. Natural losses within writing off normal value	6186	36300
Total Material Costs	24346	163895
Wages	25508	109910
Other costs		
a. Deductions to social insurance	9438	40667
b. Employment fund allocations		1099
c. allocations to emergency situation fund	1277	8135
d. allocations to non-budget fund	-	1694
e. payment for non-departmental guard services	1600	-
f. payment for communication services	1000	4000
g. bank credit interest	20636	100000
h. travel allowance expenses	1883	2000
i. Other costs (intermediary services, collection, property tax, treatment of archives documents, other costs)	12527	18000
Total other costs	48351	175595
Amortization of funds	638	22000
Total Costs	98853	471400
Volume	824340	3388000
Gross income	146043	542300
Profit	47190	70900

Source: Kyrgyztopsnab
Date: May 1993

PRELIMINARY DATA NEEDS VERIFICATION

Table 35 a

Delivered Price to Bishkek Power Station

	Jan 92	Jun 92	Sep 92	Oct 92	Nov 92	Dec 92	Jan 93	Feb 93	Mar 93	Jun 93	Dec 93
Average Price											
Coal (ruble/ton)	65.95	511.44	795.9	879.6	956.2	2208.35	6051	4891.31	6060.81	7488.63	7488.63
Kyrgyzstan	67.26	352.04	838.08	964.94	1103.77	1661.78	4368.43	4721.57	5947.02	5950	5950
Karaganda	24.5	684.67	750.2	791.3	851.1	2581.18	6672.25	7084	7084	8938	8938
Uzbekistan	19.55	–	–	–	–	1376	–	–	–	–	–
Average Price											
Natural Gas (R/th. cm)	604.74	1310.76	4224	3951	4224	4225.05	26287.82	26250	26250	26250	26250
Turkmenistan	604.74	130.76	4224	3951	4224	4225.05	26287.82	26250	26250	26250	26250
Uzbekistan											
Mazut (ruble/ton)	310.98	831.24	3460	6243	9216.2	7630.55	11578	26160	61150	61150	61150
1. Kirghiz coal:											
Kok–Yanghak	57.77	–	838.08	1399.84	1454.2	1687	4854	4673	5886	5950	5950
Tash–Kumyr	75.75	352.04	–	699.7	1007.4	1658	4176	4727	5954	5950	5950
Kizil–Kiya	–	–	–	–	–	–	–	–	–	–	–
2. Uzbek coal:											
Shargul	19.55	–	–	–	–	1376	–	–	–	–	–
3. Karaganda coal											
altogether coal	–	–	–	–	–	3194	8035	9428	9428	–	–
industrial coal	24.52	684.67	750.2	791.3	851.1	1237	3046	5674	5674	8938	8938

Source: Kyrgyzstan State Energy Company
Date: March 1993

Table 35 b

Delivered Price to Issyk–Kul Valley Power Station

	Jan 92	Jun 92	Sep 92	Oct 92	Nov 92	Dec 92	Jan 93	Feb 93	Mar 93	Jun 93	Dec 93
Average price											
coal: total R/ton	250.44	1856.71	1842.62	2497.22	2019.72	2936.52	3493.64	5156.72	5156.72	8136.46	8136.46
including											
Uzbek coal, R/ton	75.95	1856.71	2564.28		1802.04						
Kyrgyz coal, R/ton	309.14	–	1842.62	2497.22	2019.72	2936.52	3493.64	5156.72	5156.72	8136.46	8136.46
1. Kyrgyz coal											
Kyzil–Kiya	299.62	–	–	365.02	–	3966	3911.32	3972	3972	10116	10116
Kok–Yangak	258.68	–	1968.5	–	–	–	3289.44	3289.44	3289.44	7612	7612
Dzherghalan	185.8	–	1442.97	2067.29	2873.06	2873		6927	6927	6420	6420
Tash–Kumyr	256.67	–	–	–	–	–	–	–	–	–	–
Kadzhi–Saisk	–	–	–	–	132.31	–	–	6767	6767		
2. Uzbek coal											
Shargun	7595	1856.71	2564.28	2844.75	1802.04	2844	–	–	–	–	–

Source: Kyrgyzstan State Energy Company
Date: March 1993

Table 35 c

Delivered Price to Osh Power Station

	Jan 92	Jun 92	Sep 92	Oct 92	Nov 92	Dec 92	Jan 93	Feb 93	Mar 93	Jun 93	Dec 93
Natural gas, R/th. cm	318.6	1046	4224	4224	4299.26	4401.41	–	27896.38	27896.38	26250	26250
Kyrgyzstan	–	–	–	–	–	–	–	–	–	–	–
Kyrgyzstan and Turkmenistan	318.6	1046	4224	4224	4299.26	4401.41	–	27896.38	27896.38	26250	26250
Mazut, R/ton	1016.66	1976	4952.08	5195	14514.18	9591.94	19243.62	24917.23	46000	74813	74813

Source: Kyrgyzstan State Energy Company
Date: March 1993

Table 35 d

Delivered Price to Kyzil–Kiya Boiler Station

	Jan 92	Jun 92	Sep 92	Oct 92	Nov 92	Dec 92	Jan 93	Feb 93	Mar 93	Jun 93	Dec 93
Coal – TOTAL	105.35	–	–	–	1304.43	869.17	1242.08	4882	6000	9400	9400
including											
Kyzil–Kiya	105.35	–	–	–	1304.43	869.17	1242.08	4882	6000	9400	9400

Source: Kyrgyzstan
Date: March 1993

Table 36

Estimate of Fuel Cost
Projected 1993: National Energy Co.

Fuel	Plant		Consumption of conventional fuel th.tons	Coefficient	Consumption of TFE	Price of 1 ton of TFE in Rb / ton (gas – 1000 cm) according to price – list	Fuel cost (th.rubles)	Transport rate (Rb/ton)	Fuel transport cost (th/r)	Total Fuel Cost at the point of destination (th.roubles)	Cost of 1 ton of natural fuel (rubles)	Cost of 1 ton of conventional fuel
Mazut	Bishkek TPS		166.4	1.39	119.71	57750	6913252.5	3400	407014	7320267	61150	43991
	Osh TPS		112.7	1.39	81.06	70313	5700078	4500	364860	6065938	74813	53822.88
	Bishkek TPS-2		12.9	1.39	9.23	57750	535920	4500	41760	577680	62250	44761
	Total		292	1.39	210.07	62598.9	13150151	3973.2	813634	13963785	66472.05	47821.18
Gas	Bishkek TPS		1034.9	1.16	892.16	26250	23419200			23419200	26250	22629.43
	Osh TPS		111.7	1.16	96.29	26250	2527613.5			2527613	26250	22629.58
	Bishkek TPS-2		15.9	1.16	13.71	26250	359887.5			359888	26250	22634.43
	Total		1162.5	1.16	1002.16	26250	26306700			26306700	26250	22629.42
Coal	Bishkek TPS		600.126	0.55	1091.14	6250.78	6820448.5	1237.8	1350657	8171106	7488.83	13615.25
	Osh TPS		10	0.52	19.23	7000	134610	2400	46152	180762	9400	18076.2
	Bishkek TPS-2		58.5	0.56	104.48	5599.49	584922.78	2537	265012	849935	8136.48	14528.8
	Total		668.625	0.55	1214.83	6206.84	7539981.3	1368	1661821.9201803	7574.59	13782.26	7575
	Karagandia Industrial enterprise, Bishkek TPS		309.026	0.55	561.865	7900	4438733.5	1035	583216	5021949	8936	16250
	Kirghiz	Bishkek TPS	291.1	0.55	529.27	4500	2381715	1450	767442	3149157	5950	10818013
		Issyk-KulPS										
	Kok-Yanghak	Bishkek TPS					0		0			
		Issyk-KulPS	17.47	0.56	31.2	4500	140400	3112	97094	237494	7612	13594.41
	Kyzil-Kiya	Osh TPS	10	0.52	31.2	7000	134610	2400	46152	180762	9400	18076.2
		Issyk-KulPS	21.53	0.56	19.23	7000	269150	3116	119810	388960	10116	18065.96
		Total	31.53	0.547	38.45							
	Dzherghapan	Issyk-KulPS	19.5	0.56	57.88	5038	175372.76	1362	48107	223480	8420	11460
	Total according to calculation											
	Bishkek TPS		1801.426				37152901		1757671	38910572		21599.87
	Osh TPS		234.4				8366200.5		411.12	8774213		37432.85
	Bishkek TPS-2		28.8				895807.5		41760	937568		32554.43
	Issyk-KulPS		58.5				584922.78		265012	849935		14528.8
	Total		2123.126				46996832		2475455	49472287		23301.83

Source: State Energy Company
Date: March 1993

Table 37

Electric Power Tariff for 1993
(with capital investments)
(actual tariff groups)

Consumers	useful supply million kwh	tariff copecks/kwh	products thous. rubles	Alternative 1: useful supply million kwh	tariff copecks/kwh	products thous. rubles	Alternative 2 without profit tax: useful supply million kwh	tariff copecks/kwh	products thous. rubles
Industrial & equated consumers	3050	660	20130000	2608	1224	31921920	2608	919	23967520
				2879	1224	35238756	2879	918.8	26451435
Electrified town transport	35	500	175000	35	500	175000	35	500	175000
Non-industrial consumers including:									
a) budget organizations which attend to population	920	235	2162000	920	456	4195200	920	456	4195200
b) other (non-industrial) consumers	271	660	1788600	271	1224	3317040	271	919	2490490
c) Kirghizzhilkommunisoyz (budget and population)	150	235	352500	150	456	684000	150	456	684000
Power load for agricultural consumers	2046	235	4808100	2046	456	9329760	2046	456	9329760
Urban population	750	60	450000	1034	60	620400	1034	60	620400
Rural population	1392	40	556800	1550	40	620000	1550	40	620000
TOTAL	8614	352	30358522	8614	590.5	50863116	8614	488.5	42075765
Transmision of electricity	2376	700	16632000	1280	1716	21621600	1280	1716	21621600
Total consumption	10990			9874			9874		
Electric power	10990	428	46990522	10990	734.1	72484716	10990	645.1	63697365
Thermal energy	5606	3857	21622342	5606	5675	32935000	5606	5675	32935000
Other energy			728000			2163000			2163000
Total energy products including:			69340864			107582716			98795365
Production costs	204.06		47967000			80111000			80111000
including: electric power					455.9	45013000		455.9	45013000
thermal energy						32935000			32935000
other energy						2163000			2163000
Profit			21373864			27471716			18684365
Road tax			554726.91			860861.73			790362.9
Tax on buildings			2000			2000			2000
Balance profit			20817137			26609054			17892002
Average supply tariff (copecks/kwh)			427.6			734.1		645.1	
Average supply tariff for own consumers			352.4			590.5		488.5	
Electric power production cost (copecks/kwh)			235			455.9		455.9	

Source: State Energy Company
Date: March 1993

Table 38

Costs of Electric Power Production, Transmission and Distribution in Kyrgyzstan
in million rubles

Cost estimate items	1993	% of Total
Fuel for basic needs	23769	52.80%
Water for basic needs	125	0.28%
Fixed salary of industrial worker	988	2.19%
Extra salary of industrial worker	105	0.23%
Deductions to socail security from salary of industrial workers	416	0.92%
Equipment maintenance expenses including:	8169	18.15%
– depreciation of industrial equipment	2160	4.80%
– deductions to repair fund	5564	12.36%
– expenses for basic systems serviced by housing opearation organization	6	0.01%
Start up expenses	142	0.32%
Shop expenses	1763	3.92%
Plant expenses	8841	19.64%
Discharge payments within normal value	8	0.02%
Purchase energy	687	1.53%
Total production costs	45013	
Useful supply, mln.kwh	10990	
Production cost, 1 cop/kwh	409.58	

Source: State Energy Company
Date: March 1993

Table 39
Production Cost Estimates
Thermal energy transmission in Bishkek Heating System

Cost items:	1992 planned	% Total	1993 planned	% Total	% Increase
Operation services	14748	16.36%	97419	11.78%	560.56%
Materials	1419	1.57%	20699	2.50%	1358.70%
Fuel from other sources	885	0.98%	23760	2.87%	2584.75%
Electrical power	60	0.07%	1200	0.15%	1900.00%
Fixed and extra salary	33719	37.39%	219285	26.52%	550.33%
Deductions to social security	12979	14.39%	83328	10.08%	542.02%
Depreciation	4016	4.45%	5766	0.70%	43.58%
Other cash expenditures	2725	3.02%	27736	3.35%	917.83%
TOTAL	70551	78.24%	479193	57.94%	579.22%
Fund for promoting peoples protection 1% of wages fund	337	0.37%	2193	0.27%	550.74%
Medical Insurance 6% of wages fund	322	0.36%	13157	1.59%	3986.02%
Environment protection	2	0.00%	80	0.01%	3900.00%
State property insurance	60	0.07%	90	0.01%	50.00%
Bank credit payment	0	0.00%	2284	0.28%	
Purchase thermal energy, 60000 to .897	18900	20.96%	330000	39.90%	1646.03%
TOTAL COSTS	90172	100.00%	826997	100.00%	817.13%
including					
capital repair	13643		90928		
current repair	708		9084		

Source: Bishkek Heating System Enterprise
Date: March 1993

Table 40a

Tariff Dynamic Alteration
for thermal energy produced by heat
power stations
Kirghiz State Energy Company 1992–93

Consumers	yearly distribution of heat energy th.GCal	prices for January 1, 1992: tariffs on thermal energy, R/GCal	prices for January 1, 1992: total sales of thermal energy, th.r	prices for January 1, 1993: tariffs on thermal energy, R/GCal	prices for January 1, 1993: total sales of thermal energy, th.r	in prices for April 1, 1993 (projected): tariffs on thermal energy, R/GCal	in prices for April 1, 1993 (projected): total sales of thermal energy, th.r	in prices for April 1, 1993 (projected): needed subdiskes th.r
Industrial and equated non-industrial consumers	2 122	102.36	217.2	9550	20265400	5875	12466750	−7798 350
People	2244	3049	7.8	170	224400	5875	13 183500	12959 100
Hot-houses	246	12.92	3.2	1373	337642	5875	1443250	1107608
Budget enterprises and organiz.	994	12	11.9	800	795200	5875	5839750	5044550
Total distribution of thermal energy	5606	4.3	240.1	3857	2 1622342	5875	32933250	11 312908

Source: Bishkek Heating System Enterprise
Date: March 1993

Table 40b
Electric Power: Useful Supply and Tariffs
1993: 1 Q

Consumers	Useful Supply million Kwth	Tariff Kopeks kwth	Marketable Products Th. Rubles
Useful electric power energy including:	2588	235	6087379
Industrial and similar consumers	759	527	4004598
Electric town transport	6	499	31902
Non–industrial consumer	376	272	1023130
Power load for agriculture consumers	548	151	826634
Urban population	350	31	108236
Rural population	549	17	92879

Source: Kyrgyz State Energy Company
Date: May 1993

Table 41

Production Cost Calculation
Heat Energy, its Transmission and Distribution
(millions of rubles)

Cost Items	From 3/1/92 to 7/10/92	From 7/10/92 to 1/1/93	From 1/1/93 to 4/1/93	From 4/1/93 Projected
Fuel for basic needs	1345	2796	18510	25703
Water for basic needs	9	23	69	96
Fixed wages of industrial workers	19	52	317	439
Extra wages for industrial workers	1	5	31	43
Deductions for social security from wages of industrial workers	8	21	132	182
Equipment maintenance expenses including:	101	113	558	1484
– depreciation of industrial equipment	9	8	20	330
– deductions to repair fund	32	55	307	887
– expenses for housing operation serviced by housing opearation organiz.	1	2	10	2
Preparation and start up expenses	3	9	27	84
Shop expenses	13	27	130	3637
Plant expenses	19	48	1241	3637
Discharge payments within normal value	3	3	9	9
Purchase energy	9	19	600	974
Total production cost (full cost)	1532	3116	21624	32935
Sales, th. GCal	5718.1	5718.1	5606.4	5606.4
Production cost (R / Gcal)	268	544.99	3857	5875

Source: Bishkek Heating System Enterprise
Date: March 1993

Table 42

COST ESTIMATES FOR THERMAL ENERGY GENERATION IN BISHKEK HEATING SYSTEM KIRGHIZ NATIONAL ENERGY COMPANY		
COST ITEMS	1992 Projected (thousand roubles)	1993 Projected
Operation services	14748	97419
Materials	1419	20699
Fuel from other sources (gasoline)	885	23760
Electric power	60	1200
Fixed and extra salary	33719	219285
Deductions to social security	12979	83328
Depreciation costs for full recovery	4016	5766
Other cash expenditures	2725	27736
TOTAL	70551	479193
Fund for promoting people's protection (1% of wages fund)	337	2193
Medical insurance (6% of wages fund)	322	13157
Environment protection	2	80
State property insurance	60	90
Bank credit payment	0	2284
Purchase thermal energy (60000 to 0.897)	18900	330000
	19621	347804
TOTAL COSTS:	90172	826997
Capital repair	13643	90928
Current repair	708	9084
GRAND TOTAL	104523	927009

Source: State Energy Company
Date: May 1993

Table 43

Kyrgyzstan Electricity Sales (million kWh)					
Months	Residnt'l	Commrc'l	Industrial	Other	TOTAL
1992					
April	124.4	253.1	158.8	110.8	**647.1**
May	105.5	240.1	163.7	104.1	**613.4**
June	110.4	222.9	154.5	87.1	**574.9**
July	92.4	227.9	148.9	87.6	**556.8**
August	105.3	211.6	164.8	79.8	**561.5**
September	124.1	190.6	153.7	76.8	**545.2**
October	135.0	253.1	136.4	95.0	**619.5**
November	193.7	250.1	139.0	115.2	**698.0**
December	346.4	226.3	161.6	148.3	**882.6**
1993					
January	321.6	279.9	182.6	130.8	**914.9**
February	268.3	248.0	201.6	129.3	**847.2**
March	309.4	224.9	163.3	128.2	**825.8**
April	256.3	186.3	132.3	109.2	**684.1**

Source: Kyrgyzstan State Energy Company
Date: May 1993

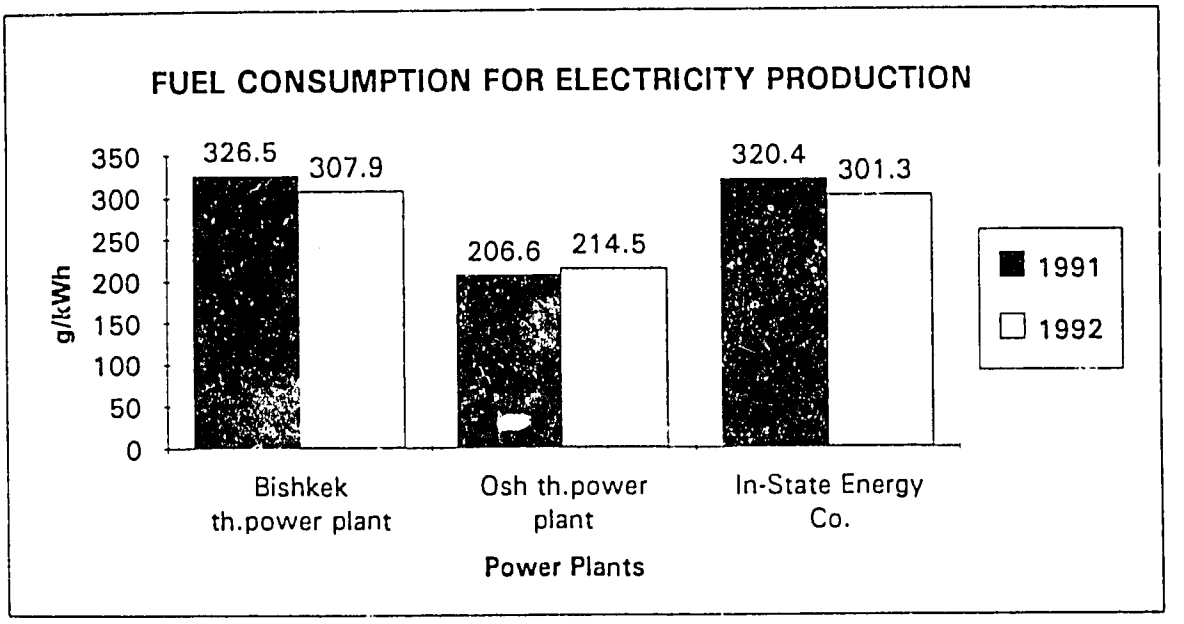
Table 44
TECHNOLOGICAL AND ECONOMIC DATA

Operational Hours of Electric Power Plants				
	No. Hrs. the Avg. Annual Capacity was Used			
	Turbine Units		Boiler Units	
	1991	1992	1991	1992
	THERMO ELECTRIC			
Bishkek power plant	5906	3842	4529	3225
Osh power plant	4576	4096	4594	3811
Other Thermo Electric	5807	3861	4534	3272
ANNUAL AVG. OPERATING HRS	5430	3933	4552	3436
	HYDRO POWER			
Toktogul	4417	3681		
Kurpsai	4137	3829		
Tashkumyr	636	1131		
Uch-Kurgan	5111	5203		
At-Bashi	3085	3482		
Alamedin hydro cascade	2527	2156		
Bystrovka	4632	4502		
Other Hydro Power	3707	3387		
ANNUAL AVG. OPERATING HRS	3532	3421		

Source: State Energy Company
Date: May 1993

Table 45

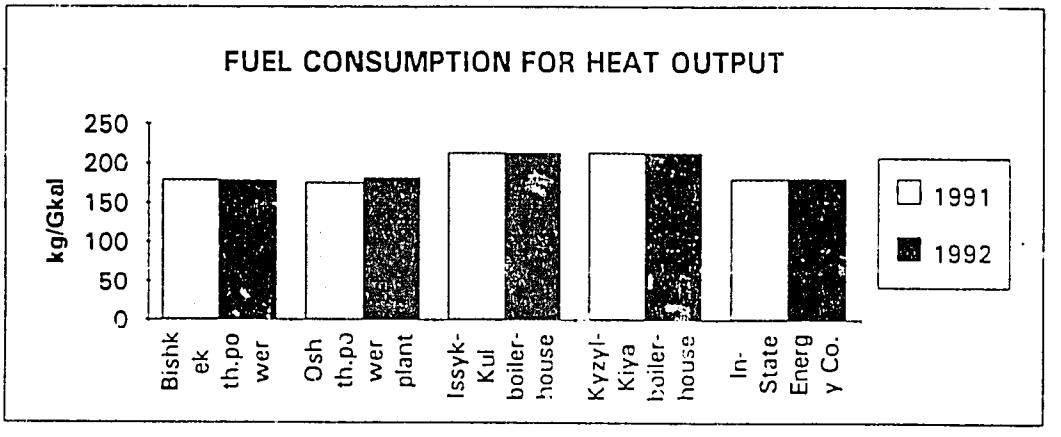
FUEL CONSUMPTION FOR ELECTRICITY PRODUCTION -- 1992 (g/kWh)			
	1991	1992	
		normative	actua
Bishkek th.power plant	326.5	308.2	307.9
Osh th.power plant	206.6	214.5	214.5
In-State Energy Co.	320.4	301.6	301.3



Source: State Energy Company
Date: May 1993

Table 46

FUEL CONSUMPTION FOR HEAT OUTPUT -- 1992 (kg/Gkal)			
	1991	1992	
		normative	actual
Bishkek th.power plant	178.7	178.5	178.5
Osh th.power plant	175.9	181.3	181.3
Issyk-Kul boiler-house	212.8	212.7	212.7
Kyzyl-Kiya boiler-house	212.8	212.7	212.7
In-State Energy Co.	179.9	180.9	180.9



RESULTS:

The operation of the power plant according to the heating cha allowed to reduce the specific fuel consumption for electricity output compared to that in 1991 by 18.6 g/kWh, and for the output of heat by 0.2 kg/Gkal, thus, saving 40,000 tons of conventional f units in 1992.

The Osh Power Plant showed a sharp increase in specific conve al fuel consumption as compared to that in 1991:

-for the output of electricity by 7.9 g/kWh;

-for the output of heat by 5.4 kg/Gkal.

The consolidated total specific consumption of conventional f for the output of electricity has been reduced against the normati by 0.3 g/kWh, thus, allowing the saving of 772 tons of conventiona fuel units.

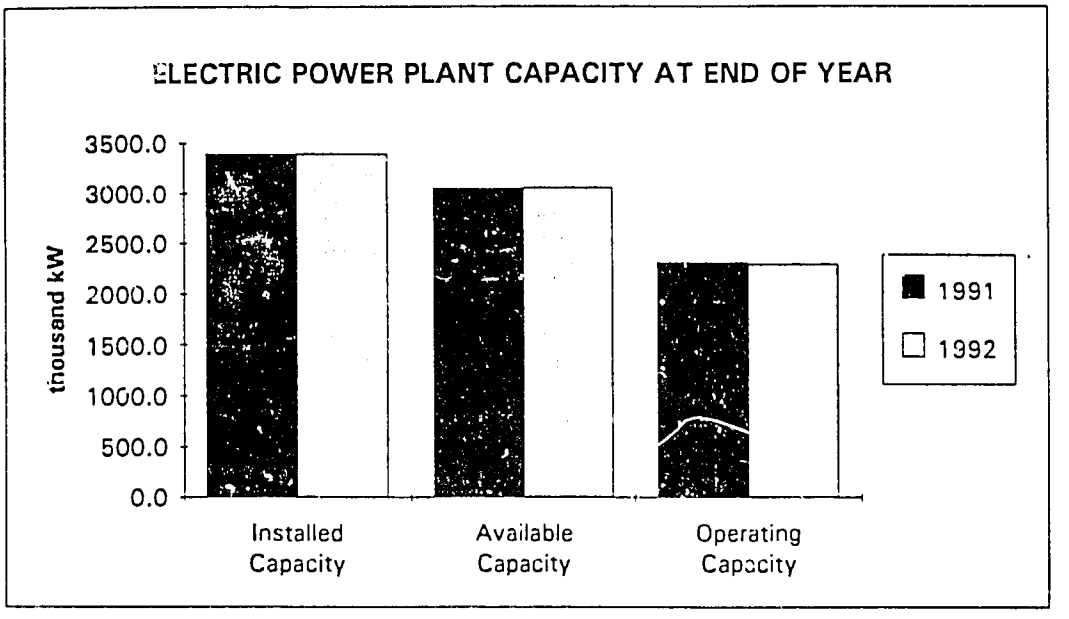
The reductions in specific consumption of fuel for the output electricity as compared to that in 1991 were by 19.1 g/kWh. Howev as a result of sharp increases in specific consumption of fuel for output of heat in the Osh power plant, the consolidated total spec consumption of conventional fuel for the output of heat was higher that of last year by 1 kg/Gkal in the State Energy Company.

Fuel savings from reducing the specific consumptions against normative values in the State energy Company were 772 tons of conventional fuel, while, that against the level of last year were 38,200 tons of conventional fuel.

Source: State Energy Company
Date: May 1993

Table47

INSTALLED AND AVAILABLE CAPACITY OF ELECTRIC POWER PLANTS OF THE ENERGY SYSTEM AT THE END OF THE YEAR: (thousand kW)		
	1991	1992
Installed Capacity	3387.3	3387.3
Available Capacity	3049.4	3052.2
Operating Capacity	2305.8	2291.5



By the end of the year enterprises of the energy system includ 20 electric power plants with a total installed capacity of 3387.2 thousand kW, including 2 thermo-electric power plants with an installed capacity of 674 thousand kW, and 18 hydro-electric power plants with an installed capacity of 2713.27 thousand kW.

There were no changes in the installed capacity of the State Energy Company in 1992.

Source: State Energy Company
Date: May 1993

Table 48

NO. AND CAPACITY OF TURBINES & NO. OF POWER BOILERS:		
Name of Power Plant	Turbines/ thous. kW	boilers/ ton/h
Bishkek th.power plant	10/624	24/4250
Osh th.power plant	2/50	3/375
Toktogul hydro	4/1200	
Kurpsai hydro	4/800	
Tashkumyr hydro	3/450	
Uch-Kurgan hydro	4/180	
At-Bashi hydro	4/40	
Bystrovka hydro	3/8.7	
Alamedin hydro cascade	18/31.26	
Kyrk-Klyzyk	2/0.72 (laid up)	
On-Aryk	2/1.47	
Leninpol	2/1.12	

Source: State Energy Company
Date: May 1993

Table 49

IMPLEMENTATION OF THE ANNUAL TARGET FOR ELECTRICITY AND HEAT OUTPUTS			
	1991 actual	1992 actual	1991 v. 1992 % comparison
ELECTRICITY OUTPUT (mln.kW) T O T A L	13972.3	11792.7	84.4
Thermo Electric:			
Bishkek power plant	3685.2	2397.6	65.1
Osh power plant	228.8	204.8	89.5
TOTAL:	3914.0	2602.4	66.5
Hydro Power:			
Toktogul	5300.1	4605.7	86.9
Kurpsai	3309.2	3063.0	92.6
Tashkumyr	286.3	339.2	118.5
Uch-Kurgan	920.0	936.5	101.8
At-Bashi	123.4	139.3	112.9
Alamedin	79.0	67.4	85.3
Bystrovka	40.3	39.2	97.3
TOTAL:	10058.3	9190.3	91.4
HEAT OUTPUT SALES (thous.Gkal) T O T A L	5805.8	5152.8	88.8
Bishkek th.power plant	4461.6	4049.6	90.7
Osh th.power plant	1030.0	795.5	77.2
Issyk-Kul Boiler-house	246.9	248.6	100.7
Kyzyl-Kiya Boiler-house	44.9	42.5	95.7
Komsomol Boiler-house	22.9	21.3	93.0

RESULTS:

Reductions in electricity and heat outputs are a result of an overall industrial decline that led to a reduction in electricity and heat consumption.

In 1992, from other electric systems of Central Asia, 1896.3 mln kW were imported, the target being 600.0 mln kW, including:

- 318.8 from Tadjikenergo;
- 1577.6 from Yuhzkazenergo.

Transmitted (exported) to other power systems: total 4072.8 mln. kWh, the target being 3610.0 mln.kWh, including:

- to Uzbekenergo 2944.2
- Almatyenergo 1128.0
- Yuzhkazenergo in the area of Merke 193.0
- Tadjikenergo 0.6

Source: State Energy Company
Date: May 1993

Table 50

Electricity and heat supplies to all sectors of the economy and population in the Kyrgyz Republic, with the exception of some private farms, were centralized.

INSTALLED CAPACITY OF POWER PLANTS (thousand kW):	
North Kyrgyzstan:	
Bishkek th.electric power plant	624.00
Alamedin hydro cascade	31.26
At-Bashi hydro	40.00
Bystrovka hydro	8.70
T O T A L	703.96
South Kyrgyzstan:	
Toktogul hydro	1200.00
Kurpsai hydro	800.00
Uch-Kurgan hydro	180.00
Tash-Kumyr hydro	450.00
Osh th.electric power plant	50.00
T O T A L	2680.00

RESULTS:

Small hydros (Kyrk-Kyzyk, Leninpol, On-Orcha) with a capacity of 3.31 thousand kW are laid up.

The overall installed capacity of electric power plants of the energy system is 3387.27 thousand kW.

In 1992 the power plants of the Kyrgyz State Energy Company produced 11792.7 mln.kWh of electricity, including:

the thermal electric power plants: 2602.4 mln.kWh
the hydros: 9190.3 mln.kWh

In the territory of the Republic, there are operating block powe stations of the Tamak-Ash Concern (food industry) with a total capaci of 31.35 thousand kW, including:

the th.electric power plant of the Ak-Sui sugar factory: 16,000 k
the th.electric power plant of the Novo-Troitsk Combinat: 8,200 k
the th.electric power plant of Kainda Sugar factory: 6,400 k
the th.electric power plant of the Kant Sugarcombinat: 750 k

In 1992 the above block power stations produced (for their own consumption) 80,000 kW of electricity.

The K thermo-electric power plant operated in a zero mode with the energy system.

Source: State Energy Company
Date: May 1993

Table 51

ADMINISTRATIVE UNITS SERVICED BY THE KYRGYZ STATE ENERGY COMPANY				
		Population		
Name of oblast (region)	area 1000km sq	total (thous.	per sq. km	Name of Enterprises
The Republic of Kyrgyzstan, including:				Kyrgyz State Energy Co.
Chui oblast	198.5	4312	22	Chui PES
Issyk-kul oblast	18.7	1600	86	Issyk-Kul PES
Naryn oblast	43.5	401	9	Naryn PES
Talas oblast	51.1	265	5	Talas PES
Osh oblast	19.6	280	14	Osh PES
Jalal-Abad oblast	65.6	1770	27	Jalal-Abad PES

Source: State Energy Company
Date: May 1993

Table 52

In connection the acquisition of independence by Kyrgyzstan and the elimination of the Union energy distribution management structures, electricity and heat supplies were provided according to direct contracts, and the structure of heat and electricity consumption had changed accordingly.

CONSUMPTION OF ELECTRICITY BY OWN CONSUMERS (mln.kWh)			
	Actual 1991	Actual 1992	Rate (%)
Industry	3508.8	2957.6	84.3
Agriculture	1985.7	1871.9	94.3
Municipal Economy (utilities)	1179.4	1331.3	112.9
Residential:			
Urban	573.1	819.4	142.2
Rural	881.7	1131.1	128.3
T O T A L	8128.7	8111.3	99.8

RESULTS:

The overall reduction in energy consumption in the Republic in 1992 by 0.2% as compared to that of 1991 is explained by a sharp decline in industrial production and resulted in a reduction of electricity consumption by 15.7% as compared to that of previous year level. Growth rates declined in the agricultural sector, partially, resulting from a reduction of consumption for irrigation as compared to 1991.

Considerable increases in the categories of "population" and pectively) results from converting from fossil fuel heating to electric heating.

Organizational work on model measures (design of capacity and electricity limitations and switching, regulation measures to reduce loads during maximum peaks of the energy system) was carried out according to the established order. There were no limitations and cut-offs of consumers in 1992.

The personnel of the electric grid enterprises (PES) controlled the modes of consumption of the customers.

Source: State Energy Company
Date: May 1993

Table 53

Kyrgyzstan Electricity Tariffs (Jan 1993)

Selected Categories	Tariff kopecks/kWh	Tariff US cents/Kwh Jan. Market Rate 500 R/$	Tariff US cents/Kwh Illustrative PPP* 250 R/$	Intl. Comaprison US cents/Kwh
Industry Load > 750 kW				
Industry Load < 750 kW				Industry
Industry Average	836	1.67	3.34	4.5 – 9.0
Railway	500	1.00	2.00	
Special Institutions & Commercial	381	0.76	1.52	
Trolleys	500	1.00	2.00	
Municipal Services	381	0.76	1.52	
Agriculture	496	0.99	1.98	
Household–	150	0.30	0.60	Households
Urban / Rural	120	0.24	0.48	6 – 14

* Purchasing Power Parity

Source: State Energy Company
Date: May 1993

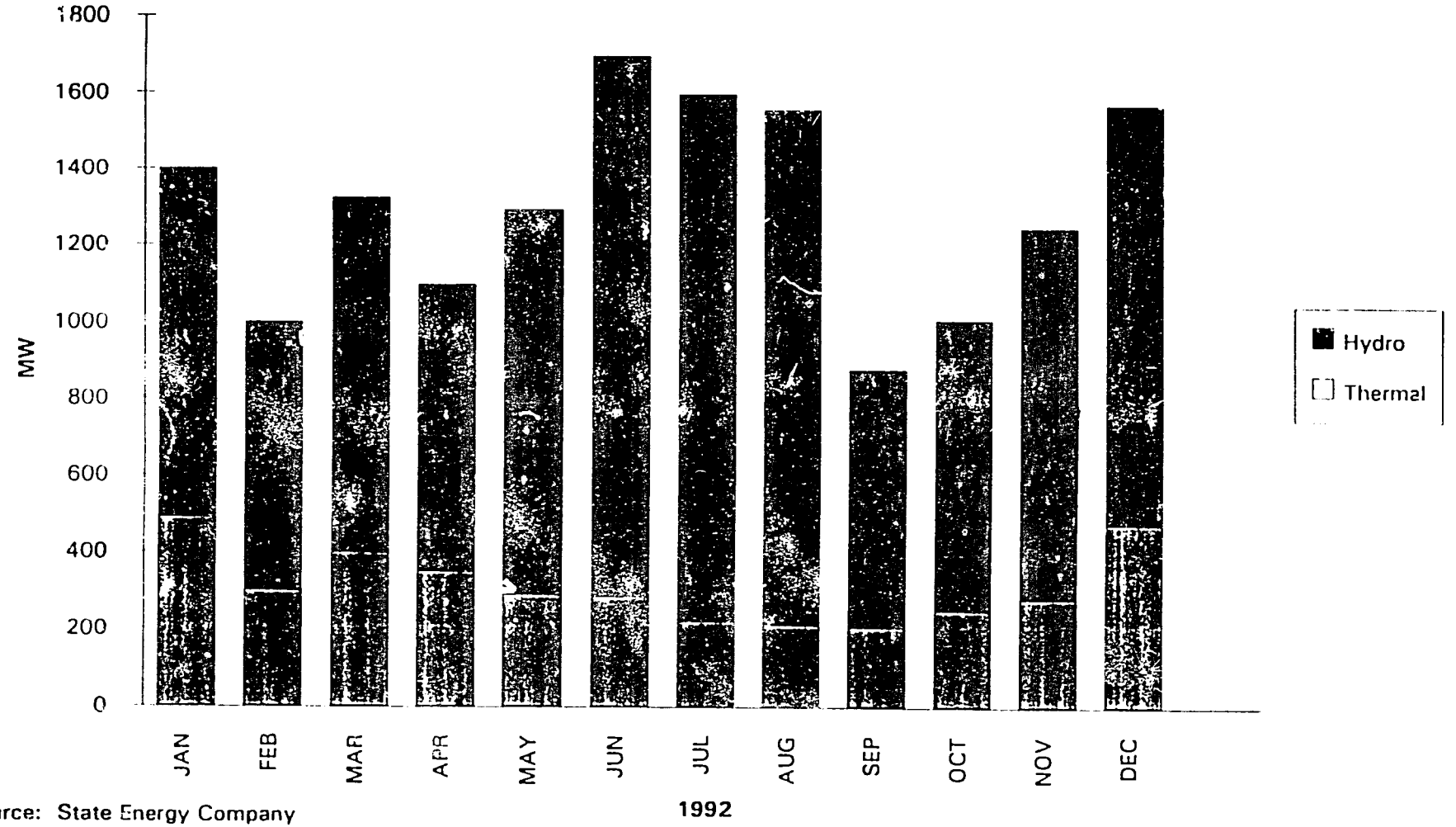
Table 54

ELECTRICITY TARIFFS -- 1993	
ELECTRICITY	Copeck/kWhr
CUSTOMER CLASS	
Commercial	479
Industrial	836
City Electric Transport	500
Non-industrial consumers including:	
a) budget organizations serving the populations	381
b) others (non-industrial consumers)	836
c) Kyrgyz Housing (utility) & communal services union (budget & population)	381
Power load from rural consumers (agricultural consumers)	496
Population: urban	150
rural	120
Export Sales	1716
DISTRICT HEATING	Rubles/GCal
Industrial	4894
Non-industrial	9550
Population	200
Green-house farms, budget organizations	5421

Source: State Energy Company
Date: May 1993

Table 55

AVERAGE MONTHLY LOAD FOR ALL ELECTRIC PLANTS

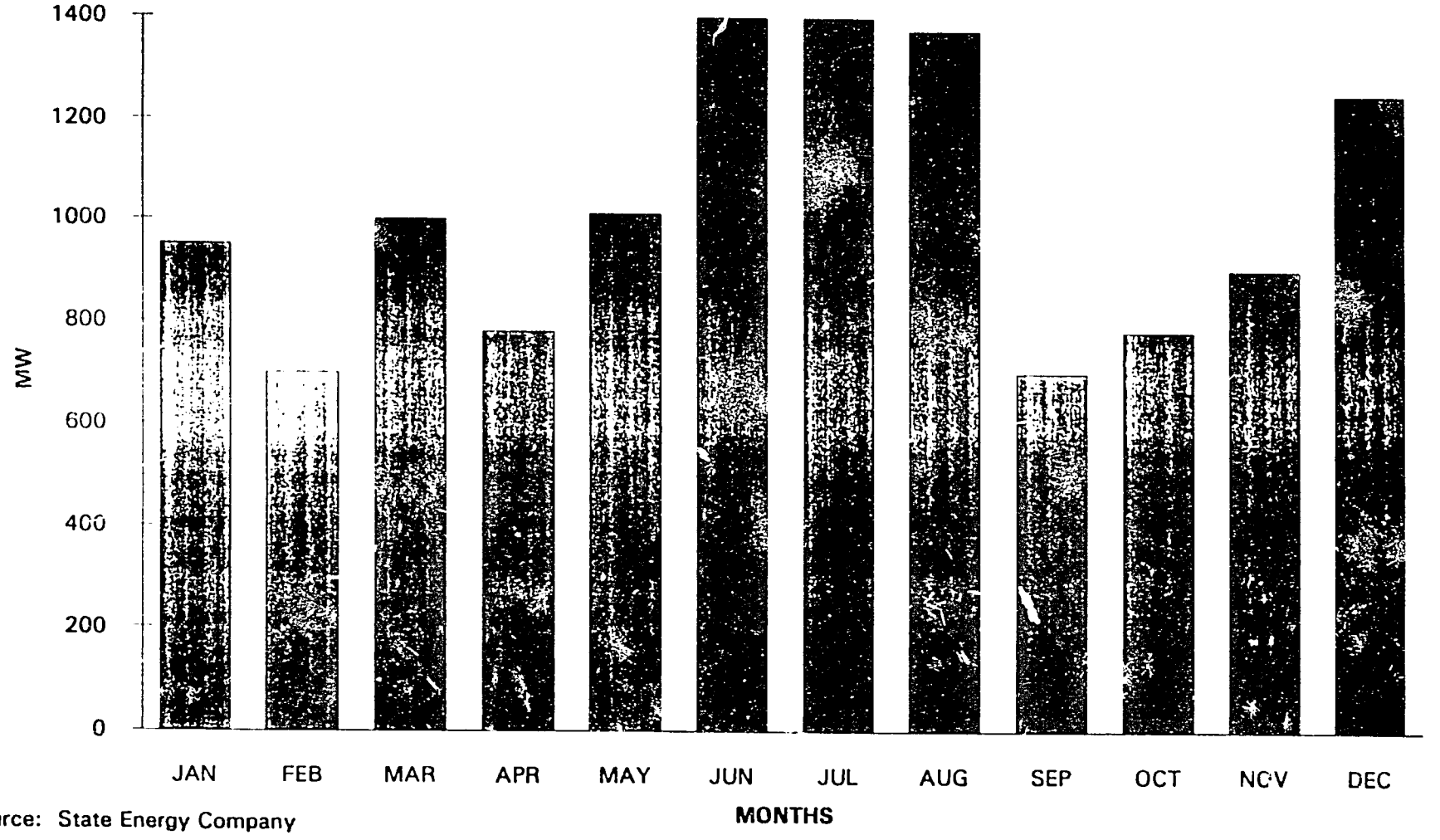


Source: State Energy Company

Date: May 1993

Table 56

AVERAGE MONTHLY LOADS OF HYDRO PLANTS



Source: State Energy Company
Date: May 1993

Table 57

ANNUAL OPERATING COSTS
State Energy Company

	1991 (rubles)	1992 (rubles)	projected 1993 (rubles)
Material Costs*	134501	3926944	54418000
Delivery expenses			
Losses			
Wages/Labor payments**	74860	733054	3030000
Social Security Payment	28503	272657	1121000
Taxes			
VAT	13729	637813	7614000
profit	48386	181727	7357539
land	–	159	18000
property / building	–	–	1170000
road	3800	72617	739904
employment fund	–	7285	30800
Maintenance and current repair	56321	161868	7307248
Rental payment for buildings			
Insurance expenses			
Depreciation of equipment and buildings	41532	46181	3090000
Interest Expenses	126	371	3452
TOTAL	475020	8221774	92488000

Note: * excluding delivery/transportation expenses
** excluding social security, taxes, etc.

Source: Kyrgyzneftеproduct
Date: May 1993

APPENDIX IV
HYDRO QUEBEC DATA

APPENDIX IV

List of Tables

1 Average Cost of Supply for Electricity – 1991
2 Average Consumption for rate G & D Customers Who Use Electric Heating
3 Breakdown of Consumption by Heating Method
4 Overall Costs by Power System Level
5 Breakdown of Costs
6 Breakdown of Sales
7 Customers with All – Electric Heating
8 Customers without Electric Heating

Table 1

Source: Hydro-Quebec

Date: 1993

AVERAGE COST OF SUPPLY FOR ELECTRICITY-1991

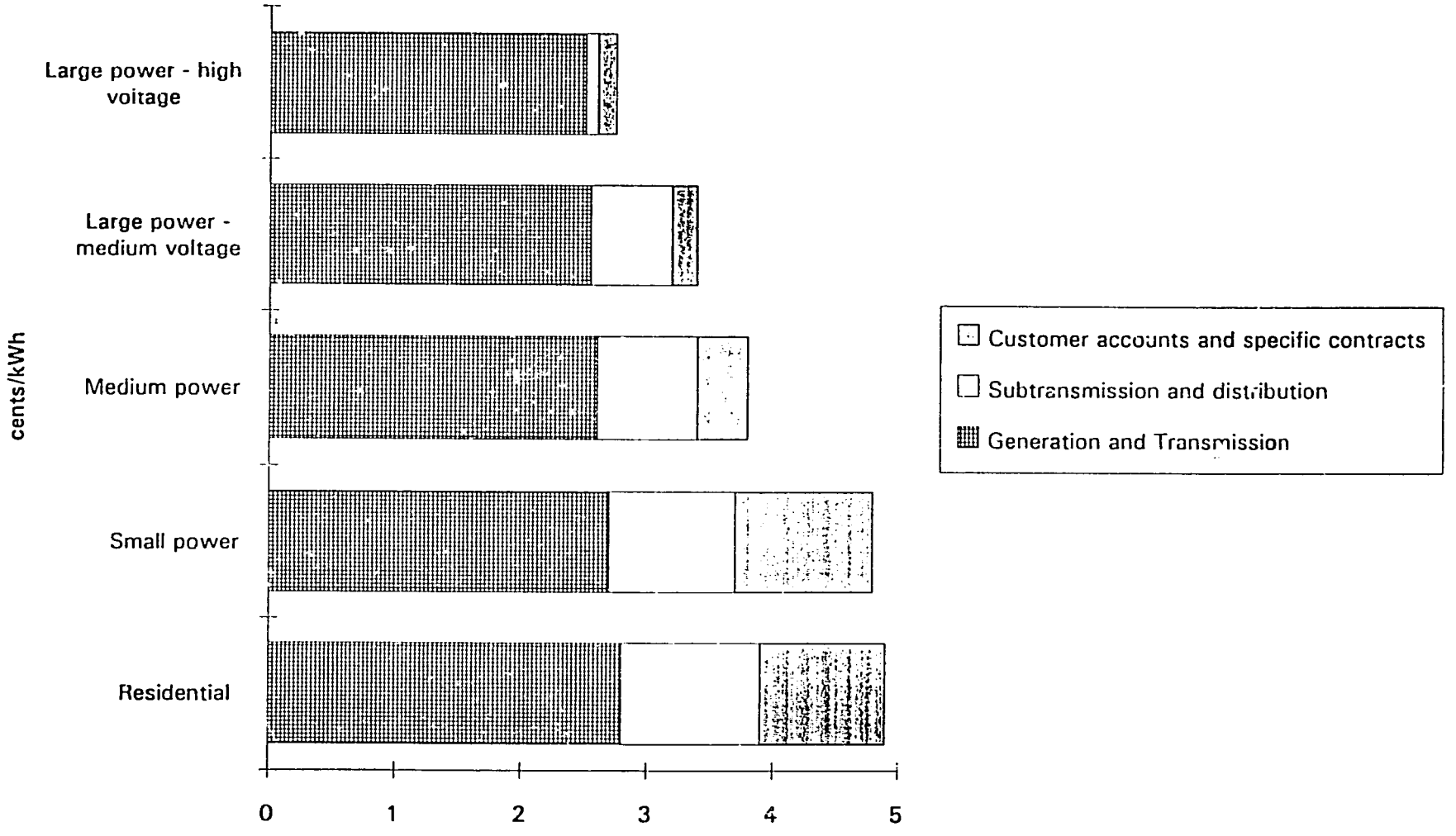
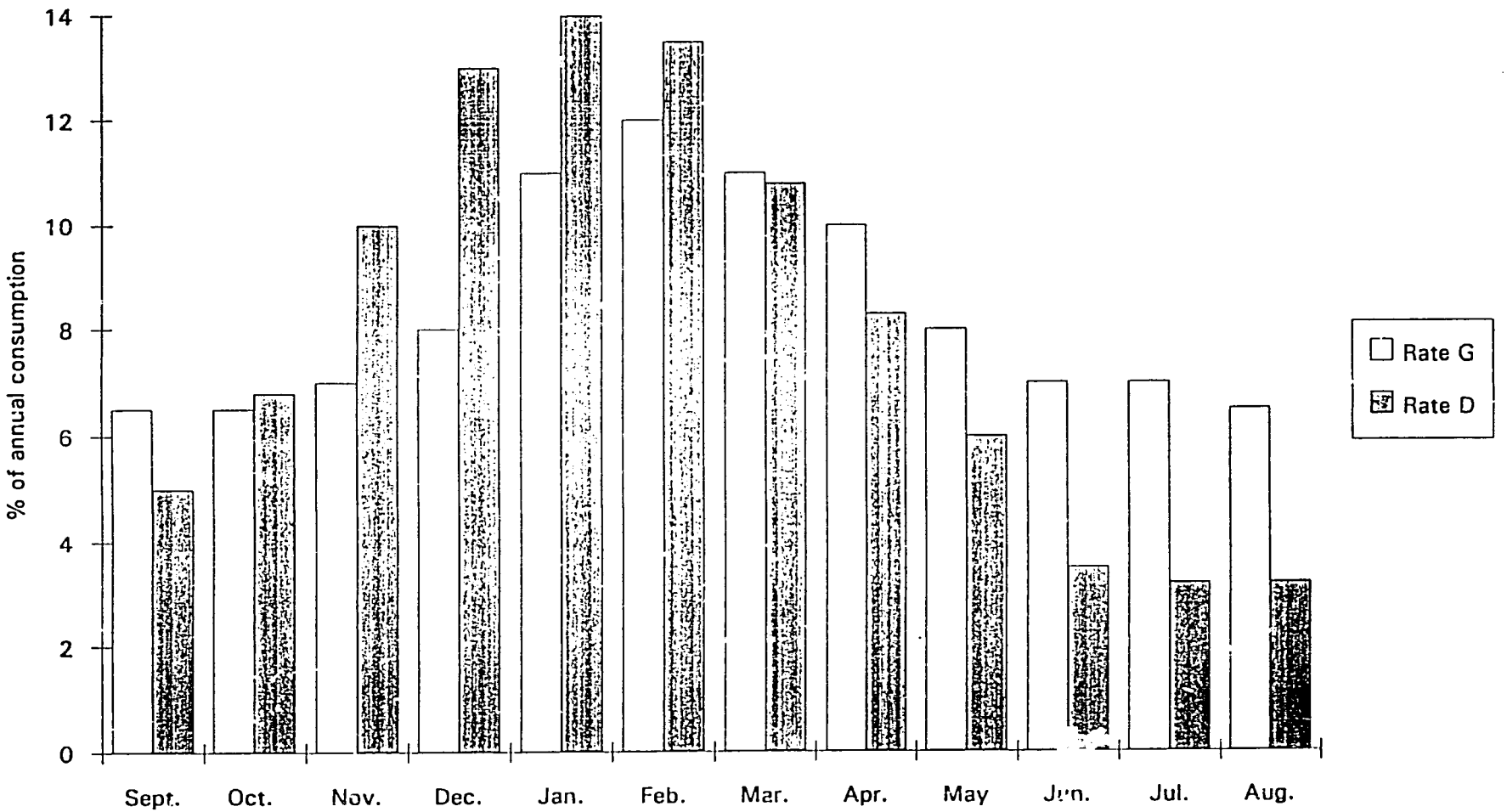


Table 2

Source: Hydro-Quebec
Date: 1993

AVERAGE CONSUMPTION FOR RATE G AND D CUSTOMERS WHO USE ELECTRIC HEATING

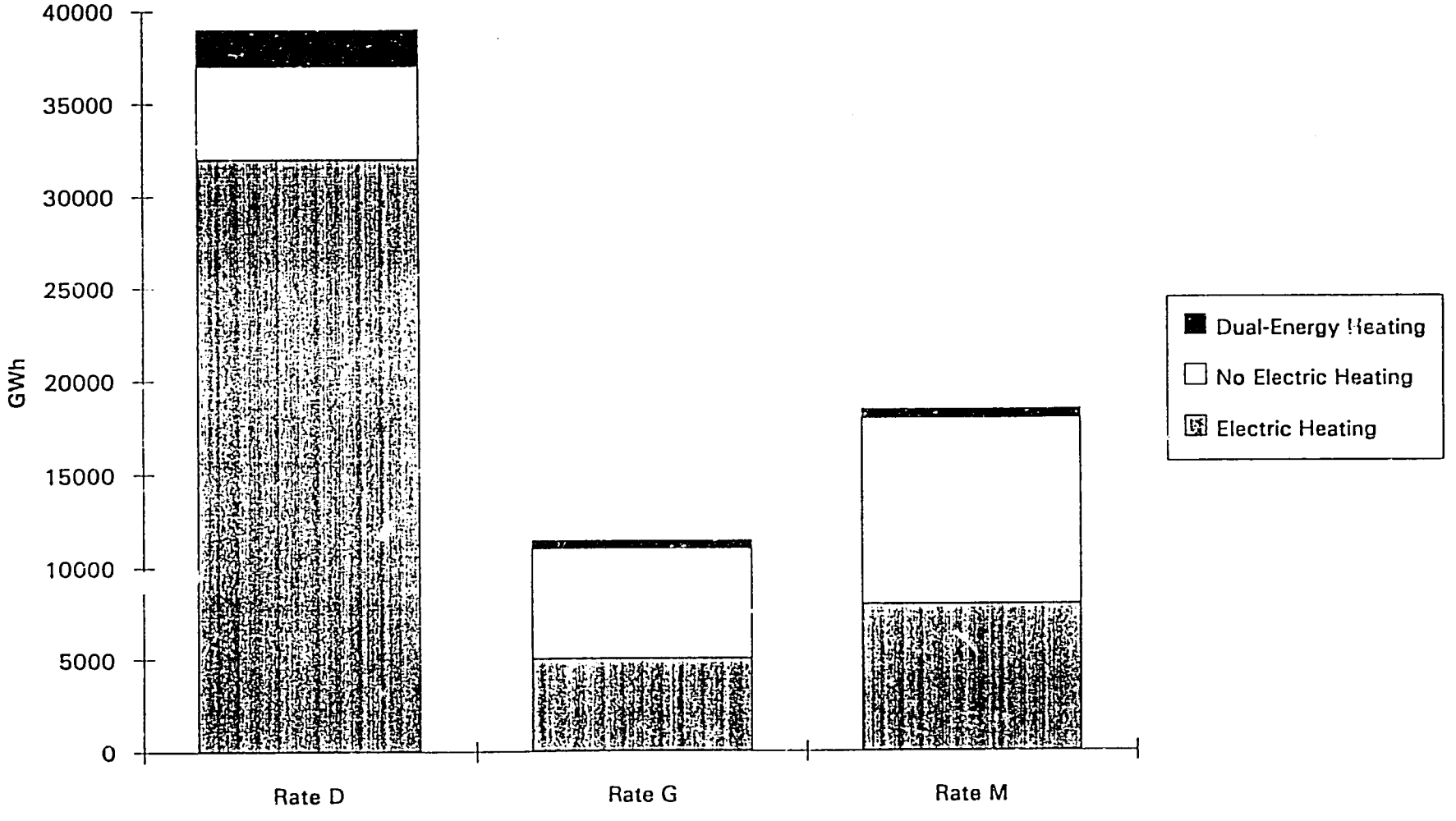


Note: Rate G is the rate for non-residential small power customers in industry, business and institutions.
Rate D is the rate for all residential customers.

Source: Hydro-Quebec
Date: 1993

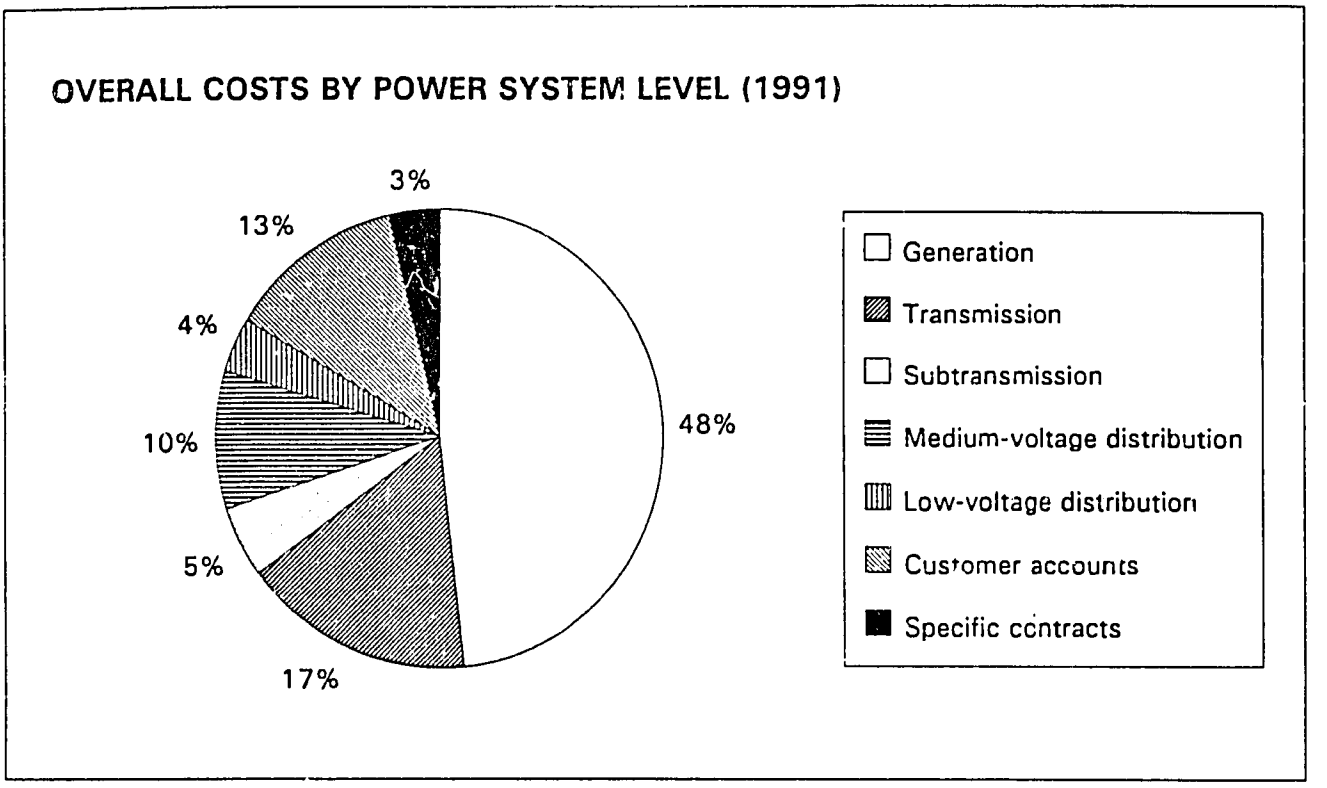
Table 3

BREAKDOWN OF CONSUMPTION ACCORDING TO HEATING METHOD



Note: Rate D is the basic rate structure for all residential customers.
Rate G is the rate structure for all non-residential small power customers (businesses, industry, institutions)
Rate M is the rate structure for all non-residential meduim power customers (business. industry, institutions)

Table 4



OVERALL COSTS BY POWER SYSTEM LEVEL (1991)

System level	cents/kWh
Generation	1.95
Transmission	0.68
Subtransmission	0.2
Medium-voltage distribution	0.39
Low-voltage distribution	0.15
Customer accounts	0.52
Specific contracts	0.14
Total	4.03

Source: Hydro-Quebec
Date: 1993

Table 5

Source: Hydro-Quebec
Date: 1993

BREAKDOWN OF COSTS (1991)

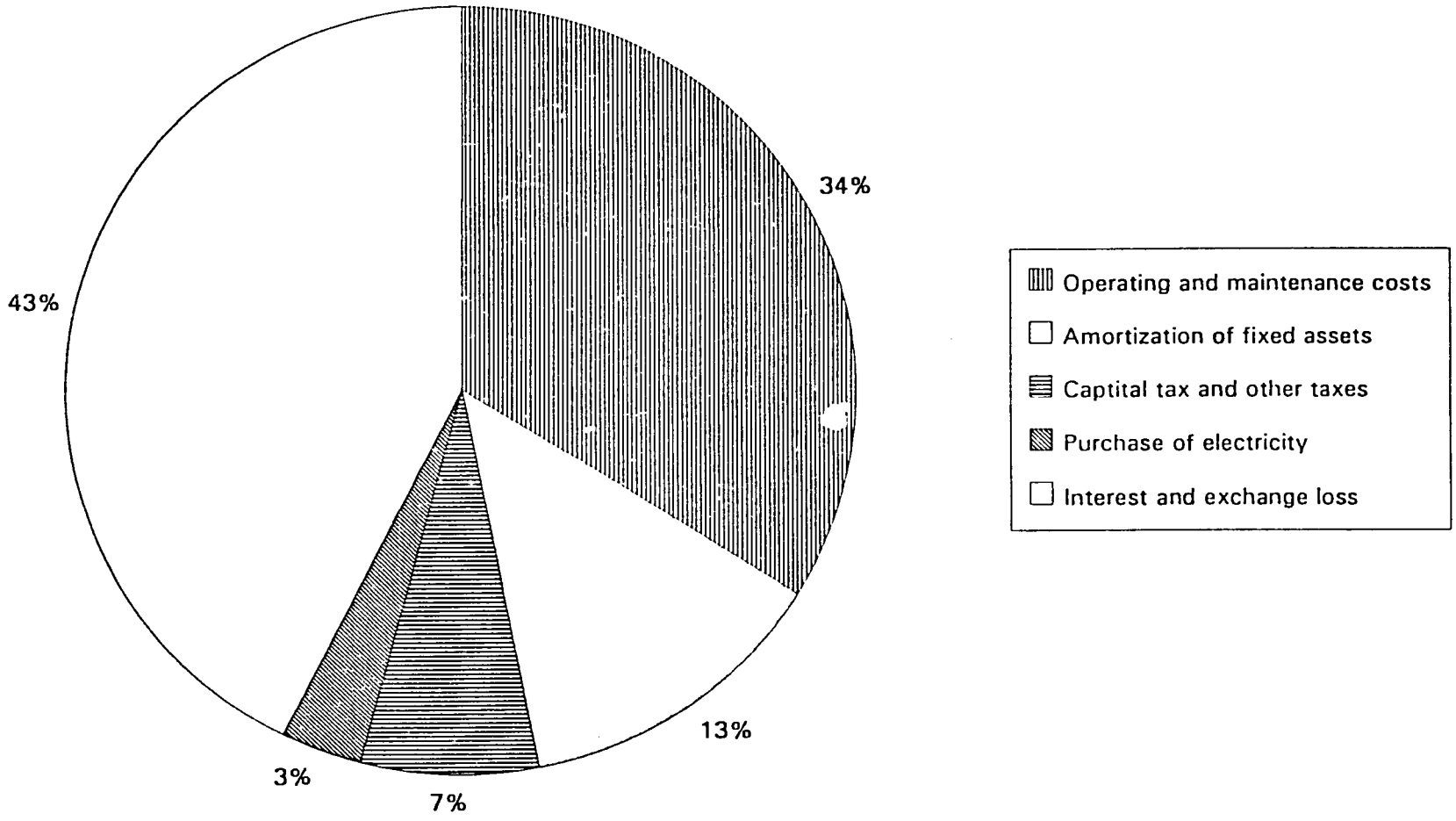


Table 6

Source: Hydro-Quebec
Date: 1993

BREAKDOWN OF SALES (1991)

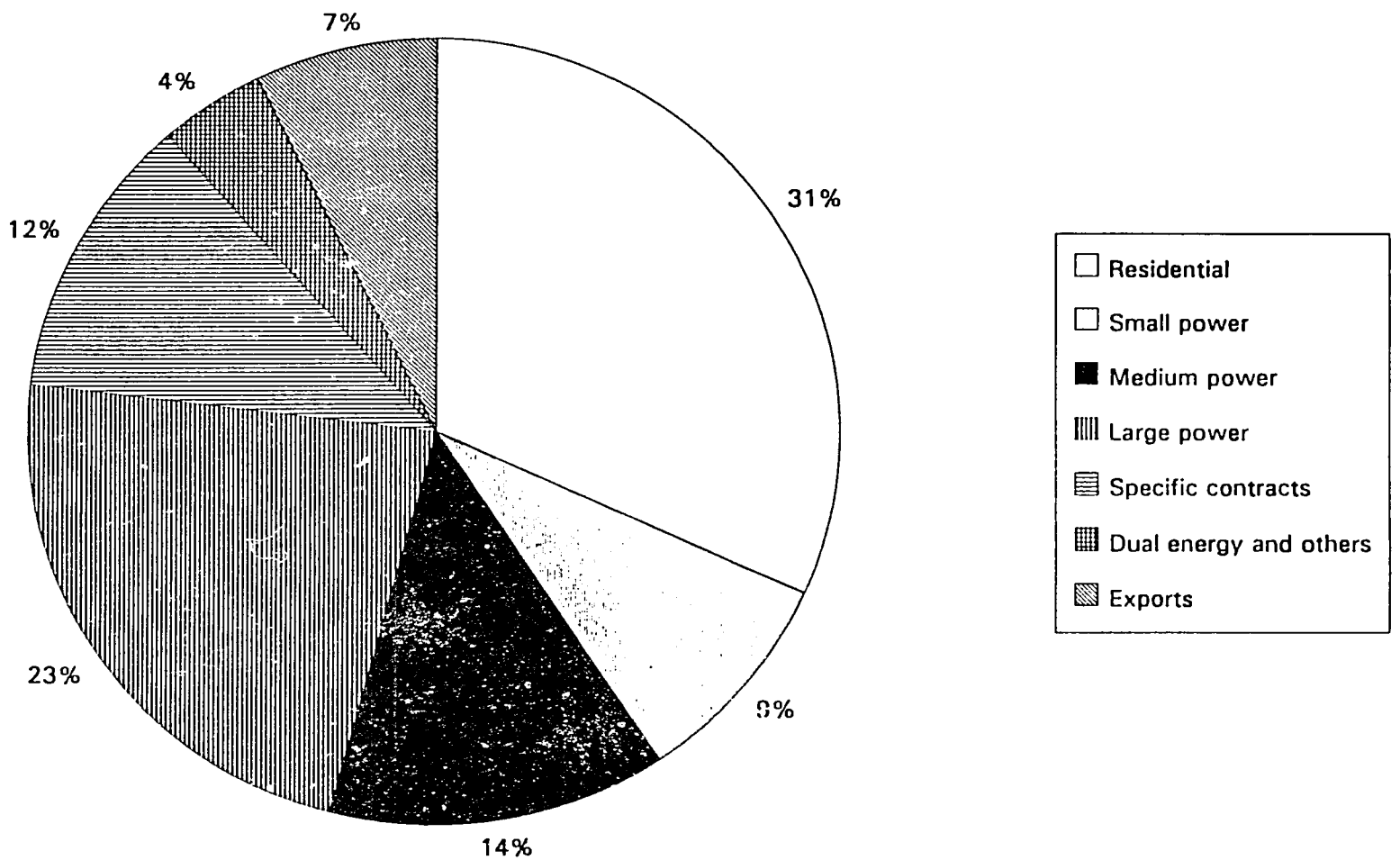


Table 7

Source: Hydro-Quebec

Date: 1993

CUSTOMERS WITH ALL-ELECTRIC HEATING (A)

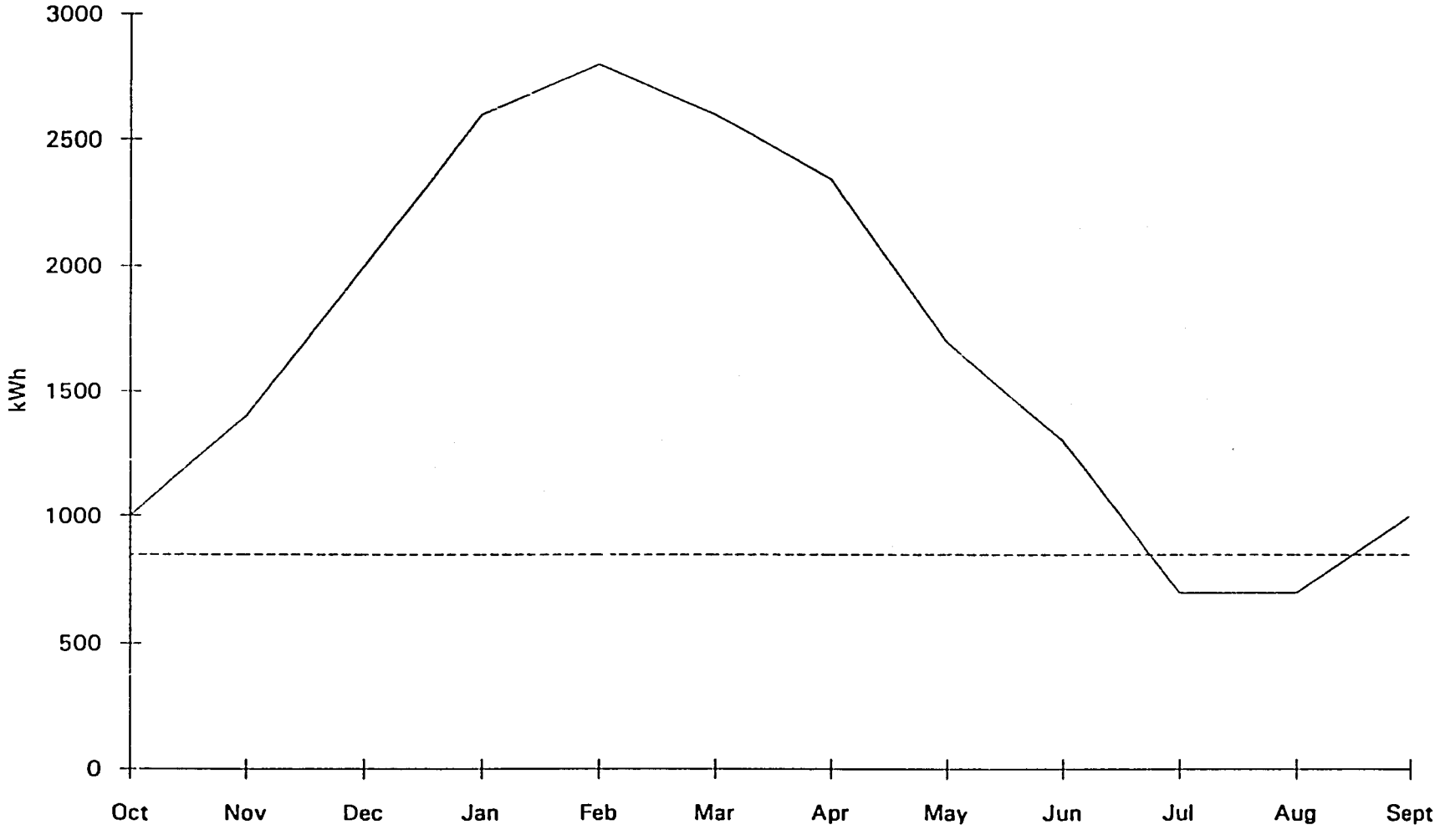
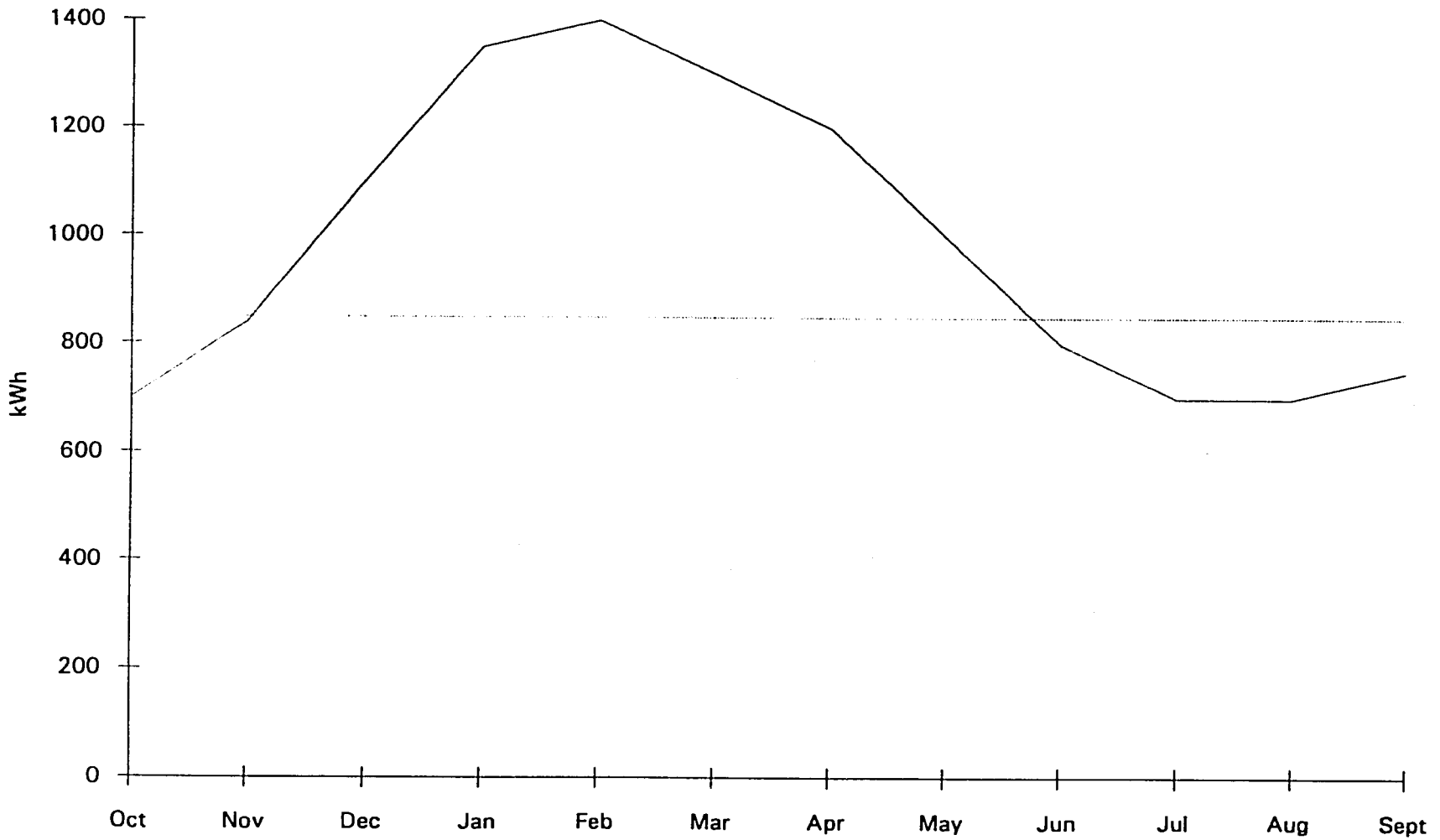


Table 8

Source: Hydro-Quebec

Date: 1993

CUSTOMERS WITHOUT ELECTRIC HEATING (B)



APPENDIX V
HYDROPOWER DEVELOPMENT IN KYRGYZSTAN

Hydropower Development in Kyrgyzstan

In 1917, Kirghizia had only five power plants of 485 kW aggregate capacity and electrical energy output was about 800 thousand kWh a year. From the very first day of Soviet government, the Communist party set itself the task of rapidly overcoming the century-old backwardness of former outlying regions. According to the GOELRO plan (Lenin's plan of electrification of Russia), all the republics of Middle Asia were treated as a single economic region, viz., the Turkestan region. This conception was used as a basis in planning combined utilization of water resources for irrigation and power generation. During the period between 1920 and 1926 a number of small power plants were built in Suljukta, Prhevalsk, Dzhalal-Abad, and Frunze (Bishkek).

In January 1929, the Malaya Alamedinskaya hydroelectric power plant of 410 kW capacity was commissioned on the Atbashinsk Canal. The power plant was the first hydropower development of Soviet Kirghizstan. The No. 1 diesel-electric power plant of 456 kW capacity was placed in operation in 1931 in Frunze.

Industrial service power plants were constructed during the second and third five-year periods at the Karabaltinsk sugar refinery, Karasuisk ginnery, mines of Kadamdzhai, Kok-Yangak, Suljukta, Tashkumyr, Az-Tjuz. By 1941, 23 power plants were built for collective and state farms and 10,000 farmsteads had been electrified. The first stage of the Lebedinovskaya hydroelectric power plant of 4000 kW capacity was built on the Bolshoy Tchuisky Canal in 1943 to make up for the electric power deficiency. That same year, the construction of the No. 1 Alamedinskaya HPP of 2200 kW was started. In general, the installed capacity of the electric power plants of Kirghizia was increased 2.2 times during the period between 1941 and 1945 and amounted to 43,700 kW. Electrical energy output raised during the same period 1.5 times and amounted to 77.3 million kWh.

Up till 1960 independent industrial power plants were predominant in electric power generation. The transfer from the domination of industrial service power industry to overall electrification with centralized power supply was started in the sixties. The first step in this direction was the construction of two large central power plants of the republic, viz. the Uch-Kurganskaya HPP in the south and the power-and-heat generating plant in Frunze (in the north). The commissioning of the Uch-Kurganskaya HPP started the utilization of waterpower resources of the Naryn river, the main waterway of the republic. Alongside with the construction of large power plants, power networks and substations were set up. From 1959 to 1970 20,000 km of power transmission lines for various voltage classes were erected, including 4500 km of 35,110 and 220 kV lines in the north of Kirghizia. Shortly thereafter, four hydroelectric power plants were operating on the Naryn river, viz., the 1200 MW Toktogulskaya HPP, the 800 MW Kurpsaiskaya HPP, the 180 MW Uch-Kurganskaya HPP and the 40 MW Atbashinskaya HPP. Following that phase, the construction of a chain of HPP's on the downstream reach of the Naryn was started.

The first 13.2 KV power transmission line, 15 km long, interconnected the Malaya Alamedynskaya HPP and Frunze was commissioned in 1929. With the commissioning of the Lebedinovskaya HPP in 1943, its power was delivered along a 22 kV power transmission line to Frunze. That same year, a 35 kV Kadamzhay - Khaidarkan power transmission line was put

to use in the south of Kirghizia. The Andizhan - Shamaldy-Sai 110 kV line was completed in 1956, and that same year the first 110 kV lines were commissioned in the Chuisk valley. Later on, 110 kV lines linked Andizhan, Dzhalal and Abad. All the necessary facilities for the construction of power transmission lines were accumulated in the republic in the early sixties. During that period, the Frunze power system was expanded to such an extent that by the end of the sixties it handled the greater part of North Kirghizia. 110 kV lines crossing the Chuisk valley from west to east were erected between 1956 and 1962. One of the first mountainous 110 kV lines of the republic interconnected Bystrova and Rybachje in 1963.

The erection of the 110 kV line around the Issyk-Kul lake, another 110 kV line interconnecting Rybachje, Kochkorka and Naryn, and one more 110 kV line between Kochkorka and Chajek was completed in 1969. These power transmission lines connected the Issyk-kul and Naryn regions to the North Kirghizia power system.

Many power transmission lines were built in South Kirghizia. Among them are the 110 kV Uch-Kurghan - Dzhalal - Abad - Osh and Uch-Kurghan - Tashkumyr lines. A unique 220 kV Frunze - Alma-Ata power transmission line was completed. The 220 kV Frunze - Dzhambul power transmission line commissioned by the close of 1969 has made it possible to connect the Frunze and Alma-Ata power system of Middle Asia.

A unique high-altitude 500 kV power transmission line, 172 km long, connected the Toktogulskaya HPP with Andizhan.

The 500 kV Toktogulskaya HPP - Frunze line and the "Frunzenskaya" 500 kV substation were commissioned in 1979. By 1985, the total length of all the overhead and cable power transmission lines of all voltage classes from 0.4 to 500 kV was 58,000 km.

The 500 kV lines running in high-mountain areas at an altitude up to 3500 m above sea level are now subject to strong winds and heavy ice loads. The 500 kV power transmission lines of Kirghizia are second to none in this country and in the world's practice of power networks construction as far as the length of high-altitude sections and the level of workmanship are concerned. An on-line load-dispatching system controlling the power networks of all voltage classes has been introduced in the power system.

The first telemechanised load-dispatching center was placed in service in 1961 in Frunze. That same year, all the 35 to 110 kV substations around Frunze were fully telemechanised. A new dispatching center equipped with advanced load dispatching and process control facilities was set up in 1968 in the operative and laboratory building of Kirghizenergo. The dispatching services personnel are provided with all necessary communication and control facilities and can check up the actual execution of the desired operating conditions of the system, acquire data on all abnormal situations, on the condition of the equipment, changes in the main electric circuit

arrangement and, also, on the acknowledgement of the execution of their commands. Communication between the dispatching office and all parts of the system is mainly accomplished via 540 high-frequency communication channels.

Radio relay communication lines have found wide application in the power system for load dispatching and supervision. Use is made of 42 terminal and repeater stations employing 400/32 equipment. Most of the radio-relay lines pass through rugged hills whose height is over 4000 m, so that in the erection of these lines it was possible to choose sections with line-of-sight distances between stations over 120 km and to raise the reliability of the radio-relay lines. Relay protective gear and automatic control facilities of none design are widely used for eliminating abnormal situations and recovering normal supply to the users.

The hydroelectric power plants have automatic process control equipment, automatic frequency starting facilities, electrohydraulic speed governors. The thermal power plants make wide use of automatic thermal process controllers.

The first phase of the automatic control system was put into commercial use in 1978, and the first phase of the automatic dispatching control system in 1981. The systems incorporate hardware for data acquisition, transfer, processing, storage and display ensuring efficient control of the operating conditions of the power system and performance calculations using economic and mathematical methods.

The early Soviet program for the comprehensive development of Kirghizia's hydropower potential called for the creation of a coordinated hydroelectric system consisting of 22 hydroelectric stations with an installed capacity of 6,690 MW and with a total storage capacity of 33,3 km^3 on the Naryn River and its tributaries.

In 1956, the construction administration "Naryngidroenergostroy" was established and assigned the task of building the Uch-Kourgan hydroscheme (the first in the Naryn coordinated hydroelectric system) and all the other hydroelectric stations in the chain. This is how the harnessing of the Naryn river in Kyrgyzstan began. The estimated waterpower resources of all the Kirghizstan rivers amount to 142.5 billion kWh annually. The waterpower resources that can be put to use amount to 72.9 billion kWh a year, and those economically efficient present make up 48.0 billion kWh a year. Of all the Kirghizstan rivers, the basin of the Naryn river is known best. Its potential resources are up to 56.9 billion kWh a year. As many as 22 hydroelectric power plants can be built on the river and its tributaries to generate electrical energy about 30 billion kWh a year.

In 1992 the power system generaged 12060 million kWhrs of electricity, including 9340 million kWhrs from hydropower plants and 2720 million kWhrs from power and heating (district heating) plants. In the process the Republic's net electricity consumption will amount to 9680 million kWhrs, while 5980 million kWhrs of electricity (49.6% of production) will be supplied to the Integrated Power System and the People's Republic of China.