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**POLICY ASSESSMENT OF THE
GEORGIAN FUELS SECTOR FOR
ELECTRICITY GENERATION**

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INTRODUCTION

This report is a policy assessment of Georgia's fuels sectors and other energy sources used for electric power generation. This work complements other efforts by USAID to assist power sector operations. The aim of this report is to provide the Government of Georgia (GoG) with fuels market policy recommendations that can be implemented to support and enhance the operation and reform progress, of the electric power sector.

This report analyzes Georgia's hydropower potential, the fuel needs of thermal power plants, and examines the markets of each of the major fossil fuels consumed by the power sector -- namely natural gas and mazout (heavy fuel oil). Even though coal is not currently consumed by power plants, a section is also devoted to the coal market in order to present a complete picture of the hydrocarbon fuels available to the Georgian electricity sector. In addition, geothermal and wind energy potential are discussed. Policy recommendations are presented at the end of the report.

As the single greatest cost in the delivery of electricity to consumers, fuel and fuel supply issues are central to the financial viability of Georgia's power sector. Access to adequate supplies of high quality, low cost fuel and other electricity sources will be essential for power sector enterprises to operate as profitable companies in the restructured Georgian power industry.

The most serious fuel-related problem facing the Georgian energy industry in the short term is power plant's inability to purchase fuel due to a lack of cash. This particular problem is rooted in the payment collections and cash flow process within the electric power industry and is in turn a product of the larger non-payment issues plaguing the overall economy.

Despite this seemingly insurmountable problem of low payments, many other major problems of fuel supply face the Georgian electricity sector. These include the total dependence on gas imported from Russia during winter months, incomplete reform in the domestic oil and gas industry, the low levels of domestic hydrocarbon production, and Georgia's difficulty in relying on electricity imports in the current context of building commercial relationships between new neighboring States.

OVERVIEW OF THE POWER GENERATION INDUSTRY

During the Soviet era Georgia's power system was integrated with those of Armenia and Azerbaijan in a Transcaucasus network which in turn was linked to the vast USSR grid. Planning was done in Moscow on a multi-republic basis and fuel for thermal power plants was supplied from the immense resources of the Soviet Union. With the collapse of the Soviet system the Transcaucasus network fractured into its national parts which now operate separately on a non-synchronized basis.

Since the breakup, Georgia has had to rely mainly on its hydroelectric production because a lack of foreign exchange has severely curtailed natural gas imports. Moreover, damaged interconnection lines as well as the shortage of financial resources have restricted the importation of electric power. Finally, internal political problems with the Abkhazian region accompanied by armed conflict have affected the availability of the Inguri hydro station, the largest single source of energy in Georgia. Together these political and financial problems have contributed to an overall deterioration in the capability of the power system to supply the nation. Of the country's original 4,932 MW of installed generating capacity, less than 1,000 MW were available for service at the end of February 1997. This compares to an estimated unconstrained annual peak of near 1,700 MW.

As the ability to supply power has declined, so has the demand for electric energy due to a contracting economy and the abandoning of uneconomic activities from the Soviet period. From more than 17 TWh in 1990, total use fell to less than 8 TWh in 1997. The reduction has been uneven, however, with metered residential consumption actually rising by more than 40% over the last 6 years as households have replaced cutoff gas supplies with electric heaters and stoves. In contrast, industrial use has shrunk by more than 70%. Unfortunately, the reduction in demand has not matched the reduction in the capacity to produce power. Technical losses in the electrical system, due to deteriorated plant and equipment and distribution overloading, plus commercial losses (faulty metering and theft) have grown to over 40% of the power produced compared to about 12% that could be expected under normal conditions. The net result of these trends has been increasingly frequent service outages as the system's ability to deliver falls short of demand. Even when functioning, the system is hard pressed to maintain the frequency of 50 Hertz at which electrical equipment is designed to operate.

Parallel with the contraction of demand and the deterioration of service capability, a critical problem of non-payment has developed. For most of the last 4 years, residential customers have made only token payments for their electric service, though industrial users have paid more regularly. For the first three months of 1998, distribution companies paid only 58% of their wholesale power bill, although this was admittedly up from the 25% reported for the first half of 1996. Georgia's generating units receive much

low payments rates. The non-payment problem has had a devastating impact on the industry's financial results in spite of the gradual increase in tariff levels since 1991.

Power Sector Structure

Since mid-1995, the Georgian electric power sector has undergone a dramatic transformation. With the creation of a high level committee on power sector restructuring and the issuance of its recommendations in the form of Presidential Decree # 437 ("On Power Sector Restructuring") in the summer of 1996, the Government of Georgia initiated an ambitious reform process. By mid-1998, most elements of this landmark restructuring program have been implemented as planned.

The former non-commercial state-run monopoly power sector is fast changing to an unbundled, commercialized, corporatized, and independently regulated industry. Distribution companies purchase power from the national transmission company (Sakenergo) which in turn purchases power from the national generating company (Sakenergo Generation) and independent generators. A new legal basis for the power sector has been established, multiple corporatized commercial enterprises have been created, and plans for privatization have been prepared. By the end of 1998 a new owner should have gained control over Telasi, the capital's distribution company, by way of strategic investor privatization.

The main elements of the unbundled sector are Sakenergo Generation (Sakgen), a state-owned entity holding generation assets, and Sakenergo (Saktrans), the state-owned transmission enterprise. SakGen operates all of the country's generating capacity save for the 100 MW of small hydro that has been privatized and the 200 MW of hydro leased to private operators. Although individual generating plants have been corporatized as joint stock companies, they will remain in the SakGen holding company structure until they are eventually privatized through sale to strategic investors.

Condition of Plant and Equipment

Growing shortages of financial resources combined with increasingly stressful operating conditions have crippled much of the power sector's physical plant which is among the oldest in the former Soviet Union. Inadequate maintenance and the use of untreated water in boilers have damaged thermal generating units. Hydro units have also suffered from neglect and dams have experienced silting that reduces water impoundment. Some transmission lines have been severed by military actions while distribution networks and transformers have been damaged by overloading as residential users have sought to keep warm with electric heaters. As a consequence, rehabilitation of the entire system has become a priority concern of both Georgian officials and providers of international assistance.

Thermal Power Plants

SakGen has 3 thermal power stations with a total installed capacity of 2088 MW. Gardabani, an oil/gas-fired installation near Tbilisi, contains 1850 MW of this total in 10 separate units including 3 of 150 MW each, 5 of 160 MW and 2 of 300 MW. At present, only 3 of the 160 MW units are operable and one of the 300 MW groups. Tkvarcheli, located in Abkhazia, is a 2 unit coal-fired plant with a total capacity of 220 MW, but reportedly was all but destroyed during the Abkhazian secessionist fighting. Tbilisi H & P station is a small district heating installation with 20 MW of capacity which has been operating only intermittently at a reduced rating because of a lack of maintenance and fuel. Gardabani is thus of critical importance to maintaining any effective level of electric service.

Currently, only about 500MW of Gardabani's 1,850MW are available. Units 1, 2, 5, 6, 7 and 10 are not operating, although Unit 10 is expected to come on line at the beginning of 1999. Units 3, 4, and 8 have all undergone partial rehabilitation in 1995, but while useable, can only produce a portion of their name plate ratings. Unit 9, thanks to extensive repairs funded by German donors in 1996, is capable of producing at near its rated 300 MW. The prospects of rehabilitating the other non-operating units are mixed at best and some may have to be abandoned. A critical concern, in addition to fuel supply for all of the units at Gardabani, is the availability of properly treated water for use in the steam generators. The use of untreated water in the past has caused many of the problems now facing the plant. Fortunately, a new water treatment facility financed by the European Bank for Reconstruction and Development (EBRD) is being installed at Gardabani.

Hydro Power Plants

Hydropower has been developed in Georgia since the early 1920's. There are 182 generating units in 103 plants. Fifty-four of the plants account for 2,840 MW of capacity, the remainder are so-called micro stations producing only a fraction of a MW each. Of the 54 regular plants, 38 are connected to the national power grid and total 2,818 MW while 16, totaling only 22 MW, serve isolated networks. To date, 19 of the smaller units accounting for about 100 MW have been privatized as part of the government's overall business privatization program. Another 4 plants totaling some 200 MW have been leased to private operators.

Six large plants (Inguri, Tkbuli, Shaori, Khrami, Lajanuri, and Jhinvali) contain nearly 2/3 of Georgia's hydro capacity. By far the largest is Inguri, a 5-unit facility located in Abkhazia. It has a capacity of 1,300 MW but has been down rated to 1,100 MW due to problems with the generators and water loss. Currently, 4 units are mechanically operable.

Carrying out major maintenance at Inguri is always subject to political difficulties. Although the Inguri reservoir is located east of the Abkhazian border, the generating units themselves are some 15 km inside Abkhazia, with water being fed to the machines by a long tunnel. Access to the turbine house by SakGen personnel is limited by the Abkhazians, and Russian troops are posted around the dam. In the spring of 1997, the plant was taken out of service for 3 months to effect repairs to the tunnel and it is expected that it will require further major maintenance in about 2 years time.

Although the political situation makes it difficult to arrange repairs, Georgia has requested funding from international lending agencies like the World Bank and the EBRD for this purpose. Besides needed overhauls of the generators, a large winch used to open and close sluice gates has fallen off the dam leaving one gate in an open position and causing the loss of significant amounts of water. Rehabilitation of the seismic controls at the dam is also particularly urgent to assure safety and monitor loading on the structure.

In addition to the large storage plants, four more run-of-river facilities downstream from the dams can produce about 230 MW. Most of the remaining hydro capacity is in 44 run-of-river plants which are in a very poor state of repair and capable of producing only a small amount of power. Fortunately, the privatized and leased hydro has been operated fairly successfully and in 1996 produced 10% of Georgia's total electricity output.

Electricity Imports

In the short and long terms, electricity imports will be an important source of power for the Georgian electricity sector. There are transmission voltage connections between Georgia and all her neighbors. Mirroring transactions made during the Soviet period, an active trans-Caucasian electricity trade has reemerged over the last two years. Power is transported from Russia to Turkey through Georgia, and Georgia, Azerbaijan, Russia, and Armenia are increasing their electricity trading arrangements as commercial mechanisms and improved payments recourse is achieved.

Turkey has been an important supplier of electricity to Georgia for many years. Payment is made on a power-sharing basis. For every kWh that Turkey supplies to Georgia in the winter, Georgia should return 1.6 kWh in the summer. A substantial debt has been accumulated. It has been reported that Azerbaijan supplies power directly to the Rustavi Metallurgical Plant. While imports from Azerbaijan to the eastern part of the SakTrans system had ceased due to the multi-million dollar debt that had accumulated, it has been reported that trading has been reestablished.

Under the joint venture agreement between RAO and SakTrans, by which the Caucasus 500-kV connection between the countries had been rehabilitated with Russian credits, power can now flow to Georgia. This transfer has been held up due to Russia's

requirement that it be paid in advance. The SAK/RAO joint venture agreement intended for 100 MW to be supplied during the day and 300 MW at night at an average cost of 3 US\$/kWh with a peak/base price variation of approximately 1.8. It has been reported that the Russians are increasing their price to 5 US\$/kWh.

Hydrocarbon Needs for Power Generation

During the winter months the Georgian power sector depends heavily on thermal electricity generation. In the summer Georgia's hydroplants produce close to enough electricity to meet system needs. In the winter generation from hydroplants slows as river flows subside. 98% of Georgia's thermal generation comes from the Gardabani thermal generating plant located near the Azeri border just east of Tbilisi. Over recent years great efforts have been expended by Georgian power sector staff and tens of millions of dollars have been spent by Georgia's foreign donor organizations to establish adequate winter generating capacity at Gardabani.

The coming winter of 1999 is expected to be the best since 1994 from a power supply perspective. Capacity additions, rehabilitation, and resolution of technical problems at the Gardabani thermal plant mean that there is expected to be approximately 500 MW of firm capacity available from the beginning of November to the end of March. It is expected that Gardabani will produce more than 2 billion kWh hours over the six month winter period -- a doubling over last winter's production levels.

To produce more than 2 billion kWh this coming winter a fuel mix of 650 million m³ of gas and 100,000 tons of mazout (fuel oil) will be required. A conservative estimate for fuel costs would be \$70 per thousand m³ of gas and \$100 per ton of fuel oil. These figures are slightly above the amounts paid last year. If actually incurred for the fuel quantities projected, such prices would mean a total fuel bill of some US \$55 million or 67 million Lari at today's exchange rate.

Last winter the total value of fuel used at market prices was approximately \$25 million or 33 million Lari. This represents something less than half the fuel expense being projected by SakGen for the coming winter. A significant part of the previous winter's gas requirement was provided via humanitarian and World Bank arrangements that are unlikely to be available this year. As a consequence, the question posed is whether or not SakGen would be able to fund fuel acquisition through normal commercial channels. Such commercial funding would require that collections from customers improve markedly in order to actually pay for the fuel or to support sufficient credits to finance its purchase.

Unfortunately, so far in 1998 payments to SakGen (the operator of Gardabani) for power received by Sakenergo Transmission (SakTrans) have been averaging only 7% of the amount billed by SakGen. Moreover, less than half that received by SakGen was in

direct cash payments with the balance being non cash offsets against SakGen debts to some of its larger consumers plus the so-called direct transfers of money withheld by the government from salaries and pensions to cover electricity bills. In any case this would suggest that amassing the 67 million Lari required for the Gardabani winter generation plan is not feasible. Indeed accumulating half that amount to procure the same quantities of fuel used in winter 1997-98 will be a difficult task.

Through the winter of 1997-98 the problem of improving the winter electricity supply was one of both mechanical and financial dimensions. Operating problems with both Unit 9 and the smaller units at Gardabani limited the generation of electricity to amounts that would not have permitted noticeably better service even if fuel had been available in noticeably greater quantities. Many of these problems have now been resolved however and with the addition of Unit 10 to the generating picture money to procure fuel is now the limiting factor in improving wintertime service.

It is clear from the above discussion that the major problems facing the Georgian electricity generation sector continue to be the low revenue collections rates from customers and low payments rates to electricity generating companies.

Despite the current problems of paying the gas bill looking forward gas electricity generation capacity is the second most cost-effective option available to Georgia for meeting current demand and expanding to meet future growth. Hydroplant rehabilitation is the most viable option. Preliminary results of the Burns and Roe 'Least Cost Expansion Plan' work indicate the economic viability of constructing a 320 MW gas combined cycle plant in the medium term to replace the older Units 3 and 8 at Gardabani.

Hydropower Rehabilitation and Development

Even in its current high risk investment environment the Georgian power sector could immediately and profitably exploit the attractive returns available from existing hydroplant rehabilitation. This conclusion has been recently demonstrated by the 'Least Cost Expansion Plan' work of Burns & Roe funded by USAID.

Indeed most of the best investment opportunities have already been taken using funds made available by Georgia's donor community (Germany's KfW, the Japanese Government, the EBRD, the World Bank, etc.). In addition, many smaller plants have been rehabilitated under private ownership by eager entrepreneurs.

The Georgian power sector establishment, and even most of the country's population, firmly believe that exploitation of the country's vast hydropower potential is the key to solving the country's power sector problems. Of course, the Caucasus mountains and the fast rivers that flow from its peaks present a huge technical potential for hydroplant development. However if viewed from a commercial perspective the development of

this potential to build new hydroplants presents limited opportunities. In a high risk environment, high capital costs and long construction times make the development of hydropower a distant second option to cheaper thermal power plants. In this regard, the recent Burns and Roe least cost expansion work demonstrates the prohibitively high costs of finishing the huge Khudoni hydroelectric plant upstream of the Inguri reservoir.

However, if cheap donor funds are made available, the development of new hydropower potential for electricity generation would certainly be viable – and would make an extremely important contribution to Georgia's electricity security.

OVERVIEW OF THE HYDROCARBONS SECTORS

As well as being fuels from which electricity can be generated hydrocarbons used by residential commercial and industrial customers can displace demand for electricity This is particularly important in Georgia during the winter months Residential gas supplies have been cut since the winter of 1994 Piped natural gas was the primary source of cooking and heating energy for the Georgian population until this date Due to this collapse of the gas distribution system customers had little choice but to switch to electricity as an energy source for cooking and heating

For these two important reasons – fuel for electricity generation, and fuel substitute to electricity – this section and the next discuss the Georgian hydrocarbons sector in some detail

Natural Gas Market

The entire gas sector of Georgia has collapsed Historically natural gas had been the single most important energy source for the Georgian economy, accounting for over 70% of Georgia's primary energy use in 1989

After the breakup of the FSU and beginning in 1992 the price of imported gas rose by 2500% thus ruining the Georgian economy Turkmenistan is currently owed close to \$400 million which Georgia can not pay The inability of Georgia to pay has resulted in an almost total interruption of gas supplies A small amount of gas is still imported as and when funds are available principally for the Rustavi Metal Works (0.5 mcm/day) and for electricity generation at Gardabani (2.5 mcm/day – when operating)

Thus annual gas consumption has dropped from a high of 6.2 bcm in 1989 to an estimated 0.7 bcm in 1996 Industrial production in Georgia had fallen by 96% by 1995 Gas was historically used in Georgian industry (metallurgy cement, chemicals and fertilizer) the energy sector (electricity generation and district heating) agriculture and food processing as well as in households (250,000 in Tbilisi alone)

Natural gas production in the country has been negligible Proven reserves are approximately 2.5 bcm however and estimated probable reserves are 95 bcm (15 years supply at 1989 consumption rates) The historic reason for the lack of exploration and production of indigenous gas was a plentiful and cheap supply from the FSU Georgia could, given the will develop its own gas production, however, certain alleged commercial relations between policy makers and importers may have acted as a disincentive to do so

Until 1991 Georgia's sole source of gas supply was Russia. Beginning in 1992 Georgia started importing gas from Turkmenistan through the Itera International Energy Company (a company with offices in St. Petersburg, Florida and reputedly controlled by the number two at Gazprom) via pipelines transiting Russia.

Georgia is paying Itera about \$54 per tcm for imported gas which on an annualized basis, equates to an import bill of approximately \$38 million at current consumption rates. At pre-1990 rates of consumption Georgia's gas bill would be \$335 million at current prices. The IMF estimates Georgia's total exports in 1996 at only a little over \$500 million and its total imports at over \$850 million, yielding a trade imbalance of close to \$350 million/year.

Georgia is supplied (or was supplied) with natural gas from Turkmenistan. The gas is transported via a 1200 mm pipeline through Uzbekistan, Kazakhstan and Russia. It enters Georgia from the north. The main trunk line continues through Georgia to Armenia. Within Georgia the transmission network was over 2300 km long and traversed the length and breadth of the country servicing all major population centers. At one time the organization employed 12,300 people.

Due to poor construction, a lack of maintenance, a paucity of investment and civil disturbance, the entire system save the main trunk line transiting the country to Armenia has collapsed. The cost of repairing the system is well beyond the means of the country at present. Moreover, users and potential users are for the most part un-metered (nor is the gas metered when entering or leaving the country). Hence there is no effective way to collect tariffs. Moreover, the complete absence of accounting systems renders any discussion of tariff methodologies moot.

Finally, the fact that a good part of the compression system was powered by Sakenergo means that the system will require its own compression power sources if it is to be restored. The investment needed to restore the system easily exceeds \$100 million.

Unless Georgia develops its indigenous gas resources, Georgia's reliance on imported gas as a primary energy source will emasculate its ability to recover its industrial base, undermine its currency, ruin its budget, and compromise its existence as an independent state.

Georgian Oil Sector

Oil production in Georgia dates to the 1930's. Beginning in 1970 and effectively ending in 1986, Georgia enjoyed a brief period of indigenous oil production. At the height of production (in 1980) the country was pumping over 3 million tons of oil annually, but this was short-lived as poor field management, soviet era equipment and technology, and the absence of secondary recovery all conspired to reduce output. By 1986, production

had fallen to 180 thousand tons and it consistently stayed at low levels till 1993 when civil disruption caused production to fall away to a mere 40 thousand tons. Current oil production has recovered somewhat to about 100 thousand tons per annum.

Throughout the 1980s, Georgia's consumption averaged over 4.4 million tons (\$616 million at current prices). But Georgia has always been a net importer of fuel even in the halcyon days of 1980, when imports even then stood at 1.6 million tons.

Estimated proven reserves for Georgia are 12 million tons, and estimated probable reserves are 580 million tons. (It should be noted however that these figures are highly questionable, and are derived from the Georgian's own estimates. Chevron has independently reviewed the data and concluded that reserves may be no more than 300 million tons.)

Saknavtobi is the de facto national oil company of Georgia. It functions as the country's sole exploration and production enterprise and reports to the Ministry of Fuel and Energy though it is supposed to soon be corporatized and therefore transferred over to the supervision of the Ministry of State Property Management. In 1993 the enterprise employed 7,538 employees. Today it employs only 20% of that number, the majority of whom are unpaid.

Saknavtobi also had been responsible for the operation of all oil pipelines in the country through its budgetary sub-unit, the Industrial Amalgamation of Main Oil Pipelines. The principal asset of this enterprise was transferred to the Georgian International Oil Company (GIOC) as part of the contract with AIOC for the rehabilitation of the Gachiani/Supsa portion of this line.

Finally, Saknavtobi had been responsible for the operation of the Batumi Oil Refinery which was built in 1928 and which had the capacity to refine up to 2.5 million tons of low grade crude. This facility experienced a number of fires and now has ceased operations. Independent surveys have concluded that rehabilitation of the refinery is not economic.

Oil product wholesaling and retailing were once handled exclusively by the Saknavtoproducti budgetary enterprise through its 43 depots located around the country. In the past five years private wholesalers and retailers have taken over most of the business though they use the assets of this SOE for storage and transportation.

The infrastructure at these depots is extremely poor, threatening the environment and evidencing a widespread disregard to public safety. The situation is complicated by the fact that private companies make extensive use of this enterprise's depots but are suspected of paying little or nothing for the service. By the Ministry of Fuel & Energy's own account as much as 90% of the country's consumption is wholesaled and retailed privately.

The oil distribution sector (when viewed from the perspective of the private operators) is one of the most profitable businesses in Georgia. It generates substantial profits for the private sector which is using the state assets nominally held by this enterprise.

Prior to the breakdown of the economy, 49% of products consumed were Heavy Fuel Oils (HFO) of which 42% was used in electricity generation. The next largest product category was gasoline which represented 24% of total fuels consumed. Diesel Oil was the third largest product group (13%) with the majority of that fuel being used for agriculture. Based on figures available for Poti Port, the current oil products mix is preponderantly gasoline by a factor of 2/1 over HFO. This is consistent with the general collapse of the Georgian economy and the revival of private transport usage in the past 18 months.

Russia and Azerbaijan were the traditional suppliers due to favorable credit terms. Now that the business has been put on a cash and carry basis, oil products are being imported from Bulgaria and Greece (Gasoline), Turkey (Kerosene, LPG and lubricants) and Diesel (Azerbaijan).

Coal Market

Georgian coal reserves are about 1 billion tons. The reserves are located in central and western Georgia. The coal industry dates back to 1847, since which time 100,000 mt have been extracted (or approximately 10% of total estimated reserves). Coal in Georgia is considered to be of low quality. Unlike Russian and Ukrainian coal, it contains no anthracites. While a poor source of fuel, Georgian coal is potentially an excellent source of gas.

The establishment of a gas distribution system in Georgia in the 1960s and 70's shifted the role of coal from the primary source of energy to a secondary resource. Nevertheless, coal remained in high demand in Georgia. As late as 1980, 4.5 million tons of coal were consumed by industrial and household users. Of that sum, 3.2 million was produced within Soviet Georgia. With the collapse of the Soviet Union and subsequent civil unrest, support for the coal industry dried up completely. Today the coal industry is dormant for lack of funding.

The two main coal fields are in Tkibuli and Chiatura in Western Georgia. Georgian Coal, a State Company within the Ministry of Fuel and Energy, acquired development rights (in the form of licenses) to these fields in January 1997.

Georgian Coal now seeks partners to help in develop these fields. The licenses offer attractive conditions for potential investors. The Mineral Use Tax for both the Tkibuli

and Chiatura fields in only 2%. This compares to 5% and 10% for gas and oil respectively.

Generally, the management of Georgian Coal is well-trained (with significant experience throughout the former Soviet Union), flexible and open to working with foreigners. Some of its senior management recently traveled to the United States to look at production techniques in Appalachia.

The estimated recoverable methane content of coal in Georgia is 15 cubic meters/ton. How much of this is recoverable is open to question. It is worth remembering, however, that Georgia's remaining reserves of coal are estimated at 900,000 tons. The critical issues for methane center on economics and environment. Before mining operations are commenced, an environmental impact assessment must be carried out by the Ministry of Environmental Protection and Natural Resources. Subsequently, a permit is issued for exploration and production.

Georgian coal is found at depths from 500 to 1500 meters. An industry rule of thumb is that coal at depths below 1 km is probably not worth exploiting. In Georgia, a thick layer of clay separates the coal bed from the water table. This clay acts as a shield preventing the dissipation of methane gas into underlying aquifers. Production of coal-bed methane is accompanied by significant environmental challenges, including the prevention of loss of methane to the atmosphere during underground mining and the disposal of large quantities of water, sometimes saline, that is produced with the gas.

Potential of Georgian Hydrocarbons for Electricity Generation

According to Georgian and international experts -- corroborated in studies undertaken by foreign technical assistance organizations over recent years -- Georgian coal is too expensive and low-quality to be of any use for electricity generation.

While domestic gas supplies could make a small contribution to the gas requirements of the Gardabani thermal power plant (estimates of around 5% of current consumption have been calculated by foreign experts), the payments risk and other constraints have impeded such development.

Georgia as a Hydrocarbons Transit Nation

Georgia's geographic position makes it an important country for hydrocarbon transportation. As Caspian and Central Asian hydrocarbon reserves are exploited and transit routes through Georgia are developed, there will be ready supplies of cost-effective hydrocarbons available for electricity generation.

In fact various multinational energy companies – and others interested in developing Caspian energy resources -- have already performed due diligence on electricity generation in Georgia using hydrocarbons transiting the nation. While smaller electricity generating units for self-consumption are planned as part of the early oil pipeline construction effort, the payments and technical risks of power sales to the national grid (including for transit to Turkey) are voiced as the major barriers to immediate development of such power generating options. Nevertheless, as economic recovery proceeds in Georgia the interest and possibility for such commercial development will increase.

Facts and figures for oil and gas reserves and production in the Caspian region are as follows:

- ◆ The Caspian Sea has proven reserves of four billion tonnes (29 billion barrels) of oil equivalent -- crude and gas condensate. Of that total, 1.5 billion tonnes lie in Azerbaijan's sector. However, estimated total reserves in the Caspian Sea are put at 13-15 billion tonnes, of which Azerbaijan is estimated to have 7-8 billion tonnes. (Source: Azerbaijani State Oil Company SOCAR -- one tonne is equivalent to 7.33 barrels.) For comparison, the Gulf has proven oil reserves of more than 82 billion tonnes.
- ◆ So far, only Azerbaijan has offshore drilling operations, and much exploration work still has to be carried out to establish the size of many of the Caspian fields. According to some estimates, the Caspian may contain as much as 200 billion barrels of oil.
- ◆ Of the Caspian littoral states (Azerbaijan, Iran, Kazakhstan, Russia, and Turkmenistan), Azerbaijan has the largest proven offshore oil reserves.
- ◆ Azerbaijan's largest offshore fields, in order of importance, are Chirag, Gyuneshli, and Azeri. They are being developed by the Azerbaijan International Operating Company (AIOC), a 12-company consortium that includes British Petroleum, US oil majors Amoco and Unocal, Russia's LUKoil, and SOCAR.
- ◆ The AIOC's output is expected to reach 700,000-800,000 barrels per day (b/d) by 2007-10.
- ◆ Azerbaijan also has numerous smaller offshore oilfields, including Karabakh, Bahar, Shakh-Deniz, and Ashrafi.
- ◆ Azerbaijan currently produces nine million tonnes of oil annually, but SOCAR estimates that it will boost that figure to 35-37 million tonnes by 2010.
- ◆ Kazakhstan is developing the huge Tengiz oil and gas field in the Caspian region with US oil majors Chevron and Mobil, in a joint venture called Tengizchevroil.
- ◆ The Tengiz field is estimated to contain 6-9 billion barrels of oil, but the recently discovered Kashagan formation may prove much bigger than Tengiz.
- ◆ Tengizchevroil currently produces 7.5 million tonnes of oil annually, but the field is expected to yield about 60 million tonnes annually after 2000.
- ◆ The vast Karachaganak gas field in northern Kazakhstan is being developed by a consortium that includes British Gas, Agip of Italy, and US oil major Texaco. It

has about 1.33 trillion cubic metres of gas and more than 1.2 billion tonnes of gas condensate

- ♦ Both Russia and Kazakhstan claim the Severny field in the northern Caspian which may contain as much as 600 million tonnes of oil according to Russian geologists
- ♦ Meanwhile Turkmenistan and Azerbaijan are involved in a sovereignty dispute over the Kyapaz field in the southern Caspian
- ♦ Turkmenistan has huge gas reserves under its western desert but depends on Russian pipelines to export gas to other ex-Soviet republics

Proven total oil reserves at the beginning of 1997 (Source: British Petroleum Statistical Review)

- ♦ Azerbaijan - 1 billion tonnes (0.7 percent of proven global reserves)
- ♦ Kazakhstan - 1.1 billion tonnes (0.8 percent of global figure)
- ♦ Russia - 6.7 billion tonnes (4.7 percent of global figure)

Proven total gas reserves at the beginning of 1997

- ♦ Azerbaijan - 0.9 trillion cubic meters (30 trillion cubic feet or 0.6 percent of proven global gas reserves)
- ♦ Kazakhstan - 1.95 trillion cubic meters (65 trillion cubic feet or 1.3 percent of proven global gas reserves)
- ♦ Russia - 51.5 trillion cubic meters (1.717 trillion cubic feet or 34.4 percent of global figure)
- ♦ Turkmenistan - 3.06 trillion cubic meters (102 trillion cubic feet, or two percent of global figure)

Clearly the above figures demonstrate Georgia's potential as a transit nation for significant quantities of hydrocarbons if the nation is chosen as a route between Caspian and Central Asian resources and markets in Europe and the Mediterranean

COMPANIES OF THE GEORGIAN OIL AND GAS SECTOR

This section of the report gives an overview of the operating companies and institutions involved in the Georgian oil and gas sectors. Currently, the oil and gas sector is composed of companies wholly owned by the Government, in either the "Joint Stock Company" (JSC) form or as "State Enterprise" (SE).

The JSCs include the Georgian International Oil Corporation (GIOC), and the Georgian International Gas Corporation (GIGC). The SEs are departments of the Ministry of Fuel and Energy (MFE) such as Saknavtobi (Georgian Oil Co.), Saktransgazmretsvi (Georgian Gas Transmission Co.), Saknavtobprodukti (Georgian Oil Products Co.), Sakthevadgazi (Georgian Liquid Gas Co.) and the Batumi Oil Refinery. Those that are an integral part of the MFE are considered to be property of the Treasury.

Georgian International Oil Company (GIOC)

GIOC was founded as a joint stock company by Presidential Decrees No. 477 and No. 178, on November 11, 1995 and February 18, 1996, respectively, for the purpose of participating in the transport of "early oil" through Georgia. The corporation's shares are held by the Ministry of State Property Management (MSPM). The GIOC has signed a 30-year pipeline construction and operating agreement with the Azerbaijan International Operating Company (AIOC), a firm founded to expedite crude oil shipments from the Caspian Sea region to the Black Sea port of Supsa. AIOC is a consortium of 10 international operating companies. Existing segments of the pipeline are being refurbished and other sections are under construction. GIOC employs a staff of about a hundred persons. Its assets do not include the pipeline that belongs to the State of Georgia.

Georgian International Gas Company (GIGC)

GIGC was established by Presidential Decree 206 on April 20, 1997 as a joint-stock company for the purpose of managing Georgia's natural gas pipeline network and to represent the State in agreements and negotiations on gas imports with foreign countries. In early 1998, it took over management of the operations Saktransgazmretsvi, the State gas transmission and wholesale distribution company. However, in April 1998, management control of Saktransgazmretsvi had been transferred again, this time to Interpak (see below).

Saknavtobi (Georgian National Oil Co)

Saknavtobi is the company responsible for exploration and production of hydrocarbons as well as for transportation, refining and sales of petroleum and petroleum products including imports. Once a part of the USSR Ministry of Petroleum, it owes its current existence to Decree No. 124 (January 17, 1996) whereby it was placed into the Ministry of Fuel and Energy (Decree 124 was replaced by Decree No. 612, dated September 18, 1996, again replaced by Decree No. 703, dated December 1, 1997, amended by No. 772 of December 29, 1997, but none of the latter refer to Saknavtobi). The corporation used to be the operator of the crude oil pipelines of the country, however, management of these facilities has been transferred by the Government to GIOC.

The corporation's structure includes divisions for Oil and Gas Production, Oil and Gas Exploration, Oil and Gas Technology, Oil Service, Construction, and a Bureau for Housing and Accommodation. Subsidiaries include Navtobsamecniaro Ltd (petroleum sciences, i.e., research), Navtobgeophysika Ltd (geophysical surveys and measurements), Samtomashveli Ltd (blow-out prevention and rescue services), Menavtobe Ltd (field operations) and a Komerciuili Centri (commercial activities) that is actually State Treasury property.

Navtobsamecniaro Ltd operates 18 engineering departments and laboratories responsible for geological appraisal, geochemical and petrophysical analyses, field survey design, drilling plans and well construction layout, field development and unitization, borehole testing, oil and gas production processes, gas storage design, and environmental protection measures. Navtobgeophysika Ltd operates seismic and gravimetric equipment and crews and a petrophysical laboratory, and conducts well logging, borehole geophysics and DST (perforation) tests. The responsibility of Samtomashveli Ltd is exploration and production safety. The Commercial Center is involved in crude oil sales and exports (a function since removed) in contracts for oil transportation from tanks at Samgori to the Batumi refinery and to load tankers, and in handling customs and registration matters. In addition, the Center collects payments.

Domestic oil and gas production has declined during the past few years, and Saknavtobi has had cash flow problems to conduct more than rudimentary exploration. As a result, it has entered into contracts for exploration and production of oil and gas with JKC, Iorix Valley, Ramco (also known as Khaketi Oil), Saracen (since canceled), and more recently with Frontera Resources. It may enter into production sharing with ARCO on offshore blocks in the near future and has been negotiating with Canadian Canargo Energy. It had been also responsible, through its subsidiary, the Department of Industrial Amalgamation of Main Oil Pipelines for the construction of the Samgori-Batumi 530 mm diameter pipeline, whose ownership had been transferred to GIOC. The pipeline is being rehabilitated for use by AIOC.

Saktransgazmretsvi (Georgian National Gas Co)

Saktransgazmretsvi is responsible for the transport and sale of natural gas. In its present form it was established by Order No. 48 of the Minister of Fuel and Energy on November 11, 1996, as successor to the companies Sakgaz and Saktransgaz and it is a State enterprise (a department of the Ministry). Gas supply in Georgia originally under Sakgaz was nearly ubiquitous: 46 cities and 230 villages had access through local distribution points, as were more than 800 industrial facilities and about 3500 communal installations. The responsibility for management of the gas distribution was conveyed in 1996 to municipal governments in each locality prior to the establishment of Saktransgazmretsvi. The State retained ownership of both the tangible and intangible assets (facilities and shares in each local distribution entity).

The main activities of the realigned Saktransgazmretsvi became the purchase, import, and transportation of natural gas in Georgia (and trans-shipment to Armenia), supply to industry and to gas distribution companies, and design, construction, operation and maintenance of the gas pipeline network. The network consists of a 1200 mm diameter main transport pipeline connecting Georgia to Russia, a 1000 mm diameter (Saguramo-Tsiteli Khidi) line to Armenia and Azerbaijan and a domestic network of 1940 km length, some of it in need of rehabilitation. These and the remaining pipeline segments are shown in Table 1. The design capacity of the entire system is 20 billion m³, that of the North Caucasian - Transcaucasian line is 16.4 billion m³, and that of the Saguramo - Tsiteli Khidi export line to Armenia and Azerbaijan is 3.6 billion m³. It is a low-pressure system operating at 2.5 MPa with a maximum allowable pressure of 5.5 MPa. Annual losses in the system amount to 144 million m³ according to the company.

In addition to its pipeline-related activities, the company also manufactures and markets gas industry equipment, operates five gas transfer stations, drills and operates gas wells and geothermal and potable water wells (the geothermal activities are carried out by the subsidiary Sakburggeotermia). Saktransgazmretsvi has no LPG business, although it controls nine LPG distribution companies operated by Sakthevadgazi. On April 1, 1997, the company employed 1569 people. According to the company, assets in 1997 comprised 37.2 million laris (about \$28 M), profit in 1995 was 1,267,000 laris (about \$1 M), no profit was declared for 1996, but in 1997 net revenues increased to \$3.8 million. The company's liabilities, on the other hand, are said to exceed \$100 million. Operational expenses in 1997 amounted to \$19 million. The firm's management rights have recently been transferred to GIGC, then subsequently to Interpak, a company registered on the Isle of Man (U.K., though headquartered in Moscow). The pipeline assets remained in State hands. Interpak bought five municipal gas distribution companies (Kutaisgazi, Bolnisi, Rustav, Marneuli, and Kaspigazi) in January, 1998, for a reported sum of \$430,000, and subsequently added one more (Gorigazi) for a total sale price of \$500,000.

According to the MSPM only management rights and no equity were transferred for a period of five years to Intergas a Georgian subsidiary of Interpak that also purchased the Rustavi cement plant a major gas consumer In April 1998, as a follow on the MSPM has issued a public tender for the sale of 76% of Tbilgazi the Tbilisi gas distribution company with a reservation price of \$6 million The MSPM intends to dispose 18 more gas distribution companies in the near future by means of tenders Public announcements of the completed transactions have not been made

Saknavtobprodukti (Georgian Petroleum Products Co)

Saknavtobprodukti is responsible for storing and marketing petroleum products such as LPG and owns and operates petroleum product pipelines It was established pursuant to Presidential Decree 288 on June 11 1995 The company holds a 51% interest in 38 joint-stock companies whose assets appear to be made up of 49 oil depots and operates 982 storage tanks with a total capacity of 436 375 m³ of which the Kashuri facility has a storage capacity of 76,000 m³ Saknavtobprodukti imports gasoline and diesel fuel through the port of Poti (on the Black Sea) along with private entrepreneurs The firm controls the main petroleum product pipeline from the coast to the interior and storage tanks at Batumi with 4000 m³ of capacity The pipeline is 232 km long, its diameter is 530 mm and its volumetric capacity is 43 024 m³ During November 1997 the Ministry of State Property Management (MSPM) announced its intent to sell shares in nine of the 38 subsidiaries storing petroleum products An April 1998 tender announcement by MSPM increased this number to 27 oil product depots for majority (50+ percent) stakes with list prices ranging from \$3 800 to \$152 400 The announced intent was to cover the outstanding receivables on Saknavtobprodukti's books

Saknavtobprodukti has been dispossessed of most its retail gasoline service stations Recently it began to reenter the retail market through joint ventures

Sakthevadgazi (Georgian Liquid Gas Co)

Sakthevadgazi an SOE engaged in storing transporting and distributing liquid natural gas (LNG) was established in 1995 by the State The firm operates nine LNG depots with a total capacity of 12 500 metric tons and commonly maintains 1600-1700 tons of reserves The market of retail sales of liquid bottled gas (LPG) in the Tbilisi area has been taken over by private firms importing the product resulting in a substantial loss of the market for Sakthevadgazi even through the private dealers prices are 35-40% higher Consumption of LPG has grown from 3 000 tons per year in 1991 to 20 000 tons in 1998 as LPG replaced natural gas in constant shortage The company pays not only a 20% VAT in purchasing gas from Russia but an additional 20% "access fee" plus customs duties

Refining

The Batumi Oil refinery built in 1928 is defunct (although according to the EIA in November 1997 it is operating at a reduced capacity). Its offshore loading terminal capable of berthing ships of 30 000 tons is functioning. Its storage tanks are used for the export of indigenous crude oil and for the trans-shipment of Chevron's Tengiz crude reaching the terminal by rail. One new refinery is being built with participation of JKC and nearly completed at Sartichala, but its capacity of processing crude is very small (about 240 tons/day). Frontera Resources is considering to build another one in Gardabani.

OTHER ELECTRICITY GENERATING SOURCES

This section briefly discusses other indigenous renewable electricity generating sources available to Georgia. As is described below, geothermal, wind, and solar energy are not economically viable options when compared to gas, hydro, and electricity importation options.

Geothermal Energy

Geothermal springs have been known in Georgia since ancient times. Thermal waters have been used for centuries for bathing and other purposes. Presently, geothermal water is produced from 23 resource deposits located mostly in western Georgia. The water is used for heating and hot water supply, and also for technological and balneological purposes. According to data from 1989, the largest portion (60%) of geothermal water produced was consumed by public services. Agriculture and industry accounted respectively for 25% and 15% of the consumption.

Unfortunately, according to both Georgian and foreign experts, the temperature and pressure of Georgian geothermal water resources are too low to be considered as a cost-effective fuel source for electricity generation.

Wind Energy

Georgia possesses a wind resource suitable for electricity generation. According to the Georgian Institute of Hydrometeorology, there is an available technical potential of 2-3 billion kWh per year. A detailed study performed by the Georgian firm "Karenergo" states that 500 MW of windpower, producing 1.4 billion kWh/year, would cost approximately US\$ 500 million to construct. Currently, negotiations with Japanese and Danish companies are in progress for the construction of a 10 MW wind farm at Mta-Sabuetti.

Solar Energy

According to investigations performed to date on solar electric energy potential in Georgia, the production of electricity in this way in Georgia is very expensive. Due to these high costs, very limited experimentation with this technology has been undertaken.

CRITIQUE OF GEORGIAN ENERGY POLICY

Ensuring that the Georgian power sector has adequate supplies of fuels requires continued deep changes to the way the Georgian energy sector is organized and led through the current major reform process. This section provides perspective on and a critique of, overall Georgian energy policy.

The NIS countries, including Georgia, had been boundless users of energy during the Soviet era. Energy was priced cheaply, hence efficiency of utilization was ignored. Georgia's energy consumption per unit of GDP during the Soviet era was virtually double that of Western consumption per the same unit. Per capita consumption remains high in most former Soviet-sphere countries, and the exception in this regard in Georgia is ascribable to the chronic energy shortages of only the past few years.

Concepts of supply, demand, and markets under the command economy system were either distorted or non-existent. Regulation was carried out by State enterprises on behalf of the Government, in collusion with their own interests, the case still extant in Georgia. Fuel choices were dictated without regard for economic cost or threats to the environment. Hence, gas was seldom used for home heating as distribution costs, relative to coal, were considered high, so that it was flared at the well-sites. Georgia was an exception: cheap gas reached most of the population except the scattered, low-density rural settlements.

Conservation in the Soviet Union was a neglected concept. The population became used to artificially low pricing and to a system of subsidies. The elimination of the law of supply and demand, together with State monopolies, made it "unnecessary." Energy imports at artificially low prices (or as barter in return for labor and technology) were never threatened, hence energy independence and diversification of supplies were not issues.

Given these conditions -- and the conditioning of the policy-makers of centrally planned economies in believing the conditions would remain in perpetuity -- there was no need for an energy policy expressing a rational planning of resource acquisition, utilization, and value. The continuing energy crisis in Georgia did, however, bring about awareness of this issue, and energy policy formulation, however slowly, is under way.

The first published Energy Policy for Georgia -- elaborated at the end of 1995 -- estimated the time needed for rehabilitation and restructuring, as well as for full development of the sector, as 20-25 years, an unusually long period given the energy shortages of the country. This policy also attempted to address other fundamental issues to be successful in attracting investment into the sector: elimination of the existing distortion in the fuel and energy price system so that prices reflect real economic costs.

recognition of environmental damage and inclusion of further effects in the price of energy regulation of natural monopolies and compliance of the industry with State policy increase of energy efficiency setting a policy about energy imports and exports with reference to the European Energy Charter enticing foreign and domestic investment and participation of regional governments in the implementation of energy programs

The policy also addressed issues of the short-term (the next 5-7 years) For the short-term preeminence was given to restructuring and privatization of the energy industry, enacting legislation to combat monopolistic practices setting prices to reflect real economic costs, enabling energy forecasting, establishing a regulatory system and supporting indigent consumers Unfortunately this reasonably comprehensive approach has not been adopted by the Government

Although this policy recognized the problems of price distortion and subsidies not much has been done to change this Today only prices for imported oil products are fully liberalized with import and retail activities in the hands of traders Other energy prices are still controlled by the State The lack of full cost-recovery possibilities and the low rates of collecting payments for utility services have made the energy enterprises insolvent leading to disrepair of the infrastructure that will come to haunt the nation as refurbishment costs will increase with time Although direct subsidies have been removed the indirect subsidies of energy commodities by the Government represent a substantial loss to the budget

A more recent and officially adopted policy (mid-1997) treats the energy sector in specifics namely sector by sector but without taking into consideration the industry-wide issues discussed by the earlier draft policy The new policy apparently generated by the Ministry of Fuel and Energy omits any reference to the need for legislation and regulatory systems control of natural monopolies, industry compliance balancing imports and exports and similar important topics formulated in the earlier version Neither this policy or the earlier document addressed the separation of ownership and management responsibilities from policy making and regulatory powers The following is a verbatim quote of the adopted course

"The short and long term energy policy strategy is intended for a 5-7 year period Its main goal is the establishment of a secure level in the country's energy sector completion of the reform rehabilitation and modernization of the existing power sector entities development of some economically efficient trends implementation of the first stage of measures for the rational use of energy resources and overcoming of negative impacts of the energy crisis as a whole The strategy covers the following areas electricity sector, natural gas industry coal industry, oil and gas production, oil processing and transportation, heat supply rational use of energy resources

Natural Gas Industry

- ♦ Rehabilitation modernization and expansion of the existing main pipelines and local networks wider use of natural gas and propane in transport increase of annual gas supply capacity for the internal use up to 4-5 billion standard m³
- ♦ Improvement of the reliability of natural gas supply and economic efficiency of the branch by means of optimum usage of the existing main pipelines connecting Georgia with the neighboring countries (including transit) and by means of constructing new pipelines Increase of the total annual transit flow up to 4-5 billion standard m³,
- ♦ Design of technical means necessary to build up the country's gas reserves and start of the project implementation,

Coal Industry

- ♦ Rehabilitation and modernization of Tkibuli Coal Production Enterprise increase of annual production volume up to 0.8-1.0 million tons,
- ♦ Drawing up a program of the coal industry rationalization (including development and expansion) by means of modernizing the processing production re-processing and transportation technologies and start of the program implementation taking into consideration the possible increase of coal consumption in other branches of the economy and households,
- ♦ Building up the state coal reserve

Oil and Gas Production Oil Processing and Transportation

- ♦ Development of oil and gas production, increase of annual oil production up to 0.7 - 1.0 million tons natural gas production to 0.5 - 0.6 billion standard m³,
- ♦ Development of oil and oil product transportation system (including transit), for the efficient realization of the country potential and reliable supply energy sources
- ♦ Modernization and expansion of the oil processing industry
- ♦ Building up the state oil product reserve to an optimum volume,

Heat Supply

- ♦ Wide introduction of individual heating systems which are modern energy efficient and ecologically clean
- ♦ Development of efficient cooking and heating equipment in which coal and wood will be used for fuel and wide introduction of this equipment in the areas that are not covered by the gas supply network
- ♦ Provision of full scale and efficient operation of the existing geothermal well yields, introduction of solar systems and thermal pump systems,

- ♦ Widespread usage of combined heat and power generating systems of various scales (mainly operating on natural gas fuel) including partial use of the restorable networks
- ♦ Drawing up and implementation of an economically justified program for wood supply and usage

Rationalization of Using Energy Resources

- ♦ Improvement of cost-effective and efficient use of energy resources in the industrial and household sectors including the price formation mechanism that would reflect actual prices introduction of energy consumption metering and through the amplification of the bill payment system,
- ♦ Implementation of energy audit at energy consuming enterprises, also elaboration and implementation of programs of improving energy efficiency,
- ♦ Elaboration and implementation of programs aimed at the improvement of thermal insulation parameters of the existing buildings,
- ♦ Elaboration and implementation of programs of transferring a part of the construction material industry to coal fuel,
- ♦ Implementation of modern management methods in the energy consumption sector "

This energy policy aside from a few concepts in passing such as the desirability of energy audits and "actual prices" is distinctly a reminder of central planning whereby the State made the decisions and industry carried out the directives. Examples are the target figures for production of coal, oil and gas, the "development of the oil and oil product transportation system (including transit) modernization and expansion of the oil processing industry, and building up the state oil product reserve to an optimum volume" Unfortunately, the policy states these objectives without specifying how such desires could be financed given the near-bankrupt condition of the industry, the unpaid fuel bills to Turkmenistan and the chronic budget deficits of the Government.

When planning targets are set prices lose their signaling ability and allocative functions. Although the policy recognizes that non-payment of bills needs to be combated by metering consumption and improved collections it avoids the larger macroeconomic issue of energy pricing regulatory functions competition issues consumer rights and environmental protection. It is unclear what is meant by "short and long term strategy intended for 5-7 years"

Accelerated use of indigenous coal and wood contradict terms of international agreements and conventions to reduce carbon emissions, and thus, in the present context does not seem rational. The policy does recognize however, Georgia being potentially in a hydrocarbon transit corridor, and this is one of the appropriate components of an energy policy for the country. So is the promotion of renewable energy resources.

Suggested General Modifications to Georgian Energy Policy

To rectify some of the deficiencies in the official policy the following outline of an energy policy is offered without elaboration of each of the topics. It is intended to demonstrate the breadth of issues confronting the energy sector and the Government's policy formulation and oversight responsibility.

1 General Policies

- ◆ Clear separation of the Government's regulatory role from its ownership role,
- ◆ Survey of energy supply and demand in all sectors that generate, transmit or use energy
- ◆ Understanding energy markets and the potential for marketing
- ◆ Setting goals for the energy industry to be self-financing and eliminating the State's intervention in the sector (i.e. direct, hidden and cross-subsidies),
- ◆ Energy supply diversification and reduction of import dependence,
- ◆ Projecting changes in the intensity of energy consumption and energy switching in an improving economy (e.g. with reference to inefficient and polluting coal),
- ◆ Gradual conversion to clean energy
- ◆ Physical interconnections and their international trade and commercial arrangements
- ◆ Fuel choices and supply contract terms
- ◆ Stockpiling crude oil and natural gas for emergencies and force majeure conditions
- ◆ Promotion of renewable energy development (in addition to geothermal energy) through proper tax incentives or price-setting,
- ◆ Adaptation of international standards and policies (e.g. EU) and harmonizing the energy policy with international commitments (e.g., Convention on Climate Change, Helsinki Protocol on sulfur emissions)

2 Legislation and Regulation

- ◆ Enactment of an internationally acceptable petroleum law and related regulations,
- ◆ Development and enactment of an internationally acceptable Natural Gas Act to promote investment in and provide a regulatory framework for the operation of the industry involved natural gas transmission, transit and distribution,
- ◆ Ensuring that anti-monopolistic practices in the petroleum industry are kept in check, including in the segment known as natural monopolies,
- ◆ Preventing collusion (e.g., unwanted mergers, acquisitions - antitrust legislation),
- ◆ Provision of a legal framework for streamlined investment in the oil and gas sector without the possibilities of voiding existing agreements or licenses through renewed reviews,

- ♦ Preventing unfair practices ensuring quality of service through consumer protection legislation
- ♦ Safety measures in regard to the generation transmission distribution of energy and in disposing wastes,
- ♦ Introduction of international standards and certification in equipment manufacturing, use and maintenance procedures
- ♦ Elimination of regulatory risk before privatization

3 *Economics Finance and Trade*

- ♦ Liberalization of trade in energy commodities,
- ♦ Appraisal of the financial viability of the industry
- ♦ Reduction of the burden on Government providing finances and guarantees to the energy sector to prevent bankruptcies
- ♦ Adopting concepts on economics of supply and demand (demand-side management economic efficiency determinations etc)
- ♦ Amortization of past investments and setting rational depreciation schedules
- ♦ Improved collection rates from customers through enforcement of service termination in case of non-payment,
- ♦ Reforming the pricing structure of energy carriers
- ♦ Undistorted and transparent rate-making procedures with reversal of large customers paying more for energy use than small ones (distinguishing industrial, commercial and residential consumer classes)
- ♦ Attraction of foreign capital for investment in capital-intensive projects,
- ♦ Free and open trade and secure framework for investment,
- ♦ Preparation of energy pricing mechanisms with definition of cost criteria,
- ♦ Publicizing energy prices and future price increases,
- ♦ Introduction of non-punitive taxation and royalty regimes,
- ♦ Shifting budgetary outlays for roads environmental protection, etc , to the consumer (e g petroleum products)

4 *Conservation Efficiency and the Environment*

- ♦ Use of conservation and efficiency measures in energy forecasting, power generation expansion plans household and industrial energy conversions, etc ,
- ♦ Adoption of flexible emergency measures (including queuing, strategic reserves)
- ♦ Minimizing pollution in addition to improved protection of the environment with introduction of emission standards and adaptation of regular emission inspections,
- ♦ Evaluation of past environmental damage (needed for rectification definition of preventive measures and discounts on investments),
- ♦ Providing financial incentives (preferential loans pricing or tax breaks) for energy conversions, efficiency, conservation metering, utilization of waste,
- ♦ Enforcement of energy conservation measures in new construction, appliances etc ,

- ♦ Energy audits
- ♦ Promoting energy research and development (innovation)
- ♦ Public participation in major energy facility siting

5 *Institutional Structure Management and Information*

- ♦ Evaluating causes of declining energy production in terms of their interdependence,
- ♦ Introducing management techniques and corporate governance,
- ♦ Transformation and corporatization of energy sector enterprises,
- ♦ Separation of cost and profit centers after due diligence,
- ♦ Introduction of international accepted accounting procedures
- ♦ Introduction of profit motives and performance criteria for managers of State enterprises,
- ♦ Requiring business plans cost-structure analyses audits
- ♦ Cooperation among and coordination of energy market participants
- ♦ Improvement of customer relations
- ♦ Consumer education
- ♦ Consumer participation in energy pricing (public hearings)
- ♦ Paring unnecessary social services costs

6 *Ownership Restructuring and Privatization*

- ♦ Developing a flexible plan for evaluating strategic vs financial investors domestic vs foreign investment options in various parts of the energy sector
- ♦ Transparency in the operations ownership and management of energy enterprises,
- ♦ Specification of which firms are considered strategic and for how long and what this represents in terms of ownership structure and the expectations by the Government,
- ♦ Transparent goals and schedules of privatizing SOE's
- ♦ Divestiture and privatization
- ♦ Increasing operational and financial autonomy for SOE's and company management reform
- ♦ Public announcements of tenders and awards
- ♦ Understanding rate-of-return requirements of investors
- ♦ Training of management and technical training in specialized topics (e.g. economic principles accounting financial analyses and projections management techniques international agreements and commercial relations industrial safety)

The foregoing is a list of common energy policy topics, most of which apply to the situation in Georgia. It is intended to demonstrate that once a thorough review of the energy sector has taken place, and policies have been set on future industry performance expectation, then the sharing of the responsibilities between the public (tax-supported) system and the private enterprises can be more clearly delineated.

Without a doubt it would be important to develop a more detailed and more comprehensive energy policy for Georgia. It appears however that there is no institutional responsibility for the execution of the energy policy as the policy document makes no assignments nor sets macroeconomic targets for the energy sector. This is in stark contrast to e.g. the Hungarian energy policy which not only targeted the responsible Government bodies but also the energy industry companies in the context of both domestic and international dependencies.

Before energy policy is put into effect, it is important to remember that several other policies must also be in place aiming at economic deregulation. Among these are foreign trade reform, price reform, tax reform and financial sector reform, none of which is elaborated by the Government of Georgia in reference to the energy policy.

RECOMMENDATIONS

To ensure that the electric power industry is able to complete its ambitious reform program and to facilitate the availability of the cheapest possible fuels for electricity generation a number of governmental policies should be enacted immediately. We recommend the following policy measures:

- ▶ The development of a comprehensive national energy policy clearly indicating the future direction of energy reforms in Armenia. This national policy should focus on the process and scope of transforming state-owned energy enterprises into corporatized and privatized companies and should outline the future development of fuel markets within the country. The policy should begin by identifying the government's energy sector reform goals and program objectives. Methods for achieving these goals and objectives must be identified and paired with financing sources, including international assistance. In addition to this basic structure such a national energy policy should include
 - A re-evaluation of the current reform plans for the fuel sectors. The efforts to reform the fuel sectors should be brought in line with the vision for the reform of the entire energy industry.
 - An emphasis on reducing the role of the State in actual energy production and enterprise management in favor of the private sector. Privatization of state energy industries should be seen as a method for improving the health, attracting investment, and promoting the industry's development.
 - In addition to appropriate definition of policy-making and regulatory goals and mechanisms, the GoG must enact an appropriate legal framework for all energy sub-sectors as soon as possible.
 - A plan to restructure the State energy institutions to reflect the focus of the government on policy formation and regulation instead of on setting production targets and directing investment decisions. An immediate step is the creation of regulatory bodies responsible for gas distribution and oil and gas production.
 - The improvement of energy policy coordination between the various energy sub-sectors.
 - The creation of a timeline establishing milestones and dates for achieving the goals outlined in the policy. A timeline will help to visually organize the sequencing of reform activities and add to the coordination of the reforms between various energy sectors.
 - Establish greater transparency in the reform process by publicizing forecasts and restructuring plans.

- ▶ Implement significant legislative, institutional, and educational measures to convert the existing energy sector enterprises into profit-oriented and

corporatized viable economic entities capable of raising capital and competing in a market environment. To accomplish this, the following measures should be taken:

- Implement International Accounting Standards and implement other commercial management systems in all energy supply enterprises. Carry out training courses for sector accountants.
 - Institute public auditing requirements compatible with the needs of international investors; develop standard charts of accounts for regulated enterprises; carry out scoping audits immediately; and expand public relations activities including the expansion of monthly data reporting on the operations of energy enterprises.
 - Require annual internationally recognized audits on all State-owned energy enterprises.
 - Focus energy company efforts on attracting, training, and keeping qualified personnel.
 - Assist energy sector companies to develop business plans to guide activities and improve technical and financial performance. Implement strategic planning.
- ▶ To ensure adequate supplies of fuels and to develop competitive fuel markets, the Government of Georgia must increase cash collections from electricity consumers by enforcing the "user pays" principle. Simultaneously, cash flows within the industry should be improved to ensure that electricity producers are paid the full value for the power that they produce. Unless generators are paid for the fuel they produce, they will not be able to operate or purchase fuel.
 - ▶ The GoG should continue to liberalize domestic fuel prices by removing any residual administrative pricing controls in favor of market pricing or prices regulated by appropriate regulatory commissions.
 - ▶ The transportation industry, particularly the railroad, should also be corporatized and regulated to ensure that energy consumers are protected from monopoly abuse and to provide similar conditions for all suppliers. The GoG should encourage the development of alternative transportation and import options to give energy traders and consumers more choices and energy options. The current lack of supply options reduces competition within the fuel market and lowers reliability.
 - ▶ Continued cooperation with donors and international lending institutions can provide technical, educational, and financial capital for the reform of the energy sector.