

Malawi: Rural Energy and Institutional Development

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Energy Sector Management Assistance Program
ESMAP

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Washington, D.C. 20433, U.S.A.

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First printing April 2005

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Abbreviations and Acronyms

DANIDA	Danish International Development Agency
ESCOM	Electricity Supply Commission of Malawi
ESMAP	Energy Sector Management Assistance Programme
FINESSE	Financing Energy Services for Small-Scale Energy Users
GDP	gross domestic product
HH	household
HV	high voltage
IPP	independent power producer
LPG	liquefied petroleum gas
MASAF	Malawi Social Action Fund
MOEM	Ministry of Energy and Mining
MOFFEA	Ministry of Forestry, Fisheries, and Environmental Affairs
MV&LV	medium-voltage and low-voltage
NGO	nongovernmental organization
PV	photovoltaic
RECO	rural electrification company
REF	Rural Electrification Fund
REP	rural electrification project
RESCO	rural energy services company
RETC	Rural Electrification Technical Committee
SADC	Southern Africa Development Community
SAPP	Southern African Power Pool
SBU	Strategic Business Unit
SIC	Interconnected Central Grid (<i>Sistema Interconectado Central</i>)
SING	Northern Interconnected Grid (<i>Sistema Interconectado del Norte Grande</i>)
SUCOMA	Sugar Corporation of Malawi
T&D	transmission and distribution
UNDP	United Nations Development Programme
VNRMC	village natural resource management committee

Units of Measure

GJ	gigajoule
kgOE	kilogram of oil equivalent
kWh	kilowatt hour
kW	kilowatt
km	kilometer
kV	kilovolt
kVA	kilovolt-amperes
MJ	megajoule
MWh	megawatt hour
MW	megawatt
TWh	terawatt hour

Currency Equivalents

US\$1.00 = 17.5 Malawi kwacha (MK) (October 1997)

US\$1.00 = MK 42.5 (June 1999)

Energy Conversion Factors

Fuel type	Energy content			Efficiency for cooking (percent)
	(megajoule)	(kgOE)	(kilocalories)	
Liquefied petroleum gas (LPG) (kg)	45.0	1.059	10,800	60
Electricity (kWh)	3.6	0.085	860	75
Kerosene (liter)	35.0	0.824	8,400	35
Charcoal (kg), 5 percent moisture, \approx 4 percent ash	30.0	0.706	7,200	22
Wood (kg), 15 percent moisture, \approx 1 percent ash	16.0	0.376	3,840	15
Dung (kg), 15 percent moisture, \approx 20 percent ash	14.5	0.341	3,480	10–15
Straw (kg) 5 percent moisture, \approx 4 percent ash	13.5	0.318	3,240	10–15

Preface

The development agenda of the government of Malawi identifies as high priorities poverty reduction and the need for targeted interventions for the poorest. Because more than 80 percent of Malawi's population lives in rural areas and the incidence of poverty is higher in rural than in urban areas, the government's is directing its poverty alleviation efforts primarily at rural development.

Most rural incomes derive directly or indirectly from agriculture, including forestry and fishing. Successful agricultural development is thus a precondition for successful rural development. The rapid growth of the rural population, land scarcity, mounting environmental pressures, and the migration to urban areas of rural jobseekers mean that the development of off-farm and nonfarming income sources also must be seen as an integral component of rural development; the importance of access to energy, both modern and traditional, in productive (income-generating) applications and as a vital element in the improvement of the rural life also must be recognized.

Need for New Rural Energy Policy Framework

The primary energy resources in rural Malawi are biomass. Kerosene is used to a limited extent for lighting, but household cooking is done predominantly using woodfuel, products and crop residues. Access to electricity is negligible, despite the existence of what is by southern African standards a robust transmission network. The government recognizes that to achieve the desired growth in rural areas it must provide additional, sustainable energy supplies. These supplies must be environmentally sound, socially acceptable, and economically viable.

The government and the donor community must be strongly committed from the outset to the long-term goals of rural development. They must be fully prepared to employ innovative policies to encourage local community involvement in forest resource management and private sector participation in the generation and distribution of electricity. The distribution of electricity may be achieved through extension of the grid or through decentralized off-grid systems; either way, it will require the creation of a new policy framework to facilitate achievement of the government's objectives.

At the request of the Ministry of Energy and Mining (MOEM) of the Republic of Malawi, the joint World Bank/United Nations Development Programme Energy Sector Management Assistance Programme (UNDP ESMAP) carried out a study of the existing policy framework of the biomass energy, rural electrification, and renewable energy subsectors. The ESMAP team visited Malawi twice for two weeks in late 1997 and early 1998 to review Malawi's existing policies in these subsectors, visiting rural areas with the potential for rural electrification and meeting with bilateral agencies to review their rural energy activities. During its stay the team worked closely with a counterpart team from the MOEM, the Electricity Supply Commission of Malawi (ESCOM), and the Ministry of Forestry, Fisheries, and Environmental Affairs (MOFFEA).

This report summarizes the results of this study and makes a series of policy and institutional recommendations intended to facilitate the achievement of national policy objectives in these subsectors.

Acknowledgments

The authors of this report are Mangesh Hoskote and Dean Girdis. Significant contributions were made also by Douglas Barnes, Peter Cordukes, Willem Floor, Keith Openshaw, Ron Orozco, Mahesh Sharma, Assefa Telahun, Mark Tomlinson, and Jerome Weingart. Gerald Foley assisted with the final editing.

The preparation of the report would not have been possible without the dedication of officials of the Government of Malawi and ESCOM. The ESMAP team was assisted by the following persons from the MOEM: Mac Hanjahanja, Permanent Secretary; Arnold Juma, Acting Director of Energy Affairs; Harry Chienje, Principal Energy Officer; Lewis Mhango, Senior Energy Officer; Gideon Nyiringo, Senior Energy Officer; and Timothy Chima, Energy Engineer. From ESCOM, the team received valuable guidance from Reynold Duncan, General Manager (retired); Overton Mandalasi, Acting General Manager; G.D. Kainja, Director of Administration; K.M. Padumbo, Director of Finance; Dr. Alexxon Chiwaya, Chief Engineer; and D.G. Kachila, Senior Engineer.

The ESMAP team gratefully acknowledges the management support and guidance received from Barbara Kafka, Country Director, and Karl Jechoutek, Sector Manager. This study was made possible by the financial support of the United Kingdom's Department for International Development (formerly the Overseas Development Agency).

An early draft of this report was discussed with the government of Malawi in March 1998. This final report reflects the comments received.

Special thanks to Matthew Gardner for putting together this report and Marjorie K. Araya for coordinating the production and printing process.

Executive Summary

1. This study reviews Malawi's policies in the biomass, rural electrification, and nonbiomass renewable energy subsectors to identify problems and constraints to progress and to propose policies, initiatives, and institutional structures to overcome those problems and constraints.

The Biomass Subsector

2. Biomass is Malawi's most important energy resource, in 1996 providing 89 percent of all energy consumed. Fuelwood is used to meet most rural energy needs and charcoal is the primary fuel used in urban areas.

3. The woodfuel supply and demand position is satisfactory. Total consumption of woodfuels is about one-third the estimated annual yield from the country's wood resources. There are, however, important regional imbalances. The northern region, for example, has about one-half of the country's wood resources but is home to only about 20 percent of the population.

Deforestation

4. There are some signs of stress on woodland resources in the southern region and around the major towns, but deforestation as a result of woodfuel harvesting is not yet a serious issue.

5. Deforestation due to other reasons is in some areas substantial. In 1996 an estimated 73,000 hectares of natural woodlands was permanently cleared for arable agriculture to meet the needs of a growing population.

6. Where deforestation is occurring it is progressively concentrating woodfuel harvesting on a diminishing resource base. There is a danger that the effect on the resource base could become significant. If this is to be avoided deforestation due to agricultural expansion must be slowed down and eventually reversed. This can only be achieved if the increases in agricultural output that are required to raise food and cash earnings are obtained through higher productivity, rather than through expansion of the area under cultivation.

The Woodfuel Trade

7. The positive aspects of the availability and consumption of woodfuel should be considered in all policy discussions relating to the biomass subsector. In addition to meeting the bulk of household energy needs in rural and urban areas, the commercial woodfuel business is a relatively large provider of rural employment.

8. In 1996 an estimated 70,000 people, most of them self-employed rural people, were fully occupied in the business of woodfuel energy, from the growing of trees to the delivery of the final product. Woodfuel traded in the marketplace represented some 3.5 percent of total gross domestic product (GDP).

Obstacles to Sustainable Fuelwood Production

9. Rural people are allowed to freely remove forest products from nonreserved areas for their own use, but are legally obligated to obtain permission from the Department of Forestry for the removal of products for sale. This obligation is rarely met. The removal of forest products from reserved areas is forbidden but goes largely unchecked. Similarly, the government policy that in the past banned charcoal production in woodland areas was largely ignored. There is today an extensive illegal trade in charcoal.

10. The casual pilferage of fuelwood, illegal charcoal-making, and the destruction of forest resources thus occur on a widespread scale; these activities are largely unchecked and are tacitly accepted. Any large-scale organized harvesting of fuelwood by local people on which a sustainable system of

exploitation might be based would necessarily contravene the existing regulatory system. The system as a consequence can only be seen as a barrier to the rational long-term management of Malawi's woodfuel resources by the local communities that are best placed to carry it out and that would have a strong vested interest in seeing it succeed.

Toward a Sustainable Biomass Policy

11. It is recommended that the government take immediate steps to:
- reform the legislative and regulatory framework to permit and encourage local management of woodlands on a commercially viable and environmentally sustainable basis;
 - facilitate the expansion of private tree planting;
 - institute community-based land use planning and management systems assisted by Department of Forestry extension service staff;
 - develop and implement a system of stumpage fees to encourage the efficient use of woodfuel resources; and
 - provide technical assistance for the woodfuel industry in tree growing, production, and marketing.

Parallel Measures to Increase Agricultural Productivity

12. It must be recognized that any measures that focus directly on the woodfuel issue need to be seen within the wider context of the agricultural system as a whole. The long-term survival and productivity of the country's forest resources ultimately depends on the implementation of a parallel range of policies that intensify and increase the productivity of the agricultural system.

13. Regulations that would reserve critical land areas for water protection and flora and fauna conservation and that provide advice to local authorities need to be drawn up and entrusted to an appropriate land use planning body. In the absence of these wider measures the expansion of agricultural activities into the country's woodland areas will inevitably continue.

The Electricity Subsector

14. The operational performance of the national power utility, ESCOM, is relatively poor: there are frequent supply interruptions and brownouts. The system is almost entirely dependent on the hydropower stations on the Shire River; major capacity problems are foreseen because the water flow in the river appears to be declining.

15. Only about 25 percent of urban households and about 1 percent of rural households have electricity supply, and the rate of expansion of the system is declining: the delay in connecting new consumers increased more than tenfold from 1990/91 to 1995/96, from 14 days to 150 days. Rural electrification is almost at a standstill.

16. ESCOM is nominally an autonomous parastatal organization, but in reality all decisions on tariff setting, investments, and borrowing are made by the government. Electricity is being sold at about 40 percent of its long-run marginal cost, and as a result ESCOM is unable to recover its costs, earn a profit, or meet its loan covenants with lending institutions. This has contributed to poor technical and commercial performance and low employee productivity and morale.

17. The heavily subsidized price of electricity—to the degree that electricity is the cheapest cooking fuel in the country—has exacerbated these problems by encouraging an explosion of demand among those that have an electricity connection. The government's justification for subsidizing electricity is

to make it affordable to the poor for lighting, but as the great majority of the poor do not have electricity supply the greater part of the benefits from the subsidy go to middle- and upper-income consumers.

18. The poor performance of ESCOM has ripple effects that are felt throughout the economy. Forced outages and rolling brownouts are harming industrial output and are forcing large electricity users to invest in diesel generator sets, thus depressing economic activity and increasing the dependence on imports.

Need for Reform or Restructuring of ESCOM

19. A range of measures is required if ESCOM is to be reformed or restructured such that it can play the part required of it in Malawi's economy. Annex I of this report provides a detailed discussion of four different restructuring options for the power subsector and a possible implementation schedule. The exact choice of structure and the modalities of its implementation are matters for government decision. What is not in any serious doubt, however, is that major reform is urgently needed.

Rural Electrification

20. The government has expressed its intention to promote rural electrification, and a new framework of institutional arrangement has been drawn up under which responsibility for rural electrification has been given to the Ministry of Energy and Mining (MOEM). There is, however, no practical policy on rural electrification. The existing regulations are unclear with regard to whether ESCOM or the MOEM is ultimately responsible for rural electrification.

Prerequisites for Successful Rural Electrification

21. Successful rural electrification programs in the developing and newly industrializing world are providing an accumulating and compelling body of evidence on the prerequisites for such programs. These prerequisites include the following:

- an effective institutional structure for the implementing agency;
- autonomy in decision-making, freedom from outside interference, and clearly defined criteria for the choice of areas to be electrified;
- a realistic charging policy that permits the rural electrification service to be run on a sustainable basis;
- low entry barriers that allow the largest possible number of consumers to obtain electricity supply;
- prioritization of areas for electrification in accordance with their existing level of infrastructural provision, development, and economic activity;
- involvement of the local community in planning and implementation; and
- minimization of capital and operating costs.

22. The fact that these criteria have not been applied in Malawi explains why rural electrification has made so little headway. Specifically, the adherence to a one-dimensional model has been a major obstacle to rural electrification. There is one developer (the state), one technical solution (grid extension), one operator (ESCOM), and one uniform and low tariff nationwide. The government has a critical leadership role to play in articulating a rural electrification policy and implementation mechanisms, but it should not be the sole developer of the system. The opening up of the power sector furthermore should be accompanied by the involvement of local communities as well as private sector operators in decentralized rural grids as an alternative (not a substitute) to grid-based rural electrification.

23. The main focus of government policy should be the exploration and support of effective and economic ways of increasing service provision to the urban poor and to low-density rural areas.

These ways include the following: (a) applying technical means of reducing distribution, connection, wiring costs, and so on; (b) providing innovative microfinancing, leasing, and other means of reducing initial costs; (c) designing cost-reflective tariffs; (d) encouraging a diversity of investors and investments, such as private, cooperative, and joint private/public off-grid and microgrid systems; (e) emphasizing local participation and institutional development; (f) promoting a wide variety of energy choices, such as by supporting solar and other renewable energy technologies and back-up services, as increasingly important and cost-effective options for supplying electricity in rural areas; and (g) limiting the role of government to addressing market failures, ensuring the creation of a level playing field, and providing financial and technical assistance.

Developing a Comprehensive Policy for the Electricity Subsector

24. Investment in rural electrification initially must concentrate on those areas in which investments in agricultural development, roads, health services, education, and other infrastructural requirements have already been made or are planned for the immediate future.

25. Rural electrification rightly is a long-term objective of the government. The most critical function of the government at this point is to create enabling legal and regulatory frameworks for the development and operation on a commercial basis of grid-based and off-grid networks by ESCOM and private sector entities.

26. The government must create legal and regulatory frameworks for rural electrification and must define the role of community organizations and private sector entities in these projects. The government should see itself as a facilitator of rural electrification rather than as an implementing agency.

27. Issues that need to be addressed relating to the government's role as a facilitator include the following:

- the restructuring of ESCOM to deal with the crisis in the generation and distribution of electricity (and thereby the creation of a basis for rural electrification);
- the revision of connection charges, especially capital contribution charges, such that ESCOM's investments in distribution are incorporated in its database;
- the development of safety standards for low-cost technologies for rural electrification distribution networks;
- the encouragement of entrepreneurs to enter the electrical service contracting business; and
- the provision of incentives to encourage existing medium-voltage and low-voltage (MV&LV) customers (such as maize mill owners) to become electricity retailers.

Nonbiomass Renewable Energy Technologies

28. The promotion of nonbiomass renewable energy technologies, the most promising of which is solar energy, is at an early stage in Malawi. There is evidence to suggest that some of these technologies could provide the least-cost option in meeting certain rural energy demands. There may be potential for the establishment of self-sustaining markets in these technologies.

29. Experience from around the world suggests that the most successful renewable energy dissemination programs generally meet four criteria. These are that the project under implementation is or has a realistic prospect of becoming

- economically justifiable;
- financially viable;
- institutionally sustainable; and

- locally replicable.

30. The Government of Malawi released in August 1997 the final draft of its report *National Sustainable and Renewable Energy Programme*. This report includes an initial identification of the conditions required to create an enabling environment in which the private sector might be encouraged to provide renewable energy equipment and services.

31. This enabling environment ideally would abolish, or at least reduce, the existing high barriers to the entry of companies into the business of providing nonbiomass renewable energy equipment and services. These barriers include duties and surtaxes that add significantly to the cost and selling prices of equipment for the private market; the absence of end-user financing that can be tapped for renewable energy applications in rural areas; and the widespread lack of knowledge of the potential options for renewable energy-based equipment and services.

32. If the potential for renewable energy technologies in Malawi is to be realized, significant changes will be required to the institutional structure of existing policies. Among the policy options that should be considered are the following:

- *Freedom to set fees.* Private companies providing energy services should be allowed to operate on a fee-for-service basis, independent of the national electricity tariff.
- *Active support of international joint ventures.* The government should encourage joint ventures between local companies and international firms in rural energy provision.
- *Establishment of standards for rural energy service enterprises and equipment.* The government, working with industry, should establish standards of service for rural energy service enterprises and standards for the associated equipment, components, and systems. This would prevent companies that lack adequate technical or financial resources from undercutting the market with inferior goods and services.
- *Mandatory performance reviews.* Performance reviews and assessments of rural energy enterprises by independent organizations should be mandated. Through such reviews standards can be revised and best practices identified and disseminated.
- *Incorporation of renewable energy systems into rural programs.* The government should commit itself to overseeing the incorporation of renewable energy into rural development projects in potable water, health services, and education. It should seek to identify cases in which renewable energy provides a technically adequate and least-cost solution, and should make all such opportunities fully known to the private sector.
- *Removal of import duties, tariffs, and surcharges.* The government should release off-grid energy components and systems from import duties and taxes.

Summary Recommendations

33. The main recommendations of this report to the Government of Malawi are as follows:
- Reform the present legislative and regulatory framework to permit and encourage local management of woodlands on a commercially viable and environmentally sustainable basis. In particular,
 - Devolve the exclusive authority and responsibility for the exploitation and management of forest cover other than that pertaining to the gazetted forests (that is, forests that are assigned or marked out by the government) to the local rural population, based on mutually agreed management plans.
 - Provide real incentives (including penalties, where applicable) for private sector tree planting, in particular on the tobacco estates.
 - Apply a stumpage fee system to achieve environmental (sustainable management) and energy policy (efficient conversion and end use) objectives.
 - Create a regulatory and institutional framework within which private sector initiatives and large-scale rural electrification can proceed in a financially viable manner. In particular,
 - Establish a mechanism for the provision of technical assistance, promotion, and support in cases where off-grid rural electrification is to be executed by the private sector.
 - Create a mechanism for the cofinancing of rural electrification by which funds are channeled to the beneficiaries through local, private sector banks.
 - Create an enabling environment within which the development and dissemination of nonbiomass renewable energy sources can be accelerated. In particular,
 - Provide fiscal relief (for example, remove import tariffs, and provide preferential VAT treatment on renewable energy technology systems and their components) and other incentives for the use of renewable energy sources.
 - Where cost-effective, promote the use of renewable energy in rural electrification projects, and specifically in government-sponsored rural social investments in, for example, health and education.

1

The Country Setting

Geography and Population

1.1 Malawi is a long, narrow, landlocked country in southern Africa. It is surrounded by Tanzania to the north, Zambia to the northwest, and Mozambique to the east and southwest. Lake Malawi forms the eastern boundary for more than half its length; water bodies comprise 2.4 million hectares out of a total country area of 11.8 million hectares. The average annual rainfall is about 1,000mm, all of it falling in one rainy season.

1.2 About one-third of the land area is given over to intensive agriculture. This is carried out mainly on small farms with an average size of just more than 1 hectare, but also includes significant areas of large tobacco and tea estates. The next largest land use is extensive agriculture, carried out in wooded or partly wooded areas. Forests and woodlands are the third largest land use, occupying about 26 percent of the land area. Details of the land use breakdown are given in Table 1.1.

Table 1.1. Area by Land Use Type, 1996

(thousands of hectares)		
Land use category	Area	Percentage
Intensive agriculture	3,273	34.8
Extensive agriculture	2,668	28.4
Forest and woodland	2,478	26.4
Grassland	762	8.1
Miscellaneous	218	2.3
Total land area	9,399	100.0
Water	2,423	
Total area	11,822	

Source: Department of Forestry/Satellitbild 1993, adjusted to 1996.

1.3 The population of Malawi is estimated at 10.7 million, of whom 85 percent live in rural areas. The southern region of the country has a population of about 5.4 million and about 30 percent of the forest area. The central region has about 4.2 million people and a slightly lower area of forest, though the forest is more richly stocked. The northern region has the lowest population, about 1.1 million people, but accounts for 50 percent of the forest area.

The Economy

1.4 Until mid-1994, when free multiparty elections ended three decades of authoritarian, single-party rule, Malawi's development strategy was primarily aimed at maintaining macroeconomic stability and

promoting growth through the expansion of estate agriculture, assisted in part through state investment in the supporting infrastructure. Domestic manufacturing and rural and urban development were deemed less important for the achievement of growth, as was the development of the human resource base. The record of economic performance suggests that the strategy, while effective initially, subsequently was less successful.

1.5 In response to the first round of shocks that buffeted the economy in the early 1990s, the government embarked on a program of reforms that was and continues to be implemented in phases with the support of the International Monetary Fund and the World Bank. Under a program that aimed to restore macroeconomic stability, the Malawi kwacha was floated in 1994.

1.6 Malawi is among the world's poorest countries, showing a GDP in 1994 of just US\$170 per capita. Infrastructure is poorly developed and major investments are required in health and education. Life expectancy at birth is 44, and infant mortality per 1,000 live births is 134. Adult illiteracy is 28 percent among men and 58 percent among women.

1.7 Malawi's natural resource base is modest. The soil generally is moderately fertile, there are large areas of natural forests and lakes, and the country is relatively rich in flora and fauna. Malawi is almost totally dependent on agriculture, which provides income and employment for more than 85 percent of the population. Tobacco is the main export crop, accounting for 90 percent of foreign exchange earnings. Maize is the staple food crop.

1.8 The manufacturing base is poorly developed, and most consumer goods are imported. The long distance to the nearest ports in South Africa and Mozambique increases the cost of imports and reduces the competitiveness of exports.

The Government's Development Agenda

1.9 In marked contrast to that of the previous regime, the development agenda of the government elected to office in 1994 takes sustainable reduction in poverty as its point of departure and underscores the need for promoting broad-based growth and targeted interventions for the poorest.

1.10 In support of these objectives, the government has accorded priority to four key areas:

- maintaining macroeconomic stability;
- providing greater access to primary healthcare and educational services;
- creating an enabling environment for private sector investments, and streamlining the investment approval process; and
- building administrative capacity by strengthening the civil service.

1.11 Because Malawi has few resources other than its land and its people, the building blocks for future development necessarily must be agriculture and natural resource utilization. Previous efforts to increase agricultural output have focused on expanding the area of land under cultivation, by reclaiming forest and woodland. Where this strategy continues it is essential that it be kept under review, to ensure that it does not jeopardize the environmental stability of the country or the biomass resource base on which most people depend for their energy needs. In this context, it should be noted that the provision of greater access in both urban and rural areas to reliable modern energy is an important missing element of the government's development agenda.

Energy Resources

Biomass

1.12 Malawi is well endowed with natural forests. These forests supply almost 90 percent of the country's energy needs for all purposes.

Hydropower

1.13 The country's large-scale hydropower projects are concentrated on the Shire River, where 220MW of hydroelectricity capacity is installed. There is little available information on potential microhydro sites.

Coal

1.14 Malawi has four coalfields—three in the north and one in the south—but is mining only the Livingstonia area in the north. Estimated reserves are about 80 million tons, including proven reserves of approximately 20 million tons. The coal is of variable quality, with energy values ranging from 17MJ/kg to 30MJ/kg. The coal being mined at Livingstonia is of the higher quality.

Hydrocarbons

1.15 Malawi has no hydrocarbon resources, and must import all petroleum products. The country's sources include refineries in South Africa and Zambia, with finished products imported through ports in Tanzania, Mozambique, and South Africa. The transportation cost of imported petroleum products to the major market in Blantyre is at least US\$60 per ton for liquid products and US\$100 per ton for liquefied petroleum gas (LPG).

Ethanol

1.16 Ethanol, produced from molasses at the Sugar Corporation of Malawi (SUCOMA) sugar factory, is blended with petrol for the use of the transportation sector. Ethanol production is economically viable primarily because of the high transportation cost of petroleum products. Any future expansion of production will be dependent on the market price of molasses, the demand for motor ethanol, and the capital cost of new facilities.

Nonbiomass Renewable Energy

1.17 The main nonbiomass renewable energy source in Malawi, apart from hydropower, is solar energy. Average daily insolation is about 5kWh per square meter, and significantly is relatively uniform throughout the year.

1.18 Wind energy is less promising. Wind speeds in general are low, but there are local possibilities for windpower generation. Studies are being carried out with assistance from the Danish International Development Agency (DANIDA) to identify potential applications.

The Electricity Subsector

1.19 Electricity is provided by the Electricity Supply Commission of Malawi (ESCOM). ESCOM has a monopoly on electricity sales.

1.20 ESCOM has a relatively extensive transmission system. The main transmission line is a 132kV spine that runs the length of the country and connects all the main towns. Subtransmission lines of 66kV further extend the system: few populated areas in the country are more than 60–80km from an existing 60kV line. The level of electrification is, however, extremely low. Outside the main urban areas only the larger trading centers and some of the smaller towns have electricity supply.

1.21 In 1996 ESCOM had about 62,000 customers across the country's three regions, divided in close proportion to each region's share of the total population (see Table 1.2). ESCOM's registered consumer base comprises about 25 percent of the urban population and about 1 percent of those living in rural areas.

Table 1.2: Access to Electricity by Region

Users	Northern	Central	Southern	Total
Rural	1,070,600	3,668,000	4,571,000	9,309,600
Urban	149,000	512,000	781,000	1,442,000
Total population	1,219,600	4,180,000	5,352,000	10,751,600
ESCOM consumers in 1996	5,808	21,546	34,099	61,453
% of total regional population	0.476	0.515	0.637	0.572
% of urban population in region	3.90	4.21	4.37	4.26

Source: ESCOM Annual Report 1995/96

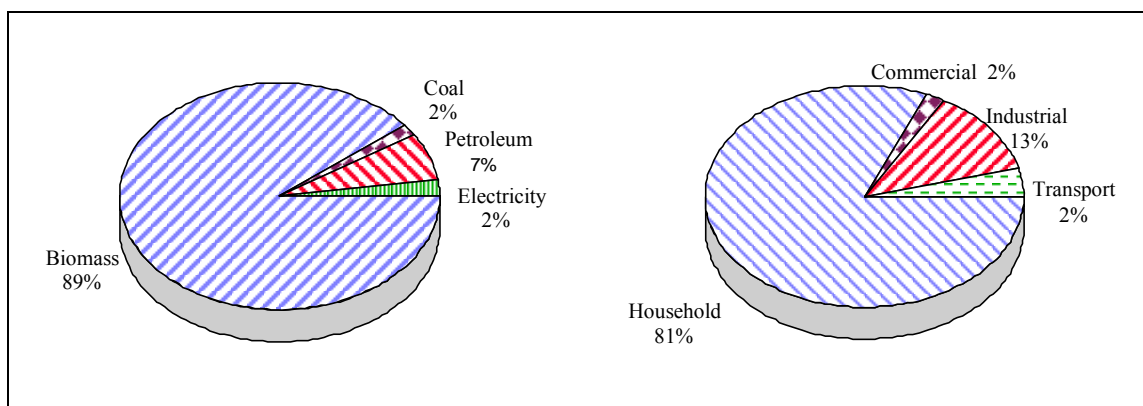
Energy Use Patterns in Malawi

1.22 The household sector is by far the largest energy user in Malawi, accounting for 81 percent of the country's total primary energy consumption. It is followed by the industrial sector at 13 percent, with the transportation and service sectors accounting for 4 percent and 2 percent respectively. Figure 1.1 provides an estimated breakdown of 1996 energy consumption by sector and energy type.

1.23 Biomass, in the form of fuelwood and charcoal, is the dominant domestic fuel in both rural and urban areas, accounting for 89 percent of the country's total energy consumption.

1.24 Electricity use is almost entirely confined to urban areas. Low-income consumers use electricity mainly for lighting, cooling (fans), and other appliances. In higher-income groups it is also widely used for cooking.

Figure 1.1: Malawi Energy Consumption by Source and Sector



1.25 Kerosene is widely used for lighting in urban areas, even by some households that have electricity supply. It is little used in rural areas, where light is provided by candles, flashlights, wood fires, and in rare cases electricity. Only 6 percent of households use kerosene for cooking, and half of these use it only occasionally. Some kerosene additionally is used as a starter fuel to light charcoal fires. Automobile batteries are sometimes used to provide electric power for stereos and other equipment, and for basic lighting. A number of solar energy projects have been implemented, but the overall contribution of solar energy is insignificant at the national level.

1.26 Table 1.3 gives a breakdown of annual household energy consumption by fuel and by income group. It can be seen that all income groups use roughly the same amount of fuelwood. Low-income groups use considerably less kerosene, electricity, and charcoal. The use of electricity for cooking is reflected in the higher consumption figures of the upper-income groups. LPG, which is not shown in the table, is used by a small percentage of high-income people living in low-density urban areas.

Table 1.3. Annual Energy Consumption by Urban Households by Fuel and Income Group

Monthly income	Average	<MK 350	MK 350–500	MK 500–1,000	MK 1,000–2,000	>MK 2,000
Kerosene (liters/HH/year)	30	18.1	27.6	32.4	44.8	23.9
Electricity (kWh/HH/year)	704	74	141	123	655	2,463
Charcoal (kg/HH/year)	393	176	391	398	417	493
Fuelwood (kg/HH/year)	2,115	1,910	2,431	2,031	2,313	1,931

HH = household

Source: Malawi: Urban Household Energy Study, Table 2-12, Arpaillage, 1996.

Comparative Energy Costs to the Consumer

1.27 The comparative costs of cooking by the four widely available cooking fuels are shown in Table 1.4. They have been calculated on the basis of average present retail prices. In each case, the efficiency of the cooking device has been taken into account in order to give the final, or useful, energy price to the consumer. In the case of electricity, ESCOM makes no charge for the first 30kWh consumed; the price for consumption above this level has been used.

Table 1.4. Comparative Cooking Energy Costs

	Energy content (MJ/unit)	Retail price (MK)	Unit (kg)	MK/kg	Price of energy delivered (MK/MJ)	Assumed efficiency	Price of useful energy (MK/MJ)
Fuelwood (2–3 pieces)	16	1.00	1.57	0.82	0.051	15%	0.287
Charcoal	30	10	5.86	1.76	0.058	25%	0.232
			liter	MK/l	MK/J		
Kerosene (liter)	36	7.54	1	7.54	0.206	35%	0.589
				MK/kWh	MK/MJ		
Electricity >30kWh/month, no fixed charge				0.37	0.102	65%	0.157
At long-run marginal cost				1.05	0.291		0.448

Source: J. Arpaillage 1996 (Table 2.10).

1.28 For the consumer, electricity is by a considerable margin the cheapest cooking fuel. When the estimated long-run marginal cost is used, however, the cost of cooking by electricity is much higher than that of cooking by fuelwood or charcoal.

1.29 The ability of consumers to pay for their monthly energy needs is greater than is generally assumed. Approximately 75 percent of Malawi's population is in the low-income bracket, with a total monthly disposable income of about MK 450 (US\$26 equivalent). Within this bracket 17 to 33 percent of income is spent on basic energy needs. A random and nonstatistically valid sampling¹ of rural residents indicated that consumers would be willing to pay on average from MK 150/month to MK 300/month for electrification.

¹ Residents in the following rural communities were interviewed in April 1997: Chididi in Nsanje, Thekerani in Thyolo, Mganga and Mtekete in Makanjila, and Likoma Island. See Annex II.

2

The Biomass Subsector

2.1 Biomass, in the form primarily of woodfuels, is the main energy source in Malawi, and the woodfuel trade consequently is a major source of employment and income. The country is well endowed with wood resources, and the biomass supply position is satisfactory. There are, however, a number of trends that give cause for concern, and measures need to be taken to counteract these before the position deteriorates.

The Present Position

Use of Biomass Fuels

2.2 Woodfuels are the predominant source of energy in the country, accounting for 89 percent of total energy consumption. Of this total, it is estimated that 76 percent is used for cooking, 22 percent for heating water, and 2 percent for space heating.

2.3 In rural areas fuelwood is virtually the sole source of cooking energy, although small amounts of charcoal also are used (often simply collected from the fireplace after the fire has been extinguished). Most fuelwood is collected from farm or forest lands without payment. Crop residues are used as a supplementary fuel in some areas where fuelwood is becoming scarce.

2.4 In urban areas both fuelwood and charcoal are widely used. Charcoal is more convenient than wood but its higher cost means that it is mainly used by middle- and upper-income households. Consumption patterns differ between towns. Charcoal use is well established in the older towns of Blantyre and Limbe, but is not common in smaller towns. Usage in Lilongwe, a large but relatively new town, falls somewhere between the two.

2.5 Most fuelwood is burned in inefficient, traditional three-stone cooking fires. There has been little adoption of improved stoves, especially in the rural areas. Fuelwood is also used for tobacco curing and brick making; there has been some improvement in the efficiency of fuelwood use in these applications, particularly in tobacco curing, but significant additional gains are possible.

2.6 Sugarcane waste (*bagasse*) is used in the country's two sugar factories to produce heat and steam. About 10 percent of the steam is used to generate electricity for the factory and for households on the sugar estates.

2.7 The total consumption of biomass fuels, poles, and sawnwood in 1996 was about 10.7 million cubic meters (see

2.8 Table 2.1). Fuelwood accounts for almost 80 percent of the total biomass fuel consumption for all purposes, charcoal for 8.8 percent, and crop residues for 11.2 percent. The table also breaks down consumption by urban and rural areas, indicating that rural areas account for about 83 percent of total biomass consumption.

Table 2.1. Estimated Consumption of Wood Products and Crop Residues for Energy, 1996

(thousands of cubic meters roundwood equivalent)			
Population and forestry products	Rural	Urban	Country
Population ('000s)	9,309.7	1,442.6	10,752.3
Woodfuel	7,536	1,028	8,564
Charcoal wood	102	844	946
Fuelwood	7,638	1,872	9,510
Poles	795	45	840
Sawnwood	150	90	240
Total roundwood	8,583	2,007	10,590
Crop residues for fuel	1,209	8	1,217
Total (wood equivalent)	9,792	2,015	11,807
Total for energy use	8,847	1,880	10,727

Access to Woodfuel Resources

2.9 There are three major land tenure systems in Malawi: private, reserved, and customary or trust land. Private land is held mainly by the estate sector and includes agricultural land and woodlots. Reserved, or public, land is owned by the government and consists mainly of forests, plantations, and national parks. Customary land, which accounts for about 70 percent of the total land area, is administered by traditional authorities and is divided among about 1.6 million smallholder farming families.

2.10 The use of forest products harvested from customary land traditionally was based on an open access regime. Rural people could and still can freely remove forest products for their own use, but they are legally obliged to obtain permission for the removal of products for sale. Previously this was seldom done, but the Forest Policy of January 1996 made provision for the management of customary land by local people. This provision was included in the Forest Act of 1997 that was passed by parliament and became effective on December 22, 1997.

2.11 Part V of the Forest Act deals specifically with customary land forest, promoting participatory forest management and the demarcation and management of village forest areas. It also vests in the village the ownership of indigenous trees and provides for the establishment of nurseries and the regulation of forest produce. Village natural resource management committees (VNRMCs) are being mobilized and could eventually extend to the more than 15,000 villages throughout Malawi. Each VNRMC will enter a management agreement with a management authority that will enable the village to exploit and benefit from the forest according to the specified management plan.

2.12 Commercial woodfuel producers wishing to exploit a woodland area on customary land previously would negotiate with the local elders, but under the new act must make their agreement with the VNRMC. Producers or traders that deal in wood products harvested from private land continue to negotiate terms directly with the owner.

2.13 Reserved lands include both natural forests and plantations. Most plantations are owned by the state, through the Department of Forestry, but there exist also some village woodlots and municipal and small private plantations. Management plans are prepared for all reserved forest areas. Clear felling of trees is prohibited in most natural forests, and especially in watersheds and other fragile areas, but selective felling is

allowed in most areas. The collection of dead wood and other forest products is permitted provided permission is first obtained.

2.14 All plantations are exploited according to the agreed management plans (the plans can be amended to meet changing conditions and to take advantage of research findings). Illegal exploitation has occurred in reserved forest areas in the past, but this may diminish under the new Forest Act, which enables the Director of Forestry to sign agreements permitting local communities to implement the management plans for these forest areas. The hope is that by giving local people a vested interest in their reserved forest the illegal removal of wood and other forest products will be significantly curtailed.

2.15 Table 2.2 gives an estimated breakdown of the sources of the fuelwood and charcoal supplied to Malawi's four main towns in 1996. Eighty percent of the woodfuel comes from nongovernment lands. It is also noticeable that 39 percent of the trees are planted by man, 15 percent in formal plantations and the remainder on farmlands, roadsides, and other areas.

Table 2.2. Sources of Fuelwood Supply to the Four Main Towns in 1996

Source	(percent)		
	Fuelwood	Charcoal wood	Woodfuel
Woodland	44	51	47
Plantation	19	10	15
Open areas	37	39	38
Government land	25	14	20
Nongovernment land	75	86	80
Natural trees	58	64	61
Planted trees	42	36	39
Live wood	51	66	58
Dead wood	49	34	42

Note: The above percentages are based on qualitative, not quantitative, analysis.

Source: K. Openshaw 1997 (Consolidated Report).

Woodfuel Taxes and Prices

2.16 *Woodfuel resource payment and taxes.* Rural people do not pay for wood that they collect from customary land (provided that it is collected purely for their own use). Commercial woodfuel producers that wanted to exploit trees on customary land previously would enter into an agreement with the local chiefs. Under the 1997 Forest Act they must negotiate with the VNRMC. The VNRMC management plan provides guidelines for the amount to be charged for different species and size of trees. Wood from state forest areas is subject to fixed stumpage fees (resource payments), assessed according to species, end use, and diameter class. (This paper proposes that these fees not be fixed, but that they be adjusted to take account of the location in relation to the demand center. Ultimately, it is proposed that tree parcels be sold by auction.)

2.17 It was previously thought that many woodfuel producers evaded paying for the raw wood. However, a recent study of woodfuel production, transport, and trade found that, for wood from all kinds of land, the woodfuel producers on average paid about 10 percent of their selling price to purchase the wood. Local authorities additionally imposed some taxes, mainly as market fees. (Note that a stumpage fee, or a payment for wood to a chief, village, or private individual, is not a tax but rather is a resource payment.)

2.18 In government forest areas wood is sold at a fixed price according to end use and species. These charges are frequently evaded because the Department of Forestry is unable to police all of the national forest areas under its jurisdiction.

2.19 Woodfuel prices vary from location to location largely as a function of distance to market, but other factors can also influence the price. Wood intended for charcoal-making, for example, is sometimes sold at a lower unit price than is wood for resale as fuelwood. This may be due to the purchase in bulk of charcoal wood or because the market for fuelwood is saturated. Wood may also be sold at a discount if the woodcutter is clearing land for agricultural expansion. Government plantation-grown fuelwood additionally is sometimes sold below cost.

Woodfuel Trade

2.20 The commercial woodfuel business is a relatively large generator of rural employment. In 1996 the felling, transport, and trading of fuelwood gave full-time employment to an estimated 63,400 people, about 80 percent of whom live in rural areas. A further 6,100 people were engaged in the growing and tending of trees to supply this fuelwood. Most of these nearly 70,000 people occupied in the business of woodfuel energy are self-employed rural dwellers.

2.21 The total value of traded woodfuel in the market place is estimated to be MK 753 million (US\$49.2 million). The estimated GDP for Malawi in 1996 was US\$1,400 million; traded woodfuel thus represents some 3.5 percent of this total. This underestimates the full economic importance of woodfuel, however, as without it the country would be forced to increase its imports of kerosene as a cooking fuel.

Balance of Supply and Demand

2.22 The supply and demand balance of woodfuel in Malawi is much more favorable than in many African countries. The total growing stock is estimated to be about 500 million cubic meters (see Table 2.3).

Table 2.3. Growing Wood Stock by Region

(million cubic meters above ground)					
Land use	Region			Total (and as % of overall stock)	Change 1990-96 (%)
	Northern	Central	Southern		
Forest, woodland, plantation	147.8	85.0	56.7	289.5 (58)	-13.2
Extensive agriculture in forests	83.5	23.5	27.6	134.6 (27)	-12.2
Intensive agriculture	3.0	42.7	26.6	72.3 (14)	9.7
Grassland	1.9	1.5	1.3	4.7 (1)	-0.4
Miscellaneous	0.0	0.1	0.1	0.2 (0)	0.0
Total	236.2	152.8	112.3	501.3	-16.1
(%)	(47)	(30)	(23)	(100)	

2.23 The annual yield from the different wood stock sources is estimated to be about 30 million cubic meters per year, comfortably exceeding the total consumption figure of about 10 million cubic meters per year. This comparison at the national level is not particularly meaningful, however, since the key question is household access to woodfuel resources. The southern region, for example, has about 40 percent of Malawi's population and 20 percent of the growing stock; in contrast, the northern region has about 20 percent of the population and almost 50 percent of the growing stock.

Deforestation

2.24 There are signs that woodland resources in the southern region and around the major towns are under stress, but deforestation as a result of woodfuel harvesting is not yet a serious issue.

2.25 Deforestation for other reasons, however, is becoming significant in some parts of the country. In 1996 an estimated 73,000 hectares of natural woodlands was permanently cleared for arable agriculture, to serve the country's rapidly growing population.

2.26 This is a finding of major importance, as it indicates that even if all woodfuel consumption were to cease deforestation would still continue. Despite the favorable supply and demand balance, a continuation of the present trend of deforestation would tend to concentrate woodfuel harvesting on a diminishing resource base on which the effects would rapidly become significant. If this situation is to be avoided, deforestation as a result of agricultural expansion will need be slowed down and eventually reversed.

Institutional and Policy Framework

2.27 The Ministry of Forestry, Fisheries, and Environmental Affairs (MOFFEA) has primary responsibility for wood and charcoal energy planning. Within the MOFFEA, the Department of Forestry has overall responsibility for forestry development, protection, and conservation, as well as for wood pricing policy. Because many trees grow on farmland and many woodlands are on nonreserved trust or community lands, however, the government's policy influence is not all-embracing.

2.28 The Department of Forestry has four operating divisions, including the Forest Extension Division. The Wood Energy Unit, now with the Department of Energy, previously was a fifth division. There is some debate as to where the Energy Studies Unit should be located. Logically it should be transferred back to the Department of Forestry, and specifically to the Forest Extension Division. Through its extension and nursery programs the Department of Forestry has been successful in distributing millions of tree seedlings over the past 20 years. The results are everywhere to be seen, with many trees thriving outside the forest, especially on farms. The Wood Energy Division, in contrast, focuses on the use of wood as a household fuel and as an energy resource for the tobacco and other rural industries.

2.29 Past government policy in the fuelwood area was based on the perception that Malawi was facing an impending fuelwood crisis. As a result, fuelwood production was banned in woodland areas and restrictions were placed on the use of fuelwood for brick production. These regulations were ineffective and charcoal production continued—the overall effect, in fact, was counterproductive because the Department of Forestry had no control over where charcoal was made and because it could not charge stumpage fees from forest reserves, nor could it advise or train charcoal producers in woodland management and charcoal production.

2.30 Until the new Forest Act becomes operational, casual pilfering and illegal charcoal-making will continue. (As the VNRMCS exert their authority these illegal activities should diminish, with wood resources gradually becoming legally exploited according to the prescriptions laid down in the management plans.) Illegal activities have been blamed for deforestation, but most deforestation in practice has occurred as a result of woodland clearance for crop production. In several instances this clearance has been undertaken on behalf of the farmers by fuelwood and charcoal producers, who have received the wood free of charge for the service rendered. Unless a concerted effort is made to increase agricultural productivity, such clearances will continue even when the woodland management plans are in place. Raising agricultural productivity as a result must be made a priority if deforestation is to be reduced and eventually eliminated.

Initiatives for Sustainable Biomass Resource Management

2.31 The Government of Malawi introduced a new National Forestry Policy in September 1996 that was intended to “sustain the contribution of national forest resources and to improve and uplift the quality of life in Malawi by conserving the resources for the benefit of the nation.”

2.32 The general objectives of this new policy include the following:

- give all citizens regulated and monitored access to some forest products;
- contribute toward the quality of life in rural communities and provide a stable local economy, to reduce the degenerative impact on the environment; and
- establish appropriate incentives to promote community-based conservation and the sustainable utilization of forest resources as a means of alleviating poverty.

2.33 The implementation of these measures has faltered because of a lack of budgetary resources.

Biomass Energy Resources Policy Agenda

2.34 The present supply and demand position in the biomass fuels subsector is relatively satisfactory. It is, however, evolving rapidly, and there are certain trends that give cause for concern. To avert the emergence of major problems, the future policy agenda in the biomass subsector should seek to:

- encourage productivity improvements in agriculture;
- institute community-based land use planning and management systems (assisted by Department of Forestry extension service staff);
- protect the watersheds of the river and lake systems;
- develop and implement an economically efficient fee system for woodfuel resources; and
- provide technical assistance for the woodfuel industry.

Productivity Improvements in Agriculture

2.35 Government policy needs to address the effects of agricultural expansion; specifically, it needs to find ways to slow down this expansion. Efforts to reduce population growth could be helpful, but the most important way forward is to raise farm productivity, for example through the use of new seed types and fertilizers.

2.36 Increasing agriculture productivity must therefore be a major thrust of government policy, not only to improve and diversify farm yields but also to ensure a sustainable supply of wood products and to protect the environment (including the flora and fauna).

2.37 This will require that the issue of land tenure discrimination against smallholder agriculture be addressed, and that the preferential support that has been given to estates and that has resulted in the highly uneven distribution of land, wealth, and opportunities be withdrawn. (From the late 1970s through the early 1990s estate agriculture expanded rapidly while smallholder agriculture stagnated. Despite above-average growth rates in Malawian agriculture as a whole, the country’s rural economy has remained underdeveloped.)

2.38 Parastatal operations and restrictive legislation in Malawi have crowded out private trade, while credit and input subsidies and official commodity prices have insulated farmers from international prices. This has engendered a dependence on government support, especially among smallholder farmers, that must be addressed. Market mechanisms also are needed to protect farmers against the vagaries of weather-related risks.

2.39 The lack of crop diversity also needs to be addressed. Smallholder farmers typically rely on a single food crop, maize, and estate holders on tobacco and burley (a tobacco varietal). This narrow agricultural base has rendered the country highly vulnerable to the vagaries of climate and to international price shocks.

Community-Based Land Use Planning and Management Systems

2.40 About 80 percent of the demand for charcoal and of the urban demand for fuelwood is served by nongovernment lands. There has in the past been little organized management of customary land. Under the 1997 Forestry Act, however, the management of each woodland area will be ascribed to a village and undertaken by the villagers themselves. Assistance in the formulation of the management plan will be provided to the villagers. The Forest Extension Division will also help farmers manage trees on their land and will provide suitable tree seedlings. Other advice and inputs will include guidance and assistance in the improvement of irrigation facilities and the extended use of natural (such as nitrogen-fixing trees) and artificial fertilizers. The application of this participatory approach to woodland and tree management in urban fuelwood catchment areas is expected to help reduce woodland degradation and improve the livelihood of the rural population.

2.41 The successful management of the new village-run forest areas will require at least initially that the government and donor agencies provide various essential inputs. The VNRMC, for example, will need assistance in drawing up a land use map and plan. Inventories of tree resources also should be completed to assist in the formulation of the management plan and to guide the pricing at which and the extent to which wood and other forest resources can be offered to fuelwood producers. Working from these plans the VNRMC can ensure that the thinning or felling of trees is undertaken in a timely fashion.

Watershed Protection

2.42 Watershed protection is vital to ensure that Malawi's hydroelectric system can operate at or near its rated capacity, even in the dry season. The watershed areas in forests and grasslands should be reserved and any activities that are harmful to the waterflow, particularly arable farming, should be stopped. Farmers should be compensated and paid to restore and manage these areas, with the funds coming from the general electricity tariff. Such protection would ensure a much more even and clear flow of water into and out of Lake Malawi. This in turn would help ensure a more even generation of electricity.

Market Pricing of Wood

2.43 About 20 percent of urban woodfuel comes from government forests and plantations. At present there is a fixed stumpage fee for different classes of wood, irrespective of distance from the market or of the demand for different categories of wood.² The government needs to address the pricing of wood on two fronts. All price adjustments (increases) for wood from government forests must as things stand be approved by a minister and gazetted before going into effect. This takes a minimum of three months, and usually much longer. Price adjustments furthermore are subject to political pressure. This procedure needs to be changed so that prices can be adjusted much more rapidly, to at least keep in line with inflation. Second, the government needs to establish a graded stumpage price that takes into consideration all costs and the demand for the product. This graded price system should be used to inform the private sector and local communities about the prices that may be expected for wood at various locations and about the market for different products. Ultimately, the aim should be to sell wood by auction.

² While wood from the Blantyre fuelwood plantations, for example, is in high demand, wood from the Mulanje plantations, 100km from the Blantyre demand center, is as a consequence difficult to sell.

Technical Assistance for the Woodfuel Industry

2.44 Most woodfuel trade is conducted informally. In the interests of environmental sustainability, technical assistance should be given that addresses all aspects of production, including marketing. By providing technical assistance the government would both support closer cooperation between producers and growers and would enable better management overall of Malawi's wood resource.

Measures To Be Taken by the Government

2.45 The work of the VNRMCs in managing the local woodlands vested to them initially must be supported by the government, and in particular the Forest Department. Based on the principles of community involvement in forestry resource management outlined above, the government should:

- reform the legislative and regulatory framework to permit and encourage local management of woodlands on a commercially viable and environmentally sustainable basis;
- transfer the responsibility for the forest directly to the rural communities that will set up the VNRMCs;
- have the VNRMCs enter into a long-term franchise agreement with the Department of Forestry and take on responsibility for forest management, including the seeding, maintenance, and harvesting of the trees; and
- have the VNRMCs develop forest management plans with assistance from the Department of Forestry.

2.46 The producers of wood harvested from these managed areas should be free to sell at the market clearing price.

Institutional Changes

2.47 To assist the VNRMCs, the Forest Extension Division will have to be strengthened. It would facilitate matters if the Energy Study Unit were to be transferred back to this division within the Forestry Department. There are more than 15,000 villages within Malawi; assigning woodland areas to all these villages and drawing up management plans for them is an enormous undertaking. The government, and in particular the forest service, will need donor and other assistance in this task.

2.48 The Ministry of Energy and Mining (MOEM) must continue to undertake periodic supply and demand studies to monitor the consumption of all energy, particularly biomass energy. The Department of Forestry must undertake inventory of trees on all land types and must monitor land use changes. Without this information the growing stock and annual yield of wood cannot be managed to match demand.

2.49 The Department of Forestry has the management capacity to institute the proposed activities, but its rural extension service needs to be expanded and strengthened. The government should also consider other options for the provision of rural extension services, including:

- Instituting an agriculture and forestry extension service in an academic institution such as the University of Malawi. The provision of extension services to rural communities would be a requirement for completing a diploma.
- Encouraging nongovernmental organizations (NGOs) engaged in forestry management to provide extension services to rural communities.

2.50 In both cases, the Department of Forestry would continue to have an oversight responsibility without having to expand its own service.

Improved Extension Services

2.51 If community-based and on-farm tree resource management is to be successful, the most important component will be the ability of extension workers to work effectively and cooperatively with rural communities. The Department of Forestry has a crucial role to play in:

- creating a unified rural extension service able to deliver a consistent message concerning farming (both arable and pastoral), forestry, agroforestry, and conservation;
- providing, or arranging through academic institutions and NGOs the provision of, technical and managerial training in growing, producing, and marketing wood;
- establishing a proactive land use planning body that advises local authorities about land use changes and that has the power to reserve land for the protection of watersheds and the conservation of flora and fauna; and
- removing restrictions on the manufacture of products such as charcoal and on the cutting of trees on unreserved land.

3

Rural Electrification

3.1 The power sector in Malawi is in a state of acute crisis. This has major implications for the wider economy of the country, and the reform and restructuring of the national power utility, the Electricity Supply Commission of Malawi (ESCOM), is an urgent priority. The overall problems of the power sector are reflected in the country's rural electrification program. Little headway has been made in electrifying rural areas, and new connections are virtually at a standstill. This chapter discusses the constraints to further progress in rural electrification and outlines a long-term strategy for overcoming them.

The Electricity Subsector

Institutional Arrangements

3.2 ESCOM was created as a vertically integrated electric utility under the former Federation of Rhodesia and Nyasaland in 1956. The Electricity Act of 1963 subsequently invested ESCOM with responsibility for licensing, system planning, and system expansion. The commission is organized as a parastatal institution and is the sole supplier of electricity to the public.

3.3 The corporate headquarters of ESCOM are located in Blantyre. The regional headquarters for the southern, central, and northern regions are in Blantyre, Lilongwe, and Mzuzu. The regional offices primarily are responsible for electricity distribution, including the connection of new customers, substation and low-voltage-line maintenance, and bill collection. They also are responsible for preliminary electrification planning studies, submitting annual budgets to corporate headquarters that assess the viability and priority of the proposed projects.

3.4 The statutory provisions under which ESCOM was established in principle give the commission substantial autonomy from the government. ESCOM also is statutorily obliged to operate in a financially disciplined manner and on a sound commercial footing. In reality, however, government intervention has prevented the commission from operating as an autonomous and efficient organization, and all decisions on tariff setting, investments, and borrowings are controlled by the government.

Generating Capacity

3.5 ESCOM depends heavily for its power supplies on a series of cascading hydro plants on the Shire River. These have a total rated output of 220MW and account for about 90 percent of ESCOM's generating capacity. The remainder of its electricity output comes from a number of small thermal stations. The generation capacity of the Shire River is afflicted by silting that is attributed to deforestation and soil erosion. ESCOM has incurred considerable expense in silt removal.

3.6 Of greater concern than silting is the fact that the water level in Lake Malawi has been falling. This is not unprecedented: low lake levels left the Shire completely dry between 1915 and 1935. The indications are that the water flow at the power station intakes may fall to about 100 cubic meters per second, with a resulting fall of 50 percent in electricity generation. This would translate to a reduction in capacity of about 100MW.

3.7 Fearing a repeat of last year's power shortages ESCOM has begun a procurement process to lease, with an option to purchase, two 10MW diesel gas-turbine generating sets. This will provide some of the required extra capacity if water levels continue to fall but is far less than required to meet the projected capacity shortage of 100MW.

3.8 To strengthen its supply position, Malawi has joined forces with other electric utilities from the Southern Africa Development Community (SADC) to establish the Southern Africa Power Pool (SAPP). Plans are underway to interconnect Malawi's grid system to those of Mozambique and Zambia.

Electricity Tariffs

3.9 Malawi's tariff-setting mechanisms are not cost-reflective. Electricity is priced well below its true economic value, with the result that it is being overused, especially by upper- and middle-income consumers.

3.10 In September 1977 ESCOM increased its tariffs by 5 percent for domestic consumers, 25 percent for commercial consumers, 45 percent for industrial consumers, and 50 percent for export sales. These increases raised the average tariff to about US\$0.029/kWh, a figure that is less than 40 percent of the estimated long-run marginal cost of electricity, of around US\$0.075/kWh. In October 1997 the government furthermore announced that there would be no charge for the first 30kWh/month of residential consumption. ESCOM estimates that this will cost US\$18 million per year in lost revenues.

3.11 The government's contention that the tariff system is helping the poor is contradicted by evidence that suggests that it is middle- and upper-income consumers that are benefiting the most. Upper-income households receive a subsidy of about US\$375 per year, compared to about US\$65 per year that is received by poorer customers. Those Malawians that have no electricity supply—predominantly the poor—obviously receive no benefit at all from the subsidy. In other words, the well off, who are in a position to pay the full cost for electricity, are the main beneficiaries of a policy designed to help the poor.

ESCOM Coverage

3.12 ESCOM has an extensive transmission network. Despite Malawi's relatively high density of medium- and low-voltage transmission lines, however, connection rates are low.

3.13 ESCOM's consumer base in 1996 was about 62,000, with a geographic distribution of 55 percent in the southern region, 35 percent in the central region, and 10 percent in the northern regions (see Table 3.1). This customer distribution closely matched the overall population distribution. About 25 percent of the urban population and 1 percent of the rural population were connected to the grid.

Table 3.1: Access to Electricity by Region

Consumer class	Northern	Central	Southern	Total
Rural	1,070,600	3,668,000	4,571,000	9,309,600
Urban	149,000	512,000	781,000	1,442,000
Total population	1,219,600	4,180,000	5,352,000	10,751,600
ESCOM consumers in 1996	5,808	21,546	34,099	61,453

Source: ESCOM Annual Report 1995/96.

3.14 ESCOM's efforts to expand its coverage generally are focused on the high-density urban and periurban areas, where the highest returns are expected. Any network expansion, however, deepens ESCOM's financial problems, since the tariff regime ensures that increased sales bring increased losses. The rate of connections in any event is slowing: in 1990/91 the average time taken to connect a new customer was 14 days; in 1995/96 the connection delay had reached 150 days.

ESCOM Operational Performance

3.15 The operational performance of ESCOM is poor, characterized by frequent supply interruptions and brownouts. These are largely the result of inadequate operation and maintenance practices, but they also are a consequence of ESCOM's dependence on the Shire River hydro plants for the bulk of its supplies.

3.16 Table 3.2 gives comparative indicators for 10 African electricity utilities. In ESCOM's case, peak demand, customers, and sales per kilometer of high-voltage (HV) line are low, reflecting Malawi's low levels of electrification and its comparatively extensive HV grid. Transmission and distribution (T&D) losses, at 28 percent are extremely high.

Table 3.2: Comparative Indicators of Selected Electric Utilities in Sub-Saharan Africa

Country	Peak demand per km of HV line	Customers per km of HV line	Sales per km of HV line (MWh)	T&D losses (percent)
South Africa	990	790	5980	8
Zambia	600	50	3200	9
Zimbabwe	300	80	1800	14
Kenya	240	120	1200	18
Uganda	200	130	800	38
Malawi	180	70	900	28
Mali	175	180	750	24
Tanzania	150	85	600	20
Mozambique	150	90	500	55
Mauritius	45	50	200	12

3.17 ESCOM is also afflicted by administrative weaknesses. Receivables tend to be about 80 days of sales, undermining the liquidity and general financial condition of the company.

Ripple Effects in the Malawi Economy

3.18 ESCOM's poor performance has a ripple effect on the general economy of Malawi. The company's lack of autonomy and accountability, together with deep subsidies and government tariff control, have led to poor commercial operation, eroding both revenues and profits. Lack of working capital has resulted in the deterioration of assets and inferior maintenance has led to forced outages and rolling brownouts; these have harmed industrial output, leading to a decline in the production of consumer goods and

an increase in imports. The increased importation of consumer goods and the obligation that manufacturers have faced to invest in diesel generators have resulted in turn in a drain on foreign exchange reserves, in low employee productivity and morale, and in a threat to worker security and safety.

Power Sector Reform Initiatives

3.19 Recognizing the problems facing the power sector and their effects on the wider economy, in 1994 the government established a task force to develop a power sector reform strategy. Additional impetus for the establishment of this task force was provided by the need for greater regional cooperation within SAPP and for greater responsiveness to the nascent private sector interest in power generation. An Australian company, for example, expressed an interest in developing a mine-mouth coal-fired power plant in the northern part of Malawi.

3.20 In mid-1997 the Power Sector Reform Task Force of the MOEM drafted two bills: the Electricity Bill and the Electricity Supply Commission of Malawi (ESCOM) Bill. The objectives of the Electricity Bill were twofold: (a) to establish a regulatory agency (the Electricity Council) authorized to issue licenses to generation, transmission, and distribution entities, to approve tariffs and contractual arrangements, and to arbitrate disputes between licensees and customers; and (b) to allow private participation in Malawi's electricity subsector.

3.21 These two bills indicate the government's willingness to reform the power sector, but they are not founded in a properly thought-out and articulated strategic plan. It is not apparent from the draft legislation that there has been the requisite investigation of restructuring options, of the problems likely to arise at the regulatory and commercial interfaces, or of the overall legal and regulatory framework required to make the new system work effectively.

Options for Restructuring of the Power Sector

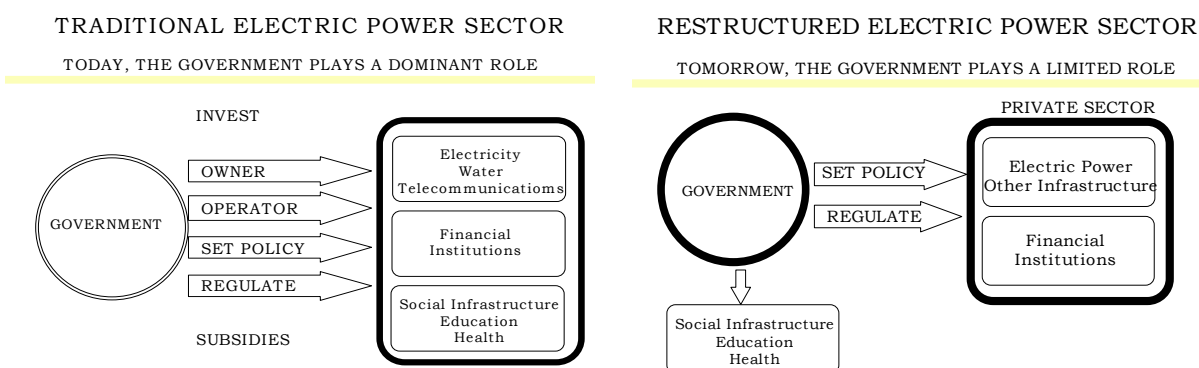
3.22 There is a wide range of options for restructuring the power sector. At one end of the spectrum lie those options that focus only on improving the management aspects of the national power utility. These involve the implementation of improved commercial practices, better management information systems, measures to improve operation and management practices; and enhanced human resource management techniques.

3.23 These objectives can be achieved through a variety of "velvet glove" approaches. They typically involve twinning arrangements with another utility in which the necessary expertise is transferred by staff exchange and support schemes or by the provision, for a management fee, of training and support services. These approaches are relatively low-risk options for the service providers, but the record of such interventions is relatively poor. There is no reason to believe that they can deliver the required results for Malawi.

3.24 A better alternative is to embark on a radical restructuring exercise based on the recognition that the monolithic structure of the power sector that has been established as part of a centrally planned economy is too inflexible to respond efficiently to market forces or to provide appropriate incentives for such responses.

3.25 The contrast between a traditional power sector structure and that of the more flexible arrangement that is needed given the crisis in the power sector in Malawi is shown diagrammatically in figure 3.1. The key feature of the restructured sector is that the government's role, rather than being that of owner, operator, policymaker, and regulator, is simply to set policy and regulate its implementation. In short, instead of controlling the sector the government would create an environment that enables the sector to function effectively.

Figure 3.1: Traditional and Restructured Electric Power Sectors



3.26 Annex I provides a detailed discussion of four restructuring options for the power sector in Malawi, together with a possible implementation schedule. The choice of organizational structure and the modalities of its implementation is a matter for the government. What is not in any serious doubt is that major reform is urgently needed.

Rural Electrification

Present Position

3.27 The provision of electricity supply to rural areas in Malawi requires either the extension of the distribution network or the establishment of standalone, decentralized networks not connected to the national grid. Progress in both areas has been extremely slow.

3.28 ESCOM has conducted three rural electrification projects in which it was responsible for site selection, economic analysis, and project implementation. Most of the investment made in these projects has been in generation and transmission, however—the actual extension achieved of the distribution network into rural areas has been minimal (see Table 3.3). ESCOM's other rural electrification efforts, usually donor-driven, have similarly been patchy and have failed to conform to any coherent overall strategy.

Table 3.3: Summary of Rural Electrification Projects

Project	Year	Financing	Investment	Customers connected
REP I	1980	African Development Bank	115km of 33kVa substations, 66kV and 11kV to 33kV	16 district centers were connected to the grid
REP II	mid-1980s	Kreditanstalt für Wiederaufbau	4.5MW minihydro; 212km of HV lines (66/33/11kV)	Major trading centers; tobacco farms
REP III	1991–95	Spanish government with ESCOM	586km of HV lines; 45km of LV lines; six 33kV substations	Nine rural centers connected to the grid

REP = Rural Electrification Project

3.29 ESCOM has today virtually given up on rural electrification, finding it impossible to reconcile the heavily loss-making extension of electricity supply to rural areas with the need to meet profitability and loan repayment requirements. The company's policy is to do nothing unless the customer is willing to pay the full capital costs of extending supply from the nearest grid point. Unsurprisingly, the number of new connections has reduced to a trickle.

3.30 This is highlighted in a draft report entitled "National Sustainable and Renewable Energy Programme" published by the MOEM³ which states that "[while the] Rural Electrification Programme is an integral component of the government's social policy for poverty alleviation, it is unlikely that the population living a few kilometers from the grid will be connected to it in the near future, even where ESCOM identifies a major economic activity warranting grid extension."

Obstacles to Rural Electrification

3.31 It is evident that there are major obstacles to rural electrification in Malawi. These need to be addressed in future rural electrification planning in the country.

3.32 The most important of these obstacles is the low level of disposable income among rural households. Other, more urgent, needs, such as food, accommodation, healthcare, schooling, livestock, and farm inputs will tend to take precedence over obtaining an electricity supply.

3.33 The high connection fee and the requirement that consumers pay the full cost of grid extension to their homes prior to connection pushes obtaining an electricity supply even further out of the reach of low-income rural families. Policies furthermore preclude connection to traditionally built houses on the grounds that these cannot be safely wired.

3.34 The high cost to the consumer of an electricity connection is a reflection of the high capital investment cost of grid extensions. In Malawi, as in many other developing economies, the electricity supply system uses design standards⁴ based on those of industrialized countries. The use of these standards for the low rural demands typical in Malawi imposes a heavy and unnecessary cost burden and narrows the potential

³ The draft report is further discussed in Chapter 4.

⁴ Reticulation systems for urban and periurban areas use standard 100 square millimeter bare overhead conductors and are designed for 2kVA ADMD]. Aerial bundle conductors are not used. Transformers are usually pole-mounted. The design tolerance for voltage is ± 6 percent, which typically allows low-voltage line runs of 400–500 meters from a transformer. Households are responsible for their own internal wiring, which typically costs about US\$200 for a small housing unit with three lamp outlets and one wall receptacle outlet. The standards provide for 16A service, but for most rural Malawian households 0.5A or 1.0A service would be sufficient.

consumer base. Another factor contributing to the high cost of electrification is that all the equipment is imported, and usually is subject to import surcharges and duties that can increase the total costs by about 45–60 percent.

New Institutional Framework

3.35 In May 1995 the government reassigned responsibility for planning rural electrification activities from ESCOM to the MOEM. As part of the implementation of the new planning function within the MOEM three new organizational changes have been made, as defined in the following paragraphs.

3.36 A Rural Electrification Technical Committee (RETC) has been established. The committee is chaired by the Acting Director of Energy Affairs and has representatives from ESCOM, the Ministry of Women's and Children's Affairs (MWCA), the Malawi Industrial Research and Technology Development Centre, and the private sector.

3.37 The MWCA proposes to create a Rural Electrification Technical Unit (RETU) within the MOEM to handle the new responsibilities.

3.38 An Energy Fund has been created to support both the operation of the RETU and the implementation (including capital investments) of rural projects. The fund will be financed from two sources: a surtax on electricity sales, and a surtax on petroleum sales of 2 tambala per liter.

3.39 There nonetheless remain unanswered questions underlying these legislative and organizational initiatives. The role of ESCOM in project implementation is unclear, for example. Although the government clearly wishes to support rural electrification, as evidenced by new legislation and the transfer of rural electrification responsibilities to the MOEM, there exists no practical policy for rural electrification.

Current Plans

3.40 The RETC has identified for grid-connected rural electrification 19 sites in the southern region, 10 sites in the central region, and nine sites in the northern region. In addition, for off-grid electrification, primarily through renewable energy technologies, the RETC has identified eight sites in the southern region, four sites in the central region, and two sites in the northern region. The overall criteria for site selection are unclear, but in the case of the off-grid standalone systems the electricity supply should meet the demand of rural healthcare centers, education centers, and police stations.

3.41 This rural electrification initiative is quite progressive, but critical questions remain unanswered. These include questions on site selection methodology; on the need for a demand survey and a review of low-cost connection options for grid-connected networks; on the selection of least-cost technology (solar, diesel, and hybrid systems) for off-grid systems; on the need for an economic analysis; and on how the initiative will be financed.

Prerequisites for Successful Rural Electrification

3.42 Experience throughout the developing world and the newly industrializing countries is providing an accumulating and compelling body of evidence on the prerequisites for successful rural electrification programs. These prerequisites provide a set of pragmatic criteria for the evaluation of future rural electrification initiatives in Malawi. They include:

- *Effective institutional structure.* Although the institutional structure for the rural electrification implementing agency does not appear to be critical, a high degree of operating autonomy is essential. The agency should have a clearly defined budget over

which it should have effective control; it should work according to a coherent, fully costed plan; and it must work within a framework of responsibility and accountability.

- *Autonomy and openness in decision-making.* The rural electrification implementing agency must have a high degree of autonomy. When technical and financial decision-making are subject to outside influence, professional discipline is destroyed and the organizational structure is undermined. To avoid this, it is essential that planning be open and objective and based on clearly defined criteria that enable areas to be ranked in order of priority for electrification. Capital investment costs, the level of local contributions, the number and density of consumers, and the likely demand for electricity are among the factors that normally should be taken into account. The single most crucial requirement, however, is that the decision-making system be perceived by all to be fair and fairly applied.
- *Charging realistic prices and recovering costs.* There is a widespread belief that tariffs need to be extremely low if rural electrification programs are to benefit rural people. The facts do not support this belief. In areas that are suitable for rural electrification there invariably is an existing demand for kerosene, LPG, dry cell batteries, car battery recharging, and other small power units that may be used for lighting, to power cassette players, and for refrigeration and other needs. Analysis of international practice shows that where these energy sources are in use, rural electrification tariffs in the range of US\$0.10 to US\$0.20 per kWh are financially competitive. Private suppliers, furthermore, often find a ready market for electricity at up to US\$1.0 per kWh. Tariffs set at realistic levels do not prevent people from obtaining substantial benefits. On the contrary, they enable the rural electrification program to recover its costs and ensure that the electricity supply system is effective, reliable, sustainable, and that it ultimately reaches a greater number of consumers.
- *Lowering the entry barriers.* High initial connection charges, as exist in Malawi, can be a far more important barrier to obtaining an electricity supply than the unit cost of electricity. Amortizing these charges, even if it means a higher unit charge for electricity supplied, will increase the number of people that have service. When setting tariff structures it is essential that the entry barrier to new consumers be examined carefully and reduced to the minimum prudent level.
- *Prioritizing areas for electrification.* Rural electrification in itself will not cause development to occur—it is irrelevant to development unless the other necessary preconditions are met. Investment in the basic infrastructure of roads, markets, health centers, water supplies, and schools should already have occurred or should be taking place. A key requirement for successful rural electrification programs, normally met when the basic infrastructure is in place, is that there be an existing market for energy sources, such as kerosene, dry cell batteries, car batteries, and small generators, that can be replaced by an electricity supply. Rural electrification planning should prioritize those areas where the complementary infrastructure is in place or where there are immediate plans to build it. Where this is the case, investment in rural electrification is likely to bring substantial benefits and to contribute significantly to further development.
- *Involvement of the local community.* Rural electrification programs benefit greatly from the involvement of the local community. Setting up a committee to represent the local community should be one of the first steps in an area where electrification is being considered. The rural electrification committee can play a crucial role in helping assess the demand for electricity, educating consumers in advance, encouraging them to sign up for supply, and promoting the wider use of electricity. Community contributions, in cash

or in kind, mobilized by the committee can also be a deciding factor in bringing an area within the scope of the rural electrification program.

- *Reducing costs.* All successful rural electrification programs have been extremely active in reducing costs. There are numerous ways of achieving this. Using standards appropriate to local conditions rather than relying on inherited guidelines is an important way of obtaining major savings. Standardizing and simplifying household connections, allowing multiple connections from a master meter, mobilizing local manual labor for construction work, and other, even minor, measures can bring worthwhile savings. A cost-reduction committee, including representatives from the utility, consumers, academics, and private sector companies, should be set up as part of any large-scale rural electrification program to establish essential standards and guidelines.

The Role of the Government in Rural Electrification

3.43 Rural electrification rightly is a long-term objective of the Government of Malawi, and the above guidelines provide a conceptual framework within which the government can develop its strategy for achieving this objective. It is critical when developing a long-term strategy that the government create enabling legal and regulatory frameworks for the development and operation, by ESCOM and other private sector entities, of commercial grid-based and off-grid networks.

3.44 In addition to building the legal and regulatory frameworks for rural electrification, the government should define the role of community organizations and private sector entities in the project. Other possible actions that it might take are to move away from simple tariff regulation and a fixed charge per unit electricity used, and to instead consider the use of “fee-for-service.” In this regard, the government should see itself as a facilitator of rural electrification rather than as an implementing agency.

3.45 Fee-for-service is an arrangement whereby a rural energy services company (RESCO) provides electricity services to off-grid communities for household, community, and economically productive uses. For example, a RESCO might charge a household a fixed monthly fee for electricity provided for four hours per day to run three lamps, a radio, and a television. In such cases energy service charges cannot be based on conventional price per kWh tariff structures.

3.46 Fee-for-service is a relatively new model for rural electricity services. Several private companies, formed in recent years to establish rural-based service operations in developing country markets, already are applying the model. These include Community Power Corporation / Bakrie and Brothers (Indonesia), SELCO (India, Thailand, and Sri Lanka), and Sunlight Power International (Central America and Morocco). A rural energy services company also is scheduled to provide commercial off-grid electricity services to a community in Cameroon; under the fee-for-service model, the company will charge about US\$2.70 per electrical outlet per month.

3.47 The RESCO must be able to generate electricity from a variety of energy sources, as appropriate to local conditions. For example, in Malawi such an enterprise would initiate its commercial operations in those regions that have a significant number of high-value market entry points. End users would contract for the energy services they need (such as for grain grinding, commercial refrigeration, vaccine refrigeration, community water pumping, or household lighting) and the RESCO would own, maintain, and repair the equipment required. The electricity services would be provided from free-standing photovoltaic (PV) units and, for a few larger communities, from a local low-voltage minigrid employing PV/diesel hybrid power units. Service fees would reflect revenue requirements for the sustainability and growth of the enterprise.

Policy Initiatives to Promote Fee-for-Service Models

3.48 For a RESCO to be sustainable, the government of Malawi would have to introduce several policy changes. Specifically, the RESCO should be permitted to charge a reasonable fee-for-service that (a) is consistent with the willingness and ability of the customer to pay for the service and (b) meets the revenue requirements for the profitability and growth of the RESCO.

3.49 Other tasks that would need to be completed include the following:

- restructuring of ESCOM to deal with the crisis in the generation and distribution of electricity, thereby creating a basis for rural electrification;
- revision of connection charges, especially capital contribution charges, to permit ESCOM's investments in distribution to be incorporated in its database;
- development of the fee-for-service concept for rural electrification projects;
- development of safety standards for low-cost technologies for rural electrification distribution networks;
- investigation of end-use financing options for house wiring and appliances;
- encouragement of entrepreneurs to enter into the electrical service contracting business; and
- provision of incentives to existing MV&LV customers, such as maize mill owners, to become electricity retailers.

Developing the Role of the MOEM

3.50 The MOEM has established the RETU and is in the process of setting up the Rural Electrification Fund (REF). These important initiatives need to be supported if the government's rural energy policy objectives are to be met. In this regard, the RETU should include representatives from other ministries, such as the ministries of agriculture and health, and a representative manager from the REF. NGOs and nonprofit groups promoting rural electrification can be included on a case-by-case basis. The RETU will be the facilitator of rural electrification projects, and will have the following tasks:

- conducting site assessments of potential market niches for small grid-extension and off-grid systems;
- monitoring and evaluating projects that work, and developing best practices;
- disseminating information on best practices to all ministries, NGOs, and donor agencies;
- encouraging cooperation between rural development programs and local electricity markets;
- coordinating with the Malawi Social Action Fund (MASAF) and inviting proposals from rural communities and entrepreneurs; and
- meeting about four times a year to identify projects and to review progress reports from the fund manager.

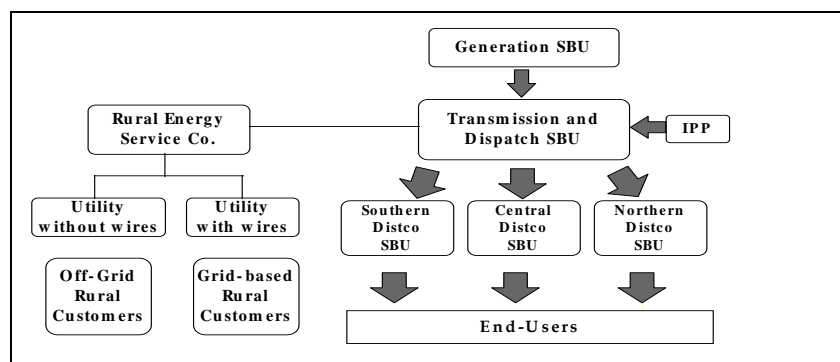
Establishing an Independent Rural Electrification Company within a Restructured ESCOM

3.51 Looking further ahead, a separate Rural Electrification Company (RECO) could be established and managed as a separate cost center within a restructured ESCOM (see Figure 3.2). Composed

of capable staff, initially seconded from each of ESCOM's functional departments and, if necessary, contract personnel, the RECO would have responsibility for all operational functions in rural areas, as well as financial accountability.

3.52 A major advantage of this option is that it would permit the RECO to function as a "utility without wires" in off-grid rural electrification projects. For example, the company would install solar home systems, appropriately designed for demand and application, in each of the households in a village. The customers would not own the equipment but would be required to pay a monthly service charge to the RECO for maintenance and replacement of parts. The monthly service charge would include a rental or leasing fee and a maintenance fee. This model has been successfully applied in Central America, the Dominican Republic, Indonesia, and Morocco.

Figure 3.2: Restructured ESCOM and Rural Electrification



Rural Energy Service Companies

3.53 Rural communities that are located far from the national transmission grid can be served by private entrepreneurs. An immediate start on this could be made through the promotion of private distribution systems run on a for-profit basis by maize mill owners, as discussed earlier. A basis for this already exists, as ESCOM's extensive transmission network has enabled it to energize maize mills in rural communities without electrifying the neighboring villages.

3.54 The maize mills are usually privately owned and operate only during the daytime. The opportunity therefore exists for the private mill operator to be a retailer of electricity after nightfall. This option would require the operator to undertake investments in switching devices, feeders, safety and protection systems, and low-cost distribution networks. As a result of this business diversification, the mill operator would have to learn a new line of business, for which technical assistance could be provided through the RETU of the MOEM.

3.55 It is essential, however, to ensure that such initiatives are commercially viable and self-sustaining. It must be clear from the beginning that, after an initial period of technical support, the local supply system must be financially self-sufficient, with the owner bearing the full financial risk. As a corollary, the owner must be given freedom to set the charges at whatever level is necessary to cover costs and to provide an acceptable profit.

3.56 In setting up such a system, the RETU should arrange for an NGO or a technical consultant to:

- make recommendations to the maize mill owner regarding the appropriateness of the various off-grid options;

- help the owner to develop a specification for the distribution system;
- conduct a demand assessment of prospective consumers;
- identify the level of monetary or nonmonetary contributions that the prospective consumers would be willing to make;
- provide training to the mill owner regarding the operation and maintenance of an electricity-generation set and distribution system;
- help establish safety standards for the distribution network;
- provide training to the mill owner regarding business and management practices in bill collection, bookkeeping, and customer services, for example;
- help the mill owner prepare a business plan; and
- help the owner obtain funding for commercially viable initiatives.

3.57 The concept of the local private electricity retailer can be developed and extended. An institutional model, the rural energy service company, or RESCO, is emerging that would provide electricity services to isolated communities. A RESCO is a standalone miniutility grid complete with one or two small electricity generators and a low-cost distribution network.⁵ It also can function as a “utility without wires” in off-grid rural electrification projects.

Financing Rural Electrification

3.58 The development of off-grid networks and private retailer networks are feasible options in Malawi. The challenge is to set up a financing arrangement that can buy down the first cost of these investments and encourage private investment, both domestic and foreign. In the case of Malawi there are two options that essentially leverage existing institutional mechanisms. These are described in the following paragraphs.

“Piggyback” on Local Community Development Projects

3.59 The Malawi Social Action Fund (MASAF) was set up by the World Bank to provide financial assistance to local community development projects such as rural health centers and distance education centers. The electrification component of these projects could be of either the grid or the off-grid type. Where the project is grid-connected, ESCOM could design and implement the electrification component using low-cost technologies and with funding from MASAF. For off-grid applications the MASAF agency could tailor its actions in specific areas to assist in load aggregation to facilitate investment by the private sector.

Privately Managed Rural Energy Fund

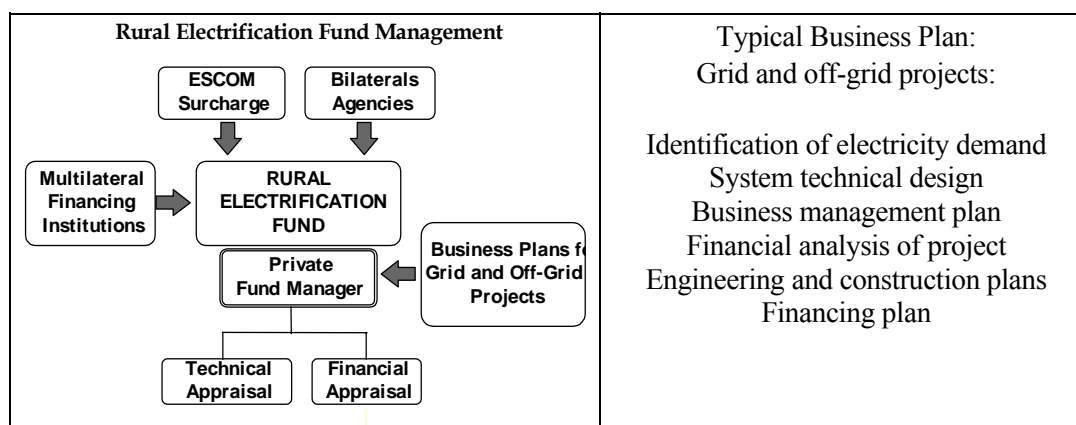
3.60 The MOEM has set up an REF to finance rural electrification projects. The REF will be financed from a 2 percent surcharge on ESCOM’s electricity sales and a 2 tambala per liter surcharge on the sale of petroleum products.

3.61 It is conceivable that this REF could be cofinanced with bilateral funds (for example, from the Canadian International Development Agency, the Danish International Development Agency (DANIDA), Gesellschaft für Technische Zusammenarbeit, or the United States Agency for International Development

⁵ Minigrids have been successfully developed in West Africa: two isolated miniutility networks are operating in Guinea and one in Côte d’Ivoire. Each has a capacity of about 20–30kW and serves an average of 800 households on a monthly “fee-for-service” of about US\$5–7 for four hours of electricity between 7 p.m. and 11 p.m.

(USAID)) and multilateral funds (for example, from the International Finance Corporation, the African Development Bank, or the Commonwealth Development Corporation). Again, the RECO division of ESCOM would be responsible for grid-connected rural electrification projects. For off-grid projects, the MOEM could develop a prefeasibility study of potential off-grid electrification sites and then invite competitive bids from private developers,⁶ requiring that they identify the availability of below-market financing in their bid documents. A private sector institution with power project and financial appraisal skills would be retained by the MOEM to manage the fund. The fund manager's fee would be included in the project financing of grid-based or off-grid networks. These arrangements are shown diagrammatically in Figure 3.3.

Figure 3.3: Rural Electrification Fund Management



3.62 Grant funds would need to be made available through the initial stages of the development by a local community group of an off-grid project. These funds would be needed in part to hire an experienced consulting organization to assist in the preparation of a business plan.

3.63 The business plan for an off-grid electrification project in the initial stages would be reviewed independently by the fund manager, assisted by experienced consulting organizations. The business plan and loan applications would be judged on their financial soundness, the extent of equity contribution, extent of local investment in the project, the adequacy of demand analysis, the menu of electricity service packages, the fee schedule for service, and the competence of the local operator.

3.64 The fund manager would develop a monitoring and evaluation methodology to track finances and other information important to the functioning of the system. This methodology should provide for monitoring of the households using the service, the type of load development experienced during the development of the business, consumer willingness to pay for the service, and consumer satisfaction with the system. The fund manager would provide quarterly progress reports to the RETU to enable monitoring of the performance of the service provider. The RETU also would report to the line ministry any lessons learned, to inform the design and development of new systems.

⁶ There are several well-capitalized private sector developers that recognize the market niche in off-grid networks, including Energy Works (Pacific Gas and Electric (PGE) and Bechtel), Community Power, the Solar Electric Power Corporation, APAVE Sud, ESKOM, and so on.

4

Nonbiomass Renewable Energy

4.1 Malawi is reasonably well endowed with nonbiomass renewable energy, mainly in the form of solar energy. Progress in harnessing renewable energy sources has been slow and fragmented, however. It may be valuable therefore to create a framework by which to support the evaluation, prioritization, and coordination of future efforts to promote nonbiomass renewable energy generation.

Current Position

4.2 The government has no policies designed specifically to encourage the widespread use of nonbiomass renewable energy options. In the last two years, however, it has shown growing interest in the development of a policy framework that would facilitate the use of decentralized energy options—primarily renewable energy technologies—on a scale that could contribute to economic development in Malawi’s rural and periurban communities.

Institutional Framework

4.3 There is no formal institutional framework to encourage the use of renewable energy technologies. Rural projects such as health centers, distance learning centers, water pumping, and other facilities that potentially could use renewable energy technology typically approach the donor community when considering the provision of electrical power. The MOEM seldom is informed of these development projects.

Progress to Date

4.4 There has been little recent progress in the implementation of renewable energy projects. A small number of PV lighting systems, PV water pumping systems, and solar water units have been installed by NGOs, private schools, churches, health clinics, and other institutions. These installations typically have been one-offs, however, made following actions by committed individuals who have needed electricity to support their primary missions in locations that lack access to the grid.

Nonbiomass Renewable Energy Market

4.5 There is no functioning market of any significance in Malawi for renewable energy-based products and services. Total sales of related equipment are estimated to be about US\$400,000 per year. There are two PV product suppliers in the country but these appear to be primarily interested in large installations rather than small systems or components, and are mainly targeting donor-financed and NGO projects.

4.6 The absence of a functioning market for renewable energy equipment and services is a reflection of the following factors:

- the small number of renewable energy equipment and service companies;

- the lack of financial resources that would enable rural communities to consider the use of renewable energy equipment and to pay for the necessary maintenance services;
- the lack of proactive policies and of the technical and financial resources necessary to catalyze and facilitate sustainable (that is, profitable) private sector activity in this market; and
- the lack of awareness about what equipment and services are available and their associated costs and service requirements.

Entry Barriers to Market

4.7 There are numerous barriers to the entry of companies into this market sector. These include primarily:

- *Import duties and taxes.* Duties and surtaxes add significantly to the cost and selling price of PV-based equipment for the private market. There is a 10 percent duty and a 20 percent surtax on solar panels, charge controllers, and lights. These are compounded, so the effective import fee is 32 percent. There also is a 62 percent duty on batteries (reduced recently from 74 percent) and on refrigerators.
- *Lack of end-user financing.* There is no end-user financing in Malawi available for renewable energy applications in rural areas.
- *Lack of knowledge.* There is a widespread lack of knowledge of the potential options for renewable energy-based equipment and services. For example, even the ministries of health and education, which have used PV water pumping and lighting systems, show a lack of understanding of the relative characteristics, benefits, and limitations of hand pumps, diesel-powered pumps, and PV pumps.

Renewable Energy Initiatives

4.8 With the assistance of the United Nations Development Programme (UNDP), local and foreign consultants, together with experts from the MOEM, have prepared a draft report, published in August 1997, on a “National Sustainable and Renewable Energy Programme.” Proposed institutional initiatives include the establishment of a National Sustainable and Renewable Energy Council (NSREC), a National Energy Technical Committee (the Southern Africa Development Community (SADC) Financing Energy Services for Small-Scale Energy Users, or FINESSE, steering group), and an Energy Secretariat at the MOEM as the operational unit of the National Sustainable and Renewable Energy Programme.

4.9 The SADC Technical and Administrative Unit (SADC-TAU), in cooperation with UNDP’s Energy and Atmosphere Programme (UNDP/EAP), is assisting Malawi in the identification and development of renewable energy and energy efficiency services through the FINESSE model. DANIDA is also assisting the MOEM in identifying opportunities for the use of wind energy in urban and periurban applications.

4.10 These initiatives reflect MOEM’s strong interest in promoting the widespread use of renewable energy technologies. There are, nevertheless, weaknesses in the approach outlined in the MOEM draft report. In particular, there is no analysis, much less quantification, of the current and potential markets for renewable and nonrenewable decentralized energy systems, and there is little discussion of the role of the private sector. Yet it is on such market opportunities that any realistic prospects for large-scale dissemination of renewable energy technologies ultimately rest.

4.11 The MOEM report also calls for an in-country manufacturing or industrial capacity to permit the local manufacture of renewable energy equipment. While this may be a desirable goal, it can only be

financially viable when a large sustained market is established to justify the necessary investment in such facilities.

Criteria for Effective Renewable Energy Project Promotion

4.12 Experience with renewable energy projects throughout the developing world shows that the most successful projects tend to meet four criteria:

- *Economically justifiable.* A renewable energy project should produce more economic benefits than it consumes in the country in which it is implemented. The local costs of providing materials, together with the necessary skilled and unskilled labor, are often high. This is particularly the case when skilled local technicians are attracted to the development project from other more productive activities. Operating costs during the lifetime of the installation, including the cost of spare parts that may have to be imported, need to be taken into account. These costs must then be compared with the economic value of the energy produced. If the costs are greater than the benefits there will be no net economic benefit and the project should not be implemented.
- *Financially viable.* Once the funding period is over, the project should be able to keep operating satisfactorily until the end of its useful life. Ideally, payments by the beneficiaries of the project should fund its full running and maintenance costs. Where this is not possible the burden falls on the government, and the continued functioning of the project will depend on the availability of funds and personnel. The reality is that the many pressures on government funds render economically unattractive the subsidization of renewable energy projects that cannot cover their own costs. A lack of financial viability is perhaps the main reason that renewable energy projects in the developing world fail.
- *Institutionally sustainable.* Operation and maintenance have to be organized on a permanent and self-sustaining basis. Staff with the necessary skills must be found, appointed, and paid to take responsibility for operation and maintenance and user fees must be collected and properly handled. Training workshops may be able to provide an initial skill base, but trained people need to practice their skills—otherwise the knowledge is lost. Establishing the local institutional framework on a sustainable basis is one of the most difficult tasks in deploying renewable energy technologies; at the same time, it is vitally important.
- *Locally replicable.* Large-scale renewable energy projects (such as village PV power stations) tend to have capital costs that are far beyond the ability or willingness of village communities to pay. Implementation of such projects is therefore limited to the relatively small scale of project for which the donor is prepared to pay. If they are to make a significant contribution to the overall energy needs of rural areas, projects must be designed such that they can be locally replicated without further donor or government intervention.

4.13 Proposals for new project initiatives should always be assessed against those criteria that provide a basis for the comparison and prioritizing of their implementation. Projects that fail to meet these criteria may provide useful information that can be applied in future projects, but it should be recognized from the beginning that they will almost certainly require a continued input of external funds and expertise to keep them functioning. The simplest and most effective approach to effective renewable energy promotion is to ensure that projects are promoted in areas where a viable market for their output already exists or can be created, so that the project can be implemented on a commercial basis by local private suppliers.

Nonbiomass Renewable Energy Policy Agenda

4.14 A renewable energy policy incorporating these criteria needs to be made part of a national energy policy framework to encourage the use of renewable energy systems in support of economic development in rural communities. The policy and its implementing rules and regulations should embody and reflect a stated national commitment to providing basic electricity services to the off-grid population (which amounts to 99 percent of the rural population) on a long-term, least-cost-preferred basis.

4.15 The articulation of such a commitment is an essential, though not sufficient, requirement for the establishment of viable institutions—whether public or private sector—able to supply off-grid electricity services in a sustainable manner. The private sector has an indispensable role to play in implementing such a policy, and will automatically tend to select projects in accordance with the criteria listed in the previous section. It must therefore be provided with an implementation framework that provides it with the freedom of action and the support it requires if it is to function effectively. The required framework should incorporate the following:

- *Freedom to set fees.* The government must not set or regulate the fees charged by private companies. Private companies providing energy services must be allowed to operate on a fee-for-service basis independent of the national electricity tariff and based on their own cost recovery and operating profit requirements. This applies to all types of off-grid systems.
- *Active support of international joint ventures.* The government should encourage joint ventures between local companies and international firms to establish rural energy enterprises.
- *Standards.* The government, working with industry, should establish service standards⁷ for rural energy enterprises and technical standards for the associated equipment components and systems. The purpose of these standards is to discourage companies that lack adequate technical or financial resources from undercutting the market with inferior goods and services. The problems involved in imposing such regulations must be recognized and the danger must be guarded against that bureaucratic procedures impose additional administrative costs and time delays. The level of regulation must be as low as possible consistent with providing a normal level of consumer protection.
- *Performance reviews for the private sector.* Performance reviews and assessments of rural energy enterprises should be conducted by objective independent organizations. Through such reviews standards can be revised and best practices established. These should be widely disseminated through the private and public sectors.
- *Incorporation of decentralized energy systems in government programs.* Where renewable energy systems provide technically adequate least-cost energy solutions, the government should make a commitment to incorporate such systems into its programs in potable water, health services, education, and other areas.
- *Import duties, tariffs, and fees.* The government should release off-grid energy components and systems from import duties and taxes.

⁷ The Malawi Bureau of Standards (MBS), a member of the International Bureau of Standards, promotes conformity with internationally accepted standards and is capable of supporting the domestic introduction and promulgation of international standards for decentralized energy equipment and services. The bureau prescribes and enforces product standardization in Malawi. All products manufactured locally for export must obtain an MBS certification before export.

5

Conclusions and Recommendations

5.1 This study has examined the Government of Malawi's energy policy in the biomass, electricity, and nonbiomass renewable subsectors.

The Biomass Subsector

5.2 Malawi depends on biomass, principally in the form of fuelwood, for 89 percent of its energy supplies. It is apparent that biomass energy will continue to be a critically important resource for the foreseeable future.

5.3 The woodfuel supply and demand position is satisfactory, but signs of stress on woodland resources are showing in the southern region and around major towns. Substantial amounts of deforestation are occurring due to other causes: in 1996 an estimated 73,000 hectares of natural woodlands was permanently cleared for the expansion of arable agriculture to meet the needs of a growing population.

5.4 Even if all woodfuel consumption were to cease, deforestation would continue. Deforestation progressively concentrates woodfuel harvesting on a diminishing resource base, and the effects of this in Malawi could rapidly become significant. If this is to be avoided, agricultural expansion will need be slowed down and eventually reversed. Given Malawi's need to increase its agricultural output to raise food production and boost cash earnings, this will only be achieved through first raising agricultural productivity.

5.5 The long-term survival of the biomass resource base requires that it be managed in a rational, sustainable, and commercially viable manner. The existing system of forest regulations, however, prevents this being done by the local communities that are the best placed to carry it out and that have the greatest vested interest in its success.

Toward a Sustainable Biomass Policy

5.6 It is recommended that the government take immediate steps to:

- reform the legislative and regulatory framework to permit and encourage local management of woodlands on a commercially viable and environmentally sustainable basis;
- facilitate the expansion of private tree planting;
- institute community-based land use planning and management systems, assisted by Department of Forestry extension service staff;
- develop and implement a system of stumpage fees that can encourage the efficient use of woodfuel resources; and

- provide technical assistance for the woodfuel industry in growing, production, and marketing.

Parallel Measures to Increase Agricultural Productivity

5.7 It must be recognized that the above measures, which focus directly on the woodfuel issue, need to be seen within the wider context of the agricultural system as a whole. The long-term survival and productivity of Malawi's forest resource ultimately depend on the implementation of a parallel range of policies capable of intensifying and increasing the productivity of the agricultural system.

5.8 Regulations that reserve critical land areas for water protection and for the conservation of flora and fauna and that provide advice to local authorities need to be drawn up and entrusted to an appropriate land use planning body. Absent such wider measures the expansion of agricultural activities into the country's woodland areas will inevitably continue.

The Electricity Subsector

5.9 The operational performance of the national power utility, ESCOM, is poor. The frequent supply interruptions and brown-outs have ripple effects that are felt throughout the economy, reducing industrial output and forcing large electricity users to invest in diesel generator sets, with the net effects of depressing economic activity and increasing imports.

5.10 A range of measures will be required if ESCOM is to be reformed or restructured so that it can play the part required of it in the economy of Malawi. Annex I of this report provides a detailed discussion of four different restructuring options for the power sector, together with a possible implementation schedule.

Rural Electrification

5.11 Based on its analysis of the position in Malawi and on experience elsewhere in the developing world, this report concludes that extensive rural electrification should not at this stage be an investment priority for Malawi.

5.12 For the immediate future, investment in rural electrification should be highly selective. Specifically, it should be concentrated on those areas where investments in agricultural development, roads, health services, education, and other infrastructural improvements have already been made or are planned for the immediate future.

5.13 Rural electrification nevertheless rightly remains a long-term objective of the government. In promoting rural electrification the most critical function of the government is to create legal and regulatory frameworks that support the development and commercial operation, by ESCOM and private sector entities, of grid-based and off-grid networks.

5.14 In creating this enabling environment the government should see itself as a facilitator of rural electrification rather than as an implementing agency. Particular tasks that it must address include the following:

- restructuring ESCOM to deal with the crisis in the generation and distribution of electricity, thereby creating a basis for rural electrification;
- revising connection charges, especially capital contribution charges, to enable ESCOM's investments in distribution to be incorporated in its database;

- developing safety standards for low-cost technologies for rural electrification distribution networks;
- encouraging entrepreneurs to enter into the electrical service contracting business; and
- providing incentives to existing medium-voltage and low-voltage (MV&LV) customers, such as maize mill owners, to become electricity retailers.

Nonbiomass Renewable Energy Technologies

5.15 Promotion of nonbiomass renewable energy technologies, the most promising of which is solar energy, is at an early stage in Malawi. There is evidence to suggest, that some of these technologies, in the appropriate conditions, can represent the least-cost option in meeting certain rural energy demands.

5.16 The most promising renewable energy projects will be those that are:

- economically justifiable;
- financially viable;
- institutionally sustainable; and
- locally replicable.

5.17 There is a need to create an enabling environment that will encourage and facilitate the implementation of projects meeting these criteria. This will require a variety of new policy measures, among which the following are of primary importance:

- *Freedom to set fees.* Private companies providing energy services should be allowed to operate on a fee-for-service basis independent of the national electricity tariff.
- *Active support of international joint ventures.* The government should encourage joint ventures between local companies and international firms to establish rural energy enterprises.
- *Standards for rural energy service enterprises and for equipment.* The government, working with industry, should establish standards of service for rural energy service enterprises and standards for associated equipment components and systems. Enforcement of these standards will discourage companies that lack adequate technical or financial resources from attempting to undercut the market with inferior goods and services.
- *Mandatory performance reviews.* Performance reviews and assessments of the rural energy enterprises should be made mandatory and should be conducted by objective independent organizations. Through such reviews standards can be revised and best practices established and widely disseminated.
- *Incorporation of renewable energy systems in rural programs.* Where renewable energy technologies represent technically adequate and least-cost solutions, the government should commit itself to incorporating renewable energy into all rural development projects in potable water, health services, and education. It should ensure that any such opportunities are made fully known to the private sector.
- *Removal of import duties, tariffs, and surcharges.* The government should release off-grid energy components and systems from import duties and taxes.

Annex 1

Options for Restructuring Malawi's Power Sector

Background

A.1.1 Malawi is facing a major crisis in its electricity supply system. This has ripple effects that are felt throughout the economy.

A.1.2 The economic losses to the country due to power shortages are high. Forced outages and rolling brownouts are reducing industrial output, depressing economic activity and increasing imports. Power shortages have adversely affected all areas of the economy, but they are disproportionately affecting small-scale enterprises, many of which have been forced to install their own generation capacity to augment and compensate for the inadequate power supply from the grid.

A.1.3 The inadequacies of the power sector also have damaging implications for rural electrification. Even if the institutional and other barriers to an effective rural electrification program were to be overcome, the lack of reliable electricity supplies would remain a major constraint.

A.1.4 It is imperative that reform and restructuring of the power sector be addressed as an urgent priority by the Government of Malawi. The purpose of this annex is to present for consideration a menu of restructuring options for consideration.

Major Issues Impeding Sector Performance

A.1.5 The major issues that continue to impede efficient sectoral performance are summarized below:

A.1.6 *Autonomy.* The statutory provisions under which ESCOM was established provided the company with substantial autonomy from the government. The actual situation is very different: Government regulations have effectively prevented ESCOM from operating as an autonomous and efficient organization. Decisions on major policy matters such as tariff setting, investments, and borrowings are all controlled by the government. The devaluation of the Malawi kwacha has further undermined ESCOM's financial performance.

A.1.7 *Corporatization.* While ESCOM could be structured as a corporate body under the Companies Act, the Finance and Audit Act of 1976 and the Statutory Bodies (Control of Contracts) Act of 1966 would compromise corporate management operations. Although it might be possible to achieve high professional standards in decision-making, the rigid bureaucratic structure would tend to prevent the institution from functioning as a cohesive, forward-looking corporation.

A.1.8 *Commercialization.* There is an absence of commercial orientation in the distribution departments of ESCOM. Sensitivity and responsiveness to customer needs are important, but ESCOM's monopoly in generation, transmission, and most distribution-related activities insulates the institution from competition, resulting in unreliable and unsatisfactory service. The customer base of ESCOM has stagnated at approximately 5 percent of the population due to supply constraints and a distorted

connection pricing policy. About 25 percent of urban households are electrified but only about 5 percent of all consumers within reach of the distribution network are connected; this underscores the need for significant additional investment, particularly in the transmission and distribution sector, to increase electrification rates, improve commercial performance, and promote customer confidence and satisfaction.

A.1.9 *Generation expansion and distribution planning.* The criteria for generation capacity and energy planning in hydropower systems normally are based on dry-hydrological and average hydrological conditions, respectively, but ESCOM bases all of its planning criteria on average hydro conditions. If ESCOM had followed normal practice, it would have installed sufficient thermal capacity to respond to the energy and capacity shortfalls that result from the hydrology risks of the Shire River. The company furthermore has failed to realize the benefits of resource portfolio diversification by interconnecting to its neighboring utilities. Its reliance on unnecessarily high technical specifications and design standards, coupled with high connection charges, additionally has led to few new customer connections.

A.1.10 *Inadequate maintenance.* Many of Malawi's power stations experience frequent outages, in large part because they are old and in many cases because of inadequate preventive maintenance.

A.1.11 *Private sector participation.* In the absence of a well-defined legal and regulatory framework the scope for private sector initiatives remains unclear. There have been few unsolicited private power offers. One that has been received is for a 300MW coal-fired plant and a 50MW wood-fired power plant at the Vipha plantation in northern Malawi, but there is a danger that the lack of clarity in how such offers should be evaluated will result in any negotiating activity involving ESCOM and other arms of the government tending to contradict each other. ESCOM as a statutory body is required to competitively tender its resource requirement.

Sector Reform and Promotion of Private Sector Investments

A.1.12 Given its budget deficit, Malawi has reached a ceiling on the availability of public sector resources for infrastructure investment. The government has therefore decided to seek private participation in the power sector. Malawi has also joined forces with its neighbors to establish the Southern Africa Power Pool (SAPP), which comprises utilities from the Southern Africa Development Community (SADC) countries, and plans are underway to connect Malawi's grid system to those of Mozambique and Zambia.

A.1.13 In recognition of the far-reaching implications of these changes and the overwhelming need to reform the power sector, an ESCOM task force was set up in 1994 to develop a power sector reform strategy. The Ministry of Energy and Mining (MOEM) has drafted two bills germane to the electricity subsector: the 1997 Electricity Bill and the 1997 Electricity Supply Commission of Malawi Bill. These have been tabled with the Cabinet Committee on Legislative Affairs.

A.1.14 It appears, however, that the proposed legislation did not derive from a broad and cogent review of power sector reform options. ESCOM indicated that the proposed legislative measures are based on the trend in power sector reform in the SADC countries to facilitate cross-border trade. It is pertinent to observe that except for Zambia and Zimbabwe none of the countries in the SADC region have implemented reforms to foster private participation in the power sector.

A.1.15 Whereas these two bills indicate the government's willingness to bring about reform in the power sector, a fundamental concern with this draft legislation is that the bills do not emanate from a well thought-out and articulated strategic plan. It is apparent that there has been insufficient investigation of the restructuring options, the problems that are likely to arise at the regulatory and commercial interfaces, and the legal and regulatory framework required to make the new system work effectively.

A.1.16 The establishment of a regulatory agency, for example, raises certain questions. The objective is to create an independent agency that will regulate the electricity subsector and encourage

private investment. Private investment, however, will depend on a predictable regulatory process. This involves three determinants:

- *Agenda control*, which dictates whether or not changes should be considered and what those proposed changes might be.
- *Reversionary policy*, which instructs whether or not, in the absence of change, policy should revert to the status quo.
- *Number and control of veto gates*: For which events in the regulatory process should the possibility of rejecting changes be denied, and for which should each party be permitted the right to exercise power of veto?

A.1.17 The above three determinants of regulatory predictability are particularly important in the rate-setting process of electric utilities. In the case of the proposed draft Electricity Bill, the Electricity Council or the minister controls the rate-setting agenda of when and how often the rates need to be adjusted, and controls also the veto gate.⁸ The reversionary policy is the rate that was set in the licence. If investors do not have a modicum of agenda control, such as the power to request rate adjustments to recover costs, then the reversionary policy (that for example would see the reversion to rates set in the original licence) is no incentive for private participation.

A.1.18 The ministerial discretionary powers included in the bill, such as control of veto gates, amendment of licences, assignment of licence, and ordering of inquiries, are excessive.⁹ It is likely that investors will be unwilling to submit to a regime that is so intrusive and so subject to ministerial discretion. There is therefore a high probability that the bill's objectives will not be met.

Reform Initiative Premises

A.1.19 The power sector reform-related activities remain in the early stages of evolution. The reform initiatives generally are based on the following premises:

- the utility should operate as a profit-making commercial business;
- greater coordination is required of planning and investments with SAPP;
- there should be less reliance on the government for subsidies and credit for capital investments;
- there should be greater private sector participation in new sector investments; and
- the role of government should be restricted to energy policy and regulatory intervention.

A.1.20 The key output of this initial phase is to define that long-term structure of the power sector that will enable the government to achieve its policy objectives. It is important to recognize that implementation of long-term structural change is a slow process. This restructuring note therefore also addresses the need for and type of implementation strategy required, as well as the steps that must be taken during the transition.

Addressing the Reform Process

A.1.21 The process of restructuring the power sector begins with the realization that a monolithic structure, often established as part of a centrally planned or command economy, is too inflexible to respond efficiently to market forces and to provide appropriate incentives for such responses. The restructuring process must involve change along three different but interdependent axes—structure, ownership, and regulation—as described below.

⁸ Electricity Bill 1997, Sections 19 (2) and 19 (3).

⁹ Electricity Bill 1997, Section 12 (4); Section 16 (1), (2)(c), and (4); and Section 34 (1).

Sector Structure Axis

A.1.22 The electricity supply industry (ESI) traditionally has been divided along functional lines into five segments: generation, dispatch, transmission, distribution, and supply. For reasons of economies of scale and scope, these functions have in many countries remained under a single, vertically integrated company. Separating these segments into distinct commercial entities is called vertical unbundling, which can be achieved either by vesting the five functions in separate organizations or by establishing separate accounts, with clear transparent transfer costs, for each function. Ownership of the facilities may continue to be vested in a single utility. Such separation has the potential to encourage new entries and competition in segments that are potentially competitive.

A.1.23 Horizontal unbundling takes place when a system is split into separate entities on a geographical basis, and may or may not be accompanied by vertical unbundling. Breaking up a generation monopoly allows new entrants to power generation to compete for the customers of power distributors and users, but this is often at the loss of some economies of scale. Horizontal unbundling in the distribution segment—separation of a unified distribution activity into more than one regional distribution company (RDC)—increases economic efficiency due to higher levels of competition and more effective regulation.

A.1.24 The use of different permutations and combinations of the functional entities and of horizontal and vertical unbundling enables several restructuring models to be developed.

Ownership Axis

A.1.25 The issue of private versus public ownership of the various segments of the electricity industry is related both to the desired degree of customer choice and competition within a segment of the industry and to the extent to which the government or others wish to use utility operations to achieve social policy objectives. Greater private ownership is likely to give rise to additional customer choice. Alternatively, greater public ownership, by generating new employment, for example, enables the use of customers to achieve policy goals such as those related to regional economic development.

A.1.26 The ownership function can be retained by the state or transferred to municipal or regional companies or the private sector, but it is imperative that the day-to-day management of the enterprises, even if fully state-owned, should be exercised by an autonomous body operating strictly under commercial principles.

Regulatory Axis

A.1.27 Appropriate regulation is a corollary to the decisions for sector restructuring. As the power sector moves away from control by a government department toward greater operating autonomy, and as new commercial structures are introduced, including private sector participation, an explicit regulatory function becomes increasingly necessary.

A.1.28 When designing a regulatory framework it is necessary to consider a number of important criteria by which it might be judged. An effective regulatory framework should exhibit the following features:

- *Stability and predictability.* This feature is especially important in cases where private sector participation is an important consideration, because it enables enterprises to plan and invest with confidence. Some provision should be made for flexibility in the system to allow it to respond to changing market conditions.
- *Simplicity.* Regulation is most likely to be effective and inspire confidence when it is simple. This allows it to be easily understood by all parties and may help to avoid excessive administrative costs.

- *Transparency.* The process by which regulation takes place should, as far as possible, be open to public scrutiny. This gives all parties greater confidence that the process is fair.
- *Continuity.* New regulatory arrangements are more easily accepted and implemented if they display continuity with existing practices.
- *Best practice.* Any regulatory regime must reflect domestic requirements and practices. However, systems that can be seen to be operating satisfactorily elsewhere are more acceptable than systems that are new and untried.
- *Promotion of efficiency.* Regulation can have significant effects, both positive and negative, on the incentives for enterprises to operate efficiently. Given the normal background to regulation—that is, monopoly and absence of market pressures—it is important that the regulatory system encourage efficient operation.
- *Managerial independence.* Enterprise managers should be given as much independence as the regulatory regime allows.
- *Incentive-based.* The essence of a regulatory regime is to ensure that the enterprises it governs behave (against their own tendencies) in the public interest. Although compliance might be achieved by means of instructions, success is more likely if it can be provided through incentives.

Review of Restructuring Options

A.1.29 There are several permutations and combinations of models that may be developed along the three interdependent axes of sector structure, ownership, and regulation. These permutations differ in specifics, with each option potentially diverging in terms of ownership, the degree of competition in each segment, customer choice offered, and the degree of monopoly retained within the structure.

A.1.30 At one end of the spectrum of restructuring options is the “velvet glove” approach: options that only address improvement of the management aspect of the enterprise through twinning or management contracts. At the other end of the continuum are essentially four restructuring options that enable varying degrees of control along the three reform axes.

A.1.31 Twinning arrangements seek to promote the transfer of management “software”: improved commercial practices, better management information systems, and measures to improve operation and management practices. The provider of these services is usually paid a management fee. To the extent that the provision of this skills transfer does not entail putting equity at risk, the provider of these services has no incentive to improve ESCOM performance. Furthermore, the providers of these services usually have no incentive to provide the right skills mix; invariably, staff are brought back from retirement or those close to retirement are assigned. Twinning arrangements and management contracts have an inherent appeal because they represent a low-risk, low-cost market entry for the private sector. However, this option has neither shown promise nor achieved success in the electric utility business.

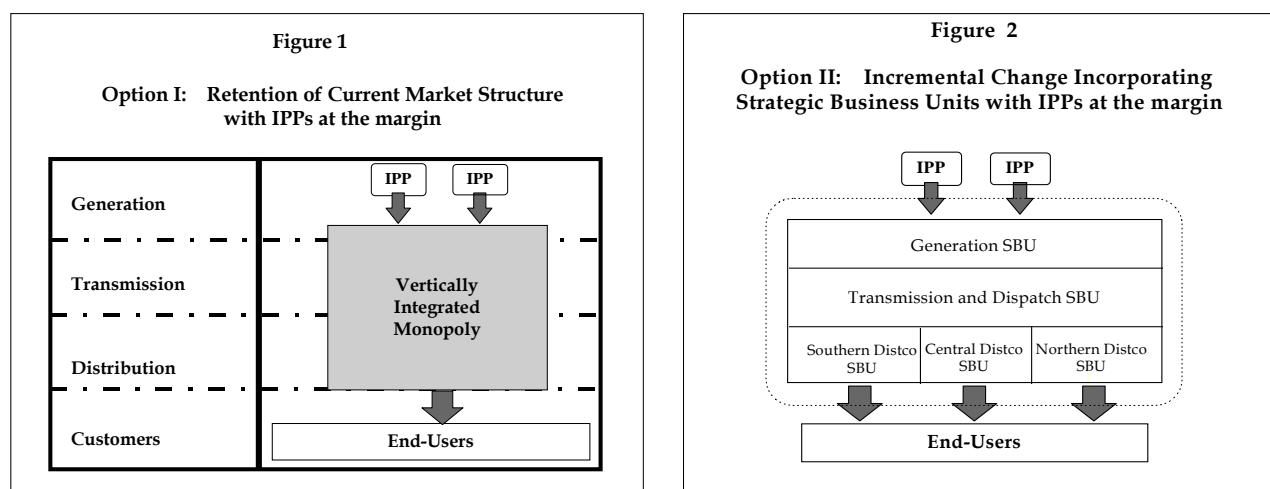
A.1.32 Management contracts have been successfully applied in nonutility enterprises, notably in the hotel industry. Their success primarily can be attributed to their direct interface with the paying customer; the receipt of payment in hard currency from customers; and to the total control they afford in enterprise and human resource management. Because of this control exercised by the management contractor the contractor's fee invariably is linked to the performance of the enterprise. In an electric utility, however, such control is seldom given to the management contractor, which typically earns a flat management fee in hard currency, usually borrowed from a multilateral lending institution by what commonly is a virtually bankrupt state-owned entity. Because there are no built-in incentives for performance improvement, the poor staffing mix that is typical of twinning arrangements is also found here.

Four Restructuring Options

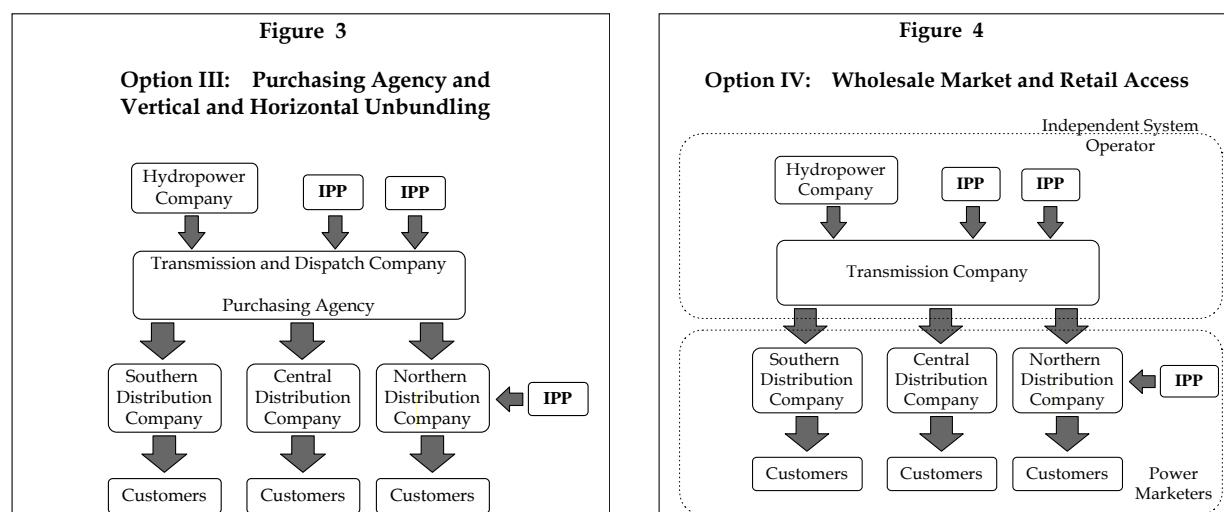
A.1.33 This section investigates the four alternative options.

A.1.34 *Option I.* The first of these options is retention of the current market structure, combined with some of the recent initiatives to encourage private participation in generation through independent power producers (IPPs). (See part 1 of Figure A.1.1)

Figure A.1.1: Restructuring Options I and II



A.1.35 *Option II.* The second option again entails the retention of the current market structure, this time with incremental changes aimed at commercializing the functional entities and introducing more competition into the generation segment through IPPs (see part 2 of Figure A.1.1). Under this option ESCOM would retain its vertically integrated structure, with each of the segments (generation, transmission, and distribution) functionally separated within the organization into strategic business units (SBUs). Separate accounts would be kept for each operational segment to ascertain its specific costs.

Figure A.1.2: Restructuring Options III and IV

A.1.36 *Option III.* The third option, the purchasing agency option, involves the complete deintegration of the industry (see part 1 of Figure A.1.2). The generation segment would be separated to make it fully competitive, with its assets transferred to a generation company. The distribution companies would enter into a power purchase contract with a transmission company, that in turn would also provide transmission services to other generators. Alternatively, all generation could be channeled through a power pool, with dispatch controlled by an independent system operator responding to market signals and financial contracts between the distribution companies and the transmission company.

A.1.37 *Option IV.* The fourth option, the wholesale market option, again involves complete deintegration, but also allows all customers to choose the electricity supplier with which they wish to contract (see part 2 of Figure A.1.2). End users would have the right to contract separately with the power suppliers. The option for bundled service—for example, the common practice of purchasing electricity from the local distribution company—would be retained.

Table A.1.1: Summary of Policy Options

Option	Advantages	Disadvantages
Option I Retention of current market structure	<ol style="list-style-type: none"> 1. Relatively less disruptive and more easily implemented 2. Low transition costs 3. May encourage limited new investments in IPPs 4. May provide for a more commercial operation 	<ol style="list-style-type: none"> 1. Does not provide full benefits of competition 2. ESCOM could limit IPP participation and engage in discriminatory behavior 3. Susceptible to ineffective regulation 4. Performance contracts may not be effective 5. ESCOM could still be used as an instrument of public policy 6. Investors likely to perceive higher risk than is associated with Options II through IV
Option II Incremental change	<ol style="list-style-type: none"> 1. Provides greater scope for competition in general than does Option I 2. Significantly reduces government scope for investment in and management of the electricity subsector 3. Provides greater cost and pricing transparency 4. Provides incentives to improve operations 5. Facilitates greater empowerment of management and employees 6. Greater potential to attract private investment 7. Offers better managerial and professional employment opportunities 	<ol style="list-style-type: none"> 1. Potential exists for the maintenance of economic distortions associated with fuel pricing policies 2. Extensive and complex contracts for existing generation plants 3. Restructuring transaction costs higher than those of Option I 4. Need for government guarantees to attract private investment
Option III Purchasing agency	<ol style="list-style-type: none"> 1. Provides earlier and potentially greater supply competition 2. Provides significant management autonomy 3. Offers greater managerial and professional career opportunities 4. More attractive to private sector investors 5. Entitlements could provide a means of constraining the market power of the owners of these assets 	<ol style="list-style-type: none"> 1. Requires complex contractual arrangements 2. Customers may seek entitlements to the production from existing low-embedded-cost generation assets
Option IV Wholesale market	<ol style="list-style-type: none"> 1. Provides fullest scope for competitive benefits 2. Most effectively realizes the government's strategic objectives 3. Greatest potential for capital attraction and privatization 4. Complete management autonomy 	<ol style="list-style-type: none"> 1. Highest transition costs 2. Requires complex commercial and institutional arrangements 3. Additional legal and regulatory requirements

Legislative Requirements

A.1.38 There are four core legal areas that should be addressed with respect to any restructuring option chosen, as follows:

- *Enabling legislation.* The laws governing the electric power sector should clearly set forth the authority pursuant to which the sector's structure operates, and should define the general parameters of that structure.
- *Regulatory authority.* The law should provide for an independent regulatory authority that follows clearly expressed substantive criteria and that functions in an open, predictable, and reviewable manner.
- *Commercial and investment environment.* Because private investment is a goal of the government, the laws dealing with commercial and investment issues should facilitate such investment.
- *Antimonopoly control.* If competition is a goal, the law must set up a mechanism by which the government can deter and stop participants in the sector from obtaining monopoly control and engaging in anticompetitive behavior.

Enabling Environment for Private Sector Participation

A.1.39 Allowing for private entry in the generation business is the first step in deconcentrating the sector and paving the way for increased supply competition. Although most attention has tended to be focused on the introduction of independent power producers (IPPs), private sector entry can also be realized through permitting full or partial ownership of existing utilities or subsidiary companies, the lease or franchising of operations, and so on. An enabling environment for private sector entry should exhibit the following characteristics:

A.1.40 *Transparency of process.* Private sector investment opportunities are conditioned on the existence of specific government policies and programs that encourage private sector entry, and on an award process and systems that are transparent. Well-defined project selection criteria and an evaluation process make for a transparent framework and reduce cost to both the project developer and the country in question, and lead also to faster successful closure of projects.

A.1.41 *Competitiveness of bids.* Transparency and public accountability are best achieved through a competitive bidding and project selection process. It is possible to use negotiations to satisfy purchaser and developer concerns without compromising the transparency of the project selection process.

A.1.42 *Appropriate allocation of risk.* The issue of risk sharing between the government, utility, lenders, and developers is at the heart of much debate over private build-operate-transfer (BOT) and build-own-operate (BOO) projects. Some concept of graduated risk-sharing over the contract duration will become necessary in the future as the developers take on increasing risks as the market systems mature.

A.1.43 *Developer returns commensurate with risks.* Quantifying the risk inherent in—and, by extension, the acceptable equity return in—large infrastructure projects is difficult. IPP investors in the United States, having earned high returns in the early years now accrue returns that are in the range of 10–15 percent. This is due to increased competition, standardization in financing structures, and increased clarity in risk allocation.

A.1.44 *Dispute resolution mechanisms* include conditions of exit, such as accession undertaking. Private power investors, domestic and foreign, desire a policy (tax, investment framework, and so on) that is both stable and predictable. In countries where the regulatory framework is well defined and where

there is some history of its successful operation, project developers may not seek added safeguards written into their contracts with purchasers and suppliers.

A.1.45 *Targeted role of government, bilateral and multilateral guarantees, and credit enhancements* are often critical to the successful financing of IPP projects, particularly in the early years and during the transitional phase from state dominance to a more market-oriented system. The provision of limited government guarantees in certain critical areas (such as utility performance, fuel supply, or access to foreign exchange) may be the best option in the short term to attract IPP investments.

Transition Strategies

A.1.46 Power sector reform is a process-driven rather than project-specific activity. In the transition period a number of issues need to be carefully considered. These include:

A.1.47 *Changes in trading system.* The first generation of privatization encompasses the introduction of a limited number of IPPs with long-term “take or pay” contracts, relatively high power prices, and high capacity charges (70–90 percent). These are pioneer projects and normally constitute no more than 10–15 percent of the total generation capacity in the country, with the consequence that the impact on overall tariffs is muted. The second generation of privatization sees the emergence of major, contentious issues when the existing generation capacity of the national utility is commercialized and partially privatized through sale of shares to a strategic investor. For example, should these new generation companies also be given “take or pay” contracts on lines similar to the IPPs? Will any strategic investor buy into the existing utility plants without a long-term contract? Are initial public offerings (IPOs) for the tranching sale of shares likely to provide good returns absent guaranteed returns for the new owners? There are several alternatives open to the government at this stage.

A.1.48 *Implications of changes of ownership.* Besides the impact on existing loans, debt covenants, and so on, which can be handled by the creation of holding companies to succeed the original debtor, the change in ownership has two other critical components: (a) even a partial transfer of ownership of a government utility to the private sector will alter the relationships in the public sector as a whole; and (b) it creates an entity that is not easily reverted to government ownership. All decisions on the creation of subsidiary companies thus require the careful consideration of the government. Decisions on the number of subsidiaries, their type and asset structure, the invitation of strategic investors, the issue of IPOs, and so on all will irreversibly alter the structure of the sector.

A.1.49 *Provision for investments in areas in which the private sector is not interested in investing.* Investment in areas such as rural electrification, multipurpose integrated hydro projects, and transmission and distribution needs to be provided for either through a cost-sharing approach or as a requirement for private sector entry. As the cost of unserved demand is high, provision also needs to be made for public sector investments that can be brought on line quickly should the private sector IPPs prove unable to reach financial closure as planned.

Transition to Restructured Sector

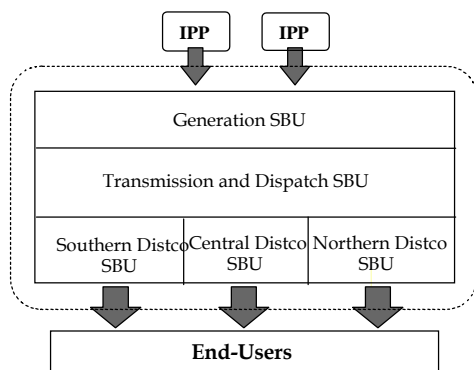
A.1.50 Achieving meaningful sector change will require a transition from the current structure. This report recommends that the Government of Malawi proceed using a phased approach. The exact timing of each phase is difficult to predict with certainty at this point, but once a decision has been made to pursue a specific option we would recommend that a high-level task force be established to oversee the process and ensure that all objectives are achieved. This section outlines three phases, sequential and in tandem, that would be required for the Malawi power sector to evolve into a more competitive structure.

A.1.51 While recognizing that the twinning/management contract option by itself would not be sufficient, the transfer of management “software” and managerial skills under this option should be used in the first two phases to prepare ESCOM for an Option II structure. That is, these two phases would establish ESCOM as a holding company and under this company would separate the utility department,

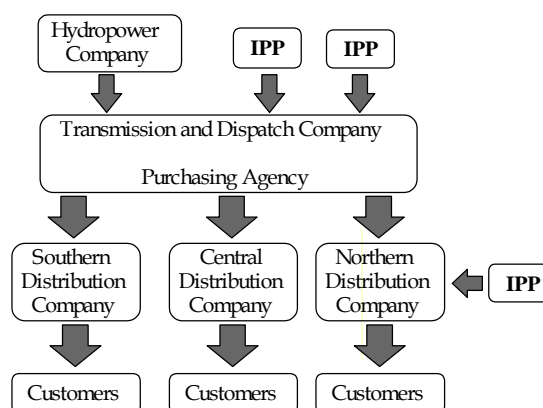
along functional lines, into strategic business units (SBUs). Each SBU would be headed by a manager responsible for developing budgets and the SBU's profitability. The manager of each SBU also would have autonomy as regards decision-making in noncore activities and in the hiring and firing of staff. In the third phase, each SBU should be spun off and privatized, with the assistance of an investment banking firm (see Figure A.1.3).

Figure A.1.3: Phases of ESCOM Restructuring

Phases I & II: Restructure ESCOM into Strategic Business Units with IPPs at the Margin



Phase III: Purchasing Agency and Vertical and Horizontal Unbundling



A.1.52 The sequence of events in which these changes would take place over a three-year period is set out below.

A.1.53 *Phases 1 and 2: 1998–99* Undertake a twinning arrangement with an electric utility to establish the SBUs and introduce IPPs.

- Separate the functions of ESCOM (generation, transmission, and distribution) into SBUs that function as independent profit or cost centers.
- Introduce IPPs for thermal power plants and design the power purchase agreements (PPAs) such that they can be transferred from ESCOM to the distribution companies at a later stage with regulated transmission tariffs.
- Initiate the creation of regional distribution companies (RDCs).
- Initiate studies for bulk power tariffs and the use of transmission charges and wheeling charges, and for distribution “wires” charges and retail tariffs (value-added approach) for each of the RDCs.
- Set up a regulator to manage the IPP process and the transformation to a more disaggregated structure.

A.1.54 *Phase 2: Establish a separate generating company (GENCO) and RDCs.*

- Create one or more GENCOs that would compete with all IPPs.
- Set up the regional distribution companies or RDCs as suggested in the studies.
- Transfer the PPA contracts from ESCOM to the distribution companies.

- Set up a regulated transmission and dispatch company, to be owned by ESCOM or a successor organization.

A.1.55 *Phase 3: Privatization of ESCOM SBUs.*

- Retain investment banking firm as an advisor.
- Prepare information memorandum.
- Conduct market sounding.
- Prepare bidding documents.
- Conduct “road show.”
- Stage bidding process.
- Assist the Government of Malawi in evaluation and negotiations; assist in selection of the winning bidder.

Annex 2

Survey of Rural Communities

FIELD VISIT		
Date	3 April 1997	4 April 1997
Site	Nsanje	Thyolo (interview at District Commissioner's Office)
Location	Chididi	Thekerami (2nd/3rd major MX5)
Local contact	Colex, B. Chapendeka (Community Development Assistant)	Alfred Nyasulu, (District Development Officer) Robert White (Small Enterprise Development Facilitator)
Proximity to grid	8–11 km	20 km
Proximity to energy sources		
Biomass	Firewood (free forest area)	Yes
Minihydro		
Solar		Yes (Shire Valley)
Wind		Yes
Economic activity		
Community center	None	Library facilities, good market (no refrigerator)
Distance education center	1. DEC (one) 2. Primary school (one 8th grade, one 4th grade, one senior primary)	DEC, primary school
Fishing industry		
Fruit industry	Oranges, pears, pineapples	Citrus fruits, pears, cassava, bananas
Farming	Maize (self and sale); orange, pears, pineapples. Fail to sell all because of roads	Maize, sweet potatoes
Hospital	African Evangelical Mission Clinic (private and	Health center

Police station	maternity. No electricity)	
Other	Real need for one. Previous one's house was blown off.	Telecom center, post office, missionary church,
Population	22 villages (7,000 population)	major railway center
Number of households	Burn brick house—some with corrugated sheet, some with thatch	25,000 + 75,000 outlying
	Mud bricks	3,000
Average household size	7-10	
Average household income	MK 250/month	MK 300/month
	Sept–Feb ⇒ no income	
	Mar–Aug ⇒ income	

ENERGY USE ASSESSMENT		
Cooking		Yes
Firewood – Three-stone	Yes	Yes
– Mud stove		
– Metal		
– Ceramic		
Charcoal – Ceramic	No	Infrequent
– Metal		
Crop residue – Three-stone	Yes	Cassava stocks
– Mud stove		
Kerosene – Wick stove		2 percent of population
– Pressure stove		
Heating		
Firewood	Yes	Yes
Charcoal		Yes (MK 30/30kg)
Others		
Lighting		
Candles		
Kerosene – Wick lamp	From Nsanje (MK 7.50/liter)	Yes (MK 10/liter)
– Pressure lamp	Purchase from Nsanje	Yes

<p>ESTIMATE OF EXPENDITURES</p> <p>Cooking</p> <p>Heating</p> <p>Lighting</p> <p>POTENTIAL ELECTRICITY USAGE</p> <p>Cooking</p> <p>Lighting</p> <p>Entertainment</p> <p>Radio</p> <p>TV</p> <p>Ironing</p> <p>Refrigeration</p> <p>Others</p>	<p>Free fuelwood</p> <p>Free fuelwood</p> <p>MK 15–20/month</p> <p>3</p> <p>1</p> <p>2</p> <p>Family in the city.</p> <p>In Chididi—may be for heating.</p>	<p>2 liters/month</p> <p>1</p> <p>2</p>
<p>WILLINGNESS TO PAY FOR ELECTRICITY</p> <p>Connection charge</p> <p>MK 250–500</p> <p>MK 500–750</p> <p>MK 750–1,000</p> <p>>MK 1,000</p> <p>Monthly charge</p> <p>MK 0–60</p> <p>MK 60–120</p> <p>MK 120–240</p> <p>> MK 240</p> <p>FIELD VISIT</p> <p>Date</p> <p>Site</p> <p>Location</p>	<p>75–100</p> <p>5 April 1997</p> <p>Makanjila</p> <p>Maganga</p>	<p>MK 100/month</p> <p>5 April 1997</p> <p>Makanjila</p> <p>Mtekete (near Salima)</p>

Local contact	M.D. Chinsato	F.K. Charula
Proximity to grid	60km to Monkey Bay	60km to Monkey Bay
Proximity to energy sources		
Biomass	Yes	Yes
Minihydro		
Solar	Yes	Yes
Wind	Yes	Yes
Economic activity		
Community center	Yes	None
Distance education center	Yes	None
Fishing industry	Yes	Dry fish sold two times/month. Fresh fish three times/week
Fruit industry		None
Farming	Subsistence	Subsistence
Hospital	Nearest clinic at Lulanga, 52km away	Lulanga, 55km away
Police station		None
Other		
Population	10,000	250
Number of households	1,000	50
Average household size	10	5
Average household income	MK 2,000/month	MK 1,500/month

ENERGY USE ASSESSMENT		
Cooking		
Firewood – Three-stone	Yes	Used for drying fish
– Mud stove		Yes
– Metal		Yes
– Ceramic		Yes
Charcoal – Ceramic		
– Metal		
Crop residue – Three-stone	Yes	Yes
– Mud stove		
Kerosene – Wick stove		

– Pressure stove Heating Firewood Charcoal Others Lighting Candles Kerosene – Wick lamp – Pressure lamp – Fishing	Yes Yes	
ESTIMATE OF EXPENDITURES		2.5 liters/month
Cooking	MK 60/month	5 liters/night
Heating		
Lighting	Kerosene (4–5 bottles at MK 5/300ml bottle)	MK 40/month
POTENTIAL ELECTRICITY USAGE		Kerosene MK 5/300ml bottle 4–5 bottles/month for lighting
Cooking	Highest priority	1
Lighting		
Entertainment	Third highest	3
Radio		
TV		
Ironing	Second highest	2
Refrigeration		
Others		

WILLINGNESS TO PAY FOR ELECTRICITY Connection charge MK 250–500	250	250
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MK 500–750		
MK 750–1,000		
>MK 1,000		
Monthly Charge		
MK 0–60		
MK 60–120		
MK 120–240		
>MK 240	300	MK 200
FIELD VISIT		
Date	8 April 1997	
Site		
Location	Likoma Island	
Local contact	T.A. Mkumpha II (Chief) Clifford Mkambula (Chief Counselor)	
Proximity to grid		
Proximity to energy sources		
Biomass		
Minihydro		
Solar	Yes	
Wind	Wind	
Economic activity		
Community center	Remittances	
Distance education center		
Fishing industry	Principal need is for cold storage	
Fruit industry	Food imported	
Farming	Cassava	
Hospital	30 beds	
Police station		
Tourism	Likely	
Other		
Population	15,000–16,000	
Number of households		
Average household size	7–10	
Average household income	MK 2,000–5,000/week	

Other	
Population	15,000–16,000
Number of households	
Average household size	7–10
Average household income	MK 2,000–5,000/week
ENERGY USE ASSESSMENT	
Cooking	
Firewood – Three-stone	Yes
– Mud stove	
– Metal	Yes
– Ceramic	
Charcoal – Ceramic	
– Metal	
Crop residue – Three-stone	
– Mud stove	
Kerosene – Wick stove	Some
– Pressure stove	
Heating	
Firewood	Yes
Charcoal	
Others	
Lighting	
Candles	
Kerosene – Wick lamp	Yes
– Pressure lamp	Fishing pressure lamp
ESTIMATE OF EXPENDITURES	
Cooking	
Heating	
Lighting	MK 30 (lighting)
	MK 30 (cooking)
	MK 35 (fishing)
POTENTIAL ELECTRICITY USAGE	

Cooking	4	
Lighting	2	
Entertainment		
Radio		
TV		

Ironing	3	
Refrigeration		
Others	Business, trade schools, fishing (cold storage)	
WILLINGNESS TO PAY FOR ELECTRICITY		
Connection charge		
MK 250–500		
MK 500–750		
MK 750–1,000		
> MK 1,000		
Monthly charge		
MK 0–60		
MK 60–120		
MK 120–240		
> MK 240	MK 250–300/month	

Annex 3

International Experience in Power Sector Reform

A.3.1 Malawi is not alone in reviewing the structural options for its electricity subsector. The worldwide trend in the electric power industry is toward improving operation and performance through reform, typically of the industry structure; the ownership and operational control of industry assets; regulation; the price-setting regime; and of competition within the sector.

A.3.2 Several industry models and regulatory schemes are emerging. This annex examines a number of models that have been adopted in countries around the world.

Meaning of Regulation

A.3.3 “Regulation” as referred to here describes government control of an enterprise’s activities. When a government regulates, it imposes direct and indirect controls on the actions of state-owned and non-state-owned enterprises in a particular sector. Regulation is typically conducted through rules as defined in laws, decrees, and guidelines. As important as the actual rules are the procedures used to interpret, apply, monitor, and enforce them.

A.3.4 In the electricity subsector there are five activity areas to which the rules of regulation may apply: generation, transmission, dispatch, pooling, and retailing. The fact that each of these activities can be regulated does not mean that they should be regulated. Perhaps the single most common mistake of new regulatory systems is that they regulate too much. Countries that are moving away from a centrally planned economy are especially susceptible to this tendency. It has been suggested that the fundamental requirement for successful regulatory reform is to break away from the “overregulation habit.”

The Independence Question

A.3.5 During creation of a new regulatory system, the question that always generates the most controversy is: Should the regulatory entity be independent of the government? When this question is first raised most high-level government officials tend to react to the notion of an independent regulatory entity with dismay and disbelief. This negative reaction is the result, in part, of three misunderstandings.

A.3.6 The first misunderstanding is rooted in misinterpretation of the word “independence” itself. No regulatory entity can be truly independent. Even where a regulatory entity is a nonministerial commission or office it is still a creature of government, because it was created by government. The “independence” of a regulatory entity refers to the fact that it does not have to get the approval of the premier or other high-level political authority to amend tariffs or to make other major decisions. Although the political decision has been

made to give the regulatory body autonomy in tariff changes and other decisions, this does not imply an absence of accountability. While not accountable to the minister, the regulatory body is accountable to the tariff standards in the law.

A.3.7 The second misunderstanding lies in the belief that the regulatory entity must be given complete authority over all policy decisions that affect the power sector. In countries with independent regulatory entities, executive departments or ministries retain control over many fundamental policy decisions affecting the sector. The basis division is between policy development by the ministry and policy implementation by the regulatory entity (see Box A.3.1).

A.3.8 The third, and perhaps most important, misunderstanding arises from confusion about the reason for independence. Independence is not an end in itself, but is a means to an end. What ultimately matters is not whether the regulatory entity is independent but whether the government can give a credible commitment to investors and consumers. Investors, both domestic and foreign, need assurances that their investment will not disappear through direct expropriation or through many small regulatory actions that may add up to de facto expropriation. In other words, they need to be convinced that they will within reason recover their costs and earn a profit commensurate with the risk that they take. Consumers need to be convinced that the government will not leave them unprotected from monopoly prices charged by entities that have been given a legal monopoly by the government.

A.3.9 If a government can give credible commitments without an independent regulatory entity, there is no real need for independence. In most countries, however, high-level government officials will try to keep tariffs low when they have direct (or hidden, indirect) control over tariffs. The basic rationale for creating an independent regulatory entity therefore is that such an entity may be better able to give a commitment on which investors can rely.

Sector Structure and Regulation

A.3.10 This annex also focuses on regulation and sector structure in each of the models described. This is done for several reasons. First, sector structure is the single most important determinant of what should and should not be regulated. Second, some sector structures are easier to regulate than others, and some are more susceptible to economic abuse. Third, if the power sector is evolving from one structure to another, regulatory actions can help or hinder the transition.

Box A.3.1: Responsibilities Not Assigned to Regulatory Institutions

- Allocation of subsidies to particular regions, customer classes, technologies, and fuel sources.
- Development of national, provincial, and local energy, development, and industrial plans.
- Approval of government funding to finance the construction of power facilities.
- Approval of the use of national, provincial, and local resources, such as foreign exchange, land, and water resources.
- Design of power sector industry structure and the use of private funding and foreign participation.

Chile

Privatization Experience of the Electric Power Industry

A.3.11 The primary aim of the power sector reforms initiated by the government of Chile in the late 1970s was to establish a stable, nonpoliticized, and transparent regulatory basis that emphasized efficient operation and a declining commercial role for the government in the sector and that would ensure the sector's long-term financial viability. To this end, the government established technical and economic standards in the sector's legal and regulatory frameworks that aimed to foster efficiency through competition and to enable private investment in electric utility operations. To enhance utility operations and make the sector more attractive to private investors, the government determined to diversify the ownership of and to deconcentrate, decentralize, and regionalize the existing power companies.

A.3.12 Having decided to follow this course, the government pursued privatization goals in an incremental and deliberate manner, and premised those goals on the substantial participation of major institutional investors in the privatization process at levels sustainable by developing capital markets. Privatization as a goal was permissible only to the extent that it safeguarded an acceptable level of efficiency and economic operation in the development of the electricity subsector. Among the benefits anticipated from electricity subsector reform were greater diversity of job opportunities for utility workers and managers; more numerous and smaller electric power companies, offering a variety of services to meet the particular needs of customers; enterprise and sector features attractive to investors; and greater technological competition and innovation within the sector.

A.3.13 The reform objectives and the mechanisms through which they were to be attained were outlined in Decree-Law 2.224 of 1980 and the Electricity Law embodied in DFL-1, Mining, of 1982. These laws provided the CNE[with the philosophical basis for the breaking up of integrated sector enterprises, for introducing competition in the bulk power markets, for establishing equitable operating standards based on economic criteria, and for creating opportunities for private sector participation at all levels.

A.3.14 The government determined to undertake a two-step process to restructure and privatize the electricity subsector and to carry out the intention of the 1982 Electricity Law. First, CORFO, the holding company for state enterprises, would implement the corporate reorganization and financial restructuring of the state-owned utilities. The organizational changes were necessary to decentralize utility functions, diversify the number and size of utility operators, and prepare the state-run utilities for operation on a competitive basis. The restructuring not only served to prepare the state companies to operate on a level playing field with private operators but also made the state companies more feasible (in terms of size) and attractive as an investment option for privatization. The second stage would be the actual transfer of the electricity subsector's operations and assets to the private sector.

A.3.15 The first stage required the breaking up of the two main state utility conglomerates—ENDESA and Chilectra—placing their operations into separate corporate entities that could later be sold to private investors by means of public auction, sale of stock, direct sales to employees, and so on. ENDESA's and Chilectra's operations were divided into various companies by distinguishing the generating functions from distribution functions, and by further dividing these separated operations into geographical zones. The

new companies all reorganized internally to meet the financial reporting requirements of their respective board of directors and shareholders and to secure project capital.

A.3.16 CORFO estimated ENDESA's stock value at roughly equivalent to 40 percent of its book value. During the first year of the offering the private sector bought only about 15 percent of the share value on the stock exchange, however, indicating that investors found the selling price too high. A period of inflation subsequently acted to devalue the stock offering (which remained at the same price), stimulating activity in ENDESA shares. At the close of the second year on the stock exchange more than 60 percent of ENDESA's ownership shares had been purchased by the private sector.

ENDESA

A.3.17 In 1980 the government of Chile had successfully sold two of ENDESA's former distribution companies to COPEC, a petroleum company, through public auction. The two companies, SAESA and Frontel, had already been operating as affiliates before the privatization process began. Most of the other operating affiliates of both ENDESA and Chilectra were not ready for sale as autonomous entities until several years later. ENDESA's generating companies were not made ready for privatization until the mid-1980s and later, and three of its distribution companies, operating at a loss, were considered such poor prospects for privatization that they initially were bought from ENDESA by CORFO.

A.3.18 The remaining ENDESA affiliates were over the ensuing decade sold in tranches to private investors, culminating in the privatization of the main ENDESA generating company in 1990 and the completion of ownership transfer of the Pehuenche power station by the time it came on-line in 1991. From 1986 to 1989, direct sales to the public saw the ownership of Edelmag partially transferred to small investors from its own region, as well as to other investors. This was also the case when Elecda (in which various investors purchased shares through the stock market, and a portion of which was given in an expropriation settlement to some small investors) and Emelari were similarly partly sold to regional investors and, in Emelari's case, partly to public employees. Eliqsa was sold to regional investors and public sector employees in one tranche; it was also subject to the dispersal of ownership shares through an expropriation settlement and through stock market purchases.

A.3.19 In 1986 three of ENDESA's former distribution affiliates—Coquimbo (Emec), Melipilla (Emel), and Atacama (Emelat)—and one small generating affiliate (Pilmaiquen) were sold. Emec was sold by public auction, Emel was sold directly to ENDESA employees, Emelat was sold by auction to Emel and ENDESA employees, and Pilmaiquen was sold through auction to a foreign investor. In 1986 a generation project under ENDESA was hived off into the independent Empresa Eléctrica Pehuenche S.A. (Pehuenche). This company, which was undertaking the construction of a hydroelectric generating project of about 500MW, was gradually sold by direct sales to its own employees and, through a subscription of new shares to ENDESA, by the time its powerplant came on-line in 1991. Another former ENDESA affiliate, the small generating company Empresa Eléctrica Pullinque S.A. (Pullinque), was sold by auction in 1987.

A.3.20 Finally, ENDESA, at this point the largest generating company in Chile with 1,870MW of installed capacity, was sold in 1989 through stock sales, direct sales to employees, direct sale to the public, and expropriation settlements to small investors. As of 1991, 91 percent of ENDESA's employees (almost 2,700) owned 3.5 percent of the company's value in stocks. About 33,000 public sector employees held 32 percent of the stock value, and another 25 percent of the stock value was held indirectly (through pension funds) by workers.

A.3.21 By 1990 all the distribution companies had been privatized. In the central zone, only the Colbún Machicura hydroelectric generating company remained under state (CORFO) control. The government retained majority ownership of the generating and distributing utilities of Edelnor in the northern zone and Edelaysen in the southern zone.

Chilécetra

A.3.22 In 1981 Chilécetra was broken up into Chilécetra-Generación (Chilgener) and two distribution companies: Chilécetra-Metropolitana (Chilmetro) and Chilécetra-V Region (Chilquinta). After the auction of SAESA and Frontel in 1980 and the initial spin-off of Chilécetra and ENDESA affiliates, in 1983 CORFO set up the trading on the stock exchange of Chilécetra shares and the shares of ENDESA subsidiaries, resulting in 8–10 percent of Chilécetra's two distribution companies being privatized. By 1987 the reorganized Chilécetra companies were fully privatized through stock sales to pension funds, banks, and other domestic investors (and, in the case of Chilgener, to foreign investors), and by direct sales of shares to utility employees.

The New Electricity Subsector

A.3.23 The electricity industry in Chile is divided into three key areas: generation, transmission, and distribution. Designed to provide a fully competitive environment, it is regulated by the General Electricity Law, Decree Law No. 1, 1982, of the Ministry of Mining. Power generation is organized around two major grid systems: the Interconnected Central Grid (*Sistema Interconectado Central*, or SIC), extending from the Third to the Tenth Region and serving 93 percent of the population, and the Northern Interconnected Grid (*Sistema Interconectado del Norte Grande*, or SING), serving the First and Second Regions, including large consumers in mining and industry. Electricity generation is coordinated in each area by the corresponding Economic Load Dispatch Center (*Comité de Despacho Económico*), an autonomous organization that groups the main generating companies.

A.3.24 The Economic Load Dispatch Center plans and coordinates the operation of the plants to ensure the economic efficiency of the electricity system. Demand is met by dispatching plants in order of increasing variable generating costs, to ensure that electricity is always provided at the lowest generating cost possible.

A.3.25 The generation companies sell to three main markets:

- *Producers.* Energy and capacity are transferred between generation companies to enable them to meet their contractual commitments. The valuation of the energy is done on an hourly basis at the system marginal cost of operation. Capacity is transferred at the corresponding node price.
- *Free market.* All consumers with installed capacity in excess of 2MW are not subject to price regulations and can freely negotiate with the generation companies. In 1997 30 percent of SIC sales and 85 percent of SING sales were made to the free market.
- *Regulated market.* The regulated market comprises all consumers with demand of less than 2MW that are located within the concession areas of the distribution companies. Electricity is sold to these protected consumers at a regulated node price, reassessed every six months by the National Energy Commission on the basis of the projections of marginal costs of the system in two (SING) and four (SIC) horizons.

A.3.26 The transmission system operates on an open basis and provides access for all users. Transmission tariffs are charged to generation companies and large users according to the replacement cost of the line, the area of influence, and the amount of energy transmitted.

A.3.27 There are 11 generating companies in Chile, eight of which provide power to SIC. ENDESA, the largest generator, with 1,927MW of installed capacity, sells about one-half of its generation to the SIC at regulated prices and the remaining one-half at nonregulated prices. The largest four suppliers to the SIC (and the largest in Chile), each with an installed capacity of around 500MW or more, are:

- Empresa Nacional de Electricidad S.A. (ENDESA), supplying 1,734MW
- Compañía Chilena de Generación Eléctrica S.A. (Chilgener), supplying 547MW
- Empresa Eléctrica Colbún-Machicura S.A. (Colbún), supplying 490MW
- Empresa Eléctrica Pehuenche S.A. (Pehuenche), supplying 500MW

A.3.28 There are four medium-sized generators (10–50MW) on the SIC—Pilmaiquen, Pullinque, Hidroeléctrica Guarda Vieja, and S.C. del Maipo. There are also numerous smaller electricity suppliers, totaling about 10MW, that serve the southern and central regions of the country.

A.3.29 The main generating company on the SING is the Empresa Eléctrica del Norte Grande S.A. (Edelnor), with 96MW of installed capacity. Edelnor is majority-owned by the state but is scheduled to be sold off through stock sales. In the south, the Empresa Eléctrica de Aysen S.A. (Edelaysen), also under state majority ownership, has 11MW of generating capacity, and the privately owned Empresa Eléctrica de Magallanes S.A. (Edelmag) has 46MW of capacity. The SING additionally is supplied by a large amount of self-generation and third-party sales. A few other small isolated systems have self-sufficient power producers, adding a small amount of generating capacity to Chile's total.

A.3.30 In 1979 there were 10 distribution companies under state control and a few other companies not under state ownership. Electricity distribution is now provided by 23 privately owned and two state-owned distribution franchises, three municipal utilities, and seven electric cooperatives with electric concessions. Most of these distribution entities purchase bulk electricity from generation companies or third-party generators, including industrial self-generators. On the SIC grid alone there are 17 regional distributing companies, of greatly divergent sizes. There are three small municipal utilities: Empresa Eléctrica de Machalf, Empresa Eléctrica de Til-Til, and Empresa Eléctrica Municipal de Las Condes, each selling around 1.5MWh of energy to between 600 and 1,000 customers. In addition to these distribution companies there are approximately five nonconcessionaire electric cooperatives that supply power to their members.

Salient Features of Chile Reform:

- First country to restructure power sector and set up competitive market.
- Successful in attracting private sector investment.
- Sector reform was an integral part of the overall macroeconomic reform guarantee.
- Categorized local institutional investment through the participation of pension funds in the privatization of sector entities.
- Model for reform in other Latin American countries.

Colombia

Sector Structure and Reforms

A.3.31 The Colombian electricity subsector generally has sufficient generation capability to meet demand, but periodic shortages occur due to drought. About 78 percent of Colombia's 10,000MW of installed capacity is hydroelectric. To reduce its dependence on hydroelectric power the government is encouraging the development of new power plants using established coal reserves and a newly discovered gas reserve. Like many countries, Colombia's electricity rates have been kept low for political reasons, with the result that many state enterprises have not been able to recover their costs. The tariff structure also supports cross-subsidies. Before sector reform was begun it was estimated that some industrial customers paid two times the long-run marginal cost of generation in order that subsidies might be provided to residential customers. Losses are of the order of 20 percent.

A.3.32 Until recently government enterprises completely dominated the power sector. Large municipal companies operate in Bogotá, Cali, and Medellín. The government and national government institutions, such as CORELCA, own and control generation and distribution assets through their ownership interests in more than 20 regional companies. Another state-owned company, ISA owns and operates about 70 percent of the national interconnected grid.

A.3.33 Colombia has undertaken significant structural reforms in the last several years. Important goals of the 1994 Public Service Law and the 1994 Electricity Law were to achieve an open, unbundled, and competitive electricity subsector. The Electricity Law promotes competition in generation and third-party access in transmission and allows customers with demands in excess of 2MW to buy directly from generators. The law prohibits new distribution companies from owning generation plants, but it appears that the Minister of Mines and Energy has given at least one exception to this prohibition.

A.3.34 The Colombian power reform program was a more gradual process than the reform program that was instituted in England, but its final goal is similar: a deintegrated, competitive, and largely privately owned power sector. To facilitate the move toward private ownership, the Public Service Law encourages commercialization and corporatization of publicly owned power enterprises. For example, the law contains provisions that create a new corporate form for public enterprises that allows them to issue shares, impose restrictions on political control of the board of directors of local public utilities, and establish private contracting and commercial procurement practices for public and private utilities.

Regulation

A.3.35 Colombia's structural reform effort has been accompanied by regulatory reform, primarily in the form of establishment of the National Energy Regulatory Commission, created by decree in 1992 and by law in 1994. The commission has responsibility for the electricity and natural gas subsectors.

A.3.36 The National Energy Regulatory Commission has jurisdiction over both public and private power enterprises. It has the power to stop anticompetitive practices, to establish tariffs for regulated services, to develop rules for a national pool, and to set requirements for gaining access to the national grid.

Composition, Voting, and Staffing

A.3.37 The National Energy Regulatory Commission is composed of eight members. Five members are full-time regulators who are described as "experts;" the other three are the Ministers of Finance, Planning,

and Mines and Energy. The Minister of Mines and Energy serves also as President of the National Energy Regulatory Commission. The minister and the executive director certify the decisions of the commission. Under Colombian law, the minister is not allowed by law to withhold his signature from a commission decision even if he disagrees with it. The executive director of the commission is responsible for developing the agenda of commission meetings and determining the issues that will be dealt with. That position is rotated among the five full-time members. It has been suggested that the executive director be required to share his agenda and planning responsibilities with the other four experts who form a committee that is specified in the law.

A.3.38 The five expert members are appointed by the President of Colombia for four-year, staggered terms and earn salaries that are comparable to that of a high-level government official. In practice, the appointments are made on the recommendation of the Minister of Mines and Energy. Similarly, although the commissioners' terms are theoretically fixed the three government ministers can influence changes in the commission's composition. The expert members must have at least six years of experience in the electricity subsector, plus a degree in engineering, economics, business administration, or a related field. Lawyers, unusually, are excluded from membership. Most other regulatory commissions around the world encourage or require that at least one commissioner be a lawyer.

A.3.39 During its start-up period the National Energy Regulatory Commission has relied heavily on outside consultants. Their services have been financed by the World Bank and the Inter-American Development Bank. Commentators have suggested that, for the purposes of flexibility, the commission be expressly exempted from public procurement rules with respect to the hiring of consultants. However, it has also been suggested that procedures be developed that proscribe, for a period of one year, the subsequent employment of consultants to positions in which they could use their inside knowledge for the benefit of the regulated entities. A one-year prohibition on employment by regulated entities already exists for the commissioners.

Degree of Independence

A.3.40 The presence on the commission of three government ministers means that the National Energy Regulatory Commission cannot be considered independent. The Colombian constitution furthermore requires that the commission's authority to regulate must be established by presidential decree. If a future Colombian president is displeased with the commission's actions, he or she could eliminate the commission's powers with another decree.

A.3.41 Another unusual feature of the Colombian system is that the commission does not enforce its own decisions. The Colombian constitution provides for the supervision and control function to be delegated to the superintendent of public services, who reports directly to the President. In effect, the superintendent's role is to ensure compliance with laws and regulations.

Process, Decisions, and Appeals

A.3.42 Although not required to do so by law, Colombia has introduced an informal consultative process that affords the opportunity for comment to the industry, consumers, and other interested parties. The consultations take place in the form of private meetings between the commissioners and different enterprises, and are considered to enhance the effectiveness of regulation by improving the quality of regulatory decisions

and therefore by adding to the acceptability of regulatory decisions. The practice of private consultation, however, is susceptible to the criticism that it can serve as a mechanism for giving “special deals.”

A.3.43 It has been recommended that Colombia expressly adopt a consultative process that includes a written proposal of regulatory action, written comments, and an opportunity for the regulator to meet separately with different parties. It has also been recommended that this consultative process not be employed for tariff decisions because, given the politically charged nature of those decisions, the consultative process might be overwhelming and this could interfere with the regulator’s ability to reach a decision.

A.3.44 The National Energy Regulatory Commission’s decisions are issued in writing, with references to the laws, decrees, and regulations that provide the basis for regulatory action. The decisions are published in the official diary that provides notice of regulatory action.

A.3.45 Regulatory decisions may be appealed to the commission. The appellant must first file a notice of intent to appeal, and the commission will then rule on that appeal. On legal matters, regulatory decisions can be appealed to the State Council, an administrative court. On a day-to-day basis, the executive director may issue clarifications of existing policies.

Pricing Mechanism

A.3.46 The National Energy Regulatory Commission regulates prices only in the regulated market. For example, the commission does not regulate prices for consumers with loads of 2MW or more. Those customers are allowed to purchase directly from any supplier at nonregulated prices. A similar system exists in England, Chile, and Argentina. When this practice was first implemented the financial condition of the distribution companies deteriorated, because they previously had used their industrial customers as a source of subsidies for other retail customers. In the regulated market the distribution companies are allowed to recover their purchase power costs, transmission costs, and an incremental charge for distribution. The incremental cost of distribution is set using an estimate of the cost of operations of an optimally configured system.

A.3.47 The National Energy Regulatory Commission does not regulate the prices charged by independent power producers (IPPs). To date, most IPP sales are made to existing generation enterprises that resell the power in a national pool. If the buyer pays too much, it runs the risk of being unable to resell the power in the pool. The competition in the pool thus creates a strong need for discipline on the part of those generators that buy from IPPs.

A.3.48 This discipline is missing when the buyer is a distributor that supplies captive customers. The Colombian commission, like its English counterpart, has legal responsibility to review the major power purchases of the distribution companies to ensure that there is “economic” purchasing. This can be done by looking at the procurement process, the prices paid, or both. In Argentina, for example, the distribution utilities serving Buenos Aires are allowed to pass through the power prices observed in the spot market. Another alternative would be to establish a benchmark using prices paid in long-term contracts. The Colombian commission has not yet made a decision on the method or methods it will use.

England and Wales

A.3.49 The model adopted by England and Wales is that of a disaggregated and privatized competitive industry structure.

Policy Objectives

A.3.50 The government's objectives in restructuring and privatizing the power sector included developing a more cost-effective and efficient electricity system that was regulated by the market and responsive to customer needs.

Industry Structure

A.3.51 Prior to restructuring and privatization the industry consisted of the following:

- The Central Electricity Generating Board (CEGB), which produced approximately 94 percent of the total public supply system requirements.
- The CEGB owned and operated the national grid and managed the interconnections with France and Scotland.
- Twelve Area Boards purchased electricity from the CEGB and distributed it in designated franchise areas.
- The Electricity Council exercised a coordinating role for the electricity supply industry, providing services in areas of common interest (such as national pay bargaining). The CEGB and Area Boards were part of the Electricity Council.

A.3.52 The restructuring of the industry disaggregated the sector into separate generation, transmission, and distribution companies. Generation is dominated by National Power and PowerGen, with approximately 44 percent and 28 percent of the market, respectively. The nuclear facilities, which account for approximately 18.5 percent of overall generation capacity, are owned by state-owned Nuclear Electric, recently renamed British Electric. The remaining electricity comes from imports (8.5 percent) and from the National Grid Company (NGC; approximately 1 percent).

A.3.53 The National Grid Group (NGG), the holding company of NGC, owns and operates the transmission system in England and Wales and also has interests in projects in Argentina and Pakistan.¹⁰

A.3.54 Twelve Regional Electric Companies (RECs) are responsible for buying and selling electricity as suppliers and distributing it to customers. The RECs buy electricity through a pool and, through tariffs and contracts with customers, seek to pass the costs involved in the purchase and sale of electricity on to customers and to make a small operating profit.

Regulatory Framework

A.3.55 The purpose of regulation is to oversee prices, promote competition, and protect customer interests in areas where natural monopolies remain (such as distribution and transmission).

A.3.56 The relevant government minister and the Director General of Electricity Supply (DGES) are the principal regulators of the industry; each is given specific responsibilities under the Electricity Act of

¹⁰ In October 1995, six RECs, holding approximately 47 percent of the share capital of NGG, announced their intention to sell their interest in the capital market.

1989. The responsibilities of the government minister include licensing and the regulation of certain matters related to the development of the physical electricity supply system, fuel stocking, and the quality of electricity supply. Those of the DGES include economic regulation, licensing (pursuant to a general authority given by the minister), and the general supervision and enforcement of the license regime. Together with the minister, the DGES has the duty to promote competition and to ensure the protection of the interests of electricity consumers. The DGES has established the Office of Electricity Regulation (OFFER) to assist him or her in carrying out duties and functions under the regulatory regime. In early 1998 the government decided to merge regulation of the electricity (OFFER) and gas (OFGAS) industries under a single agency.

A.3.57 The role of DGES with respect to generation is limited because it is expected that competitive forces will force productive and allocative efficiency. Contracted supply by bodies other than the RECs to nontariff industrial or commercial customers is not subject to price control because of market competition. The supply of electricity by RECs, as well as the monopoly activities of transmission and distribution, is heavily regulated. OFFER administers price caps rather than controlling rates of return. Price control for the distribution and transmission grid is based on an RPI-X formula: The rates charged for distribution services are set equal to the base year revenue requirements (calculated on the historical cost) times RPI-X (where RPI equals the inflation rate and X equals an efficiency factor calculated by the regulatory body). The theory is that the distribution company should be allowed to recover the total costs of operation adjusted for inflation, and with incentive to improve efficiency.

A.3.58 It was believed in setting up the regulatory system that regulation would be light-handed. In spite of this intent and the support of DGES for the workings of the market, regulation has been perhaps more active than was originally conceived. OFFER has since imposed price control on the pool (see discussion below) and forced the generators to divest themselves of certain assets.

A.3.59 NGC is charged with promoting competition in generation by permitting nondiscriminatory access to all parties and charging nondiscriminatory prices to similarly situated customers. NGC's transmission prices vary by geographic zone, to take into account the relative cost of transmission within that zone. Overall rate increases for transmission through 1997 were based on a variation of the RPI-X formula.

A.3.60 The pool, operated by NGC, is the mechanism by which production and consumption are coordinated and appropriate prices set. Long-term supplies of electricity to consumers are still set by contract, but the ongoing operation of the system is managed by the pool. The pool is intended to replace the coordination of the industry that was formerly provided under state ownership through the vertical integration of the various business units. It is not the pool, however, that dictates the actual prices paid for the majority of power traded. Concern over the potential volatility of the pool price means that approximately 95 percent of electricity purchases are made under long-term contracts that are based on expectations of the generating costs. The pool price is used to clear the market between the generators and distributors on an ongoing basis.

Capital Attraction

A.3.61 In addition to restructuring the industry, the government privatized much of the power industry, raising US\$17 billion. Shares in National Power and PowerGen were sold to the public in two tranches: 60 percent in 1990 and the balance in 1995.

A.3.62 Following privatization the government's earlier plans to build three more expensive nuclear power plants and CEEB's desire to build four 900MW coal plants were dropped. New capacity has been provided by gas-fired units, at an estimated annual savings of US\$1 billion.

A.3.63 The 12 RECs were sold in a single offering, with the exception of the "golden share," which was sold in March 1995. The total value of the fully paid shares was £5.2 billion; in addition the government loaded debt of £1.9 billion on the RECs and £900 million on NGC.

A.3.64 The government has divested itself of British Energy (formerly Nuclear Electric and Scottish Nuclear). The company is now a standalone private company.

Financial Impacts

A.3.65 The financial impacts of the restructuring pertain to the financial results of the companies in the industry and their impacts on the government and other customers.

A.3.66 It is generally accepted that the costs of production have decreased since privatization. At the time of restructuring, no account was taken of the scope for cutting staff and increasing efficiency. The generators reduced their numbers by more than half, and the RECs by at least 25 percent. Even state-owned Nuclear Electric, faced with periodic status reviews, has reduced operating costs by 20 percent.

A.3.67 The operation of the pool system has failed to drive down prices. The two large generating companies, National Power and PowerGen, have been suspected of exploiting their market power to maintain prices at an artificially high level, as pool prices have risen significantly since 1990. The two large generators have retained control over the pool price largely by virtue of their ownership of power stations. National Power and PowerGen own all the coal-fired stations, which have higher running costs than the nuclear and the gas-fired stations of their main competitors. As a result, the generators are the last generators to be brought on-stream at high levels of demand, and largely dictate the final clearing price of the pool, unchallenged by competition from other generators.

A.3.68 To mitigate this, both companies have been ordered by the regulator to sell off 6,000MW of capacity to better realize the desired levels of competition.

A.3.69 OFFER conducted a review of the industry in August 1994. As a result of this review the regulatory body chose to encourage cost-cutting by controlling the actions of the distributors rather than those of the generators. The main points of the review are:

- Distribution prices fell 11–17 percent in 1995 and were forecast to fall by RPI-2 percent between 1996 and 2000.
- Prices are to be based on the previous year's inflation rate, rather than on a forecast of the next year's rate.
- Measures are to be introduced to reduce power losses and encourage energy efficiency.
- Standards of service on supply restoration and meter reading are to be raised.

A.3.70 The regulator is attempting to preserve the level of quality and reliability and at the same time manage the delivery price to the customer. According to UK government statistics, large industrial customers have seen on average an 8 percent drop in power rates since 1989; small industries a 5 percent

drop; and households a 3 percent drop, excluding VAT (VAT increases have wiped out the savings from which households otherwise would benefit).

A.3.71 Competition was introduced not only in generation but also in supply. In the four years prior to March 1994, the competitive market had included 5,000 customers with demand in excess of 1MW, accounting for 30 percent of energy consumption. In April 1994, the lower limit defining the competitive market was dropped to include 50,000 100kW customers, representing another 20 percent of energy consumption. In April 1998, all 22 million electricity customers became part of the competitive market.

A.3.72 The financial performance of the companies making up the restructured industry can be summarized as having produced attractive returns for investors. A number of the companies have diversified into other activities in the United Kingdom (for instance, retailing electrical goods and natural gas development) and have invested in other countries. In 1992–93, NGC earned 30 percent on equity and the RECs averaged 20 percent. More recently, the returns of the generators and RECs have averaged about 20 percent.

Transition Costs

A.3.73 Transition costs were incurred in terms of the interim support provided to various segments of the industry and reduced employment.

A.3.74 To ensure the financial viability of the new generators, the government capitalized them with little or no debt. To assist the RECs the government gave them three-year contracts to supply their franchise markets and incorporated a capacity allowance comparable to the estimate of short-term prices in a genuinely competitive market.

A.3.75 To protect the nuclear power industry, the government chose to subsidize nuclear plants until 1998 with a levy on the operators of fossil-fuel-fired plants.

A.3.76 To protect British Coal, the government required National Power and PowerGen to enter into three-year contracts for 65 million tons of coal at prices 50 percent above world coal prices. The prices were built into the franchise contracts. The domestic coal industry nonetheless has suffered from the privatization of the electricity industry: once privatized, the generators were allowed to purchase fuel from more competitive sources.

A.3.77 Additionally, in the early 1990s the European Commission lifted the ban preventing countries from using gas to generate electricity. All the RECs, with the exception of Manweb, undertook a “dash for gas” by building combined-cycle gas turbine stations, either by themselves or with a partner. The coal industry strongly opposed this action, but the regulator found that the RECs’ plans were acceptable and he found no evidence that the companies were committing themselves to an uneconomic supply of fuel. British Coal still exists, but in greatly reduced form: its staffing level fell from 240,000 in 1984 to 16,000 in 1994.

A.3.78 At the time of its dissolution in 1990, CEGB employed 47,000 people. In 1994 its successor companies employed 26,000.

Lessons Learned

A.3.79 The main lessons from the privatization of the electricity subsector include:

- Effective competition between regional distributors may be difficult to achieve in practice.
- Competition in generation requires more than two dominant players.
- The adoption of a pool system may provide an effective means of clearing prices in the wholesale market for electricity, but may not be effective in encouraging cost reductions.
- Operation of the national grid as a natural monopoly may prove highly profitable for the grid operator.

A.1.56 The activities of the industry regulator DGES have been of concern to politicians and to the financial markets, and have highlighted the continued importance of the regulatory function in the power industry. There is a need for a transparent, stable, and rational regulatory regime to encourage new entrants into the sector, and there is a need for a deliberate and publicized pricing policy to build confidence in the industry.

A.3.80 Incentive-based price regulation can inspire management to reduce costs and improve shareholder value, thereby increasing the opportunity for mergers and acquisitions (or, in effect, another round of industry restructuring).

A.3.81 The electricity industry in England remains dynamic, with a number of pending sales. There has been a flurry of merger and takeover activity that may suggest that the separation of generation from distribution may not be essential to the successful operation of the industry.

State of Orissa, India

Sector Structure and Reforms

A.3.82 Orissa is a state in south-central India with 39 million people. Until recently, electricity service to about 1.3 million customers was provided by the Orissa State Electricity Board (OSEB), a vertically integrated power enterprise that was owned and controlled by the state government. In 1993, the state government decided to initiate a radical reform program involving a combination of restructuring, privatization, and independent regulation.

A.3.83 This decision was motivated by the poor technical and economic performance of OSEB. OSEB was experiencing losses of 40 to 50 percent—in effect, it was billing 1kWh for every 2kWh that it was generating or purchasing. The losses were caused by poor operation and theft. Blackouts were commonplace and the quality of the electricity was poor, with significant fluctuations in frequency and voltage. Tariffs were too low to produce revenues that would allow OSEB to recover its operating and capital costs. In addition, the managers of OSEB complained that they could not properly manage the company because of political interference in many operating and investment decisions. OSEB's poor financial performance meant that the state government had to provide significant subsidies to OSEB; the government's decision to undertake a radical reform was triggered in part by its realization that it simply did not have the financial capability to finance the construction by OSEB of new generating plants.

A.3.84 Orissa has chosen to restructure its power sector along the lines of the single buyer–single seller model. The Grid Corporation of Orissa (GRIDCO), a state-owned corporation, was established in 1995. All of OSEB's transmission and distribution assets were transferred to GRIDCO on 1 April 1996, and at least initially it is GRIDCO that will own and operate the transmission and distribution systems and perform the

dispatch function. It furthermore will act as the single wholesale buyer of power from existing and new generating facilities. The government's reform strategy is to privatize all existing generation, with the possible exception of some hydroelectric facilities. All new generating plants will be built by private IPPs on a build-own-operate (BOO) basis. The acquisition of all new generation supplies will be through competitive bidding. It is anticipated that most of the investment funds in these new generating plants will come from foreign companies. Indian law allows foreign companies to have a majority interest.

Regulatory Reform

A.3.85 On 1 April 1996 the Orissa Electricity Regulatory Commission was established under requirements specified in the Orissa Electricity Reform Act. Three commissioners have been selected. The commission is not a division or office within an existing ministry, but is the first fully independent electricity regulatory authority in India. The law sets forth the commission's responsibilities and obligations in considerable detail.

A.3.86 Under the Indian constitution electricity is a "concurrent" subject. This means that regulatory responsibility for the power sector is divided between the national and state governments. Since two levels of government are jointly responsible for regulating the sector, the constitution required Orissa to receive the approval of the central government for its new law. The fact that Orissa received central government approval to establish a particular type of regulatory system does not mean that other Indian states are now required to adopt the Orissa system.

Issues and Problems

A.3.87 The Orissa reform is still in its early stages and would be premature to attempt a full assessment of the new system. There nonetheless are certain issues relating to the design of the regulatory system and the general reform process that are worth highlighting.

Conflict of Interest Standards for the Commission

A.3.88 In writing the new law, an important objective of the Orissa government was that the general public should have confidence that the regulatory commission will make fair and objective decisions. If the public believes that a regulatory commissioner is favoring the interests of a power enterprise, the commission will soon lose its political legitimacy. The new law in Orissa as a consequence imposes strict restrictions on the commissioners. Article 5 of the law prohibits a commissioner or any relative from having employment and financial interests in any company that the commission regulates or in any company that provides goods or services to the regulated companies.

Openness of the Decision-Making Process

A.3.89 The Orissa law places much emphasis on the transparency of the decision-making process. Article 9 of the law requires that the new commission develop written procedures to ensure an open decision-making process, to ensure that the commission is perceived as a legitimate and impartial institution.

A.3.90 The first set of rules and procedures were developed by the new commissioners and outside consultants. The developers set forth specific requirements, procedures, rights, and obligations for each of the commission's principal areas of regulatory responsibility: licensing; the setting and monitoring of transfers; the monitoring of transfers involving utility assets; ensuring quality of service; and setting the standards for the provision of and abandonment of service by licensees.

A.3.91 The rules are intended to satisfy three (sometimes conflicting) goals:

- to ensure that sufficient information is available for the commission to make high-quality decisions;
- to ensure sufficient transparency in the commission's decision-making processes to guarantee the fairness of the processes; and
- to avoid a burdensome and slow decision-making process.

Subsidies

A.3.92 Subsidies are widespread in the Indian electricity subsector, with agricultural users generally receiving the greatest subsidies. The new law confronts the subsidy issue directly. Article 12 says that "the State Government shall be entitled to issue policy directives concerning the subsidies to be allowed for supply of electricity to any class or classes of persons." The article goes on to state that if the state government wishes to provide a subsidy to a particular class of customers it must provide the money to pay for the subsidy.

A.3.93 There are two important implications to Article 12. First, it is the state government, not the regulator, that makes the decision about subsidies. This is reasonable because such subsidies represent social policy, and it is not the job of the regulator to make social policy. Second, if the government decides as a matter of social policy that certain groups should be subsidized, the law requires that the government itself provide the money to support the subsidies.

A.3.94 This is an ambitious policy, and it remains to be seen whether or not the Orissa government will be successful in implementing it.

The Vertical Split of Regulatory Authority

A.3.95 The new law specifies certain functions for the new state regulatory entity but it does not clearly delineate the division of responsibilities between the regulatory entity in Orissa and the existing Central Electricity Authority of the national government.

A.3.96 The division of responsibility is implied rather than stated. Since central government approval was required for the Orissa law, and the law sets forth responsibilities for the new state regulatory authority, the implication is that the central government has agreed to this division of responsibility. Different states nonetheless retain the right to seek a different division of responsibility.

Malaysia

A.3.97 The industry structure in Malaysia exemplifies a variant of the single buyer model, in that all private developers of generation must enter into long-term power purchase agreements (PPAs) with the dominant vertically integrated utility, Tenaga Nasional Berhad (TNB).

Policy Objectives

A.3.98 The policy of the government of Malaysia is to provide opportunities for the private sector to participate in the development of new generation plants and to move the electricity subsector toward market-driven results. The most important objectives of this energy plan are to:

- reduce Malaysia's dependence on oil;

- increase the use of indigenous resources;
- supply sufficient energy to support the nation's economic development;
- increase utilization efficiency; and
- increase the utilization of waste energy sources.

A.3.99 The primary reason for introducing competition into the electricity generating industry is to produce a more efficient system and thereby to improve the performance of the economy. If there are no efficiency gains in cost or quality of service the results will not compensate for the difficulty and cost of introducing change.

Economic Conditions

A.3.100 Prior to the recent financial crisis in Asia, Malaysia had developed into one of the most politically and economically stable countries in the region. The country had been quickly moving toward becoming a high-technology industrial economy, and the demand for electricity was expected to grow at 12–15 percent a year over the next 10 years. The financial crisis caused a sharp decline in demand growth projections.

Industry Structure

A.3.101 Electricity supply in Malaysia is provided by three autonomous, vertically integrated public utilities. The largest of these is Tenaga Nasional Berhad (TNB), the successor organization of the National Electricity Board, which was incorporated in 1990 and which supplies power to the Malaysian Peninsula. The Sarawak Electricity Supply Corporation (SESCO) is a statutory body owned by the state government of Sarawak. The Lembaga Letrik Sabah (LLS), or Sabah Electricity Board, is a statutory body owned by the federal government. In addition to these, several independent power producers generate and supply power to the vertically integrated utilities.

Regulatory Mechanism

A.3.102 The regulatory framework establishes that the government will:

- focus its activities on reviewing tariffs and quality of service;
- limit its actions to those that influence private activities rather than attempting to direct such activities; and
- avoid the use of the discretionary power to intervene in the commercial decisions of private companies.

A.3.103 The Electricity Supply Act 1990 provides for the appointment and describes the functions of the director general of electricity supply, whose responsibility it is to ensure the supply of electricity at reasonable prices and the licensing and control of electrical installations, plants, and equipment. The director's duties and responsibilities include, under Section 9 of the act, issuing licenses, determining standards and performance of the license, promoting competition and thereby assuring optimum supply at reasonable prices, and ensuring that all reasonable demands for electricity are satisfied.

A.3.104 The state-owned utilities (primarily TNB) are obligated to buy all capacity generated by the IPPs at a predetermined contract price. As a result, a new tariff structure was introduced in April 1995 that

allows TNB to pass on to customers any major fuel price variation and the cost of purchasing power from the IPPs.

Capital Attraction and Capital Markets

A.3.105 As a “flagship” privatization under the Privatization Master Plan, the flotation of 22 percent of the shares of TNB created the largest capitalized company on the Kuala Lumpur Stock Exchange. Funds raised by the government approximated US\$2 billion. The government retained a 78 percent ownership position and a special voting share that enables it to ensure that TNB operates under guidelines consistent with the national interest (the ownership position and special share confer to the government the right to appoint up to six directors and to approve certain action, such as mergers or asset dispositions). There are plans for further reductions in government ownership, to approximately the 50 percent level.

Independent Power Producers

A.3.106 TNB is relying on private sector development of new generation plants to meet demand growth. (New generators must contract directly with TNB to sell their output.) The barriers to entry are high, however, because of a requirement that there be local equity participation in every IPP project, with at least one of the foreign parties having significant experience in power generation operations or the electric industry.

A.3.107 Among the first IPP sponsors to negotiate with TNB were YTL Corporation Berhad (YTL) and Sikap Power Sdn Bhd (SPSB). YTL plans to supply a total of 1,170MW of electricity to TNB. Its generating plants (two x 390MW in one location and 390MW at another site) came on-line in 1995. YTL initially was teamed with National Power of the United Kingdom, but this partner has since withdrawn. Kraftwerk Union, part of the Siemens group, was subsequently appointed contractor for the new plants and granted a 51 percent stake of the joint venture company that will operate and maintain the plants.

Financial Impacts

A.3.108 The introduction of IPPs and the resultant take-or-pay contracts has impacted the earnings of TNB (TNB’s pretax profit fell 17 percent for the year ending August 1995 to the equivalent of US\$630 million—its worst result in four years). These contracts require TNB to take all output, even if it is not needed. Because there is excess capacity in the system TNB ends up needing to use the purchased energy rather than running its own generation plants. The company has a 20 percent equity ownership in each of the IPPs, however, which goes some way to offsetting the cost of its purchase power contracts.

Transition Costs and Issues

A.3.109 In connection with the restructuring and privatization, TNB was prohibited through 1997 from reducing staff. There consequently has been no downsizing other than that realized through normal attrition.

Lessons Learned

A.3.110 Malaysia was faced with an expanding economy and limited resources for investment in new generation. The establishment of a regulatory framework and the partial privatization of the largest state-owned utility has raised funds for the sector in addition to adding more than 4,000MW of capacity. The current excess of capacity has had a temporary negative impact on the financial performance of TNB,

highlighting the need to control the rate of introduction of IPP power and to manage the risk sharing between the IPPs and the buying utility.

A.3.111 The introduction of private sector producers introduces a number of policy issues regarding how best to integrate these power production facilities with the existing transmission network. The load forecasting and resource planning mechanisms of the existing utilities must be examined and criteria established for the appropriate allocation of power development to the private sector.

A.3.112 The government has maintained control over the planning and operation of the utility through the “golden share” and 78 percent ownership of the stock. TNB has also been able to establish its own credit rating and has gained access to the international debt markets at a preferred credit rating.

A.3.113 From the government’s perspective the reform and privatization strategy in the energy sector has been successful.

Peru

A.3.114 Peru represents another example of the disaggregated competitive model, combining elements of the English model with adaptations first developed in Chile.

Policy Objectives

A.3.115 By 1990 it was the Peruvian government’s policy objective to bring Peru out of bankruptcy and stabilize the economy through the following measures:

- elimination of virtually all restrictions on investment (for foreigners and Peruvians);
- liberalization of prices and salaries in the private sector;
- removal of subsidies in public sector prices and utility rates;
- reductions in the state bureaucracy;
- unification and liberalization of the exchange rate system and elimination of all restrictions to capital flows;
- liberalization of financial markets through competition; and
- use of a well-executed privatization plan.

Economic Conditions

A.3.116 Peru’s economy was improving in 1994, with GDP increasing 13 percent (GDP growth in 1993 was 6.5 percent). Inflation dropped to 15.4 percent as a result of tight monetary and fiscal policies. Since coming to power in July 1990, the Fujimori administration had by 1994 liberalized trade, investment, and foreign exchange regulations. The administration’s reform program also has eliminated domestic deficit financing through tax reform, corrections in public prices, and expenditure control, including the elimination of subsidies.

Industry Structure

A.3.117 Peru’s electrical industry is led by Electroperu, which owns and operates eight generating plants, with a total installed capacity of 1,584MW, in the Central-North Interconnected System. The Central-North Interconnected System accounts for approximately 85 percent of the country’s electricity output. The

total installed capacity for Peru is 2,456MW, including 270MW from IPPs, of which 70 percent is hydro. The industry comprises 10 integrated regional companies, operating as subsidiaries of Electroperu. Electrolima, the largest of the regional companies, has been divided into five companies: Edegel (the generating company), Edelsur and Edelnor (which distribute power in metropolitan Lima), and Edechancay and Edecanete (which distribute power outside Lima).

A.3.118 Approximately 78 percent of Peru's electricity is generated by hydroelectric plants and 22 percent by thermoelectric plants.

Regulatory Framework

A.3.119 The regulatory framework has been set forth in a series of laws and regulations, as follows:

- Electrical Concession Law No. 25844
- Supreme Degree No. 009-93-EM (Regulations)
- Ministerial Resolutions No. 068-93-EM-ME and No. 111-93-EM-VME
- Resolutions of the Electric Tariffs Commission

A.3.120 This regulatory framework governs all matters related to the generation, transmission, and distribution of electricity, including:

- disaggregation of the vertically integrated utilities into generation, transmission, and distribution (specifically prohibiting dual ownership of the different functions);
- granting of concessions;
- establishment of the pricing system and introduction of competition in generation and supply; and
- definition of the boundaries of the transmission grid and the distribution companies.

A.3.121 Two primary authorities oversee the electric utility industry:

- the Electric Tariffs Commission, with responsibility primarily for the regulation of prices for all the components of the system and for facilitating the transition to a competitive market; and
- the Committee for the Economic Dispatch of the System (COES), with responsibility primarily for economically and efficiently dispatching the interconnected electrical system.

A.3.122 The Peruvian system allows free competition in power supply while regulating those transactions in which some form of control is required. The generation of electricity thus proceeds within a framework that mixes deregulated large-scale supply with regulated transactions to protect the small consumer. Transmission and distribution, which tend to be monopolistic, are governed by regulations that put a ceiling on transmission and distribution rates.

A.3.123 The Peruvian system is a modified system adapted from that implemented in Argentina and Chile. The price regulations in place govern power and energy transfers between generators, settlements to transmission system owners, generator energy sales to distribution concessionaires for public power

consumption, and consumer sales. The rates policy is designed to enable investors to recoup their investment with a 12 percent rate of return.

Capital Attraction

A.3.124 In July 1994, packages of 60 percent of the shares of the electricity distribution companies in Lima were sold for US\$176.49 million to Inversiones Distrilima, a consortium formed by Endesa (Spain), Chilectra and Enersis (Chile), and some Peruvian companies. Edelsur (now Luz del Sur, serving the south zone of Lima) was auctioned for US\$212.12 million to a consortium formed by Ontario Hydro (Canada) and Chilquinta (Chile). The balance of the shares, after a purchase option exercised for Edelnor's workers of US\$8.75 million, was sold through the Lima Stock Exchange and the U.S. capital markets. Edelnor's and Edelsur's sales also included investment commitments of US\$270 million over the next few years.

A.3.125 Shares of Edelgel were sold in October 1995 for US\$524.5 million, including US\$100 million in foreign debt paper. Investment commitments include construction of a 100MW generating plant within the first year. Finally, in December 1995 the consortium Distrilima (the buyers of Edelnor) won the bidding for a 60 percent stake in Edechancay, a small electricity distribution company north of Lima. Distrilima will pay US\$10.3 million.

A.3.126 Privatization of the generation assets of Electroperu started in April 1995 with the purchase by Sindicador Pesquero, Peru's largest private fish meal company, of 60 percent of the shares of the 40MW power plant in Cahua. The purchase price was US\$41.8 million. The new 200MW Ventanilla thermal plant, Etevensa, was privatized in December 1995. Generalima, the winning consortium of a 60 percent stake of Etevensa, agreed to invest US\$120 million through mid-1998 to increase total generation capacity to 480MW from the installed capacity of 200MW. Generalima is a joint venture between Endesa, which holds 72.5 percent of the company, and Peruvian investors.

Transition Costs

A.3.127 The most significant transition costs were the rate increase, reduction of staff at the state-owned utilities, and the assumption of the debt by the government prior to privatization. To attract private investment and eliminate brownouts and supply disruptions, prices have been doubled from the unrealistically low rates that predominated prior to privatization.

Lessons Learned

A.3.128 The Peruvian system is a model for a disaggregated system, similar to that of the United Kingdom but modified for a smaller economy. It introduces competition in supply, without a pool, by allowing the generation companies to compete with each other and with the distribution companies for all customers that have a demand in excess of 1MW.

A.3.129 The Peruvians adopted the concept of the economically adapted system that is the optimized system for the economy. By building depreciation for the replacement cost of the transmission and distribution system into the rates charged for electricity, as opposed to using depreciation based on the historic costs of the installed system, the rate structure provides an incentive for upgrading the outmoded transmission and distribution system.

A.3.130 Strong economic growth in Peru has led to an increased demand for electricity. The restructuring and privatization are designed to encourage foreign investment in new electricity generating plants and appear to be achieving the desired results.

Portugal

A.3.131 Portugal is an example of a country in which open access is being introduced in the power sector in conjunction with the functional separation of activities and the introduction of independent regulation.

Policy Objectives

A.3.132 The main reform objective of the government of Portugal is to strike a balance between state control and liberalization and to tailor a system unique to the country's needs. The primary purpose of the reform is to achieve greater operational efficiency and economic rationality. Other key components of the reform process are the introduction of management flexibility and the enhancement of customer service.

A.3.133 The reform contemplates an independent regulatory authority to ensure the most efficient costs and prices and to guarantee fair competition. While the regulatory authority will have some autonomy, the degree of autonomy has not yet been decided.

Industry Structure

A.3.134 Electricidade de Portugal (EDP), the state-owned electric company, was restructured in 1994. Decree-Laws 7/91 and 13/94 saw the creation of 14 new companies that, together with five existing companies, are controlled by the holding company EDP. The following separate companies, also owned by EDP, are the ones that were created in August 1994:

- Companhia Portuguesa de Produção de Electricidade S.A. (CPPE), which owns all of the generating companies, hydro and thermal;
- Rede Eléctrica Nacional, S.A. (REN), the concession holder of the National Transmission Network under Decree Law 9/91;
- four regional distribution companies; and
- four service companies (engineering, training, information systems, and employee health).
- In 1993, EDP additionally sold a power station to Tejo Energia, a consortium led by National Power of the United Kingdom, retaining a 10 percent interest. Under the terms of the agreement, Tejo Energia will sell electricity to EDP and subsequently to CPPE for 28 years.

Regulatory Framework

A.3.135 The reform contemplates an independent regulatory authority composed of members appointed by the government, the purpose of which is to ensure that costs and prices are efficient, to set tariffs, and to guarantee fair competition. The degree of autonomy that will be afforded to the regulatory authority has not yet been decided. For example, the government intends to retain control over decisions relating to investment due to concerns over the use of hydroelectric generation, given the variability of hydro as a source supply.

A.3.136 The regulator will oversee the price negotiations between REN and the producers. The regulator will influence the level of return on capital of the regional distributors through review of costs. There also will be a planning body, comprising representatives of REN, the distributors, and the government, that will determine the future capacity requirements of the system. The regulatory body will retain a role in the selection of the types and mix of fuel for new production units.

A.3.137 The plan calls for a mixed system, with both binding and nonbinding PPAs.

Binding Purchase Power Agreements

A.3.138 Producers will sell exclusively to REN through binding PPAs; REN, in turn, will have binding supply contracts with the distributors. As part of the restructuring process the terms were finalized for the PPAs applicable to each power station and between REN and CPPE. These agreements will govern the commercial relations between REN and CPPE.

Nonbinding Purchase Power Agreements

A.3.139 Small hydro plants, renewable energy sources, and cogenerators will be free to supply customers under market conditions. They also will have the option of supplying clients through the REN by paying for third-party access to the grid. Regional distributors will be permitted to purchase up to 8 percent of supplies from producers in the nonbinding system, providing prices are competitive.

Capital Attraction

A.3.140 The government intends to privatize 20–25 percent of CPPE, while retaining majority ownership. The government is seeking to encourage wide share ownership among the population: in general, privatization will be targeted at individuals and institutional investors rather than at other power companies. Foreign investors will not be restricted from buying shares.

Financial Impacts and Lessons Learned

A.3.141 It is premature to speculate on the financial impacts of the restructuring or on lessons that may be learned from Portugal's experience. It nonetheless should be noted that the approach being pursued in Portugal represents one country's effort to be responsive to EU directives calling for third-party access and price liberalization.

