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STAFF APPRAISAL REPORT

REPUBLIC OF RWANDA

ENERGY SECTOR REHABILITATION PROJECT

January 13, 1993

Industry and Energy Operations Division
South-Central and Indian Ocean Deaprtment
Africa Region

CURRENCY EQUIVALENTS

Currency unit		=	Rwandese Franc (RWF)
1992	US$1	=	RWF 125 (1st semester)
1992	US$1	=	RWF 145 (effective June 1992)

WEIGHTS AND MEASURES

Kilometer (km)	=	1,000 m or 0.62 miles
Kilovolt (kV)	=	1,000 volts
Kilovolt ampere (kVA)	=	1,000 volt ampere
Kilowatt (kW)	=	1,000 watts
Kilowatt hour (kWh)	=	1,000 watt hour
Gigawatt hour (GWh)	=	1 million kilowatt hour (kWh)
Megavolt ampere (MVA)	=	1,000 kilovolt ampere (kVA)
Megawatt (MW)	=	1,000 kilowatts (kW)
Nm3	=	1 Normal cubic meter (C 25 C, 1 atmosphere)
1 ton of Oil Equivalent (TOE)	=	10,500,000 kilocalories or about 7.5 bbl of crude oil
1 kilogram (kg)	=	2.2 pounds (lb)
1 liter (l)	=	0.26 US gallon (gal)
1 metric ton (m ton)	=	2,204 pounds (lb)
1 barrel (bbl)	=	0.16 cubic meters
1 imperial gallon (IG)	=	1.2 U.S. gallons

GLOSSARY OF ABBREVIATIONS

AGCD	=	Agence Générale de Coopération et de Développement (Belgian Aid Agency)
CCCE	=	Caisse Centrale de Coopération Economique (French Aid Agency)
DGEH	=	Direction Générale de l'Energie et des Hydrocarbures (Energy Directorate)
DGF	=	Direction Générale des Forêts (Forestry Directorate)
DM	=	Deutsch mark
EDF	=	Electricité de France (French Power Company)
EIB	=	European Investment Bank
ELECTROGAZ	=	Etablissement Public de Production de Transport et de Distribution de l'Eau, d'Electricité et de Gaz (Rwandese Utility Company)
ESMAP	=	Energy Sector Management Assistance Programme
GTZ	=	German Aid Agency
HV	=	High Voltage
LCR	=	Lease Contractor Rate
LRMC	=	Long Run Marginal Cost
LV	=	Low Voltage
MICOMART	=	Ministry of Commerce, Industry and Handicrafts
MINAGRI	=	Ministry of Agriculture and Animal Husbandry
MINITRAPE	=	Ministry of Public Works and Energy
MV	=	Medium Voltage
NFP	=	National Forestry Fund
OGL	=	Open General Licence
PCAU	=	Project Coordination and Administration Unit
PCR	=	Project Completion Report
PE	=	Public Enterprise
PIU	=	Project Implementation Unit
PPF	=	Project Preparation Facility
SAC	=	Structural Adjustment Credit
SAR	=	Staff Appraisal Report
SDR	=	Special Drawing Rights
SHS	=	Solar Household System
SINELAC	=	Société Internationale d'Electricité des Pays des Grands Lacs (Operator of Ruzizi II Power Dam)
SNP	=	Société Nationale de Patrimoine (National Holding Company)
SOCIGAZ	=	Société Commerciale et Industrielle du Gaz Methane du Lac Kivu
SPE	=	Société Privée d'Exploitation (Private Operator)
SSA	=	Sub-Saharan Africa
UNDP	=	United Nations Development Program

FISCAL YEAR

January 1 to December 31

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This report is based on the findings of an appraisal mission to Rwanda in April/May 1992 which consisted of Messrs. Richard Senou, Financial Analyst (Task Manager); Angel Baide, Power Engineer; Robert Van der Plas, Energy Planner; Colette Craven, Economist; Sunil Mathrani, Consultant Economist; Michel Patou, Petroleum Consultant; Gerard Madon, Energy Consultant; and Bernard Meunier, Solar Energy Consultant. Mr. Brian Dowse contributed to the methane gas component of the report. Messrs. James Bond and Bocar Thiam were the Peer Reviewers and Mr. Louis Cosenza, the Lead Advisor. Ms. Lily Wong provided secretarial support in the preparation of the report. Mr. Michael Sarris and Mr. Francisco Aguirre-Sacasa are the managing Division Chief and the Department Director, respectively, for the operation.

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RWANDA

ENERGY SECTOR REHABILITATION PROJECT

CREDIT AND PROJECT SUMMARY

Borrower: Republic of Rwanda

Beneficiaries: Ministry of Public Works and Energy (MINITRAPE), Ministry of Agriculture and Animal Husbandry (MINAGRI), Ministry of Commerce, Industry and Handicrafts (MICOMART), and ELECTROGAZ (the national public utility).

Amount: SDR18.5 million (US$26 million equivalent).

Terms: Standard IDA, with 40 year maturity.

On-lending Terms: US$13.44 million of the Credit would be on-lent to ELECTROGAZ for 25 years, including a 5-year grace period at the prevailing IBRD interest rate plus 1% commission. The Government would bear the foreign exchange risk.

Project Objectives: The proposed project would extend the ongoing economic reform to the energy sector. Its overall objective is to promote rational energy policies and establish the basis for efficient utilization of Rwanda's energy resources, while minimizing adverse environmental implications. Specific objectives are to: (i) create an enabling legal and regulatory environment; (ii) enhance the efficiency of ELECTROGAZ' operations; (iii) build up investment planning capacity in key sector institutions and strengthen government capacity to formulate a coherent sector policy and to monitor sector activities in woodfuel, methane gas, petroleum products and least-cost power supply alternatives for rural areas; and (iv) rehabilitate key power facilities. The basic principle underpinning this project is that the Government establishes the policy environment, but commercial decisions are left to private economic agents.

Project Description: The proposed project is comprised of two main components: (a) strengthening of the institutional regulatory and policy environment and (b) rehabilitation of key infrastructure in the power subsector. The first component would include (i) restructuring ELECTROGAZ to permit contracting out its operations to a private operator; (ii) consulting services to prepare new statutes and organization chart for the utility and bidding documents for the selection of the private operator, and to assist in implementing its contracting under a lease type contract and in establishing two companies, the "Société Nationale de Patrimoine" (SNP) and the "Société Privée d'Exploitation" (SPE); (iii) implementation of a series of "make-ready" measures in order to attract qualified private operators; (iv) introduction of incentives to rationalize and improve the efficiency of the charcoal subsector; (v) implementation of environmental and technical guidelines for future development of Lake Kivu's methane gas by private investors; (vi) studies to design and implement a strategy for development of solar home systems as a cost-efficient alternative for electricity in rural areas; and (vii) technical assistance and training to strengthen MICOMART's capacity to deal with petroleum products issues. The power subsector component would include (i) rehabilitation and improvements of key power infrastructure for five cities; (ii) improvements in the medium voltage sections; (iii) overhauls of power

station and hydraulic structures; (iv) feasibility studies for hydroplants; (v) constitution of a strategic stock of spare parts for plants and substations; (vi) capacity building and training through scholarships and strengthening of the investment planning and monitoring capacity of the utility staff.

Project Benefits: The proposed project would help increase the reliability and cost-effectiveness of the electricity system and increase efficiency in the use of the country's overall energy resources, which would improve living and working conditions for business and household consumers in the major cities and in rural areas while alleviating deforestation problems. This would be achieved through (a) establishing the basis for the utility to become autonomous and commercially viable thus providing a more favorable business climate; (b) restoring an adequate and reliable supply of electricity to meet the unserved demand of the country; (c) ensuring adequate and cost-effective supply of energy resources in Rwanda over the medium- and long-term. The economic rate of return for the physical investments is 19 percent.

Project Risks: The physical risks are minimal because rehabilitation of transmission and distribution network is routine and would be carried out under well-known conditions. The other risks are mainly of managerial and institutional nature and include: difficulty of finding private operator willing to take over ELECTROGAZ' operations and government's commitment to the effective implementation of a long-term, stable corporate culture with the private sector playing a key role in electricity and water. Up-front measures including tariff increases and major staff reductions, as well as key principles to be embodied in the utility new statutes and organization chart, the involvement of a private operator in the management of the utility operations, and the program for implementation of financial objectives and capacity building reforms, would substantially reduce these risks.

Estimated Project Cost:
(US$ Million Equivalent)

Component	Foreign	Local	Total	% Foreign Exchange	%Total Base Costs
A. REGULATORY AND POLICY ENVIRONMENT					
1. Inst. Reform Program for the Pow. Subs.	3.98	1.72	5.70	69.82	17.58
2. Improvements in Charcoal Subsector	2.82	1.43	4.25	66.36	13.11
3. Solar Home Systems	0.18	0.08	0.26	70.00	0.80
4. Kivu's Methane Gas Development	1.20	0.13	1.33	90.00	4.10
5. T.A. Petroleum Sector	0.60	0.00	0.60	100.00	1.86
Subtotal	8.78	3.36	12.14	79.24	37.45
B. POWER SUBSECTOR					
1. Distribution Rehabilitation & Extension	7.13	0.88	8.01	89.02	24.71
2. Transmission Improvements	4.29	0.21	4.50	95.33	13.88
3. Hydro Plant Rehabilitation	2.09	0.31	2.40	87.08	7.40
4. Spares, Maintenance Equipment & Tools	2.50	0.00	2.50	100.00	7.71
5. Technical Assistance & Training	0.87	0.00	0.87	100.00	2.68
6. Feasibility Studies Hydro	1.90	0.10	2.00	95.00	6.17
Subtotal	18.78	1.50	20.28	92.60	62.55
Total Baseline Costs	27.56	4.86	32.42	85.01	100.00
Physical Contingencies	2.85	0.50	3.35	85.04	10.34
Price Contingencies	2.68	0.50	3.18	84.22	9.80
Total Project Cost	33.09	5.86	38.95	84.95	120.13

Financing Plan	Foreign	Local	Total	% Total
	(US$ million equivalent)			
Government	0.00	2.32	2.32	5.96
IDA	24.31	1.69	26.00	66.76
CCCE	0.86	1.85	2.71	6.96
EIB	7.92	0.00	7.92	20.32
Total	33.09	5.86	38.95	100.0

Estimated IDA Disbursements	IDA Fiscal Year					
	(US$ million equivalent)					
	1993	1994	1995	1996	1997	1998
Annual	3.30	11.41	5.76	4.46	0.70	0.37
Cumulative	3.30	14.71	20.47	24.93	25.63	26.00

Economic Rate of Return: Physical Investments: 19%

MAP: IBRD No. 24218 and 24292.

REPUBLIC OF RWANDA

ENERGY SECTOR REHABILITATION PROJECT

Country and Sector Background

0.1 Rwanda is a small, landlocked country in Central Africa covering some 26,000 square kilometers on mountainous land. With a total population estimated at about 7.5 million, increasing at an annual rate of 3.7%, Rwanda is the most densely populated country in Africa (290 people per km^2). GDP per capita, estimated at about US$310 (1991), ranks among the lowest of the continent. Rwanda's economy is heavily dependent on coffee and tea, which account for 80% of its exports. Some 95% of the population lives in rural areas and derives its livelihood from subsistence agriculture and the cultivation of coffee and tea. The industrial sector, apart from some agro-industrial activities, remains small and insufficiently diversified, in spite of Government's efforts to expand the manufacturing base. After years of contraction in mining sector activity, the mining of tin, the principal product, stopped in 1987.

0.2 From 1970 to the mid-1980's, Rwanda followed generally prudent fiscal policies that resulted in financial stability, low inflation and sustained growth (averaging 4% per annum). Since early 1987, Rwanda has been faced with precipitous declines in world coffee prices and unfavorable climatic conditions which had an adverse impact on agricultural production. As a result, real GDP stagnated in 1987 and 1988 and declined sharply in 1989 by 6.6%, causing real income per capita to drop by almost 16.5% from its 1986 level. The initial policy response to adverse economic developments was not appropriate and, as a result, serious internal and external imbalances and declining per capita income persisted through the end of 1990.

0.3 To correct these economic imbalances, the government embarked in 1990 on a comprehensive economic reform program, supported by the first adjustment credit (SAC) approved in June 1991. The government's program includes a comprehensive package to strengthen macroeconomic management, create an incentive framework to stimulate exports and enhance private sector confidence, reform Public Enterprises (PEs), improve public expenditure management, increase the efficiency of the financial sector, liberalize the labor market and implement well-targeted measures aimed at alleviating poverty. The project described in this report is an important element of the government's economic restructuring program. It will improve the efficiency of the largest public utility of Rwanda, address pricing issues in a key sector of the economy, implement needed reforms in one of the most important public enterprises, improve the quality of the public investment program, strengthen institutions in the energy sector and improve the reliability of energy supply for domestic and industrial uses. It will also address major environmental concerns through the improved woodfuel efficiency program and the establishment of a monitoring system for the waters of the Lake Kivu and volcanic activity in the surrounding areas.

0.4 Rwanda's principal energy resource is its forest, which is being depleted in certain areas for firewood and charcoal. Agricultural by-products play an important role to meet household energy needs. Peat is available in some areas but is not widely used. The potential for hydroelectric power exists but

development is costly because the sites are widely scattered and have low storage capacity. The best hydro sites are the Kagera and Ruzizi rivers at the border of Rwanda with Tanzania and Zaire respectively. There is no evidence of the presence of oil in the country but there is a unique source of methane gas in the deep waters of Lake Kivu. Although coal is found in neighboring Zaire, none has been located in Rwanda. In terms of new and renewable sources of energy, solar energy is abundant and may have some commercial development potential.

Government's Energy Strategy and Policy

0.5 The Government's declared energy policy, reflected in a detailed Energy Sector Policy Statement Letter, which has been received (Annex 1.1), places emphasis on: (i) adoption of least cost solutions for investments in the sector; (ii) regional cooperation; (iii) regeneration and expansion of the potential for fuelwood production; (iv) improved efficiency in the production of electricity and water, of charcoal and the use of woodfuels; (v) identification of alternative competitive sources of energy such as peat, biogas; (vi) rehabilitation of key power infrastructures; and (vii) extension of electricity supplies to rural areas and to cottage industries. In a key step towards helping achieve these objectives, the government has agreed to contract out with a private operator the operations of ELECTROGAZ, the public utility company of the country. In addition, it has decided to (i) strengthen the legal framework for sector institutions, its investment planning, coordination and control; (ii) set appropriate tariff policy for electricity, water and gas; (iii) implement a major staff reduction plan within ELECTROGAZ; and (iv) promote rational pricing policies for wood, charcoal and petroleum products while addressing environmental implications. The government has also introduced a stumpage fee for wood from public forests to discourage over exploitation. The proposed operation would help the government in implementing its strategy as described above.

I. THE ENERGY SECTOR

A. Energy Consumption Patterns

1.1 The energy situation in Rwanda is characterized by a high reliance on three sources of energy: woodfuels, agricultural by-products, and imported petroleum products. In 1990, Rwanda's final energy consumption totalled about 1,44 million tons of oil equivalent (TOE) of which 93% was in the form of fuelwood, charcoal, and agricultural by-products, and the balance was provided by imported petroleum products, hydroelectricity, and a small quantity of methane gas (Table 1.1). The largest consuming sub-sector was households (91.6%), followed by transport (4.2%), industry (2.5%), and public services (1.6%). Commercial energy consumption per capita (16kgoe) is low because of the low level of income, the relatively high price of petroleum, the high cost electricity connection, the small size of the industrial sector, and the dominance of subsistence agriculture in the economy. The consumption of commercial energy (electricity and petroleum products) grew at an average annual rate of about 10% over the period 1980-87, considerably faster than GDP growth. Approximately 80% of non-traditional energy is imported and accounted for an average of 18% of merchandise imports during the period 1983-87.

Table 1.1: Energy Balance, 1990

	k.toe	%
Net supply		
Wood	1160	80.4%
Agricultural residues	154	10.7%
Petroleum fuels	87	6.0%
Charcoal	27.7	1.9%
Electricity	12.6	0.9%
Peat	1.7	0.1%
Methane gas	0.4	0.03%
Total	1442	100%
Net demand		
Households	1321	91.6%
Transport	60	4.2%
Industry	36	2.5%
Public services	23	1.6%
Total	1442	100%

Source: Energy Assessment Report for Rwanda, July 1991.

B. The Power Subsector

Past Evolution of Demand

1.2 Electrical energy demand grew at an average annual rate of 10% from 1980 to 1990 and its composition evolved in favor of domestic consumption and to the detriment of industrial and commercial consumption. This pattern is explained by the economic slowdown in the mid 1980s and the gradual increase in the number of connections for domestic clients, both in urban and rural areas. Peak power demand grew at a somewhat faster rate for the same period (11.2%), with a consequent decrease in the system's load factor. Energy supplied to the network amounted to 173.9 GWh in 1990, in response to a demand of 148.6 GWh, with the difference equivalent to the losses. Corrective measures taken by the utility for non technical losses resulted in reducing the level of total losses from 17% in 1988 to 14.6% in 1990, which compares well to an average of about 16% for sub-Saharan countries. Past evolution of demand is shown in Table 1.2.

Table 1.2: Evolution of supply and demand for power (1980-1990)

YEAR	SUPPLY GWH	CONSUMPTION GWH	LOSSES %	PEAK MW
1980	69.7	57.3	17.8	12.3
1981	79.3	63.8	19.5	14.3
1982	91.1	73.4	19.4	16.1
1983	98.0	75.4	23.1	17.1
1984	104.8	83.9	19.9	18.0
1985	110.7	92.4	16.5	19.4
1986	116.8	95.0	18.7	21.8
1987	127.3	105.2	17.4	24.9
1988	145.6	120.9	17.0	28.6
1989	165.2	137.5	16.8	33.3
1990	173.9	148.6	14.6	35.6
Average Rate of Growth % per annum		10.0		11.2

Source: ELECTROGAZ.

1.3 As of the end 1991, ELECTROGAZ had a total of about 25,000 electricity consumers. Per capita consumption of electricity, which was only 20 kWh in 1990, is one of the lowest in sub-Sahara African (SSA), where the average is about 70 kWh. Despite an average annual increase of 19% in the number of low voltage connections from 1985 to 1990, only a small fraction of the total population (1.8%) is connected. Consumption per customer has declined from 5,268 kWh per year in 1980 to 3,536 kWh per year in 1990. This phenomenon is explained by the fact that electrification expansion to new regions and residences is progressively integrating areas of lesser development and lower incomes. All major urban centers are supplied by the national grid, but only a small percentage of their respective populations actually uses electricity. In 1990, while Kigali's consumption represented 61% of the country's total consumption, only 20% of its population was connected to the power network. The extensions of the distribution network for five cities including Kigali, to be executed and financed through the proposed project, would help address this issue.

1.4 Increasing the population's use of electricity is among the objectives of the Rwandese Government for the electricity subsector. First priority is being given to expanding connections in areas where service is already available, by dealing with the high cost of an electricity connection. According to the existing regulations, consumers must pay all the costs of the connection study, equipment and works plus a 10% fee, normally in one installment when the connection is contracted. While an effort was made in January 1988 to lower this cost somewhat by decreasing the surcharge fee from 15% to the present 10%, the average connection charge is still high, about US$630 as compared to the GNP per capita of only US$310, in 1991 prices. The high cost of connections is in part explained by the overly demanding technical specifications applied in the construction of distribution networks. The Electricity Master Plan to be completed in January 1993 will provide least-cost technical specifications for future connections and constructions to be carried out under the proposed project.

Future Demand Growth

1.5 Within the framework of the Master Plan, a preliminary demand projection to the year 2010 has been recently completed using three different scenarios corresponding to low, medium and high growth rates. According to the medium scenario which is considered the most likely to materialize, energy demand will grow from 148.6 GWh in 1990 to 223.6 GWh in 1995 and 330.2 GWh in 2000, equivalent to an average annual growth rate of 8.4%. As in the previous decade, most of the growth will come from the low voltage consumption. In 1980, low voltage sales represented 40% of the total sales; that percentage increased to 51% in 1990 and should reach a level of about 63% in 2010.

1.6 Based on the assumption that losses will decrease to 10% in 1995 and will remain constant at that level thereafter total energy requirements will be 249 GWh in 1995 and 367 GWh in 2000. Peak power demand was estimated based on energy demand, by applying a load factor of 0.50 for low voltage and 0.65 for medium voltage. Given the increase that is foreseen in the proportion of the low voltage within total demand, this would result in a further slow reduction of the system's load factor from 55.8% in 1990 to 54.7% in 2010. Peak load would go from 35.5 MW in 1990 to 51.0 MW in 1995, and 76.2 MW in 2000. All these results are shown in Table 1.3.

Table 1.3: Projection of Demand and Supply Growth

YEAR	SUPPLY GWH	CONSUMPTION GWH	LOSSES %	PEAK MW
1991	184	158	14.0	35.6
1992	200	174	13.0	40.7
1993	219	193	12.0	44.5
1994	233	207	11.0	47.7
1995	248	224	10.0	51.0
2000	367	330	10.0	76.2
2005	515	463	10.0	107.4
2010	690	621	10.0	144.0

Source: Consultants Report - Master Plan Study.

Supply of electricity

1.7 Rwanda, Burundi and the North and South Kivu provinces in eastern Zaire are served by a regional interconnected electrical network. In addition to the national electric utility companies, ELECTROGAZ, REGIDESO and SNEL, there is in the region a multinational power company -- Société Internationale d'Electricité des Pays des Grands Lacs (SINELAC) -- jointly owned by the three countries. SINELAC owns and operates a hydro power station (Ruzizi II) and a substation (Mururu II), with the latter built on the Rwandese territory, in the Cyangugu region. Ruzizi II is a run-of-river plant, built on the Ruzizi river about 30 km downstream from SNEL's Ruzizi I power station. Both plants constitute therefore a system in cascade, for which Lake Kivu serves as a reservoir that is capable to provide annual regulation of flow.

1.8 Each of the national electric utilities is entitled to one third of the energy produced by Ruzizi II, whose average annual energy production has been set at a nominal value of 140 GWh, to be increased to 200 GWh when a third generating unit is installed in 1995. ELECTROGAZ has also a contract with the Zairian power utility, SNEL, to import power from Ruzizi I. Given this integration of the Rwandese network within a regional grid, ELECTROGAZ has three categories of sources available to satisfy the internal demand of electricity: (a) the domestic plants; (b) the part of Ruzizi II's power and energy to which Rwanda is entitled; and (c) any Zairian and Burundian surpluses, which may include their parts of Ruzizi II's power and energy. In 1990, 51% of Rwanda's electricity requirements of 174 GWh were satisfied with energy produced at Ruzizi II, and 4% were imported from Zaire's Ruzizi I.

1.9 The domestic generating capacity is predominantly hydro. The four existing hydroelectric power stations -- Ntaruka, Mukungwa, Gisenyi and Gihira -- with a combined installed capacity of 26.5 MW, are all located in the north and northwest of the country. The first two, which are the largest with a combined capacity of 23.7 MW, constitute a system in cascade, with the natural lakes of Bulera and Luhondo respectively serving as their reservoirs. There are also four diesel plants with a total capacity of 3.6 MW, of which the largest is Gatsata, located near Kigali, with 2 MW installed. At present, the thermal plants are rarely utilized. Annex 1.3 includes information on the generating facilities.

1.10 At the time of the construction of Ruzizi II and of the creation of SINELAC, not enough attention was paid to the operational aspects, with the result that the present form of operation does not achieve an efficient utilization of the resources available to the partner states: there is no joint operations planning, since considerable amounts of water that could be used to produce energy are released at Ruzizi I, without going to the turbines, and are spilled at Ruzizi II. There is no regional operations planning either, aimed at optimizing the use of available resources. Finally, under the present operating rules, bilateral energy exchanges between ELECTROGAZ and the other national utilities are virtually impossible, even when there is energy available for such exchanges. The proposed project would address these issues through technical assistance and training in the area of interconnected system operation.

1.11 The power and energy balance shown in Annex 1.2 reveals that for the medium term Rwanda will continue to depend heavily on external sources, and could face shortages beginning in 1994. The only way that this situation can be alleviated in the short term is through better utilization of the Ruzizi I - Ruzizi II system. For the longer run, various hydroelectric sites have been identified for future expansion of the generating capacity. One of the most interesting is Ruzumo falls, with an installed capacity of 82 MW and a firm capacity of 61.5 MW, which would also be a multinational project, since it is to be built at the border between Rwanda and Tanzania. Rwanda's share of firm capacity would be 20.5 MW. A donors meeting with the participation of the Bank will be organized in the first quarter of 1993 to mobilize the required financial resources for a detailed pre-feasibility study. This project will involve Rwanda, Burundi and Tanzania and the implementing institution would be the "Organisation pour l'Aménagement et le Développement du Bassin de la Rivière Kagera (OBEKA).

1.12 The next alternative would be the Mukungwa II hydroelectric plant (2.2 MW); its design is being reviewed to reduce investment costs. Other options for additional power include (i) the installation of a third unit at Ruzizi II, (ii) the building of hydroelectric plants on the sites of Nyabarongo, Rukarara and possibly Akanyaru, and (iii) Ruzizi III for which a feasibility study financed by Belgium is being carried out. Complementary options would be defined after the completion of the Electricity Master Plan (para. 1.4). The proposed project would finance the completion of detailed feasibility studies for two of the sites identified in the Master Plan.

Transmission

1.13 The backbone of the Rwandese transmission network is constituted by a sequence of 110 kV lines extending from the Mukungwa hydro power station in the north to the substation of Mururu I in the south-west. Kigali is located about midway between these points. Annex 1.3 shows a single line diagram of the system, as well as information on the main transmission lines. The structure of the transmission system makes it particularly vulnerable to collapse in the cases of loss of generation or line faults. To counter this inherent weakness, high speed reclosing and automatic load shedding schemes have been implemented, with satisfactory results.

1.14 At the time the power facilities belonging to SINELAC were built, SINELAC's Mururu II substation, which is on Rwandese territory, was actually inserted into the Rwandese high voltage network, interposing it between ELECTROGAZ's 110 kV substations of Mururu I and Karongi. In this way, ELECTROGAZ's substation of Mururu I, serving the Cyangugu region of Rwanda, and which has a connection to the Zairian power station of Ruzizi I, was separated from the rest of the Rwandese high voltage network. As SINELAC does not allow bilateral energy transfers to pass through its installations, ELECTROGAZ --which had previously been importing about 20 GWh per year from Ruzizi I-- can no longer import substantial amount of energy from it (except for the small quantities needed to supply the Cyangugu region). This situation will be corrected under the proposed project by financing two 110 kV bays to the Mururu I substation, to which the lines to Mururu II and to Karongi will be connected.

Distribution

1.15 The distribution networks in the main load centers present a wide range of problems: while parts of the networks, mainly low voltage feeders, are overloaded, there is also a good number of cases where the existing installations are overdimensioned with respect to the loads served; maintenance has been neglected due to the difficulties to purchase spare parts and materials, so that there is a backlog of repairs to be executed; finally, while there is a lot of potential new customers in the already electrified urban areas, the construction standards adopted --with almost exclusively three-phase distribution, and extensive use of

underground cables-- result in connection costs that are prohibitive for most of those potential new consumers. The proposed project will address these problems through the introduction of lower cost construction standards, and the financing of a rehabilitation and extension program for the distribution networks of the five largest cities in the country.

System Operation and Maintenance

1.16 A series of dry years combined with relatively high levels of production at the hydro plants led to critically-low levels of the Bulera and Luhondo lakes in 1989. Production from Ntaruka and Mukungwa had to be limited in 1990, while ELECTROGAZ compensated for the reduction with energy imported from Ruzizi II. GTZ (the German Cooperation Agency) is presently providing assistance in operations planning, with emphasis on a proper management of the reservoirs. Table 1.4 shows how the different sources were used in 1990 to satisfy total demand. Maintenance of the installations is hindered by the limitation of foreign exchange for power sector expenditures, that translates into insufficient spare part stocks, and lack of an adequate provision of equipment and tools for maintenance. These issues are being addressed under the proposed project (para. 2.32).

Table 1.4: Structure of Supply in 1990

SOURCE	PARTICIPATION TO SATISFY PEAK POWER DEMAND MW	ENERGY SUPPLIED GWH
MUKUNGWA	10.20	43.0
NTARUKA	2.15	14.7
GIHIRA	2.25	11.8
GISENYI		8.7
GATSATA	-	0.1
TOTAL ELECTROGAZ SOURCES	14.60 (41%)	78.3 (45%)
RUZIZI II	18.50	88.6
RUZIZI I (Zaire)	2.5	7.1
TOTAL OTHER SOURCES	21.0 (59%)	95.7 (55%)
GRAND TOTAL	35.6 (100%)	174.0 (100%)

Electricity Tariffs

1.17 The electricity tariffs in effect at the beginning of 1991 were approved in January 1988. They replaced tariffs that had existed since December 1981, reducing nominal charges per kWh from 10 to 6.5 RWF (35%) for low-voltage (LV) users and between 9% and 11% for medium-voltage (MV) users. Since the average inflation in the period 1982-86 and 1988-91 is estimated to have been 13% and 26% respectively, there has been a substantial deterioration in the real level of electricity and water rates. As part of the first SAC, electricity rates were raised in real terms by about 26% in June 1991. Details of tariffs from 1974 to date are given in Table 1.5 below.

Table 1.5: Electricity and Water Tariffs
(In RWF)

Category	U	DECREE OF 06-25-91	DECREE OF 01/07/88	DECREE OF 12/29/81	DECREE OF 12/27/74
ELECTRICITY					
Low Voltage 220/380 V					
Base tariff 1/	KWH	10	8.5	10	7
Civil servant	KWH			11	6
Medium Voltage 30 -15 - 6,6 KV					
Less than 100 KW					
consumption tariff	KWH	10	8	9	
demand charge	KWH/m	616	486	540	200
minimum to bill % contr. demand	KWH/m	79	70	70	70
plus - val 25% excess contr. dem.	KWH/m	770	608		
plus - val 50% excess contr. dem.	KWH/m			810	300
More than 100 KW					
consumption tariff	KWH/	10	5	5.5	2.5
demand charge	KWH/m	1.064	774	860	320
minimum to bill % contr. demand	KWH/m	70	70	70	70
surcharge 25% excess contr. demand	KWH/m	1.330	968		
surcharge 50% excess contr. demand	KWH/m			1.290	480
Water					
from 0 to 25 m^3 / month	m^3	60	40	40	21
from 26 to 60 m^3 /month	m^3	90	60	60	21
from 61 to 100 m^3 /month	m^3	120	80	80	21
more than 100 m^3 /month	m^3	135	90	80	21
Civil servants	m^3				17
minimum: 5 m^3 /month	m^3	200	200		variable
minimum: 10 m^3 /month	m^3			610	
community tape	m^3	40	40		
20 litre can at standpipe	l	2	2		

1/ Minimum bill for rural areas RWF 300/month and RWF 400/month for Urban Areas (30 kWh and 40 kWh/mth).
Source: ELECTROGAZ.

1.18 As shown in Table 1.5 above, for LV users, there is an energy charge of RWF 10/kWh (approximately US$0.07/kWh) for a maximum consumption of 30 kwh/month for rural area users and 40 kwh/month in urban centers; MV users have charges for energy and for peak demand; the charge for peak demand varies in accordance with the capacity of the installed equipment. For a capacity below 100 kW, the tariffs are RWF 10/kWh and RWF 616/kW/month of registered peak demand, while for capacities above 100 kW the charges are RWF 10/kWh and RWF 1,064/kW/month of registered peak demand. The present charges are inconsistent; for instance, while average annual number of hours of utilization are 2,985 for capacities below 100 kW and of 3,760 above 100 kW, average charges per kWh for MV users are RWF 12.8 and RWF 13.6 respectively (approximately US$0.09). It should be the other way around, alike in the preceding structure (before the 1990 devaluation), where these represented about US$0.13 and US$0.10. To correct this situation, agreement was reached at negotiations that Government would submit a proposal satisfactory to IDA on a new tariff structure for LV (in excess of 40 kWh/month) and MV electricity users by March 31, 1993 and implement it as a condition of Credit effectiveness.

1.19 The results of the March 1992 ELECTROGAZ restructuring study indicated that the existing tariff structure provides the largest subsidies from the Government to residential users of electricity (consuming more than 500 kwh/month), who represent a low proportion of total population and are likely to be in the higher per capita income brackets, as opposed to those consuming less than 45 kwh/month, who should be eligible for a social tariff. As the number of new LV consumers grows, the pattern of declining consumption per unit (as discussed in para. 1.5) at the LV level indicates that network expansion is progressively reaching

lower income groups. This trend can only continue if access to electricity is made easier for these groups. Lower initial connection charges (para. 1.15) including extension of repayment period coupled with a social tariff to be financed by higher rates on large domestic consumers, would be adopted under the proposed project. At negotiations, agreement was obtained that a social tariff corresponding to the cost of providing the service (remuneration of the private operator) would be implemented for small domestic consumers (up to 40 kWh/month).

1.20 As also confirmed in the study, the present tariff levels are too low both in real terms and for ELECTROGAZ to fully cover its operating costs including assets depreciation. A comparison of present rates with those in some other sub-Saharan African countries is given in Annex 1.4. Under such conditions, establishing the full rate, to meet the sectoral restructuring objectives, i.e., remunerate the future private operator and purchase energy and fuel, service the debt obligations of the asset holding company and finance the sector expansion, would require strong Government commitment and cooperation. The appropriate tariff action plan that has to be implemented under the proposed project to ensure the self-reliance and autonomy of the sector as described in the objectives mentioned above is provided in para. 5.7 and shown in Table 5.3.

C. The Woodfuel Subsector

1.21 Biomass in the form of firewood, charcoal and agricultural residues is by far the most important energy source used in Rwanda and contributes about 95% to the total end-use energy balance. Socio-economically also, biomass is the most important fuel: virtually 100% of the rural population relies entirely on wood for most of their energy needs, while 80% of the population of Kigali and, to a smaller extent, the population in secondary cities like Butare, Gisenyi and Ruhengeri, rely on charcoal for their primary energy demand. The remainder of urban households use wood, even though there is a minority of mainly high society households and expatriates that uses electricity or liquefied petroleum gas (LPG). Charcoal is considered a modern fuel and is the fuel of choice for urban households, and the total value of annual retail sales in Kigali is estimated at RWF 0.7 billion, or about 50% of the national annual electricity sales. Charcoal consumption increases at 7.5% per year in Kigali and 15% in other cities, which is faster than the overall 3.7% population growth, reflecting both the rapid degree of urbanization and a trend of modernization. A sustainable woodfuel supply should be guaranteed to cover the demand since woodfuels are so important in all strata of society. Furthermore, alternative fuels such as kerosene, LPG or electricity are financially at least 3.5 times more expensive than charcoal or wood, and this is not likely to change in the near future. When wood fuel demand exceeds sustainable supply, ecological damage such as deforestation and soil degradation can be severe, as can be observed in several prefectures.

1.22 Rwanda has a total of 436,200 ha of natural forest located in and around three National Parks. In addition, there are 35,200 ha of forestry domains, 44,600 ha of communal forests, 149,000 ha of private forests and an approximate total of 655,000 ha of "agroforestry" [1]. This is the equivalent of 25% of the country's total land area. As recently as ten years ago, agroforestry as part of a deliberate attempt to improve fuelwood supply was virtually non-existent. Due to initiatives taken by the Direction Générale des Forêts (DGF), and followed up by farmers, agroforestry is now one of the prime instruments in the efforts to increase wood production. The "National Forestry Fund" (NFF) estimated that 90% of all wood (1991) was used for energy purposes, and the remainder for construction, etc. Although only about 15% of all fuelwood is used to produce charcoal, it presents a larger environmental problem than firewood since the charcoal chain is entirely commercialized while the firewood collection basically is restricted to gathering of (dead) branches and twigs.

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[1] Defined as the planting of trees by households on farm lands, homesteads, etc.

1.23 While 85% of the pre-1987 charcoal supply came from natural resources mainly in the savannah zone in the Southeast, at present more than 85% stems from small holders plantations mainly in the South and Northwest. The estimated demand for woodfuels seems to outweigh sustainable supply and this is obvious in certain prefectures. Four out of the 11 prefectures recorded a net deficit, the largest in absolute terms being Kigali with 239,000 tons and the largest in relative terms being Ruhengeri (with almost 50% of the demand not being satisfied from resources within that prefecture). Thus, consumption is creating net depletion of tree resources, indicating that corrective action is required. The situation threatens to deteriorate in the future. Even at the ambitious pace of reforestation depicted in the Government's "National Forestry Plan", it appears that the gap between demand and sustainable supply will continue to grow. Thus, on the optimistic assumptions of the plan, only 3 out of the 9 prefectures would experience a deficit in year 2002 (as explained in Annex 4.10), but the total deficit would be more than double that of 1987, which would have serious financial/economic and environmental consequences. To illustrate this, rough calculation shows that the plantation area would have to be increased by 70,000 ha by the year 2002 (with a productivity of 15 t/ha/year) to make it possible to supply woodfuel on a sustainable basis: this objective is clearly beyond reach under current circumstances. Corrective actions to improve the balance between demand and supply through demand management and better wood supply management would be taken simultaneously under the project (para. 4.10).

1.24 Charcoal making is a relatively new activity in most of the charcoal producing regions in Rwanda; it is not a respected profession and is often left to the unemployed. Traditional charcoal kilns were observed to have an average charcoaling efficiency [2] of between 5 and 9%, with a corresponding energy efficiency ranging from 12 to 22%. This implies that more than 80% of the energy is wasted in the process of carbonization. This noted inefficiency in current charcoal production is partly due to the specific circumstances under which charcoal is produced: i.e., in mountainous regions with steep hills, with a high rainfall pattern. As a result, urban households using charcoal as their principal cooking fuel, use far more energy than necessary: if a household utilizes 3 kg of charcoal per day, it consumes the equivalent of 30 to 60 kg of wood per day, while a household utilizing directly wood, consumes only 6 to 15 kg of wood. Since it is nearly impossible to convince households to switch back to using wood instead of charcoal, substantial improvements in the charcoal production efficiency are urgently needed.

1.25 The joint UNDP/World Bank/Dutch Government/ESMAP program's project "Assistance to the Traditional Charcoaling Sector" showed that professional charcoalers can more than triple the efficiency of the charcoal making process. It furthermore created an association of full-time professional charcoalers "IGAMA", which to date has about 18 groups working throughout the country (± 350 charcoalers). This project demonstrated the need for certain policy changes in the wood sector. First, wood for charcoal making is sold below the economic cost of replanting (between 10% and 20%), with the result that rural wood suppliers subsidize urban charcoal users. A small charge levied on the transport of charcoal can correct this problem while also promoting the use of lesser valued tree species (such as Pine) which are not presently used. The government has agreed to put in place such a taxation system, details of which is provided in Annex 1.8, and to accordingly change the existing Forestry Law as a condition of Credit effectiveness (para. 4.17). These changes would affect two articles of the Forestry Law, the draft of which was agreed upon at negotiations. Secondly, although the Government issues permits to transport charcoal from certain zones

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[2] Carbonization is defined as the chemical process (also: pyrolysis) whereby wood is converted into charcoal in an oxygen-limited environment. Charcoaling is defined as the ratio of air-dry weight of the charcoal output to the air-dry weight of the wood input. This only approximates energy efficiency since it is always possible to increase the yield by altering the fixed carbon content of the charcoal made. However, the criterion is relevant in terms of "forest-efficiency", the amount of woodfuel needed to produce a unit of marketable charcoal.

only, the actual volume of wood available in these and other zones is not known. A resource study would be carried out, with emphasis on private wood owners as these supply most of the woodfuels in Rwanda and their resources are the least known. Based on this information as well as demand projections, a management plan would be designed by the Ministry of Agriculture and Animal Husbandry (MINAGRI) with the assistance of consultants to utilize wood resources at their sustainable maximum. All these issues are being addressed under the proposed project (paras. 4.10 and 4.17).

D. The Petroleum Subsector

1.26 Rwanda consumed about 66,000 Tons of petroleum products in 1991, all of which was imported overland from the Indian Ocean ports of Mombasa and Dar-Es-Salaam, a distance of about 1,700 km. The oil import bill of US$34 million represents about 35% of Rwanda's export earnings. Details of the consumption pattern by product since 1983 are given in Annex 1.5. Gasoline and diesel account for over two-thirds of sales. The consumption of petroleum products rose at an annual rate of 10% from 1980 to 1988, when it peaked. It then fell as a result of reduction in economic activity. Products are distributed by three large importers (one of which, PETRORWANDA is majority state-owned) who account for about 80% of sales. Several small companies account for the remainder. There are no restrictions for other firms to import petroleum products. The country is well served by a network of about a hundred filling stations, nearly half of which are less than five years old. The Government holds buffer stocks of petroleum products amounting to nearly 1.5 months consumption, in addition to stocks held by the importers themselves. These stocks are low for a country so far from the ocean and would not cover a major supply disruption. However, total storage capacity in the Government-owned bulk storage depots is ample (25,000 cu. m). The depots are managed by PETRORWANDA on behalf of the Government in return for a fee levied on all imports. This arrangement, which proved unsatisfactory and is inefficient according to all importers, is being revised under the project (para. 4.9).

1.27 The cost of petroleum products to Rwanda is high because of the small size of purchases, the near-impossibility of buying cargoes from oil traders who are not represented in Kenya or Tanzania and most critically, the poor transport links to the coast. Products are either piped to Nairobi from Mombasa and then trucked to Kigali or transported by rail or road from Dar Es Salaam to Isaka (Tanzania) and then trucked to Rwanda. Road transport is provided by private truckers both Rwandan and from neighboring countries. Transport costs amount to about US$180\MT, as much as the cost of the products at the Indian Ocean ports. Significant savings of about US$60\MT could be obtained if rail transport and oil storage facilities in Tanzania were upgraded, or if the most economic route through Uganda was used. The Tanzania Petroleum Sector Rehabilitation Project (Credit 2202-TA), presently under implementation, addresses the former obstacles. The Uganda route is presently closed due to political tensions at the Rwanda-Uganda border.

1.28 Additional issues affecting petroleum products in Rwanda relate to taxation and petroleum pricing structure. Maximum pump prices are set by the Ministry of Commerce, Industry and Handicrafts (MICOMART), and are uniform throughout Rwanda. Large consumers negotiate discounts from the distributors who compete for their business. However, retail prices at the pump do not vary. Taxes on petroleum products are amongst the highest in the region and account for more than 50% of the pump price. In 1990, taxes were the equivalent of US$500/MT out of the average prices of all products of US$1,020/MT. The government raised the equivalent of US$34 million from this source in 1990. This level of taxation has created a strong incentive to smuggle fuel into Rwanda. It is estimated that over a third of all diesel consumed in Rwanda enters the country illegally, mainly from Tanzania where diesel costs less than half as

much.[3] This issue was discussed, inter alia, at a September meeting in Arusha (Tanzania) between the Tanzanian and Rwandese authorities. The Tanzanian Government plans to take steps to bring its petroleum products pricing levels closer to those in Rwanda in 1993. This would reduce the incentive for smuggling. In addition, the Rwandese Government has prepared a set of administrative measures to be applied by customs agents at border posts to stop the smuggling. These measures were discussed at negotiations and assurances were obtained that they would be implemented as a condition of Credit effectiveness.

1.29 The existing pricing structure (detailed in Annex 1.5) provides little incentive for importers to seek the lowest possible FOB prices. Furthermore, it is overly complex and consists of five separate taxes levied by different agencies and at different points between arrival in Rwanda and final sale at the pump. To address these taxation and pricing structure issues while maintaining the overall Government revenues from petroleum taxes, agreement was reached at negotiations that, as condition of disbursement for the petroleum products component of the proposed project, the Government would submit to IDA by 30 September 1993 and implement by January 1, 1994 an action plan including simplification of the taxation structure and price liberalization for petroleum products.

1.30 The Solar and Gas Subsectors, are discussed in Annexes 1.6 and 1.7 respectively.

E. Energy Sector Priority Investment Planning

1.31 The environment prevailing in the energy sector during the past years has not been conducive neither to the formulation nor to the implementation of coherent long-term subsectoral strategies. Public investment programming has not been carried out within a multi-year framework; government contributions to multi-year projects have had to be reconfirmed each year, with no clear guidelines for project selection. The risks of selecting economically non-viable projects were high, partly reflecting the lack of economists and financial experts in the Directorate of Energy and Hydrocarbons and the need for training to improve skills in project analysis methodologies and energy planning. Also, in the power subsector, ELECTROGAZ' inability to generate funds for new investments has been a major problem.

1.32 To remedy this situation, starting in October 1991, the Government introduced in connection with the SAC-supported reform program, a system of three-year rolling PIP with a view to integrating the selection of projects into clearly defined sectoral objectives and a comprehensive macroeconomic framework. Project selection criteria include: (i) economic viability (rate of return not less than 10%); (ii) least-cost solution for social projects; (iii) consistency with sectoral and macroeconomic objectives, and (iv) sustainability. Major donors have agreed to support priority energy sector investments and related selection criteria under the proposed project.

1.33 The energy sector PIP for 1992-1994 comprises 29 projects. During the review process, the application of least cost technical alternatives resulted in the re-designing of three projects. This was the case for: (i) the extension of the methane gas project at Cap Rubona, for which the initial size and cost were reduced to limit the production capacity to satisfy the needs of the sole customer, BRALIRWA, a brewery company, (ii) the Rural Electrification Project, for which initial cost of about US$14 million was reduced by 20%, following review of the technical design, and (iii) the Mukungwa II Hydro Project (US$16 million), which is being reviewed to reduce its investment costs. The final PIP for 1992-1994, following the above described adjustments, is RWF 11.3 billion or US$80.7 million. It represents about 11% of the global PIP for Rwanda. In 1992, the sector PIP amounts to RWF 1,7 billion or 0.79% of the projected GDP. The

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[3] The pump price of diesel in Rwanda is 134 RWF\litre (about US$0.96)

agreed upon 1993-1995 energy sector PIP amounts to 12.59 billion or US$89.93 million and comprises 17 projects.

1.34 During negotiations, it was agreed that (i) all new investments undertaken by ELECTROGAZ would have an economic rate of return of at least 10% and IDA's non-objection would be requested for all investments above US$1,000,000; (ii) starting in January 1993, the government would prepare no later than November 30 in each year a satisfactory annual report on the public investment in the energy sector and no later than December 31 in each year agree with IDA on a satisfactory three-year rolling investment program for the energy sector; and (iii) donor coordination would be done on a continuous basis, preferably through joint supervision missions.

II. THE ENERGY SECTOR INSTITUTIONS

A. The Policy Making Institutions

2.1 The Directorate of Energy and Hydrocarbons (DGEH) in the Ministry of Public Works and Energy (MINITRAPE) has the lead role in formulating sector policy and development strategy, preparing and applying energy legislation, executing studies, supervising projects, and maintaining sector statistics. Its involvement in the electricity subsector goes far beyond policy making. It has assumed responsibility for planning and execution of power network investments, and for generation and transmission. On the other hand, in spite of the dominating role of woodfuels in the energy picture, the Directorate has not undertaken a detailed analysis of this subsector. This reduces the possibilities of applying an integrated approach to woodfuel efficiency and substitution issues, as well as to overall energy sector issues.

2.2 The institutional situation regarding woodfuels is far from ideal. MINITRAPE considers that actions and data collection in this field are the responsibility of the Forestry Department (DGF) in the Ministry of Agriculture and Animal Husbandry (MINAGRI). To avoid overlaps and, conversely, gaps in the management of woodfuels resources at all stages, household energy planning should be the responsibility of one unit within MINITRAPE. Its main purpose would be to monitor the situation in the household energy field, especially on the demand side as well as to make policy proposals in this field. There is no institution responsible for assessing the environmental impact of energy projects. Under the proposed project, MINITRAPE would be in charge of the latter and of household energy planning, while MINAGRI would handle the supply side (paras. 4.16-4.17).

2.3 Petroleum pricing policy is determined by the Ministry of Commerce, Industry and Handicrafts (MICOMART) which also has responsibility for managing the Government's buffer stocks and monitoring the quantity and quality of imports.[4] Given the diverse responsibilities of this ministry and its lack of energy sector specialists and economists, monitoring of international petroleum prices (so as to provide a quick response to change) has been inadequate. This arrangement has hindered the formulation of comprehensive energy policies. To correct this situation, the capacity of MICOMART to implement reform of the taxation and pricing for petroleum products would be enhanced as part of the proposed project.

2.4 In the gas subsector, SOCIGAZ, a company jointly owned by the governments of Rwanda and Zaire is responsible for managing the methane gas resource of Lake Kivu and exercising the regulatory power to

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[4] It has delegated the management of the storage depots, buffer stocks and the monitoring of imports to PETRORWANDA, a majority-owned company by the Government with 24% share of the market. This arrangement is unsatisfactory and is being revised under the project (para. 4.9)

exploit the gas from Lake Kivu. This includes granting concessions to third parties, managing the shares of the two States, collecting royalties, establishing tariffs, and monitoring legally, technically and environmentally the exploitation of the gas resource by third parties. The two governments have agreed that these SOCIGAZ' activities would be coordinated with MINITRAPE. In March 1992, the Governments of Rwanda and Zaire and major donors involved in the subsector also agreed to the following: (i) exploitation of this resource will only start, but on a pilot basis, once an appropriate regulatory framework is in place, and (ii) concessions should be granted to private sector operators without Government's financing. Under the proposed project, a study would be financed to prepare the regulatory framework for future development of the Lake Kivu methane gas resource.

B. The Operating Institution

2.5 ELECTROGAZ, a wholly Government-owned enterprise classified as an "établissement public" of commercial character, created by Decree Law No. 18/76 dated April 20, 1976, is responsible for generating, transmitting and distributing electricity, water and gas, and has the monopoly rights for these services. In theory, the ELECTROGAZ management team has considerable power, but in practice its authority in areas such as personnel, salary policy and tariff setting has been undermined by government intervention. For example, appointments to senior positions have to be approved by the President of the Republic. This situation has deprived management of his most powerful tools and has led to acute over-staffing and inappropriate skill-mix as further detailed in paras. 2.8 and 2.9. In addition, ELECTROGAZ' involvement in planning and execution of power network investments is limited to distribution as explained in para. 2.1. Finally, the composition of ELECTROGAZ' Board and its limited involvement in key decisions, particularly those relating to tariff setting, as well as collecting Government arrears, which amounted to 32 months of sales at the end of 1991, have also been a major contributing factor in eroding the utility autonomy and financial viability. These issues are being addressed under the proposed project.

1. ELECTROGAZ

Organization and Management

2.6 ELECTROGAZ is governed by a Board of Directors consisting of five members including a Chairman who is also the Director General of Energy in MINITRAPE. Board's members are appointed for three years by the President of the Republic from nominations made by MINITRAPE and four other ministries. The Board is empowered with complete supervision of the management and administration of ELECTROGAZ. Responsibility for day-to-day management of operations is delegated to ELECTROGAZ' manager assisted by three department directors--administrative and financial, electricity operations, and water and gas-- all appointed by the President of the Republic. Statutes and organization of the departments are proposed by the Board and issued by Presidential Decree. The Government and ELECTROGAZ have agreed to change ELECTROGAZ' existing Law, statutes, and organization as well as to review and clearly define the functions and responsibilities of Government, and of ELECTROGAZ' Board and Management. In this connection, the existing Law, as defined in para. 2.5 is being reviewed by consultants to take into account the provisions of the draft Law on PEs' regulatory and institutional reform[5] that is currently unde. discussion within the Government. During negotiations, agreement was reached on the provisions of the draft Law on PEs' regulatory framework which is available in the Project File. The Law has been submitted to Parliament for its approval; in the meantime its main features will be incorporated in the lease contract with the future private operator to be approved by the Government and ELECTROGAZ or its successor, as discussed in

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[5] Prepared by consultants under the IDA-financed PE Reform Project (CR. 2113-RW).

paras. 2.25 - 2.27. Publication of the Law as well as enactment of ELECTROGAZ' new statutes and functions through a Presidential Decree, and appointment of its Board's members would be conditions of disbursement for the component related to the rehabilitation and extension of the distribution network .

Staffing and Personnel

2.7 As of March 31, 1992, ELECTROGAZ had a total of 4,108 staff. Of this total, 1,253 were under permanent contract, 670 were temporary agents with status similar to permanent contract, and 2,185 were temporary workers of which 700 were used for force account works. During appraisal, ELECTROGAZ has agreed to contract out to the private sector activities currently carried out under force account. This resulted in the laying off of about 700 temporary staff on August 31, 1992. In addition, during negotiations, agreement was obtained from the government that necessary measures would be taken so as to bring and thereafter maintain its staff at level not to exceed 1,253[6] by Credit effectiveness. Severance payments would be secured from the Caisse Centrale de Coopération Economique (CCCE, the French Aid Agency) as part of its financing under the proposed project. Meanwhile, a local consultant is being hired to assess its cost and legal implications in accordance with the Rwandese labor legislation, and to propose appropriate measures to deal with the side effects of this exercise.

2.8 Out of the 1,923 permanent agents or with similar status, 66 (3.4%) are middle managers, 77 (4%) are engineer technicians and 1,780 (92.6%) are technicians and unskilled workers. Also, 846 agents (44% of the 1923 mentioned above) are assigned to electricity and 1,043 (54%) to water, while electricity revenues represent about 69% of the utility total revenues for about 25,000 customers and water revenues 30% of total revenues for about 16,000 customers. Gas revenues on the other hand represent 1% of the utility's total revenues; 34 agents are assigned to this activity which concerns one customer only. ELECTROGAZ' personnel allocations are therefore unbalanced. The ratios of total customers to permanent agents were 30 to 1 for electricity and 16 to 1 for water in 1991, which are among the lowest levels of efficiency in sub-Saharan Africa, where these range between 33 and 116 for electricity and between 53 and 186 for water. Under the proposed project, improved efficiency through the taking over of operations by a private operator coupled with the implementation of the above staff reduction plan are expected to bring these performance indicators in line with the standards of efficient utility companies (7% and 25% of total staffing for middle managers and engineer technicians respectively).

2.9 ELECTROGAZ has difficulties in identifying and recruiting qualified personnel. This is further exacerbated by the requirement in the utility's present statutes that its middle managers including university graduates be recruited with the approval of the President of the Republic, which in many cases takes up to 2 years. As a result, only 7% of ELECTROGAZ' personnel are university graduates, with an additional 13% being high school graduates. Promotion and salary incentives are given on the basis of seniority and hierarchy rather than on qualifications and job performance. Engineers and other skilled technicians are paid almost the same low salaries as civil servants. New personnel management policies for recruitment, performance evaluation and salary incentives as well as new personnel statutes would be introduced on a performance basis for the asset holding company. The proposed project would also provide training for the asset holding company's managers, electricity and gas technicians and non-technical personnel (administration, accounting, finance and commercial aspects), and medium-term training for six electricity students at the Ecole Interafricaine d'Electricité located in Côte-d'Ivoire.

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[6] 2,155 agents, including 670 temporary agents with permanent status and 1,485 temporary workers will be laid off by Credit effectiveness.

Accounting, Audit and Insurance

2.10 Under the First Power Project (CR 1495-RW), ELECTROGAZ' accounting system has been reviewed to correct deficiencies identified by the audit reports from 1983 through 1988. In connection to this, a consultant had designed and implemented a comprehensive management information system, including an acceptable computerized accounting system. The utility's books are maintained in accordance with internationally-accepted accounting practices. Accounts are kept on an historical cost basis and foreign debt and related transactions are revalued annually at prevailing year-end exchange rates. All exchange gains/losses are treated in accordance with international standards. However, ELECTROGAZ is currently experiencing significant delays in the flow of accounting information due to late arrival of data from stations and branches. Consolidated annual operational, financial and commercial reports are inconsistent and inaccurate. Furthermore, because of the absence of trained personnel in the financial department, the accounting framework is not used properly and the annual financial statements are inadequate.

2.11 As a mixed-product utility, ELECTROGAZ' electricity, water, and gas operations share common administrative, financial, and support services (workshops, garage, training facilities, etc.). While this arrangement may be more economical by making the best use of scarce managerial resources, the absence of separate cost accounting for each activity complicates the analysis of their financial viability. Also, for commercial operations, water and electricity consumptions are billed jointly, so that management of receivables is more difficult, and outstanding customer accounts cannot be derived and followed through. Transparency would be introduced into ELECTROGAZ' cost accounting so that key policy decisions, especially for pricing, would be based on complete information. With the assistance of Price Waterhouse, ELECTROGAZ has now prepared separate accounts for each of its 1991 operations.

2.12 ELECTROGAZ's financial statements for FY89, FY90 and 1991 have been audited by external auditors (Price Waterhouse). The audit report for FY90 was qualified, particularly regarding ELECTROGAZ' Accounting Department's inability to record the exchange risk of about RWF 2.5 billion related to the debts contracted from the CCCE and written-off vis-à-vis the Rwandese Government by the French Government. The report also highlighted the unreliability of the low voltage consumers balance account, with substantial discrepancies between the Accounting and the Commercial Departments. Furthermore, the report indicated that there is an increasing number of errors in the billing system, the correction of which creates a workload on the Commercial Department, delays the recording of the related accounting transactions and impedes the timely collection of revenues. Finally, there is no reliable accounting system for capital works and the projects costs are obtained and registered from incomplete estimates. The FY91 audit report noted that significant progress has been made in reconciling the discrepancies in the low voltage consumers balance account and in recording accounting transactions. The restructuring of ELECTROGAZ to be financed under the project will help correct the remaining deficiencies. During negotiations, it was agreed that ELECTROGAZ will continue to employ qualified external auditors and will provide the Bank annually with audited financial statements including a long-term report no later than six months after the end of each fiscal year.

2.13 In the past, insurance, apart from statutory insurance, has only covered freight and transport of goods as ELECTROGAZ has operated on the basis of self insurance, without making any provision for an insurance fund. The coverage does not reflect the devaluation of the Rwandese Franc, nor does it take account of the realistic values of its assets. The new insurance premium contracted by ELECTROGAZ, effective September 30, 1992, provides coverage beyond the statutory insurance, as it is based on the revalued costs of assets, and contains provision for an insurance fund.

2. Proposed Institutional Reform Program and Policy Measures

2.14 The insufficient involvement of ELECTROGAZ in sectoral planning and investment decisions and the excessive government presence in the utility management has had a significant impact on its operations and finances. Its poor financial situation, characterized by RWF 8.3 billion (US$57.6 million) of accumulated losses at the end of 1991, also stems indirectly from the institutional weaknesses described in para. 2.5, and the low level of tariffs as explained in para. 1.20, high accounts receivable from Government (para. 5.9), chronic over-staffing (one of the lowest ratio of consumers/agent in sub-Saharan Africa) and poor quality of service.

2.15 Following a review in March 1992 of a proposal made by consultants for the restructuring of the sector Government, ELECTROGAZ and donor representatives participated in a joint review of alternative management tools identified by the consultants as possible solutions to the institutional weaknesses as outlined above. As there was a consensus that neither local investors exist with the financial capacity to acquire the assets, nor foreign investors willing to invest in the utility in its present state, full privatization was eliminated. Other options included (i) retaining ELECTROGAZ as the sole operator in the sector, (ii) creating a second public utility through separation of water from electricity operations, (iii) introducing a performance-based management contract or a lease contract with an outside party, and (v) granting an exclusive concession to run the assets of the sector to a private operator.

2.16 While attempts could be made to improve ELECTROGAZ' performance without major institutional reform, problems of excessive government interference in issues such as staffing and compensation policy would persist and ELECTROGAZ' finances would always remain vulnerable to government reluctance to authorize tariff increases and to settle its own bills promptly. Equally, the option of splitting water and electricity operations was ruled out because of the unnecessary duplication and higher overhead costs arising from the creation of parallel structures.

2.17 The Government sought a means of bringing private sector management into the sector without selling the assets of ELECTROGAZ. Given that under a concession, full title to the assets would be granted to a private firm for a long period (30-40 years), this option was excluded for reasons similar to those against immediate privatization. The final choice was between a lease or management contract with a private operator to run ELECTROGAZ' assets. The Government decided to select a lease contract for the future operations of the electricity and water sectors.

2.18 The lease contract option entails the creation of a public holding company which retains ownership of the sectoral assets that are then leased to a private firm to operate. The holding company retains responsibility for investment planning and system expansion. Compared to a management contract, leasing out the assets offers several advantages. Firstly, the private operator, in addition to its know-how, has to put some of its capital at risk and has a strong incentive to perform as efficiently as possible. As he is only allowed to charge an agreed tariff to customers and must provide sufficient revenues to the holding company to meet its financial needs, the lower the costs the higher his remuneration. This eliminates the need for an elaborate performance monitoring system to be negotiated and constantly observed by both parties. Secondly, the management fee or a substantial element of it that has to be paid under a management contract regardless of the profitability of the utility or the performance of the manager does not exist under a lease contract. Finally, with a lease contract, pressure to minimize costs pushes any potential foreign investor to quickly indigenise the top management to the full extent possible, thus keeping expatriates to a minimum. This is another positive feature compared to a management contract.

2.19 The new institutional framework to be adopted under the proposed project would include (i) limiting the role of MINITRAPE, the representative of the Government, to formulation of the sectoral policy and strategy and to regulatory oversight; (ii) separating ownership of assets and sector development planning responsibility from operations and maintenance; and (iii) enacting enabling legislation and corporate statutes for ELECTROGAZ or its successor and for a private operator to take over these responsibilities respectively, while providing them with freedom to recruit and fire and set incentive-based salary levels, (iv) strengthening the planning capacity of the utility by transferring 3 to 4 engineers from MINITRAPE to staff the Planning Unit of ELECTROGAZ or of its successor, and (v) opening the composition of the Board of ELECTROGAZ' successor to include more private sector agents, and enabling it to be more involved in key policy decisions including tariff setting.

2.20 As detailed analysis carried out by the consultant in connection with ELECTROGAZ' restructuring study confirmed that the utility staffing needs are close to the number of those currently holding permanent contract, the Government decided to implement a major staff reduction plan with a view to laying off all the temporary agents including those with status similar to permanent agents. This decision affects about 2,155 (about 70%) out of the total 4,108 agents. The proposed project will support this Government's decision by providing the necessary severance payments to these agents before the taking over of its operations by the private operator, at a cost of about RWF 261 million, so as to ensure a successful implementation of the privatization program. The Caisse Centrale de Coopération Economique (CCCE, the French Aid Agency) has agreed to finance this operation. The private operator and the asset holding company would be free to select their respective employees among the remaining 1,253 agents. The number of agents to be employed by the asset holding company is being determined by a consultant. Additional measures to avoid that unemployment be a major problem for the Government would be identified by the local consultant currently assessing the cost and contractual implications of the staff reduction plan with respect to the Rwandese labor legislation (para. 2.7).

2.21 A successful implementation of the lease contract will also require strong Government's commitment and cooperation in promptly settling its bills and setting appropriate tariff policy. Under the proposed project, the contractual arrangements between the private operator and the holding company/Government would include provisions for (i) the Government to rationalize its electricity and water consumption, and pay its bills within 60 days upon reception, and (ii) the private operator to implement systematic power cut policy for all consumers including Government's agencies and to deduct from revenues it collects unpaid Government consumption before any further allocation. Agreement on this, as well as on a first 15% average tariff increase for electricity and water by January 15, 1993, followed by another 15%, effective April 15, 1993, as given in para. 5.8, was reached with Government at negotiations, to ensure the autonomy and self-reliance of the subsectors. An automatic adjustment formula that is based on the rates of exchanges between the Rwandese Franc and the US$, on price of purchasing electricity from SINELAC and on salaries, as well as an annual report reflecting the adequacy of tariffs to meet the above objectives, would be used.

3. The New Institutions

2.22 The ultimate objective for ELECTROGAZ is to become a financially-viable and operationally-efficient power, water and gas utility. Given past poor performance, the Government decided that this can only be achieved through contracting out of its operations to a private operator with an adequate degree of autonomy and responsibility to guarantee efficient operations. The underlying sectoral restructuring that was agreed upon at negotiations involves the establishment of two companies:

(a) a National Utility Authority, "Société Nationale de Patrimoine" (SNP), or the successor of ELECTROGAZ, 100% owned by the Government, which would be the owner of the assets and

facilities and be fully responsible for future sector development including identification, preparation, financing and implementation of new projects. It would also issue consolidated financial statements (for SNP and the private operating company), service the power sector debts, and provide training to its staff under the proposed project. The number of staff to be employed by the SNP is being assessed by a consultant, and would need to be confirmed in the contractual documents for the institutional arrangements between the SNP and the Government; and

(b) a Private Management Company, "Société Privée d'Exploitation" (SPE), to be held by a professional private utility operator, with partial ownership by the State (up to 20%); this company would be responsible for production, transmission and distribution of electricity, water and gas. It would operate and maintain the assets and facilities of ELECTROGAZ, bill the customers and collect the revenues, invest in short-term fixed assets (maintenance) and in all items covered by working capital, within the framework of a ten-year lease contract with the National Utility Authority (the SNP).

2.23 The separation of planning/financing and executing investments from the daily operating activities of utility would allow for strong involvement of a professional private company in the technical and commercial operations and therefore an increased efficiency without putting the burden of capital expenditures on the latter.

The Lease Contract

2.24 The exact terms of the lease contract including the State equity contribution to the SPE will be defined by consultants with whom a contract has been signed, along the outline given in Annex 2.2, and with guidance from models of contract documents for the water utility in Guinea, and the water and electricity in Côte-d'Ivoire, where the electricity sector was successfully privatized about two years ago.

2.25 The consultants will assist the Government in drafting the bidding and contractual documents and evaluating the proposals, and will provide legal advice throughout the selection process of the private operator. Available background reports to be also used as direct inputs to their work include ELECTROGAZ' restructuring, electricity demand, audited financial statements for the past two years, the draft Law on the new regulatory and legal framework of Public Enterprises (PEs), which are available in the Project File. The TORs for these consultants are provided in Annex 2.1.

2.26 Key elements of the draft lease contract have been agreed with Government and include: (i) the statutes of the SNP, the delineation of responsibilities between the SNP and the Government, the SNP/Government and the SPE; (ii) detailed agreements on the allotment of revenues between the SPE and the SNP/Government; (iii) the electricity, urban water supply and gas general regulations defining the SPE's permanent rights and obligations vis-à-vis its shareholders; (iv) the responsibility and process for tariffs review; (iv) the freedom to recruit and fire and to operate independently from political interference; (v) timely payment of bills by government agencies, or otherwise procedures for systematic power cut-off; (vi) contents and periodicity of operation and accounting reporting; technical norms for works to be executed and respective responsibilities of the SNP and SPE in supervision; and (vii) general rules for operation, maintenance, including employees per customer, sales, technical and non-technical losses, collections from sales. The lease contract will detail treatment of purchase of electricity and other operating costs, debt service charges, and taxation and insurance arrangements. Additional areas to be covered include clear statement of objectives and the rights and obligations of the parties; the selection process of the SNP's general manager and key staff positions including the nomination process of its Board' members; the shareholders agreements and statutes of the jointly-owned SPE, and the standard "supply contracts" with its customers.

2.27 As it will take a few years before an independent and effective regulatory capacity can be developed, the lease contract will be the main tool for regulating the operator, with automaticity for the primary regulatory variable, tariff setting. Agreement was reached at negotiations on the following: (i) the lease contract award would be tied upon conclusion of contractual arrangements, satisfactory to IDA, for the establishment of the private operating company, the SPE; (ii) detailed program of critical milestones necessary to monitor progress in this area; (iii) launching of bids for the selection of operators would be a condition of Credit effectiveness; (iv) disbursements for the rehabilitation and extension of the distribution networks would be made upon enactment and implementation of the regulatory framework and program including the establishment of the SNP, the SPE and related contractual arrangements satisfactory to IDA, and upon confirmation of the availability of the State equity contribution (US$1 million equivalent) to SPE's capital, and the hiring of the private operator; and (v) key milestone dates: selection and starting of negotiations with the successful professional private operator — August 31, 1993; signature of the lease contract — before November 30, 1993.

Financing the operations of the new institutions

2.28 The SPE would: (a) collect from the customers the full rate for electricity and water, defined as the rate that is sufficient to cover reasonable operating expenses for the SNP and SPE, including the purchase of energy and fuel, the remuneration of the shareholders' equity, the depreciation of the SNP's assets, the service of its debts as well as the financing of the subsectoral investment program, and to yield a reasonable rate of return on the SNP's assets; (b) retain part of it, the "lease contractor rate" (LCR), to cover its own operating expenses, including the remuneration of its equity; (c) use part of it to purchase imported electricity and (d) give back to the SNP for each kilowatt hour (kWh) of electricity and cubic meter (m3) of water collected, the difference between the full rate on one hand and the LCR and cost of imported electricity on the other. The LCR would be the basis for the selection of the lease contractor.

2.29 The private operator through the SPE would operate and maintain the systems at its own risk and its only revenues would be the LCR. In that way, it would have real incentives to improve the collection ratio, cut operating costs, and reduce the unaccounted for water and losses for electricity. It would also implicitly be encouraged to replace expensive but initially needed expatriates, with correctly trained and paid local staff. Since the only revenues of the SNP would be what remains once the SPE retains its remuneration and purchases energy, the SNP would have real incentives to obtain from the Government consumer rates always sufficient to at least maintain a positive cash flow situation.

2.30 It is essential for the successful implementation of the sector restructuring to have appropriate tariff policy (the full rate). As a first step toward reaching the full rate, the average electricity and water tariffs were increased by 15% on January 15, 1993, and would be increased by another 15% on April 15, 1993. These levels would cover the SPE's own expenses and the purchase of energy, and would be sufficient to meet the SNP's operating expenses including only 45% of its assets depreciation, with no resources left for subsectoral debts and investments. The features of further increases are described in para. 5.8 and shown in Table 5.3. In any case, the final increases would not be less than what is needed to reach the full rate, and would be phased to reach the long-run marginal cost (LRMC) by the mid-term review in June 1995.

2.31 Water tariffs would need to be raised by additional 40% and 20%[7] to reach full rates of RWF 142.55/m^3 and RWF 171.06/m^3 respectively, even after the two 15% increases mentioned above. The immediate priority in implementing a full rate for water is to restore the customers' willingness to pay for

[7] Due to new investments for water related to the next project Kigali 2000.

water, and to enforce sound and secure billing and collection procedures, including cut-off as needed. As this priority would be progressively achieved in parallel with improvements of the quality and availability of water service following the rehabilitation and upgrading of connection installations, the increases needed for water tariff to reach the full rates mentioned above would be phased. During negotiations, it was agreed that the Government would finance every year until 1998, the differential between the current water tariff (after the yearly increase mentioned in para. 5.8) and the full rate. This pragmatic subsidization scheme is deemed effective and appropriate since: (a) the process is entirely transparent as subsidies would be conveyed through budgetary channels; and (b) the arrangements would last only a limited period of time. In this connection, the Government's contribution to water tariff (details of which are provided in Annex 5.6) that is necessary to maintain the full rate for water over the project implementation would be determined and adjusted, when needed, by October 31 in each year for the succeeding year, taking into account the yearly water tariff increases as described in para. 5.8.

Private Operator Access to Foreign Exchange

2.32 Past experience in the sector with ELECTROGAZ as well as experience elsewhere demonstrated both the importance and the problems in having ready access to foreign exchanges to cover operations needs. Continued difficulties in this area could result in delays in timely implementation of contractual obligations by the private operation under the proposed arrangements. This risk is now significantly reduced in Rwanda which under the SAC-supported reform program, has established on July 1, 1992 a non-discriminatory foreign exchange allocation regime through an Open General License (OGL) system administered by commercial banks. This system is funded by foreign exchange earnings, as well as by the proceeds of the IMF's SAF and the first SAC operation. Other donors will also utilize this system in their balance of payments assistance to Rwanda. It is therefore expected that the OGL system would provide the future private operator that will operate ELECTROGAZ access to foreign exchange at the prevailing exchange rate to finance essential spare parts and service in the normal course of business.

III. BANK SUPPORT TO THE SECTOR

A. Bank Assistance to the Sector

3.1 In the past, IDA has provided funds to help address key energy issues under four different projects. The Integrated Forestry and Livestock Development Project (Cr. 1039-RW, July 7, 1980), which did not meet the anticipated expectations, financed experimental work for improved woodstoves in rural areas and for transformation into charcoal of the bamboo cleared from afforested areas of the Gishwati forest zone. The Ruzizi II project, approved by the Bank on December 6, 1983 (Cr. 1419-BU, 1420-RW and 1421-ZR), provided additional electricity to Burundi, Zaire and Rwanda as a least-cost option. The Ruzizi II power plant has been successfully completed and is operational since 1989, but, as explained in the project completion report (PCR) for this project which was issued on April 26, 1992, the pricing issue of the energy sold is yet to be resolved[8]. Improved charcoal stoves and efficiency improvements in charcoal production were successfully introduced under the joint UNDP/WB ESMAP program in 1987.

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[8] SINELAC was expected to earn 10% rate of return on the assets over the life of the project. The actual sales price, initially SDR0.025/kWh, was increased to SDR0.04/kWh, and in July 1992 to SDR0.05/kWh. This is below the economic price of SDR0.071/kWh as well as below the levels that are necessary for the project to earn the 10% rate of return required to ensure the financial viability of SINELAC. A further price increase is to be considered in January 1993.

3.2 IDA also financed a project to improve reliability of the production, transmission and distribution of electricity so as to serve additional consumers, and to strengthen ELECTROGAZ in its planning, management, general operations and maintenance, with a Credit of SDR 8.5 million (Cr. 1495-RW), approved on June 12, 1984. The PCR for this project, which was issued on March 26, 1992, indicated that, while the major physical works for this project were satisfactorily completed, there are still some outstanding technical problems related to the rehabilitation of the Ntaruka hydroelectric plant, and a need for improvement in the quality of distribution services. Concerning ELECTROGAZ' operations, a planning unit was created but planning responsibility de facto remained with MINITRAPE, and few of the financial performance targets were met owing to inadequate tariffs, stagnant sales revenues and accumulation of Government receivables. These issues have been dealt with in the proposed project through upfront actions (paras. 5.6 - 5.7 and 5.9).

3.3 To reflect the increasing emphasis on the role of the overall policy and institutional environment in the adjustment process at the macro level, the restructuring of the public enterprises (PEs) must particularly focus on PEs whose performance is critical to the success or failure of other actors in the economy. This approach has led IDA to finance in 1990 a PE reform project (CR. 2113-RW), under which a new legal framework for PEs has been prepared and agreed upon with IDA. The main features of this framework that refer to Stated-owned Corporations are available in the Project File.

B. IDA Strategy and Rationale for Involvement

3.4 To assist the Government in meeting its declared objectives as stated in para. 0.5, under the proposed project, IDA would support policy reforms in the energy sector by restructuring key sector institutions including ELECTROGAZ, and introducing rational investment and expenditure programming for the sector, through continued dialogue and support for highest priority investment program. IDA would also help expand the role of the private sector by encouraging its participation in (i) taking over the operations of ELECTROGAZ, which is a fundamentally-different approach from the past, where technical assistance to management has proved ineffective and inefficient, (ii) the rational use of existing woodfuel resources, (iii) a small-scale approach for development of Lake Kivu's methane gas if warranted from an economic and environmental point of view, and (iv) managing the resources available for quality and quantity control of petroleum products. Among others, these would restore ELECTROGAZ' efficiency and financial viability, its service reliability and consumer satisfaction. IDA's involvement is further needed to assist in coordinating donors' actions, improve the management of available resources and foster economic development and growth. Finally, IDA would help ensure that the institutional arrangements and policy measures are the most appropriate to attract the maximum number of interested bidders, and that the interests of the Government and the consumer are also preserved.

IV. THE PROJECT

A. Project Objectives

4.1 The main objective of the proposed project is to promote rational energy policies while minimizing adverse environmental implications, and establish the basis for efficient utilization of Rwanda's energy resources. Specific objectives are: (i) create an enabling regulatory and policy environment; (ii) enhance the efficiency of ELECTROGAZ' operations; (iii) provide technical assistance and training to key sector institutions to build up investment planning capacity, and strengthen government capacity to formulate a coherent sector policy and to monitor sector activities including those related to woodfuel, methane, petroleum products, and least-cost power supply alternatives for rural areas; and (iv) rehabilitate key power

infrastructure. The basic principle underpinning this project is that the Government establishes the policy environment, but commercial decisions are left to private economic agents.

B. Project Description

4.2 The main features of the project are summarized as follows:

(a) Strengthening Regulatory and Policy Environment

(i) institutional reform program of the power subsector, including consulting services to revise ELECTROGAZ' existing Law and statutes to permit the contracting out of the utility operations to a private operator and prepare the bidding documents for its selection, and assist in implementing the specifics for operations contracting under a lease type contract, and in establishing two companies, the Société Nationale de Patrimoine (SNP) and the Société Privée d'Exploitation (SPE); and implementation of a series of "make-ready" measures in order to attract qualified private operators; (ii) introduction of incentives to rationalize and improve the efficiency of the charcoal subsector; (iii) implementation of environmental and technical guidelines for future development of Lake Kivu's methane gas, creation of a data base and dissemination of information to private investors, both national and foreign, interested in the development of the Lake Kivu's methane gas; and setting up of laboratory facilities and training local technicians to monitor Lake Kivu's waters (chemistry, stratification) and volcanic activity in the surrounding areas; (iv) studies to design and implement a strategy for solar home systems as a cost efficient alternative for electricity in the rural areas; and (v) technical assistance and training to strengthen the capacity of MICOMART to implement the reform for the taxation and pricing of petroleum products;

(b) Rehabilitation and Improvement of Key Power Infrastructure.

(i) rehabilitation and extension of the distribution network for five cities; (ii) improvements in the transmission network substations including the addition of two 110 kv bays in the Mururu I substations that are complementary to those carried out under the Energy I Project (Cr. 1495-RW); (iii) overhaul of the Mukungwa I hydro power station, and of the hydraulic structures of the Gisenyi and Gihira hydro plant; (iv) feasibility studies for hydroplants; (v) constitution of a reserve stock of spare parts for plants and substations; and (vi) capacity building and training for the staff of the Project Coordination and Administration Unit (PCAU) and Project Implementation Units (PIUs) in area of project monitoring and management, and training through scholarships to four students to be trained at the Ecole Supérieure d'Electricité in Côte-d'Ivoire, and strengthening of the investment planning and monitoring capacity of the utility staff;

A more detailed explanation of these components is provided below.

Institutional Restructuring Program of the Subsector

4.3 In order to attract qualified international private operators, a number of "make-ready" measures are necessary. These measures, which would bring the facilities and means of the utility to a minimum acceptable level, have been identified as follows: (i) complete inventory of delivery points and updating of customer files; (ii) updating and completion of plans and drawings for the distribution installations of electricity and water; and (iii) and upgrading of electricity and water consumer connections and metering facilities to make it possible to account for electricity and water supplied, as well as to cut service to delinquent customers. In addition, this component would include the costs pertaining to the severance

payments for ELECTROGAZ' excess personnel to be laid off as part of the restructuring measures, which the CCCE, as a cofinancier has agreed to finance. Finally, the component includes the costs of consulting services to help prepare the bidding documents and assist in the selection of the private operator. The cost estimate for this component is US$5.70 million, of which US$2.71 million would be provided by CCCE.

Infrastructure Rehabilitation and Extensions

4.4 This project component would finance rehabilitation and extension works for the distribution networks of the five largest cities of the country: Kigali, Butare, Gisenyi, Nyabisindu and Ruhengeri. The definition of works to be executed and the estimate of the corresponding costs as prepared by a consultant and found reasonable by IDA is available in the Project File. A qualified consultant will be hired once the private operator is on board to prepare bidding documents for the procurement of equipment and material, and for the execution of works. The latter will be bid locally, since it has been determined that the project consists of a collection of a large number of interventions from small to medium scope that can be carried out by local expertise. The SPE will ensure compliance with norms and the conditions of its involvement would be clarified in the context of the contractual arrangements to be implemented under the proposed project. The cost estimate for this component is US$9.77 million.

4.5 In order to improve the condition of the substations of the transmission network, a series of works will be carried out. These would mainly affect the medium voltage sections that were not included in the rehabilitation works executed under the Energy I Project (Cr. 1495-RW). The works also include the addition of two 110 kV bays in the Mururu substation to (i) reconstitute the integrity of the Rwandese high voltage network that was separated into two parts by the creation of SINELAC's installations, and (ii) facilitate energy imports from Zaire. The services of a qualified consultant will be retained to undertake a technical audit of the network, which would be used to define the scope of work to be executed. Its terms of reference are provided in Annex 4.9. The cost estimate for this component is US$5.53 million. The Government has agreed to provide US$0.26 million and the European Investment Bank (EIB) has been requested to finance US$5.27 million, as a cofinancier of the project.

4.6 As the Mukungwa I hydro power station (commissioned in 1982) has completed ten years of uninterrupted operation without any major maintenance, a complete overhaul which is by now overdue, would be financed under the proposed project. Rehabilitation works will also be executed on the deteriorated hydraulic structures of the Gisenyi and Gihira hydro power stations. A general inspection of these installations has been conducted by an ELECTROGAZ' team with the assistance of an expert from GTZ (Germany) resulting in a preliminary identification of the required works, equipment and materials. A qualified consultant for which terms of reference are also provided in Annex 4.9 will be hired to finalize definition of works and materials and prepare the bidding documents. EIB has also been requested to finance this component for US$2.65 million, as a cofinancier of the project; the total cost estimate for this component is US$3.05 million.

4.7 The maintenance of all ELECTROGAZ' installations has suffered in the past from lack of adequate provision of spare parts, tools and maintenance equipment, due to financial problems and difficulties in obtaining the necessary foreign exchange. The proposed project would finance the procurement of minimum stocks of spare parts for the plants and substations, and maintenance equipment and tools on the basis of a list prepared by ELECTROGAZ with assistance from GTZ and reviewed by IDA during the appraisal mission. The cost estimate for this project component is US$2.96 million.

4.8 Petroleum products component. At present the Government does not adequately monitor the international petroleum market. Under the proposed project, the capacity of MICOMART to implement the

needed reform for petroleum products taxation and pricing will be strengthened. The project will finance the costs of equipping and training a small petroleum monitoring and analysis unit. The cost estimate is US$0.69 million.

4.9 The present tax of 2.32% on the CIF value of all imports (about RWF 62 million in 1991), levied by the State for PETRORWANDA to manage the petroleum storage depots on behalf of all importers, is sufficient to cover the annual operating and maintenance costs of this activity. However, the management of these installations is inefficient, and the quality and quantity control of imported petroleum products is poorly executed. Laboratory facilities as well as calibration and quality control equipment at the main petroleum storage in Kigali are inadequate and not well maintained. At negotiations, agreement was reached with Government that: in order to improve management of its petroleum storage depots, responsibility for this shall be transferred from PETRORWANDA to a new management company as a condition of disbursement for the petroleum products component. This service company will be created and jointly owned by all the oil importers[9], including PETRORWANDA, and will be run on a minimum cost-recovery basis and not as a profit center.

4.10 Rationalization of the Urban Charcoal Supply. Consumption of charcoal is expected to continue to increase faster than urban population growth. This will have environmental consequences unless corrective action is undertaken, particularly since charcoal is currently produced through a wasteful process, leading to a loss of about 80% of the energy contained in wood. To ensure that charcoal is produced and used as rationally and efficiently as possible, the proposed project would therefore finance equipment and services required to establish a self-financing program after three years through allocation of part of the tax on charcoal transport, details of which is provided in Annex 1.8. The services of local and foreign experts would be financed to design a master plan for the supply of charcoal to urban areas. This includes (i) studies to identify existing private, village, state resources, using aerial photographies and mappings, the maximum annual sustainable wood supply of these resources as well as projections of wood demand by source and product type and by city; (ii) preparation and implementation of wood use management plans at the village levels through training, seminars, sensitization and promotion campaigns; (iii) pinewood promotion to increase its competitiveness with eucalyptus wood, and (iv) equipment to modernize the wood and charcoal subsectors. This plan of actions would help implement pricing and taxation policies to facilitate rational use of these resources. Wood consumption with and without the proposed project including savings is presented in Annex 4.8. The estimated cost of this component is about US$4.56 million.

4.11 Strategy for Solar Home Systems (SHS) Development. Presently, most rural areas will have to wait years before being reached by an extension of the electricity network. Under these circumstances, the least-cost alternative to grid connection is a stand-alone solar home system which could provide similar benefits to households. Since many activities including financial and technical assistance to importers and local producers are already financed by German bilateral assistance (GTZ), the proposed project will provide funding for two studies, to design a strategy for SHSs through a market study and prepare proposals for innovative financing schemes for SHS. The estimated cost for this component is about US$0.3 million.

4.12 Future Development of Lake Kivu Methane Gas. During a seminar on Lake Kivu's methane gas, attended by representatives of the principal donors involved in the gas subsector, including the European Community (EC), the Belgian Cooperation Agency (AGCD) and the Government of Rwanda, it was

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[9] Petroleum products are imported and distributed by six companies. PETRORWANDA (majority-owned by the Government) has 24% of the market, ERP (owned by Rwandese private entrepreneurs) holds 40% of the market, two subsidiaries of the large international companies (SHELL and BP-FINA) have 30% of the market with the remaining share left to two Rwandese private entrepreneurs.

recommended that development of methane gas be limited to private sector at market conditions with no Government's financing. The seminar helped clarify the environmental issues associated with development of Lake Kivu methane gas. To this end, it was agreed that funding be provided for studies and projects to encourage private sector involvement in the future exploitation of this resource. An environmental issues paper and a mitigation plan are available in the Project File. The proposed project would therefore provide financing for (i) the editing of a manual with proper standardized technical and environmental specifications, adequate concessions arrangements, tariff structure, royalties and appropriate legal framework for the future exploitation of Lake Kivu's methane gas, (ii) the setting-up of monitoring system for the chemistry of dissolved gases in the Lake Kivu and volcanic activity in the area; (iii) the provision of specialized training for local scientists and technicians; (iv) the establishment of a warning system and evacuation plan for the event of a disaster; and (v) a complete bathymetric survey of the Lake including environmental impact on the identified sites. Before proceeding with the surveys and studies related to the implementation of environmental and technical guidelines for future development of Lake Kivu's methane gas, the Government has agreed at negotiations to include in their terms of reference an examination of any potential riparian issues. The estimated cost for this component is about US$1.54 million.

C. Project Costs

4.13 Project costs are detailed in Annex 4.1 and summarized in Table 4.1. Total cost, including physical and price contingencies and duties and taxes, is estimated at US$38.95 million, of which US$33.09 million are foreign exchange costs. The cost estimates for the energy sector institutional reform program were prepared by IDA, while the costs of the other components were estimated by ELECTROGAZ and consultants, reviewed by IDA and found to be reasonable. Physical contingencies of 10% were added to each component to provide an allowance for unforeseen increases in the volume of work. Price contingencies assume local inflation of 12% in 1992, 5% in 1993, 4% in 1994 and thereafter, and international inflation rates of 4.1% for 1992, 5.4% for 1993, 4.7% for 1994 and 3.6% for 1995.

Table 4.1: Program Cost Summary
(US$ millions)

	Foreign	Local	Total	% Foreign Exchange	% Total Base Costs
A. STRENGTHENING REGULATORY AND POLICY ENVIRONMENT					
1. Inst. Reform Program for the Pow. Subs.	3.98	1.72	5.70	69.82	17.58
2. Rational. of the Urb. Charcoal Supply	2.82	1.43	4.25	66.36	13.11
3. Solar Home Systems	0.18	0.08	0.26	70.00	0.80
4. Kivu's Methane Gas Development	1.20	0.13	1.33	90.00	4.10
5. T.A. Petroleum Sector	0.60	0.00	0.60	100.00	1.86
Subtotal	8.78	3.36	12.14	79.24	37.45
B. POWER SUBSECTOR					
1. Distribution Rehabilitation & Extension	7.13	0.88	8.01	89.02	24.71
2. Transmission Improvements	4.29	0.21	4.50	95.33	13.88
3. Hydro Plant Rehabilitation	2.09	0.31	2.40	87.08	7.40
4. Spares, Maintenance Equipment & Tools	2.50	0.00	2.50	100.00	7.71
5. Technical Assistance & Training	0.87	0.00	0.87	100.00	2.68
6. Feasibility Studies Hydro	1.90	0.10	2.00	95.00	6.17
Subtotal	18.78	1.50	20.28	92.60	62.55
Total Baseline Costs	27.56	4.86	32.42	85.01	100.00
Physical Contingencies	2.85	0.50	3.35	85.04	10.34
Price Contingencies	2.68	0.50	3.18	84.22	9.80
Total Project Cost	33.09	5.86	38.95	84.95	120.14

D. The Implementing Agencies

4.14 The Borrower would be the Government of the Rwandese Republic. The Ministry of Public Works and Energy (MINITRAPE) would be responsible for the overall coordination and supervision of the program and would directly implement some of the activities related to woodfuel, gas, and solar systems. The Ministry of Agriculture and Animal Husbandry (MINAGRI) would coordinate the implementation of the charcoal master plan whereas the Ministry of Industry, Commerce and Artisanat (MICOMART) would be in charge of implementing the petroleum products component. ELECTROGAZ and its successors would be the implementing agency for the power subsector components. A project coordination and administration unit (PCAU) would be established within MINITRAPE, and project implementation units (PIUs) would be set within ELECTROGAZ or its successor, MINITRAPE, MINAGRI, and MICOMART.

E. Project Implementation

4.15 A Project Preparation Facility (No. 701-RW) has been approved for the preparation of the rehabilitation and extension of the distribution network, and for the institutional reform of ELECTROGAZ. Selection of consultants for these activities as well as the related studies have now been completed. Work on all other components of the proposed project would follow the detailed schedule given in Annex 4.4. The physical execution of the project would be completed by June 30, 1998. A mid-term review by the Government and IDA would be organized by June 1995 to assess the overall project implementation and achievements and take the corrective actions that may be needed. The areas to be covered are detailed in para. 4.30, while Annex 4.11 provides the set of indicators that was agreed upon during negotiations.

4.16 The Project Coordination and Administration Unit (PCAU) to be established within MINITRAPE would be the main counterpart for discussions with the Bank. The PCAU would include the Director General of Energy and Hydrocarbons, one representative from MICOMART, MINAGRI and MINITRAPE each, and a representative from ELECTROGAZ. Its main functions are detailed in Annex 4.2. Each implementing agency would establish a focal point for project implementation within its existing administrative framework, hereafter referred to as Project Implementation Unit (PIU). The PIUs to be established include: (a) ELECTROGAZ or its successor, the SNP: for the rehabilitation and extension of the distribution network for Kigali, Butare, Gisenyi, Ruhengeri and Nyabisindu, the rehabilitation work for the power substations and transmission network, and the provision of spare parts, software and other equipment; as explained in para. 4.4, the SPE would ensure the compliance of these works with norms; (b) MINITRAPE: for the establishment of a woodfuel consumption database, and other demand aspects of the charcoal component, for the coordination and supervision of the solar energy and methane gas activities; (c) MINAGRI: for the preparation and execution of the charcoal component; (d) MICOMART: for the implementation of the petroleum products component. As a condition of Credit effectiveness, the PCAU and PIUs would be established; each of the PIUs would appoint a manager; and one accountant and an assistant accountant for the PCAU would be appointed.

4.17 Implementation of the Charcoal Component. This component would involve two institutions: the DGEH (MINITRAPE) and the DGF (MINAGRI). The supply side would be handled by MINAGRI and the demand side by MINITRAPE. Specifically, (i) the PCAU would be responsible for the overall coordination between MINITRAPE and MINAGRI through their respective PIUs; (ii) data collection on the availability of resources would be managed by MINAGRI, (iii) demand projections would be prepared by MINITRAPE for the wood-energy side and by MINAGRI for the non-energy side (construction wood, pole wood, etc). Preparation and implementation of village wood management plans would be handled by MINAGRI, with

assistance from MINITRAPE through its Programme Special Energie[10]. Modernization of the charcoaling sector including levying a tax on charcoal transport, as well as promotion and sensitization campaigns to increase the competitiveness of pinewood with eucalyptus wood is MINAGRI's responsibility. This would require a change in the existing Forestry Law as this presently excludes taxation on the transport of charcoal. The draft changes affecting two articles of the Law which have been prepared by consultant was discussed and agreed upon at negotiations. Implementation of the Ministerial Decree promulgating the new taxation on charcoal transport, including its collection, allocation through the National Forestry Fund (NFF) would be a condition of Credit effectiveness. Annex 1.8 provides details of the new taxation system.

4.18 Implementation of the strategy for the Solar Home Systems Component. This component would mainly assist the Government in creating a solar energy policy and help the private sector develop a better strategy to commercialize SHS. MINITRAPE would coordinate the studies through a PIU, and GTZ, which already has a "Programme Special Energie" in place within MINITRAPE, would also be involved in the implementation of this component.

4.19 Implementation of the Lake Kivu's Methane Gas Development Component. Monitoring of environmental risks and of studies would be organized and coordinated by MINITRAPE through SOCIGAZ.

4.20 Implementation of the Petroleum Product Component. MICOMART would be responsible for the implementation of this component.

4.21 Implementation of the Power Subsector Component. Engineering, rehabilitation and extension of the distribution network and rehabilitation of the power substations and transmission network would be executed by foreign or local companies. The SNP would be responsible for the supervision of all these works. responsibility of the SPE in ensuring compliance of these works with norms including the cost implications would be clarified in the contractual arrangements between the two parties.

F. Procurement

4.22 A summary of procurement methods is presented below in Table 4.2. Since the leasing out of ELECTROGAZ' operations to a private operator is akin to contracting specialized services, it was deemed necessary to ensure prior to bidding that only qualified potential contractors be invited to bid. Consequently, a pre-qualification process was agreed upon with the government. The related documents have been completed and were advertised in July 1992 through the proper channels. The future private operator would be selected among the prequalified firms. Four utility operators have submitted their proposals for prequalification: Sogea-Denys (France), Tractebel (Belgique), Saur-Afrique/ Hydro Quebec International (France and Canada), and Imatran Voima Oy-Ekono Energy (Finland). The only parameter to be taken into account would be the LCR, exclusive of taxes and customs duties, that the SPE would retain on each kilowatt hour of electricity and cubic meter of water billed and collected. The studies for the rehabilitation and extension of the distribution networks for the five cities and to restructure ELECTROGAZ were financed under the PPF advance for the proposed project.

4.23 International competitive bidding (ICB) would be used to procure equipment for the rehabilitation and extension of the distribution networks and for the upgrading of service connections. Aerial survey, photo interpretation and map printing, all related to the charcoal program would also be procured through ICB for a total amount of US$350,000. For the distribution rehabilitation works, local competitive bidding would

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[10] This program is being financed by the German bilateral assistance (GTZ) and provides support (about US$1.5) to household energy, particularly to solar home systems and to a lesser degree to wood-energy.

be used. It has been agreed that the works for upgrading the service connections, which will have a potentially-large impact on commercial operations and thus on the financial performance of the selected private operator, should be procured through LCB and executed by contractors under the supervision of the SPE (the Société Privée d'Exploitation) under conditions satisfactory to the Bank. These would be included in the lease contract. IDA financing for these works will not exceed US$250,000. LCB would also be used for purchasing of vehicles, office furniture and equipment, and computers pertaining to the charcoal program for a maximum amount of US$270,000. Spare parts for existing power plants and power stations would be purchased directly from the original manufacturers for a total amount of US$2.61 million. Laboratory equipment for the monitoring of Lake Kivu, as well as equipment to repair and modernize the fuel depots would be procured through prudent shopping (minimum of 3 price quotations from at least 2 different countries), for a maximum of US$440,000. The financing of scholarships for four students to be trained at the Ecole Supérieure Interafricaine d'Electricité in Côte-d'Ivoire would also be treated as direct contracting. All consulting and other services would be procured in accordance with World Bank guidelines. All invitations to bid, proposed awards and final contracts estimated to cost the equivalent of US$100,000 or more will be subject to prior IDA reviews. In all cases, the Bank's sample bid documents will be used.

4.24 All procurement for items not financed by IDA will be carried out according to the guidelines of the respective financing agencies, which would involve competitive bidding.

Table 4.2: Summary of Proposed Procurement Arrangements
(US$ Million equivalent)

PROJECT ELEMENT	PROCUREMENT METHOD				
	ICB	LCB	Other	NBF	TOTAL
WORKS					
Distribution Rehab & Extensions		2.21 (1.65)			2.21 (1.65)
Transmission Improvements				5.27 a/	5.27
Hydro Plant Overhauls				2.65 a/	2.65
Upgrading of Service Connections		0.21 (0.21)			0.21 (0.21)
GOODS					
Electrical Equipment	8.66 (8.66)				8.66 (8.66)
Spare Parts			2.61 (2.61)		2.61 (2.61)
Water Supply Equipment	0.71 (0.71)				0.71 (0.71)
Other Equipment		0.27 d/ (0.27)	0.44 c/ (0.44)		0.71 (0.71)
SERVICES					
Aerial Survey & Photo Interpr. & Map Print.	0.34 (0.34)				0.34 (0.34)
CONSULTANCIES & TECHNICAL ASSISTANCE f/					
Feasibility Studies			2.35 (2.27)		2.35 (2.27)
Woodfuel Promotion			0.35 (0.35)		0.35 (0.35)
Engineering Studies			1.11 (1.05)	1.50 a,b/	2.61 (1.05)
Bathymetric Survey of Lake Kivu			0.62 (0.57)		0.62 (0.57)
Project Supervision			0.90 (0.86)	0.25 a/	1.15 (0.86)
Technical Assistance			2.91 (2.91)		2.91 (2.91)
Engineering Scholarships			0.79 (0.79)		0.79 (0.79)
Training			0.23 (0.21)		0.23 (0.21)
MISCELLANEOUS					
Severance Payments				1.63 b/	1.63
Personnel Salaries (Charcoal Program)			0.46 (0.32)		0.46 (0.32)
Incremental Operating Costs g/			1.73 e/ (1.06)		1.73 (1.06)
Refinancing of PPF			0.75 (0.75)		0.75 (0.75)
TOTAL	9.71 (9.71)	2.69 (2.13)	15.25 (14.16)	11.30	38.95 (26.00)

NOTE: Figures in parentheses are the respective amounts financed by the IDA Credit. NBF: Not Bank Financed.

a/ Cofinanced in parallel by the EIB.
b/ Cofinanced in parallel by the CCCE.
c/ Include equipment to repair and modernize fuel depots. To be procured by shopping.
d/ Includes vehicles, office furniture and equipment, and computers for the charcoal program.
e/ Fuel and other consumables for the charcoal program. To be bought locally.
f/ Details provided in Annex 4.1, page 10 of 10.
g/ On a decreasing basis 100% in 1993, 80% in 1994, and 60% in 1995.

4.25 Advance procurement and retroactive financing. Out of the proposed Credit, the Government has proposed to use up to US$1.3 million (or 5% of the total IDA Credit) for advance procurement and retroactive financing of essential consulting services for preparing the contractual agreements of SNP and SPE. Such advance procurement is necessary to continue the restructuring of the utility in anticipation of its privatization. It would avoid creating a gap between the financing of restructuring efforts and disbursements for the credit. Alternatives sources of financing are not available. All retroactive financing is expected to be within the maximum period of twelve months starting from August 31, 1992.

G. Financing Plan

4.26 The proposed IDA Credit of US$26 million will finance about 67% of the estimated project cost of US$38.95 million and 73% of the foreign currency expenses of the project (US$33.09 million). Table 4.3 summarizes the financing plan for which further detail is provided in Annex 4.3. IDA will also provide US$1.69 million for incremental local costs. The local project costs represent about US$5.86 million. The CCCE will provide the equivalent of US$2.71 million of which about 1.63 million will finance severance payments and the rest will be used for the upgrading of water connections, both as part of the institutional reform program. EIB has been requested to finance the equivalent of US$7.92 million for improvements in transmission and hydro plants overhauls. The Government will provide the equivalent of US$2.32 million. Confirmation of the project financing plan would be a condition of Credit effectiveness.

4.27 The Government would onlend to ELECTROGAZ up to US$13.44 million of the proceeds of the proposed Credit at IBRD rate plus 1% commission, for a period of 25 years, including a 5-year grace period. The Government would assume the foreign exchange risk. The indicated amount corresponds to the total IDA Credit for physical investments in the power subsector. A contract acceptable to the Bank would be signed as a condition of Credit effectiveness.

Table 4.3: Project Financing Plan
(US$ MILLIONS)

		IDA		CCCE		EIB		GOVERNMENT		TOTAL	
	COMPONENT	AMOUNT	%	AMOUNT	%	AMOUNT	%	AMOUNT	%	AMOUNT	%
A.	Instit. Reform	3.93	58.61	2.71	40.50	0.00	0.00	0.06	0.89	6.70	17.21
B.	Feasibility Studies Hydro	2.29	97.47	0.00	0.00	0.00	0.00	0.06	2.53	2.35	6.02
C.	Distribution Rehab. & Ext.	9.22	94.32	0.00	0.00	0.00	0.00	0.56	5.68	9.78	25.09
D.	Improvements in Transmission	0.00	0.00	0.00	0.00	5.27	95.24	0.26	4.76	5.53	14.20
E.	Hydro Plant Overhauls	0.00	0.00	0.00	0.00	2.65	86.80	0.40	13.20	3.05	7.83
F.	Spares, Maint. Equip. and Tools	2.96	100.00	0.00	0.00	0.00	0.00	0.00	0.00	2.96	7.61
G.	Operational Assistance and Training	1.06	100.00	0.00	0.00	0.00	0.00	0.00	0.00	1.06	2.71
H.	Urb. Charcoal Supply	4.14	82.87	0.00	0.00	0.00	0.00	0.86	17.13	5.00	12.83
I.	Solar Home Systems	0.26	84.89	0.00	0.00	0.00	0.00	0.05	15.11	0.31	0.78
J.	Kivu's Methane Future Gas Dev	1.46	94.96	0.00	0.00	0.00	0.00	0.08	5.04	1.54	3.95
K.	Assist. to Petr. Sector	0.69	100.00	0.00	0.00	0.00	0.00	0.00	0.00	0.69	1.77
	TOTAL	26.00	66.76	2.71	6.97	7.92	20.32	2.32	5.95	38.95	100.00

H. Disbursements

4.28 The proceeds of the proposed IDA Credit would be disbursed over 6 years, which closely corresponds to the standard Disbursement Profiles for the Africa Region (Annex 4.5) and constitutes an improvement as compared to disbursements under Credit 1495-RW, mainly due to involvement of the private operator. The closing date would be December 31, 1998. The disbursement schedule presented in Table 4.4 below has been derived from the project implementation schedule provided in Annex 4.4. The IDA Credit will finance 100% of foreign expenditures for equipment, materials and vehicles. Consulting services, technical assistance and training would be disbursed against 100% of foreign expenses and 90% of local expenditures. Civil works disbursements would be made against 100% of foreign expenditures and 90% of local expenditures.

Table 4.4: Estimated Disbursement Schedule
(Million US$)

YEAR	ANNUAL	CUMULATIVE AMOUNT	CUMULATIVE %
1993	3.30	3.30	12.7
1994	11.41	14.71	56.6
1995	5.76	20.47	78.7
1996	4.46	24.93	95.8
1997	0.70	25.63	98.5
1998	0.37	26.00	100.0

4.29 To facilitate project implementation, a Special Account of US$0.5 million would be established in a commercial bank acceptable to IDA and replenished as needed in accordance with established procedures to finance eligible expenditures. Disbursements against Statements of Expenditures would be made for contracts of less than US$25,000. All other disbursements would be fully documented. The Project Administration and Coordination Unit within MINITRAPE would be responsible for record keeping and the safeguard of documents, which would be made available for review by IDA supervision missions. The annual auditing of project accounts would include a specific section for audit of the Special Account and the Statements of Expenditures. ELECTROGAZ is in compliance with auditing requirements.

I. Monitoring and Reporting

4.30 The proposed project would require careful coordination and frequent IDA supervision, particularly in the initial years of its implementation. Progress reports will be submitted to IDA and cofinanciers every three months. The structure of these reports was finalized during negotiations. An annual review of the implementation of all aspects of the proposed project, including achievement of agreed financial objectives would be undertaken by the SNP, the Government, IDA and cofinanciers. The proposed supervision plan is detailed in Annex 4.6 and IDA supervision input into key activities is given in Annex 4.7. Preparation of a project completion report not later than six months after project completion as well as of a mid-term review to be undertaken by the Government and IDA by June 30, 1995, taking into consideration, among others, net production (GWh), power available for sales, billing (percentage of power available for sale), client-account expressed in days of sales (non governmental), purchase of electricity, number of clients per employee, net operating coefficient, self financing ratio, service quality including the quality of voltage and number of interruptions and average interruption per client, and standards of drinkability of water, as fixed by the World Health Organization.

J. Environmental Considerations

4.31 Rationalization of the Urban Charcoal Supply. The agroforestry activity as well as wood use management plans included in this component are specifically designed to counter environmental problems such as deforestation and soil degradation resulting from over-cutting of trees. Improved carbonization techniques and charcoal stoves would reduce the demand for woodfuel. Since charcoal is the major urban fuel which will increase in importance with increasing urbanization, it must be ensured that its production is done in a sustainable manner. These activities would provide a better grasp on existing wood resources, allow to monitor their evolution, so as to prevent ecological disasters from taking place.

4.32 Strategy for Solar Home Systems Development. There are no environmental risks involved with this activity. On the contrary, if solar home systems replace thermal electricity or kerosene for lightning, less CO_2 will be emitted and this would reduce the contribution to the greenhouse effect.

4.33 Lake Kivu Methane Gas Development. A study financed by the European Community (EC) in 1988 on the production and environmental impact of gas methane, as well as studies financed by the Belgians and the Canadians concluded that (i) there is no relation between the gas extraction and a possible volcanic eruption, (ii) it is possible to extract between 50 and 150 million N m3 per year without risk of depleting the gas deposit, (iii) this level of gas production would not result in a risk of a gas eruption like the one that occurred at Lake Nyos in Cameroun in 1986 and (iv) that the stratification of the waters in Lake Kivu, which is stable, would still be protected with a production not exceeding 500 million N m3 per year, providing the production increase in a series of steps and detailed scientific measurements are taken step by step. In addition, both methane gas and carbon dioxide are presently naturally escaping to the atmosphere. Since they both are " Green House" gases in that they capture the sun's heat, the ultimate end-effect of gas development will be to trap some of the methane and burn it, thereby converting it to carbon dioxide and water. Since methane is approximately 70 times more potent to capture heat than CO_2, the reduction of methane emissions will therefore lower the negative environmental impact. Finally, as it is possible that volcanic/tectonic activity in the region of Lake Kivu could contribute to gas eruptions in the future at the Lake, irrespective of gas extraction, the proposed project would finance a set of measures to monitor the chemistry of dissolved gases and the volcanic activity around the Lake. The EC study also recommended that a modular approach be utilized for the production of methane gas from Lake Kivu. This approach will allow technical knowledge to be gained at each stage of development and result in a minimum of environmental risk. All these are being detailed in the environmental issues paper and mitigation plan which are available in the Project File.

4.34 Additional measures to be taken under the proposed project include (i) incorporation of an examination by the Government of any potential riparian issues in all the terms of reference for surveys and studies on future development of Lake Kivu's methane gas, and (ii) provision of a map indicating the international waterway and location of the sites to be studied. The authorization of the Government of Zaire to fly over its section of Lake Kivu has been received.

V. FINANCIAL ANALYSIS

Past Financial Performance and Present Position

5.1 Salient features highlighting ELECTROGAZ' historical operating results and present positions are summarized in Table 5.1. These include only revenues related to operating activities, but not the major works processed through the utility's force accounts which should not be treated as revenues.

Table 5.1: Electrogaz Operating Results for FY88-91
(in millions of RWF)

	1988	1989	1990	1991
Water Revenues	436	471	540	725
Water sold (m3)	6,707	8,311	8,536	9,156
Average tariff in RWF/m3	65	57	63	79
Electricity revenues	953	1,061	1,140	1,477
Energy sold (GWh)	110	123	134	144
Average tariff in RWF/kwh	8.67	8.64	8.53	10.25
Gas revenues	20	3	22	22
Gas sold (Nm^3)	903	132	973	974
Average tariff (RWF/m3)	22	21	22	22
Other revenues	752	692	683	385
TOTAL REVENUES	2,161	2,227	2,385	2,609
Operating expenses bef. purchase of Electric.	-770	-790	-758	-1,003
Purchase of Electricity	-53	-140	-351	-645
Salaries	-338	-363	-394	-401
Operating income before depreciation	1,000	934	882	560
Depreciation	-863	-1,178	-1,248	-1,549
Operating income bef. interest	137	-243	-366	-989
Interest	-120	-355	-582	-711
Operating income bef. exchange losses	17	-598	-948	-1,700
Exchange gains (losses)	0	-173	-5,236	0
Net Operating income (losses)	17	-771	-6,184	-1,700
Exceptional Profit & Loss	-74	-20	-127	0
Profit & Loss of the Year	-57	-791	-6,311	-1,700
Net fixed assets in service	13,026	14,585	15,928	17,666
Rate of Return on fixed assets	0.13%	-4.05%	-6.0%	-9.6%
Debt service coverage ratio	0.80	-0.5	-0.6	-1.22
Operating expenses/operat. revenues	0.99	1.27	1.40	1.65

5.2 ELECTROGAZ's revenues from the sales of electricity, water and gas rose from RWF 1,409 million in 1988 to RWF 1,535, RWF 1,702 and RWF 2,277 million in 1989, 1990, and 1991 respectively, representing 9% increase in 1989, 10.8% in 1990 and 33.8% in 1991. Except for 1991, these increases are rather small when compared to those of operating expenses (excluding provisions for exchange losses), which rose by 32% in 1989 and 19% in 1990. Other revenues, including subsidy (for about 40% of the total) and revenues from connections remained almost constant over the period 1988-1990, but declined by about 50% in 1991. The poor performance of revenues is primarily due to inadequate tariff and improper connection policies associated with insufficient supply and lack of materials to meet the fast-growing demand, but poor billing and collection practices have also been a major contributing factor.

5.3 Operating expenses (excluding depreciation) rose from RWF 1,161 million in 1988 to RWF 2,049 million in 1991, which represent an increase of 77%. Purchases of electricity from Ruzizi I (SNEL of Zaire) and Ruzizi II (SINELAC) represented 2.5%, 6.2%, 15% and 25% of operating revenues in 1988, 1989, 1990 and 1991 respectively, thus confirming the critical dependence of the country on external sources for its power needs, as shown in the power and energy balance given in Annex 1.2. Depreciation increased from RWF 863 million in 1988 to RWF 1,549 million in 1991, which corresponds to an increase of 79%, while exchange losses (calculated as required by accounting principles) have gone up from a zero value in 1988 to RWF 173 million in 1989 and RWF 5,236 million in 1990. Interests were multiplied by a factor of about 6, increasing from RWF 120 million in 1988 to RWF 711 million in 1991, as a result of maturity of new

debts. Annex 5.5 provides details of ELECTROGAZ' debt situation. Increasing dependence on SINELAC and SNEL to meet the fast-growing electricity needs of the country, ELECTROGAZ' inability to implement a comprehensive cost reduction plan, excessive capital investments, inordinate borrowing coupled with the recent devaluations of the Rwandese franc have brought total expenses to levels incompatible with revenues. As a result, ELECTROGAZ' losses went up from RWF 56 million in 1988, to RWF 791 million in 1989, RWF 6,310 million in 1990 and to RWF 1,700 in 1991. As indicated in Table 5.1 above, depreciation plus interest expenses and exchange losses represented about 45% of total revenues in 1988, 77% in 1989 and 3 times the total revenues for 1990. During the same period, the respective operating ratios (excluding exchange losses) were 99, 127, 140 and 165. Without concrete actions on all expense items, the utility's overall performance cannot improve.

5.4 The rates of return on net revalued fixed assets (excluding the exchange losses) fell from a positive value of 0.13% in 1988 to -4% in 1989, -6% in 1990 and -9.6% in 1991, which are far below the 1.4% established in the agreements of CR. 1495-RW. The debt service ratios fell from a positive value of 0.8 in 1988, to -0.5 in 1989, -0.6 in 1990, and to -1.2 in 1991, which indicates that the company is unable to service its increasingly heavy debts. The current ratio declined, moving from 1.3 in 1988, to 1.16 in 1989, 1.06 in 1990 and to 0.63 in 1991, thus reflecting the excessive level of receivables for the sales of electricity and water, with an average of 12 months of billing as of December 31, 1991, or 32 months for Central Government receivables and 6 months for private consumers, as shown in Table 5.2.

Financial Restructuring

5.5 ELECTROGAZ' balance sheets for 1988, 1989 and 1990 are summarized in Table 5.2. The capital structure has been deteriorating. Its debt/equity ratios were 0.92, 0.73 and 2.42 in 1988, in 1989 and 1990 respectively. Accumulated earnings (profits or losses), which were positive in 1988, totalling RWF 455 million, declined to -RWF 336 million in 1989, to - RWF 6,646 million in 1990 and - RWF 8,346 million in 1991. However, total equity remained positive during the same period, even though falling from RWF 12,196 million in 1989 to RWF 6,125 million in 1990 and RWF 4,095 million in 1991. The sharp downfall experienced in 1990 is primarily due to the devaluation of the Rwandese franc. This situation will continue to deteriorate as most of past debts contracted in foreign currencies arrived at maturity in 1991. ELECTROGAZ therefore needs to be recapitalized. A capital restructuring package for the SNP would be prepared by the Government with assistance from a consultant. During negotiations, the Government has agreed to use the balance of compensation of cross-debts with ELECTROGAZ as its contribution to recapitalize the SNP without any cash outlays as explained in para. 5.13. Progress in the implementation of this measure will be assessed before the private operator is in place.

Table 5.2: Electrogaz - Balance Sheets for FY88-91
(in Million of RWF)

	1988	1989	1990	1991
ASSETS				
Net fixed assets	17,161	20,690	20,717	21,203
Current assets	3,137	3,645	9,568	9,444
TOTAL ASSETS	20,298	24,335	30,285	30,647
EQUITY AND LIABILITIES				
Paid-in capital	2,101	5,584	5,680	5,680
Accum. Retained earn.	512	455	-336	-6,646
Profit & Loss of the year	-56	-791	-6,310	-1,700
Equip. subsidy + Central Govt. Dev. Budget	6,741	6,948	7,091	6,761
TOTAL EQUITY	9,298	12,196	6,125	4,095
Provisions for losses	11	187	5,422	5,260
Net long-term debts	8,577	8,953	14,845	14,962
Current liabilities	2,412	2,999	3,893	6,330
TOTAL EQUITY + LIABILITIES	20,298	24,335	30,285	30,647
Current ratio	1.30	1.16	1.06	0.63
Debt as % of Equity	0.92	0.73	2.42	3.65
Private consumer receivables			7 months of sales	6 months
Government Receivables			29 months of sales	32 months

ELECTROGAZ' Past and Present Debts

5.6 Starting in 1988, ELECTROGAZ failed to service its debt obligations vis-à-vis the Government. As of December 31, 1991, the outstanding short-term and long-term debts amounted to RWF 3.7 billion and to RWF 14.9 billion respectively. This situation, as confirmed by consultants in the study on ELECTROGAZ restructuring, stems from inordinate borrowings and excessive capital investments in the past, coupled with the devaluations of the Rwandese Franc as mentioned in para. 5.3. The study also highlighted among others, the impact of two IDA-financed projects[11]. As shown in Annex 5.7, onlending rates and repayment periods, which follow the policy of each donor, ranged from 2% to 6%, and between 25 and 50 years respectively, for all other cofinanciers involved in the electricity and water sectors, whereas IDA rates were 10% for electricity and 10.97% for water, with 20 years repayment periods. As a result, these IDA-financed projects represented about 48% of the total outstanding debts of the utility, and contributed in debt obligations including exchange losses for about 60%. The study however concluded that, with the restructuring measures to be implemented under the proposed project, including a satisfactory investment program (para. 1.34), the recapitalization of the SNP (para. 5.5), the financial objectives (para. 5.7), the tariff action plan (para. 5.8), the government contribution to water tariff (paras. 5.11), and the onlending terms and conditions of the proposed project (at the prevailing IBRD rate plus 1% commission, with 25 years repayment period including a grace period of 5 years and provided that the Government bear the foreign exchange risk), ELECTROGAZ would become a financially-sound institution capable to service its past and future debt obligations. Nevertheless, there is a need to consolidate and harmonize the onlending terms and conditions of past IDA-

[11] The First Water Supply Project (Cr. 1345-RW) dated April 12, 1983, with the equivalent of SDR12 million and the Power I Project (Cr.1495-RW) dated June 12, 1984, with the equivalent of SDR8.5 million, were onlent to ELECTROGAZ at 10.97% and 10% respectively, with repayment periods of 20 years including 5 years of grace period.

financed projects. In the subsidiary loan agreement between the Government and ELECTROGAZ referred to in para. 4.27, the onlending rates and repayment periods for the two IDA-financed Credits would be modified to reflect those applied in the proposed project.

Financial Objectives

5.7 To improve the financial situation of the sector and based on the proposed tariff increases, agreement was reached with the Government at negotiations for the implementation of the following objectives:

(i) average electricity and water tariffs were raised by 15% in January 15, 1993, and would be raised by another 15% in April 15, 1993, with both increases included in one decree that was issued in January 11, 1993; the April 15 increase would be a condition of Credit effectiveness; these levels would be sufficient to remunerate the SPE, purchase energy and fuel, and cover about 46% of the SNP's depreciation;

(ii) average electricity tariffs would be raised, effective October 1, 1993, by at least 10% in real terms with the objective of reaching the LRMC in a phased manner by the mid-term review in June 30 1995[12]; these levels would be sufficient to remunerate the SPE, purchase energy and fuel, cover the SNP's operating expenses, service its full debt obligations; the SNP is required to earn an after tax rate of return on revalued net fixed assets of 2.47% in 1993, and 5.27% in 1994; average water tariffs would be raised by 8%, effective also October 1, 1993 and by 7.5% each year thereafter until December 31, 1998, so as to gradually transfer the financial burden of sectoral debt service and development onto the consumers;

(iii) average tariffs would be raised, effective June 30, 1995; for electricity, by a percentage that has to be determined as described above, so as to catch up with the LRMC, and for water by 7.5% subject to change upon completion of ongoing studies on the investment program for the water sector; the SNP is required to earn an after tax rate of return on revalued net fixed assets of 6% and thereafter;

(iv) the SNP would maintain a debt service ratio of at least 1.5 and not incur any debt unless forecasts show that the debt service coverage ratio in all succeeding years will be at least 1.5.

Tariff Action

5.8 The agreed tariff increases are given in Table 5.3 below. To achieve the objectives mentioned in the previous paragraph, during negotiations, agreement was obtained from the Government that, except for small domestic consumers using up to 40kWh/month:

(i) tariffs be maintained at such levels as would provide to the asset holding company revenues necessary to meet the objectives in para. 5.7;

(ii) the electricity and water tariffs be automatically adjusted to take into account changes in the rate of exchange between the Rwandese franc and the US$, in price of purchasing electricity from SINELAC and in salaries (using the formula as defined in Annex 5.9); and

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[12] In any case, the final increase would not be less than what is needed to meet the full rate for electricity tariffs, as defined in para. 2.28.

(iii) an annual report on the adequacy of tariffs to meet the objectives in para. 5.7 be prepared and be submitted by December 31 each year to the Government and to IDA for review and action.

Table 5.3: Agreed Tariff Increases (in RWF) a/

	1992	1993	1994	1995	1996	1997	1998
ELECTRICITY							
Agreed Increases	0.0%	49.5% c/	15% c/	15% c/	d/	d/	d/
RWF / KWh	10.25	15.32 c/	17.62 c/	20.26 b/	d/	d/	d/
WATER							
Agreed Increases	0.0%	43.00% f/	7.5%	7.5%	7.5%	7.5%	7.5%
RWF/m³	79.20	113.26 e/	121.75 e/	130.88 e/	140.7 e/	151.3 e/	162.59 e/

a/ As agreed upon during negotiations;
b/ The LRMC for electricity, as estimated by consultants and agreed upon at negotiations, is RWF 20/kWh;
c/ This 49.5% increase consists of two 15% average increases in January 15 and April 15, 1993, and of a 13% in October 1993. After that, the Government has agreed that each annual increase would be at least 10%, so as to reach the LRMC in a phased manner by June 30, 1995, but has retained the flexibility to decide on the actual size of the three annual increases; in this report, a uniform 15% increase has, therefore, been used from 1993 to 1995;
d/ Any variation in the exchange rate between the RWF and the US$, or in the price of electricity purchased from SINELAC or in salaries, would require appropriate tariff adjustments, so as to prevent adverse effects on the sector finances.
e/ These tariffs would be subject to change once the LRMC for water is available upon completion of ongoing water supply studies for Kigali and secondary centers;
f/ In 1993, water tariffs would be suject to a phased 43% increase as follows: two 15%, the first in January 15 and the second in April 15, 1993, and 8% in October 1, 1993;

Source: Restructuring Study (March 92), LRMC Study (October 92), ELECTROGAZ and mission estimated.

Arrears, Billing and Revenues Collection

5.9 The balance on receivables for 1989, 1990 and 1991 is presented in Table 5.4. Receivables from the private sector amounted in December 1990 to 52% of the total and represented 7 months of sales with a collection rate of 60%. At the end of December 1991, payments received from the private consumers resulted in reducing its arrears to 6 months of sales, which is still high as compared to the agreed upon 60 days after the reception of the bill. The Government's arrears as of December 31, 1990, were equivalent to 29 months of billing, with a collection rate of 11% in 1990. This situation is primarily due to the budget allocation process which allows MINITRAPE to manage and pay for electricity and water bills of most of the Public Offices and Government's agencies. As a result, the amount allocated by MINITRAPE to each ministry, which is already insufficient to pay for the actual electricity and water bills, is used by the ministries to finance other expense items, leaving ELECTROGAZ with excessive arrears. For 1991, the allocated budget for electricity and water consumption of this category of consumers totalled RWF 210 million which is very low as compared to the actual consumption bills of RWF 345 million, with RWF 120 million collected.

Table 5.4: Electrogaz - Receivable Ratios
(in million of RWF)

Category of Consumers	Receivable as of Dec. 31, 1989	Sales	1989 Ratios	Receivable as of Dec. 31, 1990	Sales	1990 Ratios	1991 Ratios
Government	557.2	270.3	25 months	778.2	323.5	29 months	32 months
Private	680.4	1,227.9	6 months	839.4	1,444.6	7 months	6 months
Total	1,237.6	1,498.2	10 months	1,617.6	1,768.4	11 months	12 months

Source: ELECTROGAZ.

5.10 The cross-debts between the Government and ELECTROGAZ (about RWF 1.7 billion in favor of Government by the end of 1991) were compensated[13] as of November 30, 1992. During negotiations, agreement was obtained that: (i) starting from January 1993, each government agency and ministry shall be made responsible for the cost of its electricity and water consumption and shall implement an action plan to reduce consumption; (ii) their annual budget allocations shall include sufficient provision to cover the cost of their electricity and water consumption and would be determined by October 31 each year for the following year; (iii) systematic power cut-off to government agencies in arrears would be implemented by March 31, 1993; and (iv) all their future bills shall be paid within 60 days of sales from presentation in accordance with agreed administrative procedures. Such procedures were agreed upon at negotiations, and include the establishment (tied upon the hiring of the private operator) by the Government of an escrow account in a local commercial bank acceptable to IDA, where the budget allocation for electricity and water consumption of government agencies and ministries would be deposited each year. In this connection, the Government has agreed during negotiations to make, no later than November 30, 1993, an initial deposit of RWF 500 million, to be used for the payment of the 1994 electricity and water bills of the Government's ministries and agencies. For private customers, it was also agreed that: (i) reduction of the average age of receivables to 60 days of sales from presentation of bills by March 31, 1993; and (ii) power cuts for customers with arrears over these targets.

Future Financial Position

5.11 The projected financial statements of ELECTROGAZ from 1990 to 1998 are presented in Annexes 5.1 to 5.4, while Annex 5.8 gives the assumptions used. A summary of forecasted operating results and selected indicators is shown in Table 5.5 below for 1993 to 1997.

Table 5.5: Key Operating Results for 1993-97 a/

	1993	1994	1995	1996	1997
THE SPE, THE OPERATING COMPANY					
Aver. water operat. tariff (in RWF)	55.21	59.35	63.80	60.04	57.04
Aver. electr. oper. tariff (in RWF)	9.03	9.03	10.34	10.34	9.30
Aver. gas operat. tariff (in RWF)	20.00	20.00	20.00	20.00	20.00
Net income (in mRWF)	126,931	148,285	186,489	204,623	256,786
Internal resources	204,580	243,199	303,750	351,248	442,591
Operating ratio	0.95	0.95	0.94	0.94	0.92
Circulating assets/circulating liabilities	0.99	1.09	1.24	1.46	1.89
THE SNP, THE PUBLIC ASSETS COMPANY					
Part wat. tar. for sect. investment	58.05	62.40	67.08	80.66	94.26
Part elec. tar. for sector invest.	6.29	8.59	9.92	9.92	10.96
Part tar. (gas) for sect. investm.	2.00	2.00	2.00	2.00	2.00
Net income (in RWF)	-10,427	482,953	752,125	953,132	1,148,451
Internal resources (in mRWF)	906,610	1,373,279	1,647,636	1,856,404	2,805,296
Rate of return on net fixed assets	2.47%	5.27%	6.69%	7.82%	6.02%
Debt service coverage ratio	1.52	1.69	1.62	1.84	2.03
Operating ratio	0.70	0.59	0.55	0.52	0.59
Circulating assets/liabilities	0.13	0.18	0.22	0.31	0.92
Debt/equity	3.90	3.75	4.39	4.78	4.10

a/ Do not include Government subsidy for water;

[13] The resulting balance of the cross-debts compensation, which is in favor of the Government, will be used by the latter as its contribution to recapitalize the SNP with no cash outlays.

5.12 With the actions mentioned earlier (paras. 5.5 - 5.8 and 5.10), net income of the SNP becomes positive in 1994, and increase to RWF 1,148 million in 1997. All operating expenses, including interest payments are covered by revenues in 1994. Improvements in management and operational efficiency through the Lease Contract, satisfactory investment programs, adequate electricity and water tariffs as well as the financial restructuring package are expected to bring the successor of ELECTROGAZ, the SNP, back to full financial viability. At negotiations, agreement was reached that: before the end of November in each year, the Government and the SNP will review with the Bank the financial projections of the latter, and agree on measures to achieve the targeted indicators, including tariff adjustment. Key performance indicators for the SNP are provided in Annex 4.11.

Project Impact on Government Finances

5.13 Given the country's precarious fiscal situation, particular attention has been paid to the project impact on Government finances. As shown in Table 5.6 below, and further detailed in Annexes 5.6-5.7, the resulting impact of the proposed project on Government finances, in terms of financial inflows and outflows, is about RWF 2.1 billion in favor of the Government. On one hand, the Government will receive about RWF 3.33 billion (RWF 24 billion) in tax payment on net income from the SNP and SPE over the period of 1993-1998. On the other, its contribution to water tariffs and its counterpart funding as cofinancier represent about RWF 1,220.8 million (US$8,72 million) and correspond to 0.60% of the 1992 projected GDP. The financial impact over six years is as follows: -RWF 224.3 million in 1993, +RWF 47.8 million in 1994, +RWF 254.5 million in 1995, +RWF 477.7 million in 1996, +RWF 455.4 million in 1997 and +RWF 1,104.4 million in 1998. For the remaining balance of the compensation of cross-debts between ELECTROGAZ and Government (about RWF 1.7 billion as of December 31, 1991), which mainly corresponds to outstanding current liabilities owed by ELECTROGAZ to Government, it would be used to recapitalize ELECTROGAZ or its successor, and would involve no cash outlays from the Government. The Government equity contribution to the capital of the private operating company (RWF 145 million, or 20% of the capital of the SPE estimated by consultant at US$5 million) would take the form of assignments of some of the main buildings presently used by ELECTROGAZ with no financial flow.

Table 5.6: Project Impact on Government's Finances a/
(in millions of RWF)

Categories	Compensation of Arrears b/	Contribution to the SNP's Capital b/	Counterpart Funding c/	Tax Payments from the SNP/SPE	Contribution to Water Tariff d/	Impact on Government Finances
Impact on Government Finance	- 1,707	+ 1,707	- 324.80	+ 3,336	- 896	+ 2,115.20

a/ The contribution of Government to the SPE's capital (about 20% of the SPE capital of US$5 million) is not accounted for in this table as it may take the form of assignment of some of the main buildings presently used by ELECTROGAZ;

b/ With no cash outlay from the Government;

c/ As per disbursements per cofinanciers as provided in Annex 4.5 page 2 of 2, using an exchange rate of US$1 = RWF 140;

d/ RWF 249 million in 1993, RWF 189 million in 1994, RWF 114 million in 1995, and RWF 20 million in 1996, RWF 222 million in 1997 and RWF 102 million in 1998, as explained in Annex 5.6.

VI. PROJECT JUSTIFICATION, BENEFITS AND RISKS

Justification

6.1 Following the 1992 UNDP/World Bank Energy Sector Assessment Report, the proposed project is the first comprehensive attempt to address the spectrum of problems in the sector as highlighted in this report. Specifically, it is an important extension to and deepening of the Government's ongoing public enterprise reform program as it includes fundamental changes to the structure and management of the country's major public utility. The project will also extend electricity supply in Rwanda's five main urban centers in a lower-cost manner than in the past, make it accessible to a larger proportion of the population[14] through a more appropriate tariff structure and reduce the drain on the national budget caused by ELECTROGAZ's poor financial management in the past. IDA's involvement and assistance through this project will help the Government and ELECTROGAZ to effectively carry out the required institutional reforms and build up the management capabilities that are needed to restore adequate and reliable supply of electricity.

6.2 The proposed project addresses important environmental concerns. An estimated 90% of wood production in Rwanda is for domestic energy consumption in the form of woodfuel and charcoal. Charcoal, which is resource-intensive in production as well as in use, is to a significant extent responsible for the deforestation and wood depletion that have taken place in certain parts of the country. High population density and dependence on woodfuels for energy needs are determining factors. Through the improved carbonization techniques, the design and implementation of a wooduse management plan at the village level, the proposed project would contribute to substantially reduce the negative effects on the environment of the necessary wood use and charcoal consumption.

Benefits

6.3 For electricity, the proposed project includes the bulk of ELECTROGAZ's investments in generation, transmission and distribution over the period 1993-97. All components of the program have been reviewed to ensure that they meet least-cost criteria. Rehabilitation of generation and transmission facilities is justified as it will prolong their operational life and no cheaper alternative exists. Concerning distribution facilities, their design, which would lead to substantial cost reduction as compared to the existing installations, has been done along the lines of least-cost technical alternatives, proposed by the consultant, agreed by ELECTROGAZ and found acceptable during appraisal. Only new hydro plants to be developed with Rwanda's neighbors and some rural electrification programs that are presently under consideration have not been considered as part of ELECTROGAZ's program.

6.4 In the economic analysis of the electricity component of the proposed project (details are given in Annex 6.1), the main quantifiable benefits taken into account are the increased sales of electricity and the reduction in losses obtained. The sales are based on a recent load forecast and are projected to rise by an annual average of 8.4%. They have been valued at US$0.12/kWh, taken as an average of the social tariff of RWF 10.00/kWh, and the estimated long-run marginal cost RWF 20/kWh, weighted by the respective percentage of total consumption to which they are applied. Such a tariff covers the SDR0.05 tariff of SINELAC. Using this minimum value for the benefits from the project, the resulting internal economic rate

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[14] Presently, the population's access to electricity is very low: less than 2 percent for Rwanda and 20 percent for Kigali. This is one of the lowest in sub-Saharan Africa: Burundi and Zaire, 3 percent, Tanzania, 6 percent, Kenya, 12 percent and Ivory-Coast, 14 percent.

of return (IERR) on this component is 19%. In the event that investment costs were 10% higher than projected, and sales growth was 6% p.a., the IERR would fall to 10%. If sales growth was to average only 6% p.a. as a result of 10% higher tariffs, the resulting IERR is 15%. On the other hand, if load growth remains at 8.4% despite average tariffs 10% higher than projected, the IERR would go up to 24%. With 8.4% load growth and investment costs 10% higher than projected, the IERR is 17%. In the event of a 2-year delay, with investment costs 10% higher than projected, in spite of 8.4% load growth, the IERR would fall to 10%.

6.5 The IERR and net present value for the extension of distribution network in each of the five cities are as follows: for Kigali, 36% and US$3.75 million; for Butare, 23% and US$69,950; for Ruhengeri, 13% and US$570,700; for Gisenyi, 14% and US$351,910; and for Nyabisindu, 12% and US$156,710. The average consumption per consumer has been calculated as the average weighted demand for two categories of consumers: those using up to 400 kWh per year, which form about 48% of the total number of consumers, and those using up to 3,500 kWh per year, which constitute 40% of the total number of consumers. The sales have been valued using an average tariff of US$0.12, as defined above. The detail of the cost/benefit as well as the sensitivity analysis is provided in Annex 6.1.

Risks

6.6 The physical risks of the proposed project are minimal because rehabilitation work in transmission and distribution network is routine and would be carried out under well-known conditions. The other risks are mainly of managerial and institutional nature and include: the difficulty of finding a private operator willing to take over ELECTROGAZ' operations, possible government interference in day-to-day management of the utility, its non-observance of the lease contract, its failure to promptly settle its bills, its reluctance to set an appropriate tariff policy for electricity and water, and the effective implementation of a long-term, stable corporate culture. The Government's recent track record with implementing difficult decisions to create an enabling environment for the path of reforms suggests that the risk of not taking necessary measures to ensure appropriate energy pricing policy is low. Planning for the restructuring of ELECTROGAZ has been the subject of a long-standing and intensive dialogue and preparation, and it is unlikely that it would back track on it at this stage. The institutional component has been designed with maximum effort to prepare the path for privatization of the utility and improvement of the regulatory framework. Furthermore, up-front measures including a major staff reduction plan before the private operator is in place, and key commercially-oriented principles to be embodied in the utility revised Law and statutes, as well as the program for implementation of financial and capacity-building reforms, would substantially reduce these risks.

6.7 The risk of delays and cost increases caused by slowness in approving contracts and disbursements would be mitigated by the retention of a private operator and competent consultants to assist ELECTROGAZ in successfully carrying out the implementation of the proposed project. The phasing of the project and the requirement to achieve measurable progress on privatization before disbursement of most of project physical components would also reduce this risk. For the charcoal component, implementation of wood use management plans at the village levels and adoption of more efficient carbonization techniques, advertising campaigns for rationale charcoal consumption and promotion of the use of pinewood, will be carefully designed and monitored with a view to achieving effective sensitization of targeted groups.

VII AGREEMENTS REACHED AND RECOMMENDATIONS

7.1 Agreements were reached on the following during negotiations:

(a) The restructuring package of ELECTROGAZ including the establishment of a national utility company (SNP) and the contracting out of the operations of ELECTROGAZ to a private company, the SPE (para. 2.22); and implementation of a staff stabilization plan for ELECTROGAZ so as to bring and maintain the staff at a level not to exceed 1,253 employees (para. 2.7);

(b) Terms of reference for consultants to assist the Government in drafting the bidding documents, evaluating the proposals and providing legal advice throughout the selection process of the private operator (para. 2.25);

(c) Except for small domestic consumers using up to 40 kWh/month, (i) tariffs would be first maintained at such levels as would provide to the asset holding company revenues necessary to meet the objectives in para. 5.7; and each year thereafter (ii) tariffs would be automatically adjusted to take into account changes in the rates of exchange between the Rwandese franc and the US$, in price of purchasing electricity from SINELAC and in salaries; and (iii) an annual report on the adequacy of tariffs to meet the objectives in para. 5.7 would be prepared and be submitted by December 31 each year to the Government and to IDA for review and action (paras. 5.7 and 5.8);

(d) Increase in average tariffs for electricity by at least 10% in real terms, effective October 1, 1993, so as to reach the LRMC in a phased manner by June 1995; for water, by 8%, in real terms, effective also October 1, 1993, and by 7.5% in real terms each year thereafter until December 31, 1998 (paras. 5.7 and 5.8);

(e) Starting from January 1993, each government agency and ministry shall be made responsible for the cost of its electricity and water consumption and shall implement an action plan to reduce consumption of electricity and water; their annual budget allocations shall include sufficient provision to cover the cost of their electricity and water consumption; and all their future bills be paid within 60 days of sales from presentation in accordance with agreed administrative procedures and by March 31, 1993, implementation of a systematic power cut policy for government agencies with arrears over this target (para. 5.10);

(f) The administrative procedures for payment of Government bills would include establishment of an escrow account in a local commercial bank acceptable to IDA, and a deposit in each year of the budget allocation for electricity and water consumption of government agencies and ministries; no later than November 30, 1993, an initial deposit of RWF 500 million would be deposited to cover the 1994 bills for electricity and water consumed by such institutions (para. 5.10);

(g) For private customers: (i) reduction to 60 days of sales from presentation by March 31, 1993 of the average age of receivables; and (ii) power cuts for customers with arrears over this target (para. 5.10);

(h) The Government would provide the differential between the actual water tariff (after the yearly increase as described in para. 5.8) and the full rate; the actual provision would be determined by October 31 of each year for the succeeding years (para. 2.31);

(i) Starting January 1993, the Government will prepare no later than November 30 in each year a satisfactory annual report on the public investment program in the energy sector and no later than December 31 in each year agree with the Bank on a satisfactory three-year rolling program for the energy sector (para. 1.34);

(j) All new investments, including those related to rural electrification, undertaken by the successor of ELECTROGAZ, the SNP, will have an economic rate of return of at least 10% and the successor of ELECTROGAZ, the SNP, will request IDA's approval for all investments above US$1,000,000 (para. 1.34);

(k) The successor of ELECTROGAZ, the SNP, will continue to employ qualified external auditors and will send to the Bank, audited financial statements including the long form report, as well as audited accounts of the Special Account and of the Statements of Expenditures, within six months after the end of each fiscal year (paras. 2.12 and 4.29);

(l) A Project Completion Report will be prepared no later than six months after the completion of the project (para. 4.30);

(m) A mid-term review will be undertaken by June 30, 1995 by the Government and IDA, to assess the overall project implementation and achievements, and to take the corrective measures that may be needed, taking into consideration, among others, net production (GWh), power available for sales, billing (percentage of power available for sale), client-account expressed in days of sales (non governmental), purchase of electricity, number of clients per employee, net operating coefficient, self financing ratio, service quality including the quality of voltage and number of interruptions and average interruption per client, and standards of drinkability of water, as fixed by the World Health Organization (para. 4.30);

(n) Key milestone dates for the implementation of ELECTROGAZ' operations contracting: selection and starting of negotiations with the successful professional private operator -- August 31, 1993; signature of the lease contract -- before November 30, 1993 (para. 2.27).

(o) Government and SNP will annually review with the Bank before the end of November the financial projections of the SNP and agree on measures to achieve the targeted indicators, including tariff adjustment (para. 5.12);

(p) In the subsidiary loan agreement between the Government and ELECTROGAZ referred in para. 4.27, the onlending rates and repayment periods for IDA Credits 1345-RW and 1495-RW would be modified to reflect those applied in the proposed project (para. 5.6); and

(q) The Government would submit to IDA by 30 September 1993 and implement by January 1, 1994 an action plan including simplification of the taxation structure and price liberalization for petroleum products (para. 1.29).

7.2 The following would be **conditions for Credit Effectiveness:**

(a) Execution of the subsidiary loan agreement between the Government and ELECTROGAZ (para. 4.27);

(b) Establishment of the PCAU and PIUs, and recruitment by each of the PIUs of a manager and by the PCAU of an accountant and an assistant accountant (para. 4.16);

(c) Submission by the Government of a proposal satisfactory to IDA on a new tariff structure for electricity and its implementation (para. 1.18);

(d) Launching of bids to select the professional private partner; (para. 2.27);

(e) Implementation of the Ministerial Decree that promulgates the details of charcoal transport taxation including its collection and allocation through the National Forestry Fund (NFF), (para. 4.17);

(f) Implementation by the Rwandese customs agents of measures to stop the smuggling of diesel at border posts (para. 1.28);

(g) Confirmation of a satisfactory financing plan for the proposed project (para. 4.26); and implementation of the staff stabilization plan for ELECTROGAZ so as to bring and maintain the staff at a level not to exceed 1,253 employees (para. 2.7); and;

(h) Increase in average electricity and water tariffs by 15% (para. 5.7);

7.3 The following would be **conditions of disbursement** :

(a) For the rehabilitation and extension of the distribution networks:

Publication of the Law establishing the regulatory and institutional framework for PEs; enactment of the SNP's statutes and functions, and appointment of its Board members (para. 2.6); hiring a private operator under a lease contract; and confirmation by Government of the availability of the State equity contribution to SPE for the equivalent of US$1 million (para. 2.27); and

(b) For the petroleum products component:

Transfer of responsibilities for managing the petroleum storage depots from PETRORWANDA to a private company to be created and jointly owned by all oil importers (para. 4.9); and submission by Government to IDA of an action plan including simplifications of the taxation structure and price liberalization and its implementation (para. 1.29).

Recommendation

7.4 Subject to the above agreements, the project is suitable for an IDA Credit of US$26 million equivalent on standard terms.

REPUBLIC OF RWANDA

ENERGY SECTOR REHABILITATION PROJECT

Kigali, November 5, 1992

DRAFT LETTER OF DEVELOPMENT POLICY FOR THE ENERGY SECTOR

I. Background

Economic policy of Government

The Rwandese Government has adopted the economic reform program detailed in the Policy Framework Paper (PFP) for 1991-93 to resolve the serious economic and financial problems besetting the country. The basic macroeconomic objectives are an early return to a viable external and domestic financial position together with accomplishment of sustainable economic growth strategy with low inflation. This new strategy represents a definite move away from the policy of the 1980s, as it places the emphasis on recourse to market forces and private sector and is more export-oriented. The key objectives of the program are to reestablish economic growth of some 4% between now and 1993 and to bring inflation down to 5% p.a. by the same year, while ensuring a certain stability as regards the budget and balance of payments. To achieve these objectives, the program aims to: (i) create a climate conducive to private sector activity and international competitiveness; (ii) improve and rationalize public sector management; (iii) develop the human resource base; and (iv) improve natural resource management. To promote participation of the private sector in the economy, the Government has decided to abolish price control and to institute transparent, clear and simple procedures for the establishment of enterprises.

In the energy sector, about 80% of the commercial energy used in Rwanda is imported, representing on average 18% of goods imports during the period 1983-87. Domestic prices of oil products during the 1980s were appreciably above international levels. On the other hand, electricity tariffs remained unchanged from 1981 to 1988, where they were reduced by 14%. At the end of 1990, tariffs for household consumption represented 33% of the long-term marginal cost. The electricity system is not well maintained and is run by a public corporation, ELECTROGAZ, which is characterized by excessive government intervention, poor management and a rapidly deteriorating financial position. To address ELECTROGAZ's problems, a new law on legal and institutional framework for Public Enterprises – the draft of which and Institutional Reform of Public Enterprises was adopted by the Council of Ministers during its sessions that took place between December 4 and 10, 1992. This draft was sent to the Parliament on December 15, 1992 and will be published and

implemented no later than the end of June 1993. Under this new law, ELECTROGAZ, now a public establishment, will become a national corporation.

The prices of oil products were raised by 79% in November 1990. This has brought the current retail price of gasoline up to US$1 per liter in Kigali. This increase, a preliminary measure taken in the context of the structural adjustment program, has provided a strong incentive for energy savings and has helped to ease the Government's budgetary problems. As regards rate-setting for electricity, the objective is to align rates on the respective long-term marginal costs and to restore the financial position of ELECTROGAZ, which has been the subject of a detailed analysis as part of the Public Enterprises Reform Project financed by IDA. New electricity tariffs were brought into effect as of July 1, 1991, and consultants are currently finalizing a least-cost master plan that will include revised estimates of long-term marginal cost and establishment of an appropriate tariff structure. Once this master plan is completed in January 1993, a new tariff structure (compatible with the long-term marginal cost) will be prepared and adopted within the context of actions envisioned in the electricity subsector. To ensure that this public enterprise reform produces the desired results, ELECTROGAZ will conclude a lease contract with a private operator under which it will retain ownership of its assets but the specialized professional partner will be entitled to use them and will be responsible for generation, transmission, distribution, maintenance, billing and collection in a way that will ensure enhanced efficiency, while applying an effective and coherent reform policy. Assistance in implementing this reform in the energy sector will be provided by the Government, IDA, the Caisse Centrale de Coopération Economique and the European Investment Bank for about US$38.95 million through the Energy Sector Rehabilitation Project (ESRP).

II. Energy balance/Overall energy consumption

In 1991, Rwanda consumed 1.4 million tons of oil equivalent (toe), taking all energy sources together. Biomass (wood and wood products, agricultural residues) accounts for 93% of all energy consumption, oil products 5%, and electricity 1%. In terms of commercial energy consumption (oil products, all imported; electricity, half of which is imported; charcoal, produced locally; wood, used in the institutional sector and in industries), it is apparent that per capita net annual consumption, of the order of 0.011 toe, is among the lowest in the world. To place the energy flows in a fully controlled context, the Government has undertaken priority studies focusing on:

- consolidation of the energy database
- devising of an oil product supply strategy
- the master plan for electrification of Rwanda by the year 2010
- the peat development master plan.

III. Sector objectives

The Government's key objectives are to: better utilize the energy resources, enlarging the population's access to more energy and rationalize the management of the sector as a whole, in order to promote socioeconomic development while ensuring protection of the environment. To

accomplish these objectives, the Government, in close cooperation with the donors, will spare no effort to respond to the challenges of the energy sector and initiate all actions needed to:

* adopt least-cost solutions as regards investment;
* strengthen regional cooperation;
* diversify accessible energy sources;
* make rational use of energy sources;
* create and maintain an environment that fosters private-sector involvement and is better suited to ensuring good service quality while generating the financial resources essential for rapid development of the sector;
* identify basic energy needs in order to direct demand toward energy sources that are more accessible and whose impact on the environment is controllable;
* reconstitute and conserve the forest cover while improving the efficiency of wood, charcoal production and consumption;
* improve the efficiency of power generation and water production;
* strengthen the sector institutions, including ELECTROGAZ;
* establish appropriate tariffs for electricity, water and gas; and
* promote rational pricing for wood, charcoal and oil products while at the same time lessening the impact of their use on the environment.

IV. Subsector Situation

A. Electricity

(i) Generation/consumption demand forecasts

Almost all electricity consumed in Rwanda is hydroelectric in origin. Over the period 1980-90, electrical energy consumption rose from 57 GWh to 149 GWh, i.e. an average growth rate of 10% per year. Low-voltage sales make up more than 50% of total sales. System losses in 1991 were about 14%. Kigali and its environs absorb nearly 60% of this energy.

In 1991, the system's peak demand was 37.3 MW whereas ELECTROGAZ's installed capacity is only 26.5 MW. More than half of the country's electricity requirements are met by purchasing from SINELAC (the regional power company) and from SNEL (Zaire).

The number of users (25,639 as of the end of 1991) grew steadily over the period 1980-90 by 16% per year. Nevertheless, 98% of the population is still without access to this energy source. The major obstacles to an intensified electrification policy are the unit cost of connections, which represents several months income for many potential clients, and the fact that homes tend to be scattered in Rwanda, while the low household incomes mean that people have difficulty paying their bills.

For the period 1992-2000, demand for electricity is expected to rise at an average annual rate of 8.4%. Between now and 1995, it will only be possible to satisfy the additional energy needs, in part, by stepping up SINELAC's generating capacity, since Rwanda is entitled to one third of its output. Under these circumstances, a sizable shortfall, of the order of 30-40 GWh/year, is to be feared in power supply in the system, even if for subsequent years Rwanda were to benefit from a part of the Rusumo Falls plant's generation (60 MW and 400 GWh), an OBK regional project for which detailed designs are already available. Financing for feasibility studies would have to be raised during a roundtable meeting of donors to be arranged during the first half of 1993. Higher demand will require implementation of other plants (Nyabarongo and Ruzizi 3), the dates of entry into service of which will be specified in the master plan now being finalized.

(ii) Investment program

The energy sector investment program for 1992-94 amounts to RWF 11.302 billion (US$80.7 million) and includes the Energy Sector Rehabilitation Project (ESRP) for which the Rwandese Government has requested financial support from IDA and other donors. The share earmarked for electricity represents about 67% of the global PIP for the energy sector. The energy sector PIP represents in turn 11% of the global PIP for all sectors in Rwanda. The energy sector PIP for the period 1993-95 concerning which agreement was reached with IDA during the ESRP negotiations totals RWF 12.591 billion and comprises 17 projects, including the ESRP. The energy sector PIP for 1993-95 is annexed to this letter. In order to ensure the sustainability of the investments in the energy sector, the Government has decided to adopt a much more rational method than in the past for selecting investments for inclusion in the PIP. The selection criteria will henceforward be based on: (i) economic viability and justification (rate of return of at least 10%); (ii) least cost for social projects; (iii) consistency with sectoral and macroeconomic objectives; and (iv) sustainability. To this end, the Government will prepare no later than November 30 of each year, an annual report on public investments in the energy sector, and no later than December 31 of each year, it will agree with IDA on a rolling three-year investment program for the sector. In addition, for each new project undertaken in the energy sector involving capital expenditure in excess of US$1 million, a declaration of no objection will have to be sought from IDA.

To remove the main constraints (low energy autonomy, hydroelectric resources that are abundant but shared with neighboring countries, low cover-age rate, high investment costs) that impede the sound functioning of the sector, the electrification projects adopted (rural electrification and rehabilitation of ELECTROGAZ) will aim at promoting electricity use in the productive sectors and by households. The Rwandese Electrification Master Plan will adjust the timetable for entry into service of new projects for extending power lines in rural areas and for expansion of power plants.

(iii) Institutional framework

Up to the present, the electricity subsector has been run by the Etablissement Public de Production, de Transport et de Distribution d'Electricité, d'Eau et de Gaz (ELECTROGAZ), which is responsible for managing the generation, production, transmission and distribution facilities for electricity and water under the technical supervision of MINITRAPE. Its function is to foresee the execution of distribution projects, while MINITRAPE has responsibility for design and implementation of large projects. This division of responsibilities has not always been conducive to optimum coordination of the planning and execution of projects in the sector.

Like other public enterprises, ELECTROGAZ has a large number of problems, some of which derive from the nature of its relations with the Government. After a series of diagnostic studies and extensive discussion of their conclusions and recommendations involving all the parties concerned, including the donors, the Government has decided to embark upon a fundamental reform of the sector's institutional structure.

(iv) Proposed reforms

The solution adopted by the Government on October 13, 1992 to resolve ELECTROGAZ's problems involves splitting the corporation into two. In its place there will be established a national company responsible for acting as contracting authority and project manager and for asset management, and a private operating company that will take care of technical and commercial management and maintenance of all subsector facilities.

The Government has already invited power and water companies to seek qualification to participate in international bidding to run ELECTROGAZ's facilities under a lease contract.

(v) Measures to be taken in the context of the ESRP

The Government intends to issue the call for bids on the lease contract before the end of March 1993. This would make it possible to institute negotiations with the company selected before the end of November 1993.

The draft law abolishing Decree Law 1876 of April 20, 1976, that established ELECTROGAZ, was examined and adopted by the Council of Ministers during its sessions that took place between December 4 and 10, 1992. This draft law was submitted to the Parliament on December 15, 1992.

Significant rehabilitation measures will be deployed to put an end to the financial crisis besetting ELECTROGAZ. The average electricity and water tariffs were raised by 15% in January 15, 1992 and will be raised by an additional 15%, effective April 15 1993. These two increases were included in a single decree issued in December 11, 1992. At the same time, the Government took steps to mitigate the impact of these measures on low-income consumers by introducing social consumption brackets of less than 40 kWh/month or 5 m^3/month for which tariffs will remain unchanged at their present levels. ELECTROGAZ will examine the conditions under which and the extent to which it would assume the connection costs for all new residential clients, to facilitate access to water and electricity. In addition, in order to bring tariffs into line with the

long-term marginal cost of electricity (calculated at about RWF 20/kWh) by June 30, 1995, further increases will be necessary in 1993, 1994 and 1995.

Regarding billing for electricity service, the State and the public institutions are currently about 32 months behind in paying their bills. The Government has decided that from now on it will settle its bills within 60 days of receipt and will take all necessary steps to ensure that the ministries and government agencies do the same. In addition, settlement of the cross between the State and debts State/ELECTROGAZ were compensated effective November 30, 1992. As of December 31, 1991, the balance of the State/ELECTROGAZ cross-debts, which stood at RF 1.707 billion in favor of the Government, was used as Government contribution to recapitalize ELECTROGAZ.

At the same time, special attention will be given to the retraining of present ELECTROGAZ personnel who will not be employed in either of the two companies to be formed. ELECTROGAZ's target in reducing its personnel is to bring the number down to 1,253 between now and the end of April 1993.

B. Oil products

(i) Present situation

In 1991, Rwanda consumed 66,000 tons of oil products, all imported from the East Coast of Africa, which was more than 1.5 times its 1980 consumption. This represented about 80% of the commercial energy consumed in Rwanda; nevertheless, the corresponding rate of consumption (10 kg per capita/year) remains particularly low. It can be expected to rise over the medium term due to the increase in traffic, the more so since three quarters of the products consumed are used for transportation purposes. Moreover, it should be borne in mind that the country's oil product supply is vulnerable because the cost of transportation from the ports of Mombasa and Dar es Salaam, entirely overland (1,700 km), is very high, being equivalent to the f.o.b. cost of the products concerned. Given that these imports, at about RF 4.2 billion (US$34 million in 1991), absorb over two thirds of the country's export earnings, Rwanda is in a most uncomfortable position in the oil product market and this position could deteriorate as a result of high purchase prices and the uncertainty of the supply channels. At the same time, Rwanda's oil product prices are among the highest in the region, which is a direct consequence of an extremely complex price structure coupled with very high taxation which accounts for over 50% of the price at the pump. The price structure in fact comprises five different taxes collected by different institutions and does not allow importers to seek out the lowest possible f.o.b. prices. This situation creates an incentive for fraud in Rwanda, especially for diesel fuel, the price of which in Rwanda is almost double that in Tanzania. In September 1992, in Arusha, Tanzania notified the Rwandese authorities of its intention to harmonize its oil product prices with those in effect in the region.

(ii) Institutional framework

MICOMART is responsible for setting the maximum prices to be charged at the pump. Through the semipublic company Petrorwanda, which covers almost 25% of the national market (imports and distribution) and in which it is the main stockholder, the State is able to gain a clearer picture of the contours of the oil market and of its cost structure. Thus, the country's primary

policy options reside in control of maximum prices at the pump and, to a lesser extent, regulation of transportation and establishment of strategic fuel stocks. Under these conditions, it is not surprising that the Government's petroleum policy, the constituent components of which are economic and financial, does not necessarily mesh with national energy context.

Specific actions program aligned on the actual energy situation will have to be instituted, focusing on control of consumption of energy products, their substitution by cheaper energy sources that are available locally, and formulation of coherent strategies for holding the cost of supply, management and reconstitution of buffer stocks down to a minimum in order to maintain activity in the sensitive sectors of the economy that are dependent on these products.

To remedy this situation, the Government proposes to implement immediately strengthened administrative control measures at the border posts to combat fraud with oil products. A study will be made right away with a view to simplifying the price structure for oil products and decontrolling prices while maintaining the level of revenue derived from these products. These measures will be discussed with IDA no later than September 1993 and implemented by January 1994 at the latest.

C. Wood and charcoal

(i) Present situation

The share of wood and wood products in meeting basic energy needs is put at 93%. Consumption levels, characterized by a relatively moderate growth rate (2% p.a.), mean that wood is being used at a rate (3 million m^3/year) that exceeds the limits of rational exploitation while still leaving a huge gap of the order of 4 million m^3/year between supply and demand. It is accordingly imperative to stabilize, and even reduce, consumption of ligno-cellulose biomass in order to conserve the forest cover under acceptable conditions. However, the problem smacks of squaring of the circle: on the one hand, the available resources are limited; on the other, Rwanda's population is growing at a particularly high rate, leading to intense pressure to clear land for farming at the expense of the forest.

Although the household sector is by far the largest consumer of fuelwood, this consumption cannot easily be reduced because the contribution of the different supply channels is markedly decentralized and, therefore, only partly known. On the other hand, the consumption of charcoal and of wood fuels in the institutional and small-scale industry sector, while admittedly representing less than 5% of total energy consumption, should be amenable to rationalization because the supply channels involved are highly commercialized.

(ii) Institutional framework and future prospects

Some projects have been set up with a view to reducing the gap between supply of and demand for fuels; those aimed at fuelwood supply have been placed under MINAGRI supervision, while those designed to promote fuel savings are overseen by MINITRAPE. In this connection, MINAGRI has drawn up the National Forest Plan, the main objectives of which are the following:

- establishment and maintenance, on a country-wide scale, of ecologically balanced forest resources;

- increasing of forestry production;

- better utilization and upgrading of forestry production.

An ad-hoc Law was promulgated in December 1988. This law, which did not include provision for taxation of transportation of charcoal, needs to be amended. The Government accordingly proposes to amend certain articles to permit collection of a specific tax on charcoal transportation. This tax will be divided into two rates: (a) a special rate of RF 30/bag, and (b) a regular rate of RF 60/bag. The arrangements for collection of this tax will be set out in a ministerial decree expected to be promulgated at the end of December 1992. The tax would serve to modernize the sector, thereby constituting an important stage in the rationalization of wood and charcoal use while instilling a conservation mentality. The tax would also enable better management of forest resources at community level. The rationalization of charcoal supply in urban areas will ensure protection of the environment. By exempting pinewood from the tax it will be made as competitive an energy source as eucalyptus.

For its part, MINITRAPE has launched projects aimed at improving performance and yields (improved, Rondereza and three-stone stoves, fuel-saving cooking methods, more efficient carbonization techniques) and developing substitute fuels (papyrus briquettes, biogas, and peat, the master plan for which is in course of preparation). Given the clear linkages between population increase, demand for household fuels and the pressures on natural resources, all measures in this sector need to be preceded by detailed coordination. At the initiative of MINITRAPE, a National Wood-Energy Coordination Commission has been formed, which is made up of representatives of the ministries concerned (MININTER, MINITRASO, MINAGRI, MINIPLAN, MICOMART, MINITRAPE) and has been operational since April 1990.

As will be apparent from the foregoing, the Government has set up appropriate machinery for implementing a coherent strategy for resolving, in the medium term, the problem situation arising from the heavy pressure on the nation's wood resources. Among the implementation measures, special note should be taken of the contribution expected from the Urban Charcoal Supply Rationalization component in the ESRP, the primary aim of which is to ensure regular supply at affordable cost for the inhabitants of the country's main towns, within the context of rational management of the nation's forest resources so as to ensure better protection of the environment. This will involve:

(a) establishment of a master plan for urban charcoal supply;

(b) modernization and strengthening of the monitoring and control of wood use for charcoal making and of the supply channels;

(c) support for the preparation and implementation of community forestry plans;

(d) support for marketing pinewood from thinning of the plantations on the Zaire-Nile Divide.

As noted above, MINITRAPE will be responsible for the technical and financial execution of activities to do with charcoal demand and will entrust those concerning supply to MINAGRI.

D. Methane gas

The methane gas reserves of Lake Kivu, jointly owned by Zaire and Rwanda, are considerable (60 billion Nm^3, i.e. 27 million toe) and renewable (about 200 million Nm^3/year). As of April 1990, the two joint owners of the gas have given SOCIGAZ the right to produce and market it, thus providing the essential institutional framework for supervising production operations. The possibility of producing and marketing this gas has been demonstrated by the experience with a pilot project that has been running at Cap Rubona since 1963. Moreover, studies have shown that there are large and very interested consumers (BRALIRWA in Gisenyi and CIMERWA in Mashyuza) in the immediate vicinity. In addition, the environmental impact and risks connected with methane gas production have been assessed and the preliminary conclusion is that production on a reasonable scale, of the order of 100 million Nm^3/year, would not represent any hazard to the environment. This quantity, which is very small compared with the size of the proven reserves, would nevertheless be equivalent to 45,000 toe. This resource is unquestionably an inestimable asset to the national energy sector, its rational development is a matter of the highest priority.

In this context, the Rwandese Government, in close cooperation with its partners -- the Zairian State, SOCIGAZ -- has requested IDA, in the context of the ESRP, to consider financing the following actions:

* preparation of regulations to govern production
* promotion of the gas to private operators
* bathymetric studies on Lake Kivu
* laboratory for measuring the environmental impact.

Implementation of these actions would make it possible to open the way for future development of the gas reserves and to make production as profitable as possible, in the interests of both parties, of course. This letter gives me the opportunity to reiterate the Rwandese Government's solemn commitment to entrust production and sale of the gas by priority to private operators in accordance with the objectives set forth in its Declaration of Economic Policy, which are specifically aimed at improving the competitiveness of the Rwandese economy and encouraging the private sector.

E. New and renewable forms of energy

As already noted, the population's main energy needs are connected with food preparation and, to a lesser extent, home heating and lighting. Therefore, although the potentials of new and renewable forms of energy may be considerable, for technical, socioeconomic and cost reasons their actual contribution is minimal.

Purely by way of illustration, despite the availability of solar energy -- 4.5 kwh/m^2/day -- large-scale utilization of promising applications such as the solar water heater and photovoltaic panels is blocked by the high specific costs involved, which are further aggravated by the low national production and after-sales service capacities. However, photovoltaic systems are particularly attractive for rural communities whose basic electricity needs (lighting, radio) could be

met at affordable cost, the more so since the ELECTROGAZ system will not be in a position to cover the entire country and private-sector initiatives (housing credit from Banques Populaires, etc.) will be able to help finance installation of such systems.

As for the other highly decentralized energy sources, the Government's role will consist in supporting private initiatives with a view to consolidating and extending progress already made. To this end, within the framework of the ESRP a market study will be made and appropriate financing arrangements will be developed in order to be able to formulate a strategy that will make it possible to speed introduction of larger-scale utilization of this energy source.

IV. Conclusion

As will be apparent from the points outlined in the foregoing, the Government of the Rwandese Republic is setting up appropriate mechanisms for rational management of the energy sector that will position it to make a significant contribution to recovery of the national economy and improvement of living conditions for the country's people, especially those living in the rural areas.

The main actions planned are designed to bring about, within the very short term, restoration of ELECTROGAZ's financial equilibria thanks to more efficient management of its facilities, operation of which will be entrusted to the private sector. The parallel application of the "cost pricing" principle for all energy sources (oil products, wood and wood products, electricity, etc.), and the resulting energy rationalizations, will be central to all our strategies aimed at energy rationalization in order to safeguard the meager resources available in a better balanced environment.

Félicien GATABAZI
Minister of Public Works and Energy

PIP 1993 - 1995

NUMERO	DESCRIPTION DU PROJET	MONTANT (en millions de francs rwandais)	SOURCE DE FINANCEMENT	TAUX DE RENTABILITE ECONOMIQUE
1. N 33 BE 665	Etude de Mise en Valeur du Gaz Méthane du lac Kivu.	192	IDA, FED, CCCE	N/A
2. N 33 BE 765	Etude de Plan Directeur de la Biomasse.	78	Don a/	N/A
3. N 33 766	Etude de faisabilité mise en valeur des ressources géothermiques.	62	IDA	N/A
4. N 33 BE 166	Conservation du bois de feu et combustible alternatifs.	78	Pays-Bas	N/A
5. N 33 EP 767	Construction d'une centrale hydroélectrique sur la Rukarara. b/	880	a/	10%
6. N 33 768	Centrale hydroélectrique de Rusumo Falls. c/	1.220	a/	11%
7. N 33 BE 186	Projet de Réhabilitation du Secteur Energie. d/	1.352	IDA, BEI, CCCE	19%
8. N 33 EP 178	Alimentation de la Cimenterie de Mashyuza en Gaz Méthane. e/	1.512	CCCE + BEI	23%
9. N 33 EP 180	Quintuplement de la production de gaz méthane à Cap Rubona.	1.917	Brelirwa, Belgique	13%
10. N 33 EP 184	Electrification rurale II. g/	608	CCCE	4.5%
11. N 33 EP 495	Ligne électrique Jabena-Byumba-Nyagatare.	1.598	Canada	10%
12. N 33 EP 162	Construction de la centrale hydroélectrique Mukungwa II. h/	2.057	Japon, ELECTROGAZ	7.5%
13. C 33 EP 160	Assistance technique à ELECTROGAZ.	422	Belgique, CCCE, Allemagne	N/A
14. C 33 BE 488	Programme Spécial Energie/Gestion Rationnelle de l'Energie et de l'Environnement.	335	Allemagne	N/A
15. C 33 EP 161	Suivi, Recherche, appui Electrification rurale.	10	Don Suisse	N/A
16. N 33 EP 179	Construction des microcentrales hydroélectriques.	225	Don a/	13%
17. C 33 BE 164	Electrification des Centres de Santé Ruhunda-Kabare.	45	BD f/	N/A
	TOTAL	12.591		

a/ Recherche de financement en cours;
b/ Etude de faisabilité: FRW640 millions en 1992-1994; investissement: FRW240 millions en 1995; reste après 1995: FRW3,760 millions;
c/ Etude de faisabilité: FRW800 millions en 1992-1994; investissement: FRW420 millions en 1995; reste après 1995: FRW6,580 millions;
d/ Suivant Tableau des décaissements du PRSE: FRW2,688 millions en 1992-1994; FRW1,352 millions en 1995; FRW1,413 millions après 1995;
e/ FRW504 millions par année de 1993 à 1995; FRW3,528 million à répartir après 1995;
f/ Projet commencé en 1991; fin des travaux prévue pour premier trimestre 1993;
g/ Projet maintenu dans le PIP 1992-1994 après accord de réduction d'environ 20% du coût initial intervenu entre la Banque, la CCCE et le Gouvernement;
h/ Suivant accord intervenu entre le Gouvernement du Rwanda, l'OECF (Japon) et la Banque, ce projet a été maintenu dans le PIP 1992-1994;

REPUBLIC OF RWANDA

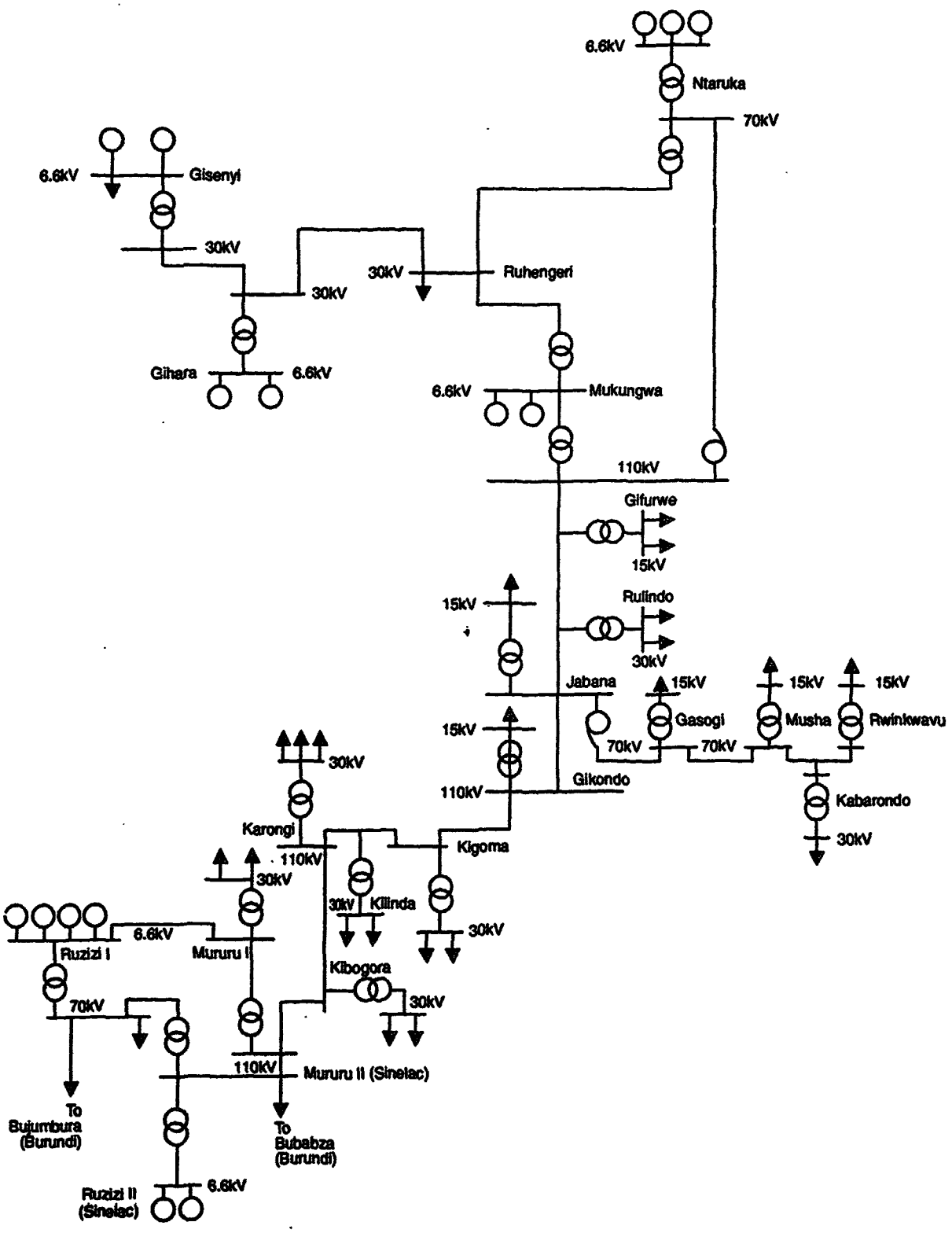
ENERGY SECTOR REHABILITATION PROJECT

PROJECTED POWER AND ENERGY BALANCE

	1991	1992	1993	1994	1995	1996	1997	1998
Energy Requirement GWh	184	200	219	233	248	270	292	316
ENERGY SUPPLY GWh								
Domestic								
Hydro (annual average)	88.4	88.4	88.4	88.4	88.4	105.7a/	105.7	105.7
Thermal	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0
Total from Domestic Plants	100.4	100.4	100.4	100.4	100.4	117.7	117.7	117.7
Ruzizi II	47.0	47.0	47.0	47.0	67.0b/	67.0	67.0	67.0
Other Regional Availabilities	137.0	95.0	86.0	77.0	99.0	91.0	84.0	76.0
Total available supply GWh	284.4	242.4	233.4	224.4	266.4	275.7	268.7	260.7
ENERGY BALANCE, GWh	100.4	42.4	14.4	-8.6	18.4	5.7	-23.3	-55.3
Peak Power Demand MW	37.3	40.7	44.5	47.7	51.0	55.5	60.2	65.3
POWER SUPPLY MW								
Domestic	28.7	28.7	28.7	28.7	28.7	30.9a/	30.9	30.9
Ruzizi	8.9	8.9	8.9	8.9	13.3b/	13.3	13.3	13.3
Other available supplyc/	22.8	11.6	8.9	5.9	17.1	14.2	11.0	7.9
Total Supply MW	60.4	49.2	46.5	43.5	59.1	58.4	55.2	55.1
POWER BALANCE, MW	23.1	8.5	2.0	-4.2	8.1	2.9	-5.0	-13.2

a/ Commissioning of Mukungwa II, with an installed capacity of 2.2 MW and an average annual production of 17.3 GWh.
b/ Commissioning of the third unit of Ruzizi II.
c/ Considering SNEL's and REGIDESO's hydro installed capacity, plus their share of Ruzizi II, and supposing they keep a reserve of 10% of their peak demand.

RWANDA
INTERCONNECTED POWER SYSTEM



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REPUBLIC OF RWANDA

ENERGY SECTOR REHABILITATION PROJECT

GENERATING FACILITIES

PLANT	GENERATING UNITS			TOTAL INSTALLED CAPACITY MW	YEARLY AVERAGE PRODUCTION CAPACITY GWH	RESERVOIR CAPACITY GWH	PLANT FACTOR %
	NUMBER	UNIT CAPACITY MW	YEAR OF COMMISSION				
HYDRO ELECTROGAZ							
GISENYI	2	0.6	1981 a/	1.2	8.4	1.3	80
NTARUKA	2	3.75	1958				
	1	3.75	1969	11.25	22.0	46.0	22
MUKUNGWA	2	6.225	1982	12.45	48	47.0	41
GIHIRA	2	0.92	1985	1.84	10	-	63
HYDRO SINELAC							
RUZIZI II	2	13.33	1989	26.67	140 b/	0.2	60 b/
DIESEL							
GATSATA	3	0.67	1977	2.0	12	N.A.	70

a/ The plant was commissioned in 1958. During rehabilitation works in 1979/80 the two generating units were replaced by new ones.
b/ These are nominal values, chosen somewhat arbitrarily. They could be higher if the operation of Ruzizi II was coordinated with that of upstream Ruzizi I.

REPUBLIC OF RWANDA

ENERGY SECTOR REHABILITATION PROJECT

MAIN TRANSMISSION LINES

TERMINALS	LENGTH KM
110 KV lines	
MUKUNGWA - JABANA	58
JABANA - GIKONDO	8
GIKONDO - KIGOMA	45
KIGOMA - KARONGI	54
KARONGI - NURURU II	79
NURURU II - NURURU I	0.5
Total	245
70 KV lines	
NTARUKA - MUKUNGWA	36
JABANA - GASOGI	16
GASOGI - MUSHA	14
MUSHA - RWINKWAVU	30
Total	96

ANNEX 1.4
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REPUBLIC OF RWANDA

ENERGY SECTOR REHABILITATION PROJECT

AVERAGE TARIFFS FOR SALES OF WATER IN SOME SUB-SAHARA AFRICAN COUNTRIES

Country	No	Tariff Structure Limits	Currency	Tariffs/m³	Date	Equivalent FRF	Exhange rate/FRF
ALGERIA	1	0-220 m³/m	DA	1.65	1992	0.40	0.25
	2	221-330 m³/m	DA	2.89	1992	0.72	0.26
	3	>331 m³/m	DA	4.13	1992	1.08	0.25
COTE D'IVOIRE	Ft	0-15 m³/trim	FCFA	159	1990	3.18	0.02
	1	16-30 m³/trim	FCFA	159	1990	3.18	0.02
	2	31-90 m³/trim	FCFA	209	1990	4.18	0.02
	3	91-300 m³/trim	FCFA	307	1990	6.16	0.02
CAR	Ft	15 m³/m	FCFA	176	1990	3.52	0.02
	1	0-30 m³/m	FCFA	104	1990	2.08	0.02
	2	31-2000 m³/m	FCFA	209	1990	4.18	0.02
	3	>2000 m³/m	FCFA	169	1990	3.36	0.02
SENEGAL	1	0-29 m³/bim	FCFA	105	1986	2.10	0.02
	2	20-180 m³/bim	FCFA	265	1986	5.30	0.02
	3	>180 m³/bim	FCFA	306	1986	6.13	0.02
CONGO	1	0-35 m³/m	FCFA	83	1987	1.66	0.02
	2	35-100 m³/m	FCFA	108	1987	2.16	0.02
	3	>100 m³	FCFA	127	1987	2.54	0.02
GUINEA	1	No Tariffs	FG	241	1991	4.82	0.02
CHAD	1	0-15 m³/m	FCFA	115	1991	2.30	0.02
	2	16-600 m³/m	FCFA	230	1991	4.60	0.02
	3	>600 m³/m	FCFA		1001		0.02
RWANDA	1	0-25 m³/m	FRW	60	1992	2.40	0.04
	2	26-60 m³/m	FRW	90	1992	3.60	0.04
	3	60-100 m³/m	FRW	120	1992	4.80	0.04
	4	>100 m³/m	FRW	135	1992	5.40	0.04

RWANDA

ENERGY SECTOR REHABILITATION PROJECT

AVERAGE TARIFFS FOR ELECTRICITY IN SOME SUB-SAHARA AFRICAN COUNTRIES

COUNTRY	COMPANY	Tariff excluding location of meters			Tariff including location of meters			Date		Remarks
	Tariff excl. location of meters		U	equ. FCFA/kWh	Tariff incl. location of meters	U	equ. FCFA/kWh			
BENIN	SBEE	55,0	FCFA	55,0	58,7	FCFA	58,7	1991	hydro/therm	Tariffs do not meet sectoral financial needs
COTE D'IVOIRE	CIE	48,3	FCFA	48,3		FCFA		1991	hydro/therm	Tariffs fully meet sectoral financial needs
MALI	EDM	59,5	FCFA	59,5	60,9	FCFA	60,9	1991	hydro/therm	Tariffs do not meet sectoral financial needs
RCA	ENERCA	44,7	FCFA	44,7		FCFA		1992	hydro/therm	Tariffs do not meet sectoral financial needs
RWANDA	ELECTROGAZ	12,8	FRW	25,0[1]		FRW		1992	hydroelectric	Tariffs do not meet sectoral financial needs
TCHAD	STEE	92,8	FCFA	92,8		FCFA		1990	thermal	Tariffs do not meet sectoral financial needs

1/ One of the lowest in sub-Saharan Africa.

REPUBLIC OF RWANDA

ENERGY SECTOR REHABILITATION PROJECT

EVOLUTION OF PRICE STRUCTURE FOR SUPER GASOLINE (RWF/liter)

	Feb. 1986	Nov. 1986	May 1987	June 1988	Sept. 1990	12 Nov. 1990	25 Dec. 1990 7/	29 Mar. 1992	17 Aug. 1991	07 Oct. 1991	19 Mar. 1992
Acquisition Cost											
FOB Price	25.05	14.18	16.93	13.24	23.00	40.36	40.36	32.90	30.43	28.79	27.11
Transport	14.50	14.50	14.50	14.50	13.00	20.00	22.00	22.00	22.00	22.00	22.00
Insurance 1/	0.40	0.29	0.32	0.28	0.36	0.60	0.68	0.61	0.58	0.56	0.54
CIF KIGALI	39.95	28.97	31.75	28.02	36.36	60.96	63.04	55.51	53.01	51.35	49.65
Taxation											
Entry Fees	13.23	13.23	13.23	17.64	17.64	17.64	29.40	29.40	29.40	29.40	29.40
Concession Fees 2/	1.20	0.87	0.95	0.84	1.09	1.83	2.08	1.67	1.59	1.54	1.49
Import Licence Fees 3/	-	-	-	-	-	-	-	-	2.62	2.54	2.46
Perequation Tax 8/	-	8.0	11.00	8.00	3.00	29.16	8.55	16.92	17.04	18.93	20.43
Tax on Turnover 4/	-	2.60	2.77	2.81	3.42	5.02	11.09	11.09	11.09	11.09	11.09
Sub-Total Taxation	14.43	24.70	27.95	29.29	25.15	53.65	51.12	59.08	61.74	63.50	64.87
Costs & Margins											
Depot Transit Costs 5/	0.40	0.29	0.32	0.28	0.84	1.41	1.61	1.42	1.35	1.31	1.26
Wholes.Costs & Margins 6/	9.62	10.44	4.38	6.81	4.65	5.98	6.23	5.99	5.90	5.84	6.22
Retailer Costs & Margins	2.40	2.40	2.40	2.40	3.00	3.00	3.00	3.00	3.00	3.00	3.00
Sub-Total Costs & Margins	12.42	13.13	7.10	9.49	8.49	10.39	10.84	10.41	10.25	10.15	10.48
Sale Price	66.80	66.80	66.80	66.80	70.00	125.00	125.007	125.007	125.00	125.00	125.00
Exchange Rate (FRW/US$)	89.00	86.00	80.00	75.02	73.89	120.00	120.44	126.68	128.07	125.66	125.00
Sale Price US$/l equiv.	0.751	0.777	0.835	0.890	0.947	1.042	1.038	0.987	0.976	0.995	1.000

1/ Including tax on turnover for insurance since August 1991.
2/ 3% of C&F collected by MAGERWA until March 1990.
3/ 5% of C&F.
4/ Tax on turnover: 6% until December 1990; 10% thereafter.
5/ 2.32% of CIF and tax on turnover for these costs. Until March 1990, 1% collected by MAGERWA.
6/ Banking costs (3% of C&F) and tax on turnover for these costs + losses 0,5% + margin 4.17 RWF/l.
7/ Introduction of a 10% tax on turnover.
8/ Established (in RWF/l) periodically by MICOMART to compensate for variations in external price.

REPUBLIC OF RWANDA

ENERGY SECTOR REHABILITATION PROJECT

EVOLUTION OF PRICE STRUCTURE FOR GASOIL AND KEROSENE (RWF/liter)

	12 Nov. 1990		25 Dec. 1990 7/		29 March 1991		23 May 1991		19 March 1992	
	Gasoil	Kerosene	Gasoil	Kerosene	Gasoil	Kerosene	Gasoil	Kerosene	Gasoil	Kerosene
Acquisition Cost										
Price	37,98	51,04	37,98	51,04	34,84	48.09	31,90	30,64	23,19	28,62
Transport	20,00	20,00	22,00	22,00	22,00	20,00	22,00	20,00	22,00	20,00
Insurance 1/	0,58	0,71	0,66	0,80	0,63	0,68	0,59	0,51	0,50	0,51
CIF Kigali	58,56	71,75	60,64	73,84	57,47	68,77	54,49	51,15	45,69	49,13
Taxation:										
Entry Fees	17,64	-	29,40	7,38	29,40	6,88	29,40	5,12	29,40	6,91
Concession Fee 2/	1,76	2,15	2,00	2,44	1,72	2,06	1,63	1,53	1,37	1,47
Import License Fee 3/	-	-	-	-	-	-	-	-	2,26	2,43
Perequation Tax 8/	26,91	25,13	6,62	9,78	10,26	16,38	13,50	-	20,66	-
Tax on Turnover 4/	4,86	-	10,64	5,10	10,64	5,10	10,64	3,30	10,64	3,30
Subtotal TAXATION	51,17	27,28	48,66	27,40	52,02	30,42	55,17	9,95	64,33	12,11
Costs and Margins:										
Depot Transit Costs 5/	1,36	1,66	1,55	1,88	1,46	1,60	1,39	1,17	1,16	1,14
Wholesale Costs & Margin 6/	5,91	6,31	6,15	6,58	6,05	6,21	5,95	7,03	5,82	6,92
Retailer Costs and Margins	3,00	3,00	3,00	3,00	3,00	3,00	3,00	5,70	3,00	5,70
Total Costs and Margins	10,27	10,97	10,70	11,46	10,51	10,81	10,34	13,90	9,98	13,76
Sale Price	120,00	110,00	120,00	110,00	120,00	110,00	120,00	75,00	120,00	75,00

1/ Including tax on turnover for insurance since August 1991.
2/ 3% of C&F collected by MAGERWA until March 1990.
3/ 5% of C&F.
4/ Tax on turnover: 6% until December 1990; 10% thereafter.
5/ 2.32% of CIF and tax on turnover for these costs. Until March 1990, 1% collected by MAGERWA.
6/ Banking costs (3% of C&F) and tax on turnover for these costs + losses 0,5% + margin 4.17 RWF/l.
7/ Introduction of a 10% tax on turnover.
8/ Established (in RWF/l) periodically by MICOMART to compensate for variations in external price.

REPUBLIC OF RWANDA

ENERGY SECTOR REHABILITATION

OIL IMPORT BILL

	Import of Petroleum Products			Yearly average exchange rate	Total Export FOB Price	
	Tons	Price Million RWF (a)	CIF Price Million US$		Million RWF (b)	
1988	91,750	3,213	42,025	76.45	9,010.5	
1989	89,557	3,154	39,356	80.14	8,376.6	
1990	84,479	3,167	38,345	82.589	8,478.3	
1991	65,878	4,248	33,944	125.156	11,971.3	

REPUBLIC OF RWANDA

ENERGY SECTOR REHABILITATION PROJECT

CONSUMPTION OF PETROLEUM PRODUCTS

	1983	1984	1985	1986	1987	1988	1989	1990	1991
Importations 1/									
Aviation Gasoline	376	263	299	393	465	606	258	200	79
Gasoline	34188	33298	35486	38716	37240	39783	38684	35143	25585
Kerosine	3134	3332	4672	7370	8775	8106	8397	8332	6247
Jet A1 2/	3846	6333	5539	4662	4744	3809	3270	3531	1813
Gasoil	22941	26997	31814	35008	27329	25111	25123	23599	18223
Fuel	2319	2358	2393	3881	11343	14091	13576	13471	13755
L.P.G.	196	202	198	235	237	244	249	203	176
TOTAL	66000	72783	80401	90265	90133	91750	89557	84479	65878
Smuggling 3/				1200	12000	15000	17000	19000	21000
Total Consumption	66000	72783	80401	91465	102133	106750	106557	103479	86878
Growth Rate/Year % per annum		10.3	10.5	13.8	11.7	4.5	-	(2.9)	(16.0)
Average rate 83 to 88: 10.1%									
1991 Reduction as compared to 1988: 18,6%									

Sources:
1/ Banque Nationale du Rwanda
2/ B.P. Fina
3/ Unofficial consultant's estimations

REPUBLIC OF RWANDA

ENERGY SECTOR REHABILITATION PROJECT

THE SOLAR ENERGY SUBSECTOR

1.1 Rwanda is well-placed in terms of solar radiation endowment: horizontal radiation averages 5.15 kWh/m^2/day, or potentially 1.9 MWh/m^2/year. Yearly variations in radiation are modest, although effective radiation/m^2 of array surface is reduced due to periods of overcast and during the dry months on account of dust. While awaiting more reliable data on this matter from the Energy Center (Univerity of Butare), conservative figures of 3.8 kWh/m^2/day for the north and 4.0 kWh/m^2/day for the south are used [1]. Applications of solar energy currently found in Rwanda are photovoltaic (PV) systems for lighting, refrigeration, communication, and sterilization, as well as solar thermal water heating and crop drying.

1.2 PV systems have found a ready market niche in the rural areas, and some 950 systems with a total peak power of 27.8 kW$_p$ have been installed todate, generating approximately 50 MWh/year (which represents a capacity factor of 45 percent). One radio transmitter (3.3 kW$_p$) operates in Kinaniva (Cyangugu), ELECTROGAZ and BUFMAR have installed 240 systems in rural health centers (11.2 kW$_p$), and the remainder (11.2 kW$_p$) was sold mainly to households in rural areas through private entreprises. Most of the household systems were sold at cost. A financing scheme exists (13 percent interest to households, with 20 percent downpayment, and 11 to 48 month terms) with the Union des Banques Populaires du Rwanda (UBPR); most of the systems for health centers were subsidized by a bilateral donor.

1.3 The current energy policy aims at making energy available to everybody at a reasonable price, and even though it specifically highlights renewable energy, no detailed policy has yet been formulated for the promotion of PVs. The Division "des Energies Nouvelles et Renouvellables et des Hydrocarbures" (DENRH) within MINITRAPE is coordinating the existing PV activities in collaboration with the UBPR and the private sector, with financial and technical assistance from GTZ's Special Energy Project. The DENRH has also created a training program for PV retailers under which about 2 retailers per prefecture have been trained. A round-table seminar was organized in May 92 with most of the actors present in the PV sector in Rwanda, and it was concluded that considerable scope exists for improvement in terms of reducing the cost to the user and improving the quality of the services rendered. PV systems provide the lowest-cost option for households in rural areas to obtain some of the modern benefits of electricity.

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[1] IPC: "Planning des Sonderenergieprogrammes Rwanda", January 1986.

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REPUBLIC OF RWANDA

ENERGY SECTOR REHABILITATION PROJECT

THE GAS SUBSECTOR

1.1 Large quantities of gas exist in the deep waters of Lake Kivu. It is estimated that the waters below a depth of 270 meters contain about 60 billion Nm3 of methane with an annual additional generation of about 250 million Nm3. The gas trapped in the deep waters contains approximately 73.5 percent of carbondioxide (CO_2), 24.9 methane (CH_4) and other constituents notably nitrogen and sulferic acid (H_2S). At Cap Rubona, a pilot project has operated for about 30 years, providing a third of the energy required for a local brewery. This project produces about 1.4 million Nm3/year of gas with a methane content of 80 percent. During a seminar organized by the Bank in February 1992, a strategy was established to develop the methane resource in the context of the energy sector PIP review, and was subsequently accepted by all the donors involved and the Government. The three conditions underlying the strategy for donor involvement in any project related to methane gas development are: (i) promotion of regional management of the whole resource, (ii) granting of exploitation concessions to the private sector and (iii) close coordination between the parties involved including Rwanda, Zaire, SOCIGAZ and the donors. Government has agreed to confirm in writing by negotiations that project development will be left to the private sector.

1.2 Studies were carried out on methods of increasing the use of the methane. The European Community Commission (ECC) financed a study of the commercial development (production, distribution and marketing) of the gas reserve for the regional market. The Belgian Government studied the expansion of the Cap Rubona plant by a factor of five in framework of fully supplying the brewery, and the Canadian Government funded a study on the use and marketing of the gas into the Rwanda market. The ECC study indicated that it is possible to extract between 50 and 150 million Nm3 of methane per year on a sustainable basis without depleting the deposit. Following projections, it appears that the stratification of the waters of Lake Kivu would still be protected with production of 500 million Nm3 per year. The study also indicated that this level of gas production from Lake Kivu will not result in additional risk of a gas eruption similar to the one that occurred at Lake Nyos in Cameroon in 1986. Another conclusion of the study is to adopt a modular approach for the extraction of methane, allowing technical knowledge to be gained at each stage of development thereby further minimizing environmental risks. On the basis of actual proven demand at the Cement Plant at Mashyuza, a new collection station with an annual capacity of 25 million Nm3 is earmarked to be financed by the ECC. The bid documents for the Cap Rubona gas project have been prepared and submitted to the Rwandese Government.

REPUBLIC OF RWANDA

ENERGY SECTOR REHABILITATION PROJECT

OUTLINE OF THE CHARCOAL TAXATION SYSTEM

Taxation of charcoal is to be introduced under the project to facilitate a modernization of the charcoal sector with a view to use scarce wood resources as rationally as possible and to ensure a sustainable supply of charcoal until the population can afford a switch to modern fuels such as kerosene and LPG. As pinewood is currently not used for the production of charcoal, and vast quantities are available for many years to come, a specific tax of approximately FRW 1 - FRW 2 per kg will be applied to eucalyptus to make pinewood charcoal competitive with eucalyptus charcoal (See Figure below). As shown, at present the point of equilibrium (Q1) between pinewood and eucalyptus charcoal is at approximately 150 km from Kigali (constituting 80% of the total charcoal market). A specific tax of FRW 1/kg will change this point of equilibrium to 180 km (Q2), and a tax of FRW 2/kg to 220 km (Q3). The pinewood resources are located at distances greater than 200 km from Kigali.

The specific tax on charcoal will have a minor effect on end-users since the retail price of charcoal in towns is likely to increase thereby giving an incentive to use improved stoves and save charcoal. Improved stoves could more than off-set the charcoal price increase as average charcoal savings in practice amount to 35%.

There are two proposed tax regimes: a normal regime (FRW 60 per bag), and a special regime (FRW 30 per bag). The special regime is applied to efficient charcoal production in villages that manage their wood resources properly; such villages will have a wood use management plan approved by MINAGRI. In this case, some 83 percent of the tax (FRW 25/bag) remains in the village and 17 percent (FRW 5/bag) flows into the NFF. The normal regime is applied in all other cases and represents the current inefficient situation in Rwanda. In this case, some 80 percent (FRW 47.5/bag) of the tax flows into the NFF and 20 percent (FRW 12.5) remains with the village authorities. Pinewood charcoal is exempt from the tax so as to make it competitive with eucalyptus charcoal.

Transporters would pay the specific tax on charcoal to the village authorities where the wood originated. They will receive a receipt stating the date, the type of wood used, the amount of charcoal transported, the amount of tax paid, and the names of the village and the transporter. This receipt will replace the current transport permit. The tax difference provides an incentive on the one hand to transporters for finding charcoal in villages that apply the special regime, and on the other hand to villages for preparing a village wood use plan.

At the town entry (initially Kigali and later other towns also), control posts will collect from transporters the receipt given to them in the village. This allows MINAGRI to maintain detailed data on the charcoal production as well as to prepare plans for optimal use of wood resources. The revenues from the tax are sufficient to cover the cost of the control posts (even when they are only 80%), and will also enable the financing of a number of village wood use plans through the NFF.

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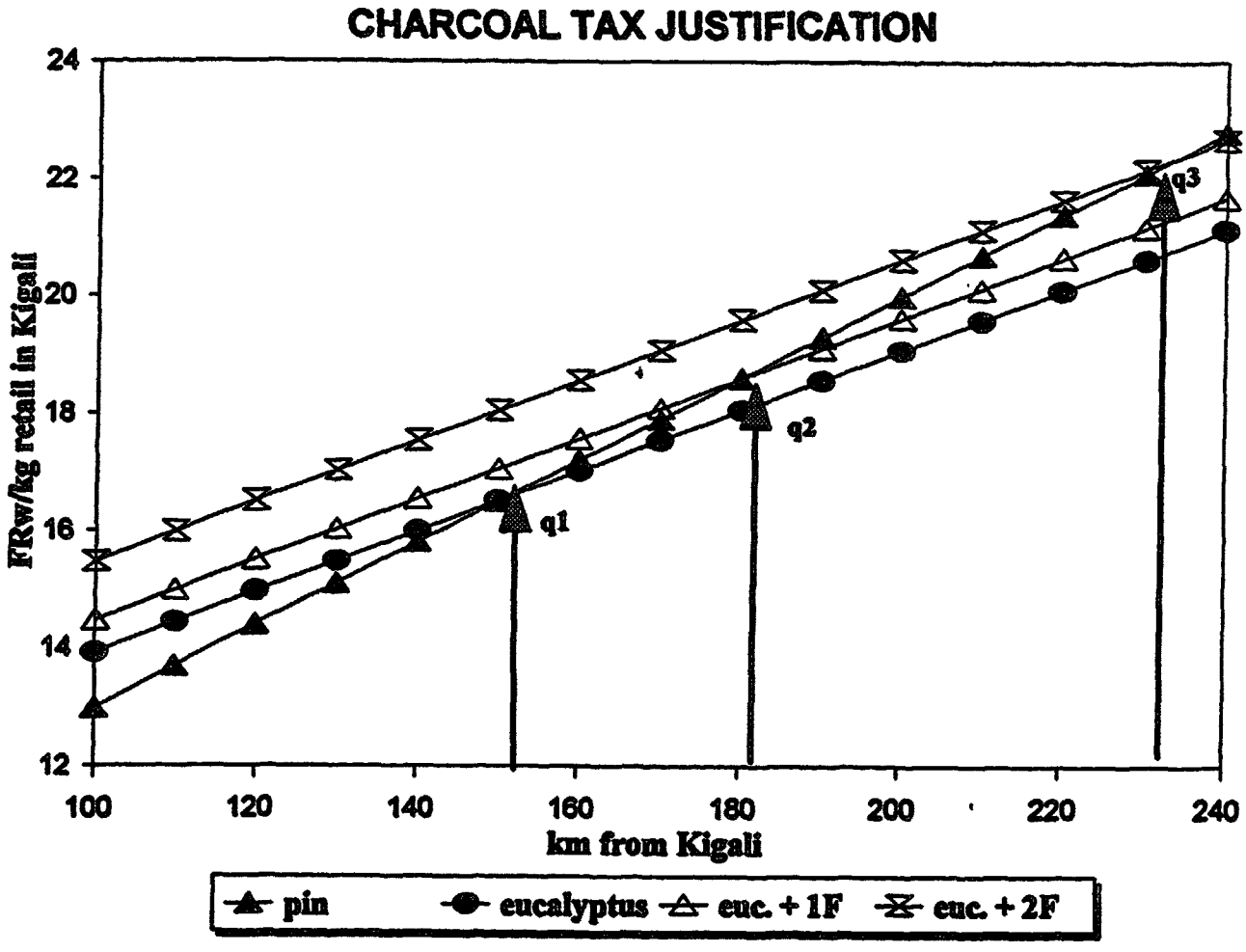
REPUBLIC OF RWANDA

ENERGY SECTOR REHABILITATION PROJECT



REPUBLIC OF RWANDA

ENERGY SECTOR REHABILITATION PROJECT

TERMS OF REFERENCE FOR CONSULTANTS

FOR PREPARATION OF BIDDING AND CONTRACTUAL DOCUMENTS FOR THE SELECTION OF THE PRIVATE OPERATOR

1. Introduction

ELECTROGAZ is a government monopoly responsible for the production, transmission and distribution of electric power, water and gas. A body corporate with financial autonomy, it was created in its present form by Decree-Law No. 18-76 of April 20, 1976 and is governed by Decree-Law No. 39-75 (Public Institutions). It is headed by a Board of Directors and a Director, the latter appointed by the President of the Republic. In technical matters, it is under the supervision of the Ministry of Public Works and Energy and in financial matters under that of the Ministry of Finance.

As noted above, ELECTROGAZ is active in three sectors: water, electric power, and gas. Large-scale civil engineering works, even in these sectors, are by custom evaluated separately, accounting for a not insignificant proportion of the agency's turnover, as indicated further on. At the end of 1990, the key indicators of the utility activity as of the audited financial statements were as follows:

POWER

Production Capacity	5 Hydro Stations (Installed Capacity: 28.69 MW)
Generated	78.3 GWH
Imported[1]	95.7 GWH
System losses	14.6%
No. of customers, of which: - LV - MV	25,000 24,750 250
Turnover	RWF 1,139,863

1/ Imports from the RUZIZI I & II Stations.

WATER

Production capacity	22,870,000 m³
No. of facilities	12
Production	10,228,000 m³
System losses	35%
No. of customers	16,000
Turnover	RWF 540,833

Gas supply activities are marginal: sales are made to a single client, Brasserie et Limonaderie du Rwanda, which consumes 131,000 m³, for a turnover figure of RF 2 million.

Turnover on large-scale civil engineering works at the end of 1990 was RF 655 million, including approximately RF 195 million for works and supplies on its own account.

At the end of 1991, ELECTROGAZ had a total staff complement of 4,108 individuals, in the following categories:

-	Regular or fixed-term	1,253
-	Permanent part-time	670
-	Temporary part-time (operations)	1,485
-	Temporary part-time (works)	700
	TOTAL	4,108

2. Present Situation

The Rwandese State and ELECTROGAZ, with the support of various donors, have been engaged for many years in a major investment program, as a result of which the agency's fixed assets were valued at a total of RF 29 billion as of December 31, 1990 (RF 20 billion after depreciation). Although this program has made it possible to double the number of customers in five years, growth in turnover has not been on a par with the investment rate, chiefly because of inadequate tariffs and inappropriate commercial policy. These weaknesses have been exacerbated by:

- major system losses;
- defective collection, with billings to customer accounts at close of 1990 being 11 months behind on average;
- ineffective and inadequate management procedures for an enterprise of this size (one consequence: ignorance of cost prices);
- lack of an efficient Planning Unit;
- an unsuitable institutional framework, exacerbated by the agency's status as a public enterprise.

These handicaps have produced cash-flow difficulties that have prevented the agency since 1988 from meeting its debt-service obligations, which have thus fallen to the Government. However,

the Government, faced with its own serious financial difficulties, has not paid its utility bills. The end result is that major cross-indebtedness exists.

Given the agency's precarious financial status (V. attached Financial Statements), the devaluation of the Rwandese franc by 67% in November 1990 saddled ELECTROGAZ with a loss of RF 1.7 billion in 1991, on top of losses amounting to RF 6.3 billion in 1990 (about three times its turnover).

3. Proposed Reform

While conducting various studies to identify means of rehabilitating the agency permanently, the Government rapidly came to realize that the most efficient and appropriate of the possible options would be to transfer ELECTROGAZ operations to a private-sector operator. It therefore proposes to split the agency into two separate entities — a Société nationale de patrimoine (SNP) to serve as principal and administer the agency's assets, and a Société privée d'exploitation (SPE) to be responsible for production and the operation of agency facilities. The relationship between the two entities would be governed by a lease contract . The SPE would also be responsible for billing and collection operations, retaining a portion of the proceeds in lieu of lease contractor and energy costs, and remitting the balance to the SNP to cover its own operating costs, as well as debt-service obligations and energy and water sector development investments.

Notification of prequalification proceedings was published in Development Business No. 347 of July 31, 1992, the response cut-off date being given as September 30, 1992.

In order to ensure the success of the reform process, the Government wishes to recruit consultants to help draw up the various contractual documents necessary and to assist it as necessary in negotiations with potential partners.

The consultants will be required to perform the following tasks:

- determine the responsibilities of the various intervening parties (SNP, SPE, Government);
- draft Statutes for the SNP, decide its optimum staff size, and make recommendations for reorganization of its capital structure;
- draft a lease contract between the SNP and the SPE;
- prepare all bidding documents for selection of the future private operator.

Moreover, in order to attract the largest possible number of qualified private operators, certain incentives are to be offered. The Energy Sector Rehabilitation Project would first finance the following activities:

- inventory of all water supply and power supply points;
- updating of the customer database (power and water);
- upgrading and finalization of plans and maps of all water and power distribution facilities;
- overhaul of water and power service drops and meters;
- constitution of a strategic inventory of spare parts.

Simultaneously, the Project would also provide financing for the rehabilitation and extension of the distribution network serving the cities of Kigali, Butare, Nyabisindu, Ruhengeri and Gisenyi, rehabilitation of the Mukungwa I and Gisenyi hydro-plants and rehabilitation of the Mururu I substation.

Government Contribution to Water Tariff

Water tariffs, would need to be raised by additional 40% and 20% to reach full rates of RWF142.55 and RWF171.06 respectively, even after the two increases of 15% each that are contemplated under the project. The immediate priority in implementing a full rate for water is to restore the customers' willingness to pay for water, and to enforce sound and secure billing and collection procedures, including cut-off as needed. As this priority would be progressively achieved in parallel with improvements of the quality and availability of water service following the rehabilitation and upgrading of connection installations, the increase needed for water tariff (which is too high to implement at once), would need to be phased. The Government would finance every year until 1998, the differential between the current water tariff and the full rate. This pragmatic subsidization scheme, is deemed effective and appropriate since: (a) the process is entirely transparent as subsidies would be conveyed through budgetary channels; and (b) the arrangements would last only a limited period of time and would be done on a declining basis. In this connection, the Government's contributions to water tariff that is necessary to maintain the full rate for water over the project implementation would be determined by October 31 in each year for the succeeding year, taking into account the yearly water tariff increases.

Private Operator Access to Foreign Exchange

Past experience in the sector with ELECTROGAZ as well as experience elsewhere demonstrated both the importance and the problems in having ready access to foreign exchanges to cover operations needs. Continued difficulties in this area could result in delays in timely implementation of contractual obligations by the private operation under the proposed arrangements. This risk is now significantly reduced in Rwanda which under the SAC-supported reform program, has established on July 1, 1992 a non-discriminatory foreign exchange allocation regime through an Open General License (OGL) system administered by commercial banks. This system is funded by foreign exchange earnings, as well as by the proceeds of the IMF's SAF and the first SAC operation. Other donors will also utilize this system in their balance of payments assistance to Rwanda. It is therefore expected that the OGL system would provide the future private operator that will operate ELECTROGAZ access to foreign exchange at the prevailing exchange rate to finance essential spare parts and service in the normal course of business.

4. Consultants' Tasks

4.1 Responsibilities of intervening parties

Since there are now to be three intervening parties (the SPE, the SNP and the Government) instead of two, the consultants are asked to provide clear statements of the responsibilities of each of them, particularly as their respective interests do not necessarily coincide. These responsibilities consist not only of the investment program and the frequency and extent of tariff adjustment, but also the interface between administration of assets on the one hand and operating activities, including maintenance, on the other. As far as the latter arena is concerned, the consultants should pay particular attention to the practical side of the subdivision of ELECTROGAZ into SNP and SPE.

Their first step should be to identify the functions belonging specifically to the SNP, the SPE and the Government as far as design, financing, execution and operation of facilities are concerned. The separate fields of responsibility of each party should be clearly marked out so as to prevent situations of avoidance of responsibility or encroachment on the terrain of others. Provisions should be made for arbitration mechanisms or structures for dealing with disputes.

The consultants should also examine the following particular points with care.

- Mechanisms for setting tariffs: The single tariff collected from the consumer will be distributed as follows: one part will cover SPE fees, another will be used to purchase energy (Ruzizi I and II) and the remainder will be remitted to the SNP to cover its running costs, meet debt-service obligations and finance necessary investments in sector development. The structure of the tariffs and the mechanisms for adjusting them should be studied with the three partners in mind. An externally regulated structure to arbitrate potential conflicts should be envisaged.

- Investment program: The interest of the three partners could in some cases be split between the determination to maximize water and power delivery services throughout the country and the possibility of making these investments profitable. The consultants should therefore put forward proposals regarding decision-making mechanisms and means of appeal.

- Other aspects of the functioning of these three entities should also be studied so that overlapping and duplication are prevented.

4.2 Drafting of SNP statutes

The Ministry of Finance has recently prepared a new draft of the Public Enterprises Bill (Loi-Cadre), which introduces two categories of public entity, namely etablissements publics (public institutions) and sociétés nationales (State-owned corporations). The latter are defined as corporations subject to private law but wholly owned by the State and/or by bodies corporate subject to public law; they are governed by the legislation on commercial corporations, except as specified in the Public Enterprises Act.

This Bill nullifies all earlier instruments, particularly the 1976 Decree-Law creating ELECTROGAZ, although they will remain in force temporarily until new Statutes can be adopted, preferably via presidential decree.

After careful analysis of earlier instruments, particularly any specific technical provisions, some of which should be retained, the consultants will draw up the new Statutes of the Société national de Patrimoine (the SNP). In addition to the general features common to all sociétés nationales (State-owned corporations), the Statutes should incorporate the distribution of responsibilities referred to in Section 4.1 above and specific prescriptions for administration of the water and power subsectors.

The consultants should be aware of any amendments the legislature may make in the text of the Bill and should review judicial practice as far as decisions affecting monopolies are concerned.

Structure/Organization Chart. The consultants should provide a suggested organization chart, and should indicate both the functions of the various units comprising it and their staffing needs. These needs should be dictated essentially by the SNP's new responsibilities and designated spheres of action; they should also be consistent with the requirements of strict, optimal management on the principle of minimum running costs.

Capital Structure. At the present time, ELECTROGAZ needs to be recapitalized. The consultants should therefore propose means of reorganizing its capital structure, incorporating mechanisms for capitalizing short-term debt, and clearing cumulative losses.

4.3 SPE lease contract

Against the background of the legislation in force and the provisions referred to in Section 4.2 above, the lease contract between the SNP and the SPE, in addition to the clauses usually contained in such contracts, should incorporate provisions on the following points:

- steps to be followed in putting the contract into effect (e.g. transfer of ELECTROGAZ operating assets to the SNP and the SPE, handling of client accounts receivable and supplier accounts payable, etc.);
- responsibilities, obligations, rights and spheres of action of the three partners (Government, SNP, SPE);
- duration of the contract and procedures for its amendment and renewal;
- the principle on which contractual remuneration is to be computed; particular attention should be given to Government arrears — for instance, the SPE would be authorized to deduct regular government consumption still due from amounts collected after 60 days upon receipt of bills;
- content and frequency of operating reports (to include volumes/ quantities of water and electricity consumption billed and paid for by month and by quarter), and content of the end-of-contract report;
- technical standards for works to be executed by the SPE;
- general operating regulations and rules for the arbitration of SNP/SPE disputes;
- capital of the SPE (the equivalent of about US$5 million).

4.4 Drafting of new customer contracts

The consultants should draw up model contracts (power and water) for the SPE to use with its customers and update the existing ELECTROGAZ contracts. The customer contract should specify criteria for judging quality of service and procedures for settlement of SPE/customer disputes.

4.5 Bidding documents

With the contents of Sections 4.1-4.4 above in mind, the consultants are asked to prepare bidding documents giving all necessary and available information on the expected contents of bidders' proposals, procedures for their presentation and the criteria that will be used in evaluating them.

4.6 Evaluation of bids; negotiations with successful bidder

The consultants will be expected to assist the Government in evaluating bid proposals received, and in negotiations with the successful bidder.

5. Deadline for Consultants

The documentation referred to in Sections 4.1-4.5 above should be finalized by February 15, 1993, and, as far as the lease contract is concerned, should have been discussed by then with both the Government, lease prequalified bidders and the Bank.

6. Bidders

The consultants selected to carry out these tasks will be expected to assemble a multi-disciplinary team including in particular:

- a legal expert or experts experienced in the specific fields of corporate law, affermage contracts, and the types of regulatory mechanism envisaged;

- an engineer or engineers specializing in the production and distribution of electric power and water and in the formulation of general operating regulations.

Relevant experience in the restructuring of a corporation engaged in the production and distribution of water and power in Africa is indispensable.

7. Information Available

The consultants should consult the following documentation pertinent to their mandate:

- Master Plan for the Electrification of Rwanda by 2010, Hydro-Québec International (Canada);

- Water Resource Master Plan and Management System, TWB Consulting Engineers (Austria);

- ELECTROGAZ Rehabilitation Study, SAUR-AFRIQUE (France);

- Draft Law for Public Enterprises (Ministry of Finance).

- Key elements of the lease contract as agreed upon with the Government.

Any other available Executive Branch documentation can be remitted to the consultants on request.

REPUBLIC OF RWANDA

ENERGY SECTOR REHABILITATION PROJECT

CONDITIONS TO BE INCLUDED IN THE LEASE CONTRACT PROPOSED FOR THE POWER AND WATER SECTORS IN RWANDA

1. Purpose of the Contract: The Lessee will manage, entirely at his own risk, the works and installations leased to him by the Lessor. The Government, through the SNP, is the owner of the assets, existing or future, and regulates the Lessee.

2. Responsibilities of the Lessee: The Lessee is responsible, under the terms of the contract signed with the Lessor, of the following: (a) the generation, transmission and distribution of electricity and water in the areas leased to him; (b) the quality and the reliability of the service, and (c) the prudent choice of new investments, when and if this is delegated to him in the contract. The lease will include all the works and installations (including land and buildings) for the generation, transmission and distribution, including the major spare parts for the generating units, but excluding the clients' meters which will be purchased by the Lessee from Electrograz and which will then become the property of the Lessee. The lease shall also include all the equipment necessary for data gathering, monitoring, control and dispatch of the load

3. Financial responsibility of the Lessee: The Lessee will be responsible for all the operation expenses (excluding fuel and imports of electricity), for maintenance and the replacement of short-lived assets, and of the technical, financial and commercial management of the assets of the Lessor. In particular, he will be responsible for: (a) salaries of the SPE's staff; (b) all the expenses necessary for the operation, maintenance (up to the limits mentioned hereunder) and management; (c) the cost of the services that the SPE might hire with others; (d) the expenses associated with service to the clients, including but not limited to billing, collections, etc; (e) the investment in assets needed to operate, as detailed hereunder and excluding those directly related to the assets leased to him, and (f) duties and taxes. The Lessee will pay out of his own remuneration for the spare parts needed for the maintenance of the installations and for the replacement of short lived assets provided that the cost of each one of these parts/assets does not exceed US$5,000 or a total of US$100,000 per year; otherwise, such parts/assets will be purchased out of the funds to be collected and transferred to the Lessor, as per the following paragraph. In any event, it is understood that the Lessee will pay, out of his own remuneration, (i) all office equipment and supplies, (ii) all meters, house service drop wires and associated hardware, (iii) vehicles, tools and testing equipment (cable, meter, oil, insulation, etc), (iv) all equipment needed for billing and collections, and (v) expansion of the distribution network to serve new customers, or an increase in load of existing customers, provided that the cost of each such expansion does not exceed US$10,000.

4. Payment to the Lessee: The Lessee will allowed to keep as his remuneration a portion of what he collects for each kWh sold. Tariffs will be set by Government through the legally established channels. After setting apart his payment, the Lessee shall use the remaining funds to: (a) pay for fuel and for the importation of electricity, and (b) what is left after this will be turned over to the Lessor. This will be done as payment from the clients is collected and the payment frequency and timing would be agreed upon between the Government and the private operator during discussions on contractual arrangements.

5. Transfer to the Lessor: Transfer to the Lessor will be used to: (a) pay the debt service of the assets of the sector; (b) pay the operating expenses of the SNP, owner of the assets and entrusted with the planning of the sector and the construction of the future assets; (c) establish a fund for the replacement of assets that are not the responsibility of the Lessee, and (d) finance the investment program of the sector.

6. Adjustment of the Lessee's remuneration: The Lessee's remuneration will be adjusted by a factor equivalent to 50% of the local inflation. It is expected that the Lessee will compensate for the remaining 50% through efficiency improvements.

7. Personnel for the SPE: The lessee will have complete freedom in all that concerns the hiring and firing of the personnel needed for the operation of the SPE. This will include: (a) the definition of the staffing level and numbers; (b) the definition of the requirements for each position; (c) the salary level for each position; (d) the benefits and incentives to be paid in addition to the basic salary, and (e) the management of the personnel, including firing, when necessary. It is understood that the Lessee will operate in accordance with the Labor Laws in effect in Rwanda.

8. Taxes and duties: The Lessee and the SPE will pay taxes and duties as per the applicable legislation in Rwanda. The Lessee and the SPE will receive the same treatment that the Law accords to other similar corporations in Rwanda.

9. Condition of the installations: The installations to the leased will be in good condition, or will be the object of a rehabilitation program financed by several donors. An adequate supply of spare parts for the generating stations will also be made available.

10. Purchase of existing operating assets: The Lessee will purchase from the Lessor, at fair market value, all those existing assets (vehicles, tools, meters, cable for house service connection, office equipment and supplies, computers, equipment and materials for distribution expansion, etc) that he considers necessary for the proper running of the SPE

11. Deposits: The total paid by customers as deposit for their future consumptions will be turned over to the Lessee on the date on which the lease contract is to take effect.

12. Energy consumed by Government and Government agencies: Payment to the Lessee is to be based on the assumption that Government and Government agencies will pay for their consumption as any other client. To this effect, the Government will set up (and replenish) an escrow account to cover two months consumption of the public sector, including those parastatals that traditionally have not paid, or paid late, their consumption. The Lessor and Lessee will control the escrow account.

13. Duration of the contract: The duration of the contract shall be 10 years, with an extension of 5 years, subject to satisfactory performance.

REPUBLIC OF RWANDA
ENERGY SECTOR REHABILITATION
Summary Accounts Cost Summary

	FRW			US$			% Foreign Exchange	% Total Base Costs
	Local	Foreign	Total	Local	Foreign	Total		
I. INVESTMENT COSTS								
A. Works								
1. Distribution Rehab Works	52.85	52.85	105.70	0.36	0.36	0.73	50.00	2.25
2. Distribution Extensions	74.67	74.67	149.35	0.51	0.51	1.03	50.00	3.18
3. Substation Works	30.45	578.55	609.00	0.21	3.99	4.20	95.00	12.96
4. Hydro Overhauls	43.50	246.50	290.00	0.30	1.70	2.00	85.00	6.17
5. Service Connect Upgrading	8.70	34.80	43.50	0.06	0.24	0.30	80.00	0.93
6. Small Constructions	3.13	0.35	3.48	0.02	0.00	0.02	10.00	0.07
Sub-Total	213.31	987.73	1201.03	1.47	6.81	8.28	82.24	25.55
B. Goods								
1. Plant Equipment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2. Substation Equipment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3. Spares for Gener & Transm	0.00	319.00	319.00	0.00	2.20	2.20	100.00	6.79
4. Distrib Eqipm & Materials	0.00	767.34	767.34	0.00	5.29	5.29	100.00	16.32
5. Elect Matls/Servic Connec	0.00	232.00	232.00	0.00	1.60	1.60	100.00	4.94
6. Water Connec Eq & Matls	0.00	87.00	87.00	0.00	0.60	0.60	100.00	1.85
7. Tools & Mainten Equipment	0.00	43.50	43.50	0.00	0.30	0.30	100.00	0.93
8. Other Equipment	0.00	190.53	190.53	0.00	1.31	1.31	100.00	4.05
9. Consumables	149.16	16.57	165.73	1.03	0.11	1.14	10.00	3.53
Sub-Total	149.16	1655.94	1805.10	1.03	11.42	12.45	91.74	38.40
C. Services								
1. Bathymetric Survey	8.70	78.30	87.00	0.06	0.54	0.60	90.00	1.85
2. Training Services	0.00	104.40	104.40	0.00	0.72	0.72	100.00	2.22
3. Photo Interpr & Map Prtng	0.00	49.44	49.44	0.00	0.34	0.34	100.00	1.05
Sub-Total	8.70	232.14	240.84	0.06	1.60	1.66	96.39	5.12
D. Consultancies								
1. Feasibility Studies	14.50	275.50	290.00	0.10	1.90	2.00	95.00	6.17
2. Engineering Studies	37.70	288.55	326.25	0.26	1.99	2.25	88.44	6.94
3. Project Mgmt & Supervisio	1.45	130.35	131.80	0.01	0.90	0.91	98.90	2.80
4. Institutional/Mgmt Assist	18.27	161.53	179.80	0.13	1.11	1.24	89.84	3.82
5. Operational Assistance	21.56	215.80	237.36	0.15	1.49	1.64	90.92	5.05
6. Training	2.86	25.71	28.56	0.02	0.18	0.20	90.00	0.61
Sub-Total	96.34	1097.45	1193.78	0.66	7.57	8.23	91.93	25.40
E. Miscellaneous								
1. Refinancing of PPF	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2. Severance Payments	203.00	0.00	203.00	1.40	0.00	1.40	0.00	4.32
3. Salaries (Charcoal M Pln)	34.19	22.79	56.98	0.24	0.16	0.39	40.00	1.21
Sub-Total	237.19	22.79	259.98	1.64	0.16	1.79	8.77	5.53
Total BASELINE COSTS	704.70	3996.05	4700.75	4.86	27.56	32.42	85.01	100.00
Physical Contingencies	72.72	413.31	486.03	0.50	2.85	3.35	85.04	10.34
Price Contingencies	72.65	387.80	460.44	0.50	2.67	3.18	84.22	9.80
Total PROJECTS COSTS	850.07	4797.16	5647.22	5.86	33.09	38.95	84.95	120.13

REPUBLIC OF RWANDA
ENERGY SECTOR REHABILITATION
Summary Accounts by Year

	Totals Including Contingencies FRW							Totals Including Contingencies US$						
	1993	1994	1995	1996	1997	1998	Total	1993	1994	1995	1996	1997	1998	Total
I. INVESTMENT COSTS														
A. Works														
1. Distribution Rehab Works	0.00	24.77	45.05	33.43	20.84	7.22	131.31	0.00	0.17	0.31	0.23	0.14	0.05	0.91
2. Distribution Extensions	0.00	26.25	45.46	47.24	49.08	20.40	188.42	0.00	0.18	0.31	0.33	0.34	0.14	1.30
3. Substation Works	0.00	71.00	258.08	344.46	79.46	0.00	753.00	0.00	0.49	1.78	2.38	0.55	0.00	5.19
4. Hydro Overhauls	0.00	35.39	183.78	133.57	19.81	0.00	372.54	0.00	0.24	1.27	0.92	0.14	0.00	2.57
5. Service Connect Upgrading	0.00	33.87	17.59	0.00	0.00	0.00	51.45	0.00	0.23	0.12	0.00	0.00	0.00	0.35
6. Small Constructions	2.61	1.37	0.00	0.00	0.00	0.00	3.98	0.02	0.01	0.00	0.00	0.00	0.00	0.03
Sub-Total	2.61	192.63	549.96	558.70	169.20	27.62	1500.72	0.02	1.33	3.79	3.85	1.17	0.19	10.35
B. Goods														
1. Plant Equipment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2. Substation Equipment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3. Spares for Gener & Transm	0.00	185.85	193.00	0.00	0.00	0.00	378.85	0.00	1.28	1.33	0.00	0.00	0.00	2.61
4. Distrib Eqipm & Materials	0.00	447.05	0.00	481.90	0.00	0.00	928.94	0.00	3.08	0.00	3.32	0.00	0.00	6.41
5. Elect Matls/Servic Connec	0.00	135.16	140.36	0.00	0.00	0.00	275.53	0.00	0.93	0.97	0.00	0.00	0.00	1.90
6. Water Connec Eq & Matls	0.00	50.69	52.64	0.00	0.00	0.00	103.32	0.00	0.35	0.36	0.00	0.00	0.00	0.71
7. Tools & Mainten Equipment	0.00	50.69	0.00	0.00	0.00	0.00	50.69	0.00	0.35	0.00	0.00	0.00	0.00	0.35
8. Other Equipment	67.48	126.38	23.16	3.46	0.00	0.00	220.48	0.47	0.87	0.16	0.02	0.00	0.00	1.52
9. Consumables	37.58	56.82	53.59	51.29	0.00	0.00	199.28	0.26	0.39	0.37	0.35	0.00	0.00	1.37
Sub-Total	105.07	1052.63	462.75	536.65	0.00	0.00	2157.09	0.72	7.26	3.19	3.70	0.00	0.00	14.88
C. Services														
1. Bathymetric Survey	81.35	16.91	0.00	0.00	0.00	0.00	98.26	0.56	0.12	0.00	0.00	0.00	0.00	0.68
2. Training Services	19.51	20.27	21.05	21.85	22.69	23.55	128.93	0.13	0.14	0.15	0.15	0.16	0.16	0.89
3. Photo Interpr & Map Prtng	20.16	23.99	13.16	0.00	0.00	0.00	57.31	0.14	0.17	0.09	0.00	0.00	0.00	0.40
Sub-Total	121.03	61.18	34.21	21.85	22.69	23.55	284.51	0.83	0.42	0.24	0.15	0.16	0.16	1.96
D. Consultancies														
1. Feasibility Studies	32.53	219.76	87.78	0.00	0.00	0.00	340.07	0.22	1.52	0.61	0.00	0.00	0.00	2.35
2. Engineering Studies	121.96	190.44	65.94	0.00	0.00	0.00	378.33	0.84	1.31	0.45	0.00	0.00	0.00	2.61
3. Project Mgmt & Supervisio	0.00	24.49	55.67	45.62	28.79	10.44	165.01	0.00	0.17	0.38	0.31	0.20	0.07	1.14
4. Institutional/Mgmt Assist	104.09	64.34	38.67	0.00	0.00	0.00	207.10	0.72	0.44	0.27	0.00	0.00	0.00	1.43
5. Operational Assistance	77.59	109.77	78.18	12.04	0.00	0.00	277.58	0.54	0.76	0.54	0.08	0.00	0.00	1.91
6. Training	7.81	12.69	9.84	3.28	0.00	0.00	33.62	0.05	0.09	0.07	0.02	0.00	0.00	0.23
Sub-Total	343.98	621.49	336.07	60.94	28.79	10.44	1401.71	2.37	4.29	2.32	0.42	0.20	0.07	9.67
E. Miscellaneous														
1. Refinancing of PPF	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2. Severance Payments	65.39	170.82	0.00	0.00	0.00	0.00	236.22	0.45	1.18	0.00	0.00	0.00	0.00	1.63
3. Salaries (Charcoal M Pln)	19.74	25.68	16.79	4.78	0.00	0.00	66.99	0.14	0.18	0.12	0.03	0.00	0.00	0.46
Sub-Total	85.13	196.51	16.79	4.78	0.00	0.00	303.21	0.59	1.36	0.12	0.03	0.00	0.00	2.09
Total PROJECT COSTS	657.82	2124.43	1399.78	1182.92	220.68	61.60	5647.22	4.54	14.65	9.65	8.16	1.52	0.42	38.95

REPUBLIC OF RWANDA
ENERGY SECTOR REHABILITATION
Table 1. Energy Sector Rehabilitation
Institutional Reform
Detailed Cost Table
FRW

	Quantity	Unit Cost	Base Costs in US$					Totals Including Contingencies US$				
	93-98 Total	1993-98	1993	1994	1995	1996-98	Total	1993	1994	1995	1996-98	Total
I. INVESTMENT COSTS												
A. Data Base Upgrading												
Updating Plans & Drawings	-	-	0.00	375.00	125.00	0.00	500.00	0.00	437.91	151.63	0.00	589.55
Inventory Delivery Points	-	-	0.00	600.00	200.00	0.00	800.00	0.00	700.66	242.61	0.00	943.28
Sub-Total			0.00	975.00	325.00	0.00	1300.00	0.00	1138.58	394.25	0.00	1532.82
B. Service Connec. Upgrading												
Works	-	-	0.00	200.00	100.00	0.00	300.00	0.00	233.55	121.31	0.00	354.86
Water Connec Eq & Matls	-	-	0.00	300.00	300.00	0.00	600.00	0.00	349.56	363.01	0.00	712.57
Elect Connec Eq & Matls	-	-	0.00	800.00	800.00	0.00	1600.00	0.00	932.15	968.03	0.00	1900.18
Consultant Services	-	-	0.00	150.00	50.00	0.00	200.00	0.00	174.78	60.50	0.00	235.28
Sub-Total			0.00	1450.00	1250.00	0.00	2700.00	0.00	1690.04	1512.85	0.00	3202.88
C. Severance Payments	-	-	400.00	1000.00	0.00	0.00	1400.00	451.00	1178.10	0.00	0.00	1629.10
D. Consulting Services	-	-	300.00	0.00	0.00	0.00	300.00	336.43	0.00	0.00	0.00	336.43
Total INVESTMENT COSTS			700.00	3425.00	1575.00	0.00	5700.00	787.43	4006.71	1907.10	0.00	6701.24
Total			700.00	3425.00	1575.00	0.00	5700.00	787.43	4006.71	1907.10	0.00	6701.24

Unit Costs Scaled by 1000.0 - Values scaled by 1000.0 11/10/1992 9:47

REPUBLIC OF RWANDA
ENERGY SECTOR REHABILITATION
Table 2. Energy Sector Rehabilitation
Feasibility Studies for Hydro Projects
Detailed Cost Table
FRW

	Quantity	Unit Cost	Base Costs in US$					Totals Including Contingencies US$				
	93-98 Total	1993-98	1993	1994	1995	1996-98	Total	1993	1994	1995	1996-98	Total
I. INVESTMENT COSTS												
A. Consultants Services	-	-	200.00	1300.00	500.00	0.00	2000.00	224.35	1515.58	605.40	0.00	2345.33
Total INVESTMENT COSTS			200.00	1300.00	500.00	0.00	2000.00	224.35	1515.58	605.40	0.00	2345.33
Total			200.00	1300.00	500.00	0.00	2000.00	224.35	1515.58	605.40	0.00	2345.33

Unit Costs Scaled by 1000.0 - Values scaled by 1000.0 11/10/1992 9:47

REPUBLIC OF RWANDA
ENERGY SECTOR REHABILITATION
Table 3. Rehabilitation and Extension of Distribution Networks
Detailed Cost Table
FRW

	Totals Including Contingencies US$							Breakdown of Totals Incl.Cont. US$			
	1993	1994	1995	1996	1997	1998	Total	F.Exch	Local	Taxes	Total
I. INVESTMENT COSTS											
A. Engr Study/Bidding Docmts	280.36	0.00	0.00	0.00	0.00	0.00	280.36	280.36	0.00	0.00	280.36
B. Kigali											
Eq & Matls Rehabilitation	0.00	671.15	0.00	723.47	0.00	0.00	1394.61	1394.61	0.00	0.00	1394.61
Eq & Matls for Extensions	0.00	372.86	0.00	401.93	0.00	0.00	774.78	774.78	0.00	0.00	774.78
Rehabilitation Works	0.00	89.98	163.65	121.45	75.71	26.22	477.02	236.89	240.13	0.00	477.02
Extension Works	0.00	36.91	63.93	66.42	69.01	28.68	264.94	131.52	133.42	0.00	264.94
Project Supervision	0.00	55.93	101.64	75.36	46.93	16.24	296.11	296.11	0.00	0.00	296.11
Sub-Total	0.00	1226.83	329.22	1388.62	191.66	71.14	3207.47	2833.91	373.56	0.00	3207.47
C. Butare											
Eq & Matls Rehabilitation	0.00	302.95	0.00	326.56	0.00	0.00	629.51	629.51	0.00	0.00	629.51
Eq & Matls for Extensions	0.00	17.48	0.00	18.84	0.00	0.00	36.32	36.32	0.00	0.00	36.32
Rehabilitation Works	0.00	39.84	72.45	53.77	33.52	11.61	211.18	104.87	106.31	0.00	211.18
Extension Works	0.00	1.76	3.04	3.16	3.29	1.37	12.62	6.26	6.35	0.00	12.62
Project Supervision	0.00	17.24	31.34	23.24	14.47	5.01	91.30	91.30	0.00	0.00	91.30
Sub-Total	0.00	379.26	106.83	425.57	51.28	17.98	980.93	868.26	112.66	0.00	980.93
D. Ruhengeri											
Eq & Matls Rehabilitation	0.00	46.61	0.00	50.24	0.00	0.00	96.85	96.85	0.00	0.00	96.85
Eq & Matls for Extensions	0.00	1106.93	0.00	1193.22	0.00	0.00	2300.14	2300.14	0.00	0.00	2300.14
Rehabilitation Works	0.00	5.86	10.65	7.91	4.93	1.71	31.06	15.42	15.63	0.00	31.06
Extension Works	0.00	112.48	194.82	202.42	210.32	87.41	807.44	400.82	406.62	0.00	807.44
Project Supervion	0.00	46.32	80.16	83.21	86.37	35.86	331.93	331.93	0.00	0.00	331.93
Sub-Total	0.00	1318.19	285.64	1536.99	301.62	124.98	3567.42	3145.16	422.26	0.00	3567.42
E. Gisenyi											
Eq & Matls Rehabilitation	0.00	134.00	0.00	144.44	0.00	0.00	278.44	278.44	0.00	0.00	278.44
Eq & Matls for Extensions	0.00	267.99	0.00	288.88	0.00	0.00	556.88	556.88	0.00	0.00	556.88
Rehabilitation Works	0.00	18.75	34.09	25.30	15.77	5.46	99.38	49.35	50.03	0.00	99.38
Extension Works	0.00	26.36	45.66	47.44	49.29	20.49	189.24	93.94	95.30	0.00	189.24
Project Supervision	0.00	15.73	27.23	28.26	29.33	12.18	112.73	112.73	0.00	0.00	112.73
Sub-Total	0.00	462.83	106.98	534.33	94.40	38.13	1236.67	1091.34	145.33	0.00	1236.67
F. Nyabisindu											
Eq & Matls Rehabilitation	0.00	128.17	0.00	138.16	0.00	0.00	266.33	266.33	0.00	0.00	266.33
Eq & Matls for Extensions	0.00	34.96	0.00	37.68	0.00	0.00	72.64	72.64	0.00	0.00	72.64
Rehabilitation Works	0.00	16.40	29.83	22.14	13.80	4.78	86.96	43.18	43.77	0.00	86.96
Extension Works	0.00	3.51	6.09	6.33	6.57	2.73	25.23	12.53	12.71	0.00	25.23
Project Supervision	0.00	9.32	16.94	12.56	7.82	2.71	49.35	49.35	0.00	0.00	49.35
Sub-Total	0.00	192.37	52.86	216.87	28.20	10.22	500.51	444.03	56.48	0.00	500.51
Total INVESTMENT COSTS	280.36	3579.47	881.53	4102.39	667.15	262.45	9773.35	8663.06	1110.29	0.00	9773.35
Total	280.36	3579.47	881.53	4102.39	667.15	262.45	9773.35	8663.06	1110.29	0.00	9773.35

- Values scaled by 1000.0 11/10/1992 9:47

REPUBLIC OF RWANDA
ENERGY SECTOR REHABILITATION
Table 4. Improvement of Substations
Detailed Cost Table
FRW

	Totals Including Contingencies US$							Breakdown of Totals Incl.Cont. US$			
	1993	1994	1995	1996	1997	1998	Total	F.Exch	Local	Taxes	Total
I. INVESTMENT COSTS											
A. Engrn & Prepar Bidd Docs	336.43	0.00	0.00	0.00	0.00	0.00	336.43	336.43	0.00	0.00	336.43
B. Modification of Mururu I Works and Materials	0.00	139.90	508.53	678.74	156.58	0.00	1483.75	1408.60	75.15	0.00	1483.75
C. Works Other Substations Works and Materials	0.00	349.75	1271.33	1696.85	391.45	0.00	3709.38	3521.50	187.88	0.00	3709.38
Total INVESTMENT COSTS	336.43	489.65	1779.87	2375.59	548.02	0.00	5529.57	5266.53	263.04	0.00	5529.57
Total	336.43	489.65	1779.87	2375.59	548.02	0.00	5529.57	5266.53	263.04	0.00	5529.57

- Values scaled by 1000.0 11/10/1992 9:47

REPUBLIC OF RWANDA
ENERGY SECTOR REHABILITATION
Table 5. Overhaul Works at Hydro Power Stations
Detailed Cost Table
FRW

	Totals Including Contingencies US$							Breakdown of Totals Incl.Cont. US$			
	1993	1994	1995	1996	1997	1998	Total	F.Exch	Local	Taxes	Total
I. INVESTMENT COSTS											
A. Engrn & Prepr Bidd Docmts	224.29	0.00	0.00	0.00	0.00	0.00	224.29	224.29	0.00	0.00	224.29
B. Works and Materials											
Mukungwa	0.00	121.95	633.31	460.25	68.26	0.00	1283.78	1153.86	129.91	0.00	1283.78
Gisenyi Hydrlic Structurs	0.00	122.08	634.11	460.92	68.37	0.00	1285.49	1025.66	259.83	0.00	1285.49
Sub-Total	0.00	244.03	1267.42	921.18	136.64	0.00	2569.27	2179.52	389.74	0.00	2569.27
C. Project Supervision	0.00	24.38	126.58	91.98	13.64	0.00	256.59	243.59	12.99	0.00	256.59
Total INVESTMENT COSTS	224.29	268.41	1394.00	1013.16	150.28	0.00	3050.14	2647.41	402.74	0.00	3050.14
Total	224.29	268.41	1394.00	1013.16	150.28	0.00	3050.14	2647.41	402.74	0.00	3050.14

- Values scaled by 1000.0 11/10/1992 9:47

REPUBLIC OF RWANDA
ENERGY SECTOR REHABILITATION
Table 6. Spare Parts and Maintenance Equipment
Detailed Cost Table
FRW

	Quantity 93-98 Total		Unit Cost 1993-98	Base Costs in US$ 1993	1994	1995	1996-98	Total	Totals Including Contingencies US$ 1993	1994	1995	1996-98	Total
I. INVESTMENT COSTS													
A. Spare Parts	-	-	-	0.00	1100.00	1100.00	0.00	2200.00	0.00	1281.71	1331.04	0.00	2612.74
B. Tools & Equipment	-	-	-	0.00	300.00	0.00	0.00	300.00	0.00	349.56	0.00	0.00	349.56
Total INVESTMENT COSTS				0.00	1400.00	1100.00	0.00	2500.00	0.00	1631.26	1331.04	0.00	2962.30
Total				0.00	1400.00	1100.00	0.00	2500.00	0.00	1631.26	1331.04	0.00	2962.30

Unit Costs Scaled by 1000.0 - Values scaled by 1000.0 11/10/1992 9:47

REPUBLIC OF RWANDA
ENERGY SECTOR REHABILITATION
Table 7. Technical Assistance and Capacity Building for Power Sector
Detailed Cost Table
FRW

	Unit	Quantity 93-98 Total		Unit Cost 1993-98	Base Costs in US$ 1993	1994-98	Total	Totals Including Contingencies US$ 1993	1994	1995	1996	1997	1998	Total
I. INVESTMENT COSTS														
A. Imprvmt Regional Operatn		-	-	-	150.00	0.00	150.00	168.22	0.00	0.00	0.00	0.00	0.00	168.22
B. Scholarships for ESIE	Students	6	36	2900.0	120.00	120.00	720.00	134.57	139.82	145.20	150.72	156.45	162.39	889.17
Total INVESTMENT COSTS					270.00	120.00	870.00	302.79	139.82	145.20	150.72	156.45	162.39	1057.38
Total					270.00	120.00	870.00	302.79	139.82	145.20	150.72	156.45	162.39	1057.38

Unit Costs Scaled by 1000.0 - Values scaled by 1000.0 11/10/1992 9:47

REPUBLIC OF RWANDA
ENERGY SECTOR REHABILITATION
Table 8. Charcoal Master Plan Study
Detailed Cost Table
FRW

	Totals Including Contingencies US$						Breakdown of Totals Incl.Cont. US$			
	1993	1994	1995	1996	1997-98	Total	F.Exch	Local	Taxes	Total
I. INVESTMENT COSTS										
A. Masterplan Woodfuel Spply										
Photogr & Other Equipment	206.35	115.35	0.00	0.00	0.00	321.70	321.70	0.00	0.00	321.70
Consltants & Local Exprts	141.38	192.47	118.73	3.77	0.00	456.35	410.32	46.03	0.00	456.35
Temporary Personnel	32.63	36.36	18.29	0.00	0.00	87.28	34.72	52.56	0.00	87.28
Photo Interpr & Map Prtng	139.06	165.46	90.75	0.00	0.00	395.27	395.27	0.00	0.00	395.27
Training of Local Personn	39.27	51.33	30.29	0.00	0.00	120.89	108.69	12.19	0.00	120.89
Fuel & Other Consumables	31.55	43.54	28.15	5.09	0.00	108.33	10.74	97.59	0.00	108.33
Sub-Total	590.24	604.51	286.21	8.86	0.00	1489.81	1281.44	208.38	0.00	1489.81
B. Modernization & Follow-up										
Construction Cntrol Posts	18.03	9.41	0.00	0.00	0.00	27.44	2.73	24.72	0.00	27.44
Cars & Data Procss Equipm	47.10	69.91	45.98	0.00	0.00	162.99	162.99	0.00	0.00	162.99
Consltants & Lcal Experts	59.47	102.65	79.96	25.16	0.00	267.24	240.26	26.98	0.00	267.24
Temporary Personnel	73.13	105.56	69.49	3.80	0.00	251.99	100.20	151.79	0.00	251.99
Training of Local Personn	6.73	26.83	27.87	13.84	0.00	75.26	67.66	7.61	0.00	75.26
Fuel & Other Consumables	29.30	40.01	36.71	38.17	0.00	144.19	14.28	129.92	0.00	144.19
Sub-Total	233.76	354.38	260.01	80.97	0.00	929.12	588.11	341.01	0.00	929.12
C. Communal Forestry Plans										
Cars & Data Procss Equipm	153.64	154.97	72.60	0.00	0.00	381.21	381.21	0.00	0.00	381.21
Consltants & Local Exprts	62.84	129.48	105.41	22.64	0.00	320.36	288.02	32.34	0.00	320.36
Temporary Personnel	22.50	26.98	21.94	22.81	0.00	94.23	37.45	56.78	0.00	94.23
Training of Local Personn	7.85	9.33	9.69	8.80	0.00	35.68	32.08	3.60	0.00	35.68
Fuel & Other Consumables	162.27	262.43	264.32	268.48	0.00	957.50	94.77	862.73	0.00	957.50
Sub-Total	409.10	583.19	473.96	322.73	0.00	1788.98	833.52	955.46	0.00	1788.98
D. Improv Utilizatn Pinewood										
Cars & Data Procss Equipm	58.32	65.25	41.14	23.86	0.00	188.57	188.57	0.00	0.00	188.57
Consltants & Lcal Experts	103.23	157.47	113.89	31.45	0.00	406.04	365.06	40.98	0.00	406.04
Temporary Personnel	7.88	8.21	6.10	6.33	0.00	28.52	11.33	17.18	0.00	28.52
Fuel & Other Consumables	36.06	45.90	40.38	41.99	0.00	164.33	16.27	148.06	0.00	164.33
Sub-Total	205.48	276.83	201.51	103.63	0.00	787.45	581.23	206.22	0.00	787.45
Total INVESTMENT COSTS	1438.58	1818.90	1221.69	516.19	0.00	4995.37	3284.31	1711.06	0.00	4995.37
Total	1438.58	1818.90	1221.69	516.19	0.00	4995.37	3284.31	1711.06	0.00	4995.37

- Values scaled by 1000.0 11/10/1992 9:47

REPUBLIC OF RWANDA
ENERGY SECTOR REHABILITATION
Table 9. Commercialization of Photovoltaic Units
Detailed Cost Table
FRW

	Quantity		Unit Cost	Base Costs in US$					Totals Including Contingencies US$				
	93-98 Total		1993-98	1993	1994	1995	1996-98	Total	1993	1994	1995	1996-98	Total
I. INVESTMENT COSTS													
A. Market & Strategy Studies													
Market Study	-	-	-	40.00	50.00	0.00	0.00	90.00	44.93	58.45	0.00	0.00	103.38
Formulation of Strategy	-	-	-	0.00	40.00	0.00	0.00	40.00	0.00	46.76	0.00	0.00	46.76
Sub-Total				40.00	90.00	0.00	0.00	130.00	44.93	105.22	0.00	0.00	150.15
B. New Financial Mechanisms													
Finan Product Identifictn	-	-	-	0.00	60.00	0.00	0.00	60.00	0.00	70.14	0.00	0.00	70.14
Testing and Validation	-	-	-	0.00	30.00	40.00	0.00	70.00	0.00	35.07	48.58	0.00	83.66
Sub-Total				0.00	90.00	40.00	0.00	130.00	0.00	105.22	48.58	0.00	153.80
Total INVESTMENT COSTS				40.00	180.00	40.00	0.00	260.00	44.93	210.43	48.58	0.00	303.95
Total				40.00	180.00	40.00	0.00	260.00	44.93	210.43	48.58	0.00	303.95

Unit Costs Scaled by 1000.0 - Values scaled by 1000.0 11/10/1992 9:47

REPUBLIC OF RWANDA
ENERGY SECTOR REHABILITATION
Table 10. Support to Private Sector Development of Kivu's Methane Gas
Detailed Cost Table
FRW

	Quantity		Unit Cost	Base Costs in US$					Totals Including Contingencies US$				
	93-98 Total		1993-98	1993	1994	1995	1996-98	Total	1993	1994	1995	1996-98	Total
I. INVESTMENT COSTS													
A. Bathimetric Surveys	-	-	-	500.00	100.00	0.00	0.00	600.00	561.03	116.65	0.00	0.00	677.68
B. Set-up Monitoring System	-	-	-	0.00	150.00	100.00	0.00	250.00	0.00	174.97	121.16	0.00	296.13
C. Drafting of Norms	-	-	-	100.00	100.00	0.00	0.00	200.00	112.21	116.65	0.00	0.00	228.85
D. Promotion of Gas Developm	-	-	-	0.00	100.00	180.00	0.00	280.00	0.00	116.65	218.08	0.00	334.73
Total INVESTMENT COSTS				600.00	450.00	280.00	0.00	1330.00	673.23	524.92	339.24	0.00	1537.38
Total				600.00	450.00	280.00	0.00	1330.00	673.23	524.92	339.24	0.00	1537.38

Unit Costs Scaled by 1000.0 - Values scaled by 1000.0 11/10/1992 9:47

REPUBLIC OF RWANDA
ENERGY SECTOR REHABILITATION
Table 11. Assistance to the Petroleum Sector
Detailed Cost Table
FRW

	Quantity	Unit Cost	Base Costs in US$				Totals Including Contingencies US$				Breakdown of Totals Incl.Cont. US$			
	93-98 Total	1993-98	1993	1994	1995-98	Total	1993	1994	1995-98	Total	F.Exch	Local	Taxes	Total
I. INVESTMENT COSTS														
A. Technical Assistance	- -	-	200.00	0.00	0.00	200.00	224.29	0.00	0.00	224.29	224.29	0.00	0.00	224.29
B. Depot Repair & Modernizat	- -	-	0.00	400.00	0.00	400.00	0.00	466.07	0.00	466.07	466.07	0.00	0.00	466.07
Total INVESTMENT COSTS			200.00	400.00	0.00	600.00	224.29	466.07	0.00	690.36	690.36	0.00	0.00	690.36
Total			200.00	400.00	0.00	600.00	224.29	466.07	0.00	690.36	690.36	0.00	0.00	690.36

Unit Costs Scaled by 1000.0 - Values scaled by 1000.0 11/10/1992 9:48

REPUBLIC OF RWANDA
ENERGY SECTOR REHABILITATION PROJECT

DETAILS OF CONSULTING SERVICES

Brief Description of Services	Man month Requirements	Consulting Firms or Individual Experts
1. Feasibilities studies for two hydro plant projects: Complementary geological surveys.	80	Consulting Firms
2. Woodfuel Promotion: Promotion and sentization campaigns for use of pine wood, for efficient production and consumption and rational use of wood and woodfuel including participation of local experts. Promotion of wooduse management plans.	20	Consulting Firms
3. Engineering Studies:		
(a) Upgrading of services connections: inventory of existing connections, preparation of maps;	15	Individual experts
(b) Improvement of substations:	15	Consulting Firms
- technical audits to identify the weak points in the main substations of the transmission network and proposals for equipment needs and works for corrective actions.		
- Study and detailed design for extension of the Muruvu I substation.		
(c) Hydro Overhauls:	10	Consulting Firms
- Execution of the Mukungwa power station and of the hydraulic structures of Gihira power station.		
- Preparation of technical specifications and bidding documents for the supplies and execution of works.		
(d) Technical Norms for Gas production: preparation of technical standards for future development of methane gas from Lake Kivu.	6	Individual Experts
(e) Verification of variation pattern of the Lake depth, identification of sites. Detailed survey of the areas using sonar equipment.	20	Consulting Firms
4. Project Supervision:		
- Supervision services for the rehabilitation and extension of the distribution networks	36	Consulting Firms
5. Technical Assistance:		
- through seminars and development of simple computer models for operations planning to ELECTROGAZ staff to improve the operation of the regional interconnected network for the design and implementation of the charcoal Master Plan:	10	Individual Experts
- Project coordinator for the first 3 years.	26	Consulting Firms1/
- Establishment of control system and planning of woodfuel production zoning.	16	Consulting Firms
- Preparation of wooduse management plans;	20	Consulting Firms
- Commercialisation of pinewood.	18	Consulting Firms
- Dissemination of the above to the public: Individuals	30	Individual Experts & Consult. Firms
- Dissemination of the above to the public: Firms	100	Individual Experts & Consult. Firms
6. Training (woodfuel): Seminars on efficiency techniques for wood cut and carbonisation throughout the project implementation.	14	Individual experts

1/ For the efficiency of the coordination of these activities, one firm should be selected to provide these services.

REPUBLIC OF RWANDA

ENERGY SECTOR REHABILITATION PROJECT

ORGANIZATION AND FUNCTIONS OF THE PCAU

The main functions of the Project Coordination and Administration Unit (PCAU) are:

(i) to be counterpart for IDA, consultants and contractors;

(ii) to coordinate and supervise the use of IDA funds and other funds allocated for the execution of the Project;

(iii) to keep detailed accounts of the funds used in the execution of the project;

(iv) to supervise the execution by each Project Implementation Unit (PIU) of the different project components;

(v) to submit the requests for disbursements to IDA;

(vi) to supervise, jointly with the representatives of each Ministry and Agency involved, the procurement procedures for each contract to be entered into and follow up the execution of each contract;

(vii) to keep appropriate files for all project components;

(viii) to coordinate the preparation by the PIUs of their respective annual work program and progress reports, consolidate and send them to IDA at three-month intervals;

(ix) to carry out the same activities as in (viii) but with respect to the Project Completion Report, once disbursements have been completed and not later than six months after the end of all activities; and

(x) to handle official correspondence in respect of project execution with IDA, consultants, contractors, and Government Agencies.

REPUBLIC OF RWANDA
ENERGY SECTOR REHABILITATION
Financing Plan by Disbursement Category
US$

	IDA		CCCE		EIB		Government		Total		For. Exch.	Local (Excl. Taxes)	Duties & Tax.
	Amount	%	Amount	%	Amount	%	Amount	%	Amount	%			
A. IDA Financing	25.79	93.98	0.00	0.00	0.00	0.00	1.65	6.02	27.44	70.45	24.13	3.31	0.00
B. Caisse Centrale	0.00	0.00	2.57	100.00	0.00	0.00	0.00	0.00	2.57	6.60	0.75	1.82	0.00
C. Cofinanced	0.21	60.00	0.14	40.00	0.00	0.00	0.00	0.00	0.35	0.91	0.28	0.07	0.00
D. EIB	0.00	0.00	0.00	0.00	7.91	92.24	0.67	7.76	8.58	22.03	7.91	0.67	0.00
Total Disbursement	26.00	66.76	2.71	6.97	7.91	20.32	2.32	5.95	38.95	100.00	33.08	5.86	0.00

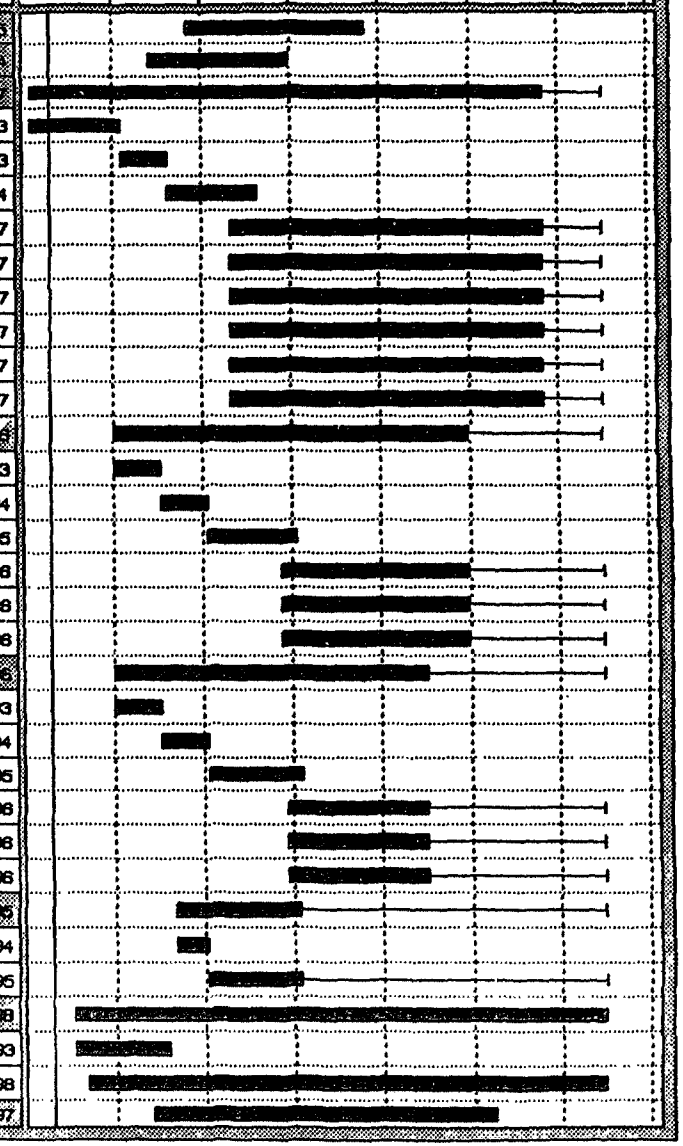
Values Scaled by 1000000.0 11/10/1992 9:48

REPUBLIC OF RWANDA

ENERGY SECTOR REHABILITATION PROJECT

IMPLEMENTATION AND PROCUREMENT SCHEDULE

Nbr	Task Name	Million US$	Procurm Method	Start Date	End Date
1.0.0	Institutional Reform	12.71	ICB/Other	1-Nov-93	31-Oct-95
2.0.0	Feasibility Studies for Hydro	0.35	Other	1-Jul-93	28-Dec-94
3.0.0	Distribution Rehab & Extens	8.77	ICB/LCB	3-Feb-92	27-Oct-97
3.1.0	Studies & Planning	0.00		3-Feb-92	3-Feb-93
3.2.0	Bidding & Contracting	0.00		4-Feb-93	11-Aug-93
3.3.0	Manufacturing & Shipping	0.00		12-Aug-93	16-Aug-94
3.4.0	Execution of Works	0.00		27-Apr-94	27-Oct-97
3.4.1	Kigali	0.00		27-Apr-94	27-Oct-97
3.4.2	Butare	0.00		27-Apr-94	27-Oct-97
3.4.3	Ruhengeri	0.00		27-Apr-94	27-Oct-97
3.4.4	Gisenyi	0.00		27-Apr-94	27-Oct-97
3.4.5	Nyabisindu	0.00		27-Apr-94	27-Oct-97
4.0.0	Transmission System Improvems	5.00	NBF	4-Jan-93	30-Jun-96
4.1.0	Technical Audit & Doc Prep	0.00		4-Jan-93	12-Jul-93
4.2.0	Bidding & Contracting	0.00		13-Jul-93	21-Jan-94
4.3.0	Manufacturing & Shipping	0.00		24-Jan-94	23-Jan-95
4.4.0	Execution of Works	0.00		16-Nov-94	24-Dec-96
4.4.1	Modification of Mururu I	0.00		16-Nov-94	24-Dec-96
4.4.2	Improvement of Other Substatio	0.00		16-Nov-94	24-Dec-96
5.0.0	Hydro Plant Overhauls	3.00	NBF	4-Jan-93	3-Jul-96
5.1.0	Technical Audit & Doc Prep	0.00		4-Jan-93	12-Jul-93
5.2.0	Bidding & Contracting	0.00		13-Jul-93	21-Jan-94
5.3.0	Manufacturing & Shipping	0.00		24-Jan-94	9-Feb-95
5.4.0	Execution of Works	0.00		7-Dec-94	3-Jul-96
5.4.1	Mukungwa	0.00		7-Dec-94	3-Jul-96
5.4.2	Gisenyi	0.00		7-Dec-94	3-Jul-96
6.0.0	Spares, Maint Eq & Tools	2.36	Direct	1-Sep-93	30-Jan-96
6.1.0	Listing & Ordering	0.00		1-Sep-93	10-Jan-94
6.2.0	Manufacturing & Shipping	0.00		11-Jan-94	30-Jan-95
7.0.0	Technical Assistance & Trainin	1.08	Other	15-Jul-92	1-Jul-98
7.1.0	Improved Regional Operation	0.17		15-Jul-92	2-Aug-93
7.2.0	Training of Engineers	0.89		1-Sep-92	1-Jul-98
8.0.0	Charcoal Master Plan	5.00	ICB/Other	1-Jun-93	31-Mar-97

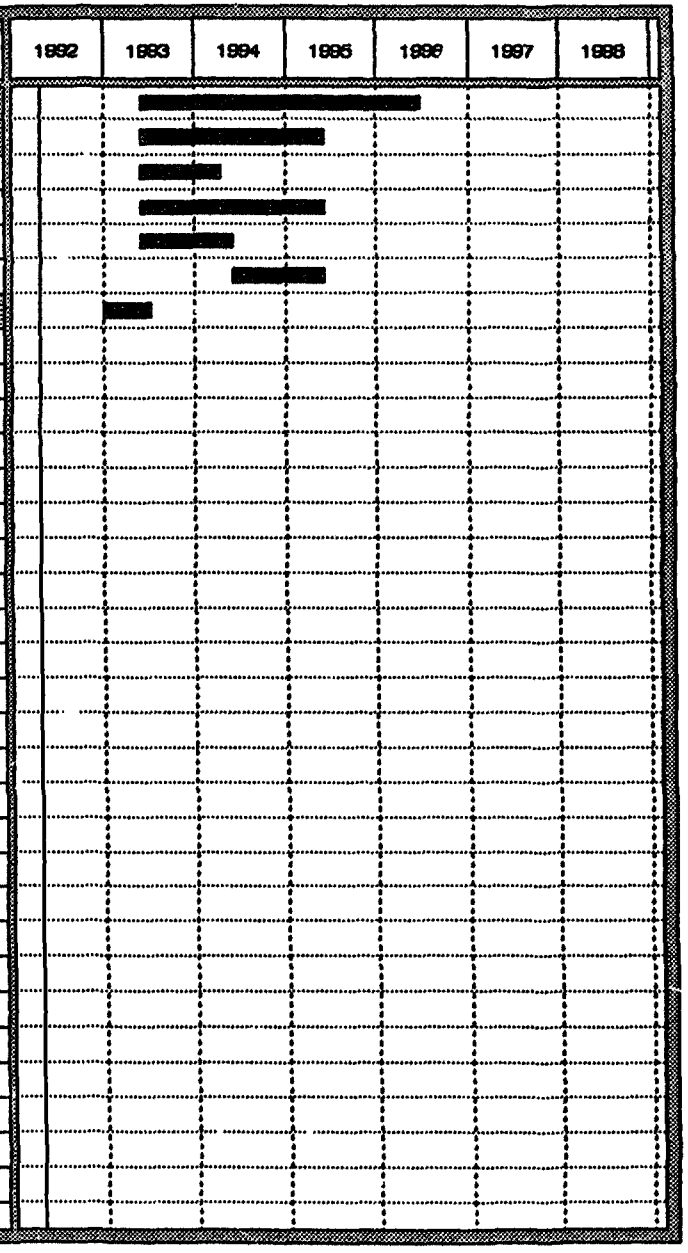


REPUBLIC OF RWANDA

ENERGY SECTOR REHABILITATION PROJECT

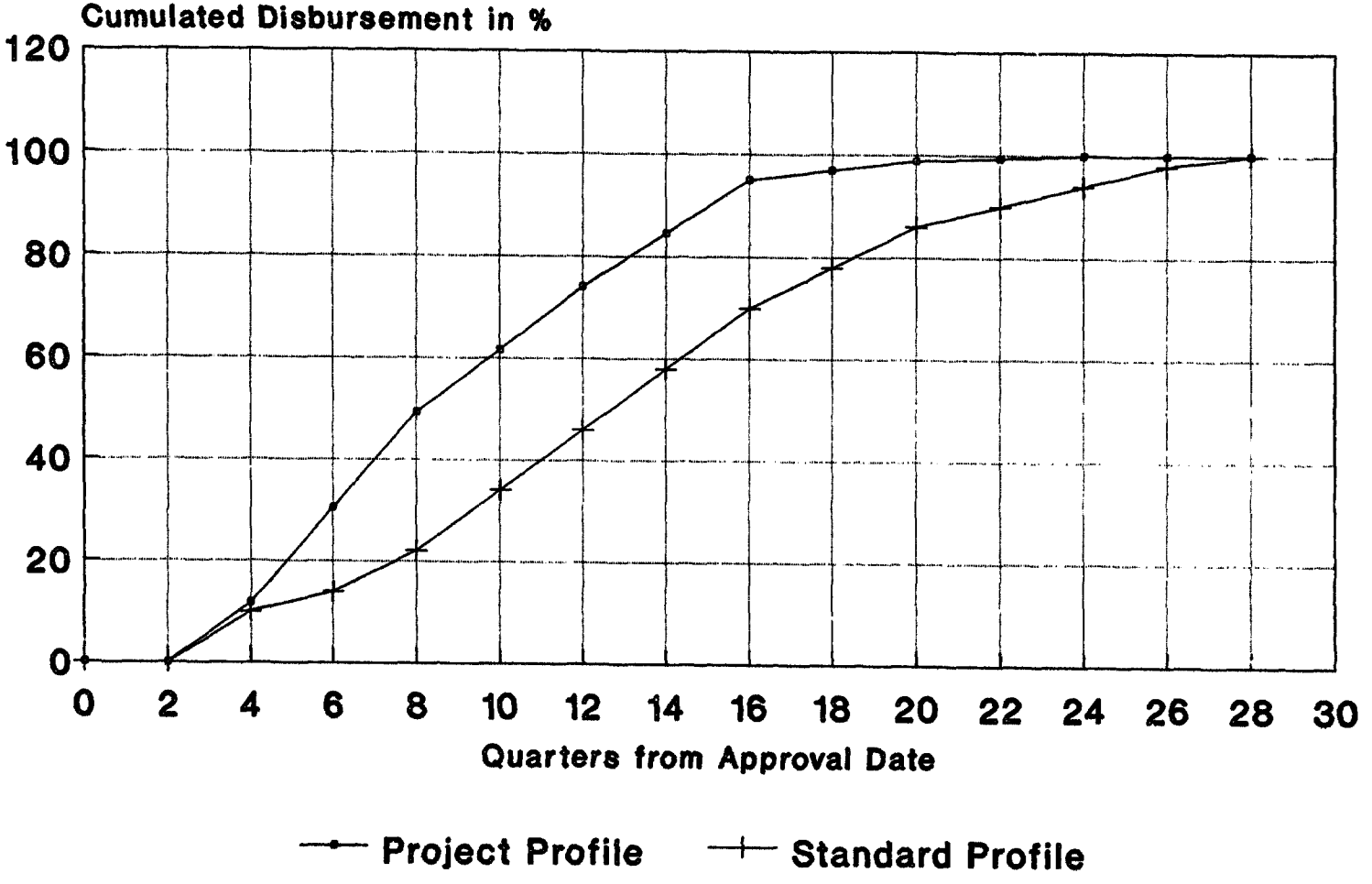
IMPLEMENTATION AND PROCUREMENT SCHEDULE

Nbr	Task Name	Million US$	Procurm Method	Start Date	End Date
9.0.0	Commercialization of PV Units	0.30	Other	1-Jun-93	24-Jun-96
10.0.0	Kivu's Methane Gas Development	1.64	Other	1-Jun-93	6-Jun-94
10.1.0	Bathymetric Surveys	0.68		1-Jun-93	15-Apr-94
10.2.0	Setting Up Monitoring System	0.30	Shopping	1-Jun-93	6-Jun-95
10.3.0	Drafting of Norms	0.23		1-Jun-93	2-Jun-94
10.4.0	Promotion	0.33		3-Jun-94	2-Jun-95
11.0.0	Petroleum Prking Study	0.99	Shopping	4-Jun-93	12-Jul-93



REPUBLIC OF RWANDA

ENERGY SECTOR REHABILITATION PROJECT
Disbursement Profile Comparison



Std Profile: Africa Energy Sector

REPUBLIC OF RWANDA

ENERGY SECTOR REHABILITATION PROJECT

DISBURSEMENT BY FINANCIER BY SEMESTER

US$

Semester	IDA Amount	CCCE Amount	EIB Amount	Government Amount	Total Amount
1	1.65	0.23	0.28	0.12	2.27
2	1.65	0.23	0.28	0.12	2.27
3	5.71	0.99	0.35	0.28	7.33
4	5.71	0.99	0.35	0.28	7.33
5	2.88	0.15	1.44	0.36	4.83
6	2.88	0.15	1.44	0.36	4.83
7	2.23	0.00	1.56	0.29	4.08
8	2.23	0.00	1.56	0.29	4.08
9	0.35	0.00	0.32	0.09	0.76
10	0.35	0.00	0.32	0.09	0.76
11	0.19	0.00	0.00	0.02	0.21
12	0.19	0.00	0.00	0.02	0.21
Total	[illegible]	2.71	7.92	2.32	38.95

Values Scaled by 1000000.0

ANNEX 4.6
Page 1 of 1

REPUBLIC OF RWANDA

ENERGY SECTOR REHABILITATION PROJECT

SUPERVISION PLAN

1. IDA Supervision Input into Key Activities. The staff input indicated in the table below comes in addition to regular supervision needs for the review of progress reports, procurement actions, correspondence, etc. For this project, this will require nine staff weeks per year.

2. Borrower's Contribution to Supervision.

(a) Progress reports are to be submitted as follows:

(i) at three-month intervals, using the quarterly audited baseline performance targets with format and content to be agreed upon during negotiations to assess the performance of the SPE.

(ii) by the PCAU in the Ministry of Public Works, Energy and Water (MINITRAPE), which will consolidate the reports prepared by the various PIUs.

(b) Audit reports within six months of the end of each fiscal year. An external auditor, acceptable to IDA, will be selected, using Bank's procedures.

(c) Project review meeting with participation of the various project agencies will be held three times a year normally during IDA supervision mission. The meetings will be chaired by the Director General of Energy, of MINITRAPE.

(d) The PCAU will be responsible for coordinating arrangements with the PIUs for Bank supervision missions, and for providing information required by missions.

(e) Mission briefing meetings on arrival and wrap-up meetings will be chaired normally by the Minister of Public Works, Energy, and Water (MINITRAPE) or his representative, with the participation of the Director General of Energy and the Head of the PCAU.

REPUBLIC OF RWANDA

ENERGY SECTOR REHABILITATION PROJECT

IDA SUPERVISION INPUT INTO KEY ACTIVITIES

Approximate Date	Activity	Expected Skill Requirements	Staff Input (Staff Weeks)
March/April 1993	Project Launch Workshop	Power Engineer, Procurement Institutional Analyst, Disbursement Officer, Lawyer, Household Energy Specialist and Financial Analyst	10
August 1993	Follow up on Establishment of the SNP and SPE	Power Engineer, Financial Analyst, Household Energy Specialist, Economist, Lawyer	8
Nov. 1993	Supervision Mission: First Meeting with Private Operator	Power Engineer, Financial Analyst, Household Energy Specialist, Economist, Lawyer	10
February 1994	Supervision Mission to Review Financial Objectives	Power Engineer, Financial Analyst, Household Energy Specialist, Economist	10
June 1994	Supervision Mission	Same as above	8
October 1994	Supervision Mission	Same as above	8
June 1995	Mid-Term Review	Power Engineer, Financial Analyst, Household Energy Specialist, Economist, Lawyer, Disbursement Officer	14
December 1995	Supervision Mission	Power Engineer Financial Analyst, Economist, Household Energy Specialist	10

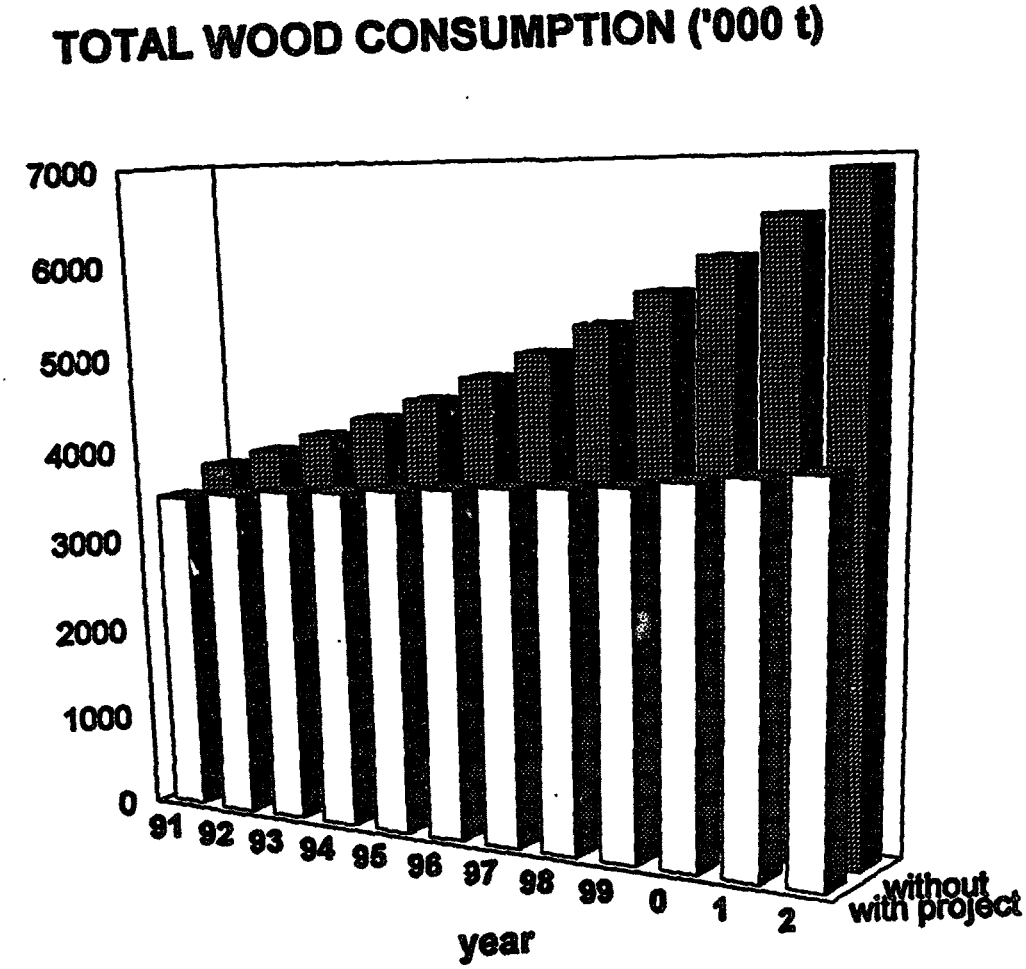
Approximate Date	Activity	Expected Skill Requirements	Staff Input (Staff Weeks)
June 1996	Supervision Mission	Power Engineer, Financial Analyst, Economist, Household Energy Specialist	7
December 1996	Supervision Mission	Power Engineer, Financial Analyst, Economist, Household Energy Specialist	7
June 1997	Supervision Mission	Power Engineer, Financial Analyst, Economist, Household Energy Specialist	7
December 1997	Supervision Mission	Power Engineer, Financial Analyst, Economist, Household Energy Specialist	7
June 1998	Final Supervision Mission	Power Engineer, Financial Analyst, Institutional Specialist, Economist	7
December 1998	Final Supervision Mission	Power Engineer, Financial Analyst, Institutional Specialist, Economist	8

REPUBLIC OF RWANDA
ENERGY SECTOR REHABILITATION PROJECT

RWANDA WOOD CONSUMPTION WITH AND WITHOUT THE PROJECT

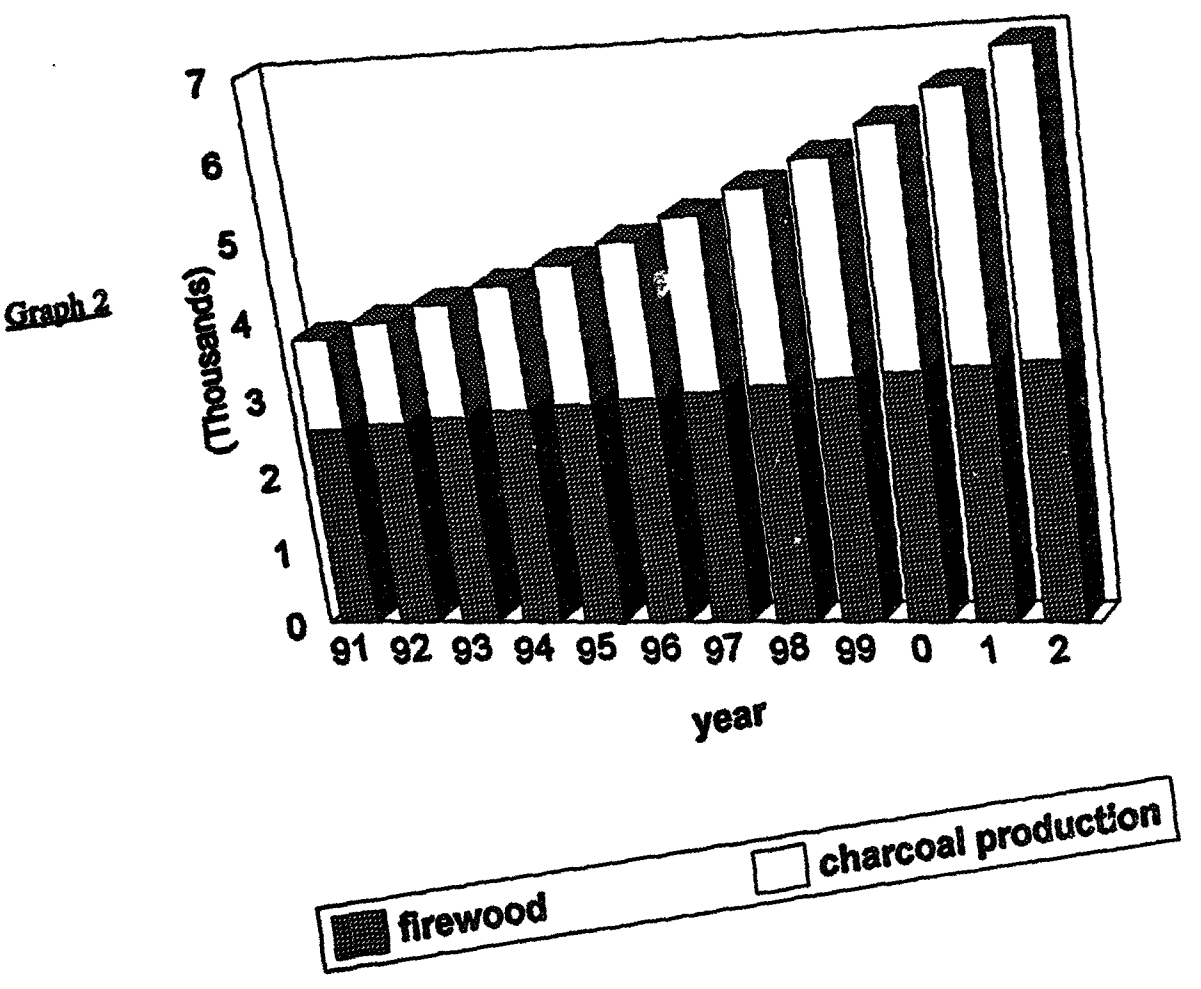
Graph 1 shows Rwanda's total wood consumption 'With', and 'Without' the project. The 'without' case shows an exponential growth in wood consumption with the total wood consumption in 2002 84% higher than in 1992. The "With" scenario the 2002 wood consumption is only 18% higher than in 1992. Graph 1 also shows that wood consumption ('With' case) continues to increase, although at a much lower growth rate: the projected wood consumption in 2002 for the 'With' case is approximately 60% of that in the "Without" case.

Graph 1



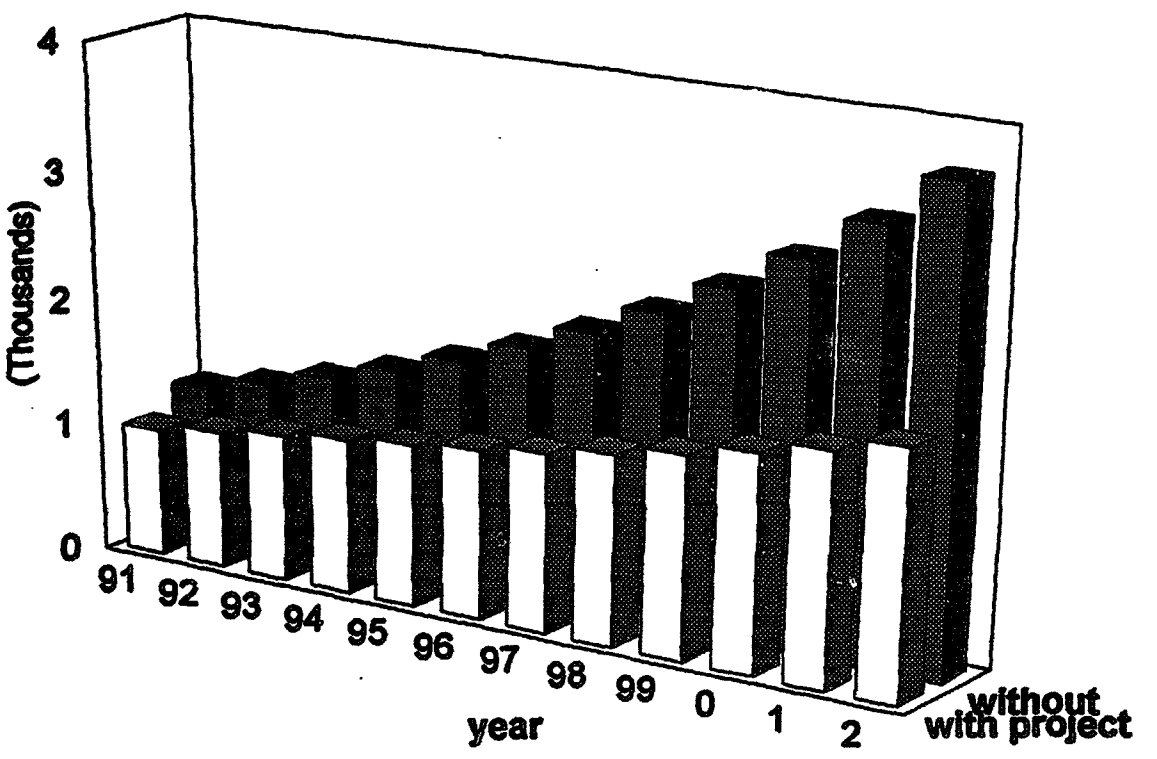
Graph 2 shows a breakdown of the wood consumption in the 'without' case. Most of the growth in wood consumption stems from the wood that is used to produce charcoal (33% in 1992 and 53% in 2002). This is the result of urban households switching from wood to charcoal for their energy needs, in combination with increased urbanization due to population pressure. The project therefore concentrates on efficiency improvements in charcoal production and use.

Graph 2



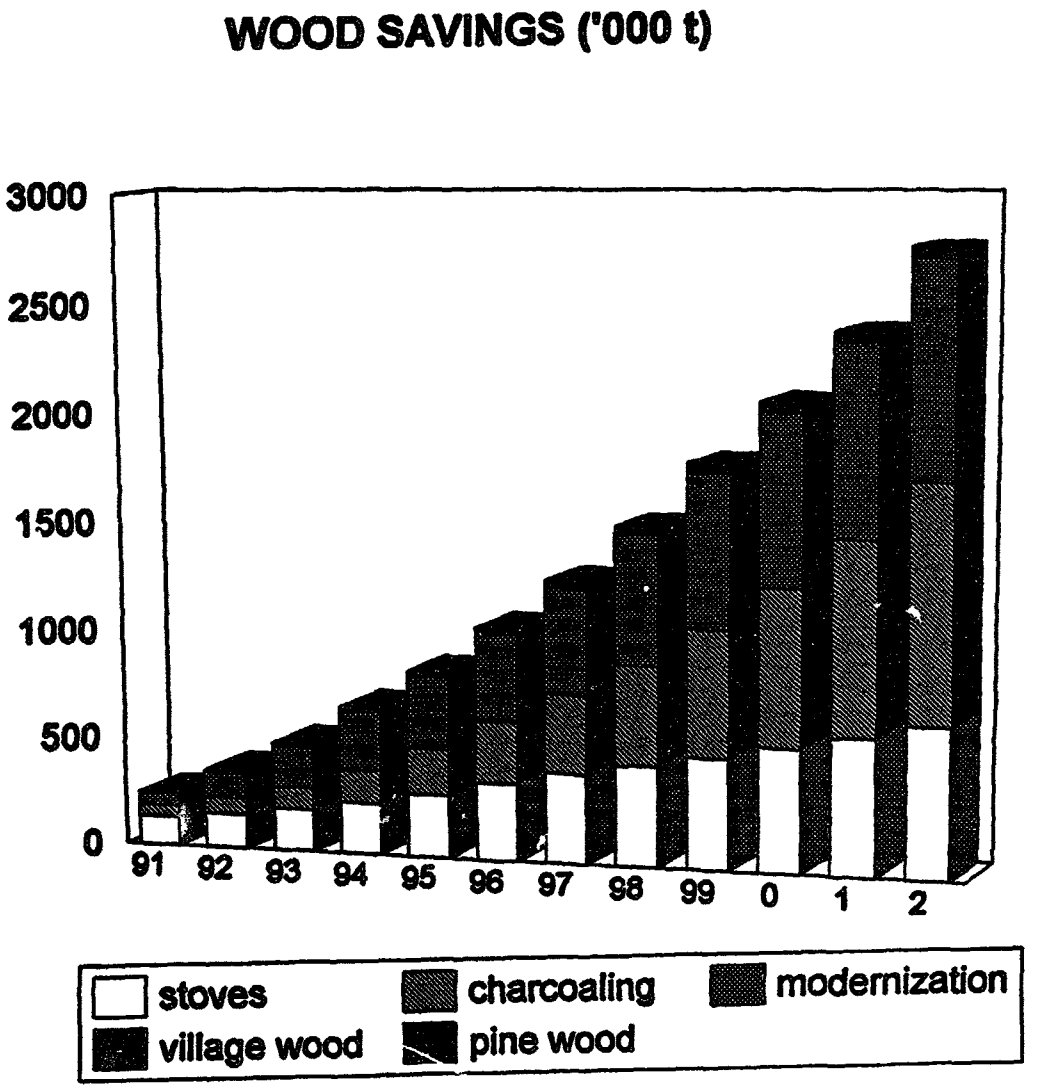
Graph 3 shows for both scenarios the amount of wood used to produce charcoal. Even the 'With' case shows an increase in consumption, albeit a moderate one: the increase in the 'Without' case would be 210% ove the period of 10 years (or an average annual increase of 11.9%), whereas the increase in the 'With' case would be only 93% over the same period (average annual increase of 4.1%). The resulting wood consumption in the "With" case is less than 50% of what it would have been in the 'Without' case.

Graph 3



Graph 4 shows disaggregated wood savings for the 5 different types of intervention. Charcoal stoves have the biggest impact in the immediate future (55% of the total savings in 1992). While they save a considerable amount of wood in the long-term (25% in 2002), improved charcoal making will relatively save more (38% of the total 2002 savings). Wood savings from the modernization of the charcoaling sector (management of wood resources) are most difficult to estimate, but they will be approximately as important as improved charcoal making (34% of the 2002 savings).

Graph 4



REPUBLIC OF RWANDA

ENERGY SECTOR REHABILITATION PROJECT

TERMS OF REFERENCE FOR A DETAILED INSPECTION OF THE MUKUNGWA AND GIHIRA HYDRO POWER STATIONS

Background

1. The hydro power station of Mukungwa (two units of 6.225 MW each) was commissioned in 1982, and has, therefore, already completed ten years of continuous operation without having benefited from any major maintenance. Although the plant is functioning normally, it is now necessary to execute a general overhaul of the installation in order to check the condition of the main components and to correct the effects of the accumulated wear. In the smaller hydro power station of Gihira (two units of 0.92 MW each), situated nearby, there is a need to overhaul the hydraulic structures, heavily damaged by erosion due to the great amount of sand carried by the water.

2. Under the Energy Sector Rehabilitation Project, IDA will finance the above mentioned works. ELECTROGAZ wishes to retain consulting services to carry out a detailed inspection of the installations and to prepare detailed specifications for the equipment, spare parts and materials to be purchased, as well as for the works to be executed, and the necessary bidding documents.

Objectives and Expected Output

3. The objective of the assignment is to identify as precisely as possible the materials and works that will be necessary so as to minimize surprises and delays during the execution stage. It is considered that the best way to proceed is to have a single contract covering the supply of materials and works for both power stations, but the consultant should analyze the convenience of this solution, and recommend if he thinks that other options are preferable. The expected output is a set of bidding documents according to the contract packaging scheme that is decided.

Scope, Timing and Budget

4. The consultant shall carry out a detailed inspection of the concerned installations in order to determine the present condition of the components and what is needed for their rehabilitation. Any test instruments or measuring devices that are necessary and that ELECTROGAZ does not have available will be provided by the consultant. For Gihira the inspection will be restricted to the hydraulic structures. For Mukungwa it should cover the hydraulic structures as well as the equipment in the power house.

5. It is estimated that a time of about five weeks will be necessary for the inspections and that the total duration of the assignment will be of the order of six months, but the consultant in his proposal can suggest a different timing. A total of about 150,000 USD have been budgeted for this purpose.

Previous Studies

6. A preliminary inspection of both Mukungwa and Gihira has been carried out by ELECTROGAZ with the assistance of GTZ, and the corresponding report is attached.

Inputs by ELECTROGAZ

7. ELECTROGAZ will provide: (i) all the information available on Mukungwa and Gihira; (ii) any tools, measuring devices, and test instruments needed for the detailed inspections, that it has available; (iii) qualified technicians as required by the consultant to assist him in his task; iv) assistance with customs formalities for the introduction and re-export of any test instruments and equipment he might need to bring into the country; and v) internal transportation and access to the installations.

REPUBLIC OF RWANDA

ENERGY SECTOR REHABILITATION PROJECT

TERMS OF REFERENCE FOR

A TECHNICAL AUDIT OF THE TRANSMISSION NETWORK

Background

1. A rehabilitation of the high voltage transmission network of ELECTROGAZ was carried out under the Energy I project for Rwanda. The medium voltage sections of the transmission substations were not included in the rehabilitation. On the other hand, part of the high voltage equipment in the substations is relatively old. For those reasons, it is desired to carry out a technical audit of all of the transmission and subtransmission substations aimed at identifying complementary rehabilitation works that might be necessary. Although the main focus will be on the medium voltage installations, the audit should also include an evaluation of the older pieces of high voltage equipment (with, say, more that 25 years of operation) in the substations.

2. Under the new Energy Sector Rehabilitation Project, IDA will finance the execution of the audit as well as the priority rehabilitation works that are eventually identified as a result of the audit. ELECTROGAZ wishes to retain consulting services for the execution of the technical audit and the preparation of the corresponding report.

Objectives and Expected Output

3. The objective of the assignment is to identify the measures required, first, to correct weaknesses in the transmission and subtransmission substations so as to ensure an adequate level of reliability, and second, to restore to good condition equipments for which some components have failed (for example meters in a control panel). The expected result of the assignment is: i) a detailed specification of the pieces of equipment and spare parts to be purchased, as well as of the works that will be necessary; ii) an estimation of the corresponding costs; and iii) a tentative schedule for execution and for disbursements, the latter classified into local and foreign expenses.

Scope, Timing and Budget

4. The audit shall cover the following substations: Gihira, Ruhengeri, Ntaruka, Mukungwa, Gifurwe, Rulindo, Kigoma, Kilinda, Karongi, Kibogora, and Mururu I. Single line diagrams of the whole system and of the individual substations are attached. It is expected that the inspection of the installations will include electrical tests and partial or total dismantling of some pieces of equipment, when this is necessary for a complete assessment of their state. For test instruments that cannot be provided by ELECTROGAZ it will be the responsibility of the consultant to supply them.

5. A time of about eight weeks on the terrain is estimated to be necessary, and a total time of about six months. A total amount of 150,000 USD has been budgeted for these services.

Inputs by ELECTROGAZ

6. ELECTROGAZ will provide all information available for the concerned installations; any test instruments that it has and that the consultant determines he will need for his work; qualified technicians as required by the consultant to assist him in his task; assistance with customs formalities for the introduction and re export by the consultant of any test instruments that he might need to bring into the country; and internal transportation and access to the installations.

REPUBLIC OF RWANDA

ENERGY SECTOR REHABILITATION PROJECT

TERMS OF REFERENCE FOR DETAILED DESIGN OF AN EXTENSION TO THE MURURU I SUBSTATION

Background

1. Rwanda, together with Burundi and the Kivu province in the eastern part of Zaire are served by a regional interconnected electrical network. There exists, furthermore, a multinational power company –Société Internationale d'Electricité des Pays des Grands Lacs (SINELAC)– owned by the three governments, which owns and operates a hydro power station (Ruzizi II) and a substation (Mururu II), the latter built on Rwandese territory, in the Cyangugu region. Before the commissioning of SINELAC's installations in 1989, the main Rwandese substation in the Cyangugu region, the substation of Mururu I, was connected to the (Rwandese) Karongi substation through a 110 kV line, and from there on, with the rest of the high voltage Rwandese network. When SINELAC's installations were incorporated to the network, though, the Mururu I - Karongi line was opened, and the Mururu II substation was connected in between. This means that the Mururu I substation is now separated from the rest of the Rwandese high voltage network, which creates some operations problems, the most important of which is the restriction of direct energy imports from Zaire.

2. Under the Energy Sector Rehabilitation Project for Rwanda, IDA will finance an extension of the Mururu I substation consisting in the addition of two 110 kV bays, to which the lines to Mururu II and to Karongi will be connected. The space available for this extension is very restricted, therefore a solution that minimizes space requirements while keeping the cost as low as possible is necessary. ELECTROGAZ, the state owned enterprise responsible for electricity in Rwanda wishes to retain consulting services for the detailed design of this extension, and for the preparation of the bidding documents for the supply of the equipment and the execution of the works. Single line diagrams of the Mururu I substation before and after the incorporation of SINELAC's installations, as well as showing the proposed modification are attached.

Objectives and Expected Output

3. The objective of the assignment is to define an adequate, least cost engineering solution to the problem of reconstituting the continuity of the Rwandese high voltage transmission network, by modifying the Mururu I substation within the existing space restrictions, mainly with the purpose of making possible the direct importation of electrical energy from Zaire, without the need for that energy to pass through the SINELAC installations. The expected output from the consultant is a detailed design of the new installations, as well as the necessary bidding documents for the implementation of the project.

Scope, Timing and Budget

4. The consultant shall inspect the site and define a solution in close communication with ELECTROGAZ. Once the basic concept of the solution has been approved by the client and by IDA, the consultant will proceed with the detailed design. The consultant shall recommend the best alternative concerning the packaging of the contracts (it is presently thought that the best solution is to have a single contract for works and supplies on a turn-key basis), and will proceed to prepare bidding documents as necessary after a decision has been reached in that respect. The time necessary to complete the assignment is estimated at 6 months. A total amount of 150,000 USD has been budgeted for these services.

Previous Studies

5. A preliminary design for the modification of Mururu I was done in 1989, and the corresponding documents are available from ELECTROGAZ.

Inputs by ELECTROGAZ

6. ELECTROGAZ will provide all the information available on the Mururu I substation as well as on the neighboring installations of the high voltage network, and will arrange for the consultant to have access to all those installations as needed.

REPUBLIC OF RWANDA

ENERGY SECTOR REHABILITATION PROJECT

SUSTAINABLE WOODFUELS SUPPLY - 1987

VOLUME
(In '000s m^3)

Prefecture	Plantations	Arborization	Savannah	Natural Forests	Total
Gisenyi	140.6	189.4	0.5	77.2	407.7
Ruhengeri	178.2	188.9	0.2	30.2	397.5
Byumba	161.2	306.6	46.9	0.0	514.7
Kibuye	99.2	174.3	1.9	10.1	285.6
Gitarama	204.4	288.0	2.4	0.0	494.8
Kigali	141.7	340.3	36.1	10.6	528.8
Kibungo	47.9	300.9	52.4	18.6	419.9
Cyangugu	96.1	165.6	1.8	143.2	406.7
Gikongoro	146.1	229.5	1.2	100.6	477.4
Butare	162.3	238.5	2.2	0.0	403.1
RWANDA	1,377.8	2,422.2	145.7	390.6	4,336.2
	31.8%	55.9%	3.4%	9.0%	100.0%

WEIGHT
(In '000s tons)

Prefecture	Plantation	Arborization	Savannah	Natural Forest	Total	Surplus/-Deficit	Percentage of Demand
Gisenyi	84.3	113.6	0.3	46.3	244.6	34.1	16.2
Ruhengeri	106.9	113.4	0.1	18.1	238.5	-216.9	-47.6
Byumba	96.7	183.9	28.1	0.0	308.8	105.9	52.2
Kibuye	59.5	104.6	1.2	6.1	171.3	32.2	23.1
Gitarama	122.6	172.8	1.5	0.0	296.9	60.0	25.3
Kigali	85.0	204.2	21.7	6.4	317.3	-238.9	-43.0
Kibungo	28.8	180.6	31.5	11.2	251.9	111.8	79.8
Cyangugu	57.7	99.4	1.1	85.9	244.0	104.9	75.4
Gikongoro	87.7	137.7	0.7	60.4	286.4	-23.1	-7.5
Butare	97.4	143.1	1.3	0.0	241.9	-26.9	-10.0
RWANDA	826.7	1,453.3	87.4	234.3	2,601.7	-505.8	-16.3

Assumptions: (Tree productivity and area).

Arborisation: 7.5% of agricultural land; 20.0 m^3/ha/year. Plantations: 9.0 m^3/ha/year.
Savannah: 1.0 m^3/ha/year.
Natural forests: 3.0 m^3/ha/year (actual); 0.0 m^3/ha/year (authorized).

The overall deficit has been assessed by adding up all regional deficits, the assumption being that little or no interregional trade takes place. This is not entirely true as Gikongoro, for instance, supplies Kigali with charcoal. If the statistics are correct Gikongoro prefecture experiences a deficit notably larger than the one presently identified, the difference being woodfuels supplied to Kigali.

Source: "Secteur Charbonnier" study; mission estimates.

REPUBLIC OF RWANDA

ENERGY SECTOR REHABILITATION PROJECT

WOODFUELS BALANCE - 2002

AREA INCREASES UNTIL 2002
(In '000s hectares)

Year	Plantations	Arborization	Savannah	Natural Forests	Total
1988	7.0	13.0	-4.6		15.4
1989	7.0	13.0	-4.6		15.4
1990	7.0	13.0	-3.4		16.6
1991	7.0	13.0		1.5	21.5
1992	7.0	13.0		1.5	21.5
1993	7.0	13.0		1.5	21.5
1994	7.0	13.0		3.0	23.0
1995	7.0	13.0		3.0	23.0
1996	7.0	13.0		3.0	23.0
1997	1.1	11.5		5.4	18.0
1998				5.4	5.4
1999				5.4	5.4
2000				5.4	5.4
2001				5.4	5.4
2002				5.4	5.4

SUSTAINABLE SUPPLY OF WOODFUELS - 2002
(In '000 tons)

Prefecture	Plantation	Arborization	Savannah	Natural Forest	Total	Surplus/- Deficit 1/	Percentage
Gisenyi	119.7	223.1	0.3	92.1	445.2	96.5	27.7
Ruhengeri	151.7	232.5	0.1	36.0	420.3	-295.0	-41.2
Byumba	137.2	377.3	27.2	0.0	541.7	229.5	73.5
Kibuye	84.5	214.5	1.1	12.0	312.2	111.1	55.3
Gitarama	174.0	354.5	1.4	0.0	529.9	165.3	45.3
Kigali	120.7	418.8	20.9	12.7	573.1	-783.6	-57.8
Kibungo	40.8	370.4	30.4	22.2	463.7	248.1	115.0
Cyangugu	81.8	203.9	1.0	170.7	457.4	256.4	127.6
Gikongoro	124.4	282.4	0.7	120.0	527.5	51.1	10.7
Butare	138.2	293.6	1.3	0.0	433.1	-9.8	- 2.2
RWANDA	1,172.8	2,981.0	84.4	465.7	4,704.0	-1,088.4	-18.8

Assumptions:

- Area increases until year 2002 in accordance with "Plan Forestier National".
- Area increases are assigned to each particular prefecture in proportion to initial areas.
- Logging of natural forests produces 150 m^3/ha.
- Sustainable productivities remain as in 1987.

1/ The overall deficit has been assessed by adding up all regional deficits, the assumption being that little or no interregional trade takes place. This is not entirely true as Gikongoro, for instance, supplies Kigali with charcoal. If the statistics are correct Gikongoro prefecture experiences a deficit notably larger than the one presently identified, the difference being woodfuels supplied to Kigali.

Source: "Plan Forestier National"; mission estimates.

REPUBLIC OF RWANDA
ENERGY SECTOR REHABILITATION PROJECT

KEY MONITORING INDICATORS FOR MID TERM REVIEW

Qualité du Service Electricité

1. Les indicateurs de la qualité du service électrique comprennent trois composantes: la qualité de la fréquence, la qualité de la tension, et la continuité du service. Cependant, étant donné que la fréquence est déterminée par des méthodes de réglage résultant d'accords négociés par les quatre partenaires de l'interconnexion régionale, c'est seulement les deux derniers paramètres qui vont servir à faire un suivi de la performance de l'opérateur privé.

2. Les écarts maximaux admissibles de la tension livrée aux clients par rapport à sa valeur nominale seront spécifiés dans le cahier des charges. Ces valeurs seront définies en prenant comme point de départ des normes internationales (celles de la Commission Electrotechnique Internationale (CEI), par exemple), que l'on pourra adapter pour tenir compte des conditions particulières au Rwanda: (a) condition actuelle du réseau; (b) sensibilité des différents types d'abonnés aux écarts de tension (un consommateur rural, par exemple, n'utilisant l'électricité que pour l'éclairage, aura une tolérance plus grande qu'un consommateur en milieu urbain); (c) justification économique des investissements supplémentaires qu'il faudrait faire pour améliorer la qualité de la tension (il faudra, peut être, accepter une moins bonne qualité de la tension pour certains groupes d'usagers en des régions éloignées qu'il est très onéreux de desservir). Le cahier des charges devra spécifier des indices qui reflètent la continuité du service, et qui devront être produits par l'exploitant privé comme partie de ses statistiques d'exploitation, par exemple: (a) energie coupée par niveau de tension et par région; (b) nombre d'interruptions par abonné par an; (c) durée moyenne des interruptions par abonné et par région.

Qualité du Service Eau

3. Les normes de potabilité de l'Organisation Mondiale de la Santé seront utilisées pour mesurer la qualité du service de l'eau.

Autres Indicateurs:

4. L'exploitant privé devra apporter et mettre en place des systèmes modernes de gestion pour les différentes activités de la société, tant ceux à caractère purement technique que celles à caractère administratif. Il est souhaitable que ces systèmes soient informatisés. Par exemple, les systèmes administratifs informatisés devront comprendre: (a) gestion commerciale; (b) approvisionnement et gestion des stocks; (c) comptabilité; (d) gestion de la paie du personnel. Pour les systèmes techniques informatisés il s'agit de: (a) gestion optimale de la production et les importations d'énergie électrique; (b) coordination des protections; (c) planification, conception et calcul, construction des extensions en distribution; (d) gestion de la maintenance des installations.

5. L'exploitant privé devra laisser tous ces systèmes en place à la fin de la période de validité du contrat, au cas où celui-ci ne serait pas renouvelé, et transférer à la Société Nationale de Patrimoine la propriété de toute la documentation et des logiciels nécessaires à leur fonctionnement. Le contrat établira des spécifications minimum pour chacun de ces systèmes (voir en annexe, à titre illustratif, des spécifications minimum pour le système de gestion de la maintenance des installations).

6. Le cahier des charges établira les spécifications auxquelles devront répondre les produits livrés par l'exploitant privé aux consommateurs. La SNP fera le suivi des performances de la SPE dans ce domaine au moyen de contrôles appropriés, par exemple, analyse d'échantillons d'eau, analyse d'enregistrements de tension pris en des points judicieusement choisis, suivi des statistiques sur la continuité du service.

7. Pour mémoire, la revue à mi-parcours devra également se concentrer sur la passation et l'attribution de marchés pour toutes les composantes du projet, sur le programme de formation et son exécution en ce qui concerne la cellule du projet et la SNP, les tarifs d'eau et d'électricité, les prix du charbon de bois et des produits pétroliers, et les conditionnalités financières et opérationnelles des Accords de Crédit et de Projet.

REPUBLIC OF RWANDA

ENERGY SECTOR REHABILITATION PROJECT

('000 RWF)

ANNEX 5.1: ELECTROGAZ: PROJECTED INCOME STATEMENTS

	--Estimate-- 1991	Projected 1992	1993	1994	1995	1996	1997	1998
REVENUES								
Sales of water + electricity + gas	2,226,151	3,018,711	4,183,367	4,809,484	5,748,731	6,097,215	6,971,809	7,522,412
Other revenues	79,010	28,465	130,514	132,670	35,040	37,262	39,835	42,443
Depreciation subsidies	206,080	125,511	319,065	324,968	264,991	261,650	256,463	250,731
Connection revenues	99,687	86,463	266,480	311,231	157,532	144,683	150,909	152,658
TOTAL REVENUES	2,608,928	3,259,150	4,899,426	5,578,353	6,206,294	6,540,810	7,419,016	7,968,244
EXPENSES								
Reagents	197,442	208,415	219,143	230,252	243,021	255,447	268,524	281,997
Electricity purchases	644,668	751,738	831,598	936,279	1,092,065	1,195,159	1,068,363	592,892
Other materials and supplies	698,723	808,278	808,278	808,278	808,278	808,278	808,278	808,278
Personnel costs	401,047	381,139	362,570	346,240	330,955	316,792	303,659	291,474
Depreciation	1,355,282	1,362,059	1,418,900	1,447,029	1,552,153	1,559,914	2,331,737	2,343,396
Loss on bad debts	193,953	250,838	309,361	266,569	292,544	258,627	296,012	319,441
Exchange gains or losses	151,722	151,722	282,798	331,736	333,786	333,786	352,036	334,269
Global connection expenses	107,332	93,198	101,459	102,488	121,178	111,295	116,084	117,429
TOTAL EXPENSES	3,750,170	4,007,388	4,334,288	4,468,871	4,773,979	4,839,297	5,544,693	5,089,177
Operating income before interest	-1,141,241	-748,237	565,138	1,109,481	1,432,315	1,701,512	1,874,323	2,879,067
Interest expenses	-711,389	-774,866	-749,832	-806,642	-816,578	-822,094	-765,653	-705,843
Provisions for interest expenses	0	0	0	0	0	0	0	0
Write-back on provisions for interest expenses	151,722	151,722	282,798	331,736	333,786	333,786	352,036	334,269
Income before extraordinary items	-1,700,908	-1,371,381	98,105	634,576	949,523	1,213,204	1,460,707	2,507,494
Extraordinary income or expenses	0	0	0	0	0	0	0	0
Net income for year	-1,700,908	-1,371,381	98,105	634,576	949,523	1,213,204	1,460,707	2,507,494
Average water tariff incl. govt. subsidy	79,20	95,03	142,55	142,55	142,55	142,55	171,06	171,06
Average electricity tariff	10,25	13,32	15,32	17,62	20	20	20	20
Average gas tariff	22,00	22,00	22,00	22,00	22,00	22,00	22,00	22,00

REPUBLIC OF RWANDA

ENERGY SECTOR REHABILITATION PROJECT
('000 RWF)

ANNEX 5.2: ELECTROGAZ: PROJECTED BALANCE SHEETS, FOR WATER, ELECTRICITY AND GAS

	Estimate 1991	Projected 1992	1993	1994	1995	1996	1997	1998
ASSETS								
FIXED ASSETS	21,203,478	20,971,132	21,328,875	27,577,902	32,404,038	37,236,540	35,102,432	33,050,589
Intangible assets	559,882	559,882	559,882	559,882	559,882	559,882	559,882	559,882
Net tangible assets	19,621,599	18,429,863	18,532,978	17,832,671	19,106,036	17,742,768	34,195,973	32,144,130
Working assets	675,420	1,634,810	1,889,439	8,838,771	12,391,542	18,587,314	0	0
Other assets	346,577	346,577	346,577	346,577	346,577	346,577	346,577	346,577
CIRCULATING ASSETS	3,984,721	1,878,285	2,273,237	2,440,619	2,566,465	2,652,751	2,870,103	4,046,007
Inventory and work in progress	1,143,749	1,143,749	1,143,749	1,143,749	1,143,749	1,143,749	1,143,749	1,143,749
Customer receivables	853,197	587,629	903,590	1,037,496	1,138,173	1,207,202	1,381,083	1,490,057
Government receivables	1,987,774	146,907	225,898	259,374	284,543	301,800	345,271	372,514
Cash	0	0	0	0	0	0	0	1,039,686
CONVERSION DISCREPANCY - ASSETS	5,459,098	5,459,098	5,459,098	5,459,098	5,459,098	5,459,098	5,459,098	5,459,098
TOTAL ASSETS	30,647,297	26,308,515	29,061,211	35,477,619	40,429,601	45,348,390	43,431,633	42,555,694
LIABILITIES								
EQUITY	4,095,418	2,772,934	4,053,156	5,784,264	6,410,931	7,301,278	8,439,129	10,623,766
Paid in capital	430,002	430,002	430,002	430,002	430,002	430,002	430,002	430,002
Reserves	5,250,670	5,250,670	5,250,670	5,250,670	5,250,670	5,250,670	5,250,670	5,250,670
Retained earnings	-6,944,901	-8,645,808	-10,017,190	-9,919,085	-9,284,509	-8,334,986	-7,121,782	-5,661,076
Net income for year	-1,700,908	-1,371,381	98,105	634,576	949,525	1,213,204	1,460,707	2,507,494
Central government development budget	4,143,237	4,143,237	4,143,237	4,143,237	4,143,237	4,143,237	4,143,237	4,143,237
Equipment subsidies	1,720,677	1,831,489	3,075,520	4,233,967	3,973,024	3,712,082	3,451,140	3,190,198
Extension works financed by third parties	1,196,640	1,134,725	1,072,811	1,010,897	948,983	887,069	825,155	763,241
PROVISIONS FOR CURRENCY EXCHANGE RISK	5,259,687	5,107,965	4,825,166	4,493,430	4,159,644	3,825,859	3,473,822	3,139,554
DEBT	21,292,192	20,427,617	20,182,888	25,199,925	29,859,026	34,221,253	31,518,682	28,792,375
Long and medium term debt	14,961,795	15,283,244	14,792,143	20,176,707	25,433,477	30,734,247	29,738,681	26,792,375
Current portion to central government	3,696,695	2,772,749	2,079,562	1,386,375	693,187	0	0	0
Other short-term debt	2,635,703	2,371,623	3,311,184	3,636,844	3,710,362	3,487,006	1,780,001	0
CONVERSION DISCREPANCY - LIABILITIES								
TOTAL LIABILITIES	30,647,297	28,308,515	29,061,211	35,477,619	40,429,601	45,348,390	43,431,633	42,555,694
Circulating assets/circulating liabilities	0.63	0.37	0.42	0.49	0.58	0.76	1.61	N.S.
Debt/equity	3.65	5.51	3.65	3.49	3.97	4.21	3.52	2.71
Private receivables/month of sales	6	5	4	3	3	3	3	3
Central government receivables/month of sales	32	3. 1/	3	3	3	3	3	3

1/ As a result of compensation of cross-debts and agreements to be signed between the Private Operator and Government through the Lease Contract.

REPUBLIC OF RWANDA

ENERGY SECTOR REHABILITATION PROJECT

('000 RWF)

ANNEX 5.3: ELECTROGAZ: PROJECTED FUND FLOWS STATEMENTS FOR ELECTRICITY, WATER AND GAS

	Projected						
	1992	1993	1994	1995	1996	1997	1998
INTERNAL SOURCES	-367,125	1,015,141	1,524,902	1,845,034	2,116,476	3,117,551	4,193,764
Net income	-1,371,381	98,105	434,576	949,523	1,213,204	1,460,707	2,507,494
Depreciation	1,362,059	1,418,900	1,447,029	1,552,153	1,559,914	2,331,737	2,343,396
Write back on currency exchange losses	-151,722	-282,798	-331,736	-333,786	-333,786	-352,036	-334,269
Depreciation subsidy	-206,080	-219,065	-224,968	-322,856	-322,856	-322,856	-322,856
OTHER SOURCES OF FUNDS	959,390	1,605,469	7,517,271	6,195,771	6,195,771	0	0
Sale of fixed assets	0	0	0	0	0	0	0
Increase in capital	0	0	0	0	0	0	0
Increase in equipment subsidy	254,978	1,401,183	1,321,500	0	0	0	0
Increase in medium and long-term debt	704,412	204,287	6,195,771	6,195,771	6,195,771	0	0
TOTAL SOURCES OF FUNDS	592,264	2,620,611	9,042,173	8,040,005	8,312,247	3,117,551	4,193,764
Dividend pay-out	0	0	0	0	0	0	0
Payment fixed assets	1,129,712	1,776,644	7,696,056	6,378,289	6,392,417	197,629	291,554
Reduction in equity	0	0	0	0	0	0	0
Loan repayment (principal)	382,963	695,389	811,207	917,001	917,001	995,565	946,307
TOTAL USES OF FUNDS	1,512,675	2,472,032	8,507,263	7,295,290	7,309,418	1,193,194	1,237,860
SOURCES OF FUNDS - USES OF FUNDS	-920,410	148,578	534,910	745,515	1,002,829	1,924,357	2,955,904
Change in inventory	0	0	0	0	0	0	0
Change in customers receivables	-265,569	315,961	133,906	100,677	69,028	173,881	108,974
Change in central government receivables	-1,840,867	78,990	33,477	25,169	17,257	43,470	27,244
Change in debt to central government	921,945	693,187	693,187	693,187	693,187	0	0
TOTAL WORKING CAPITAL	-1,184,490	1,088,139	860,570	819,034	779,473	217,352	136,218
CASH FLOWS	264,080	-939,561	-325,660	-73,519	223,356	1,707,005	2,819,686
TREASURY	-2,371,623	-3,311,184	-3,636,844	-3,710,362	-3,487,006	-1,780,001	1,039,686

REPUBLIC OF RWANDA

ENERGY SECTOR REHABILITATION PROJECT
('000 RWF)

ANNEX 5.4: ELECTROGAZ: PROJECTED INCOME STATEMENTS, FOR ELECTRICITY

	Audited 1990	Estimate 1991	Projected 1992	1993	1994	1995	1996	1997	1998
REVENUES									
Sales of electricity	1,139,863	1,477,648	2,061,909	2,661,366	3,184,956	4,006,920	4,239,280	4,598,600	4,994,560
Volume sold (in millions of kWh)	133,583	143,461	154,798	167,191	180,758	200,346	211,964	229,930	249,728
Average Tariff (in FRw)	8,53	10,25	13,32 b/	15,32 b/	17,62 b/	20 a/	20	20	20
Other revenues	239,515	64,779	13,296	114,380	115,513	16,717	17,759	19,062	20,360
Depreciation subsidies	167,410	167,410	86,841	280,395	286,297	226,321	222,978	217,792	212,060
Connection revenues	59,394	64,887	47,935	217,831	259,698	99,756	85,259	86,922	86,681
TOTAL REVENUES	1,438,771	1,774,725	2,209,981	3,273,972	3,846,464	4,348,714	4,565,276	4,922,376	5,313,661
EXPENSES									
Reagents	350,724	644,668	751,738	831,598	936,279	1,092,065	1,195,159	1,068,363	592,892
Other materials and supplies	383,057	471,528	538,889	538,889	538,889	538,889	538,889	538,889	538,889
Personnel costs	208,892	210,000	204,745	199,729	194,942	190,372	186,009	181,844	177,866
Depreciation	799,013	922,501	927,113	981,780	1,007,724	1,110,651	1,,116,204	1,477,544	1,484,932
Loss on bad debts	53,260	131,596	170,395	206,121	183,848	203,771	179,657	194,885	211,665
Exchange gains or losses	23,248	65,911	65,911	194,586	194,586	194,586	194,586	194,586	176,819
Global connection expenses	63,690	69,580	51,402	64,037	62,847	75,986	65,584	66,863	66,678
TOTAL EXPENSES	1,881,885	2,515,783	2,710,193	3,016,741	3,119,115	3,406,301	3,476,088	3,722,973	3,249,740
Operating income before interest	-443,113	-741,059	-500,212	257,231	727,349	942,413	1,089,188	1,199,403	2,063,921
Interest expenses	-339,440	-501,623	-536,186	-526,989	-529,565	-527,766	-521,590	-483,396	-445,202
Provisions for interest expenses	-2,840,840	0	0	0	0	0	0	0	0
Write-back on provisions for interest expenses	23,248	65,911	65,911	194,586	194,586	194,586	194,586	194,586	176,819
Income before extraordinary items	-3,600,145	-1,176,771	-970,487	-75,171	392,370	609,234	762,184	910,593	1,795,537
Extraordinary income or expenses	-14,335								
Net income for year	-3,614,480	-1,176,771	-970,487	-75,171	392,370	609,234	762,184	910,593	1,795,537

a/ LRMC would be reached by June 30, 1995.
b/ After agreed increases of 30% in 1992, at least 10% thereafter so as to reach the LRMC by June 30, 1995.

REPUBLIC OF RWANDA

ENERGY SECTOR REHABILITATION PROJECT
('000 RWF)

ANNEX 5.4: ELECTROGAZ: PROJECTED INCOME STATEMENTS, FOR WATER

	Audited 1990	Estimate 1991	Projected 1992	1993	1994	1995	1996	1997	1998
REVENUES									
Sales of water	540,833	725,085	935,385	1,500,584	1,603,111	1,720,394	1,836,518	2,351,792	2,506,435
Volume sold (in millions of m³)	8,536	9,156	9,843	10,527	11,246	12,069	12,883	13,748	14,652
Average tarif	63	79	95	143	143	143	143	171	171
Other revenues	150,066	9,656	10,593	11,559	12,582	13,749	14,929	16,199	17,509
Depreciation subsidies	38,670	38,670	38,670	38,670	38,670	38,670	38,670	38,670	38,670
Connection revenues	22,723	34,800	38,528	48,649	51,533	58,776	59,425	63,987	65,977
TOTAL REVENUES	713,628	808,212	1,023,178	1,599,462	1,705,897	1,831,589	1,949,542	1,470,648	2,628,592
EXPENSES									
Reagents	100,659	197,422	208,415	219,143	230,252	243,021	255,447	268,524	281,997
Other material and supplies	175,991	214,010	253,755	253,755	253,755	253,755	253,755	253,755	253,755
Personnel costs	178,103	185,000	170,952	158,123	146,401	135,685	125,885	116,918	108,710
Depreciation	316,274	428,346	430,488	432,640	434,804	436,978	439,163	849,623	853,872
Loss on bad debts	27,034	62,357	80,433	103,240	82,721	88,772	78,970	101,127	107,777
Exchange gains or losses	24,441	85,811	85,811	88,212	137,150	139,200	139,200	197,450	157,450
Global connection expenses	24,650	37,752	41,796	37,422	39,641	45,212	45,711	49,221	50,752
TOTAL EXPENSES	847,151	1,210,719	1,271,661	1,292,536	1,324,723	1,342,622	1,338,130	1,796,618	1,814,312
Operating income before interest	-133,531	-402,507	-248,484	306,926	381,174	488,966	611,412	674,030	814,279
Interest expenses	-243,048	-209,766	-238,680	-222,843	-277,077	-288,812	-300,504	-282,257	-260,641
Provisions for interest expenses	-2,442,513	0	0	0	0	0	0	0	0
Write-back on provisions for interest expenses	24,441	85,811	85,811	88,212	137,150	139,200	139,200	157,450	157,450
Income before extraordinary items	-2,794,652	-526,462	-401,352	172,295	241,248	339,354	450,107	54,224	711,089
Extraordinary income or expenses	-115,569								
Net income for year	-2,910,221	-526,462	-401,352	172,295	241,248	339,354	450,107	549,224	711,089
Average water tariff including Government subsidy		79,20	95,03	142,55	142,55	142,55	142,55	171,06	171,06

REPUBLIC OF RWANDA

ENERGY SECTOR REHABILITATION PROJECT

('000 RWF)

ANNEX 5.4: ELECTROGAZ: PROJECTED INCOME STATEMENTS, FOR GAS

	Estimate	Projected						
	1991	1992	1993	1994	1995	1996	1997	1998
REVENUES								
Sales of gas	21,417	21,417	21,417	21,417	21,417	21,417	21,417	21,417
Volume sold (in millions of m^3)	974	974	974	974	974	974	974	974
Average tarif	22	22	22	22	22	22	22	22
Other revenues	4,575	4,575	4,575	4,575	4,575	4,575	4,575	4,575
TOTAL REVENUES	25,992	25,992	25,992	25,992	25,992	25,992	25,992	25,992
EXPENSES								
Other material and supplies	13,185	15,634	15,634	15,634	15,634	15,634	15,634	15,634
Personnel costs	6,047	5,442	4,898	4,898	4,898	4,898	4,898	4,898
Depreciation	4,435	4,458	4,480	4,502	4,525	4,547	4,570	4,593
Loss on bad debts	0	0	0	0	0	0	0	0
Exchange gains or losses	0	0	0	0	0	0	0	0
TOTAL EXPENSES	23,667	25,533	25,011	25,034	25,056	25,079	25,102	25,125
Operating income before interest	2,325	458	980	958	935	913	890	867
Interest expenses	0	0	0	0	0	0	0	0
Provisions for interest expenses	0	0	0	0	0	0	0	0
Write-back on provisions for interest expenses	0	0	0	0	0	0	0	0
Income before extraordinary items	2,325	458	980	958	935	913	890	867
Extraordinary income or expenses								
Net income for year	2,325	458	980	958	935	913	890	867
Average gas tariff	22,00	22,00	22,00	22,00	22,00	22,00	22,00	22,00

REPUBLIC OF RWANDA

ENERGY SECTOR REHABILITATION PROJECT

ELECTROGAZ - PAST AND PRESENT DEBTS a/

(in millions of RWF)

YEAR	OUTSTANDING LONG-TERM DEBTS e/	PRINCIPAL REPAYMENT			INTEREST CHARGES		
		Water	Electricity	Total	Water	Electricity	Total
1988 b/	8,577	87.5	44.5	132	42	78	120
1989 b/	8,953	87.5	102.8	190.3	151	204	355
1990 b/	14,845	128.4	102.8	231.2	243	339	582
1991 c/	14,962	128.4	102.8	231.2	210	501	711
1992 d/	15,283	128.4	102.8	231.2	239	536	775

a/ Exchange risks are not provided, as these will be offset against the constitution of provisions for interest expenses in the context of the financial restructuring of ELECTROGAZ.
b/ Audited.
c/ Estimated.
d/ Projected.
e/ As of July 31, 1992, the two IDA-financed projects (First Water Supply Project, CR 1345-RW of SDR 12 million approved on April 12, 1983, and Power I Project, CR-1495-RW of SDR 8.5 million, approved on June 12, 1984) represent about 48% of these amounts.

Source: ELECTROGAZ Restructuring Study. March 1992.

REPUBLIC OF RWANDA

ENERGY SECTOR REHABILITATION PROJECT

PROPOSED PROJECT IMPACT ON GOVERNMENT FINANCES

(in millions of RWF)

	Owed to ELECTROGAZ by Government a/	Owed to Government by ELECTROGAZ a/	Contribution to Water Tariff 1993 - 1998	Recapitalization of ELECTROGAZ	Contribution to the Capital of the Private Operator	Counterpart funding to the Proposed Project	Balance or Impact on Government Finance
1) Receivables, including Arrears	1,988						- 1,988
2) Short-term Debts		3,695 b/					+ 3,695
3) Contribution to Water Tariff			+ 896				896
4) Contribution to ELECTROGAZ Capital				1,707 c/			- 1,707
5) Contribution to the Private Operator's Capital					145 d/		—
6) Counterpart funding						336.4	324.80
7) Tax payment from SNP and SPE							+ 3,336
8) Impact on Government Finance							+ 2,115.2

a/ As of December 31, 1991, estimated by a consultant based on audited accounts for 1990.
b/ Includes capital repayment + interests not serviced by ELECTROGAZ since 1988.
c/ Balance in favor of Government of cross debts between ELECTROGAZ and Government to be used as Government contribution to ELECTROGAZ recapitalization; this involves no financial flow from Government to ELECTROGAZ.
d/ This may not involve any cash flow from Government as it can take the form of assignments of some of ELECTROGAZ main buildings.
e/ Government will receive this amount over 6 years; see details on Annex 5.6; page 3 of 3.

REPUBLIC OF RWANDA

ENERGY SECTOR REHABILITATION PROJECT

GOVERNMENT'S YEARLY CONTRIBUTION TO WATER TARIFFS a/

(in millions of RWF)

	1993	1994	1995	1996	1997 d/	1998
1) Full Rate for Water b/	142.55	142.55	142.55	142.55	171.06	171.06
2) Average Tariff after Agreed Increases c/	113.26	121.75	130.89	140.70	151.3	162.59
3) Difference: (1) - (2)	29.29	20.80	11.66	1.85	19.83	8.46
4) Volume of Water Sold. c/ (in millions of m^3)	8.5	9.1	9.8	10.5	11.2	12
5) Cost to Government (3) * (4)	248.97	189.28	114.27	19.43	222.10	101.52

a/ The figures in this table may be subject to changes once a final decision is made on the size of the investment program for water sector. The decision is expected to take place in 1993, upon completion of ongoing studies in the context of the next IDA-financed Water Project currently under preparation.

b/ As per consultant report on ELECTROGAZ'restructuring: Annex 5.4, page 2 of 3.

c/ As per tariff action plan provided in Table 5.3 of the SAR.

d/ The increase in full rate is due to new investments related to Kigali 2000, the next project in water subsector in Rwanda.

REPUBLIC OF RWANDA

ENERGY SECTOR REHABILITATION PROJECT

YEARLY PROJECT IMPACT ON GOVERNMENT FINANCES

(in millions of RWF)

	1993	1994	1995	1996	1997	1998	Total
1. Government Counterpart funding a/	33.6	78.40	100.80	81.20	25.2	5.6	324.80
2. Contribution to Water Tariff	249	189	114	20	222	102	896
3. Sub-Total	282.60	267.4	214.8	101.20	247.20	107.6	1,220.80
4. Tax Payment from SNP/SPE (50%) b/	58.3	315.2	469.3	578.9	702.6	1,212	3,336.3
5. Net Balance Per Year (4) - (3)	-224.30	+47.8	+254.50	+477.7	+455.40	+1,104.40	+2,115.5

a/ As per disbursement table in Annex 4.6, page 2, using an exchange rate of US$1 = RWF140.
b/ Net Income of SNP/SPE is as follows: RWF116.5 million in 1993, RWF 631.5 million in 1994, RWF938.6 million in 1995, RWF1,157.8 million in 1996, RWF1,405.2 million in 1997 and RWF2,424 million in 1998.

REPUBLIC OF RWANDA
ENERGY SECTOR REHABILITATION PROJECT

ELECTROGAZ BORROWING FOR ELECTRICITY SECTOR

Onlending Terms and Conditions	IDA a/	CCCE a/	KFW I	KFW II	KFW III	KFW IV	BADEA	IDA b/	CCCE IV	FAD VI	FAD VI
Capital	9,090,000	17,150,000	2,300,000	1,200,000	2,100,000	32,800,000	6,000,000	8,500,000	120,000,000	1,292,500	1,292,500
Onlending Rate	8%	5%	5%	5%	5%	6%	5%	10%	5%	2%	2%
Grace Period	5	5	5	5	5	5	5	5	5	10	10
Repayment Period	20	20	20	20	20	30	15	15	13	40	40
Currency	SDR	FF	DM	DM	DM	DM	USD	SDR	FF	UCF	UCF
Exchange Rate	198./	27.4	93	93	93	93	142.7	198.6	27.4	183.3	183.3
First Repayment	2001	2011	1984	1985	1985	1993	1983	1989	1993	2002	2003

ELECTROGAZ - BORROWING FOR WATER SECTOR

Onlending Terms and Conditions	IDA II c/	IDA II Bis c/	CCCE I	CCCE II	CCCE III	FAD III	FAD IV	FAD I	FAD II	FAD V	KIGALI 2000 (tentative)	EIB a/ (electricity)
Capital	9,616,870	2,383,130	13,000,000	85,000,000	30,000,300	2,560,000	1,460,000	5,100,000	1,710,000	13,000,000	126,666,667	5,190,000
Onlending Rate	10,97%	10.97%	2%	2%	5%	0,75%	0,75%	0,75%	0,75%	0,75%	5%	5%
Grace Period	5	5	10		5	10	10	10	10	10	5	5
Repayment Period	15	15	20	20	10	30	40	40	40	40	20	20
Currency	SDR	SDR	FRF	FRF	FRF	UCF	UCF	UCF	UCF	UCF	FRF	ECU
Exchange Rate	198.7	198.7	27.4	27.4	27.4	183.3	183.3	183.3	183.3	183.3	27.4	223.3
First Repayment	1988	1997	1994	1994	1990	1987	1995	1987	1993	1997	1999	2000

a/ Proposed Project - IDA + CCCE + EIB
b/ Cr. 1492-RW
c/ Cr. 1345-RW

Source: SAUR Afrique Report on ELECTROGAZ Restructuring dated March 1992.

REPUBLIC OF RWANDA

ENERGY SECTOR REHABILITATION PROJECT

ASSUMPTIONS FOR FINANCIAL PROJECTIONS

A. Revenues from Sales and Connections

1. Prices. Financial projections are in constant Rwandese francs. The exchange rate of the FRW to the dollar used in the projection is US$1 = FRW140.

2. Sales and Revenues. Electricity consumption is based on the forecasts of the medium scenario in the electrification Master Plan prepared by HYDRO QUEBEC INTERNATIONAL and found acceptable by IDA, with an average demand growth of 8.4%. Water consumption is estimated on the basis of growth in consumption for the last five years, averaging about 2.5 per year. Gas demand has been taken as constant, given the structure of sales (single client) and an investment program which is yet to be defined. Average tariffs for water and electricity have been projected to meet ELECTROGAZ' financial restructuring objectives over the period of 1993 - 1998 as per paras. 5.7 and 5.8.

3. System losses (technical and non-technical) for electricity are estimated to decrease from 14% in 1991 to 10% in 1995, mainly due to efficiency measures to be taken by the private operator. Unaccounted for water has been assumed to decrease from 35% in 1990 to 30% in 1992 as the result of measures currently undertaken by ELECTROGAZ. From 1993, it has been assumed that comprehensive programs to be implemented by the private operator would bring the unaccounted for water to 20% by year 2000.

4. Revenues from Connections. A margin of 30% was applied to all actual connection charges. The actual connections charges have been computed to substantially decrease (between 40 and 50%), as the result of more use of monophase than triphase to connect the increasing number of small private consumers.

B. Operating Costs

5. Other materials and supplies. The actual consumption for these cost items totalled FRW 568 million in 1990 and FRW 699 million in 1991. They have been computed to remain constant from 1993 to 1998 assuming a 15% increase in 1992 as compared to 1991, based on the assumption that any increase in these costs item would be offset by the efficiency gain of the private operator. This approach is realistic as the private operator will be driven by the implicit objective to keep the costs at the very minimum. The higher these cost items, the lower its remuneration.

6. Reagents. Reagents that are consumed have been computed using the forecasts for water consumption and volumes of water treated that arise out of the forecast demand. The quantities of reagents have been valued using the prices applied by ELECTROGAZ' suppliers.

7. Purchases of electricity. In the absence of the implementation of the agreed upon LRMC for Ruzizi II, the purchases of electricity have been valued using the new tariffs applied by SINELAC (SDR 0,05 or RWF 9.86/kWh) and SNEL (RWF7.36 kWh respectively).

8. Labor costs. These cost items are estimated for the 1992-1998 period taking into account the manpower reduction program as described in para. 2.7 and average increases in salaries and wages of about 8% per year.

9. Depreciation. Depreciation is calculated on the basis of the 1990 audited balance sheet. Fixed assets are assumed to increase, taking into account investments to be made as part of the proposed project and of the agreed upon investment program. On average over the projected period, gross fixed assets would rise by 8% yearly.

C. Other Income Statement Items

10. Exchange losses. Exchange losses that are shown in the projections relate to repayment of principal and interest charges on long and medium term debts, and are the result of the devaluations of the Rwandese franc. The projections assumed the constitution of provision for interest expenses to offset exchange losses against the past positive difference resulting from conversion into local currency of debts denominated in foreign currency.

11. Interest charges. Interest charges are computed assuming the maintenance of the current on-lending terms of the debts contracted before 1992 by ELECTROGAZ'.

12. Depreciation of the subsidies for equipment and works has been calculated on the basis of the average period of depreciation for subsidized installations.

D. Balance Sheets Items

13. Work in progress. Works in progress are estimated on the basis of ELECTROGAZ's investment program and taking into account investments under the proposed project. It has been assumed also that the investment program for water would be finalized once a decision is reached on the size of the investment program for the water sector, upon completion of ongoing studies in Kigali and secondary centers.

14. Accounts receivable. These have been computed with the objective to bring back receivables from private consumers and from Central Government to the equivalent of three months billings by December 1994 after the introduction of a vigorous billing and collection policy by the private operator under the proposed project, and after compensation of Central Government—ELECTROGAZ' crossed-debts.

15. Long-term debts. This item has been calculated on the basis of the net worth as shown in the 1990 audited financial statements, and simulations carried out on the basis of existing and future loans that constitute the investment program. IDA's and cofinancers' credits (EIB, CCCE) that form the proposed credit have also been taken into account.

16. Short term portion of current debt to Central Government. In 1991 and 1992, this item was increased by the amount of debt servicing obligations that ELECTROGAZ could not meet. It is expected that the Government will use these current liabilities as a contribution to the capital of the SNP, as part of the recapitalization package to be submitted by the Government under the proposed project. As of November 1992, compensation of cross-debts between ELECTROGAZ and Government would take place. It is expected that the balance in favor of Government would be used to recapitalize ELECTROGAZ or the SNP so as to bring its equity ratio close to the standards of financially-viable utilities by 1993.

E. Fund Flow Items

17. Debt service. ELECTROGAZ's debt service is calculated using an exchange rate of US$1 = FRW140. For loans denominated in other currencies, the exchange rates as of June 30, 1992 have been used. Debt servicing has been calculated taking into account the maintenance of the current on-lending terms to ELECTROGAZ. ELECTROGAZ' borrowings for the proposed project, the schedule of which is provided in Annex 5.5, include IDA credit and related cofinancing.

REPUBLIC OF RWANDA
ENERGY SECTOR REHABILITATION PROJECT

TARIFF ADJUSTMENT FORMULA

A. The Formula

The formula to be used for an automatic adjustment, which is based on three variables, namely exchange rate between the US$ and the Rwandese Franc, price of electricity purchased from SINELAC and salaries, is as follows:

$$T_{i+1} = T_i \times (A + B \times ER_{i+1} / ER_0 + C \times EP_{i+1} / EP_0 + D \times S_{i+1} / S_0)$$

where T stands for tariff, ER for exchange rate, EP for price of electricity purchased from SINELAC, S for salaries, i refers to a given year of the financial projection and i+1 to a subsequent moment of that year when tariffs are to be reviewed. Such a review shall be necessary when there has been a change in any of the three independent variables. The values of the variables for a given year i shall correspond to the base line values used in the projections for the particular year. The i + 1 values shall change each time that the variable change. The tariff-increase under the above conditions shall only be applied when the resulting increase is above 6% of the tariff at the time of review. The cost ratios, A, B, C and D would be calculated exante from the financial projections prepared by or for the utility. For example, for a given year of the financial projections, B would be obtained by dividing the total of those expenditures that are foreign exchange dependent for that year (such as foreign debt service, imported spare parts and equipment purchased with internally generated funds and part of the contribution to the investment program financed also with internally generated funds) oy the total projected revenues for that year. C would likewise be obtained by dividing the projected expenditures from the purchase of electricity for a given year by the projected revenues for that year. D would result from dividing the salary expenditure projected for a given year by the projected revenues for that year. The remaining factor, A, is given by the formula

$$A = 1 - (B + C + D)$$

and represents the other uses of funds that are not a function of any of the three variables used in the formula. It should be noted that the portion of the investment program that is financed by other institutions does not appear in the formula as it does not demand funds from the utility.

The values of A, B, C and D should be calculated from the financial projections for each of the years of project execution. The value of these factors will most likely change from year to year, but if the change is minor it might be simpler to hold them constant during project supervision. Furthermore, the financial projections typically will require frequent updating and this will lead to a recalculation of the cost ratios. When the formula is used to adjust the tariff, it should be applied to every customer and to every consumer block. This in effect distributes the additional costs (savings) equally to all consumers; however, assuming that the base tariff has been properly designed, this should result in an equitable sharing of the burden or benefit. Finally, it should be clear that the formula should be revenue neutral, that is to say, the utility's revenues should increase (decrease) in precisely the amount needed to compensate for the additional expenditure (saving) caused by the change in an independent variable.

B. The refinement of the formula

Notwithstanding the provisions of Section A above, in a dry year, the utility will be forced to increase its thermal generation, while in a wet year, it might be able to curtail it. This situation shall be managed by including in the variable EP the additional thermal generation price, which shall take into account the projected price of running more thermal than hydro.

REPUBLIC OF RWANDA

ENERGY SECTOR REHABILITATION PROJECT

ECONOMIC ANALYSIS OF ELECTRICITY COMPONENT

COSTS (US$ mn.)	1994	1995	1996	1997	1998	1999	2000	2001-2013
Investment[a/]	6.26	5.20	6.44	1.05	0.15	0.00	0.00	0.00
O & M[b/]	0.06	0.11	0.18	0.19	0.19	0.19	0.19	0.19
Incremental Energy Reqd. (GWh)[c/]	15.01	31.00	48.48	67.42	87.96	87.96	87.96	87.96
Energy Cost[d/]	1.05	2.17	3.39	4.72	6.16	6.16	6.16	6.16
TOTAL COSTS	7.37	7.48	10.01	5.96	6.50	6.35	6.35	6.35
BENEFITS (US$mn)								
Incr. Sales (GWh)[e/]	13.52	28.18	44.07	61.29	79.96	79.96	79.96	79.96
Value of Sales[f/]	1.64	3.41	5.33	7.42	9.68	9.68	9.68	9.68
Loss Reduction (GWh)[g/]	1.79	3.88	4.21	4.56	4.56	4.56	4.56	4.56
Value Loss Redn.[h/]	0.13	0.27	0.29	0.32	0.32	0.32	0.32	0.32
TOTAL BENEFITS	1.76	3.68	5.63	7.74	9.99	9.99	9.99	9.99
NET BENEFITS	-5.61	-3.80	-4.39	1.78	3.50	3.65	3.65	3.65

IERR (%) 18.65

Sensitivity Analysis:

Effect of 10% increase in investment costs: IERR falls to 17%.
Effect of 10% higher tariffs with lower load growth of 6% p.a.: IERR falls to 15%.
Effect of 10% higher average tariffs with unchanged load growth: IERR rises to 24.4%.
Effect of higher losses - IERR drops to 18.4% in event of a 2-year delay in reaching 10%.
Effect of load growth of 6% p.a. with 10% increase in investment costs: IERR falls to 10%.

Notes:

a/ ELECTROGAZ's investments in generation, transmission and distribution, (excluding rural electrification), including 10% physical contingencies.
b/ 1% of cumulative investment cost.
c/ Incremental sales plus losses - projected to decline to 10% by 1995.
d/ Based on SINELAC's bulk sales tariff of 0.05 SDR/kWh.
e/ 8.4% p.a. sales growth from 1992 onwards, per load forecast used for system planning. Only 5 years of incremental load included.
f/ Based on average sales tariff of US$ 0.12/kWh, defined as an average of the social tariff of RWF10.00/kWh, and the estimated LRMC of RWF20.00/kWh, weighted by the respective percentage of total consumption to which they are applied.
g/ Losses are projected to be reduced to 11% in 1994 and 10% in 1995.
h/ Losses are valued at the SINELAC bulk sales tariff.

REPUBLIC OF RWANDA
ENERGY SECTOR REHABILITATION PROJECT

ECONOMIC ANALYSIS OF THE DISTRIBUTION EXTENSIONS

1. Rates of return as well as net present values were calculated for the extensions of the distribution networks of Kigali, Butare, Ruhengeri, Gisenyi and Nyabisindu. A period of 30 years beginning in 1994 was chosen for the analysis. The calculations were done using Lotus, and the worksheets corresponding to the base case for each one of the cities are attached.

Costs

2. Investment costs were assumed to be distributed equally along the four years, 1994-1997, of the implementation period. Yearly operation and maintenance costs were taken as 2% of investment costs.

Benefits

3. The benefits of the project will be the revenues generated by the incremental sales of electricity and the consumer surplus due to substitution of alternative sources of energy mainly for lighting and cooking. Only the first of these elements was considered in the calculation of the rates of return. The incremental sales were valued as the product of the total energy supplied through the extensions and the average tariff.

4. The energy supplied was calculated from the number of consumers to be connected, as estimated by ELECTROGAZ and verified by Hydro Quebec International (HQI), and a yearly consumption per consumer. It was assumed that 60% of the consumers that would eventually be served by any given extension, would be connected immediately, and that the remaining 40% would be added at a uniform rate during the next four years. The yearly consumption per consumer was taken as the weighted average of the first two blocks of consumption in low voltage as determined by HQI within the framework of the Electricity Master Plan Study. The tariff applied --US$0.12/kWh-- was also determined as an average of the social tariff of RWF10.00/kWh, and the estimated LRMC of RWF20.00/kWh, weighted by the respective percentage of total consumption to which they are applied.

Results and Sensitivity Analysis

5. The estimated internal rate of return varies between 12% for Nyabisindu, and 36% for Kigali. A sensitivity analysis was carried out for a plus or minus 20 percent variation in each of two parameters: the number of consumers served from the extensions and the average consumption per consumer in kWh per year. Both these factors are reflected in the total consumption supplied through the extensions, which varies, therefore, between minus 36% and plus 44%, as shown in the table below.

Sensitivity Analysis of The IERR

Variation in Total Consumption	Kigali	Butare	Gisenyi	Ruhengeri	Nyabisindu
- 36%	21	13	7	7	6
- 20%	28	18	11	10	9
Base Case	36	23	14	13	12
+ 20%	45	29	18	17	16
+ 44%	56	35	22	21	20

REPUBLIC OF RWANDA

ENERGY SECTOR REHABILITATION PROJECT

DISTRIBUTION EXTENSIONS IN THE CITY OF KIGALI

ECONOMIC JUSTIFICATION

YEAR	CONSUMR SERVD BY EXTNSION	CONSUMPT '000 kWh	REVENUE '000 US$	INVESTM '000 US$	O&M COST '000 US$	TOT COST '000 US$	BENEFIT '000 US$
1994	483	869	104.26	537.5	10.75	548.25	-443.99
1995	1092	1965	235.81	537.5	21.5	559	-323.19
1996	1827	3288	394.60	537.5	32.25	569.75	-175.15
1997	2709	4876	585.17	537.5	43	580.5	4.67
1998	3075	5536	664.26		43	43	621.26
1999	3361	6050	725.98		43	43	682.98
2000	3559	6406	768.68		43	43	725.68
2001	3662	6591	790.97		43	43	747.97
2002	3662	6591	790.97		43	43	747.97
2003	3662	6591	790.97		43	43	747.97
2004	3662	6591	790.97		43	43	747.97
2005	3662	6591	790.97		43	43	747.97
2006	3662	6591	790.97		43	43	747.97
2007	3662	6591	790.97		43	43	747.97
2008	3662	6591	790.97		43	43	747.97
2009	3662	6591	790.97		43	43	747.97
2010	3662	6591	790.97		43	43	747.97
2011	3662	6591	790.97		43	43	747.97
2012	3662	6591	790.97		43	43	747.97
2013	3662	6591	790.97		43	43	747.97
2014	3662	6591	790.97		43	43	747.97
2015	3662	6591	790.97		43	43	747.97
2016	3662	6591	790.97		43	43	747.97
2017	3662	6591	790.97		43	43	747.97
2018	3662	6591	790.97		43	43	747.97
2019	3662	6591	790.97		43	43	747.97
2020	3662	6591	790.97		43	43	747.97
2021	3662	6591	790.97		43	43	747.97
2022	3662	6591	790.97		43	43	747.97
2023	3662	6591	790.97		43	43	747.97

VALUE OF PARAMETERS USED:

Average consumption by consumer in kWh/yr:	1800
Average tariff in US$ per kWh:	0.12

RESULTS:

Net present value in '000 US$ for 10% discount rate:	3754.16
Internal rate of return:	0.36

REPUBLIC OF RWANDA

ENERGY SECTOR REHABILITATION PROJECT

DISTRIBUTION EXTENSIONS IN THE CITY OF BUTARE

ECONOMIC JUSTIFICATION

YEAR	CONSUMRS SERVD BY EXTNSION	CONSUMPT '000 kWh	REVENUE '000 US$	INVESTM '000 US$	O&M COST '000 US$	TOT COST '000 US$	BENEFIT '000 US$
1994	12	22	2.61	19.5	0.39	19.89	−17.28
1995	28	50	5.96	19.5	0.78	20.28	−14.32
1996	46	82	9.86	19.5	1.17	20.67	−10.81
1997	67	121	14.56	19.5	1.56	21.06	−6.50
1998	77	138	16.53		1.56	1.56	14.97
1999	84	150	18.06		1.56	1.56	16.50
2000	88	159	19.10		1.56	1.56	17.54
2001	91	164	19.65		1.56	1.56	18.09
2002	91	164	19.65		1.56	1.56	18.09
2003	91	164	19.65		1.56	1.56	18.09
2004	91	164	19.65		1.56	1.56	18.09
2005	91	164	19.65		1.56	1.56	18.09
2006	91	164	19.65		1.56	1.56	18.09
2007	91	164	19.65		1.56	1.56	18.09
2008	91	164	19.65		1.56	1.56	18.09
2009	91	164	19.65		1.56	1.56	18.09
2010	91	164	19.65		1.56	1.56	18.09
2011	91	164	19.65		1.56	1.56	18.09
2012	91	164	19.65		1.56	1.56	18.09
2013	91	164	19.65		1.56	1.56	18.09
2014	91	164	19.65		1.56	1.56	18.09
2015	91	164	19.65		1.56	1.56	18.09
2016	91	164	19.65		1.56	1.56	18.09
2017	91	164	19.65		1.56	1.56	18.09
2018	91	164	19.65		1.56	1.56	18.09
2019	91	164	19.65		1.56	1.56	18.09
2020	91	164	19.65		1.56	1.56	18.09
2021	91	164	19.65		1.56	1.56	18.09
2022	91	164	19.65		1.56	1.56	18.09
2023	91	164	19.65		1.56	1.56	18.09

VALUE OF PARAMETERS USED:

Average consumption by consumer in kWh/yr:	1800
Average tariff in US$ per kWh:	0.12

RESULTS:

Net present value in '000 US$ for 10% discount rate:	69.95
Internal rate of return:	0.23

REPUBLIC OF RWANDA

ENERGY SECTOR REHABILITATION PROJECT

DISTRIBUTION EXTENSIONS IN THE CITY OF RUHENGERI

ECONOMIC JUSTIFICATION

YEAR	CONSUMRS SERVD BY EXTNSION	CONSUMPT '000 kWh	REVENUE '000 US$	INVESTM '000 US$	O&M COST '000 US$	TOT COST '000 US$	BENEFIT '000 US$
1994	272	490	58.82	687.5	13.75	701.25	-642.43
1995	633	1139	136.69	687.5	27.5	715	-578.31
1996	1021	1838	220.53	687.5	41.25	728.75	-508.22
1997	1494	2689	322.66	687.5	55	742.5	-419.84
1998	1694	3050	366.01		55	55	311.01
1999	1850	3330	399.56		55	55	344.56
2000	1953	3515	421.76		55	55	366.76
2001	2007	3613	433.51		55	55	378.51
2002	2007	3613	433.51		55	55	378.51
2003	2007	3613	433.51		55	55	378.51
2004	2007	3613	433.51		55	55	378.51
2005	2007	3613	433.51		55	55	378.51
2006	2007	3613	433.51		55	55	378.51
2007	2007	3613	433.51		55	55	378.51
2008	2007	3613	433.51		55	55	378.51
2009	2007	3613	433.51		55	55	378.51
2010	2007	3613	433.51		55	55	378.51
2011	2007	3613	433.51		55	55	378.51
2012	2007	3613	433.51		55	55	378.51
2013	2007	3613	433.51		55	55	378.51
2014	2007	3613	433.51		55	55	378.51
2015	2007	3613	433.51		55	55	378.51
2016	2007	3613	433.51		55	55	378.51
2017	2007	3613	433.51		55	55	378.51
2018	2007	3613	433.51		55	55	378.51
2019	2007	3613	433.51		55	55	378.51
2020	2007	3613	433.51		55	55	378.51
2021	2007	3613	433.51		55	55	378.51
2022	2007	3613	433.51		55	55	378.51
2023	2007	3613	433.51		55	55	378.51

VALUE OF PARAMETERS USED:

Average consumption by consumer in kWh/yr:	1800
Average tariff in US$ per kWh:	0.12

RESULTS:

Net present value in '000 US$ for 10% discount rate:	570.70
Internal rate of return:	0.13

REPUBLIC OF RWANDA

ENERGY SECTOR REHABILITATION PROJECT

DISTRIBUTION EXTENSIONS IN THE CITY OF GISENYI

ECONOMIC JUSTIFICATION

YEAR	CONSUMR SERVD BY EXTNSION	CONSUMPT '000 kWh	REVENUE '000 US$	INVESTM '000 US$	O&M COST '000 US$	TOT COST '000 US$	BENEFIT '000 US$
1994	131	236	28.28	305	6.1	311.1	-282.82
1995	307	553	66.31	305	12.2	317.2	-250.89
1996	488	879	105.46	305	18.3	323.3	-217.84
1997	709	1277	153.21	305	24.4	329.4	-176.19
1998	804	1448	173.74		24.4	24.4	149.34
1999	878	1580	189.55		24.4	24.4	165.15
2000	925	1665	199.81		24.4	24.4	175.41
2001	950	1710	205.25		24.4	24.4	180.85
2002	950	1710	205.25		24.4	24.4	180.85
2003	950	1710	205.25		24.4	24.4	180.85
2004	950	1710	205.25		24.4	24.4	180.85
2005	950	1710	205.25		24.4	24.4	180.85
2006	950	1710	205.25		24.4	24.4	180.85
2007	950	1710	205.25		24.4	24.4	180.85
2008	950	1710	205.25		24.4	24.4	180.85
2009	950	1710	205.25		24.4	24.4	180.85
2010	950	1710	205.25		24.4	24.4	180.85
2011	950	1710	205.25		24.4	24.4	180.85
2012	950	1710	205.25		24.4	24.4	180.85
2013	950	1710	205.25		24.4	24.4	180.85
2014	950	1710	205.25		24.4	24.4	180.85
2015	950	1710	205.25		24.4	24.4	180.85
2016	950	1710	205.25		24.4	24.4	180.85
2017	950	1710	205.25		24.4	24.4	180.85
2018	950	1710	205.25		24.4	24.4	180.85
2019	950	1710	205.25		24.4	24.4	180.85
2020	950	1710	205.25		24.4	24.4	180.85
2021	950	1710	205.25		24.4	24.4	180.85
2022	950	1710	205.25		24.4	24.4	180.85
2023	950	1710	205.25		24.4	24.4	180.85

VALUE OF PARAMETERS USED:

Average consumption by consumer in kWh/yr:	1800
Average tariff in US$ per kWh:	0.12

RESULTS:

Net present value in '000 US$ for 10% discount rate:	351.91
Internal rate of return:	0.14

REPUBLIC OF RWANDA

ENERGY SECTOR REHABILITATION PROJECT

DISTRIBUTION EXTENSIONS IN THE CITY OF NYABISINDU

ECONOMIC JUSTIFICATION

YEAR	CONSUMRS SERVD BY EXTNSION	CONSUMPT '000 kWh	REVENUE '000 US$	INVESTM '000 US$	O&M COST '000 US$	TOT COST '000 US$	BENEFIT '000 US$
1994	94	169	20.27	247.3	4.946	252.246	-231.98
1995	218	392	47.09	247.3	9.892	257.192	-210.10
1996	352	633	75.98	247.3	14.838	262.138	-186.16
1997	515	926	111.16	247.3	19.784	267.084	-155.92
1998	584	1051	126.10		19.784	19.784	106.31
1999	637	1147	137.65		19.784	19.784	117.87
2000	673	1211	145.30		19.784	19.784	125.52
2001	691	1245	149.35		19.784	19.784	129.57
2002	691	1245	149.35		19.784	19.784	129.57
2003	691	1245	149.35		19.784	19.784	129.57
2004	691	1245	149.35		19.784	19.784	129.57
2005	691	1245	149.35		19.784	19.784	129.57
2006	691	1245	149.35		19.784	19.784	129.57
2007	691	1245	149.35		19.784	19.784	129.57
2008	691	1245	149.35		19.784	19.784	129.57
2009	691	1245	149.35		19.784	19.784	129.57
2010	691	1245	149.35		19.784	19.784	129.57
2011	691	1245	149.35		19.784	19.784	129.57
2012	691	1245	149.35		19.784	19.784	129.57
2013	691	1245	149.35		19.784	19.784	129.57
2014	691	1245	149.35		19.784	19.784	129.57
2015	691	1245	149.35		19.784	19.784	129.57
2016	691	1245	149.35		19.784	19.784	129.57
2017	691	1245	149.35		19.784	19.784	129.57
2018	691	1245	149.35		19.784	19.784	129.57
2019	691	1245	149.35		19.784	19.784	129.57
2020	691	1245	149.35		19.784	19.784	129.57
2021	691	1245	149.35		19.784	19.784	129.57
2022	691	1245	149.35		19.784	19.784	129.57
2023	691	1245	149.35		19.784	19.784	129.57

VALUE OF PARAMETERS USED:

Average consumption by consumer in kWh/yr:	1800
Average tariff in US$ per kWh:	0.12

RESULTS:

Net present value in '000 US$ for 10% discount rate:	156.71
Internal rate of return:	0.12

REPUBLIC OF RWANDA

ENERGY SECTOR REHABILITATION PROJECT

DOCUMENTS IN THE PROJECT FILE

1. Detailed Scope for the Rehabilitation and Extension of the distribution network for Kigali, Butare, Gisenyi, Ruhengeri, and Nyabisindu.

2. ELECTROGAZ new statutes and functions.

3. Draft Law on Public Enterprise regulatory framework.

4. Lease Contract between ELECTROGAZ and the private operating company.

5. ELECTROGAZ restructuring Study.

6. Study on Petroleum Pricing Structure and Taxation.

7. Environmental Issues Paper and Mitigation Plan.

8. Malt System Cost Reduction and Sources.

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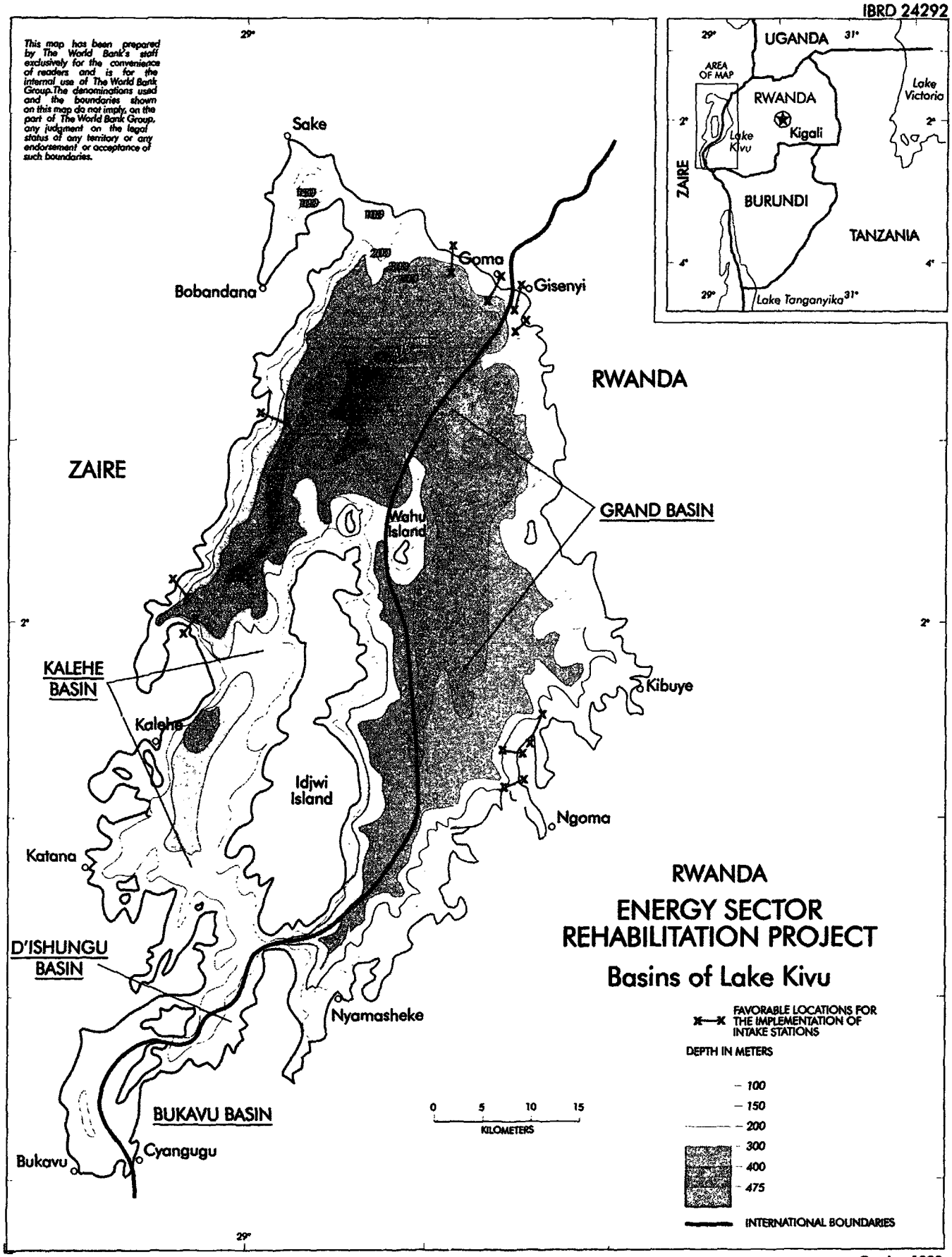
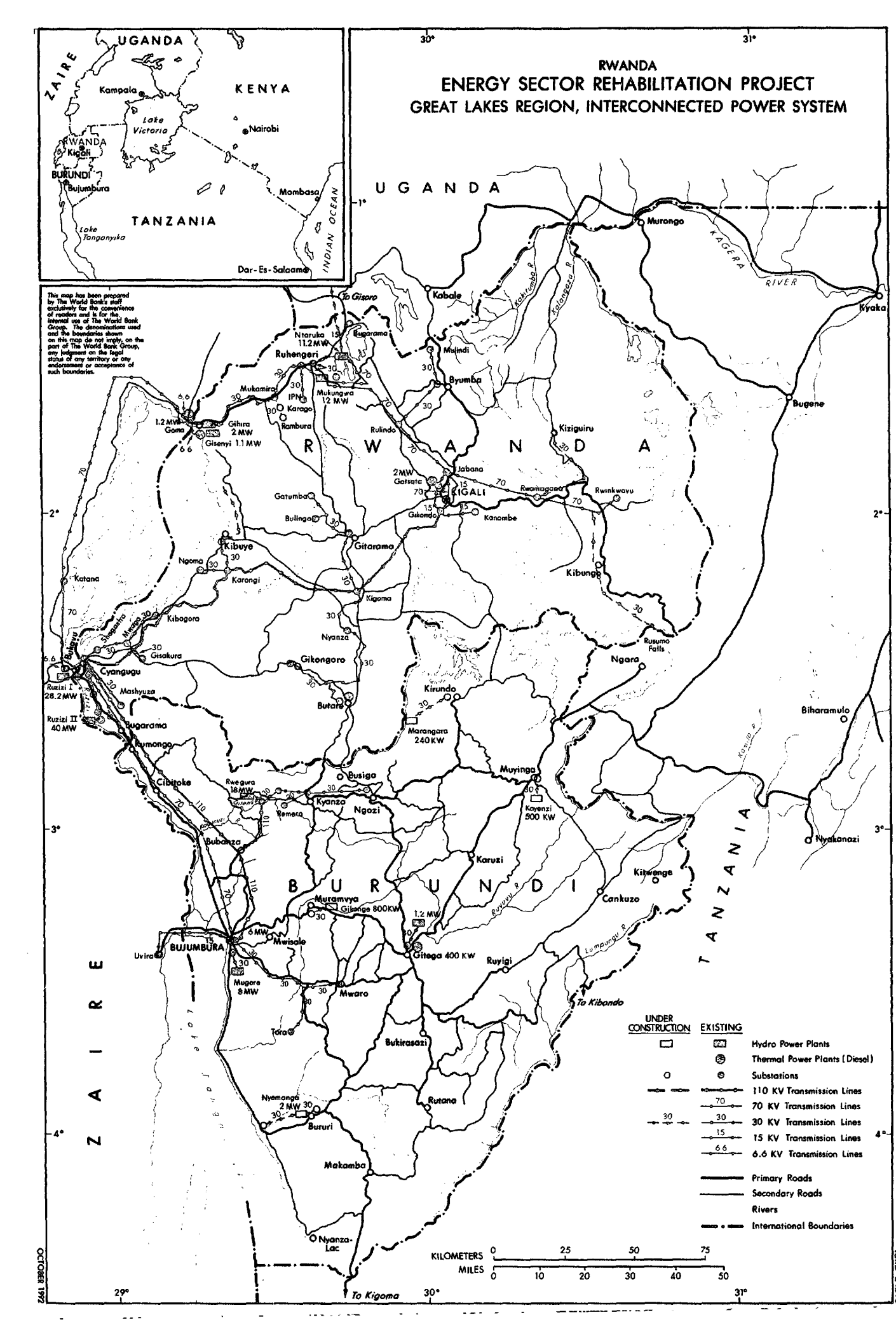


October 1992


RWANDA
ENERGY SECTOR REHABILITATION PROJECT
GREAT LAKES REGION, INTERCONNECTED POWER SYSTEM
UGANDA
KENYA
TANZANIA
ZAIRE
BURUNDI
RWANDA
Kampala
Nairobi
Kigali
Bujumbura
Mombasa
Dar-Es-Salaam
Lake Victoria
Lake Tanganyika
INDIAN OCEAN
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To Gisoro
Kabale
Murongo
KAGERA RIVER
Kyaka
Ntaruka 11.2MW
Rugarama
Mulindi
Ruhengeri
Byumba
Mukamira
IPN
Karago
Mukungwa 12 MW
Rambura
Rulindo
Bugene
Kiziguiru
1.2 MW Goma
Gihira 2 MW
Gisenyi 1.1 MW
2MW Gatsata
Jabana
KIGALI
Rwamagana
Rwinkwavu
Gatumba
Bulinga
Gikondo
Kanombe
Kibuye
Gitarama
Ngoma
Karongi
Kibungo
Katana
Kigoma
Kibogora
Nyanza
Rusumo Falls
Gisakura
Ngara
Cyangugu
Gikongoro
Ruzizi I 28.2MW
Mashyuza
Kirundo
Butare
Ruzizi II 40MW
Bugarama
Marangara 240 KW
Biharamulo
Rumonge
Muyinga
Busigo
Cibitoke
Rwegura 18MW
Kyanza
Ngozi
Kayenzi 900 KW
Remera
Nyakanazi
Bubanza
Karuzi
Kitwenge
Muramvya
Gitenge 800KW
1.2 MW
Cankuzo
6 MW
Mwisale
Uvira
BUJUMBURA
Gitega 400 KW
Ruyigi
Mugere 8MW
Mwaro
To Kibondo
Tora
Bukirasazi
Nyemanga 2 MW
Rutana
Bururi
Makamba
Nyanza-Lac
To Kigoma
UNDER CONSTRUCTION
EXISTING
Hydro Power Plants
Thermal Power Plants (Diesel)
Substations
110 KV Transmission Lines
70 KV Transmission Lines
30 KV Transmission Lines
15 KV Transmission Lines
6.6 KV Transmission Lines
Primary Roads
Secondary Roads
Rivers
International Boundaries
KILOMETERS 0 25 50 75
MILES 0 10 20 30 40 50
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