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FINANCIAL RESTATEMENT AND VALUATION OF THE GEORGIA ELECTRIC DISTRIBUTION SECTOR

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A

TABLE OF CONTENTS

EXECUTIVE SUMMARY 1

COUNTRY PROFILE AND ECONOMIC ENVIRONMENT 4

- History 4
- Economic Environment 5
- Electricity 6
  - Background 6
  - Products, Markets, and Competition 6
  - Supply 11
  - Structure of Collections and Payments 11

HISTORICAL FINANCIAL RESTATEMENT AND ANALYSIS 14

- Introduction 14
- Income Statement 14
  - Sales 16
  - Purchased Power 16
  - Operating Costs 16
  - Net Income 16
  - Collections 17

VALUATION OF DISTRIBUTION COMPANIES 19

- Assumptions 20
- Base Case 20
- Sensitivity Analysis 24

APPENDIX 1: METHODOLOGY OF RESTATEMENT 31

- Introduction 32
- Degrees of IAS Restatement 33
- Restatement of Sales 34
- Restatement of Costs 34
- Purchased Energy 34
- Money In / Money Out 34
- Balance Sheet 35

B

APPENDIX 2: VALUATION METHODOLOGY 36

Discounted Cash Flow in Perpetuity 36

Cost of Capital 37

Distribution Company Risk Factors 40

Cost of Capital Calculation 40

Assumption of Capital Structure 40

Application of Valuation Methodology 45

Distribution Companies 45
Financial Model 45
Table 1 45
Table 2 45
Table 3 46
Table 4 46
Table 5 46
Table 6 46
Table 7 46
Table 8 47
Table 9 48
Table 10 48

APPENDIX 3(a) – VALUATION OF INDIVIDUAL DISTRIBUTION COMPANIES

APPENDIX 3(b) – VALUATION OF INDIVIDUAL DISTRIBUTION COMPANIES

APPENDIX 3(c) – VALUATION OF INDIVIDUAL DISTRIBUTION COMPANIES

EXECUTIVE SUMMARY

Georgia is a small, mainly agrarian country located in the Caucasus region just east of the Black Sea and northwest of the Caspian Sea. Historically recognized as part of one of the early civilizations (the Akkadians of Northern Mesopotamia), it strategic location has historically been its comparative advantage and economic basis. Originally part of the silk trade route from West to East, from the 19th century until present it both has been and continues to be an integral part of the transport network for oil from the Caspian Sea and Kazakhstan. Upon the breakup of the Former Soviet Union (FSU), its economy suffered more than most other FSU republics due to its dependence on the traditional supply system for energy and its reliance on the All Union System of Trade. Compounding the problem of transition was a civil war. Today, Georgia is one of the most progressive FSU countries in implementing privatization and securing foreign investment.

Georgia's history with electricity totaled 100 years in 1998. The power sector was established in 1898 when thermal power was installed to provide light to the Georgian Drama Theater. Eleven years later, the first hydro station was built on the river Borjomula to provide Czar Nicholas II's summer residence with power. Since the turn of the century, Georgia has developed one of its natural resources, running water, into a vast series of hydroelectric plants that generate electricity throughout the country. Today, however, the infrastructure of the sector is deteriorating rapidly from lack of investment and maintenance. To block the continuing slide, the Ministry of State Property Management has undertaken a mass privatization program. The first company sold was Telasi, the Tbilisi distribution enterprise. It was purchased by the AES group of the United States. At present, all remaining Georgian distribution companies are being offered for sale.

The objective of this study is to calculate a realistic value for each electric distribution company that is scheduled to be privatized. Such a task requires a realistic understanding of the actual and future sales, costs, investments and cash flows that pass through the electric distribution sector. In addition, an understanding of the general economy, its future direction and how well the electric sector responds to its development is required. This task requires five steps. First, basic accounting data must be collected from each distribution company. Second, a methodology and computer model that systematically convert the collected data into Western (International Accounting Standards) (IAS) financial statements and project cash flows into the future must be developed. Third, the methodology and computer algorithm must be applied to the data collected to restate historical accounts. Fourth, a set of assumptions concerning future demand, tariffs, losses, investments and costs to be used with the computer model must be developed. Finally, the computer model must be run to determine value.

This valuation exercise is not a precise science. Two factors introduce bias. The first is the historical conversion from one system financial system (Chart of Accounts) to

another (IAS). Besides some small internal differences in the basic accounting of the two systems, the major factors preventing precise conversion to IAS financial statements are the attempts at understating cash received or overstating costs (to lower the tax burden), and the lack of standard application of the Georgian accounting system. Each distribution enterprise applies accounting rules differently. The second major reason for uncertainty is the use of assumptions in predicting the future. By its very nature the future is unknown and thus unpredictable. Thus, to use them automatically introduces distortions. Combined, these two factors represent unsystematic risk that cannot be overcome.

Section 2 of this report generally discusses the history and economic condition of the sector. Section 3 presents the results of the historical restatement of accounts. Section 4 presents the final results of both the valuation (using base case assumptions) and sensitivity analysis.

Summary of Results

The Georgian distribution sector at present includes 68 distribution companies. The largest, Telasi, has already been privatized. Of the remaining 67, we were able to collect financial and technical data on 52 companies. The results of the historical IAS financial restatement appear in Table 3.1. Three main conclusions resulted from this comprehensive set of financial restatements. First, the distribution sector is a collection of fragmented companies with sales ranging from 9.5 million GEL[1] (US$ 5.3 million) to only 193,000 GEL (US$ 107,000). For comparative purposes, in the US the average rural electric company has US$ 18 million in annual sales. The second major conclusion is that based on the financial restatements, the sector is unprofitable. The cause of the unprofitability is the lack of collection from sales. On average, cash collections average 20% of sales and total collections average only 50% (including offsets). The third conclusion is with such a low collection rate and even smaller cash collection rate, the sector's infrastructure is suffering from both a lack of investment and maintenance. Technical losses, on an annual average, are increasing because there is insufficient cash collected to reinvest. Most of the money goes for paying wages and electricity.

The results of the valuation are detailed in section 4. Under base case assumptions, the total value of the 52 companies included in the analysis is negative 52 million GEL (negative US$ 28.9 million). We obtained negative values for three reasons. First, the sector requires large initial investment to correct the declining infrastructure and install a functioning metering system. Second, the retail tariff at present and for the near future does not permit full cost recovery. It is assumed under the base case scenario that full recovery cost (US$ 7.5 cents per kwh) will be achieved in four years. Third, because of the lack of adequate metering capability, collection rates are assumed to slowly increase (over four years) to 97% from their present level. As a result, the newly

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[1] Excluding AES Telasi.

privatized companies will be providing a large amount of free electricity until the infrastructure will be in place to correct the problem.

The results of the sensitivity analysis show that changes in the retail tariff most significantly affected the final values. A US$ 1 cent increase in the tariff actually gave the sector a positive total value (using a 20% and 25 discount rate). Other variables that significantly change values were investments and collection rates. In no other sensitivity scenario, however, were the valuation results positive.

COUNTRY PROFILE AND ECONOMIC ENVIRONMENT

History

Georgia was originally settled by a Semitic speaking people called the Akkadians. This tribe had migrated north from the Mesopotamian region (now central Iran along the Tigris and Euphrates rivers) during the 5th century BC. Considered one of the early civilizations, Georgia was introduced to Christianity in 337 AD by Saint Nino. During this period, the ruling structure was a number of fiefdoms and regional monarchs. However, in the 11th century David the Builder united Georgia under a single monarchy. This union lasted until the 13th century when the Mongols (under the leadership of Genghis Khan) invaded the country. In the early 17th century the Turks invaded Georgia and annexed Georgia as part of the Ottoman Empire.

In the early 1800's war between the Georgian and Turks was initiated and in 1832 the Georgians signed the "Georgievskis Traktati" or alliance with Russia in order to gain support in its fight against the Turks. During a brief period during the Russian Revolution (1917-1923), the Georgians gained full independence as a country. However, it was short-lived, as the Bolsheviks soon overcame the country and incorporated it into the Soviet Union.

During WWII, Georgia played a significant role in the defeat of Nazi Germany. Because Germany lacked natural sources of oil, it depended on other areas. As the Allies' trade embargo caused fuel shortages in fascist Germany, the Nazi regime saw the opportunity to move South towards the oil-rich Caspian sea and secure a source of oil. As they move through Ukraine, they entered the easily defended Kerchi mountainous regions on the Northern Georgia border. The Nazis were defeated by the Georgians and for the rest of the war suffered from a chronic lack of fuel that contributed to their defeat by the Allies. After the war, the FSU started a large industrialization campaign to modernize its economy. Although Georgia has been traditionally agricultural because of its moderate climate, metallurgy plants were built about the Rustavi area and many food processing plants were constructed to serve the agricultural industry.

On May 26, 1991 Georgia was the first non-Baltic country to declare independence from the FSU. However, peace was short-lived as a civil war erupted between the former nationalistic president Zvail Ghamsakurdia and the opposition party. This internal conflict ended in 1993.

Economic Environment

Georgia is a small country located in the Caucasus mountain region between the Black and Caspian seas. Geographically the country is divided into an East and West part with the Great Caucasus Mountain Range dividing the country in half. To the East lies the Mktvari River Basin while the Kolkhida Lowlands opens to the West. The climate varies from humid sub-tropical along the Black Sea Coast to freezing temperatures in the centrally located mountainous regions.

Because of its moderate climate and lowlands on either side of the mountain range, Georgia has been an important agriculture area. Citrus, tea and grapes are largely grown and exported. In addition, its coastline has attracted a significant amount of tourism. The Abkazia region has traditionally been known as one of the most desirable seaside resort areas. Light industry, such as food processing, have also contributed to the country's prosperity.

Of equal importance to its natural resources is trade. Its strategic location in the Transcaucasus region makes it a natural link between Europe and Asia. Originally part of the Silk Road trade route, merchants and traders have been crossing the country in the pursuit of commerce for centuries. Its access to the Black Sea also make it a natural location for ports. In 1874 Robert Nobel arrived in Baku to purchase wood for rifles. Instead, he purchased an oil refinery and combined with investments from the Rothschilds, established a rail link from Baku to Batumi for oil exports. By 1905, a pipeline was completed between the two points and several refineries were constructed in the Batumi area. Georgia's strategic position has only increased in importance as large oil deposits have been discovered in Southern Kazakhstan and increased technology has allowed more access to the oil under the Caspian Sea.

The arrival of the Soviets in 1921 ended free enterprise, but the export (and transport) of oil continued to be important source of hard currency for the Communists. In addition, with Georgia's moderate climate and proximity to the Black Sea, it was one of the few sources of certain agriculture commodities available to the FSU. As a result, Georgia prospered during this period. However, the collapse of the FSU has had a devastating effect of the economy. The breakdown of the All Union Trade Organization within the Soviet Union caused severe trade and payment disruptions. These disruptions was particularly difficult for Georgia because its economy relied on trade and it does not have any natural sources of energy. Almost overnight, its economy went from utilizing very cheap energy imports from other FSU countries to facing world market prices.

Electricity

Background

The Georgina power sector originated in 1898 when thermal power was installed to provide light in the Georgian Drama Theatre. Eleven years later, the first hydro station was built on the river Borjomula on the Russia side. Its main purpose was to serve Czar Nicholas II's summer residence with power. Beginning at the turn of the century until 1913 the power sector expanded rapidly (although on a small scale) as seven hydro power stations were constructed with a total capacity of 19 million kW. After the Bolsheviks assumed power in 1921, the industry itself was administered by the Ministry of Energy from Moscow.

Capacity increased overnight by 200% as the Zemo Avchala hydroelectric power plant entered into production. In subsequent years large hydro plants were constructed on the Rioni River (1927) and the Abashariver River (1934). As the country became more reliant on power, it limitations due to seasonal fluctuations in streamflow became obvious. Therefore, in 1938 the Tkvarcheli thermal power station and heating unit were placed into commercial operation. Development was halted during the 1940's as the Soviet resources were diverted to fight the war. Expansion began again in 1960 with the construction of the Tbilisi thermal power plant.

The next major turning point in the sector occurred after the break up of the Soviet Union. Because Georgia is an energy-importing country, it was faced with a sudden increase in fossil fuel prices. As the country first used up its reserves and then credit to buy fuel, it also faced a declining economy, no markets for it exports and increasing balance of payments deficits. As a result, the State enterprises at first slowly and then rapidly fell into bankruptcy. The resulting unemployment led to a sharp increase in non-payment of the electricity bills. In 1995 the State attempted to improve financial performance by turning control of the distribution companies over to municipalities. Collections, however, continued to decline. In 1996, the first steps where taken to dismantle Sakenergo, the State-owned, vertically-integrated electric monopoly. The company was divided into two parts, Generation and Sakenergo (which contained Sales, Transmission, and Dispatch). In July 1998 the Transmission Company was set up as its own enterprise. In September, 1999 the reorganization will be completed as Dispatch will be set up as its own State Enterprise and the original Sakenergo will be a shell company.

Products, Markets and Competition

In Georgia as with the rest of the world, distribution of electricity is a simple business and very similar to any enterprise engaged in a wholesaling operation. Distributors purchase a finish product and distribute it to the final customer. The only change in the product is the lowering of voltage to a level acceptable to the needs of the customer. Normally, industrial customers require a higher voltage, and residential

customers a lower one. As the Georgian economy has declined, the proportion of low voltage electricity has increased as the large industrial companies have lost their markets and closed. Table 2.1 demonstrates the dramatic nature of this trend. In 1990, one year prior to the collapse of the FSU, industry consumed 46% percent of total electricity, while residential consumption was approximately 13%. By 1997, industry's proportion had fallen to 13% while residential consumption had increased to 35%.

Under normal conditions of electricity delivery, distributing electricity is much more efficient and inexpensive to industrial than to residential customers, because more volumes of electricity are delivered across the same investment in transmission lines. The Georgian distribution sector is no exception. Therefore, as the proportion of industry declines relative to residential, the average cost to distribute electricity increases.

Also of importance is that within the Communist economy, all customers paid the same price (excluding privilege customers, who received discounts). Therefore, a cross subsidy existed between the population and industry with industry providing the subsidy to the population. These cross-subsidies persist in Georgia.

For the Georgian distribution sector, the main consequence of this trend in declining industrial share combined with the implicit price subsidy (i.e. fixed price) is that the cost to deliver a given MWh of electricity is increasing and as a result, overall profitability of the entire sector is decreasing at a rapid rate. Although some of the problem could be overcome by price increases to compensate for the decline in efficiency, in reality the price increases have been small and insufficient to overcome the increased cost of service.

Traditionally, because of the high capital cost of establishing service, a distribution company has always been granted monopoly status. In return for the privilege of a single captive market and no direct competition, the distribution company is subject to regulation by a government body. During the Communist period, the Georgian distribution sector was part of the vertically integrated electric enterprise that was both owned and controlled by the State. In 1994, the electric sector was restructured and management control was given to the municipalities. The rationale for the restructuring was the poor collection performance at the final customer level. The desired result of higher collections was not achieved as payments continued to decline.

Table 2.2 shows the composition of the entire retail electricity market for 1998. It includes both distribution companies and direct customers. Total electricity delivered for the year was 5,858.6 GWh. Sales (in GEL) were 205 million and collections based on Sales were 125 million or 61%. This figure is misleading, however, because over half of collections are offsets arranged between companies or with the government. In reality approximately 21% of total sales are actually collected as cash. Therefore, the entire system suffers from a severe liquidity crisis and a non-collection problem.

Table 2.1
Historical Sales Distribution by Customer
Georgia Power Privatization

Electricity Month	1990	1991	1992	1993	1994	1995	1996	1997	1998
	GWh Sold								
Industry	8,054	5,609	4,135	2,552	1,434	1,518	910	953	1,023
Construction	310	280	60	170	73	51	46	38	41
Agriculture	1,460	990	730	317	128	66	26	14	17
Transport	1,040	840	655	608	37	278	275	254	237
Trade and Commerical	288	259	230	201	78	103	103	64	75
Municipal and Public	912	821	730	636	246	328	326	334	340
Residential	2,320	2,680	2,250	2,772	2,410	2,464	2,547	2,593	2,768
Other	3,066	4,149	3,746	3,607	3,556	3,028	3,207	3,113	3,301
Total	17,450	15,628	12,536	10,863	7,962	7,836	7,440	7,363	7,802
	Percent of Total								
Industry	46%	36%	33%	23%	18%	19%	12%	13%	13%
Construction	2%	2%	0%	2%	1%	1%	1%	1%	1%
Agriculture	8%	6%	6%	3%	2%	1%	0%	0%	0%
Transport	6%	5%	5%	6%	0%	4%	4%	3%	3%
Trade and Commerical	2%	2%	2%	2%	1%	1%	1%	1%	1%
Municipal and Public	5%	5%	6%	6%	3%	4%	4%	5%	4%
Residential	13%	17%	18%	26%	30%	31%	34%	35%	35%
Other	18%	27%	30%	33%	45%	39%	43%	42%	42%
Total	100%	100%	100%	100%	100%	100%	100%	100%	100%

Source: Burns and Roe, Least Cost Plane for Energy Sector, September 1998.

Table 2.2a
Georgian Wholesale Power Market
Distribution Supply and Settlement for 1998

Area Name of the Station	Electricity Received GWh	Electricity Received (000 GEL)	Collected (000 GEL)
Adjara	304.5	10,449	6,019
Guria	69.4	2,334	1,266
Including:			
1. Ozurgeti	39.7	1,333	765
2. Lanchkhuti	20	673	298
3. Chokhatauri	9.7	328	202
Zugdidi	251.1	8,797	3,201
Including:			
1. Zugdidi	15.6	6,445	1,948
2. Tsalengikha	41.6	1,444	663
3. Chkhorotsku	18.4	636	317
4. Interprise Customer	5.5	272	273
Senaki	134.3	4,600	3,149
Including:			
1. Senaki	44.1	1,506	855
2. Martvili	11.6	392	388
3. Abasha	11.5	390	283
4. Khobi	15.8	545	420
5. Poti	46.7	1,610	1,070
6. Interprise Customer	4.6	157	132
Kutaisi			
1. Kutaisi	250.2	10,799	6,853
2. Tskaltubo	83.8	2,929	1,257
3. Samtredia	77.1	2,668	829
4. Khoni	15.2	512	335
5. Vani	14.8	506	280
6. Bagdati	19.7	674	236
7. Tkibuli	41.4	1,418	346
8. Interprise Customer	115.1	4,858	1,371
Zestaponi	102.4	3,655	1,977
Including:			
1. Zestaponi	26.5	905	628
2. Terjola	20.9	710	369
3. Kharagauli	9.2	316	222
4. Chiatura	21.8	746	405
5. Sachkhere	10.8	373	276
6. "Chiatur.Marganetsi"	11.5	534	53
7. Interprise Customer	1.7	73	23
Racha	43.5	1,505	586
Including:			
1. Ambrolauri	17.2	602	210
2. Oni	5.7	190	124
3. Tsageri	11.4	393	175
4. Lentekhi	9.2	319	78
Meskheti	100.8	3,326	1,651
Including:			
1. Akhaltsikhe	27.1	894	460
2. Akhalqalaqi	16.3	534	283
3. Adigeni	6.2	205	138
4. Aspindza	2.9	96	76
5. Ninotsminda	7	227	147
6. Borjomi	39.9	1,308	493
7. Interprise Customer	14	64	55
Shida Qartli	148.1	4,965	3,394
Including:			
1. Gori	62.1	2,037	1,522
2. Khashuri	35.1	1,153	613
3. Kaspi	15.8	530	334
4. Qareli	16	514	337
5. Interprise Customer	19.1	730	588

Source: Sakenergo Annual Report 1998.

Table 2.2b
Georgian Wholesale Power Market
Distribution Supply and Settlement for 1998

Area Name of the Station	Electricity Received GWh	Electricity Received (000 GEL)	Collected (000 GEL)
Mtskheta - Mtianeti	82.5	3,427	1,076
Including:			
1. Mtskheta	50.6	2,209	516
2. Tianeti	8.5	294	184
3. Akhalgori	3.1	104	62
4. Kazbegi	4	128	56
5. "Peri"	5.2	186	36
6. LTD "Energia"	2.1	69	22
7. Interprise Customer	9	436	200
Qvemo Qartli	127.8	4,299	1,844
Including:			
1. Marneuli	55.7	1,836	624
2. Bolnisi	18 7	634	381
3. Dmanisi	8	272	175
4. Tsalka	28.6	966	264
5. Tetritskaro	11.8	402	286
6. Manglisi	3.5	119	77
7. Interprise Customer	1.5	70	38
Gurjaani	80	2,796	1,811
Including:			
1. Gurjaani	27.9	969	615
2. Signagi	11	384	320
3. Tskaro	9	310	189
4. Sagarejo	17.7	606	335
5. Lagodekhi	12.6	432	297
6. Interprise Customer	1.8	94	56
Telavi	44.7	1,532	1,173
Including:			
1. Telavi	24.8	850	696
2. Akhmeta	9.7	328	234
3. Kvareli	8.8	301	216
4. Interprise Customer	1.4	53	26
Mestia	10.8	44	71
Dusheti		14	226
of Aragvi Ravine			1,311
Total	2117.2	76,110	40,264
Direct Customer	3751.4	12,945	84,915
Including:			
1. Telasi	2127.5	69,404	27,221
2. Pero			1,680
(FA - PET)	304.5	9,799	7,329
3. JSC "Azoti"	145.3	6,543	6,544
4. Enterprise "Kimbochko"	3	138	13
5 Rustavtsementi	11.4	417	412
6. Railway Road	75.6	3,609	3,545
7. Rustavi Metalurgy Factory	16.8	957	1,501
8. Rustavwater	48.4	2,180	2,376
9. Relasi	101.9	3,341	1,280
10. Gardabani	88	2,598	1,442
11. Rustavmaheni	3.1	111	64
12. Tbilaresi	3 3	81	81
13. Caucasian Pet. Company	1.5	87	87
14. Djinvalhesi	2.7	38	38
15. Khashuri Glass Company		143	309
16. Gldani Energo 96		604	777
17. Ritseulahesi		144	144
18. Bjujahesi		37	37
19. LTD "Bimo"		4	
20. JSC Madneuli			12
21. Others	7.6	291	803
22. Repayment	810.8	29,217	29,217
Including:			
a) Export	758	26,840	26,840
b) Railway Road (Armenia)	52.8	2,376	2,376
Total	5858.6	205,855	125,179

Source: Sakenergo Annual Report 1998.

Supply

The direct source of electricity for distribution is transmission. However, transmission is similar to distribution in that it simply passes on a finished product. The real source of electricity is generation. Table 2.3 outlines the production of generation plants and Import/Exports. Total generation for 1998 was 8,170 GWh. Of this total, 99% was from hydroelectric sources. Two reasons exist for this high proportion. First, Georgia's largest energy source is running water in its numerous rivers. Therefore, over time the economy has built a large number of plants to capitalize on this inexpensive energy source. The second reason is a direct result of the economic crisis. Due to lack of resources, the country lacks the ability to purchase enough fuel to supply its main thermal plant, Gardabani. In addition, the plant itself is in disrepair from the lack of payment from distribution. Therefore, the combination of the two factors has greatly inhibited its ability to supply power to the sector from thermal sources.

The Georgian power supply is unique because 39% of its power comes from a single source, the Inguri Hydro Plant. It is the largest plant in terms of both capacity and production, with an installed capacity of 1,640 MW and production (in 1998) of 3,180 GWh.

After Inguri, the next largest plant, Jinvali, is less than $1/10^{th}$ the installed capacity of Inguri at 130 MW and power production of $1/6^{th}$. However, its control and operation has been turned over to private management through a lease agreement. Three more hydro plants, Lajaniri and Khrami 1 and 2, have an installed capacity of over 100 MW.

Structure of Collections and Payments

The most significant issue in the Georgian power sector is the lack of collections, in particular the low collection of cash from customers. Table 2.4 examines this issue on a monthly basis for 1998. Several trends are apparent from this table. The first and most troublesome is the decline in cash collection. For the first three months of 1998, cash collections averaged 26% of sales. However, for the last three months collections averaged only 16%. This represents a serious decline from an already very low level. For the year, cash collections averaged 21%. A similar trend exists for offsets. During the first three months collections from offsets averaged 23% while by year's end it had declined to 11%.

Table 2.3
Georgian Wholesale Power Market
Generation Supply for 1998

Name of the Station	Installed Capacity (MW)	1998 Supplied Energy (GWh)	1997 Energy Tariff Tetri/kWh	1998 Energy Tariff Tetri/kWh
Leased Hydro Plants				
Atshesi	16	60.0	1.30	2.00
Ortachala	18	50.6	1.30	2.00
Zahesi	37	173.4	1.30	1.60
Jinvali	130	500.0	1.20	1.72
Total Leased Hydro Plants	201	784.0		
Privatized Hydro Plants				
Matkhopi	3.9	10.8	2 00	2.40
Dashbashi	1.3	2.0	2.00	2.40
Satskhenisi	14	50.1	2.00	2.20
Kabali	1.5	9.0	2.00	2.40
Abhesi	1.8	4.0	2.00	2.40
Igoeti	1.8	0.0		2.45
Misakcieli	2.7	0.0	2.00	2.43
Bjuja	12	44.9	1.40	2.00
Tiriponi	2	0.0	2.00	2.44
Alazani	4.8	0.0	1.70	2.18
Chkhorotsku	5.3	14.0	2.00	2.40
Sioni	9.2	33.7	1.70	2.20
Tetrikhevi	14	24.3	1.70	2.00
Chitakhevi	21	105.0	1 30	1.70
Dmanisi	0.5	0.0	2.00	2.40
Kakhareti	1.1	11.4	2.00	2.40
Kurzu	2	0.7	2.00	2.40
Machakhelahesi	1.4	3.0		2.40
Skurhesi	1	2.0		2.40
Ritseula	5.1	25.7	2.00	2.40
Khertvisi	0.3	0.5	2.00	2.40
Total Privatize Hydro Plants	106.7	341.1		
Sak Gen Stations				
Gardabani	18	54.6	6 00	13 00
Tkibuli	80	155.4	0.95	1.40
Gumati	67	321.5	1.05	1.40
Rioni	49	183.3	1.05	1.40
Lajanuri	112	251.9	1.05	1.40
Khrami 2	110	230.5	0.95	1.30
Khrami 1	113	211.5	0.95	1.30
Enguri Cascade	1640	3,180.0	0.90	1.11
Shaori	38	100.6	1.20	1.50
Total Sak Gen Stations	3011	7,045.3		
Import and Export				
Export		637.6		
Total Import, including		653.0		
Import from Russia for local consumtion		458.0		4.00
Import from Armenia		139.0		5.50
Import from Azerbaijan		56.0		6.50

Source GNERC, 1999 Statistics

Table 2.4
Georgian Wholesale Power Market
Distribution Supply and Settlement for 1998

Month	Total Delivered (GWh)	Payments: Total Delivered (million GEL)	Payments: Cash Received (million GEL)	Payments: Barter Received (million GEL)	Payments: Offsets Value (million GEL)	Percent: Cash Received (million GEL)	Percent: Barter Received (million GEL)	Percent: Offsets Value (million GEL)
Janurary	444.5	14.3	3.9	0.2	1.0	27%	1%	7%
Feburary	373.4	11.9	4.3	0.2	2.0	36%	2%	17%
March	409 7	13.3	1.8	0.9	6.0	14%	7%	45%
April	355.8	11.8	1.8	0.3	4.7	15%	3%	40%
May	328.2	11.0	3.5	0.2	2.6	32%	2%	24%
June	366.1	11.6	2.1	0.1	5.7	18%	1%	49%
July	338.8	11.2	3.6	0 0	3.5	32%	0%	31%
August	331.6	10.5	1 4	0.1	3.2	13%	1%	30%
September	315.6	10.3	1.3	0.0	3.1	13%	0%	30%
October	351.2	11.3	3 7	0.0	1.7	33%	0%	15%
November	413.1	17.2	1.0	0.3	1.7	6%	2%	10%
December	419.1	17.4	1.9	0.4	1.5	11%	2%	9%
Total	4,447 1	151.8	30.3	2.7	36.7			
Average						21%	2%	26%

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12#

A second trend that is unusual for FSU countries is the low level of barter. It represents only 2% of total collections. This contrasts with countries such as Ukraine where barter is over 50% of total collections. The reason for this trend is the almost total collapse of the industrial sector (see table 1). This point is especially true in industries such as metallurgy and chemicals, whose products are storable and readily tradable. Because Georgia's primary products are basic agriculture (citrus, tea and fruit), they are not easily stored and traded, and therefore are not frequently used as exchange.

HISTORICAL FINANCIAL RESTATEMENT[2] AND ANALYSIS

Introduction

For most of the FSU, the accounting system still remains the Chart of Accounts. Its basis is the original accounting system of the Soviet era. Its main benefit continues to be its acceptance by the tax authorities as the standard for which the many taxes are calculated. However, in the end it is a tax-based system, and does not follow widely-accepted IAS rules for measuring profit.

In completing this financial evaluation, basic economic principles still apply. At some point the marginal cost of doing a task exceeds the marginal benefit derived from the cost. In the case of this restatement, a limited IAS conversion was performed because it was both cost effective and provided a reasonable estimate of the company's operating performance in a format western-trained investors may understand. This restatement focused on the profitability of operations, with particular emphasis on sales and operating costs. After all, if the company cannot be profitable from its operations, a more refined (and expensive) restatement is an academic exercise. For the reader seeking further clarification of the methodology used, a detailed explanation of the principles of restatement can be found in Appendix One.

Income Statement

Table 3.1 is the limited restatement of the Income Statement using IAS for 52 distribution companies. The restatement itself is based on detailed monthly raw accounting data collected from each company's bookkeeping department. The monthly data were then compiled using IAS standards into quarterly results representing a single year (1998) of operation. Within this section a detailed explanation of the results (along with supporting tables) will be presented.

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[2] Restatement is commonly thought of and accepted as taking an existing financial statement and performing certain adjustments to IAS. In the case of this study, the financial statements produced can be more correctly characterized as reconstructed. Instead of using an existing financial statement, a more advance approach is taken in that the raw accounting data is collected at the bookkeeping level and the financial statements are assembled according to IAS with the raw data. This approach eliminates the needed corrections (which are not always successful) to overcome many of the distortions that exist when the financial statements are prepared according to tax law or the standards used under the Soviet system.

Table 3.1
Georgia Power Privatization
Summary of 1998 Income Statements by Distribution Company [1]

Distribution Company	Total Sales (000 GEL)	Total Purchased Power (000 GEL)	Total Operating Cost[2] (000 GEL)	Net Income (000 GEL)
Abasha	426	396	57	(106)
Adigeni	193	152	16	(94)
Ambrolauri	722	611	178	(387)
Aspindza	136	97	22	17
Axalcixe	1,188	1,641	164	(929)
Axalgori	426	396	57	(106)
Axmeta	333	263	34	36
Baddadi-1	554	396	13	(7)
Bagdadi-2	214	213	86	(163)
Borjomi	1,630	1,376	117	(28)
Calenjixa	1,937	1,456	274	(455)
Calka	845	762	72	11
Chiatura	971	409	240	(189)
Chxorocku	785	649	30	(2)
Ckaltubo	3,732	2,992	138	286
Dedoplis Charv	407	310	189	(524)
Dmanisi	370	286	63	(241)
Dusheli	1,996	1,551	342	(241)
Gardabani	3,868	3,382	123	(583)
Gori	2,247	2,161	276	(193)
Gurjanni	1,336	969	68	102
Kaspi	659	537	42	156
Kvareli	286	226	31	29
Lagodexi	621	433	55	76
Lanchxuti	862	690	40	13
Marneuli	1,468	2,146	130	(1,887)
Mcxeta	1,211	1,069	315	(416)
Oni	213	193	0	87
Ozurgeti	1,995	2,079	238	(356)
Poti	1,990	1,617	95	278
Qureli	4,490	3,756	578	(941)
Qelasi	4,490	3,756	578	(941)
Rustavi	3,760	3,560	316	(154)
Sachxere	501	382	102	(29)
Sagareyo	669	552	94	(129)
Samtredia	2,335	1,875	65	(128)
Senaki	1,785	1,534	361	(1,035)
Signagi	529	385	12	132
Telavi	825	645	9	171
Telrickaro-1	162	121	23	(19)
Telrickaro-2	555	407	62	32
Terjola	911	720	83	(85)
Tkibuli-1	178	186	19	(27)
Tkibuli-2	1,656	1,309	88	25
Vani	644	520	15	18
Xaragauli	382	322	172	(116)
Xashuri	1,531	3,218	121	(1,689)
Xobi	557	1,065	208	(715)
Xoni	612	525	41	(8)
Zestafoni	973	905	118	(410)
Zugdidi	9,488	13,241	350	(4,811)

[1] Estimated on an accural basis using data suppiled by each distribution company.

[2] Excludes purchased power.

[3] Includes a component for bad debt for 1998 only. This estimate is likely understate since the aging of current accounts current accounts only started on Janurary 1999.

Sales

Beginning with total sales[3] in table 3.1, 20 of the 52 companies evaluated have sales exceeding 1 million GEL. The largest company is Zugdidi with 9.5 million GEL in sales while the smallest is Aspindza with only 139 thousand GEL. The sales level per distribution company averages 1.4 million GEL. These statistics show an important point – the inefficiency built into the system by the large number of very small distribution networks (less than 1 million GEL in sales) and the low average sales across the entire group. In comparison, the average distribution cooperative in the US has over US$ 18 million (or 34.2 million GEL) in annual sales. Even if we triple sales for the year, only Zugdidi would exceed the average figure in the US. These points make a strong case for the consolidation of a several distribution networks into much larger units.

Purchased Power

Table 3.1 shows a summary of total purchased power cost as it relates to the overall profitability of the firm. Of the 52 firms examined, only 45 were in a position where sales actually exceeded cost. That means that seven firms were losing money on every kwh they purchased. As for gross operating margin (percent of purchased power to sales), it averages 18% for the group. In comparison, a western distribution company normally needs 34% to operate at a reasonable profitability level.

Operating Costs

Operating costs average 13% of sales. When compared to the western level of 26%, this figure is low. The main reason behind the substandard level is the poor collection rate on a cash basis. With no cash to purchase needed supplies and no credit because of the poor condition of the whole sector, the companies are drastically under-spending to maintain the system. The companies' first priority is to pay employees. In addition, they must pay a small amount to continue to receive electricity. Therefore, the maintenance of the system is not given priority because there is not enough cash available to purchase supplies and spare parts.

Net Income

Finally, the last column in Table 3.1 is Net Income for the 52 companies. Only 16 of the total number show any profit at all.[4] Of the 16 that show a profit, the profit margin averaged 12%. This, however, is a misleading figure and closer examination of the individual restatements reveals that most of the profit comes from non-payment for electricity purchased that was subsequently written off and charged as income. Therefore,

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[3] Accrual basis.

[4] It is important to remember that the accounts have been restated on an accrual basis. If the accounts were restated on a cash basis, none of the enterprises would be profitable.

of the 16 who had demonstrated a profit, further adjustments to eliminate write-offs of unpaid expenditures yields only 3 companies that are truly profitable.

Collections

Table 3.2 examines the collection performance of the 52 companies included in the analysis. Of the total examined, 16 had cash collection rates below 10% of total sales. Even more striking is that 51 of 52 had cash collections rates below 50%. The only exception was the small distribution company of Calka. On sales of 845 thousand GEL, it was able to collect 91% of its total.

The next column examines the question of barter collection rates. As mentioned previously, Georgian distribution companies do not engage (or at least officially report) in very much trade in barter. Only three companies, Gardabani, Oni and Telavi show barter transactions in excess of 10% of sales. Most companies report zero. Three possible reasons exist for such a trend. First, customers may have nothing that is tradable and storable to give to the distribution sector. Second, there may not be any tax avoidance advantages to trading in barter. Finally, Georgia's inflation rate has been relatively stable in recent years. Therefore, management at the distribution companies see no real advantage to holding goods instead of money as a hedge against inflation.

Offsets, however, do play an important role in debt settlement. Of the total of 52 companies, 16 reported that settlements through the use of offsets exceeded 40% of total sales. The average for the group was 31% of total sales. The range of the group was large. At the highest extreme was both Akhalgori and Abasha. Each reported receiving 64% of collections through settlements. At the other extreme, 5 distribution companies (Calka, Dmanisi, Marneuli, Ninocminda and Senaki) reported receiving no payments in the form of offsets.

Table 3.2
Georgia Power Privatization
Summary of Collections by Distribution Company [1]

Distribution Company	Total Sales (000 GEL)	Cash Collected (%)	Barter Collected (%)	Offsets (%)
Abasha	426	8%	0%	64%
Adigeni	193	16%	0%	0%
Ambrolauri	722	33%	0%	20%
Aspindza	136	22%	0%	44%
Axalcixe	1,188	16%	0%	26%
Axalgori	426	8%	0%	64%
Axmeta	333	26%	0%	60%
Baddadi-1	554	7%	0%	28%
Bagdadi-2	214	7%	0%	22%
Borjomi	1,630	12%	0%	21%
Calenjixa	1,937	2%	0%	33%
Calka	845	91%	0%	0%
Chiatura	971	10%	0%	36%
Chxorocku	785	8%	0%	36%
Ckaltubo	3,732	5%	0%	32%
Dedoplis Charv	407	12%	0%	46%
Dmanisi	370	10%	0%	0%
Dusheli	1,996	33%	0%	17%
Gardabani	3,868	12%	18%	12%
Gori	2,247	37%	2%	40%
Gurjanni	1,336	16%	0%	38%
Kaspi	659	18%	0%	38%
Kvareli	286	19%	0%	61%
Lagodexi	621	17%	0%	38%
Lanchxuti	862	13%	0%	26%
Marneuli	1,468	12%	0%	0%
Mcxeta	1,211	14%	0%	1%
Ninocminda	345	0%	0%	0%
Oni	213	5%	28%	9%
Ozurgeti	1,995	4%	0%	36%
Poti	1,990	19%	0%	61%
Qureli	4,490	15%	0%	12%
Qelasi	4,490	15%	0%	12%
Rustavi	3,760	20%	0%	26%
Sachxere	501	10%	0%	52%
Sagareyo	669	14%	0%	35%
Samtredia	2,335	14%	0%	17%
Senaki	1,785	9%	0%	0%
Signagi	529	14%	0%	53%
Telavi	825	26%	10%	56%
Telrickaro-1	162	18%	0%	25%
Telrickaro-2	555	8%	0%	49%
Terjola	911	42%	0%	30%
Tkibuli-1	178	29%	0%	53%
Tkibuli-2	1,656	11%	0%	12%
Vani	644	6%	0%	43%
Xaragauli	382	28%	0%	51%
Xashuri	1,531	16%	0%	28%
Xobi	557	9%	0%	73%
Xoni	612	23%	0%	47%
Zestafoni	973	23%	0%	0%
Zugdidi	9,488	3%	0%	20%

[1] Estimated on an accural basis using data suppiled by each distribution company.

VALUATION OF DISTRIBUTION COMPANIES

The final step is the actual valuation of the distribution companies. The objective of the analysis is to collect the primary data necessary to restate the accounts in some preliminary form compatible with IAS (to serve as a beginning point) and then using assumptions about the future, project future cash flows to determine value. The important point to remember is that when this project was initiated, no financial database of any kind existed for these companies. In effect it was a blank page. Therefore, it is best to view this exercise as a beginning in the effort to sort out the financial labyrinth that is called the Georgian electric distribution sector.

The distribution sector consists of 68 companies ranging in size from US$ 5 million in annual sales to companies with only 70,000. They are spread across a large geographical region that includes mountainous regions, coastal shorelines, urban areas and many rural communities. Making the situation more difficult was a general feeling within the distribution companies of resentment and some degree of trepidation towards the privatization process. Therefore, to accumulate a financial database on 52 companies under the existing situation and to estimate a preliminary value for such a large number of companies proved difficult.

It is important to understand that the potential for a large degree of error exists, for two reasons. First, the financial data provided by the company may be erroneous. It was impossible in the time and resources available to perform any systematic audit of the historical information provided. There were too many companies and too much distance between them to accomplish such a task.

The second potential source of error is the assumptions about the future. To value a company is highly dependent on the assumptions concerning the future performance of both the economy in general and the company in particular. These assumptions are highly subjective. In order to complete this task several broad assumptions were made concerning future tariffs, demand, losses, collection rate, gains in operational efficiency and costs of generation. All of these factors have a significant impact on the future cash flow of the companies and ultimately their value. In each case the best information available was used, but predicting the future is at best an imprecise science. Too many random factors exist that make even the most comprehensive analysis of future performance completely wrong..

We first present our assumptions. We then give the base case results. The base case is the most probable outcome, given current information and opinions of those people closest to the operations of the sector. We then discuss what-if scenarios (sensitivity analysis). Appendix Two presents a detailed description of the financial model.

ASSUMPTIONS

Tables 4.1 and 4.2 reflect the assumptions used within the financial model. An overview will be given here. For a more detailed description refer to Appendix Two. Beginning with table 4.1, its main purpose concerns revenue calculation. Included in the table are projected tariffs for four main classes of customer, price elasticity, projected growth in demand, actual demand, losses, transmissions costs and collection (payment) rates. The tax rate and discount rate are also included.

Table 4.2 addresses expenditures, which can take two forms, future investment costs or cost of operation. The first section concerns investments. Although very little work has been done on trying to estimate the real cost to rehabilitate the sector, experience at AES Telasi suggests that between US$ 35-50 per customer will be the costs to make the distribution company operable and allow it to meter the customers for billing purposes.

BASE CASE

Table 4.3 contains the results of the base case valuation. Of the 52 companies that participated in the data request, their combined total represents 1,510 GWh of electricity and 651,610 customers. In relative terms, that is 25% of the electricity delivered. However, these figures are misleading in one respect. If we subtract direct customers and AES-Telasi, the percentage increases to 80% of total deliveries. In addition, the distribution sector within Georgia is fragmented, with many small companies. Therefore, this valuation exercise has captured most of what is available.

Based on the financial information provided by the companies, the total value of the 52 companies is negative 52.6 million GEL under the base case assumptions. However, this is placing a value on the sector as it exists today – many small companies. Although the factors that determine value will be examined in detail under the what-if scenarios later in this section, three items cause the low valuation. The first is the high investment cost in the beginning. At the moment the capacity to accurately meter and bill usage does not exist, principally because many meters are either broken or are located inside of apartments (and thus are subject to tampering).

Table 4.1
Base Case Assumptions of Revenues, Losses and Collection rates
Georgia Power Privatization
Projections of Sales and Payment Assumptions

		Actual 1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Tariff																			
Industrial	GEL Per MWH	48.6	48.6	68.4	88.2	108.0	127.8	127.8	127.8	127.8	127.8	127.8	127.8	127.8	127.8	127.8	127.8	127.8	127.8
Local Budget	GEL Per MWH	36.4	36.4	62.8	89.2	115.6	142.0	142.0	142.0	142.0	142.0	142.0	142.0	142.0	142.0	142.0	142.0	142.0	142.0
Central Budget	GEL Per MWH	34.7	34.7	61.6	88.4	115.2	142.0	142.0	142.0	142.0	142.0	142.0	142.0	142.0	142.0	142.0	142.0	142.0	142.0
Residential	GEL Per MWH	46.9	46.9	70.7	94.5	118.2	142.0	142.0	142.0	142.0	142.0	142.0	142.0	142.0	142.0	142.0	142.0	142.0	142.0
Other	GEL Per MWH	42.8	42.8	67.6	92.4	117.2	142.0	142.0	142.0	142.0	142.0	142.0	142.0	142.0	142.0	142.0	142.0	142.0	142.0
Price Elasticity of Demand [1]	Unit Change			-0.3	0.3	-0.3	-0.3	-0.3	0.3	-0.3	0.3	0.3	-0.3	0.3	-0.3	-0.3	-0.3	-0.3	-0.3
Growth in Demand [2]	%																		
Industrial				6.3%	6.3%	6.3%	6.3%	6.3%	9.2%	9.2%	9.2%	9.2%	9.2%	7.5%	7.5%	7.5%	7.5%	7.5%	6.8%
Local Budget				3.4%	3.4%	3.4%	3.4%	3.4%	4.7%	4.7%	4.7%	4.7%	4.7%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%
Central Budget				3.4%	3.4%	3.4%	3.4%	3.4%	4.7%	4.7%	4.7%	4.7%	4.7%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%
Residential				1.1%	1.1%	1.1%	1.1%	1.1%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%
Other				3.4%	3.4%	3.4%	3.4%	3.4%	4.7%	4.7%	4.7%	4.7%	4.7%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%
Projected Demand [3]																			
Industrial	MWH	373	373	364	362	365	371	394	431	470	513	561	612	658	708	761	818	879	939
Local Budget	MWH	38	38	39	40	42	43	45	47	49	51	54	56	59	63	66	70	74	78
Central Budget	MWH	25	25	25	26	27	28	29	30	32	33	35	36	38	41	43	45	48	51
Residential	MWH	8,602	8,602	8,879	9,117	9,333	9,534	9,639	9,735	9,833	9,931	10,030	10,130	10,232	10,334	10,437	10,542	10,647	10,754
Other	MWH	238	238	249	259	270	281	290	304	318	333	349	365	386	407	430	454	480	506
Losses [4]	%	20%	20%	18%	16%	14%	12%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%
Transmission Purchases	MWH	11,543	11,543	11,614	11,644	11,652	11,646	11,552	11,719	11,891	12,069	12,253	12,445	12,637	12,836	13,041	13,254	13,475	13,697
Total Delivered Price To Distribution	GEL Per MWH	35.0	35.0	47.5	60.0	72.5	85.0	85.0	85.0	85.0	85.0	85.0	85.0	85.0	85.0	85.0	85.0	85.0	85.0
Collection Rate [5]	%	72%	72%	77%	83%	87%	92%	97%	97%	97%	97%	97%	97%	97%	97%	97%	97%	97%	97%
Payment Rate [6]	%	83%	83%	86%	90%	93%	97%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Income Taxes	%		20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%
Discount Rate	%			25%	25%	25%	25%	25%	25%	25%	25%	25%	25%	25%	25%	25%	25%	25%	25%

[1] Source: Burns and Roe, USAID Delivery Order No. 13, *Georgia Least Cost Plan, table 5.3*. Price elasticity of demand is the percentage change in demand for a given percentage change in price.

[2] Source: Burns and Roe, USAID Delivery Order No. 13, Georgia Least Cost Plan, various tables.

[3] Demand is calculated as the previous years level plus (minus) the change due to decrease (increase) in demand from price decreases (increases) plus (minus) increase (decrease) in demand from improvements in the economy.

[4] Losses are assumed to decline to a benchmark to 10% over a period of five years.

[5] Collection Rate is the percent of the total amount of the electricity sales that is paid. It is assumed it will take five years to reach a benchmark of 95%.

[6] Payment Rate is the percent of the total amount of the electricity purchased that is paid. It is assumed it will take five years to reach a benchmark of 100%.

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Table 4.1
Base Case Assumptions of Revenues, Losses and Collection rates
Georgia Power Privatization
Projections of Sales and Payment Assumptions

		Actual 1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Tariff																			
Industrial	GEL Per MWH	48.6	48.6	68.4	88.2	108.0	127.8	127.8	127.8	127.8	127.8	127.8	127.8	127.8	127.8	127.8	127.8	127.8	127.8
Local Budget	GEL Per MWH	36.4	36.4	62.8	89.2	115.6	142.0	142.0	142.0	142.0	142.0	142.0	142.0	142.0	142.0	142.0	142.0	142.0	142.0
Central Budget	GEL Per MWH	34.7	34.7	61.6	88.4	115.2	142.0	142.0	142.0	142.0	142.0	142.0	142.0	142.0	142.0	142.0	142.0	142.0	142.0
Residential	GEL Per MWH	46.9	46.9	70.7	94.5	118.2	142.0	142.0	142.0	142.0	142.0	142.0	142.0	142.0	142.0	142.0	142.0	142.0	142.0
Other	GEL Per MWH	42.8	42.8	67.6	92.4	117.2	142.0	142.0	142.0	142.0	142.0	142.0	142.0	142.0	142.0	142.0	142.0	142.0	142.0
Price Elasticity of Demand[1]	Unit Change			0.3	-0.3	-0.3	-0.3	-0.3	-0.3	-0.3	-0.3	0.3	0.3	-0.3	-0.3	-0.3	0.3	-0.3	-0.3
Growth in Demand[2]	%																		
Industrial				6.3%	6.3%	6.3%	6.3%	6.3%	9.2%	9.2%	9.2%	9.2%	9.2%	7.5%	7.5%	7.5%	7.5%	7.5%	6.8%
Local Budget				3.4%	3.4%	3.4%	3.4%	3.4%	4.7%	4.7%	4.7%	4.7%	4.7%	5.6%	5.6%	5.6%	5.6%	5.6%	5.6%
Central Budget				3.4%	3.4%	3.4%	3.4%	3.4%	4.7%	4.7%	4.7%	4.7%	4.7%	5.6%	5.6%	5.6%	5.6%	5.6%	5.6%
Residential				1.1%	1.1%	1.1%	1.1%	1.1%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%
Other				3.4%	3.4%	3.4%	3.4%	3.4%	4.7%	4.7%	4.7%	4.7%	4.7%	5.6%	5.6%	5.6%	5.6%	5.6%	5.6%
Projected Demand[3]																			
Industrial	MWH	373	373	364	362	365	371	394	431	470	513	561	612	658	708	761	818	879	939
Local Budget	MWH	38	38	39	40	42	43	45	47	49	51	54	56	59	63	66	70	74	78
Central Budget	MWH	25	25	25	26	27	28	29	30	32	33	35	36	38	41	43	45	48	51
Residential	MWH	8,602	8,602	8,879	9,117	9,333	9,534	9,629	9,735	9,833	9,931	10,030	10,130	10,232	10,334	10,437	10,542	10,647	10,754
Other	MWH	238	238	249	259	270	281	290	304	318	333	349	365	386	407	430	454	480	506
Losses[4]	%	20%	20%	18%	16%	14%	12%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%
Transmission Purchases	MWH	11,543	11,543	11,614	11,644	11,652	11,646	11,552	11,719	11,891	12,069	12,253	12,445	12,637	12,836	13,041	13,254	13,475	13,697
Total Delivered Price To Distribution	GEL Per MWH	35.0	35.0	47.5	60.0	72.5	85.0	85.0	85.0	85.0	85.0	85.0	85.0	85.0	85.0	85.0	85.0	85.0	85.0
Collection Rate[5]	%	72%	72%	77%	83%	87%	92%	97%	97%	97%	97%	97%	97%	97%	97%	97%	97%	97%	97%
Payment Rate[6]	%	83%	83%	86%	90%	93%	97%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Income Taxes	%		20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%
Discount Rate	%			25%	25%	25%	25%	25%	25%	25%	25%	25%	25%	25%	25%	25%	25%	25%	25%

[1] Source: Burns and Roe, USAID Delivery Order No. 13, Georgia Least Cost Plan, table 5.3. Price elasticity of demand is the percentage change in demand for a given percentage change in price.

[2] Source: Burns and Roe, USAID Delivery Order No 13, Georgia Least Cost Plan, various tables.

[3] Demand is calculated as the previous years level plus (minus) the change due to decrease (increase) in demand from price decreases (increases) plus (minus) increase (decrease) in demand from improvements in the economy

[4] Losses are assumed to decline to a benchmark to 10% over a period of five years.

[5] Collection Rate is the percent of the total amount of the electricity sales that is paid. It is assumed it will take five years to reach a benchmark of 95%.

[6] Payment Rate is the percent of the total amount of the electricity purchased that is paid. It is assumed it will take five years to reach a benchmark of 100%.

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Table 4.3

Georgia Power Privatization
Base Case Valuation by Distribution Company

	MWH Sold	Number of Customers	Value (000 GEL)	Value per MWh Delevered (GEL)
Abasha	9,274	7,121	(315)	(34)
Adigeni	4,026	5,347	(553)	(137)
Ambrolauri	15,537	4,518	(167)	(11)
Aspindza	2,747	3,375	(158)	(58)
Axalcixe	25,613	13,774	(1,083)	(42)
Axalgori	9,274	2,914	(40)	(4)
Axmeta	6,926	10,594	(546)	(79)
Baddadi-1	12,306	7,333	(532)	(43)
Bagdadi-2	4,765	2,647	(198)	(41)
Borjomi	34,681	9,792	(784)	(23)
Calenjixa	41,924	9,737	(629)	(15)
Calka	18,060	11,165	(746)	(41)
Chiatura	20,448	17,265	(1,603)	(78)
Chxorocku	16,907	7,685	(399)	(24)
Ckaltubo	76,279	17,774	(1,244)	(16)
Dedoplis Charv	8,942	9,127	(599)	(67)
Dmanisi	7,898	13,026	(1,234)	(156)
Dusheli	44,351	9,433	(358)	(8)
Gardabani	84,040	28,833	(1,919)	(23)
Gori	56,179	26,255	(299)	(5)
Gurjanni	27,916	19,760	(1,863)	(67)
Kaspi	14,481	13,976	(540)	(37)
Kvareli	6,284	10,708	(583)	(93)
Lagodexi	13,671	13,610	(878)	(64)
Lanchxuti	18,638	10,385	(689)	(37)
Marneuli	28,550	30,248	(3,227)	(113)
Mcxeta	25,974	15,736	(1,445)	(56)
Oni	4,625	3,241	(74)	(16)
Ozurgeti	47,591	22,543	(2,505)	(53)
Poti	41,281	12,705	95	2
Qureli	90,812	15,251	(1,617)	(18)
Qelasi	90,812	17,774	(1,785)	(20)
Rustavi	80,003	39,952	(2,835)	(35)
Sachxere	10,917	11,836	(579)	(53)
Sagareyo	14,717	15,115	(990)	(67)
Samtredia	47,683	16,280	(1,589)	(33)
Senaki	37,106	13,176	(2,742)	(74)
Signagi	10,967	12,349	(625)	(57)
Telavi	20,078	19,547	(888)	(44)
Telrickaro-1	3,528	8,947	(597)	(169)
Telrickaro-2	12,018	2,218	(371)	(31)
Terjola	19,286	10,951	(1,720)	(89)
Tkibuli-1	3,799	1,545	3	1
Tkibuli-2	34,494	6,914	(829)	(24)
Vani	13,693	8,914	(472)	(35)
Xaragauli	8,295	7,238	(309)	(37)
Xashuri	31,611	16,524	(1,217)	(38)
Xobi	12,106	9,744	(392)	(32)
Xoni	13,406	8,785	(322)	(24)
Zestafoni	21,139	19,021	(2,653)	(125)
Zugdidi	205,104	18,902	(4,936)	(24)
Total	**1,510,762**	**651,610**	**(52,578)**	

The second factor determining value is collection rates. In most cases they are extremely low in the beginning of the privatization process (around 20% cash and 50% total value collected). This figure will increase slowly as investments in meters are made.

The final and most important factor in determining value is the retail tariff rate. For the purposes of this study we assumed a retail tariff of US 7.5 cents/kWh. That level represents the full cost recovery of smaller distribution companies in the US. However, whether it is sufficient to recover the large capital investments needed to restore a Georgian distribution company to some degree of operating efficiency is unclear.[5]

Arguably, the best measure of relative value is in the last column of table 4.3, value/MWh. The values range from positive 2 GEL/MWh for Poti, the Black Sea port, to negative 169 GEL/MWh, for Telrickaro-1. The average of the group is negative 48 GEL/MWh with most of the group concentrated in the negative 30-70 GEL/MWh range.

SENSITIVITY ANALYSIS

Beginning with Table 4.4, the analysis examines the changes in certain variables to determine what would have the most impact on value. The first table (4.4) examines changes in the retail tariff. This table is especially important in that under two scenarios, the optimistic situation (assumption that retail tariff of US 8.5 cents/kWh) with a discount rate of 20% and 25%, the value of the 52 companies actually has a positive value. No other factor has so much impact as to raise the aggregate value above zero. Under the 20% discount scenario, the value is 35 million GEL, whereas the 25% discount rate gives a value of 3.8 million GEL.

The next table, 4.5, examines changes in investment. Under the optimistic scenario, we assume the investment will be 40 GEL per customer, while the pessimistic scenario assumes an investment of 80 GEL per customer. In all cases, the values are negative and range from negative 26.9 to negative 69 million GEL.

Table 4.6 examines the changes in collections rates. Although the impact is not as great as the tariff rate, this variable was the second largest in terms of significance. Under the optimistic scenario, with a discount rate of 20%, the value for the 52 companies is only negative 3.3 million GEL. For the optimistic scenario, it is assumed that collections rate improve to 97% after only 2 years instead of the base case of 4 years.

Table 4.7 shows the results from changing operating cost both plus and minus 10% of the efficiency benchmark estimates. The range of estimates is from negative 28.2

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[5] A final factor, not considered here, are the gains in efficiency from consolidation. The small electric companies should be consolidated into larger units in connection with privatization, because no serious investor will be interested in such a fragmented group. How to calculate the gains from consolidation is, however, unclear.

to negative 60.5 million GEL. Compared to collections rates and tariff, the range in values is much smaller. Therefore, its impact has a much smaller effect than the other two variables.

The last variable to be used was changes in demand. The results are in table 4.8. Within the sensitivity analysis, it is assumed that demand increased and decreased by 10% of the projected demand stream. The effect of such changes were very small.

Table 4.4
Retail Tariff Sensitivity Analysis
Georgia Power Privatization [1]

Discount Rate (%)	Retail Tariff Assumptions (000 GEL)		
	Pessimistic [2]	Base Case [3]	Optimistic [4]
20%	(138,291)	(42,610)	35,125
25%	(121,375)	(52,578)	3,818
30%	107,763	(55,710)	(12,895)

[1] *Based on 52 distribution companies.*

[2] *Assume that the retail tariff for low voltage is US 6.5 cents per kwh and for high voltage US 5.5 cents per kwh.*

[3] *Assume that the retail tariff for low voltage is US 7.5 cents per kwh and for high voltage US 6.5 cents per kwh.*

[4] *Assume that the retail tariff for low voltage is US 8.5 cents per kwh and for high voltage US 7.5 cents per kwh.*

Table 4.5
Investment Sensitivity Analysis
Georgia Power Privatization [1]

Discount Rate (%)	Investment Assumptions (000 GEL)		
	Pessimistic [2]	Base Case [3]	Optimistic [4]
20%	(58,365)	(42,610)	(26,916)
25%	(67,034)	(52,578)	(38,171)
30%	(68,964)	(55,710)	(42,496)

[1] *Based on 52 distribution companies.*

[2] *Assume that total investment over three years is 40 GEL per customer.*

[3] *Assume that total investment over three years is 60 GEL per customer.*

[4] *Assume that total investment over three years is 80 GEL per customer.*

Table 4.6
Collection Rate Sensitivity Analysis
Georgia Power Privatization [1]

Discount Rate (%)	Collection Assumptions (000 GEL)		
	Pessimistic [2]	Base Case [3]	Optimistic [4]
20%	(84,509)	(42,610)	(3,352)
25%	(87,264)	(52,578)	(19,246)
30%	(89,076)	(55,710)	(27,221)

[1] *Based on 52 distribution companies.*
[2] *Assume that collection rates improve to 97% over 2 years*
[3] *Assume that collection rates improve to 97% over 4 years*
[4] *Assume that collection rates improve to 97% over 6 years*

28

Table 4.7
Operating Cost Sensitivity Analysis
Georgia Power Privatization [1]

Discount Rate (%)	Operating Cost Assumptions (000 GEL)		
	Pessimistic [2]	Base Case [3]	Optimistic [4]
20%	(54,166)	(42,610)	(28,168)
25%	(57,219)	(52,578)	(41,709)
30%	(60,506)	(55,710)	(47,140)

[1] Based on 52 distribution companies.
[2] Assume that operating costs are 10% higher than the efficiency benchmarks.
[3] Assume that operating costs are equal to efficiency benchmarks.
[4] Assume that operating costs are 10% lower than the efficiency benchmarks.

Table 4.8
Demand Sensitivity Analysis
Georgia Power Privatization [1]

Discount Rate (%)	Demand Assumptions (000 GEL)		
	Pessimistic [2]	Base Case [3]	Optimistic [4]
20%	(43,137)	(42,610)	(42,060)
25%	(52,747)	(52,578)	(52,399)
30%	(55,705)	(55,710)	(55,713)

[1] *Based on 52 distribution companies.*

[2] *Assume that projected total demand realized is 10% lower than estimated projected demand.*

[3] *Assume that projected total demand realized is equal to estimated projected demand.*

[4] *Assume that projected total demand realized is 10% higher than estimated projected demand.*

APPENDIX 1:
METHODOLOGY OF RESTATEMENT

The objective of this study is to have a realistic understanding of the actual sales, costs and cash flows that pass through the system of distributing electricity within Georgia. The constraints to achieving this goal are directly related to Georgia's integration within the FSU. First, the accounting system that has been carried over from the past was based on measuring production and actual cash flows for tax collection. Second, as with all FSU countries, the collapse of the FSU brought with it a new currency and inflation from attempts to support the infrastructure and social programs of the past. Finally, the breakup of the FSU caused a complete collapse of any systematic approach to collect and pay other parties beyond either cash transactions or barter.

A methodology has been developed and implemented to overcome these obstacles[6]. The basis of its implementation is to directly collect the raw data from bookkeepers and accountants. This basic data includes the amount of the product delivered (sales), the cost associated with delivery, and the actual cash inflows and outflows. For the most part a cost was the same in both systems of accounting. It was mainly the system of summarizing these figures that differs under Socialists and International Accounting. After collection, these figures would be then used as the raw material for re-stating the accounts using International Accounting Standards.

However, one would be naïve to state that this conversion was totally precise in going from one system to another. Besides some small internal differences in the basic accounting of the two systems, the major factors preventing accurate conversion to credible IAS financial statements would be the understating of cash received or overstating costs (to lower the tax burden) and the lack of standard application of the Ukrainian accounting system. For each chief accountant, a unique application of the rules existed. This condition existed even though a standard set of reporting practices was supposed to be followed by each company. Although some adjustments have been made to overcome this problem, these two factors represent unsystematic risk that can only be overcome by an expensive and time-consuming audit. Especially considering the size and complexity of this business, this was beyond the scope of this study and the objectives of the participants.

Through experience in past projects combined with a working knowledge of the Chart of Accounts, data collection sheets were design to collect basis accounting data for each distribution company. These data collection sheets were distributed through the Ministry of State Property. Once the information was returned, it was then incorporated into a computer algorithm that could systematically restate the company's financial

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[6] Details are provided in appendix 1.

operating position. The computer model was run and the results included within the text of this report.

INTRODUCTION

The Soviet accounting system is directly related to the cost accounting system of the West. The main purpose of Soviet Accounting was to understand the costs of production (usually on a per unit basis), how much was delivered and how much taxes is owed on delivered production whereas IAS accounting is concerned with determining ultimate profit from sales. Although each FSU country has adapted the old system to fit its own needs, the Soviet Accounting System is founded on a series of accounts from 1 – 86. The basics within each FSU country remain the same. Each account represents either an asset, liability, equity/fund, sales or cost. For example, account 01 is for fixed assets, account 20 summarizes main production costs, accounts 51-59 are cash accounts and so on. The basics are straightforward, easy to understand and perfectly acceptable way to account for the financial transactions inside a smaller company using manual accounting techniques.

The major difference between the two systems, Soviet and IAS, is the actual reporting. First, in most situations the Soviet system reports on a cash basis whereas the IAS reporting system is accrual. The Soviet reporting system counts only what was both delivered and paid for whereas the IAS system counts what is sold. Second, the Soviet system's main objective is calculating (and to some degree maximizing) taxes whereas the IAS system is used for determining profit from operations. Under the Soviet system a very large, complex and dynamic set of rules exists on what costs can be included before and after taxable profit. To overcome such large obstacles, the actual Soviet income statement is ignored and the raw data based on the ledgers is collected and used. By following such a procedure, much of the reporting bias is eliminated and a more accurate picture of sales and costs can be determined.

The most significant problem is not the Soviet Accounting System itself, but its application. Although a strict set of rules exists as to how the accounting system should be applied, the range of applications are as many as the number of chief accountants that apply them. In effect, everybody does it differently. During a detailed examination of each individual company one would first understand how the accounting procedures should have been applied and then examine the records to see how they actually were applied. Within this context, in some circumstances chief accountants (and their staff) would use intermediary accounts whereas others would not. Therefore, the threat of either double counting or not including the cost at all always existed and the only way to prevent such an occurrence would be to understand the specific application on an individual basis. Due to the scope of this exercise, it was impossible to individually examine the records. Therefore, in this case, one depends on the accuracy of the people completing the tables.

DEGREES OF IAS RESTATEMENT

As stated before, an IAS restatement is not a simple procedure. Too many variables exist concerning the actual application of the Soviet rules to allow it to be a standard methodology. Therefore, as with most things, basic economic principles apply to financial restatements as well. At some point within the analysis, the marginal cost of doing a task exceeds the marginal benefit derived from the cost. Because of this, an IAS restatement can be thought of as a matter of degree and described below is a general outline the different levels (or degrees) of restatement. For illustrative purposes, four levels of increasing complexity will be discussed.

The first (and simplest) level would be to adjust the sales and costs to an accrual basis. It is also the most cost effective. In situations where the company is either marginally profitable or losing money, this would be appropriate course to take since increasing the scope of the restatement will only intensify the problem (unprofitability) that has already been identified by a limited restatement. When the problem of unprofitability has been identified, it is a waste of resources to more precisely measure the loss. The available resources can be used in more beneficial ways.

However, if the firm is profitable on an accrual basis the restatement can go to the second level by examining the asset and liability accounts. In particular, the value of fixed assets needs to be assessed and in most cases increased to near fair value. Under the old system, extremely low values were given to fixed assets that under today's current economic situation have little association with replacement cost. To compound the problem, very low depreciation rates are allowed by tax law. All of this combined has the result of vastly understating the fixed charges of a company. For capital intensive industries this will significantly overstate profit. In addition, both accounts receivable and payable need to be evaluated and all accounts on an individual basis need to be aged. Bad debt should be charged against earnings if the account is not collectable. Finally, inventories need to be evaluated using a clear inventory costing strategy. All of this additional work is very time intensive and should only be completed once the company has been established as profitable with excellent future prospects.

If the business continues to be profitable after examination of the income, expenses and the balance sheet, the third level should be the application of the current taxes within the country. As with the examination of assets and liabilities, this can be a labor intensive task and should only be undertaken on business that have promising profit potential. Otherwise, it would be a waste of resources.

The fourth and final level of a restatement is both the most complete, labor intensive and expensive of the four choices. It is an audit of the company financial records. Within the Soviet system, a financial team would have to reconstruct the entire financial history for a period of time. In essence, all accounting transactions for the period under evaluation would have to be competed a second time under IAS. In addition, initial trail balances would have to be created.

RESTATEMENT OF SALES

The objective of restating sales is to convert them to an accrual basis. In principle, this is accomplished by determining how much electricity was delivered at what price. Within the context of the restatement, a Ministry of Energy Sales document was used. It has both the price and amount sold.

Although sales are adjusted to an accrual system to reflect potential, in Georgia the reality is many distribution companies only collect a small proportion of the sales. Compounding the problem is the small amount of actual cash realizated and the large amount of barter and offsets involved. To account for such transactions, estimations for bad debt and the actual value realized are made using IAS. For a description see the section on Money In / Money Out in this appendix.

RESTATEMENT OF COSTS

Under normal Soviet accounting procedures, this information is relatively easy to collect from account 20, main production costs, within the general ledger. However, in many cases some inconsistencies exist in the way the individual bookkeepers close the cost accounts to account 20 exist. The result is double counting of some costs. The first step in overcoming the double counting is to first determine which accounts are used as basic cost accounts and which accounts are used to summarized the basic costs by function. For example, account 2 (depreciation), account 6 (fuels) or account 70 (wages) are basic cost accounts. They represent an actual cost for production. However, account 26 (general expenses) summarizes the basic cost accounts associated with the management and support staff. As said before, application differs from business to business and it can only be determined on a case by case basis. The second step is to correctly allocate the costs according to IAS cost categories.

PURCHASED ENERGY

Because of its importance and relative size when compared with other costs of production, more detailed statistics were collected on both electricity purchases. The additional data included the amount of electricity purchased, the average price for the month and the total amount of the cost. The main reason for collecting more detailed data for the largest cost is to provide a more transparent view of the business for the interested reader.

MONEY IN / MONEY OUT

The purpose of collecting such data is twofold; first, to complete an aggregate aging of both accounts receivable and payable. The second reason is to more closely examine the structure of the flow of funds through the company. Money In can be

defined as the amount of value[7] collected from a consumer that will offset the outstanding accounts receivable of the consumer. Money Out is the amount of value paid out to creditors that offsets an outstanding accounts payable. Because of the nature of the payments system (or lack thereof) in Georgia, attempting to follow the value passing through a company is at best an imprecise science. The combination of barter deals and the uncertain prices associated with them, and multi-party offsets would require a highly sophisticated system of accounting that is far exceeds the capabilities of the hand written ledgers normally kept at the lower levels of the company.

As for Money In, the data was collected in three forms; cash, non cash payments and offsets. The total of these three forms of collection were assumed to be total collections.

Similar to Money In, Money Out was collected within three types of categories; cash, non cash and offsets. These three figures were added up and compared with the total expenses from the general accounts to determine the aggregate aging of accounts payable.

The main purpose for examining the aggregate flow of money is to broadly calculate the aging of accounts receivable and payable to estimate how much (if any) bad debt should be written off against income and to compare it with the trend in each account on the balance sheet. In addition, the growth in each account as calculated within the aging was approximately equal to the actual growth on the balance sheet. Because this close relationship between calculated and actual, the original balances were used in the restated Balance Sheet. However, it should be pointed out that for some of the individual business units bad debt did exist and were charged off against earnings.

BALANCE SHEET

With the exception of accounts receivable and payable, no other account on the balance sheet was examined in detail. Two reasons exist for not extending to assets and liabilities. First, as a going concern[8], the real value of a business comes from its ability to earn a profit and not from its liquidation of assets. Therefore, the most important variables to examine are sales and costs and in this case most of the major problems where identified. The second reason is almost half the distribution companies did not provide the balance sheet for the period examined. Therefore, with this large degree of incompleteness, it was decide to forgo it inclusion in the analysis.

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[7] The term value is used because what is actually collected from consumers can be in the form of cash, barter, and offsets.

[8] This is an assumption of IAS accounting.

APPENDIX 2:
VALUATION METHODOLOGY

DISCOUNTED CASH FLOW IN PERPETUITY

The methodology used in the actual valuation of the different entities in the Georgian power sector is the Discounted Cash Flow Method. The original concept was first published in 1930[9] and further defined by the seminal work of J.B. Williams in 1938[10]. The major premise is that a company's value is equal to the expected future cash flows discounted at the appropriate discount rate.

The definition of investment value can be expressed by the following equations:

$$V_o = \sum \pi_t v^t = \pi_1 v^1 + \pi_2 v^2 + \pi_3 v^3 + \ldots + \pi_t v^t$$

with $t = 1 \rightarrow \infty$

where V_o = investment value at the beginning of the period

π_t = economic income in year t

$v^t = \dfrac{1}{1 + i^t}$ by definition

i = cost of capital at time t

It is assumed that the entity being evaluated is a going concern. Under this accounting concept, the business is assumed to continue operations indefinitely. Therefore, t is infinite.

For the purposes of the valuation, economic income, V_o, is the cash flow of the operation. Cash flow is defined by the following equation:

$$CF_t = NI_t + D_t - \Delta WC_t - I_t + FC_t$$

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[1] Robert F. Wiese, "Investing for True Values", *Barrons,* September 8, 1930, p. 5.

[10] J. B. Williams. *The Theory of Investment Value*, Harvard University Press, Cambridge, Mass, 1938.

where CF_t = cash flow for the period t

NI_t = net income for the period t

D_t = depreciation and amortization for the period t

ΔWC_t = the change in working capital requirements during period t

I_t = investments during the period t

FC_t = financial costs during the period t

The valuation of the entity obtained from the following methodology is for an entity without debt obligations. In financial terms, it is the non-leveraged value. To correct for existing liabilities and obtain a leveraged value for the firm, the actual liabilities are subtracted from the non-leveraged value. The actual methodology is defined by the following equation:

$$\mathbf{VL_o = V_o - L_o}$$

where VL_0 = value of the leveraged entity

V_0 = as defined above

L_0 = value of the liabilities at the beginning of the period

COST OF CAPITAL

The cost of capital (sometimes referred to the (expected) required rate of return or discount rate) can be viewed from three different perspectives; on the asset side of the balance sheet, it is the discount rate that should be used to reduce future cash flows to be derived from assets to a present value. On the liability side, it is the economic cost to the firm of attracting and retaining capital in a competitive environment. To the investor, it is the returned required from one's investments. While each of these perspectives might view the cost of capital differently, they are all viewing the same number.

In terms of business valuation, the cost of capital is a critical variable in the valuation exercise using the discounted cash flow method. In this context, the cost of capital is used to discount the expected future cash flows (or income) from a business or asset to present value. Most firms use both debt and equity to fund their operations. The overall cost of capital for the firm must be such that, over the long run, there is sufficient compensation to distribute to the providers of both debt and equity capital. Thus the cost

of capital for the firm is the weighted average of the debt and equity costs of capital, where the weights are determined by some reasonable method.

The overall cost of capital is determined by estimating the required rates of return on each type of instrument composing the firm's long term capital structure.

$$r_i = \frac{(r_d * w_d) + (r_e * w_e)}{w_d + w_e}$$

where r_i = overall cost of capital

r_d, r_e = expected rates of return for debt and equity

w_d, w_e = the appropriate weights

The debt cost of capital or expected return to debt, is best approximated by the current yield to maturity on the applicable debt. Usually, this figure is the weighted average of loans already outstanding or the future cost of debt to finance the project.

Estimating the equity cost of debt is a more difficult task. The equity cost of capital is equal to the expected rate of return for a firm's equity. There are several widely used and effective estimates of the cost of capital. The two most popular in modern finance are the Capital Asset Pricing Model (CAPM) and the Arbitrage Pricing Theory (ART). For purposes of this work the CAPM will be utilized.

The CAPM is a simple model that describes the expected rate of return on any investment. The principle insight is that the expected return on any asset is related to the risk free rate plus an amount proportionate to the amount of systematic risk the investor assumes. The CAPM is defined as

$$r_i = r_f + \beta (r_m - r_f) + SP + CR$$

where r_i = expected return on company (or project) *i*

r_f = expected return from a risk-free asset

r_m = expected return from a market portfolio

β = sensitivity of an investment's return to the market's return

SP = size premia

CR = country premia

The amount of systematic risk is measured by the *beta* (β). In the context of investment analysis, beta indicates the degree with which an asset's return moves with that of the overall market. By definition, it can be defined as;

$$\beta = \frac{\mathbf{cov}\,(\mathbf{r_i}\ \ \mathbf{r_m})}{\mathbf{var}\,(\mathbf{r_m})}$$

In the context of the CAPM, beta is an expected future value. However, since beta is not observable in the market, one must estimate it from historical data.

For purposes of this valuation, the risk free asset, $\mathbf{r_f}$, is the long term (20 year) average U.S. Treasury Coupon Bond Yield. As of the end of 1998 this rate was 6.0%[11].

In addition to the risk free rate, the Expected Equity Risk Premium is required. Unfortunately, this is not directly observable and must be estimated using historical data. It is calculated by subtracting the long term average risk free rate return from the matching maturity stock market return ($r_m - r_f$). As of the end of 1998, this estimated premium was 7.4% for long term long horizon investments[12].

Two other premia need to be accounted for to determine cost of capital. The first is the small company effect (SP). CAPM does not account for all the risks associated with investing in small companies[13]. Therefore, an additional adjustment is required to account for the additional risk associated with small size[14]. The second adjustment is for country risk. All the estimates obtained for use in the model are based on the U.S. market. Since most countries have systematic risk much greater than the U.S., an adjustment is required.

The final step is the actual estimation of β (beta). Under normal circumstances, one would examine the industry and take an average of the betas of other assets with similar risk and characteristics. At first glance, this would be the electric utility industry in the U.S. However, closer examination one finds that the characteristics of the large

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[11] R. G. Ibbotson and R. A. Sinquefield, *Stocks, Bonds, Bills and Inflation: The Past and the Future*, Financial Analysts Research Foundation, Charlottesville, VA, 1998. As a point of reference, the Intermediate Term U.S. Treasury Average is 5.4% and the U.S. Treasury Bill Average is 4.6%

[12] *ibid.* For intermediate term the risk premium is 7.8% and for short term 8.8%.

[13] E. Fama and K. French. "The Cross-Section of Expected Stock Returns", *Journal of Finance,* 47 (1992a), pp. 427-465.

[14] Ibbotson and Sinquefield, *ibid.*

publicly traded U.S. electric utilities are much different than the distribution assets being valued in Georgia. Although size is the obvious difference, the most influential difference is the risk profile of the assets. In the U.S., all the publicly traded electrical utilities are both vertically integrated and highly regulated. More specifically, the generation, transmission and distribution functions are combined to lower the overall risk of producing and delivering electricity and in most cases, the actual rate of return generated by the utility is set by a local regulatory body. This is not the case for Georgia where the generation, transmission and distribution functions are separated and will be marketed to private investors as individual units. Therefore, in lieu of the U.S electric betas, a proxy must be developed to more correctly estimate the correct betas that fit the risk of the assets being evaluated. Discussed below will be the risk characteristics of the retail electricity delivery system, some comparables with the same characteristics and an estimate of the beta based on the comparable.

Distribution Company Risk Factors

Distribution is capital intensive, mainly concerned with the delivery of a final product, monopolistic and the demand for its product relatively inelastic to price and income. As a result, its earnings predictability is high. It differs from transmission in that it sells its product to a concentrated area with many consumers. Therefore, it cannot diversify away area risk and could be more susceptible to the economic conditions of the area.

Of the available industries that are publicly traded, the best proxy for electric distribution companies are water utility assets and natural gas distribution. Table A2.1 and A2.2 present data for the two industries that meet the above characteristics. As expected, the betas are very low at .6 and the earnings predictability is relatively high at .7.

Cost of Capital Calculation

	r_f	β	$r_m - r_f$	SP	CR	r_i
Distribution	**6.0**	**.6**	**7.4**	**3.6**	**11**	**25**

Assumption of Capital Structure

There exits in financial literature a very large body of work concerning the most efficient and proper capital structure. The foundation of this work is what is known as

the MM proposition[15]. It says that under certain conditions (most notable tax free environment and financial distress is inexpensive) the capital structure of the firm is irrelevant. Moreover, the firm's total value is determined by real assets and not the securities it issues.

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[15] F. Modigliani and M. H. Miller, "The Cost of Capital, Corporation Finance and the Theory of Investment", *American Economic Review*, 48:261-297 (June 1958).

Table A2.1
Distribution Proxy Financial Information

Natural Gas Distribution	Beta	Total Liabilities	Net Worth	Debt/ Worth Ratio	Interest Expense	Interest Expense	Interest Coverage	Earnings Predictability
AGL Resources	0.70	584	1,460	0.40	44	8%	3.5	85
Atmos Energy Corp.	0.55	157	455	0.35	12	7%	2.8	60
Bay State Gas	0.55	217	540	0.40	18	8%	3.5	75
Brooklyn Gas	0.70	725	1,800	0.40	46	6%	3.7	80
CTG Resources	0.45	135	335	0.40	12	9%	3.3	65
Cascade Natural Gas	0.55	102	275	0.37	8	7%	2.6	45
Connecticut Energy	0.70	135	270	0.50	12	9%	2.9	70
Energen Corp.	0.75	195	580	0.34	14	7%	2.9	60
Indiana Energy	0.65	143	620	0.23	13	9%	4.5	70
Laclede Gas	0.55	179	465	0.38	14	8%	4.3	60
MCW Energy Corp.	0.80	1,223	3,000	0.41	75	6%	3.1	65
NUI	0.65	240	495	0.48	16	7%	2.6	45
New Jersey	0.65	300	700	0.43	20	7%	3.5	70
NICOR	0.75	493	1,775	0.28	36	7%	4.7	90
Northwest Gas	0.55	271	790	0.34	23	8%	3.3	80
Oneok	0.75	342	460	0.74	28	8%	3.5	75
Pacific Enterprises	0.65	1,122	3,195	0.35	92	8%	4.0	75
Peoples Energy	0.90	528	1,450	0.36	42	8%	4.9	60
Piedmont National	0.65	391	920	0.43	29	7%	3.5	65
Providence Energy	0.40	72	190	0.38	6	9%	2.8	40
South Jersey	0.55	184	445	0.41	15	8%	2.3	70
Southwest Gas	0.75	730	1,370	0.53	48	7%	1.4	15
UGI	0.55	835	995	0.84	79	9%	2.0	NMF
Working for Gas	0.75	403	1,200	0.34	29	7%	4.5	75
WICOR	0.55	260	455	0.57	13	5%	6.5	60
Average	0.64	399	970	0	30	8%	3.5	65

Source: Value Line, Various Issues

Table A2.2
Distribution Proxy Financial Information

Water Utility	Beta	Total Liabilities	Net Worth	Debt/ Worth Ratio	Interest Expense	Interest Expense	Interest Coverage	Earnings Predictability
Am Water Wks	0.60	1,716	3,640	0.47	110	6%	2.2	85
Aquarion Co	0.70	148	340	0.44	8	6%	3.7	85
California Water	0.55	142	450	0.32	12	8%	3.7	70
Consumer Water	0.55	173	425	0.41	11	6%	1.7	75
Philadelphia Suburban	0.65	217	550	0.39	17	8%	3.2	95
United Water Sources	0.60	558	1,100	0.51	44	8%	1.8	55
Averge	0.61	492	1,084	0.42	33	7%	3	78

Source: Value Line, Various Issues

43

In other words, the value of the asset is preserved regardless of the nature of the claims against it. This statement is known as *the law of conservation of value.*

However, taxes do exist and as debt increases so do the costs associated with potential bankruptcy. Each, however, has a different effect. Beginning with taxes, debt financing has one important advantage under most tax systems. The interest paid is a tax deductible expense. Dividends and retained earnings are not. Thus, the return to bondholders at the corporate level escape taxation and a tax shield is created. Because of this, the tax structure encourages the use of debt. However, as debt increase so does the risk of default and the cost associated with the risk. Therefore, at some point the default costs outweigh the advantages of debt. Finally, the asset type needs to be considered. For companies with tangible assets, the cost of bankruptcy will be less because the tangible asset can be sold and losses recovered. However, for businesses with assets that are mainly intangible, the potential losses will be greater because the value of the firm is tied up in assets that are not marketable (for example, human capital).

Having outlined the theory above, what would be the correct debt-equity ratio for firms in Georgia. The first step is to examine the tax structure. Are the companies in a tax paying position so that the tax shield has value ? For most of the functional units, the answer is they are not profitable because of the large expense associated with too many employees, lack of collections, an inadequate tariff , a regressive tax system and the high fixed cost associated with a system that is too large for the level of demand. Because of these factors, profitability will not be realized very soon for most newly created companies. Therefore, the value of the tax shield will be low and the incentive to use debt small.

The next factor to examine is business risk. Georgia represents a country where the risk is high irregardless of the type of business being examined. Therefore, for all companies the business risk is high. This risk mainly stems from poor economic conditions and uncertainty about its regional conflicts. Compounding this problem are the carryovers from the Communist system.

Finally, one needs to examine asset type. For the most part, the asset type is intangible and under bankruptcy conditions cannot be liquidated with ease. Therefore, creditors will have no recourse under financial distress and would not be willing to lend capital.

Since the major incentive for having debt, the tax shield, does not exist for most of the newly distribution system, and long term business decisions are based on the earning power of the assets and not on tax law (which changes over time) it was decided that the beginning corporate structure would be all equity. This allows the analysis to focus on the profitability of the sector.

APPLICATION OF VALUATION METHODOLOGY

Distribution Companies

The goal of this valuation is to determine an approximate business value for the 52 different distribution companies so that they can be privatized within the near future. Normally, this would be a straight-forward exercise. However, the actual valuation in Georgia is complicated by the asset and operating structure of the distribution sector. For the most part, financial records are kept using the Soviet Chart of Accounts. As stated previously, although this systems of accounts has a exact set of rules for application, in reality the application by individual accounts is as individual as the accountant's themselves. Since the valuation exercise is very large (52 companies), it is difficult to overcome this problem. The primary solution is to examine the data collected through standardized data collection sheets for completeness and logic, and when questions arise contact the distribution company for clarification.

To accomplish the valuation, the first step is to collect the basic accounting data and perform a limited IAS accounting restatement. The actual of restatement is described in Appendix One. Using the restated 1998 Income Statement as a base, the next step is to apply some basic assumptions concerning future performance. These assumptions include incorporating efficiency benchmarks to measure the financial progress each company could achieve under private ownership.

Financial Model

This goal of this section is to describe the actual financial model used in the valuation. The model itself is a complex combination of 11interacting tables that can be broadly divided into three categories; assumptions, historic and projected financial and technical data and the actual valuations of a distribution company.

Table 1

Table 1 is the IAS restated income statement for the distribution company. The principles used to restate the accounts are outlined in Appendix One. Table 1 is simply a summary of the data that will be presented in tables 1-7. For example, the Net Sales figures located at the top of table 1 are calculated in table 2. Purchased Power, Costs and Bad Debt expenses are similarly presented in tables 3, 4, 5, 6, and 7. The restatement is performed on a quarterly basis so that seasonal trends can be identified. Since collections is a major problem with some distribution companies only collecting 10% of electricity sold, a special section is included on the financial statement identifying bad debt.

Table 2

Table 2 is a summary of Sales by customer. This table is based on a Ministry of Energy Statistical reporting table the distribution companies are required to report each month to the central agency. Within the table are the types of customers (industrial, local

budget, central budget, residential and other), the amount of electricity sold to that class of customer and the price charged to each class.

Table 3

Since purchased electricity is a large portion of the costs of a distribution company, it is of interest to any investor to see how much electricity is purchased relative to how much is sold. Therefore, data is collected on the amount purchased, the price paid and total value owed for the purchased power.

Table 4

Table 4 summarizes the main production costs related to the delivery of electricity. The account numbers relate to the basic Chart of Accounts used by the local accounts in their daily work.

Table 5

Table 5 is a broad attempt to determine the extent of bad debt. For this table we are examining the amount of sales each month and comparing it to collections. Collections in this case are from cash, barter and offsets. Value received each month is applied to the oldest debt outstanding and if the total outstanding debt exceeds 90 days it is written off.

Table 6

Similar to the aging of accounts receivable, the aging of accounts payable is also performed to determine the benefit the company receives from not paying its outstanding debts. The total expenses are added up and compared with the actual amount paid to creditors. After 90 days the credit is consider bad debt and treated as income to the distribution company.

Table 7

A summary of the amount and type of monthly collections and payments are summarized in table 7. The three types of collections are cash, barter and offsets. The table has two purposes; first, to give an investor the total amount both collected and paid, and secondly, to show in what form the payment was received. It is important for an investor to see that although the distribution company may have a high collection rate, most of it could be in the form of offsets. The result of a high percentage of offsets is the company may not generate enough cash to pay expenses and suffer from a liquidity crisis inside the company.

Table 8

The previous 7 tables mostly summarized the restatement of accounts that serve as the starting point for the valuation process. Beginning with table 8, the assumptions behind future cash flows are summarized. Each table will be explained in detailed.

At the top of table 8, four tariff classes have been defined. The categories follow the Ministry of Energy reporting document in table 2. The classes are industrial, local budget, central budget, residential and other. It is assumed that full cost recovery prices will be reached within four years. The full recovery cost is assumed to be US 7.5 cents per kwh for government and residential (assuming exchange rate of 1.9) and US 6.7 cents per kwh for industrial customers.

After the tariff classes, the next line is the price elasticity of demand. Price elasticity of demand is defined as the amount electricity will change for every unit change in price. In this case the value of negative .3 was used. This means for every 10% increase in price the amount of electricity consumed will go down by 3%. Since the study is forecasting an increase in retail prices, the amount of electricity will decrease because of the higher prices.

The next section is the annual change in forecasted demand for the years 1999-2015. The work was originally completed by Burns and Roe under an USAID project, and updated using the same methodology in 1999 by the technical staff at Hagler Bailly. The demand is forecasted for the four types of customers in the Ministry of Energy reporting document (see table 2).

Continuing down table 8 is projected demand. These figures are calculated by originally multiplying actual demand in 1998 by the projected annual change in demand and the elasticity of demand. The resulting annual estimate serves as the base value in projecting the next year.

Next, losses are estimated. Actual losses are used as a starting point in 1998. It is assumed that the distribution company will eventually reach 10% losses and that the losses will improve from it current level by 20% a year. Based on the amount of electricity delivered and the losses, the next section estimates the amount of electricity that is delivered to the distribution company by transmission. Also included is the price from transmission to distribution. It is assumed to be US 4.5 cents per kwh. Based on price and electricity received the cost of electricity for the distribution can be calculated.

Of particular importance to the Georgian electric sector is the collection and payment rates. The collection rate from final consumers is the single largest problem in the electric sector. Cash received averages only 10-15% of sales in most months with final collections from all forms averaging around 50%. It is assumed that the initial collection rate is the one they are currently achieving (1998) and that the rate will improve by 20% per year from its original level until 97% is achieved. Since the distribution company is receiving only a small percentage of the amount due, it is

impossible over the long run for them to pay their costs. In most cases, the cost that does not get paid is for purchased electricity. It is assumed for valuation purposes that the initial payment rate is the one estimated in 1998 and that it will improve to 100% by 20% a year.

The final two assumptions at the bottom of the table are the tax rate and the discount rate. The income tax rate in Georgia is currently 20% and it is simply assumed that it will continue at that level. As for the discount rate, for projects and investments in the FSU, a 25% rate is commonly used to compensate investors for the risk. The discount rate is derived in a previous section of Appendix 3 using modern portfolio theory.

Table 9

At the top of table 9 is the projected stream of new investments for rehabilitation. These annual estimates represent the investment above what is necessarily required to maintain the system. Since the system is antiquated from a technology standpoint and for the last 8 years has suffered from a gradually increasing collections problem, an investor will be required to make significant capital investments to improve distribution to an operation level.

A new investor will bring two important ingredients to the distribution company. The first is investment capital and the second is management skill. Even within the current system better management will improve the company's financial performance. Since distribution is a relatively simple business, the companies will gradually advanced towards what an efficiently operated company would be with new investment and improved management. Therefore, within the projection model, it is assumed that the company will begin it operating structure (expenses) based on 1998 performance and then over a five year period moved towards what a efficiently operated network should be spending relative to income and electricity delivered. These assumptions concerning efficiency are located in the lower half of table 9. The assumptions for efficient operation are based on operating statistics obtained from the US Rural Electric Service.

Table 10

Table 10 is the projection of cash flows that will ultimately determine value. For 1998, the figures are actual IAS estimates based on the work in table 1 thought 7. For the years 1999 onward, the projections are based on the assumptions in table 8 and 9. Beginning with Net Sales, and Purchased Power, the assumptions are based on the price and demand estimates in table 8. Other costs such as Operating, Wages, and General and Administrative are based on both actual performance and the efficiency benchmarks located in table 9. For Depreciation, it has been assumed that historical asset values are effectively near zero and that new investment will be large compared with any past values. Therefore, Depreciation expense is calculated only on new investment. The depreciation rate is 5% per year on a straight line basis.

One of the most important considerations is future collection rates. Private ownership does not mean necessarily mean 100% collections within the near future. Two reasons exist for gradual versus rapid improvement. First, the commercial losses are very high and it will take time to put into place preventive measures. More importantly, however, is the condition of the meters. Many are broken and it will take both time and investment to correct the situation. During this period the distribution company will be delivering electricity without the ability to measure how much is delivered and who should be billed. Therefore, in the projections an estimate of bad debt is given under financial costs. The same can be said for payments for electricity. If the private investors decide to fund the electricity purchases with equity, it would be treated as additional investment. In either case, the effect on value would be zero because the cash flows would not change.

Once the Sales and Cost have been accounted for through the use of assumptions and historical data, Projected Net Income is calculated. However, valuation is based on cash flows. Therefore, to Projected Net Income the charges for Depreciation , changes in Working Capital are added back and Investments and Interest Expense are subtracted out to determine Gross Cash Flow for the period 1999-2015. From Gross Cash Flow any payments for dividends and debt repayment are subtracted. In this case, it is assumed all equity will be used for financing and dividends will be reinvested.

The final step is to subtract taxes calculated on Earnings before Interest and Taxes (EBIT) to obtain the financial net income without the benefits of tax shields from Interest Expense. The line used for discounting purposes is Adjusted Free Cash Flow. The sum of the Adjusted Free Cash Flow discounted is the value of the company. See footnote 8 in table 10 for the actual value.