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ASSESSMENT OF ENERGY USE BY THE MUNICIPALITIES OF TBILISI AND KUTAISI IN GEORGIA

Prepared for:

The United States Agency for International Development
under Contract LAG-I-00-98-00005-05, Task Order 15

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June 27, 2000

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ASSESSMENT OF ENERGY USE BY THE MUNICIPALITIES OF TBILISI AND KUTAISI IN GEORGIA

EXECUTIVE SUMMARY

Georgia, like all former Soviet republics, provided extensive cultural and other services to the population that would normally be supplied from private sources in western countries. Many of these services were, and still are, provided by municipal governments, although they have been greatly reduced since the collapse of the Soviet Union. Traditional municipal responsibilities, such as water supply and public transport, although revenue generators themselves, are subsidized to a much greater degree than similar services in the west. While they too have declined as the Georgian economy has contracted, they remain important energy users, and the cost of this energy continues to be a significant operating expense. However, the energy suppliers are often not paid, or are paid not in cash but via offsets against taxes and charges for certain other municipal services. As a result, these suppliers realize little cash from, and have accumulated sizable accounts receivable for sales to, municipal governments and their agencies that, in turn, continue to accumulate sizable debt to energy suppliers.

USAID requested Hagler Bailly to undertake an assessment of energy use by the governments of the two largest municipalities in Georgia, Tbilisi and Kutaisi. These assessments have examined current energy use for regular governmental functions as well as use by specialized agencies such as public transport. The results of the these assessments and examinations are described in the following report together with recommendations aimed at improving the effectiveness of municipal expenditures for energy and energy services.

Major conclusions are that:

- water supply is the largest user of electricity among all municipal services;
- water system rehabilitation and customer conservation could reduce electricity consumption for water supply by 50%, an amount equal to five percent of all electricity use in the City of Tbilisi

Tbilisi

Tbilisi is the largest city in Georgia, serving as both the capital and center of commerce and culture for the nation. Its population of 1.4 million represents a quarter of the nation's total and consumes about one-third of the electricity used in the country. When gas was widely available in Georgia until the early 1990's, Tbilisi accounted for a similar share of total national gas consumption. At that time, half of the gas burned in Tbilisi was used to produce steam and hot

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water for a district-heating network. Today, only a tiny portion of that network remains operational, and total gas use within the city is barely 3% of its 1989 peak of 2 billion m^3 per year. Because of the city's rugged topography, pumping by the municipal water utility is the major municipal user of energy in the city. Likewise, the operation of a subway system requires significant amounts of electricity but is the most cost effective form of public transport.

Kutaisi

As the second biggest city in Georgia, with more than a quarter million population, Kutaisi is also a major energy user. Approximately one-third of the city's 65 000 dwellings are individual houses which increases energy use for heating and water supply relative to high density apartments. The fact that most multi-family housing is in low-rise buildings, however, tends to minimize use for vertical transportation. Also, the city's location in a climate zone moderated by the Black Sea serves to reduce space-heating requirements, although a higher percentage of individual dwellings in the housing stock tends to offset this benefit to some extent. Like Tbilisi, Kutaisi has a district-heating network that, except for minor segments, has been unused for years and is in an advanced state of deterioration. City officials believe that restoring it would be uneconomic. Again like Tbilisi, gas service has been greatly curtailed for the last 5 years. This has thrown much of the space and water heating burden on to electricity, a fact that has an impact on municipal finances since nearly 20% of the population receives subsidies for electricity use that are in part paid from city budgets.

Subsidies

In both Tbilisi and Kutaisi a major burden for government finances are the direct subsidies provided to certain residential electricity consumers and users of public transport. These include, among others, pensioners, war veterans and internally displaced persons or refugees. The need to curtail and eventually eliminate most of these subsidies is now recognized by many officials. However, doing so represents a major change from deeply ingrained practices established during the Soviet period when compensation and social benefits were to a large extent paid not in money but in free services. Appendix A to this report contains the recently revised categories of citizens eligible for limited quantities of free electricity, many of which previously received unlimited amounts free. It is representative of the complex schedules for disbursing social benefits typical in former socialist countries.

Available data suggest that in 1999 these direct subsidies totaled nearly 24 million Lari in Tbilisi and about 5 million Lari in Kutaisi. By comparison, Tbilisi's 1999 municipal budget was some 137 million Lari and Kutaisi's only 12 million Lari. While a significant portion of these subsidies is born by the national budget, both Tbilisi and Kutaisi would benefit if they were eliminated since more local and national financial resources allocated to the cities would be available for other municipal uses.

It is not only the direct subsidies provided to some citizens that weigh on municipal budgets, but

also indirect subsidies in the form of below cost services offered to all citizens of the community. Water supply and public transit tariffs are held far below cost, often making it impossible for the agencies supplying these services to remain solvent, especially when government fails to make them whole for the free or discounted service provided to certain categories of citizens. When these agencies face insolvency, their energy supplier is often the first to not be paid.

Conclusions

Electricity is by far the most important energy form used by the city administrations of Tbilisi and Kutaisi and their public service agencies. In both cities, water pumping is by far the municipal biggest user. Public transport is also an important user in Tbilisi because of the existence of a subway system, as is evident from the table below.

Estimated Electricity Use by Municipal Applications During 1999

Application	Tbilisi		Kutaisi	
	Million kWh	%	Million kWh	%
Water Pumping	244	67.8	60	84.5
Subway	78	21.7	--	---
Trolley Buses	12	3.3	2	2.8
Street Lighting	12	3.3	2	2.8
General Use	14	3.9	7	9.9
Total	360	100.0	71	100.0

Because of its primary role as an energy user and because the potential for energy saving is so great, up to half the current usage, water supply should be the focus of efficiency improvement efforts.

Any plans for large-scale rehabilitation of the district heating networks in both cities should not be implemented unless reliable means of metering and cutting off individual customers exist

Solving the long term problem of space heating may rest on restoration of gas supplies throughout both cities since effective metering, billing and collection for individual customers can be accomplished for gas users at a reasonable cost.

Procurement of liquid fuels for municipal vehicles can be done more economically and with a reduce potential for corruption if carried out by a central body using transparent, open tendering procedures. This is not case when procurement is the responsibility of each administrative district in the cities and prices are negotiated with individual suppliers.

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Recommendations

Because they face similar problems, an essentially common set of actions is recommended for Tbilisi and Kutaisi.

1 – Policies must be defined and implemented to reduce electricity use by reducing water waste.

Both cities use much larger quantities of electricity for water supply than for any other municipal purpose. This use is exaggerated because of both a deteriorated system and pricing practices that encourage waste. Metering of residential customers could have a significant impact on this waste. A publicity campaign stressing both water and electricity conservation could also be useful once customers are subject to cutoff for nonpayment. However, obtaining capital investment to improve the system and to implement effective pricing, metering and collection policies to end waste will require putting water supply under private management.

2 – Subsidies to special categories of users, both for direct energy consumption and indirect consumption through use of electricity intensive services such as transport, should be steadily reduced and ultimately eliminated.

3 – As quickly as resources permit street lighting should be converted to high efficiency lamps.

4 – The large-scale restoration of district-heating systems should be considered only after a realistic examination of the possibility of effectively metering and collecting from individual customers. At the same time planned evaluations of individual gas fired hot air units for apartments as alternatives to district-heating need to be pursued. Collection problems and investment requirements associated with the latter may make the individual hot air unit the only feasible means of putting space heating on a commercial basis..

5 - Procurement of liquid fuels for general municipal use should be centralized and made the subject of an open tendering process.

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ASSESSMENT OF ENERGY USE BY THE MUNICIPALITIES OF TBILISI AND KUTAISI IN GEORGIA

I. INTRODUCTION

Hagler Bailly was requested by USAID to assess the energy use by the governments of the two largest municipalities in Georgia, Tbilisi and Kutaisi. These assessments have examined current energy use for normal governmental functions as well as use by specialized agencies such as public transport. Potential tariff changes and conservation measures have also been examined, along with user subsidies, both direct and indirect, to determine their effects on the municipalities' budgets. The results of these assessments and examinations are described in the following report together with recommendations aimed at improving the effectiveness of municipal expenditures for energy and energy services.

Georgia, like all former Soviet republics, provided extensive cultural and other services to the population that would normally be supplied from private sources in western countries. Some of these services, although revenue generators themselves, were subsidized to a much greater degree than similar services in the west. Many of these activities were carried by municipal budgets and have been reduced or eliminated since independence. Nevertheless, energy use by municipal government is still a significant budgetary expense, although the suppliers of electricity and gas are often not paid. When they are, it is frequently not in cash but via offsets against taxes and charges for certain municipal services. As a result, these suppliers have accumulated sizeable accounts receivable for sales to municipal governments. In addition, certain municipal functions that in theory should be self-supporting economically, such as public transport, have accumulated significant debts for energy use.

Tbilisi is the largest city in Georgia, serving as both the capital and center of commerce and culture for the nation. Its population of 1.4 million represents a quarter of the nation's total and consumes about one-third of the electricity used in the country. When gas was widely available in Georgia until the early 1990's, its consumption in Tbilisi accounted for a similar share of total national gas consumption. At that time, half of the gas burned in Tbilisi was used to produce steam and hot water for a district heating network. Today, only a tiny portion of that network remains operational and total gas use within the city is barely three percent of its 1989 peak of 2 billion m^3 per year. Because of Tbilisi's rugged topography and due to extensive leakage and waste from the distribution system, pumping by the municipal water utility is a major user of electricity in the city, accounting for nearly 70% of all use by municipal services and over 10% of total city consumption. Likewise, the operation of a subway system requires significant amounts of electricity.

As the second largest city in Georgia with a quarter million population, Kutaisi is also a major energy user. Approximately one-third of the city's 65,000 dwellings are individual houses which increases energy use for heating and water supply relative to high density apartments. Also, the fact that most multi-family housing is in low-rise buildings tends to minimize use of electricity for vertical transportation. The city's location in a climate zone moderated by the Black Sea tends to reduce space heating requirements, although a higher percentage of individual dwellings in the housing stock tends to offset this effect to some extent. Per capita consumption of energy by the municipal government and its agencies, however, is comparable to that of the nation's capital.

II. ENERGY USE BY CITY FACILITIES

Tbilisi

According to the Tbilisi Municipal Finance Director, the city's budget for the year 1999 was 137 million Lari (US $70.3 million). This was the net amount left to the city after forwarding 140 million Lari ($71.8 million) to the state budget from a gross revenue intake of 277 million Lari ($142.0 million). The gross figure consisted of :

248 million Lari ($127.2 million) in taxes collected from residents and businesses
20 million Lari ($10.3 million) in asset sales
9 million Lari ($4.6 million) in non tax revenues (e.g. fines)
277 million Lari ($ 142.0 million) total

Details on the allocation of gross revenues to the state budget are not available.

The energy related components of the city's budget can be divided into direct expenditures for actual consumption by the city itself and expenditures for subsidies paid to support energy use by citizens of the municipality. In this second category, the budget contained subsidies worth 500,000 Lari ($256,000) for riders on TbilMetropolitan (subway) and 740,000 Lari ($379,000) for subsidized users of TbilTrans (bus and trolley bus) facilities. Another indirect energy subsidy in the budget was 5,000,000 Lari ($2.56 million) paid to Tskalkanali, the local water utility and a major energy user.

Provisions for energy use by the city itself are not totally explicit in the municipal budget. Although expenditures for energy consumption in public facilities such as schools, libraries, city hall, etc. are clearly set out as the table below covering "utilities" shows, expenditures on fuel to operate city vehicles are embedded in the budgets of each of the 10 administrative districts into which Tbilisi is divided.

Exhibit 1
1999 Budget Items for Municipal Utility Use by the Tbilisi City Government

(Lari)

	Education	Culture	Police	Sport	Social Services	Mgmt	Total
Water	1,137,000	143,800	50,000	20,000	3,800	3,400	1,358,000
Electricity	870,900	148,900	180,600	5,600	9,700	31,600	1,247,300
Heating*	1,291,000	4,400	65,000	13,700	2,500	3,800	1,380,400
Communications	32,300	10,900	30,600	800	200	67,300	142,100

*Mainly heating oil

Kutaisi

According to Kutaisi's deputy mayor, the city's 1999 net budget was some 12 million Lari ($6.2 million), only half that of Tbilisi's on a per capita basis. Expenditures for electric services to operate budget organization facilities averaged 47,000 Lari ($24,000) monthly with winter month highs reaching 72,000 Lari ($37,000). These facilities employ some 8,000 people. Another 130,000 Lari ($67,000) were spent on street lighting. Other utility services, including water, cost the city some 320,000 Lari ($164,000). One factor holding overall municipal spending to a relatively low level is the funding of some public services mainly by the central government. For example, 800 of the city's 900-man police force are paid for by the national budget.

Like most large cities in the former Soviet Union, Kutaisi has an extensive district heating system that is no longer in use. Heating of most government buildings is therefore by electricity. In some of the larger buildings, central boilers exist that could be converted to gas, but in the past have run on coal from the Tkibuli region. Coal use has been halted however, both for reasons of limited supply and environmental concerns. Currently, virtually no gas is used by city facilities and less than 30% of Kutaisi's population can receive natural gas service.

The central municipal government has a very small fleet of vehicles, and fuel purchases are made from individual service stations at normal retail prices. Vehicles used for functions such as refuse collection are operated by the city's district administrations and fuel supplies are procured via negotiated contracts.

III. ENERGY USE BY MUNICIPAL SERVICES

PUBLIC TRANSPORT

Providing public mass transport is a common municipal responsibility throughout the world. Georgia is no exception. In both Tbilisi and Kutaisi, motorized and electrified bus networks are operated and Tbilisi has a subway. Since the demise of the Soviet Union, both cities have also seen the creation of privately operated "mini" bus systems. Although not subsidized, these buses have proven highly popular since they offer frequent service over an extensive network of routes.

Subway (TbilMetropolitan)

TbilMetropolitan (TbilMetro) is the public service operating the Tbilisi's subway (Metro) system. The system consists of two lines totaling some 30 kilometers in length. The first line entered service in 1966 and connects 32 stations. The second was completed in 1979 and has five stations, one of which is common with the first line. In 1999, 97 million riders made use of the system. This was fewer than in the late Soviet period when the state industries in Tbilisi were all operating and large numbers of people used the system for their daily commute to and from work.

The standard "postage stamp" fare is 20 Tetri (about $ 0.10). However, some 27 million of the riders in 1999 benefited from subsidized service at a reduced fare of 10 Tetri. Currently, there are 12 categories of individuals (some 80,000 people) eligible for these subsidized fares. Nearly 50 000 refugees constitute the largest single group of beneficiaries. Unfortunately, TbilMetro does not always receive full compensation from the responsible state agencies for the discounted portion of the fare applicable to these riders. It has an agreement with the Ministry of Finance that requires those ministries sponsoring discounted riders (e.g. the Ministry of Defense for war veterans) to compensate it by the 20th of the month. If this is not done, the finance ministry itself is supposed to make good the obligations and then settle independently with the delinquent government agencies. Even this arrangement does not always prove satisfactory.

TbilMetro employs about 3,700 people whose salaries account for about 30% of total operating costs. The management claims that as of January 2000 all salaries are current. Management appears to be strongly motivated by the need to serve low income individuals and to protect the environment. It sees privately operated "mini buses", now common in Tbilisi, as a major competitive threat and as an environmental nuisance.

To power its trains, TbilMetro consumed about 78 million kWh of electricity in 1999, representing about 20% of operating costs that totaled around 25 million Lari ($12.8 million). During the year, its power supply consisted of energy bought under direct contracts from the Ortachala and Jhinvali hydro plants along with purchases from Telasi, Tbilisi's privately owned electricity distributor. The main supplier was Ortachala, but according to TbilMetro management, the direct contracts were terminated on December 31 because of non-payment. Also, Telasi claims its original agreement with the Georgian government gives it the right to be the exclusive supplier of power in Tbilisi.

With the benefit of some direct contract purchases, TbilMetro's average tariff for power delivered at 6 kV was 5.95 Tetri per kWh in 1999 ($0.031) for an average monthly bill of 372,000 Lari ($191,000). The actual bill for December 1999 was 400,000 Lari ($205,000). Usage by the system is higher during winter months because of energy requirements to heat metro cars and the fact that in the summer, due to reduced ridership, 10 to 15% fewer trains are operated. With the arrival of the new year and supply coming uniquely from Telasi, TbilMetro is paying 8.00 Tetri per kWh ($0.041) which at current consumption levels results in an annual energy bill of nearly 6.25 million Lari ($3.2 million) or a monthly average of 520,000 Lari ($270,000).

TbilMetro's management claims that its debt to Telasi for the period to November, 1999 was 750,000 Lari ($385,000) and that it has negotiated a repayment plan calling for 10% of this amount to be added to its monthly bill beginning with December 1999. However, TbilMetro management is expressing concern that the new tariff it is obliged to pay may render the system insolvent.

Like most major electricity users in Georgia, TbilMetro has encountered problems with the

quality of power supplied by the grid. Interruptions are serious matters for subway operation since they leave passengers stranded in trains deep underground. Even problems with low voltage service can be disruptive by causing escalators to cease working. Two of the system's stations are more than 60 meters below the surface making escalators essential.

Surface transport

Tbilisi

TbilTrans is the Tbilisi municipal agency providing electric tram and trolley bus service as well as regular bus service. It employees some 2,800 people and operates 60 trolley buses, 30 trams and 280 motor buses. In 1999 it transported 59 million passengers, 21 million in the electrified system and 38 million in regular gasoline and diesel powered vehicles. For the trams and trolley buses a regulated "postage stamp" fare of 10 Tetri ($0.05) is charged. For motor coaches the fares are unregulated and range from 15 to 30 Tetri depending on the length of the journey. Increases in the price of petroleum products in late 1999 are likely to result in increases in these unregulated fees.

As in the case of TbilMetro, a significant portion of the system's users benefit from subsidized transport. In the case of the trolley buses, eight categories of individuals accounting for 10 million out of 21 million passengers rode for free in 1999. Four categories benefited from free rides on the motor buses, representing 9.5 million passengers. According to TbilTrans management, only about 60% of the lost revenue was made good by the sponsoring government agencies.

In addition to the effect on worker traffic of state industries no longer operating, the appearance of privately operated "minibuses" on the streets of Tbilisi has reduced ridership for the motor buses of TbilTrans. In 1989, the agency had a fleet of 900 buses, but today has only 400 of which, as noted, only 280 are being operated regularly. The minibuses charge a normal tariff of 50 Tetri ($0.26) and do not offer discounted fares, yet their extensive route system and frequency of operation obviously appeal to many users who willingly pay a higher price for the convenience they offer.

To operate its trams and trolley buses, TbilTrans has 22 substations around the city, 20 taking energy at 6 kV and two at 10 kV. A direct supply contract with Jhinvali provided part of the system's power in 1999, but this contract is no longer in force and electric energy supply is now the province solely of Telasi. The tariff is 8 Tetri per kWh for service at both 6 kV and 10 kV and monthly consumption averages 1 million kWh. As of January 1, 2000, TbilTrans had a debt to Telasi of 230,000 Lari ($118,000). A repayment plan is in the process of negotiation. TbilTrans management claims that power supply quality is not a problem because the equipment at the company-owned substations compensates for voltage fluctuations.

To operate its gasoline and diesel powered buses, TbilTrans has implemented a novel arrangement with its drivers who, though being regular employees, are treated as lessees of the

vehicles they drive. Each driver is required to turn in 15% of his monthly receipts that are audited and adjusted for discounted fares. The driver is then responsible for maintaining and fueling the bus out of the balance of the revenues which also covers his salary. He procures fuel just as would a private individual under presumably the most favorable prices. It is not clear how non-cash expenses are accounted for under this scheme.

Kutaisi

Kutaisi does not have a subway and depends mainly on diesel and gasoline powered vehicles to provide public transport. An electrified trolley bus system still exists, but is used on a very limited basis. Only 10 vehicles are still in operation out of 50 available during the late Soviet period. The uncertain power supply, especially during daily peak travel periods, has meant that many riders have opted to use the motor buses even though these cost 20 Tetri per ride versus 10 Tetri for the electric buses. Currently, the trolley bus system is using about two million kWh per year supplied under a direct contract with Electrogadatsema, Georgia's transmission enterprise. At current tariffs, this is costing the transit agency some 120,000 Lari ($62,000) annually.

Water Supply

Supplying water is an essential activity for the maintenance of urban life. It requires significant use of energy even when carried out efficiently and can be a major cause of energy waste when it is not. Unfortunately, the latter situation characterizes water supply in Georgia. In particular, moving water about the mountainous terrain in and around Tbilisi results in very large pumping loads, as does the need to lift water from deep wells for Kutaisi. Heavy water losses caused by dilapidated delivery systems and profligate waste by the consuming public only serve to magnify these energy requirements.

Tbilisi

TskalKanali is the Tbilisi municipal water supply agency. Like TbilMetro and TbilTrans, it is structured as a commercial enterprise, but regulated pricing and failure to enforce customer payment requirements have effectively made it another government department that continues to accumulate debts to its suppliers. The agency employees 2,800 people and has 25 pumping stations within the city's limits as well as two large pumping facilities outside of Tbilisi. The rugged topography of the region makes water pumping critical.

Annual water use approximates 300 million/m^3. This figure is down noticeably from that experienced in the late Soviet period as many water-using industries have closed. However, even at this lower level per capita consumption of water in the city is one of the highest in the world at 800 – 900 liters per day. While leakage from the distribution system accounts for much of this "use," more than half is due to waste and leakage at residences of customers. If the system were operating under normal conditions and users responded to normal pricing signals, it is estimated that per capita use would be in the neighborhood of 300 – 350 liters per day.

Residential customers have no meters and are assessed on the number of people living in the household at the rate of 60 Tetri ($0.31) per person per month. They currently account for 270 million m^3 or 90% of the water consumed annually. Commercial and industrial users are charged 50 Tetri per m^3 and government customers, 40 Tetri per m^3.

According to management, the cost of service per thousand m^3 is 70% more than what current tariffs would produce assuming 100% collections. With the average residential tariff being 60 Tetri per person per month or 7.2 Lari ($3.70) per year, this tariff should produce approximately 10 million Lari ($5.1 million) of revenue per year. Consumption by industrial and budget organizations should generate another 13 to 14 million Lari ($6.7 million to $7.2 million) per year at an average price of 45 Tetri per m^3.

Thus, if management's estimate of cost being 70% more than revenue is accurate, the effective cost of service should be around 40 million Lari annually. Assuming 90% of this cost (or 36 million Lari or $18.5 million) should be born by residential users, this would imply a rate for residential service in the neighborhood of 133 Lari ($68) per thousand m^3 versus the 37 Lari ($19) per thousand m^3 that the current non-metered tariff produces. (See Exhibit 2) It would also suggest that the current tariffs charged industrial and budget organizations are far in excess of cost.

However, again according to management, only 30% of the system's customers pay their bills. This is in part due to some users belonging to various discount or exempt categories, but is essentially due to TskalKanali's inability to cut off non-payers.

Exhibit 2
Estimated Shortfall from Cost of Service of Tariffs for Residential Water Supply

	Lari per thousand m^3	Volume Used	Total Lari
Estimated Cost of Service	133 Lari per thousand m^3	270 million m^3	36.0 million Lari
Estimated Residential Revenue	37 Lari per thousand m^3	270 million m^3	10.0 million Lari
Apparent Shortfall	96 Lari per thousand m^3	—	26.0 million Lari

TskalKanali consumes some 250 million kWh per year to operate its system. This compares to 400 million annually in the early 1990's when most of the state-owned industries were still active. Of 1999's consumption, about 5five percent was supplied by a small hydro plant, "Tetrikhevi", owned by TskalKanali. Of the remainder, about two-thirds was purchased via direct contract from the Jhinvali hydro plant and is used in bulk pumping stations outside of

Tbilisi. For this Jhinvali was paid 2.2 Tetri per kWh and 1.6 Tetri for dispatch and transmission. The balance of the power requirement was supplied by Telasi for the 25 pumping stations within Tbilisi at the standard tariff for service at 6-10 kV. Together these sources gave TskalKanali an average cost of about 4.4 Tetri per kWh resulting in an annual expense for electricity of over 10 million Lari ($5.1 million).

Unfortunately, because less than one-third of the city's water users pay their bills, Tskalkanali has accumulated significant debts to both Telasi and Jhinvali as well as to Electrogadatsema. According to the water utility's management, the total debt to Telasi for both 1998 and 1999 is 4,244,000 Lari ($2.2 million), while Jhinvali is owed 4,983,000 Lari ($2.6 million) and Electrogadatsema, 1,531,000 ($785,000).

To support its construction and maintenance operations, TskalKanali has a fleet of 150 vehicles as well as numerous trenching and drilling machines that use gasoline or diesel engines for power. Fueling this equipment requires 80,000 to 90,000 Lari ($41,000 to $46,000) per month of petroleum fuels which, according to management, is procured through a central purchasing function. This contrasts with the distributed purchasing procedures used for fuel by TbilTrans and the municipal government itself.

At present the municipality and the Ministry of State Property Management are actively seeking a strategic investor willing to undertake management of the TbilKanali system. This is being done in conjunction with a World Bank loan for the rehabilitation of Tskalkanali's infrastructure. As an initial step the World Bank envisions engaging a management contractor for four years at a fee of $5 million with another $20 million provided by the bank for rehabilitation.

Kutaisi

Kutaisi's residents and businesses used 44 million m^3 of water in 1999, somewhat less on a per capita basis than Tbilisi that consumed 300 million m^3, nearly seven times more for less than six times the population. However, the energy use per m^3 is greater than Tbilisi's because supplies for Kutaisi must be pumped from artesian wells outside the city. Four pumping stations can lift 6,700 m^3 per hour from these wells, but only 5,000 m^3 reach the city due to leakage in the main transmission pipes. Primary pumping accounts for 90% of the water system's electricity use that averages five million kWh per month. The energy for this primary pumping is purchased under a direct contract with Electrogadatsema and delivered at 110 kV. Within the city itself, pumping is served at 10 kV by Kelasi, the electricity distributor serving the city. The system's monthly cost of electricity averages 300,000 Lari ($154,000) or nearly 3.6 million Lari ($1.85 million) annually and is estimated to account for 60% of current operating expense.

As expected, the pricing of the water service is well below cost and only half the users pay their bills. Residential customers, who are all un-metered, are charged 10 Tetri per m^3 on the assumption that their use would average 300 liters per person-day. The deputy mayor reported, however, that actual usage is three times that figure. Tests have shown that when metered, such customers cut their use by some 60%.

It is estimated that putting meters on residential users would cost at least $30 per unit including installation. In the case of apartments, of which there are over 45,000 in the city, two meters per flat would be necessary since each dwelling unit in a multi-family building has two service lines, one for the bath room and one for other use. The nearly 20,000 single family houses have only one service line. A complete metering program for residential customers could thus entail installation of perhaps 110,000 meters at a total cost of about $3.3 million. However, the cost effectiveness of such an investment could be significant if it reduced water consumption by the expected 60%, with a concomitant reduction in electricity requirements for pumping of perhaps 50%. Such a saving would translate to over $900,000 per year (at today's exchange rate.)

Industry and budget organization customers are metered and pay 2.5 Lari per thousand m^3, five times the price charged similar users in Tbilisi. This is also more than eight times the official price charged Kutaisi's residential users and 25 times the effective price since actual residential use is reported to be three times the level on which the residential tariff is based. A large element of cross subsidization obviously exists in the current pricing structure, a fact that concerns the city's managers.

According to the city's utility director, a complete renovation of the water supply system would cost $107 million including the metering of all customers, the upgrade of mains, and the construction of proper water and sewage treatment facilities. Such a complete renovation would require a tariff increase for residential users of some four Lari ($2.05) per person-month if financing were obtained on a commercial basis assuming a 20% return on the investment. The need for major investment is highlighted by the fact that, according to the city utility director, the dilapidated state of some water and sewage lines in close proximity to each other has resulted in drinking and wastewater sometimes being mixed.

Street Lighting

A separate major municipal energy user is street lighting. In both Tbilisi and Kutaisi the service is provided by specialized city "enterprises" that are funded through the municipal budgets. In 1999 Tbilisi street lighting accounted for approximately 600,000 Lari (US307,000) of annual expenditures to procure some 12 million kWh of electricity. However, Tbilisi's streets are lighted to only a fraction of the level during Soviet times.

Like Tbilisi, Kutaisi's streets are "dim" compared to a decade ago, being lighted to only 10% of the extent they were in the late 1980's. Approximately 1,000 lamps are now operated versus 10,000 a decade ago. Large, 1,000 watt bulbs are used only in the city center, and it is known that the lamps are highly inefficient. Energy for lighting is supplied by Kelasi at the low voltage tariff of 8.3 Tetri ($0.043) per kWh and in 1999 consumption totaled nearly two million kWh.

District Heating

During the Soviet period, both Tbilisi and Kutaisi operated extensive district heating systems that provided virtually their entire populations with space heating. As has already been noted, the Tbilisi system accounted for half the gas consumption in the city in 1989, the year of peak gas use. Were the Georgian networks still in good condition, it would be highly desirable to reactivate them assuming fuel supply problems could be solved, which means solving the payment collection problem. However, whether reactivation is economically feasible is doubted by many Georgian officials given the alternative of supplying gas for space heating (See Appendix C). Nevertheless, small sections of the old systems still remain in service, and in Tbilisi a combined heat and power plant continues to operate on a limited basis to supply heat to a portion of the city's downtown while generating up to 18 MW of electric power.

An interesting feature of the Tbilisi system is its design around a series of heating plant substations, some 40 in number. Each of these stations served a heating "loop" that could be operated independently of the entire system. Past studies suggest that at least some of these loops might be resurrected for neighborhood use, a move that could aid in reducing the extreme loading of Tbilisi's electric distribution network in winter. Fuel switching capability to allow the use of fuel oil in these substations could also lessen to some degree the complicated international problems associated with gas supply to Georgia.

Unfortunately, collective systems serving blocks of apartments all share the same payment collection problems because of the impossibility of cutting off single customers. The inability to collect payments from individual consumers invariably jeopardizes the utility's ability to pay for the primary energy needed to fuel the system.

IV. ENERGY SUPPLIERS

Telasi

Now privately owned by the American firm AES, Telasi has the exclusive franchise to distribute electricity within the city of Tbilisi. It serves some 360,000 residential customers and 20,000 industrial, commercial and governmental users, supplying about 2.5 billion kWh per year. Telasi is now the sole supplier of electric energy to TbilMetro and TbilTrans and provides TskalKanali with approximately 40% of its electricity. It is also the sole supplier of municipal buildings and street lighting. The table below shows this consumption by major application for the year 1999. During part of that period, both TbilMetro and TbilTrans received some energy under direct contracts with the Jhinvali hydro plant. As of January 2000, however, those contracts are no longer in force. Because a major portion of TskalKanali's electrical load is outside the city, most of its requirements are still served under direct contract with Jhinvali.

Table 3
Estimated Electricity Sales by Telasi
to Certain Municipal Applications During 1999

Application	Million kWh Usage
Water Pumping	115
Metro	53
Trolley Buses	12
Street Lighting	12
General Use	14
Total	206

For delivery at 6-10kV, Telasi's current tariff effective June 1, 1999 is 8 Tetri ($0.041) per kWh. This is the applicable charge for all municipal use except for service to buildings at 380/220 V which is 9 Tetri ($0.046) per kWh.

Tbilgazi

Tbilisi's gas supply is distributed through Tbilgazi, a state-owned, municipally-managed utility that is scheduled for privatization in the near future. From a peak of two billion m^3 used within the city of Tbilisi in 1989, gas consumption declined by 1998 to about 63 million m^3, of which 30% was "leakage". In 1989 half of the total usage was by district heating facilities. In 1998, however, only 11 million m^3 were used for this purpose. Over the same period residential consumption fell from 460 million m^3 to just 11.25 million m^3 in 1998. Gas was available to about 40,000 dwelling units then versus some 290,000 ten years earlier. Of the 40,000, however, only about 24,000 were actually receiving gas in 1998 as nearly 17,000 were reported to have been disconnected for non-payment. Use by municipal facilities also declined from 60 million m^3 to barely a half million m^3 from 1989 to 1998. Gas use today in municipal facilities is limited to the heating of a few schools and other buildings.

Kelasi

The city of Kutaisi receives electric service from the distribution enterprise Kelasi. Kelasi serves some 60,000 customers, supplying approximately 400 million kWh annually. Sales to municipal services and the municipal administration totaled 17 million kWh as detailed in Exhibit 4 below. However, Kelasi supplied only 10% of the electric energy used for water pumping, the rest being

provided via a direct contract with Electrogadatsema to operate primary pumps outside the city.

Exhibit 4
Estimated Electricity Sales by Kelasi to Certain Municipal Applications in Kutaisi During 1999

Application	Million kWh Usage
Water Pumping	6
Trolley Buses	2
Street Lighting	2
General Use	7
Total	17

Kutaisigazi

Gas is distributed in Kutaisi by Kutaisigazi, a company controlled by Sakgazi. Although some 44,000 dwelling units are connected to gas lines, only 10,000 are actually receiving gas. In 1998 some 11 million m^3 were supplied to Kutaisi, roughly one-eighth the quantity delivered in Tbilisi. Retail sales in Kutaisi were priced at 21.7 Tetri ($0.11) per m^3 compared with 25 Tetri ($0.13) in Tbilisi. In Kutaisi as in Tbilisi, however, use of gas by municipal authorities was virtually non-existent.

V. ENERGY SUBSIDIZATION

Tbilisi residents are subsidized in their use of energy in two ways. First, as direct consumers, they receive below cost supplies and in many cases are given discounts from even those artificially low prices. Second, they benefit from public transport and water supplies that are themselves major energy users and which receive electricity at below cost.

Residential Electricity

Electricity subsidies for residential users in Tbilisi have been swollen by the lack of natural gas for water heating, cooking and to fuel the district heating system. In 1989, nearly 300,000 households were receiving natural gas service and the district heating network was fully operational. Late in 1999, only 36,000 customers had regular utility gas supplies and the district system no longer operated. Subsidies for electricity consumption have traditionally been granted

to pensioners, refugees, and numerous other categories such as war veterans. Some of these recipients receive 50% or even 100% discounts. As of late 1999, approximately 40,000 and 11,000 customers respectively were eligible for these discounts. The subsidized customers logically have increased electricity use to offset gas unavailability. In total, they account for 20% of the residential use in the city.

Those users not receiving special subsidies have also offset the loss of gas service by increasing electricity use and contributing to overloading and damage to the electric distribution system. In fact, residential use of electricity in Tbilisi was some 45% higher in 1998 than it was in 1989. Renovation of the city's district heating system or the large scale use of gas for space heating would relieve the electricity network of an uneconomic burden and reduce the incidents of failures on the system.

An additional subsidy factor in the winters of both 1998/1999 and 1999/2000 was USAID's Winter Heat Assistance Program which provided support for the payment of electricity bills of unusually needy individuals in Tbilisi. In the first winter this program targeted some 139,000 people, roughly 10% of the city's population. In the second winter season a smaller number of Tbilisi citizens benefited, but the program was expanded to cover regions outside of the city. The Winter Heat Assistance Program, however, has been an externally funded program and should not be considered as part of the basic subsidization process in Georgia. Exhibit 5 below contains estimates of the subsidy burden for the four major categories of beneficiaries given the current Telasi residential rate of 9 Tetri ($0.046) per kWh.

Exhibit 5
Estimated Annual Subsidies to Certain Categories of Tbilisi Residential Electricity Users

Category of Customer	Estimated Annual kWh Use	Subsidy Rate Tetri Per kWh	Lari Subsidy
Pensioners	55,000,000	6	3,300,000
Refugees	20,000,000	9	1,800,000
50% Discounts	115,000,000	4.5	5,175,000
100% Discounts	85,000,000	9	7,650,000
Total	275,000,000	-	17,925,000

Because of its inability to actually pay Telasi for the revenue shortfall created by the subsidy schemes, the government allows the utility to offset these shortfalls against tax and other obligations. Exhibit 6 summarizes for year-end 1999 the offsets for subsidized services that Telasi is supposed to receive against various taxes and charges of the municipal and national governments.

Table 6
Subsidy Offsets to AES-Telasi by Government

(Lari)

Category	Billed in December 1999	Unpaid Balance as of December 1999	Collected in December 1999	Balance Due for Offset January 2000
Pensioners	275,500	690,400	-	965,900
Refugees	158,000	246,000	-	404,000
50% and 100% Discounts	735,000	10,252,000	-	10,987,000
Total	1,168,500	11,188,400	-	12,356,900

For Kutaisi, data for 1999 suggest that about 50,000 people receive various discounts for electric service, of which one-fourth are refugees or so called Internally Displaced Persons. These 50,000 represent about the same percent of the Kutaisi population as similar groups represent of Tbilisi's. Assuming that consumption per customer in each class of beneficiary is similar in the two cities, and recognizing the currently lower tariff in Kutaisi (8.3 vs. 9.0 Tetri per kWh), the burden of these subsidies in Kutaisi approximates 3.0 to 3.2 million Lari ($1.54 million to $164 million)(See Appendix B).

Residential Gas

In the case of natural gas supply, one of the largest components of an economic tariff is the cost of the commodity itself, and Georgia's dependence on imported gas purchased at market prices would normally be expected to force retail prices toward true cost levels.

However, most former residential gas consumers in Tbilisi were not equipped with meters and gas was sold on the basis of the number of persons per household multiplied by an assumed quantity of gas used for a specified household size. At present, gas is delivered to Tbilgazi at approximately 160 Lari ($82) per thousand m^3 or 16 Tetri per m^3. Gas is sold at 25 Tetri per m^3 to metered customers. This is about $0.35 per ccf. In the US, residential prices for gas are most commonly in the range of $0.50 to $1.00 per ccf. For non-metered users the following consumption norms are applied:

Exhibit 7
Norms for Estimating Non-Metered
Residential Gas Consumption

Persons in a Family	Consumption Norms Cubic Meters/month
1	26
2	40
3	50
4	60
5	70
More than 5	+ 75 Tetri/month/person

Based on complete 1999 statistics showing residential use of 15 million m^3 by 36,000 residential customers, the average residential user in Tbilisi consumed about 35 m^3 per month. The norms described above would imply that the average gas using household consists of only two persons when data for Telasi suggests that the average household in the city has nearly four persons. The non-metered customer may therefore be paying only two-thirds as much per m^3 as the metered user. It does not appear that these short falls are being offset by any kind of direct aid from the national or city budget and are effectively being compensated for by foregoing maintenance and improvements in the Tbilgazi distribution network. Fortunately, only about 10% of the currently active residential users of gas are non-metered.

When users are non-metered, even if the cost of gas to the local distribution company is priced economically, the effective tariff paid will be below full cost because the marginal price facing a non-metered customer is zero. Thus, reform of natural gas tariffs for domestic users must proceed in tandem with metering.

In Kutaisi all 10,000 residential gas consumers currently receiving gas are metered. Gas is delivered to the city gate at $160 per thousand m^3 and the retail tariff is 21.7 Tetri per m^3 or about $0.30 per ccf. Total use in 1999 by Kutaisi's residential customers was some 6.4 million m^3 or about 53 m^3 per customer-month. This figure is noticeably higher than that for Tbilisi and may be the result of both a lower price and the larger percentage of Kutaisi's housing stock consisting of individual dwellings.

VI. NON ENERGY SUBSIDIES IMPACTING ENERGY USE

As already noted, another important energy using municipal service, transit, is provided on a subsidized basis to certain customers. These subsidies are obviously a burden to government if they are funded, but an even greater burden to the service if the subsidies are not funded because the service providers are already forced to sell at regulated prices below their cost of service.

This additional financial strain reduces their ability to pay for the large quantities of electricity they require. Exhibit 8 indicates the magnitude of the fare subsidies supposedly provided by government to riders in Tbilisi.

Exhibit 8
Estimated Annual Subsidies to Tbilisi Users of Public Transit Facilities - Metro and Buses

Category	Subsidized Trips	Subsidy Per Trip	Lari Subsidy
Subway	27,000,000	0.10 Lari	2,700,000
Trolley Bus	10,000,000	0.10 Lari	1,000,000
Motor Bus	9,500,000	0.20 Lari[1]	1,900,000
Total	46,500,000	----	5,600,000

In Kutaisi there is no subway system and the city management reports that the combined bus and trolley bus traffic volume averages about 65,000 trips per day or 24 million per year. About 80% of these are on motor buses because of the deteriorated state of the trolley bus system. Roughly 10 million of the trips are subsidized and the fares for the two bus systems are the same as for those in Tbilisi at 10 Tetri for the trolley buses and 20 Tetri for the regular buses. The implied subsidy is set out in Exhibit 9 below.

Exhibit 9
Estimated Annual Subsidies to Kutaisi Users of Public Transit Facilities

Category	Subsidized trips	Subsidy per trip	Lari Subsidy
Trolley bus	2,000,000	0.10 Lari	200,000
motor bus	8,000,000	0.20 Lari	1,600,000
Total	10,000,000	----	1,800,000

VII. DIRECT SUBSIDY SUMMARY

Direct subsidies extended to electricity and transport users in Tbilisi provide them with nearly 24 million Lari ($12.3 million) per year of relief from current tariff charges. These direct subsidies are summarized below. Admittedly, not all of the subsidies are paid as pledged, and not all come from the municipal government. Nevertheless, the amounts are substantial and together are the equivalent of over 15% of Tbilisi's 1999 net budget.

[1] Estimated value because motor bus fares vary by distance traveled from 15 to 30 Tetri per trip.

Exhibit 10
Estimated Annual Direct Government Subsidies for Electricity Use and for Services from Municipal Transport Agencies in Tbilisi

(Lari)

Application	Electricity	Transport	Total
Subway	-	2,700,000	2,700,000
Trolley, Trams and Buses	-	2,900,000	2,900,000
Residential	17,925,000	-	17,925,000
Total	17,925,000	5,600,000	23,525,000

In Kutaisi, the estimated subsidy burden totals about five million Lari ($2.6 million) annually and is equivalent to nearly half the current city budget. Again, much of this subsidy total does not come from the municipal budget, but if such monies were available for the city, they could be used much more effectively for other municipal purposes.

Exhibit 11
Estimated Annual Direct Government Subsidies for Electricity Use and for Services from Municipal Transport Agencies in Kutaisi

(Lari)

Application	Electricity	Transport	Total
Trolley Buses and Buses	-	1,800,000	1,800,000
Residential	3,148,000	-	3,148,000
Total	3,148,000		4,948,000

Throughout Georgia the current subsidy mechanism must end if municipal finances are to be strengthened and if the electricity and transport enterprises are to more nearly function on commercial bases.

VIII. POTENTIAL TARIFF CHANGES AND THEIR IMPACT ON MUNICIPAL COSTS

Tbilisi

For a market economy to function efficiently, energy must be priced at its economic cost. Currently, electricity and natural gas are priced well below cost by virtue of prices being controlled for social reasons. This below cost approach has been reinforced by the government

not paying suppliers for subsidies granted to many groups of residential customers. In the case of electricity, the tariff for residential use as of early 2000 ranges from 8.3 to 9.0 Tetri per kWh ($0.042 to $0.045 per kWh).

Hagler Bailly estimates that the long-term marginal cost of residential service is in the range of 7 to$0.075 to $0.075 (14-15 Tetri) per kWh in 1998 dollars. Hagler Bailly also estimates that service at the 6-10 kV level has an economic cost of about $0.04 to $0.045 per kWh or 8 to 9 Tetri per kWh, close to what is currently being charged by Telasi.[2] It is obvious that future increases are inevitable, especially in the low voltage tariffs. However, they may be dampened partially by the gradual introduction of competition in the generation sub-sector.

The need for increases in the real cost of power is reflected by the agreement reached by AES with the Georgian government when it purchased Telasi. AES obtained a commitment that its distribution margin (i.e. what it could charge over the delivered cost of bulk power) would increase in steps in constant Lari over the first 10 years and be adjusted for inflation as well. The table below shows the planned progression of the constant Lari increases.

Exhibit 12
Scheduled Increases in Telasi Distribution Margin

Period	Authorized Real Distribution Margin including 20% VAT
Until March 31, 1999	2.0 Tetri/kWh
April 1, 1999 to March 31, 2000	2.5 Tetri/kWh
April 1, 2000 to March 31, 2001	3.0 Tetri/kWh
April 1, 2001 to March 31, 2002	3.5 Tetri/kWh
April 1, 2008 to September 30, 2008	3.75 Tetri/kWh

Similar arrangements are being negotiated by a French consortium as part of its tender for generation and distribution facilities in Kutaisi and other parts of western Georgia.

If electricity tariffs increase to these suggested levels in the near future, there will be a noticeable impact on the expenditures of the municipal government and public service agencies. Assuming no reduction in present consumption by these entities, the exhibit below summarizes the potential cost increases for Tbilisi municipal services (ignoring the impact of inflation.)

[2] *Electricity Pricing in Georgia*, Hagler Bailly, August 1998.

Exhibit 13
Estimated Impact of Electricity Tariff Increases
On Tbilisi Municipal Services Power Costs

Application	Electricity Use (Million kWh)	Estimated Increase (Tetri per kWh)	Increase in Power Cost (Million Lari)
Water Pumping – Direct contract	125	1.0	1.25
Water Pumping – Telasi Purchase	115	1.0	1.15
Metro	78	1.0	0.78
Trolley Buses and Trams	12	1.0	0.12
Street Lighting	12	6.0	0.72
General Use	14	6.0	0.84
Total	--------	--------	4.86

The total increase in cost associated with an alignment of tariffs to correspond to the long run marginal costs suggested above is nearly five million Lari ($2.6 million). Although the impact on the Tbilisi budget per se would be limited to the rise in street lighting and general administrative expenditures, to the extent that tariffs for public services such as water pumping were restrained, the government would likely be requested to provide subsidies directly to the agency concerned to cover major maintenance and capital investment.

Where tariff increases could have a significant impact on the budget is through the burden of subsidies to residential users. The present procedure has the government making payments or tax offsets to Telasi for these subsidies. In any case, the budget is negatively affected either on the revenue side or the expenditure side. At the present estimated level of consumption by subsidized users which totals some 275 million kWh, a 6 Tetri ($0.031) per kWh increase in the cost of low voltage service would mean a 17.7 million Lari ($8.7 million) rise in the government's subsidy obligation, a figure equivalent to approximately 13% of Tbilisi net budget.

Kutaisi

Although on a smaller scale, tariff changes will have a similar relative impact on the municipality of Kutaisi. Exhibit 14 shows the estimated impact of increased electricity tariffs on municipal service power costs. Again as in the case of Tbilisi, only the general service use and street lighting would impact the city budget directly, but to the extent that services such as transport and water cannot cover their operating costs, any additions to their electricity bills may

require them to seek assistance from the municipal budget. The total increases implied in exhibit 14 are equivalent to about 10% of the current Kutaisi budget of 12 million Lari ($6.2 million).

Exhibit 14
Estimated Impact of Electricity Tariff Increases
On Kutaisi Municipal Services Power Costs

Application	Electricity Use (Million kWh)	Estimated Increase (Tetri per kWh)	Increase in Power Cost (Million Lari)
Water Pumping – Direct Contract	54	1.0	0.54
Water Pumping – Kelasi Purchase	6	1.0	0.06
Trolley Buses	2	1.0	0.03
Street Lighting	2	6.7	0.13
General Use	7	6.7	0.47
Total	--------	--------	1.23

As in Tbilisi, the greatest impact of increases in electricity tariffs to economic levels would be on the direct subsidies given to residential users. At the current level of consumption by subsidized users, estimated at 40 million kWh yearly, a Lari increase of 6.7 Tetri per kWh would amount to 2.7 million Lari ($1.4 million), equivalent to nearly 20% of Kutaisi's current net budget.

IX. COLLECTION PROBLEMS

Like most governmental or quasi-governmental entities, public services are only partial payers of their electricity bills. The data below show Telasi's collection experience for these users during 1999.

Exhibit 15
Telasi Collection Experience for
Certain Municipal Applications in 1999

Application	Billed Lari	Collected Lari	%
Water Pumping	2,510,000 (Est.)	152,000	6.1
Metro	2,685,000	1,480,000	55.1
Trolley Buses	460,000	133,000	28.9
Street Lighting	505,000	288,000	57.0
Total	6,160,000	2,053,000	33.3%

The collection rates for services other than water pumping are noticeably better than those being recorded for residential service by Telasi. Water pumping remains the major problem because of the failure of water customers to pay their bills. As already noted, only 30% of the customers pay for their service. This implies that actual collections by the water utility produce only 7 to 8 million Lari annually given current tariffs for water supply. Since the system uses some 10 million Lari worth of power yearly, even if all the water utility's receipts were turned over to the electricity suppliers, a debt would still be accumulating.

According to the city's finance department, Tbilisi's 1999 municipal budget contained five million Lari ($2.6 million) to support TskalKanali, but the utility's management claims that only 3.3 million Lari ($1.7 million) was actually received. Based on the collections experienced by Telasi, most of the water system's revenue is obviously being spent for other purposes.[3] Addressing the non-payment for electricity problem means addressing the problem of non-payment for the water service itself. This effectively will require metering of individual buildings if not individual customers and enforcing a turnoff policy for failure to pay. Such a major metering program will require significant investment and is thus not likely to be undertaken until the proposed "privatization" of TskalKanali takes place via a long-term management contract. Finally, for its own direct consumption, the municipal government must either pay its bills or provide its energy suppliers with sufficient offsets against taxes and other municipal charges if it is to avoid being disconnected like any other non-payer.

In the cases of the city's subway and surface transit systems, the electricity collection problems must be addressed through government making good on its subsidy obligations to the various exempt groups or through the elimination of such subsidies. It must also be recognized that the below cost regulated transit tariffs themselves require subsidization if the transit systems are to maintain and upgrade their systems.

X. CONCLUSIONS

Electricity use by municipal authorities in both Tbilisi and Kutaisi is significant, representing about 270 kWh per capita annually. While most of this energy is consumed to provide services that should be self supporting, the existence of extensive subsidization of individual users and the deliberate pricing of services below cost has kept public transport and water supply agencies in a constant state of insolvency. This has resulted in these agencies failing to pay their power suppliers regularly and has diverted financial resources from other vital municipal and national purposes.

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[3] Preliminary figures for the first quarter of 2000 show that of the 310,000 Lari ($159,000) billed for power supplied to the water utility, only 35,000 ($18,000) was collected. Data on arrearages for electric service provided by the municipal agencies do not match those reported by the energy suppliers. However, both acknowledge that these numbers are significant. under normal supply conditions.

Addressing the problems of the water systems is the most productive action these municipalities can take to reduce energy use. The topography of Georgia combined with the location of water sources would produce large pumping loads for these two cities even under normal supply conditions. However, the deteriorated state of the systems and the indifference of the population to the waste of water have magnified these already substantial energy requirements.

Solving the long term problem of space heating may rest on restoration of gas supplies throughout both cities since effective metering, billing and collection for individual customers can be accomplished for gas users at a reasonable cost. Restoration of gas supply on a large scale for space heating would also benefit municipal finances by eliminating the need to use costly and inefficient electric resistance heating. Not only would municipal authorities realize cost savings for their own heating needs, but reduced electricity consumption by the public would decrease government subsidy obligations to residential electricity users and thereby free up financial resources. Any plans for large scale rehabilitation of the district heating networks in both cities should not be implemented unless economic and reliable means of metering and cutting off individual customers exist.

Finally, procedures for procuring liquid fuels for municipal vehicle operation are fragmented and do not lend themselves to transparency. The open tendering for these commodities conducted by a central bureau that could purchase in bulk quantities would almost certainly lead to lower costs.

XI. RECOMMENDATIONS

Although many of the steps necessary to reduce the energy required for a given level of a public service involve significant capital expenditures and may not be feasible in the near term, such steps need to be evaluated and prioritized in order that when available, capital can be allocated efficiently. In advance of such steps, however, there are numerous actions that can be taken that will lead to an improvement in the financial viability of some of the public service agencies and thereby improve their ability to pay for energy.

Primary among these actions is the need to reform the practice of exempting significant portions of the population from having to pay for all or a portion of the services they receive. Similar to the task of raising significant capital for public agencies, changing long-standing social subsidies may be very difficult in the near term, but the importance of such steps for improving public services must be recognized. Also, the government must support its agencies in their insistence that customers pay their utility bills, even if the bills are calculated at discounted rates.

The recommendations that follow are grouped by type of public service.

Water Supply

Policies must be defined and implemented to reduce electricity use by reducing water waste. Both cities use much larger quantities of electricity for water supply than for any other municipal purpose. This use is exaggerated because of both a deteriorated system and pricing practices that encourage waste. Metering of residential customers could have a significant impact on this waste. A publicity campaign stressing both water and electricity conservation could also be useful once customers are subject to cutoff for nonpayment.

Obtaining capital investment to improve the system and to implement effective pricing, metering and collection policies to end waste will require placing water supply under private management. The plan to undertake a long-term contract for the management of TskalKanali in Tbilisi should be pursued with urgency. A similar arrangement should be considered for Kutaisi's system.

District Heating

Any plans for large scale rehabilitation of the district heating networks in both Tbilisi and Kutaisi should not be implemented unless reliable means of metering and cutting off individual customers exist. The district heating infrastructures represent potentially valuable assets, but the problem of collecting from customers may make restoration impractical even if it is physically possible. However, earlier studies on restoration feasibility should be updated. At the same time, planned evaluations of individual gas fired hot air units for apartments need to be pursued. Collection problems and investment requirements may make the individual hot air unit the only feasible means of providing space heating on a commercial basis.

Subway Operation

Because the basic infrastructure already exists, the present subway system can obviously handle considerable additional traffic since it did so during the Soviet period. As the Georgian economy recovers, and with it Tbilisi's economy, the marginal revenue generated from increased ridership may well more than offset the incremental operating cost. Public policy should therefore encourage use of the Tbilisi Metro system. It may also include a uniform fare below full cost if external economies and benefits can be quantified to justify it. However, reduction and eventual elimination of subsidies for special classes of users must also be a policy goal if the system's solvency is to be maintained and its operating costs are not to be a burden to government.

Surface Transport

Eventual elimination of direct subsidies to transit users must be a policy goal of government if transit enterprises are to remain solvent. Procurement of liquid fuels for all municipal vehicles should be centralized and made the subject of an open tendering process.

Street Lighting

The principal means of reducing municipal costs for street lighting is the replacement of existing lamps with sodium vapor units. As soon as resources permit, this replacement should be undertaken. Such a standardization could reduce electricity consumption for lighting by more than half.

APPENDIX A

PROPOSED DISCOUNTS FOR RESIDENTIAL ELECTRICITY

LAW ON AMENDMENTS TO SOME LEGAL ACTS OF GEORGIA, DECEMBER 24, 1999

1. Participants of World War II, war on the territory of other states, war for defending the territorial integrity of the Republic of Georgia and war for freedom and independence, who are identified as 1st, 2nd and 3rd category invalids may use 50 kWh of free electricity per month. In case there are two or more privileged members in the family, they may use 75 kWh of free electricity on a monthly basis.

2. Participants of World War II, war on the territory of other states, war for defending the territorial integrity of the Republic of Georgia and war for freedom and independence, that have reached the age 70, are entitled to consume 50 kWh of free electricity per month. In case there are two or more privileged members in the family, they may consume 75kWh of free electricity on a monthly basis.

3. Participants of World War II, war on the territory of other states, war for defending the territorial integrity of the Republic of Georgia and war for freedom and independence, that have not reached age 70, are entitled to consume 30 kWh of free electricity per month. In case there are more than two privileged members in the family, they may consume 45 kWh of free electricity on a monthly basis.

4. Families of war victims and pensioners residing with them, also invalids and disabled persons are entitled to consume 50 kWh of free electricity per month. In case there are two or more privileged members in the family, they are entitled to receive 75 kWh of free electricity on a monthly basis.

5. Persons who are considered to be victims of political repression, regardless of their age or in case of their death, their spouses, parents, children, (adopted children) are entitled to receive 30 kWh of free electricity per month. In case there are two or more privileged members in the family, they are entitled to receive 45 kWh of free electricity on a monthly basis.

6. Personal pensioners, also individuals and family members of those who participated in liquidation works of the nuclear waste accumulated as a result of incident at the Chernobyl Nuclear Station, and those who lost family supporters as a result of the Chernobyl incident are entitled to consume 30 kWh of free electricity per month. In case there are two or more privileged members in the family, they are entitled to consume 45 kWh of free electricity on a monthly basis.

7. Spouses of World War II victims, spouses of the victims of the war on the territory of other states, and spouses of those lost during the war who did not remarry are entitled to consume

30 kWh of free electricity per month. In case there are two or more privileged members in the family, they are entitled to consume 45 kWh of free electricity on a monthly basis.

8. Pensioners who were also war participants, who have not reached age 70, are entitled to consume 30 kWh of free electricity per month. In case there are two or more privileged members in the family, they are entitled to receive 45 kWh of free electricity on a monthly basis.

9. Pensioners who were also war participants, who have reached age 70, are entitled to receive 50 kWh of free electricity per month. In case there are two or more privileged members in the family, they are entitled to receive 75 kWh of free electricity on a monthly basis.

Note: Cost of electricity consumed in excess to the limits established by this law shall be fully covered by the consumer (family).

APPENDIX B

CURRENT SUBSIDY RATE CALCULATION

Refugees and pensioners each receive a credit of 1.8 Lari per month for electricity service regardless of how many are in a household.

TBILISI

Pensioners (Based on 9-month 1999 data)

Class kWh Consumption	41,000,000
Number in class	153,000
kWh use per pensioner over 9 months	268

Credits per pensioner over 9 months 1.8 x 9 = 16.2 Lari =1620 Tetri

Subsidy per kWh $\frac{1620 \text{ Tetri}}{268 \text{ kWh}}$ = 6 Tetri

Refugees (Based on 9-month 1999 data)

Class kWh Consumption	14,000,000[4]
Number in class	78,000
kWh use per refugee over 9 months	180

Subsidy per kWh $\frac{1620 \text{ Tetri}}{180 \text{ kWh}}$ = 9 Tetri

KUTAISI

Because of incomplete data available for Kutaisi, it is assumed that each class accounts for the same percentage of subsidized consumption as in Tbilisi. Total subsidized consumption is assumed to represent the same share of residential use as in Tbilisi and the subsidy rates reflect the lower tariff in Kutaisi. The total estimated subsidy burden is set out in the table below.

[4] Class numbers and kWh totals were provided by AES-Telasi.

ESTIMATED ANNUAL SUBSIDIES TO CERTAIN CATEGORIES OF KUTAISI RESIDENTIAL ELECTRICITY USERS

Category of Customer	Estimated Annual kWh Use	Subsidy Rate Tetri Per kWh	Lari Subsidy
Pensioners	10,000,000	6	600,000
Refugees	3,500,000	8.3	290,000
50% Discounts	21,000,000	4.15	971,500
100% Discounts	15,500,000	8.3	1,286,500
Total	50,000,000	- - - -	3,148,000

APPENDIX C

TACIS ACTIVITY

The European Union's program of Technical Assistance to the Commonwealth of Independent States (Tacis) has initiated a number of activities in Georgia that seek to improve the efficiency of energy use. These are administered by the Tacis Energy Efficiency Center of Georgia and include projects in schools and hospitals, some of which are in Tbilisi. Most of the projects concluded to date involve energy audits with recommendations and cost estimates for improving efficiency of the energy use for space heating.

In the Soviet period, the extensive district heating network met the space heating need. However, Georgia's inability to pay for imported gas to fuel the heating stations resulted in the system being effectively abandoned. It is now in an advanced state of deterioration after five years of non-use and no maintenance. Whether it should be renovated or replaced by single gas fired units serving entire apartment blocks or small units serving individual apartments is a decision that could have a significant impact on local government's involvement in energy supply.

The work done by Tacis and by several government experts suggest that although district heating will outperform other options from an energy efficiency perspective, the total cost of renovation, including amortization of the necessary capital expenditures, and fuel costs exceed the comparable cost for a central boiler in a building.

In one case, Tacis examined the option of renovating a local district heating substation compared with a central gas-fired boiler for heating an eight level apartment building and found that the total cost of energy per kWh of heat to be nearly twice as much for district heating as for a central boiler in the building.[5]

[5] Energy Audit # 5 – Apartment Building – Dighomi, Tbilisi, "Building Sector: Report on Identification of New Auditing Sites in Building Sector", The Tacis Energy Efficiency Center of Georgia, August 1999.