

(331)
Makerere Institute of Social
Research



OWEN FALLS

ELECTRICITY IN A
DEVELOPING
COUNTRY

INSTITUTE
OF
DEVELOPMENT
STUDIES
LIBRARY

GAIL WILSON
EAST AFRICAN STUDIES NO. 27

EAST AFRICAN STUDIES 27

OWEN FALLS

Electricity in a Developing Country

*Written under the auspices of
The Makerere Institute of Social Research,
Kampala, Uganda*

OWEN FALLS

ELECTRICITY IN A DEVELOPING COUNTRY

by Gail Wilson

East African Publishing House

INSTITUTE
OF
DEVELOPMENT
STUDIES
LIBRARY

EAST AFRICAN PUBLISHING HOUSE
Uniafric House, Koinange Street
P.O. Box 30571, Nairobi

First published 1967

Copyright © Makerere Institute of Social
Research, Kampala, 1967

*Made and printed in Kenya
by Kenya Litho Ltd., Cardiff Road, Nairobi*

Contents

	<i>Page</i>
<i>Preface</i>	ix
<i>Introduction</i>	x
1 The Owen Falls Scheme	1
2 The Transmission and Distribution of Electricity in Uganda	9
3 Electricity Consumption from 1949 to 1960	24
4 The Use of Electricity by Urban Industry	37
5 The Use of Electricity by Urban Services and Institutions	53
6 Domestic and Commercial Electricity Consumption in Towns	62
7 Rural Electricity Consumption	85
8 Electricity and Development	102
<i>Index</i>	108
LIST OF MAPS	
1 Electricity Distribution in 1954	16
2 Electricity Distribution in 1961	21
3 Industrial Electricity Consumption by Areas in March and September 1960	40
4 Sub-divisions of Jinja	42
5 Sub-divisions of Kampala	46
6 Distribution of Rural Agricultural Processing Industries	89
7 Distribution of Rural Consumers by Size of Group	91
LIST OF TABLES	
1.1—Average rate of interest on capital borrowed by the UEB 1949-1962	4

CONTENTS (contd.)

III.1—Owen Falls Hydro-electric station. Total consumption and revenue 1949-1961	31
III.2—Annual percentage growth in revenue and consumption 1950-1963	32
III.3—Uganda. Industrial electricity consumption and revenue 1950-1961	33
III.4—Uganda. Domestic electricity consumption 1950-1961	33
III.5—Owen Falls. Installed capacity and maximum demand 1950-1964	34
IV.1—Uganda. Industrial electricity consumption. March and September 1960	41
IV.2—Victoria Area. Total urban industrial electricity consumption 1960	44
IV.3—Kampala. Total urban industrial electricity consumption 1960	47
IV.4—Masaka. Total urban industrial electricity consumption 1960	50
V.1—Kampala. Consumption of electricity by institutions and services. March and September 1960	55
V.2—Victoria Area. Total consumption of electricity by institutions and services 1960	57
V.3—Jinja. Consumption of electricity by institutions and services. March and September 1960	58
V.4—Smaller Towns. Consumption of electricity by institutions and services. March and September 1960	60
VI.1—Kampala. Domestic and commercial electricity consumption. March and September 1960	66
VI.2—Kampala Bazaar and Kampala Business District. Domestic and flat rate lighting electricity consumption. Monthly average 1960	67

(contd.) CONTENTS

VI.5—Busega and Lunguja. Uses of electricity. November 1961	75
VI.6—Busega and Lunguja. Consumption in relation to uses of electricity 1961	76
VI.7—Jinja. Domestic and commercial electricity consumption. March and September 1960	78
VI.8—Jinja Bazaar. Domestic and flat rate lighting electricity consumption. Monthly average 1960	79
VI.9—Masaka Bazaar. Duplication of meters. October 1960	81
VI.10—Domestic and commercial urban electricity consumption. March and September 1960	82
VI.11—Intensity of urban domestic electricity consumption in relation to European population	83
VII.1—Rural industries using mains electrical power 1960	85
VII.2—Number of months worked by rural ginneries in the Victoria Area 1960	86
VII.3—Number of months worked by rural coffee factories in the Victoria Area 1960	87
VII.4—Victoria Area. Rural industrial electricity consumption 1960	90
VII.5—The Hoima Road Area. Non-industrial electricity consumption in population centres. October 1960	96
VII.6—The Hoima Road Area. Non-industrial consumption of electricity by race and tariff. October 1960	97
VII.7—The Area North of Kampala. Mission electrification 1960	100
VII.8—The Area North of Kampala. Non-industrial electricity consumers (meters) in population centres 1960	100

PREFACE

The fieldwork for this study was undertaken in 1960 and 1961 and financed by the Goldsmiths' and Silversmiths' Company of London. I am most grateful to the Company and to the many people in all parts of Uganda who helped the work in one way or another. In particular I should like to thank the members of staff of the Uganda Electricity Board who were unfailingly helpful and hospitable in Kampala and in the other parts of the country. I am grateful to Professor S. J. K. Baker for making the facilities of the Geography Department at Makerere College available and to Dr. D. N. McMaster and Mr. B. W. Langlands of that Department for their helpful comments and advice. My sincere thanks go to Professor R. O. Buchanan without whose wisdom and encouragement this book would almost certainly never have been written. Finally, I am most grateful to Miss K. M. Pratt for typing the manuscript, Miss R. King and Mr. G. R. Versey for drawing the maps and Mrs. P. Ardrey for assistance with the tables.

May, 1967
Cambridge, England

Gail Wilson

INTRODUCTION

Most of the material in the following chapters relates to the year 1960 and some word of explanation for the publication at such a late stage is in order. In the first place the material was originally presented as an M.A. thesis for the University of London. It was written up on a part-time basis and this caused the delay in presentation. In the second place although the performance and prospects of the Uganda Electricity Board have improved considerably over the last five years the basic difficulties of supplying electricity to a relatively small, inland, under-developed, agricultural country remain and the conclusions reached on the basis of work done in 1961 need relatively little modification some six years later. Salient changes such as the rise in industrial consumption and the growing uncertainty about the future of exports to Kenya are discussed where appropriate.

For those who are not familiar with the area concerned a few facts on the geographical, economic and social situation of Uganda are outlined in the following paragraphs.

Uganda is a landlocked country in the middle of Africa. It is 500 miles from the sea by direct route but 800 miles by single track railway to Mombasa, the port which deals with practically all the foreign trade. It is therefore relatively isolated from world markets and until recently there has been very little scope for manufacturing for export.

In 1960 the administrative capital was at Entebbe on the shores of Lake Victoria, and the legislative and commercial capital twenty miles inland at Kampala. The country was divided into four provinces and these into four kingdoms and eight districts. Each area varied in the degree of local autonomy and economic development. The kingdom of Buganda was the most prosperous and had the most developed system of local administration. Jinja, which was the second town and the most important industrial centre, was just outside Buganda on the eastern bank of the River Nile.

Most of the central area of the country was a partially dissected plateau which sloped gently northwards from a height of about 4,000 feet near Lake Victoria to about 2,000 feet near the Sudan border. Apart from the Nile itself there were few major physical barriers to be overcome in building the electricity supply system. The main difficulty in the south was the vegetation—large areas of swamp and dense secondary forest growth. In the east the volcanic area round Mount Elgon and in the west the Ruwenzori massif presented more problems, but the mileage of line in these areas was small even in 1966.

The country extended approximately two degrees south and four degrees north of the equator. Temperatures, though modified by altitude, were equable and the rainfall high. In the north extremes were greater. The mean annual temperature in the south was 72°F and the average annual range 16°F. At Gulu in the north the corresponding figures were 73°F and 22°F. Rainfall was sufficient for settled agriculture in all but the pastoral areas in the south west and north east and most of the country could expect to receive 30 inches of rain in 95 years out of 100. In the south of Buganda and Busoga, bordering Lake Victoria, an annual precipitation of 50 inches could be relied on.

The economy was predominantly agricultural with production of export crops heavily concentrated in the south. Coffee and cotton were the chief cash crops and accounted for 77 per cent of the total value of exports in 1960. Coffee production was concentrated in two areas. Robusta coffee was grown in Buganda and amounted to 93 per cent of the total and arabica was grown on the slopes of Mount Elgon in Bugisu. Cotton was also grown in Buganda but its acreage was declining to make way for coffee. The bulk of the crop was grown in Eastern Province with expansion taking place in Northern Province. African peasant farming was the rule but there was some estate agriculture. The chief estate crops were sugar, tea and a small amount of both types of coffee. The staple food crops were bananas in the south and millets in the north. Maize was grown where rainfall permitted. Capital investment in agriculture was small even in the estate sector and the use of electricity was virtually confined to the agricultural processing industries. Attempts to interest African farmers in electrically driven machinery or crop driers had failed, chiefly because the cost of such equipment was prohibitive.

The most important non-agricultural export was blister copper. The copper was mined in the foothills of the Ruwenzori, concentrated, and railed to Jinja where it was smelted into blister copper. Jinja was the site of the other large industrial concern in the country, the textile factory, and of the Owen Falls Dam and hydro-electric station. Since 1961 it has acquired a steel mill and a second textile factory. Cement was manufactured at Tororo. The agricultural processing industries were scattered throughout the producing areas. Other industries were mainly small, market-oriented concerns such as soap and furniture factories, two breweries and a variety of engineering services.

The population of Uganda was divided into three social, economic and racial groups. The African population numbering 6,449,558 in 1959,¹ was engaged in agriculture and provided unskilled and semi-

skilled labour. The Asian community (71,933),* which had originated from the sub-continent of India, dominated wholesale and retail trade and members were also engaged in skilled trades, middle ranks of the Government Service and the professions. The European population (10,866),* was employed in the middle and higher ranks of the administration and in managerial positions in business and industry. Economic status corresponded closely with racial group but as the country moved towards independence, Africans were increasingly taking over the functions of the minority groups. There were numbers of all races in the top (though not the bottom), income groups. Africanisation has been speeded up since independence in 1962 and the size of the African middle class has grown, but otherwise the social structure of the country is much the same. The continuance of present expansion in electricity sales depends on the growing prosperity of the country as a whole.

*Uganda Census 1959. Uganda Protectorate. Entebbe.

I

THE OWEN FALLS SCHEME

The decision to go ahead with the Owen Falls hydro-electric scheme was taken at a time when conditions in the world and in Uganda were far from normal. The second world war had just ended. During the war the Government had taken control of the economy to a greater extent than ever before. The main export crops were sold under contract to the British Ministry of Food and Agriculture, and prices in Uganda were controlled by law. De-control only came about slowly and was accompanied by a new conviction that government action was to be constructive and beneficial to the mass of the people. Sir John Dundas, the Governor until 1944, had introduced far-reaching constitutional changes. These, and the post-war economic unrest, resulted in disturbances in 1945. The new Governor, Sir John Hall, was determined that greater prosperity should precede further constitutional changes. His aim, as set out in his directive for the Uganda Development Plan, was to develop Uganda as an agricultural country with as much industry as possible.¹

The Uganda Development Plan, produced in 1946 by Dr. E. B. Worthington, was typical of the new trend. It was a comprehensive and optimistic survey of Uganda's potential development, drawn up on the basis of what today would be considered inadequate data.² The Plan emphasised the development of services and agriculture and made only limited references to industrialisation and hydro-electricity, though it did state that the provision of hydro-electricity was fundamental to the Plan.³

The prominence accorded to agriculture was justified by the fact that virtually all Uganda's revenue in the past had come from agricultural exports and there was little hope of a change in the foreseeable future. References to the hydro-electric scheme were brief because it was the subject of a comprehensive report which was being prepared at the time. Electricity was considered as one of a number of services which the Government should provide to encourage industry.⁴ It is clear, however, that while the Government envisaged giving financial guarantees for a public electricity corporation, it did not think it necessary to make separate provision for the establishment of industries which would take the power generated.

The Governor in his 'Notes' stated that the development of hydro-electricity should encourage the grouping and possibly the expansion of secondary industry round Jinja.⁵ He also stated that the establishment of a textile mill at Jinja depended on the availability of cheap power.⁶ Dr. Worthington recommended that the Government should make sure such a supply of cheap power was available.⁷ Declaring that 'experience with electricity in other parts of the world has nearly always shown that the most optimistic estimates of consumption have been exceeded soon after the provision of a reliable and cheap supply',⁸ the Plan recommended a large hydro-electric scheme capable of meeting an expanded future demand.⁹ It was assumed that cheap power meant automatic industrialisation, and it is fair to suggest that in many minds hydro-electricity was synonymous with cheap electricity.

While Dr. Worthington was preparing the Uganda Development Plan, the future Chairman of the Uganda Electricity Board, Mr. C. R. Westlake, was investigating the hydro-electricity project. A survey of the possibility of generating electricity from the Nile had been made in 1935,¹⁰ but the engineers had concluded that, although technically feasible, such a project would not pay, as electricity consumption, both actual and potential, was too low. A decade later physical conditions had not changed significantly, but Westlake found that the 1935 projection of electricity demand had been exceeded, and, as has been outlined above, the general climate of opinion was much more favourable for expensive new projects. In the inter-war years colonial governments had been preoccupied with balancing their budgets, rather than with initiating development.

The Uganda Electricity Survey, published in 1947, showed the influence of the times. Its recommendations were based on two clearly stated beliefs. The first was that the provision of electricity was not merely a commercial enterprise but a service to be undertaken by the Government; the second, that power schemes had in the past been undertaken in order to satisfy existing demand, but that the time had come to begin a scheme which would be capable of supplying foreseeable potential demand.¹¹ When moving the adoption of the Ordinance setting up the Uganda Electricity Board in 1947, the Financial Secretary referred to the scheme as an 'act of faith'. It undoubtedly was.

The Uganda Electricity Survey, like the Worthington Plan, was prepared at a time when little statistical material was available and economic conditions were artificial and unstable. Both had to be recosted within a year of publication. Given the unavoidable limitations imposed by circumstances, however, the survey's predictions were basically sound. It stated clearly that the scheme depended on two

conditions for success. The first was that the power produced should be cheap.¹² The second was that demand should be built up before the hydro-electric station began production so that the full potential of the first generating set could be used at once.¹³ The average cost per unit was estimated at 10.5 cents in 1954 falling to 8 cents in 1960.¹⁴

It was assumed in the survey that the average interest rate on the capital employed would not rise above 3 per cent. A rise of 1 per cent in average interest would result in a 10 per cent increase in the cost of production.¹⁵ The report also pointed out that in a hydro-electric scheme where capital engineering works formed so large a proportion of the total cost, charges to the capital account had to be kept to the minimum or the project would be over-burdened by interest payments. Allowance was made for the normal practice of charging interest to the capital fund and suspending payments to the sinking fund until the station began to function, but it was assumed that this practice would then cease. In the event, certain items continued to be charged to the capital account until 1961.¹⁶ In addition the average rate of interest rose above 3 per cent in 1952 and remained high (see Table I. 1). The cost factor was further complicated by rising prices for capital goods and by the devaluation of sterling in 1949.

The Uganda Electricity Survey, which was as much a marketing survey as a technical report, was followed by a technical investigation of the actual dam site by firms of civil and mechanical engineers. They concluded that the cost of the whole project, including the transmission system, would be £7,120,000 as opposed to £4,298,000 estimated by Mr. Westlake. Part of the increased cost was accounted for by a larger generating station. Westlake recommended an ultimate capacity of 90,000 kW. but it was finally decided that it would be economic to use all the power available and the capacity was raised to 150,000 kW. Each generating set was limited to 15,000 kW. because the Mombasa railway could not, at that time, accommodate anything bigger. All the reports, however, agreed that the initial development would be 30,000 kW., or two sets.

The decision to build the dam was taken with great rapidity. The Uganda Electricity Survey was presented in May 1947 and in December the Uganda Electricity Board Ordinance 1947 was passed setting up the UEB. The Board came into existence on 18 January, 1948.

The actual building of the dam and the related civil and mechanical engineering works were not technically difficult. The site was remarkably well documented for an under-developed area. Records of the level of Lake Victoria had been kept continuously since 1896 by the Physical Department of the Egyptian Ministry of Public Works. They confirmed that the flow of the Nile at Jinja was directly related to the level of

Table I. I
AVERAGE RATE OF INTEREST ON CAPITAL BORROWED BY THE UEB 1949-1962

Year	1949	1950	1951	1952	1953	1954	1955	1956	1957	1958	1959	1960	1961	1962
%	1.8	2.6	2.6	3.5	3.3	3.3	3.3	3.8	4.3	4.5	4.5	4.6	4.9	5.0

the lake and was therefore predictable.¹⁸ The average flow of the river could be calculated from a base of 50 years. The highest and lowest flows recorded were 43,000 and 10,500 cusecs, with an average of 22,100 cusecs.¹⁹ Since the Lake acted as a natural regulator, any unusually large flows would take time to build up and ample warning would be available. For these reasons the dam could be constructed to pass the highest recorded flow of 43,000 cusecs without fear for its safety. Provision, however, was made for an area to be left free from building in case it was needed as a temporary pass in an emergency.²⁰

Other relevant data for the area were less reliable, but, for what it was worth, it was estimated that the catchment area of Lake Victoria was 103,000 square miles, with an average rainfall of 43 inches a year. Of this about 93.7 per cent was lost through evaporation.²¹ There was, however, no doubt that a steady and reliable flow would be available for the power station.

Under the Nile Waters Agreement of 1929, Britain had agreed to obtain Egyptian consent for any development of the river. With minor modifications the Owen Falls Scheme became part of Egypt's scheme for 'century storage' on the Nile.²² The dam was designed to be one metre higher than was necessary for the electricity scheme alone and it was agreed to restrict the average flow to 17,500 cusecs in order to store water in Lake Victoria for Egypt. The Egyptian Government financed the extra work and undertook to pay compensation for loss of power (a total of £980,000).

There were various possible sites for the dam. The Nile leaves Lake Victoria at the head of the Napoleon Gulf and enters a steep-banked channel about 500 feet wide. The main rock formation is shale but a series of amphibolite bars cross the shales, and being harder, give rise to falls and rapids. The best known are the Ripon Falls, the Owen Falls and the Bujagali Falls. Between Lake Victoria and the Owen Falls the Nile formerly dropped 60 feet. The aim in siting the dam was to take advantage of the amphibolite bars for foundations, to obtain the maximum head without flooding the banks and to control the level of the Lake.²³ The Bujagali site was dismissed because it would not effectively control the Lake level, the power potential was lower and the site much less accessible. Flooding at Owen Falls was not serious because the banks were steep and only a small area was affected. However this area included the embankment of the main Kampala to Mombasa railway line and the Nile Bridge, which carried both road and rail. The road was replaced by a modern highway crossing the dam and the railway realigned. The dam site was first chosen without making borings in the bed of the river. Borings on either bank appeared to confirm that the amphibolite would make a

good foundation. During 1948, however, the site was varied and even when construction had begun, the power house had to be moved 90 feet downstream to avoid a pocket of gravel.²⁴ Deep pockets of gravel and some rotting of the rock on the river bed were the main difficulties encountered during the building. The design was varied to deal with the former and concrete grouting solved the latter problem.

The dam submerged the Ripon Falls but the bar that caused the Falls continued to restrict the flow of the Nile and in 1959 part was blasted away in order to increase the flow to the turbines.

The rapid progress on the scheme was made possible by foresight and careful planning by the UEB. It was estimated that a labour force of 2,000 would be employed and contracts for labour lines were placed in 1948. Generating equipment was ordered in July 1948 but the contract for the engineering could not be let until the negotiations with the Egyptian Government had been completed. A consortium of British, Danish, Dutch and Italian firms was awarded the contract in September 1949. Forward planning would have been necessary in any circumstances, but at the time it was vitally important. Building materials were particularly short and government reports of the time refer constantly to the shortage of housing. Imports were subject to long delays both in Britain and at Mombasa. The average time for consignments to arrive from Britain rose to eight months in 1951. The UEB's decision to build labour quarters therefore eliminated at least one source of delay, as the contractors were able to start work on the dam at once. European and Asian quarters were first rented in Jinja and then developed at the Amberly Estate north of Jinja. The Estate cost £400,000 and included a club, community centre and swimming pool.

Cement was clearly vital and had at first to be imported. In 1949 the UEB agreed to act as managing agents for a local cement factory to be established at Tororo. At that time the first Uganda cement was expected in 1951, but consignments did not reach Owen Falls until two years later—another factor making for higher costs.

The construction of the dam had certain indirect effects on the surrounding country. The peak labour force was 2,500 Africans, 200 Europeans and 123 Asians. Many of these brought their dependants. In addition others not directly employed by the Owen Falls Construction Company settled in Jinja. The main African labour camp was on the west bank of the river in Buganda, but some Africans also settled outside the town boundaries north of Jinja. As would be expected this sudden increase in the population had a marked effect on the town.²⁵ Offices, shops and flats were built and an industrial future confidently predicted. However, once the dam was completed in 1954

the labour force fell rapidly and stood at 600 at the end of 1955.²⁶ Jinja was left with empty buildings and decaying streets and, still more important, a feeling of depression and slump. Population and, no doubt, economic activity were higher than in 1948, but the progress was obscured by a fall from the 1953 peak.²⁷

Another and more welcome concomitant of the dam was the elimination of the mbwa fly from the area. This fly was the vector of 'river blindness' or onchocerciasis and was in part responsible for the low density of population along the Nile in Bugerere and Butembe-Bunya. The fly breeds only in violently agitated water.²⁸ Its breeding grounds upstream of Owen Falls were flooded and downstream DDT was used to control it. The result has been an upsurge in agricultural activity in Bugerere and Butembe-Bunya.²⁹

The first power was generated in January 1954 and by the end of the year the hydro-electric station was producing virtually all the power sold by the UEB. There were no dramatic problems which caused a steep rise in the estimated cost, as for example at Kariba where one bank proved unstable. The scheme was, however, executed at a time of rising prices, financial difficulties for the pound sterling and severe dislocation of communications. All contributed to the spectacular increase in cost. By 1953 the project report estimate had been exceeded by almost 100 per cent and it was estimated that head office expenses and the capitalisation of interest would bring the total cost of the scheme to £13 million, or three times the original estimate and nearly twice the revised estimate of £7.1 million on which the decision to build the dam was based. It is therefore not surprising that the UEB has found difficulty in selling as much power as had been hoped. The fact that it has kept so close to the original targets is clearly to its credit.

References

1. E. B. Worthington, A Development Plan for Uganda, Governor's Notes.
2. Entebbe, 1946. For example, *ibid.*, p. 8. The population of Uganda was expected to reach six millions by 1977. (The total population was, however, already over 6.5m. in the Uganda Census 1959).
3. *Ibid.*, p. 76.
4. *Ibid.*, p. 5.
5. *Ibid.*, Notes, p. x.
6. *Ibid.*, Notes, p. xi.
7. *Ibid.*, p. 44.
8. *Ibid.*, p. 76.
9. *Ibid.*, p. 77.
10. C. R. Westlake, Uganda Electricity Survey 1947, p. 8, refers to the Report by Preece, Cardew and Ryder and Coode, Wilson, Mitchell and Vaughan-Lee.
11. *Ibid.*, p. 8.
12. *Ibid.*, p. 15.
13. *Ibid.*, p. 13.

14. *Ibid.*, Schedule 18. In fact average costs per unit were 22.7 cents in 1954 and 10.2 cents in 1960.
15. *Ibid.*, p. 15.
16. UEB Annual Report, 1961.
17. UEB Annual Reports, 1953-1962.
18. Sir C. R. Westlake, R. W. Mountain and T. A. L. Paton, Owen Falls, Uganda Hydro-electric Development. Proceedings of the Institution of Civil Engineers, Vol. 3. No. 6. 1954, p. 631.
19. *Ibid.*, p. 632.
20. *Ibid.*, p. 635.
21. *Ibid.*, p. 632.
22. Brigadier C. G. Hawes, 'Some Effects of the Owen Falls Scheme', *Uganda Journal*, Vol. 16. No. 2. 1952, pp. 107-110.
23. Westlake, Mountain and Paton, *op. cit.*, p. 634.
24. UEB Annual Report, 1950.
25. See C. and R. Sofer, *Finja Transformed* (East African Studies No. 4, EAISR 1955).
26. UEB Annual Report, 1955.
27. Communication by the Town Clerk.
28. Details on the fly, *simulium damnosum*, and its eradication are given in G. R. Barnley, 'The Mbwa Fly and Problems of its Control', *Uganda Journal*, Vol. 16 No. 2. 1952.
29. G. B. Masefield: *Agricultural Change in Uganda 1945-1960*. (Food Research Institute, 1960), pp. 94-95.

2

THE TRANSMISSION AND DISTRIBUTION OF ELECTRICITY IN UGANDA¹

The Owen Falls dam was expected to supply electricity to industry in Jinja and to a lesser extent in Kampala, and power and light to the richer inhabitants of these towns, Entebbe and later Masaka. The transmission system was to operate at 33kV and to link the other three centres to Jinja. Within the towns the distribution system was to be compact and cover the central areas only. In the event this was not possible and most of the transmission system operates at a higher voltage and both it and the distribution system are far more diffuse than anything the early planners ever contemplated.

There is no really clear cut difference between the transmission and distribution of electricity, particularly in Uganda. The purpose of the transmission system is to take electricity from the power house to the major sub-stations. The lines operate at high voltages (132kV and 66kV), cut straight across country and are usually carried on steel towers.² The distribution system takes power from the main sub-stations to the consumers. Its layout is determined by the pattern of consumers and potential consumers. In Uganda distribution is mainly at 11kV but there are important 33 kV lines which function as part of both the transmission and the distribution systems. Low voltage lines and service mains which lead directly from the sub-station to the consumer are at 415 volts and 220 volts. Sub-stations throughout the system transform power to the appropriate voltage.

The majority of consumers require low voltage power. However, transforming the current from one voltage to another requires expensive equipment. Some loss of power is inevitable and the bigger the change in voltage, the more expensive the process.³ Sub-stations have, therefore, to be closely related to the needs of the system. The size of the sub-station is determined by the maximum likely demand measured in kVA. In Uganda the sub-stations vary in capacity from 4kVA to several hundreds. Those below 25 kVA are usually mounted on the same poles as the distribution system, but the larger ones have to be sited on the ground and fenced off. In general any size of sub-station on an 11 kV line has proved economic provided there are enough consumers who can be cheaply connected. On a 33 kV line a

sub-station below 25 kVA is not economic and hence small consumers or groups cannot be supplied, but in some border-line cases a supply has been given from a 15 kVA station. There are, however, few consumers or groups on 33 kV lines in Uganda. By 1961 there were six large industries which took power at a high voltage (11 kV) and this had great advantages from the UEB's point of view as it minimised transformer costs.

In the early days of electrical development it was not economic to transport power over long distances as the loss of energy increased steeply with the distance from the source of power. Technical innovations have however made transmission very much more efficient so that in Uganda it is technically possible to transport electricity to virtually any part of the country without serious loss in efficiency (losses were consistently under 10 per cent after 1957). The size of the country was therefore technically no obstacle, but when distance was considered in conjunction with the physical features of landscape and climate and the numbers and type of consumer, it became a more important negative feature.

Uganda is far from ideal from the point of view of an electricity supplier. It has one of the highest frequencies for thunderstorms in the world.⁴ The system therefore needed increased protection from disturbances caused by lightning. In particular the small pole-mounted sub-stations were found to be very vulnerable and interruptions to the supply were common until the design was improved. Extra insulation had to be installed on 33 kV lines and different levels of insulation were introduced on the 132 kV mains. Many of the precautions taken were the result of empirical pioneering work, as no similar scheme had ever been undertaken in such a difficult area. Naturally some methods were more successful than others, but all added to the cost of building and maintaining the transmission and distribution system.

In addition to the direct hazard from lightning, the heavy downpours and occasional high winds associated with tropical storms caused damage to lines and equipment. In the south of Uganda, where the rainfall is heaviest, the natural vegetation is luxuriant in the extreme. Lines crossing forest reserves had to be checked frequently for creepers which, if left alone, climbed the poles and caused short circuits.⁵ Although extensive areas of natural vegetation were relatively few in South Buganda, there were numerous small forest reserves and patches of secondary vegetation along the roads which all had to be checked. On the other hand the area was heavily settled and way leaves across permanent banana groves and coffee plantations involved the Board in compensation for loss of crops while the lines were being built.⁶ In the drier parts of the country, e.g. north of Mbale, the

natural vegetation rarely interfered with the lines, but even there termite heaps might cause some realignment when they were high enough to interfere with the clearance of the line. Swamps were another serious obstacle to the system. They were again most extensive in south Buganda. In the Kampala area papyrus swamp filled virtually all the lower ground. Legislation prevented the UEB from using road foundations for their lines as the post office had done, so that special foundations and, on occasion, even steel towers, were necessary for swamp crossings. Wooden poles were much cheaper than steel towers, but even they had to be specially treated to make them resistant to termite attacks.

The adverse physical factors outlined above affected the transmission and distribution system in varying degrees. Liability to damage from lightning was common to the whole system but the main grid, as in all countries, was virtually independent of natural features. Tropical conditions also had relatively little effect in the urban areas. The physical and climatic features (other than lightning) had, however, a stronger influence in the countryside. Since the mileage of line in rural areas rose steadily during the existence of the UEB, the cost of supplying electricity tended to rise proportionally. Ideally power might have been supplied only to the modern sector of the economy, i.e. the towns and a few major industries, as Westlake first envisaged, but when it became clear that this sector could not support a project as big as Owen Falls, the Board was forced to look for consumers wherever they existed, and to an increasing extent to carry its operations into rural areas. At once a whole new set of problems arose. The settlement pattern in Uganda was distinctly unfavourable to the supply of public utilities. On the fringes of the towns (areas treated as rural by the UEB but as urban in Chapter 6), suburban homes, whether of Europeans or Africans were widely scattered each in its own plot. For Europeans who used large amounts of electricity, the expense of suburban connections could be justified, for Africans the situation was much more marginal (see Chapter 6). The suburbs had one advantage over the true rural areas, and that was the concentration of settlement along the roads. In most of south Uganda the people lived in isolated homesteads scattered along the middle slopes of each rounded hill. They were linked by winding paths and by-passed by the roads.⁷ Until 1961, however, virtually all rural supply lines followed the roads. There was therefore little prospect of mass rural electrification and the lines were built to supply isolated cotton ginneries and coffee factories, estates and the larger trading centres. Most factories only operated for part of the year and some were not even supported by a trading centre, but stood alone with perhaps the manager's house and a few

huts for the mainly seasonal labour force. More frequently, however, a factory, trading centre and perhaps a mission, were sited close together. Most of these groups were about five miles apart in Buganda but the distance rose to 10 or even 15 miles in the Eastern and Northern Provinces. Some infilling had occurred in Buganda but in general the rural network was characterised by long, unprofitable gaps and marked seasonality of consumption (see Chapter 7). Alternatively the situation might be summed up by saying that as the supply of power was adapted to human conditions in this tropical area, environmental factors exercised a growing unfavourable influence on the economics of the undertaking.

When the UEB came into existence its resources for generating electricity were limited to two small power stations and a short 11 kV transmission line. A diesel station with a capacity of 550 kW supplied Jinja, which at that time had a population of about 200 Europeans and 3,800 Asians. Kampala and Entebbe relied on a small (1,750 kW) wood-burning station at Kiruba. Entebbe was linked to Kampala by an 11 kV line. Demand for electricity was rising steadily. As mentioned above (Chapter 1), it had already exceeded the figure that had been projected in 1935. The plant and distribution system were obviously inadequate for modern needs. Even in 1946 questions in the Legislative Council revealed the unsatisfactory nature of the supply.⁸ The UEB's first aim was therefore to provide a reliable system which would meet the growing needs of the Protectorate. In addition, the Westlake and subsequent reports had stressed the need to build up demand in order to take all the Owen Falls power as soon as it became available.

The first need was an adequate link between Jinja and Kampala. The survey for a 66 kV line was begun in 1948 and the line was completed in 1951. It was at first operated at 33 kV as at that time electricity was still being generated at Kiruba and the line was not carrying the full load for Kampala. By 1953 demand and production had risen sufficiently for the line to be operated at 66 kV and the survey for the 132 kV line between Jinja and Kampala had begun.

The other aspect of development, building up the demand for electricity, proceeded at the same time as the strengthening of the transmission network. It was perhaps unfortunate that there was no need for an active sales policy. In these years of shortages, delays in the arrival of equipment and difficulties in providing suitable accommodation for staff, the Board found it was all it could do to connect the new consumers who asked for electricity without trying to stimulate demand. The opportunity to build up a strong, experienced sales department in the early years of the venture was thus missed,

but in view of the prevailing economic conditions this was not surprising.

One of the first large new consumers was the Empire Cotton Growing Corporation's new research station at Namulonge. The decision to site this station, one of the two run by the Corporation, in Uganda, was welcomed, particularly as cotton was still seen as the only important export crop. The station was sited 28 miles north of Kampala in what was to become one of the UEB's most profitable rural areas. The survey for an 11 kV line was begun in 1948 and the line was opened in 1950. In 1948, too, the existing distribution systems in Kampala and Jinja were strengthened. The new European suburbs which were growing up on the hills near the older built-up area of Kampala were connected for the first time, e.g. Makindye and Kololo. A survey of Mbale showed that there were enough potential consumers to justify a supply to the town and it was decided to set up a temporary diesel generating station there until Owen Falls power became available. An increase in overall generating capacity was also needed and work began on new thermal generating stations in Kampala and Jinja.

In the following year, 1949, a 33 kV line from Jinja to Lugazi was begun. This did not duplicate the 66 kV Jinja-Kampala line already under construction because, as explained above, the 66 kV was a transmission line. The 33 kV line was intended to supply Lugazi, which was at that time one of the most important trading centres in Buganda and possessed a potential industrial consumer in Uganda's second largest sugar factory and its subsidiaries. In addition there was a number of estates and relatively large trading centres between Lugazi and Jinja. The Board also began a 33 kV line from Jinja, through Iganga to Tororo and Mbale. This line was completed in 1951. It was built to operate at 33 kV but technical advances enabled it to be uprated to 66 kV in 1963. The temporary Mbale power station came into operation in 1950. Distribution systems were begun for domestic consumers in Tororo and Iganga and completed for most of the European areas in Kampala, Jinja and Entebbe. The new diesel station at Njeru in Jinja came into operation with a capacity of 5,760 kW and the second Kampala station, at Lugogo, was expanded, increasing the capacity from 2,600 kW to 4,510 kW. The wood-burning station at Kiruba and the station at Jinja were closed in June 1950.

1951 and 1952 were difficult years. Work on the dam was clearly behind schedule. Two expensive transmission schemes, one a 66 kV wood pole line from Jinja to Kampala and the other a 132 kV steel tower line to Kilembe Mines in Toro were approved, and almost immediately abandoned. By the end of 1952 it was clear that no large consumers could be expected before late 1956. This meant that if the dam was

completed according to schedule (September 1953), there would be a gap of three years without any really large consumers. Even the cement works at Tororo, which was expected to be in production by 1951, did not deliver its first cement till 1953.

These were years of inflation and a serious rise in costs, but economic conditions were not all unfavourable. The boom associated with the Korean War caused prices of raw materials to soar, and in Uganda more money was entering circulation than ever before.⁹ Wartime controls were still being removed and more consumer goods were becoming available in the shops. Towns and trading centres grew as standards of living rose. The work of building up demand for electricity went on and the capacity at Njeru was expanded to 9,400 kW. More Asian residential areas were supplied in Kampala, Jinja, Mbale and Entebbe, and work was begun on the first schemes for predominantly African housing areas (Katwe and Naguru South). These two areas were very different but typical of the African domestic and small commercial consumers later connected. Katwe was an indigenous growth, a commercial and residential area just outside the Kampala boundary where town planning restrictions did not apply. Naguru South was the part of a large municipal African Housing Estate designed for the higher income groups. The pace of development also quickened in rural areas. As lower voltage (11 kV and 33 kV) transmission lines came into operation it was possible to supply consumers in entirely new areas. These developments constituted a big change in the pattern of electricity distribution as compared with 1948. (See Map 1, p. 16). The map also shows the boundaries of the three administrative areas which were later used by the UEB. The head office for Victoria Area was in Kampala, for Nile Area in Jinja, and for Elgon Area in Mbale.

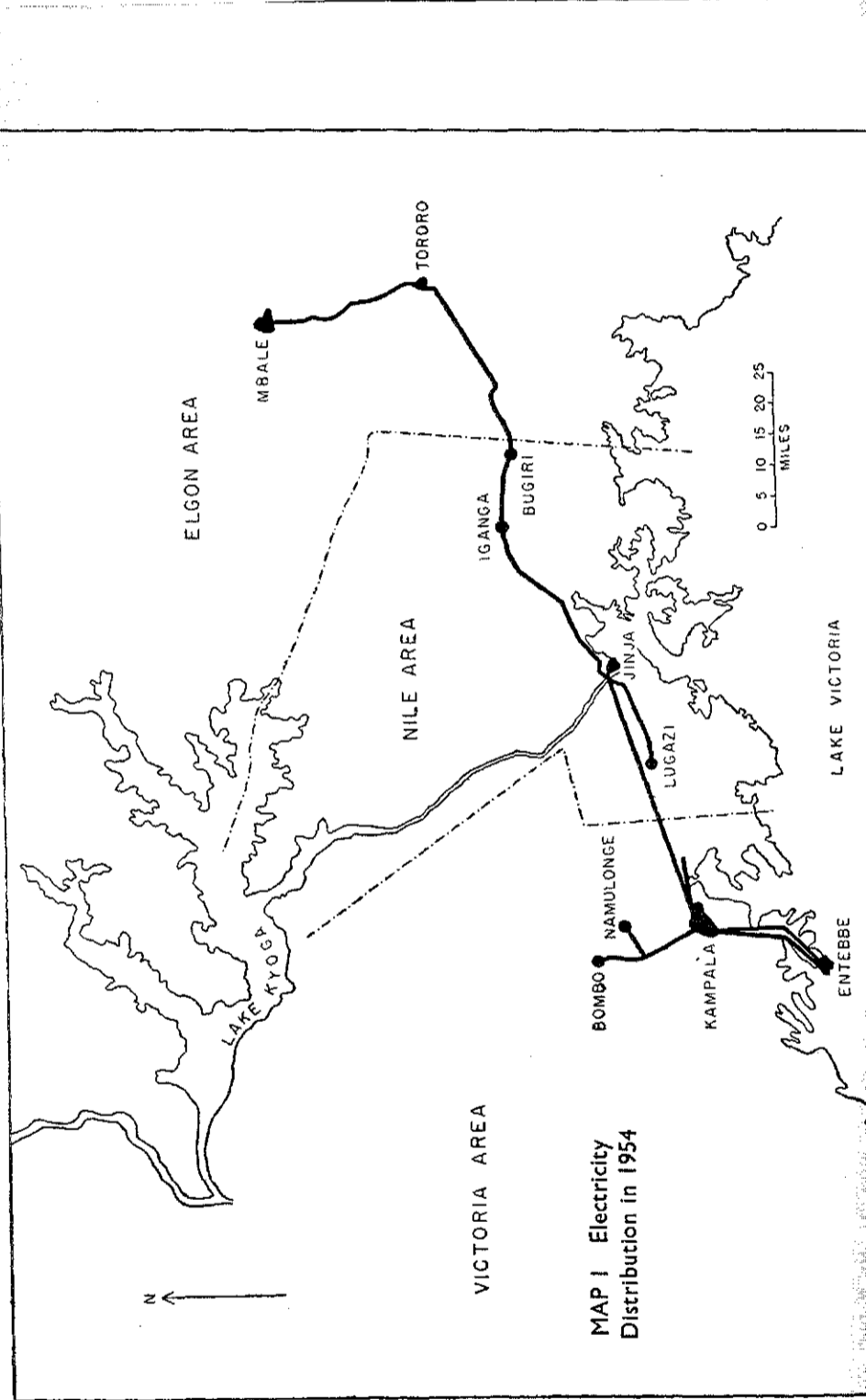
In 1954 the first generating set at Owen Falls came into operation. By April, when the Queen opened the station, there were two sets working. Their total capacity was limited to 16 MV because the water level upstream from the dam could not be raised until the railway embankment had been strengthened. Even 16 MV, however, enabled the UEB to meet all the demands made on the system and since large consumers had not materialised there was no shortage of power. Negotiations for supplying Kenya and the new textile factory at Jinja continued but there were no really important consumers until 1956.

The most important development in the field of rural electrification in 1954 was the decision to go ahead with the Masaka scheme. This scheme was the first of its kind. Hitherto rural electrification had been limited to building lines to specific consumers such as ginneries or missions, or to larger trading centres such as Bombo. Any extra

consumers along the line were connected either at the same time or later, but they were not considered as part of the original scheme. The Masaka project was the first to be based on a comprehensive survey of town, suburban and rural potential consumption, both industrial and domestic. The main transmission line followed the Masaka road and had a rating of 33 kV. It supplied the trading centres, missions and factories along the route. In Masaka the distribution system was designed to include the African commercial and residential areas inside and outside the town boundary, as well as the European and Asian areas, from the start. The scheme also included 300 potential consumers in the area north of the town, which was one of the richest coffee growing districts in the country. There were four coffee factories but the majority of the 300 rural potential consumers were in trading centres or were landowners with large incomes from coffee.¹⁰

Map 1 shows the extent of main transmission and distribution lines actually in operation in 1954. It was almost exactly the pattern which Westlake had first envisaged, except that main transmission from Jinja to Kampala was at 66kV instead of 33 kV. Consumption was not significantly below Westlake's prediction; in 1954 the actual maximum demand was 15,000 kW while Westlake had predicted this figure in 1953, and 17,600 kW by 1954. The number of units sold was 63.6 million as opposed to Westlake's 66.7 million. The significant fact is that maximum demand was below the predicted figure largely because Westlake had estimated on the basis of a much higher proportion of industrial consumption than actually occurred in 1954. The low proportion of industrial consumption affected the entire tariff structure and forced the domestic and small commercial consumers to bear an unusually large share of the total cost of the undertaking. The main source of financial difficulty in 1954, however, was not the growth or the pattern of consumption, but the enormously increased capital cost of the whole scheme.

The commercial position at the beginning of 1955 was therefore serious but not desperate. Agreement in principle was reached on the Kenya supply,¹¹ and with what were for some years to be the two largest consumers in Uganda, the textile factory and the copper smelter at Jinja. Emphasis on sales increased and for the first time a commercial engineer was appointed. The policy of supplying rural areas by comprehensive distribution scheme was extended and although the Masaka scheme was not completed and so could hardly be called a pilot project, comprehensive schemes for Busoga and the Kibuga were approved. The project to supply Kumi and Soroti was also approved but because of the limited number of consumers outside the main centres, it did not qualify as a comprehensive rural scheme.



MAP 1 Electricity Distribution in 1954

The Kibuga scheme was mainly an extension of the 11 kV and low voltage networks to the suburbs north and west of Kampala. The other two schemes needed important extensions to the 33kV transmission network. In Busoga the project was a reversal of an earlier decision. It had been decided that it would be uneconomic to supply the rural areas of north Busoga from Owen Falls and it was assumed that those who needed electricity would install private diesel generating sets. In fact the townships and trading centres were well established and by Uganda standards rural Busoga was a fairly good area for electrification. The scheme took the form of 33 kV lines to Kamuli and Kaliro with radial distribution from these two centres.

The Soroti scheme envisaged an extension of the Tororo-Mbale 33kV line to Soroti. A second 33 kV line from Tororo to Mbale to reinforce the Mbale distribution was also approved. There was a similar situation in Buganda, where the growth of consumption in Entebbe justified a second 33kV line from Kampala.

The main transmission line, the Uganda 132 kV grid from Jinja to Tororo and to Kampala, was completed in 1955 and the first circuits brought into operation at 33 kV. The Masaka line reached Budeginnery and the important trading and rural industrial centre at Mpigi.

Throughout these years it was considered uneconomic to supply up-country centres such as Gulu and Masindi from Owen Falls. The great exception was the Kilembe Copper project. The smelter would have been such a large consumer that the expense of a line to the Western Province would possibly have been justified. When it was decided to site the smelter at Jinja, there was no possibility of anything approaching the same level of consumption in the small towns, trading centres and missions that were the main potential consumers up-country. The UEB's policy in these years envisaged supplying such centres from diesel generators.

In 1956 and 1957 the pace of development again quickened. The 132 kV grid went into operation at its full capacity. The copper smelter and textile factory at Jinja began production. Masaka, Kamuli, Kaliro and Soroti received a supply for the first time, though a small diesel station had been in operation in Soroti from 1956 until the line from Mbale was completed. The second 33 kV line from Tororo to Mbale was also built. In Mengo the Kibuga scheme was under way, the line to Bombo was extended north to Wobulenzi and beyond and the Port Bell aluminium products factory began work and was expected to be a large consumer, though the hope has still not been fulfilled (1965).¹² Work was begun on comprehensive distribution schemes for Mityana, Busia, Central Mengo and the Mount Elgon-Pallissa area.

The bulk supply to Kenya began on 1 January, 1958. The

UEB's 132 kV line to Tororo had been extended to Nairobi by the Kenya Power Company and the line was intended to supply Kisumu and other centres along the route. The terms negotiated were not advantageous for Uganda but the certainty of a steady consumer for what consistently amounted to well over one third of the power generated at Owen Falls was a great advantage.¹³ In eastern Uganda the Pallissa scheme, which supplied the cotton research station at Serere and a number of missions and ginneries between Lake Kyoga and Mbale, was completed, and a line south of Tororo to Busia was built. In the west the main 33 kV transmission line for the Mityana scheme reached Mityana and a small office was opened there. Regional offices with showrooms were also opened in Masaka and Mbale. The main grid was extended when a project to strengthen the system west and south of Kampala by building a 132 kV line from the sub-station in north Kampala to another in the south-western suburbs began.

1959 was another year when many schemes were completed and the transmission and distribution system received important additions. The Kibuga scheme was finished, bringing electricity to a large number of small consumers in the African suburbs of Kampala. A main transmission line for the Mityana scheme had been built in 1958 but the distribution system for the town and the various branch lines were not completed until 1959. The scheme crossed some of the most heavily forested and thinly populated country in south Buganda and was specially subject to all the disadvantages outlined at the beginning of the Chapter. Another important 1959 scheme was the Central Mengo distribution. It was supplied from a major sub-station on the Jinja to Kampala 66 kV line at Mukono. The scheme was intended to bring power to a number of estates which had not previously been near enough to transmission lines. The Mount Elgon scheme was also completed in 1959. The number of small rural consumers turned out to be below expectations. This was a disappointment but not a disaster as all the institutions and the one cotton ginnery in the area took a supply.

After long and complicated negotiations with the Kenya Government and the Kenya Power Company, it was agreed that the line from Tororo south to Busia should also supply settlements on the Kenya side of the border, notably the leper hospital at Itesio.

In the west, the Masaka distribution was extended southwards to Kalisizo and Kyotera, both relatively large trading centres with coffee factories. Other schemes were also begun, notably the Old Entebbe-Kampala Road distribution, which was to supply suburban and rural consumers who were by-passed by the 33 kV transmission lines to Entebbe. A 2,000 kVA pumping station to irrigate the sugar estates

at Jinja was approved. On the sales side, full branch offices were opened at Mityana and Kamuli, and the consumer unit (see Chapter 3) was introduced. Lightning became an increasingly serious problem as the system grew, and the Board began installing high speed protection on 33 kV lines.

By 1960 virtually all the potential industrial consumers in southern Uganda had either taken a supply of electricity or were close enough to the mains to do so if they wished. The same was true of nearly all the gazetted trading centres in the more densely populated areas. The prospect for new consumers (though not for increased consumption by existing customers) was therefore limited. In the first place there was the possibility of increasing the number of rural and semi-rural domestic and small commercial consumers, mainly Africans. In the second, new industry or changes in the structure of existing industries might provide new potential consumers.

Changes in the structure of the main rural industries in Uganda began when legislation altered the conditions under which Africans could participate in coffee processing and cotton ginning.¹⁴ From 1959 on, the growth in the number of African-owned factories was spectacular. In some cases a co-operative bought out a coffee estate and took over the factory. In others an entirely new factory was established. A change of ownership often benefited the UEB. An Asian owner, who saw the body of discriminatory legislation mounting against him and independence drawing nearer, had little incentive to invest in the new equipment needed for a changeover to mains electricity. In many cases he preferred to carry on with obsolete and inefficient machinery. The position did not always alter when a co-operative took over but the possibility of change was greater. A scheme that resulted from these changes in industrial organisation was the line to Katera, north-west of Kampala. The line used the Mityana transmission system and took power to three African co-operative coffee factories and two ginneries.¹⁵ It also served a number of small trading centres.

The situation as regards domestic and small commercial consumers in trading centres had, in some parts of Buganda, changed radically during 1959. The boycott of Asian shopkeepers caused many to move into the towns and their places were taken by Africans.¹⁵ In addition small groups of African shops were growing up outside the gazetted centres. This tendency was also particularly noticeable in Busoga even though the effects of the boycott were very much less important. The African consumers, on average, took less power than the Asians, but nevertheless they were encouraged to take a supply wherever feasible.

The Katera-Semuto scheme was the main extension to the transmission and distribution system in 1960. The 132 kV line across Kampala was completed, but this, though important, added only five miles of line. Irrigation proved to be a success on the Jinja sugar estates and the capacity of the pumping plant was doubled. The Lugazi estate decided to take power for irrigation as well. Smaller projects were an extension to the Kibuga scheme and the beginning of a drive to connect maize mills to the public supply.

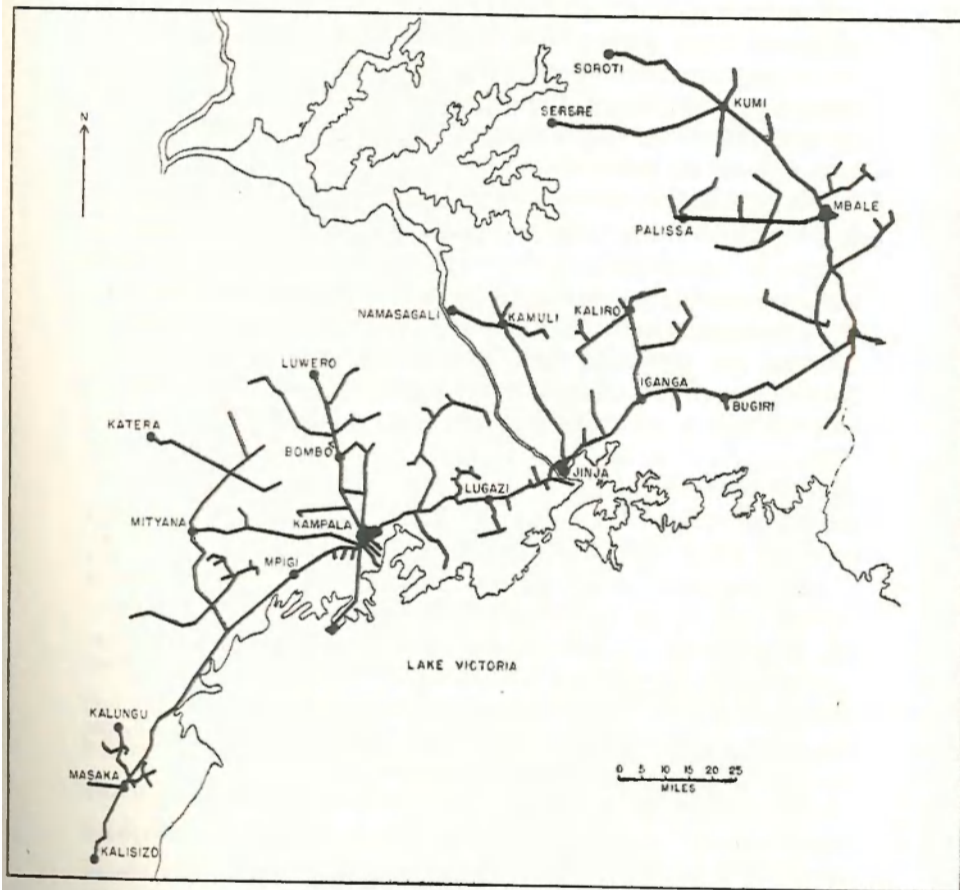
The great increase in the length of the electricity network supplied from Owen Falls was clearly reflected in the mileage of line. In 1954 the total mileage was 629 miles, of which 153 miles were low voltage lines. The figures for 1961 were 2,314 and 500.

Map 2 shows the transmission and distribution system as it was at the end of 1961. During the year the line from Soroti to Kaberamaido was completed and more consumers were connected under the Old Kampala-Entebbe Road scheme. Negotiations for a loan from the International Bank of Reconstruction and Development finally reached a successful conclusion. The Bank agreed to lend £3.1 millions for the construction of up-country lines but only on the condition that the Board operated as a paying concern and stopped charging current expenses to the capital account.¹⁶ Contracts were placed for 550 miles of line to supply Lira, Gulu, Hoima and Masinde by 33 kV line from Owen Falls, and Kilembe, Fort Portal and Kasese by 66 kV wood pole line, which would later be up-graded to 132 kV.

The years after 1961 are not considered in the following chapters, but in order to give some idea of the progress made, more recent developments are outlined. The up-country schemes progressed rapidly. The line reached Lira in 1962. The Mbale-Soroti 33 kV line was up-graded to 66 kV to supply the new areas and work was begun on a new 66 kV line from Tororo to Mbale to supply expected increases in consumption throughout the Elgon Area.

A real drive for more small African consumers was undertaken. Europeans were leaving in relatively large numbers and the UEB estimated that one lost European domestic consumer could on average be replaced only by ten Africans. Consolidation schemes were a response to this situation. The aim was to connect every potential consumer within 50 yards of an 11 kV line. In 1962 consolidation was planned for the Bombo district and the country fringing Kampala. The Old Entebbe-Kampala Road scheme was completed with 400 consumers.

The 132 kV wood pole line to Nkenda, the point where the line branched to Fort Portal and Kasese, was virtually built by 1963, but not energised. In the north the 33 kV line reached Gulu and the



MAP 2 Electricity Distribution in 1961

Tororo-Mbale 66 kV line came into operation. A 132 kV line to Masaka was approved.

Progress has continued since then. In 1964 the entire UEB administration was reorganised to facilitate Ugandanisation and by 1965 only 30 expatriates were employed. The up-country transmission system was completed and energised. Only the new line to Masaka was still uncompleted and a diesel station was meeting the excess demand meanwhile. Small hydro-electric stations served Kabale and Mbarara and a diesel supply was planned for Arua. New additions had brought the number of special industries to six and negotiations were in progress for others. The renegotiation of the Kenya agreement had resulted in lower sales but higher total revenue. 1964 was also the first year in which the UEB made a profit as measured by normal accounting procedures.¹⁶ By then virtually all the main commercial and industrial centres in Uganda either had a supply of electricity from the UEB, or were about to receive one. The network was closely related to population density and relative prosperity in different parts of the country. The transmission and distribution network exhibited the pattern that might be expected where every effort had been made to sell electricity in a developing country.

Notes and References

1. Except where otherwise stated the facts in this chapter are taken from UEB Annual Reports and from personal communications by members of the UEB, in particular Mr. F. Hayden, Chief Surveyor. Where dates differ from those given in the Annual Reports, it is because the Reports tend to be over-optimistic in describing the progress made.
2. The UEB began building 66kV lines on wood supports in 1963.
3. C. R. Westlake, *Uganda Electricity Survey 1947*, p. 26. Westlake recommended 33 kV as the highest voltage for transmission mainly to keep down the cost of tapping the lines.
4. The level is 200 isokeraunic days (days on which thunder is recorded) a year in most of southern Uganda. For purposes of comparison, the level in the area served by the Kariba hydro-electric scheme averaged 60 to 100 days a year, rising to 120 north of Kitwe.
5. The same applied to monkeys when a line had just been built but they appeared to learn better after a year or so.
6. For example, in 1959 over £50,000 was paid out by the Board in wayleave payments and crop compensation.
7. See A. M. O'Connor, *Railways and Development in Uganda* (East African Institute of Social Research, Oxford University Press, Nairobi 1965) p. 48, Map 4. The railway and settlement pattern in the Mukono area, east of Kampala.
8. Proceedings of the Uganda Legislative Council 19.2.1946.
9. The estimated values of cotton and coffee to African growers were £4,002,000 and £1,109,000 in 1946 and £11,926,000 and £4,331,000 in 1952. Uganda Protectorate 1957 Statistical Abstract. Entebbe.
10. See A. I. Richards (ed.) *Economic Development and Tribal Change* (Heffer, Cambridge) pp. 243-249.
11. Agreement in principle was reached in November 1953 but the final agreement was subject to a favourable survey report. Proceedings of the Uganda Legislative Council 20.11.1953. The first power was supplied in January, 1958.

12. Uganda Development Corporation Annual Report and Accounts 1957 to 1964.
13. The percentage of total units sold which was bought by Kenya was:

1958	..	33.5	1962	..	45.3
1959	..	41.1	1963	..	41.0
1960	..	44.2	1964	..	37.7
1961	..	47.8			
14. The Acquisition of Gineries Ordinance 1952 made it possible for African Co-operative Societies to acquire up to twenty gineries by 1960, with Government assistance. The Coffee Industry Ordinance 1953 allowed six new African-owned works to be set up. The Coffee Industry Amendment Ordinance 1957 allowed groups of Africans to set up 'estate' factories and was followed by a steady increase in the number of factories.
15. The boycott, which at its height extended to non-African manufactures, was mainly directed against Asian traders. It began in early 1959 and continued until March 1960. Trade was at first severely dislocated but wholesalers soon found African outlets (*Annual Report of the Ministry of Commerce and Industry*, Entebbe 1960).
16. Before 1961 various costs, e.g. part of general management expenses and wages in the construction department, which would normally be charged to the revenue account were charged to capital.

3

ELECTRICITY CONSUMPTION FROM 1949 TO 1960

The purpose of this chapter is to provide an historical perspective for the more detailed descriptions of the pattern of electricity consumption in 1960 that follow. Accordingly, it deals only with the total figures for consumption and revenue and gives no regional or urban breakdowns.

The statistics of consumption are taken from UEB Annual Reports from 1949 to 1963. For a variety of reasons the figures are not strictly comparable over the whole period. The tariff structure was changed in 1950, 1953, 1954, 1959 and 1961. The figures for the total revenue are therefore differently constituted at different periods and are not directly related to increases in the number of units used. After 1955 the Owen Falls generating station produced virtually all the electricity sold by the Board. In 1958, however, the hydro-electric station at Kikagati began an independent supply to the Mbarara district. The station was small (750 kW) and in 1960 accounted for only 0.75 per cent of the electricity generated by the UEB and it did not have a significant effect on the total statistics. In any case, the scheme is not considered in this study.

Electricity is not sold at a flat rate. The price reflects the various costs involved¹ and the views of the electricity undertaking on how best the total cost should be distributed among the different classes of consumer.

The tariff structure usually incorporates two elements, a fixed charge and a charge which varies according to the number of units used. The fixed charge may either be related to floor area or to maximum demand. It may be levied at a flat rate or in blocks, i.e. the first so many kW of maximum demand or square feet of floor area are charged at a higher rate than the next block. Unit charges may also be block or flat rate and combinations of both methods occur. High fixed charges related to maximum demand and low unit charges are associated with thermal generating plants where fixed costs are low but generation costs high. The opposite is true of hydro-electric schemes and low fixed costs and high unit charges—most suitable for high load industries—are usual. The UEB had, therefore, to alter the tariff structure

when the method of generating electricity changed. The change-over was gradual and the distribution of the revenue burden among consumers was unusual. The average price, particularly for smaller consumers, was high.

The changes in tariff structure noted above resulted in a system which was better adapted to conditions in Uganda as time went on.² In 1948, the tariffs inherited from the East African Power Company were very much those which would be expected in a small-scale, luxury industry, closely geared to non-African needs. Jinja, Kampala and Entebbe each had a slightly different set of tariffs even though the main outlines were the same.³ There were three separate lighting tariffs, ordinary lighting, commercial lighting, with a minimum consumption of 160 units a month, and shop window lighting which had to be separately wired and metered and was subject to a minimum of 500 watts for 3 hours per night. The last two tariffs were clearly unsuited to conditions in Uganda where commercial lighting consumption averaged thirty units a month. There was also an off-peak water heating tariff which was again more closely related to demand patterns in Europe than Uganda. The power tariff was better suited to local conditions; though said to apply to 'large factories', it was based on a maximum demand sliding scale with breaks at 7.5 kW, 15 kW and 22.5 kW of maximum demand—a narrow range applicable to factories using only small amounts of power.

In July 1950 tariffs were revised. The overall increase was approximately 20 per cent, but in order to standardise tariffs in all three areas, the ordinary lighting tariff was reduced from Shs. 1.20 per unit in Kampala and Jinja to Shs. 1. A new flat rate for commercial lighting was introduced at 90 cents a unit. At the same time the shop window and display lighting tariff was brought within reach of more consumers in Uganda by reducing the minimum to 25 units a month. The domestic tariff was changed to give a minimum return of Shs. 18.50 per month. The new tariff guaranteed a higher minimum revenue per domestic consumer than the 1948 tariff, and in a country like Uganda where domestic consumption at the lower end of the scale tended to be small it was an obvious change to make. Power tariffs were altered and maximum demand was henceforth measured in kVA not kW.

The Annual Reports continued to draw attention to rising living costs, inflation, wage increases and above all rises in the cost of fuel oil, which, once the new power stations at Njeru and Lugogo came into operation,⁴ made up the bulk of electricity generating costs. Changes in tariff structure had to be approved, however, by the Government, and took time to bring about. The next change was in September 1953. All tariffs except the flat rate lighting, which was

already high (Shs. 1 per unit), were subjected to a 25 per cent surcharge. At the same time the commercial lighting tariff (90 cents a unit) was withdrawn and the consumers turned over to the flat rate. The increases enabled the Board to abolish meter rents for small meters (under 25 amperes).

The 25 per cent surcharge remained in force until January 1955. Then, in view of the fact that all requirements were being met from Owen Falls, there was an overall decrease of approximately 5 per cent. The flat rate lighting tariff again remained the same. The minimum for domestic consumers was set at Sh. 20.75 a month. The fixed charge per room was Shs. 4.25 while the charge per unit was 11 cents. This compared with Shs. 3.50 per room in 1950 and meant that the smallest consumers were paying considerably more under the new system.

The next change was the introduction, in January 1956, of a special tariff for electrode boilers and similar installations. The tariff was limited to appliances with a capacity of 30 kW or more and they had to be separately metered. At a flat rate of 7 cents a unit it was a very favourable tariff, but of limited application. In 1960 there were only 30 users. The most important were a biscuit factory and various hospitals.

The 1959 tariff change was the one that was in force during the period under study. It was introduced in April and resulted in an overall increase of 13.4 per cent, but only for ordinary consumers. Those with long term agreements—the special industrial consumers and the Kenya Power Company (who by this time together used 67 per cent of all units sold)—were not affected. The tariff system was again changed. The old flat rate lighting, which had been partly withdrawn in 1953, was completely withdrawn. Under it there had been no distinction between lighting for small shops and lighting for domestic premises which were attached to a shop. The small domestic consumer who used electricity only for lighting had no incentive to change to the domestic tariff, buy more appliances or use power. Under the new tariffs light for commercial premises had to be separately metered and, in order to encourage consumption, the flat rate of Shs. 1 per unit was lowered to 90 cents. At the same time the basis of the domestic tariff was completely changed. It had hitherto been made up of a fixed charge per habitable room and a minimum charge for units supplied. This form of tariff was not satisfactory when the UEB was attempting to encourage new, non-European domestic consumers in the comprehensive distribution schemes that were then in full swing (see Chapter 2). The minimum of three rooms remained but a block scale for units was introduced. The first six units per room cost 90 cents a unit. This covered those who were formerly on the flat rate

lighting tariff and the new small domestic consumers. The next 12 units per room cost 25 cents each and the remainder were charged at a rate of 12.5 cents each. There was therefore encouragement to use more electricity, but a result of the new scale was that all consumers paid more than under the old system, though the larger users bore a much greater share of the increase.

The other major change was in the industrial power tariff. The former scale with breaks at 10 kVA and 20 kVA of maximum demand was replaced by a new scale with breaks at 50 kVA and 250 kVA. Fixed charges were thus lowered in accordance with the usual practice for hydro-electric schemes. The old flat rate of 11 cents a unit was changed to a block system. The new scale of charges recognised the fact that the capacity of industrial users in Uganda had grown considerably and, like the new domestic tariff, the block system was intended to encourage larger consumers. A new tariff for industrialists who could use high voltage power was introduced at the same time. It was charged on a similar system but was cheaper than the low voltage supply. The flat rate power tariff for small users was also revised to include a small incentive to increased consumption. The first 500 units cost 40 cents each and the remainder, 35 cents.

The tariffs for hotels and restaurants were altered to a sliding scale based on consumption per 1,000 square feet of floor space, a more realistic unit than the previous figure of 100 square feet, since smaller restaurants and bars used a combination of flat rate power and lighting tariffs. Further developments were the introduction of a security lighting tariff for lights which were on at night and separately metered; and in 1960 an institutional cooking tariff and the consumer unit. The purpose of the second was to encourage the use of electricity in school kitchens and it was charged at a flat rate of 13 cents a unit. The third was intended specially for African domestic consumers and applications from Asians were in general refused on the grounds that they could afford more. The units were of two sizes. The smaller (5 amp) cost Shs. 8.50 per month and were intended for lighting and wirelesses only. The large (15 amp) cost Shs. 20 per month and all the usual appliances could be used. Neither had been very successful in attracting new consumers in 1960.

In 1961 tariffs were again raised in order to meet the conditions imposed by the International Bank for Reconstruction and Development, which insisted that the annual accounts should be presented in a different form and that concealed current deficits should cease.

The UEB has presented fairly detailed breakdowns of consumption in its Annual Reports since 1950 and the figures for 1949 are given. The various tariffs outlined above were grouped for the purposes of

presentation into the following classes:—

- Flat Rate Lighting (discontinued in 1958)
- Domestic (1).
- Hotels, Clubs, etc. (4, 5, 6).
- Flat Rate Commercial Power and Heating (3).
- Commercial and Security Lighting (7, 9).
- Street Lighting (10).
- Industrial Power—Standard (2, 11, 8).
- Industrial Power—Special (12, 13, 14).
- Kenya Bulk Supply.

The groups are listed since they are used in some of the following tables. The numbers in brackets after each tariff group are the code numbers used for each tariff by the UEB in preparing monthly analyses of consumption. Tariff 1 (domestic) applied only to premises used exclusively as a private residence. There was a possibility of confusion in the small rural commercial establishment (*duka*), generally Asian-owned. In most such cases the shop fronted the road and living accommodation and storage space were behind. After 1958 when the flat rate lighting tariff was abolished, the UEB overcame the difficulty by insisting on one meter for the *duka* lights and another for electricity outlets in the domestic part of the building. Since consumers were counted according to the number of meters, i.e. one meter counted as a consumer, the actual number of customers using electricity was considerably less than the sum of consumers using each electricity tariff. The next group, hotels, clubs, etc. also included hospitals, cinemas, boarding schools and barracks. Tariff 4 was charged on a sliding scale based on the floor area of the premises. Tariff 5 was similar, but applied to large restaurants, in practice those which regularly used something over 1,000 units per month. Institutions which for one reason or another did not qualify for either 4 or 5 but needed relatively large amounts of power for a variety of non-industrial purposes were on Tariff 6. It was charged on a similar basis to the industrial tariffs but without a sliding scale. The next tariff, flat rate commercial power and heating, was used by all small non-domestic consumers who needed power as well as light. It covered a very wide range of consumers from the small bar to the factory whose manager had omitted to change to an industrial tariff when running at capacity. For example, in February 1960, consumption ranged from 3 units by a bar in north-east Busoga, to 31,808 units by a ginnery in Tororo.

The main lighting tariffs were 7 and 9. Tariff 7 was the successor to the flat rate lighting for consumers who did not transfer to the domestic tariff (approximately 7,000). It was charged at a flat rate of 90 cents per unit and was therefore the most expensive electricity

in Uganda. The vast majority of users were small shops and rural *dukas*. A light, even if only a bare bulb, was a *sine qua non* for the progressive *duka*, and in any trading centre commercial rivalry played its customary part.⁵ Consumption per head was extremely low, as would be expected. The average, which remained constant from 1959 to 1961, was slightly over 30 units a month. The security lighting tariff (9), was for outside lights which were left on for all or part of the night. It had only 130 users in 1960 and was charged at a flat rate of 60 cents a unit.

The street lighting tariff was charged according to the number of lamps in operation. The system of street lighting in the rural areas was considerably simpler than in the towns. Low voltage wiring linked a series of lamps on twenty-five foot wooden poles. There was no need to take up the roadway and expensive equipment was kept to the minimum, though the lights themselves were modern and efficient. Charges were paid by the Township Authority or African Local Government or, occasionally, by the local Indian Association. In 1960 the UEB was fortunate in that street lights were accepted as desirable and non-controversial. They have, however, been one of the first casualties of the post-independence period and consumption and revenue have fallen off since 1961.

Industrial power (2, 11, and 8) was supplied on a sliding scale of charges with the exception of tariff 8. This tariff was a special one designed to encourage the use of electrode boilers and similar industrial appliances. The UEB, for example, used it in its pole treating plants at Lugogo in Kampala and at Tororo. It was also used in hospitals and large laundries. The charge in 1960 was a flat rate of 8 cents a unit. The other two industrial tariffs were for motive power, but a limited amount of lighting was allowed. Many ginneries and some coffee factories, however, used the flat rate power tariff for the part of the year when business was slack. No lighting was then allowed and they had to use tariff 7. The distinction between tariffs 2 and 11 was one of voltage. Tariff 2 was supplied at the usual Uganda voltage (415 or less), while under tariff 11 power reached the consumer direct at high voltage (11 kV) and was cheaper. Both were charged on a double block scale based on maximum demand in kVA and the number of units used.

In most cases tariff 2 was cheaper than tariff 3 when more than 500 units per month were used, though individual cases depended on the kVA registered—in practice whether the user ran all his motors at once or not. The relationship between tariffs 2 and 3 was complicated by the fact that the UEB required a month's notice in writing when a user wished to change his tariff. The importance of this condition applied mainly to coffee and cotton factories which operated

seasonally, and mistakes occurred. It was not always possible for the consumer to plan when he would be running his machinery at capacity, or even running at all, since this depended on cotton and coffee buying and stock piling. Difficulties were greatest when electricity was first introduced into an area and factory managers, many of whom spoke little English, had not fully understood the system. There is therefore a case for considering tariffs 2 and 3 together, but because of the great difference in their respective costs per unit,⁶ and between the consumers for whom they were designed, this has not been done in this study. Little need be said about tariff 11. It averaged 6 users in 1960 and was feasible only for the largest industrialists in Uganda.

In some respects tariff 11 approached the next group, the Industrial Power—Special. These tariffs were specially negotiated and worked out at a very low rate (for Uganda), approximately 6 cents a unit, which was economic only when supplying large consumers with a relatively high load factor. Since 1960 the group has been joined by the steel mill at Jinja, the copper mine in Western Uganda and the new hospital in Kampala. The average cost per unit has actually fallen slightly (from 5.48 cents per unit in 1960 to 5.42 cents in 1964). This is the only tariff group to register a fall in price and the overall average per unit has gone up from slightly above 10 cents to over 12 cents.

The Kenya Bulk supply was the last category shown in the UEB Annual Reports. The importance of the export to Kenya has already been discussed and it shows clearly in Table III.1. The agreement was not popular in Uganda and an attempt to obtain better terms failed in 1961. Kenya then undertook not to develop its own Seven Forks hydro-electric scheme to the detriment of Uganda⁷ and in 1964 an agreement which was a slight improvement was reached.⁸ However, the Seven Forks scheme is now (1965) underway and the installed capacity is expected to be 40 MW in 1967 rising to 200 MW in the future.

The growth in consumption and revenue that accompanied the changes in tariffs is shown in Table III.1. The consumption figures are for units actually sold. More units were, of course, produced but some were used at the power station and others lost during distribution. Since 1957 the percentage of units lost in distribution has consistently been less than 10 per cent of the total sent out. The revenue figures represent revenue from sales of electricity and exclude meter rents and income from various other sources, such as rents and retail sales of appliances in the regional showrooms. Revenue from these two sources averaged about £6,000 from 1956 onwards.

As Table III.1 shows, the trend of consumption and revenue has been consistently upwards, but the rate of growth has varied very

Table III. I
OWEN FALLS HYDRO-ELECTRIC STATION.
TOTAL CONSUMPTION AND REVENUE 1949-1961

YEAR	CONSUMPTION			REVENUE		
	Total m.kWh	Uganda m.kWh	Kenya m.kWh	Total £000s	Uganda £000s	Kenya £000s
1949	8.8	8.8	—	89	89	—
1950	13.8	13.8	—	148	148	—
1951	24.6	24.6	—	266	266	—
1952	33.8	33.8	—	360	360	—
1953	51.1	51.1	—	549	549	—
1954	63.6	63.6	—	722	722	—
1955	69.3	69.3	—	746	746	—
1956	82.3	82.3	—	840	840	—
1957	133.5	133.5	—	1102	1102	—
1958	252.7	162.8	89.9	1389	1250	139
1959	314.8	185.4	129.4	1661	1465	196
1960	362.5	202.4	160.1	1846	1628	218
1961	400.5	209.2	191.3	2128	1838	290

greatly. The table clearly shows the difficult period between 1953 and 1957, when the main effort made by the Board was concentrated on attempting to finish the Owen Falls Dam according to schedule.

Table III.2 compares the annual percentage rates of growth for consumption and revenue. Very high rates of growth were achieved in the early years, as would be expected from the combination of lack of development during the War and the rise in prosperity, already referred to in Chapter 2. Revenue grew faster than consumption in 1950 and 1951 but it failed to do so in 1952, and the Board raised its prices the following year. The difficulties of 1955 and 1956, when no large industries which would take the newly available power were established, have already been discussed. The nature of the change in the next two years stands out clearly in both tables. Consumption increased greatly but revenue did not follow at the same rate. The Board was able to supply the large industries and the Kenya Power Company at more favourable rates than were possible for small industries. In the export to Kenya it had little option but to sell at a price below that of thermal electricity produced in Kenya.

The second period of low growth occurred at the time of independence and was only to be expected in view of the prevailing business uncertainty and the emigration of non-Africans.

Table III.3 shows how industrial consumption developed. Ordinary industrial consumption, i.e. predominantly the smaller concerns, was relatively static between 1954 and 1958 but since then has increased fairly steadily. In 1964 it accounted for over 65 million units. However the really big increases in consumption in Uganda come from the

Table III. 3
UGANDA. INDUSTRIAL ELECTRICITY CONSUMPTION AND REVENUE 1950-1961

Year	Industrial Consumption		Industrial Revenue	
	Total Ordin- ary kWh	Special kWh	Total £000s	Special £000s
1950	4.6	4.6	—	38
1951	10.1	10.1	—	91
1952	12.7	12.7	—	121
1953	23.7	23.7	—	229
1954	30.4	30.4	—	286
1955	29.9	29.9	—	268
1956	35.8	35.8	—	276
1957	80.3	31.1	49.2	450
1958	103.3	35.2	68.1	522
1959	122.6	40.3	82.3	612
1960	134.8	43.7	91.1	660
1961	140.7	49.2	91.5	747

Special Industries who used 155 million units in 1964, compared with none in 1956.

Table III. 4 shows the stagnation in domestic consumption which has been a marked feature since 1958. Even in 1964 consumption was only just over 40 million units. On the other hand both revenue and consumers continued to rise. Domestic revenue has never been less than 25 per cent of the total since 1950 and has averaged 28 per cent. Consumption, however, fell below 10 per cent of the total in 1961 and the trend has continued. The domestic consumer in Uganda therefore bears a heavy burden even when the high cost of connecting and servicing

Table III. 4
UGANDA. DOMESTIC ELECTRICITY CONSUMPTION 1950-1961

Year	Units	Consumers	Revenue	Units/Cons.	Revenue/
	000,000 kWh (a)	(b)	£000s (c)	(a)/(b) (d)	(c)/(b) £. (e)
1950	5.0	2100	41	2400	20
1951	8.7	3000	75	2900	25
1952	13.6	4200	110	3300	26
1953	17.9	4900	154	3700	32
1954	21.4	5800	210	3700	36
1955	25.4	7200	225	3500	31
1956	30.4	8600	271	3600	32
1957	35.0	10000	315	3500	32
1958	38.9	11600	358	3400	31
1959	40.8	16100	448	2500	28
1960	41.0	17800	493	2300	28
1961	39.6	19200	532	2100	28

Table III. 2
ANNUAL PERCENTAGE GROWTH IN REVENUE AND CONSUMPTION 1950-1963

	1950	1951	1952	1953	1954	1955	1956	1957	1958	1959	1960	1961	1962	1963
Consumption ..	57	78	37	51	25	9	19	62	89	25	15	10	4	10
Revenue	66	80	35	55	32	3	13	31	26	20	11	15	11	12

Table III. 5
OWEN FALLS. INSTALLED CAPACITY AND MAXIMUM DEMAND 1950-1964

	1950	1953	1954	1955	1956	1957	1958	1959	1960	1961	1962	1963	1964
Installed Capacity MW ..	9	17	30	60	60	90	105	120	120	120	120	102	120
Maximum Demand MW ..	4	13	15	16	22	30	52	58	63	74	73	85	99

scattered premises is taken into consideration. As a comparison, comparable figures for the former Federation of Rhodesia and Nyasaland were 18 per cent of revenue and 16 per cent of consumption.¹⁰

No discussion of an electricity undertaking can omit to mention the important factors of maximum demand and annual load. As Table III. 5 shows maximum demand was well below installed capacity during the early years of operation. It is now, however, approaching the limits (surplus capacity of 15MW or one turbine is needed in case of a breakdown), and it seems likely that the UEB will at least be able to go ahead with the project for a second dam. This scheme has been the subject of detailed study since 1956 and the ground work has been well laid. It is intended (1966) to build the dam at Bujagali, about four and a half miles below Owen Falls. The generating station will have an ultimate capacity of 180MW. The final decision, however, has still to be taken. The alternative is to reduce sales to Kenya.

The annual load factor achieved by the Board has been over 60 per cent every year since 1958. The fact that the UEB has reached considerably higher values in recent years is encouraging, particularly as expectations were of a much lower load factor—little more than 50 per cent.¹¹

The tariffs in force in 1960, which have been discussed in previous paragraphs, were introduced at the same time as the Hollerith system of accounting. The Hollerith machine produced monthly tariff analyses from which much of the material in subsequent chapters was derived.

The UEB issued accounts monthly. This may seem needlessly expensive, but in a country such as Uganda it was probably the only way to keep bad debts at a reasonable level. The number of consumers fluctuated greatly from month to month and disconnections for failure to pay bills were common. Even those that were not disconnected often used very little or no electricity in certain months. This was particularly true of small consumers on the domestic and flat rate power tariffs. Electricity was not a necessity and consumption could be relatively easily cut down. Other variations in monthly consumption were caused by the fact that the agricultural processing industries often functioned erratically. Ginnery managers might forget to change to tariff 2 and so raise the consumption total for tariff 3, or, though this occurred more frequently in coffee factories, they might stock pile for a month and then run at capacity. For all these reasons, one month's consumption was rarely a very accurate indication of the electricity supply situation and figures for one month only were not used in this survey. In all cases the monthly figures quoted are the result of averaging a period of three months. This procedure had the additional advantage of showing up any major errors in the Hollerith

monthly analyses. The variations referred to above were not very important at national level but became significant when smaller areas were considered. For the sake of consistency, however, and to facilitate comparisons, the Uganda monthly totals for each tariff have been treated in the same way as the urban and rural figures in the following chapters.

Consumption of electricity by all classes of consumers has risen consistently since the UEB was formed. Increases among the smaller users have, however, tended to level off as the bulk of the potential consumers were connected to the public supply and as uncertainty associated with approaching independence increased. The most important increases in consumption have come from a very few consumers, the large industries and the Kenya Power Company. They, and projected new industries, have the greatest potential for future growth.

Notes and References

1. I. M. D. Little, *The Price of Fuel* (OUP, 1953) pp. 54-55, lists the costs as (1) energy costs, (2) capacity costs, (3) consumer costs, (4) distribution costs, and (5) fixed costs.
2. It must, however, be noted that many of the changes introduced into Uganda copied similar changes made in Britain.
3. C. R. Westlake, *op. cit.*, p. 14. The average price of electricity in 1946 was 22.5 cents per unit in Kampala and 31.1 cents in Jinja.
4. The original stations were closed in June 1950.
5. But see A. E. Larrimore, *The Alien Town Patterns of Settlement in Busoga Uganda. An Essay in Cultural Geography* (Chicago, Illinois, 1958) p. 128. The author states that dukas in trading centres did not compete but rather divided up the existing trade on the basis of fair shares. It seems unlikely that this would be carried so far as to delay the introduction of electricity until all could afford it and no evidence of this was found.
6. Average costs in 1960 were 19 cents per unit and 37 cents per unit.
7. *Uganda Argus* 14.10.61.
8. The price paid for the first 30,000 kW remained at £13.5 per kW but all further kW were to cost £20 each.
9. UEB Annual Reports, 1950-1963.
10. Third Report of the Under-Secretary for Power 1958-59. Federation of Rhodesia and Nyasaland 1959 (for consumption) and Electricity Census 1957-58 (for revenue).
11. C. R. Westlake, *op. cit.*, Schedule 18.

4

THE USE OF ELECTRICITY IN URBAN INDUSTRY

Industry in Uganda has used approximately two-thirds of all the electricity sold in the country since 1958. This, taken by itself, is not a bad record if the small size and limited nature of the industrial sector is taken into account. However when industrial consumption is compared with the total Owen Falls output the picture is less favourable. The share of industry was 41 per cent in 1958, fell to 36 per cent in 1960 and rose slowly to 49 per cent in 1964. It is at once clear that during the period under discussion (before 1961), industry in Uganda used only about as much electricity as was exported to Kenya.

Industrial electricity consumption was concentrated in the urban areas, but the actual definition of urban or even of industry was by no means straightforward. The administrative unit, (the township or municipality), was not satisfactory either as a means of delimiting urban areas or as a criterion for determining urban status. Towns ranged in size from Masaka with relatively well-developed urban functions to small centres such as Kagulu which were in fact no more than one or two *dukas*. In practice the towns classed in this Chapter as centres of urban industry selected themselves. They were those with a total non-African population of over 1,500 in the 1959 Census: Kampala 23,646 (including the townships of Port Bell, Kawempe and Namirembe, but excluding the non-African population living in the areas administered by the Buganda Government), Jinja 9,913, Mbale 5,136, Masaka 2,457, Soroti 2,027, Entebbe 1,854 and Tororo 1,547. The only other towns in the distribution area that had a non-African population in any way comparable in size were Iganga (1,098) and Kamuli (904). Both these towns exhibited a pattern of electricity consumption which was closer to that of rural areas and they have therefore been included under that heading.

When the towns had been selected, there was the problem of defining the area which qualified as urban. The term was interpreted somewhat broadly to include suburban as well as closely built up areas. The gazetted boundaries of the towns normally included either too much or too little and could not be used. Again, in Kampala, Masaka and Tororo a number of important industrial establishments were sited

well outside the municipal boundary, and even separated from the built up area by relatively untouched countryside. It would, however, have been unrealistic to include these establishments under the heading of rural industry.

A further complication arose from the fact that the areas for which consumption statistics were available had been delimited for the purpose of meter reading, not for sales analysis. As a result some small rural areas have had to be included in the urban statistics and two peripheral rural industries omitted.¹ The actual boundaries shown on maps 4 and 5 are a compromise between the need to define the true urban area and the necessity of including industries which common sense indicated were urban but which the UEB included in its rural statistics.

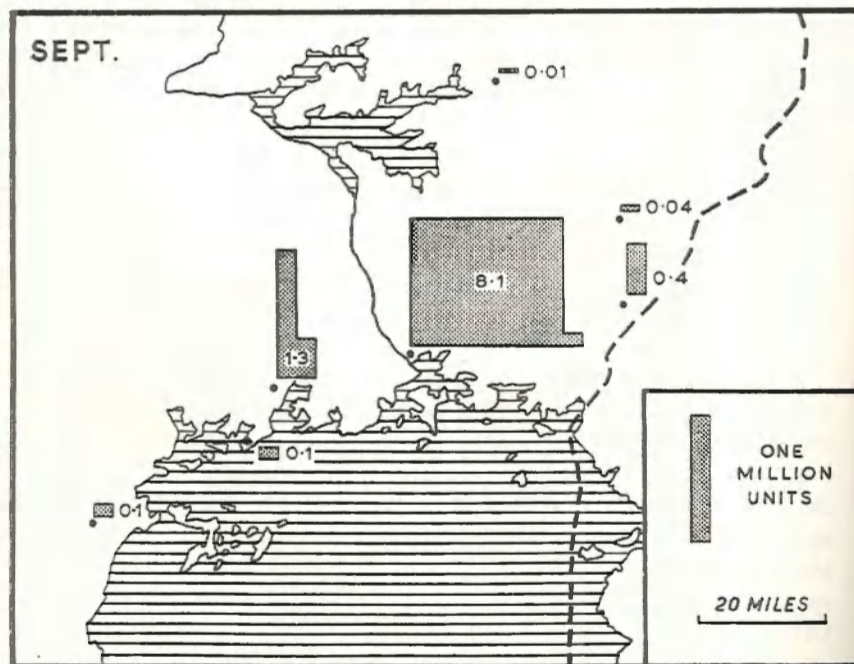
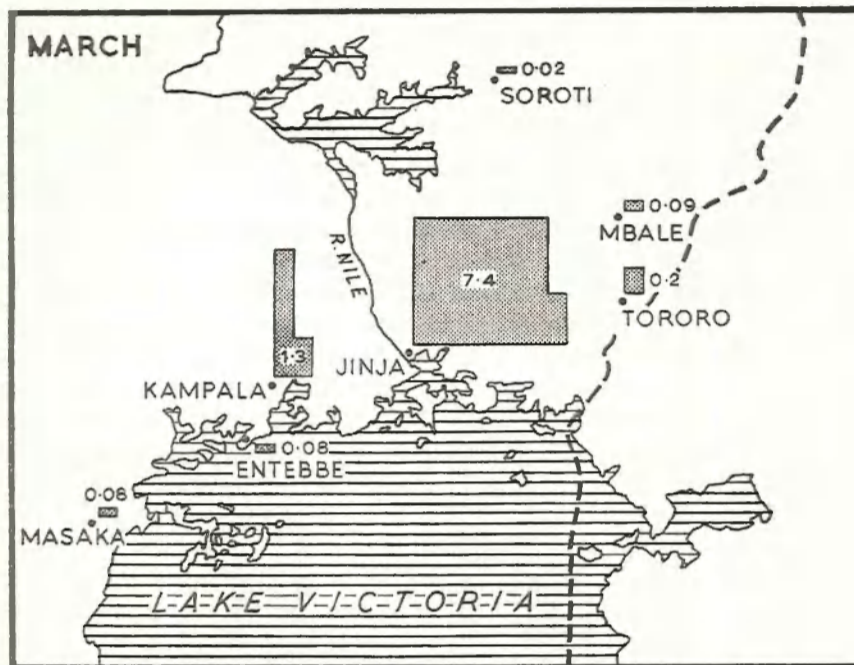
The term industry is to some extent misleading in a country such as Uganda, where the industrial sector is not only very small but is also composed of a very few modern concerns and a large number of small enterprises many of which are difficult to distinguish from commercial activity. For example, crankshaft regrinding and simple welding which might be classed as engineering, were carried on as ancillary to retailing and repairing motor vehicles, and tailoring was frequently associated with general retailing (*dukas*). In practice when the monthly statistics for industrial consumption were collected by area an undertaking was classed as industrial if it used one of the industrial power tariffs, and as commercial if it used the flat rate power tariff. In Victoria Area annual consumption figures were obtained as well as the monthly figures. They were based on the number of units used during the year on any power tariff by each establishment. This method had the advantage of illustrating the relationship between industry and electricity from the point of view of industry. The other, which was used for the whole country and based only on electricity tariff, emphasised the viewpoint of the electricity supplier. The difference in the picture presented by the two methods was small since the important industries were dominant in both. The main advantage of using the more detailed method was that it enabled the electricity used by undertakings which were not on a standard industrial tariff to be compared with those that were. The most important of these were the many small agricultural processing factories which used the flat rate power tariff for all or part of the year.

The industrial power tariffs were tariff 2, ordinary voltage, and tariff 11, high voltage, and the special industrial tariffs, 12, 13, and 14 (see Chapter 3). Tariff 8, for electrode boilers and similar installations, was used by a variety of consumers and the total consumption was

split between the industrial and institutional headings. Hospitals were classed as institutions.

Industry in Uganda, and indeed much of the economy of the country, has always been relatively closely controlled by the Government. The first important industry was cotton ginning. It was allowed to expand unchecked after the First World War. Since 1929,² however, the Government has, by a series of commissions and ordinances, attempted to undo the damage caused by excess capacity and maldistribution of ginneries during the period of uncontrolled growth. The industry still suffered from surplus capacity in 1961 and the position had been aggravated by a fall in the cotton acreage in Buganda, where many of the ginneries were situated. Uneconomic ginneries were enabled to remain in business by the quota system, which guaranteed a share of the crop to the ginneries in each area of the country. The coffee processing industry suffered from the opposite disadvantage in its early days. The number of factories was strictly limited except on private estates. In 1953 there were six licensed curing works and seven licensed scheduled hulleries, all owned by non-Africans. A curing charge was obligatory and hulleries could not cure coffee. The curing works were in Kampala (four) and Masaka (two). Since 1953 Africans have been able to enter the industry, and in 1957 the position was further liberalised. By 1962 African co-operative societies operated a total of forty-two factories. The result of developments in the industry had been a startling change in the distribution pattern of the coffee processing industry, and by 1961 the existence of excess capacity. The other major agricultural processing industries were freed earlier. Restrictions on the erection of maize mills in Buganda and Busoga were removed in 1951 and on cotton seed crushing in 1954. Capacity in the seed crushing industry had, however, even under the licensing system, expanded faster than the supply of cotton seed and the industry had been in difficulties ever since.

The other aspect of Government control of industry in Uganda has been very much more positive. The Uganda Development Corporation was set up in 1952 with the object of stimulating industrial development. The Corporation participated in almost all the major industries in Uganda, e.g. the copper smelter at Jinja and the brewery and the aluminium hollow-ware factory in Kampala. It enabled the textile factory to carry on when marketing difficulties caused the original sponsors to sell out, and it took over the cement factory in 1953. The UDC did not, however, have a complete monopoly of large scale modern industry in Uganda. There were two important sugar factories and their subsidiaries, including the brewery at Jinja, a cigarette factory and a plywood factory. Industry which was not based on agricultural



MAP 3 Industrial Electricity Consumption by Areas in March and September 1960

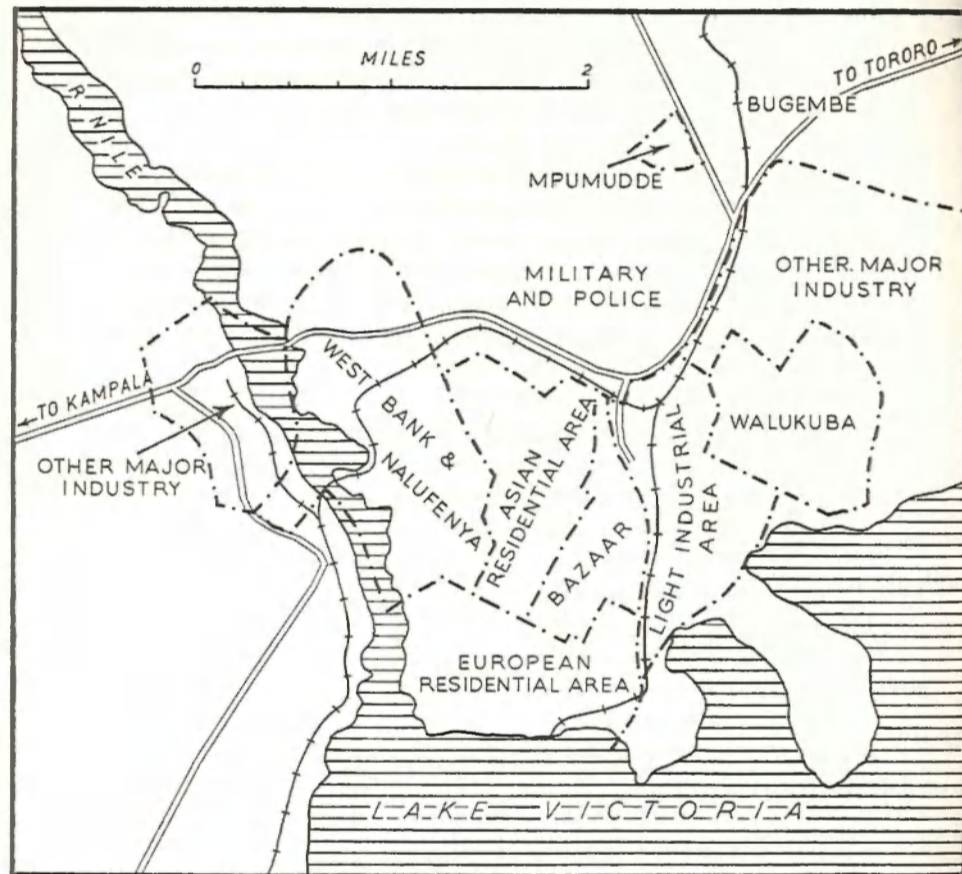
raw materials and not connected with the UDC had grown up to satisfy consumer demand, mainly in the towns. Food processing, manufacture of aerated waters, general engineering repairs and saw-milling were examples, and on a smaller scale soap and furniture manufacture. With few exceptions, however, industrial development in Uganda had taken place under relatively strict conditions of government control or participation. While the availability or not of electrical power might be expected to have had some influence on industrial location and growth in a free economy, in Uganda other conditions, such as legislation or political considerations have been of great, and in some cases over-riding, importance.

Industry accounted for approximately 66 per cent of the electricity sold in Uganda in 1960. It was distributed as shown below in Table IV.1 which gives the average monthly consumption for March and September, for each of the UEB administrative areas and its distribution between urban and rural areas. Map 3 similarly shows the importance of urban consumption in each Area in diagrammatic form.

Table IV. 1
UGANDA. INDUSTRIAL ELECTRICITY CONSUMPTION.
MARCH AND SEPTEMBER 1960

	MARCH		SEPTEMBER	
	'000 kWh	% total	'000 kWh	% total
Victoria Area				
Kampala	1,300	12.7	1,308	12.2
Entebbe	63	0.7	93	1.1
Masaka	77	0.8	108	1.1
Urban	1,440	14.2	1,509	14.4
Total Area	<u>1,807</u>	<u>17.7</u>	<u>1,704</u>	<u>16.2</u>
Nile Area				
Jinja (Urban) ..	7,407	71.7	8,142	76.0
Total Area	<u>7,939</u>	<u>76.8</u>	<u>8,512</u>	<u>79.5</u>
Elgon Area				
Tororo	220	2.7	362	3.4
Mbale	88	0.8	46	0.4
Soroti	21	0.2	7	0.1
Urban	429	3.7	415	3.9
Total Area	<u>574</u>	<u>5.5</u>	<u>461</u>	<u>4.3</u>
Total Uganda	<u>10,320</u>	<u>100.0</u>	<u>10,677</u>	<u>100.0</u>

Nile Area, with 77 per cent (March) and 80 per cent (September) of the total industrial consumption in Uganda (Table IV.1), clearly held a dominant position. Here there was no difficulty in determining the boundary of urban activity. It coincided with the Jinja Planning



MAP 4 Sub-divisions of Jinja

Area and included the textile factory, brewery and Owen Falls Power Station and so related workshops situated on the west bank of the Nile outside the Jinja town boundary. The statistics for the power station were excluded for the purposes of this analysis. It did, however use some 900,000 units of electricity annually. The other two important industrial areas were in Jinja itself (see Map 4). The copper smelter, railway station, railway workshops, cotton ginnery were situated on the eastern boundary, and other industries, notably the tobacco factory, plywood factory and one of the largest oil mills in Uganda, were in what was known as the Light Industrial Area.

Statistics for electricity consumption in Jinja were collected on a different principle from that used in other areas. All the industries in the town were put into one of two groups and this, though facilitating meter reading, made detailed analysis by area impossible. Map 4 shows the boundaries of the groups. The two areas entitled Other Major Industry include the industries on the special industrial tariffs—the textile factory in the west and the copper smelter in the east. The total consumption for these areas was 7,144,000 units in March and 7,973,000 in September 1960. Of this 6.9 million units and 7.2 million units respectively were used under special agreement. The smelter averaged between 4 million and 4.5 million units and the textile factory between 2 million and 2.5 million units a month, but both also took some of the remaining total at the same rates as other industrialists. The most important industries using the remainder of the electricity consumed in the area were the brewery, the large maize mill near the lake shore, the cigarette factory and the Jinja water works. Also included in the area were a ginnery near the smelter and an irrigation pump, which was part of the irrigation system for the sugar plantation thirteen miles away at Kakira. The industries in the Light Industrial Area used considerably less power in total, but, when consumption under the special tariffs was excluded, more in March than those in the other area. In September there was a pronounced seasonal decline, from 257,000 units to 162,000 units. The most important consumers in this group were the sawmill and plywood factory, the large oil mill which operated on a reduced scale outside the ginning season, two smaller oil and maize mills, two construction companies and an engineering repair firm. There were other small industries, particularly oil and maize mills in the industrial area, but they were not using an industrial power tariff. Other 'industrial' users were the town slaughterhouse and the General Post Office.

Industry in Jinja was dominated by two undertakings, both of which were connected with the UDC. The town was noteworthy, however, in that it was the site of the only large scale non-agricultural industries

in the country that were completely independent of the UDC, i.e. the brewery, the cigarette factory and the plywood factory. The cigarette factory produced for the East African market and was owned by an international company, but the other two concerns were the product of local Asian *entrepreneurship*. Both were market oriented and could equally well have been located in Kampala but their parent firms were in Jinja and there is reason to think that this factor was as important as any in determining location.

Total industrial consumption in Victoria Area was very much lower than in Nile Area, but when the industries on the special tariff were omitted, urban industry accounted for between a half and a third as much again as in Jinja. The number of consumers on industrial power tariffs was also very much higher, 70 as opposed to 24. Table IV. 2 shows the total consumption of electricity in the Victoria Area in 1960 by each of the main industrial sectors.

Table IV. 2
VICTORIA AREA. TOTAL URBAN INDUSTRIAL ELECTRICITY
CONSUMPTION 1960

Industry	'000 kWh	% Total
Agricultural processing:		
Coffee	1,975	
Cotton	146	
Total	2,121	11.8
Brickmaking and Quarrying	398	2.2
Sawmilling	160	0.9
Oil and Maize Milling and Soap Manufac- ture	3,481	19.4
Food industries:		
Brewing and Bottling	1,107	
Food	862	
Total	1,969	11.0
Other Industries	2,739	15.2
Printing and Publishing	313	1.7
Public Works and Sewerage:		
Water	6,244	
Sewerage	277	
PWD	332	
Total	6,803	37.8
TOTAL ALL INDUSTRY	17,984	100.0

The dominant position of the Public Works Department, Water Supply and Sewerage sector was the outstanding feature. Even if industries based on processing oil seeds, maize, coffee and cotton were grouped together, they accounted for only 31.2 per cent of the total, as opposed to 37.8 per cent for public services. There was a case for placing Public Works Department, water supply and sewerage in the category of Institutions and Services, together with hospitals and

missions, but since the major consumers (the Kampala Water Works and the PWD Central Engineering Workshop), used an industrial power tariff, it was thought more realistic to group PWD consumption under industries.

Kampala accounted for 83 per cent of the urban industrial electricity consumption in Victoria Area. The term urban was interpreted fairly loosely since common sense dictated that, for example, the Kampala Water Works, although sited outside the city boundary, should not be classed as a rural industry. Greater Kampala was made up of a number of administratively separate units. In the first place there was the Kampala Municipality, the area to which the census statistics for Kampala refer. There had, however, been considerable development outside the municipal boundary. The Kampala Planning Area extended eastwards on to Crown Land and did not differ from the town except administratively. In the south and west, Kampala was adjoined by the Kibuga, a densely settled, mainly African, suburban area, which included the headquarters of the Buganda Government and the Kabaka's Palace at Mengo, and the Anglican and Catholic cathedrals. Suburban development continued south of the Kibuga along a series of hills and ridges where the Governor's Lodge and the Water Works were sited. The neighbouring townships of Port Bell and Kawempe were also included as part of the Kampala urban area. Port Bell was formerly important as the lake port for South Buganda, but when the railway reached Kampala (1931) traffic declined. It was the site of a number of important institutions, three large industrial concerns and a small European residential area. Kawempe was a gazetted township but had been much neglected. It was, however, the centre of the predominantly Asian-owned oil and maize milling and soap manufacturing industry.

Within these limits the boundaries of the Greater Kampala urban areas were fairly easy to define and coincided well with the areas for which statistics of electricity consumption were available. The only problem arose to the east of the Planning Area, along the main road to Jinja. The UEB grouped the Technical Institute and Teacher Training College which were just outside the Planning Area boundary together with the ginnery at Kireka and schools and plantations up to fourteen miles along the Jinja road. That part of the area which included the residential suburbs at the Technical Institute should clearly have been included in statistics for Kampala, but the rest was equally clearly rural. Since only 145 of the 336 consumers in the area could be classed as suburban and only one of these, a construction company's base camp, as industrial, the whole area was omitted from the Kampala statistics and included in the chapter on rural consumption.

Electricity consumption by the various industries represented in Kampala is shown below in Table IV. 3. Map 5 outlines the urban area as described above and shows the main industrial areas with their relative importance as users of electricity.

Table IV. 3
KAMPALA. TOTAL URBAN INDUSTRIAL ELECTRICITY
CONSUMPTION 1960

Industry	'000 kWh	% Total
Agricultural processing:		
Coffee	1,293	
Cotton	146	
Total	1,440	9.0
Quarrying	398	2.5
Sawmilling	160	1.0
Oil, Maize and Soap	3,226	20.0
Food Processing:		
Brewing and bottling	1,107	
Food	862	
Total	1,970	12.2
Printing and publishing	150	0.9
Other Industry	2,739	17.0
PWD Water and Sewerage:		
Water	5,479	
PWD	314	
Sewerage	227	
Total	6,021	37.4
TOTAL FOR KAMPALA	16,104	100.0

The oldest industrial area was the northern part of the Light Industrial Area shown on Map 5. It was situated on either side of the Old Port Bell Road between the main road to Jinja and the railway. It included two of the largest coffee factories in Uganda, both owned by non-Africans, which in 1960 produced approximately 6,000 tons of coffee each, ran for ten and eleven months and used 525,000 units of electricity between them. Other major users were the PWD (over 300,000 units), four importers of frozen food, an aerated water manufacturer, two sawmills and a printing press. The neighbouring industrial area south of the main railway line was somewhat similar in structure. There were two frozen food importers, an aerated water manufacturer, the Kampala depots of the oil companies operating in East Africa and the main workshops of motor vehicle importers and related concerns. In these two areas were sited all the firms included under Other Industries in Table IV.3, with the exception of the hollow-ware factory on tariff 8. This tariff was charged at a flat rate of 12.5 cents a unit and while not as cheap as that negotiated by the special agreements it was cheaper than either of the industrial power tariffs. The

factory was the only one to use electricity under the tariff in such large amounts, and was able to do so because of the nature of its installation.

Central Kampala was mainly residential and commercial in function. Industrial consumption was accounted for by a large bakery, a small printing works and a hotel laundry.

The final industrial area of Kampala was the township of Kawempe. The town itself was a strip approximately two miles wide on either side of the main road to Bombo. The road was tarmac and part of the township had street lighting, but otherwise there was little evidence of development, urban or industrial. Uncultivated land separated the factories, and trees and bush prevented those which were not close to the main road from being seen. There had been no official encouragement of industry in the township, and even tacit discouragement by neglect of the provision of facilities. However, Kawempe was an important industrial area. The southern part of the township, shown separately on the map and known as Bwayise, was the site of the largest coffee factory in the country and two cotton ginneries all owned by an African co-operative union. The coffee factory was in production all year in 1960. It produced over 12,000 tons of coffee and used more than 500,000 units of electricity. Both ginneries produced about 2,500 bales of lint but one used considerably more electricity, 86,000 units as against 61,000.

The northern part of the township was the site of virtually all the oil and maize mills and soap works in Kampala. The industries were the product of local initiative, not of government activity, and it was thought that they might repay more detailed study. Accordingly as many firms as possible were visited in October 1961. Thirty-two firms were listed in the area, twenty-one engaged in cotton seed crushing, maize milling or soap manufacture or a combination of two or more of these functions, two in quarrying and stonework, two in sawmilling, four in baking and confectionery and three in other activities, including a telephone exchange. In the first category, seven factories were closed, four permanently and the others possibly so, and one concern in each other category was also closed. In 1960, the firms in the area used a total of 2,560,000 units and in September 1961, 236,000. The September figures were collected as a check on the amount of power that each concern reported it paid for. It was possible to obtain interviews with adequately knowledgeable personnel at eleven of the firms, nine in oil, maize and soap, and two in bakery and confectionery. One maize mill was African-owned and one bakery Greek-owned. The remainder were Asian concerns. All those interviewed complained that electricity was too expensive, though there was some tendency to exaggerate the size of the monthly bill (four cases). Two

concerns, both soap and oil manufacturers, used other sources of power as well as electricity, viz. cotton seed husks, a by-product of cotton seed crushing, and when husks were not available, wood. Labour and production tended to vary greatly from month to month, one maize mill for example, stating production as between one and four thousand bags of flour a month. Only the modern biscuit factory, which had recently expanded its operations to include manufacture under licence from a well-known British firm, was in any way satisfied with the state of the market. All others mentioned excessive competition, over-capacity and losses in recent years. Six concerns out of the seventeen which should have been using an industrial tariff were found to be using the wrong tariff, i.e. tariff 3 for flat rate power, instead of tariff 2 for industrial power. They were therefore paying very much more for their electricity than was necessary. The fact that they were on the least economical tariff was known to the UEB meter reading department, but not, apparently, to the sales department. In the long term electricity would have a better reputation and industry be better served if industrialists were assisted in choosing their tariff. The problem was not entirely straightforward, however, since the interviews referred to above were conducted in Swahili, Luganda and Gujerati as well as English and detailed explanations in several languages, though possible, make heavy demands on the sales department. In addition, the UEB allowed a consumer to change from tariff 2 to tariff 3 only twice in a year so that in the absence of careful planning a manager was liable to find himself using tariff 2 at great expense when production was low.

There is reason to suppose that industries in Kawempe were representative of many small concerns in Uganda; certainly many of the features were repeated in other firms visited, both rural and urban. The outstanding characteristics of industry in the area were the wide range in efficiency of management, of machinery and of the use of electricity, over-capacity in the industry and pessimism on the part of the industrialists. Electricity was considered too expensive, and the UEB was not helping the industrialists to make the best use of the facilities it provided.

Industrial activity in Kampala was not noticeably seasonal. There was little variation between the consumption in March and September. The greatest was in Kawempe-Bwayise and was the result of suspension of operations in the two cotton ginneries. As in Jinja, overall urban consumption tended to have a steadying effect on seasonal variations.

Masaka was a very much smaller town than Kampala. The non-African population at the time of the 1959 Census was 2,457. Apart from the two maize mills, all the industries were situated outside the township boundary. As Table IV.4 shows, the town was essentially

an agricultural processing centre. It was originally a centre for cotton ginning but all three ginneries were silent in 1960, though one was being used as a maize mill. Cotton production in Masaka District had fallen steadily in past years, but the area had become one of the richest coffee producing regions in the country. There were two non-African owned coffee factories which produced 4,000 and 5,000 tons of coffee in 1960. Since 1957, however, three new African co-operative factories had been established. They produced 3,500, 4,000 and 1,800 tons each. The smallest ran for nine months of the year and used only 43,000 units of electricity. The two non-African firms ran for seven months and the other co-operatives for eleven months. The larger factories used over 600,000 units in aggregate.

The bulk of the electricity used in maize and oil milling was consumed by the mill and ginnery situated outside the township in the suburb of Nyendo. Owing to the fact that the UEB grouped industrial areas on the fringe of Masaka together with trading centres on the main roads leading away from the town, the boundary of the urban area cannot

Table IV. 4
MASAKA. TOTAL URBAN INDUSTRIAL ELECTRICITY
CONSUMPTION 1960

Industry	'000 kWh	% Total
Agricultural processing:		
Coffee	681	52.1
Maize and oil mills	255	19.5
Water (PWD)	372	28.4
TOTAL	<u>1,308</u>	<u>100.0</u>

be clearly drawn. As a result, three small coffee factories and a ginnery have been included in the monthly totals for the town. The coffee factory in the west used 21,000 units in 1960 and the other three factories, 100,000 units between them. They did not significantly alter the pattern of industrial consumption. Masaka was noteworthy for the fact that average industrial consumption in September was considerably more than in March, a reflection of the dominance of the coffee processing industry. An additional point was that both maize mills within the town boundary were using tariff 3. For the smaller one it was the most economical tariff, but for the other it was not.

The high proportion, 28 per cent, of industrial power used by the water works clearly identifies Masaka as an urban area. Industrial consumption in Masaka was therefore strongly influenced by the agricultural processing industry and the provision of services for a relatively large non-African population.

Entebbe, which accounted for 8.8 per cent of the total urban industrial

consumption in Victoria Area in 1960 had a very different industrial structure. Its main functions were as the administrative centre for Uganda and as the site of the one international airport. Industrial consumption was virtually limited to the Public Works Department (410,000 units in 1960) and a printing and publishing firm (163,000 units).

Only 5 per cent of the industrial electricity used in Uganda in 1960 was consumed in the Elgon Area (5.5 per cent in March and 4.5 per cent in September). The percentages for urban industry were 3.7 per cent and 3.9 per cent. Tororo, with its cement industry, which was on the special industrial tariff, accounted for 2.7 per cent and 3.4 per cent in March and September respectively. Elgon was, therefore clearly low in industrial consumers, even for Uganda. It also showed by far the greatest seasonal decline in consumption outside the cotton season, (see Map 3). The Area total averaged 574,000 units in March but 461,000 units in September, and if Tororo with its cement works were omitted the figures were 109,000 and 52,000.

Tororo, despite its small size (a non-African population of 1,547, the smallest of the urban centres discussed), had the largest urban industrial consumption in the Area. Its boundaries were difficult to determine since the statistics for industrial consumption included a ginnery some ten miles away along the Mbale road. The UEB pole treatment plant, an urban industry, was grouped with a number of trading centres west of the town and has therefore been included under rural industry. The cement and asbestos sheeting factories that were the main industrial consumers (the cement factory using about 500,000 units a month on a special tariff), were situated about three miles south of the built up area of the town. The phosphate mine, another three miles farther south, has also been included, primarily because the UEB grouped it with the rest of the industries in the town. The other industries that used electricity were two oil and maize mills, one of which also made soap, a ginnery and a bakery and an aerated water factory.

Industry in Mbale was confined to the planned industrial area. The statistics also included a ginnery some 14 miles outside the town. The total consumption in the industrial area averaged 74,000 units in March and 32,000 units in September. The large co-operative coffee factory, which was capable of processing the entire Bugisu *arabica* coffee crop, was not operating at anything approaching capacity in either period as a result of disputes in the co-operative union and difficulties with the new machinery. Other industrial users were two cotton ginneries, one of which was also an oil mill, a saw mill and a slaughterhouse. Their activities declined outside the cotton season, as is shown by the

consumption figures. Some concerns in the area, notably aerated water factories, maize and oil mills and the water works and sewerage were not using an industrial tariff.

Industries in Mbale were small and showed the influence of seasonal fluctuations in economic activity. The large modern coffee factory, which would be expected to have a steadying effect on seasonal variation was not operating effectively in 1960.

Soroti was not an industrial centre of any importance. Its total industrial consumption was 21,000 units in March and 7,000 in September. The major consumers were a ginnery and two pumping stations, one for the town and one for the district secondary school, and a sewerage works. There was also a soap works and a boiler at the local farm institute. The total therefore includes two consumers, the school and farm institute, that would normally be classed as institutional, but they could not be separated from the other industries. The importance of PWD services, and the presence of the oil and soap works distinguished the town from a rural industrial centre, but Soroti showed the rural characteristic of marked seasonal fluctuation in industrial activity and electricity consumption.

There were approximately 180 consumers using electricity on an industrial tariff in 1960. Three major industries, all associated with the UDC, dwarfed consumption by all the rest (91 million units as against 44 million units). The service industries, in particular PWD activities and food and drink manufacture, proved to be characteristic of urban industrial consumption. The service industries were almost all associated with the government or with the UDC, and accounted for a large part of the total electricity used by smaller consumers. The other main group of consumers were the agricultural processing industries but although the number of establishments was high, the total power used was relatively small. Two conclusions emerged. In the first place government and quasi-government institutions made a great contribution to industrial electricity consumption. In the second, industrial undertakings in Uganda varied greatly in size with the bulk at the lower end of the range, and only a very few were significant in terms of electricity consumption.

Notes and References

1. The industries are the UEB pole treatment plant at Tororo and a construction company camp on the eastern fringe of Kampala.
2. *Report of the Commission of Enquiry into the Cotton Industry of Uganda, 1929*, Entebbe.

5

THE USE OF ELECTRICITY BY URBAN SERVICES AND INSTITUTIONS

Urban institutions and services, as defined below, accounted for about 4 per cent of the total electricity used in Uganda in 1960 and produced 7 per cent of the revenue. Consumption averaged about one million units per month, rising towards the end of the year.

The tariffs defined as institutional or service tariffs were 4, 5, 6, 10, 16 and part of tariff 8. Tariffs 4 and 5 were intended for premises where the installed capacity was less than 50 kVA. Tariff 4 was for clubs, cinemas, hotels and similar non-residential establishments. Tariff 5 was for restaurants and gave slightly more favourable terms than the flat rate power tariff when consumption was over about 1,000 units per month. Establishments whose requirements were over 50 kVA, predominantly hospitals and police lines, were on tariff 6, which was in effect the first block of the industrial power tariff (2). Tariff 10 was for street lights and tariffs 8 and 16 were special tariffs which applied only to certain installations. Tariff 16 was for school kitchens and had in 1960 been introduced only recently. In October 1960 there were nine users of which four were in Elgon Area, a reflection not of higher potential but of a more vigorous sales policy. Tariff 8 was partly covered in Chapter 4 since, as explained, some of its users were industrialists. The institutional consumers on tariff 8 were hospitals and prisons. The definition of institutional and service consumers in this chapter was therefore established almost entirely by reference to electricity tariff. As a result many similar consumers, such as small restaurants, bars, some schools and smaller prisons were not included as services because they used other tariffs, notably 3 and 7.

The pattern of consumption that emerged from a consideration of the use of electricity by urban institutions and services was in some respects transitional between the industrial and the domestic and commercial groups. The consumers were more widely distributed over the urban areas and more numerous than the industrial consumers, and on average they used less electricity per head. Institutional consumers were not, however, as widely distributed as those in the domestic and commercial sector, nor did they have such low averages for intensity of consumption.

The data for this group of consumers were treated in a slightly different way from those of the other sectors. The number of consumers was determined by counting establishments which had one or more meters on the tariffs concerned (4, 5, 6, 8, 10, 16), rather than counting the number of meters. This procedure enabled more realistic figures for *per capita* consumption to be reached. For example, the largest hospital in Uganda, which regularly used over 150,000 units per month, between 10 per cent and 15 per cent of the total monthly urban service consumption, had six meters on institutional tariffs. This problem of duplication of meters on the same tariff was much less common in the industrial sector but almost the rule, except in purely residential areas, in the domestic and commercial sector (see Chapter 6). Duplication was not taken into account for industry because it was clear that there would not be a significant alteration in the pattern of electricity consumption if it was. In the domestic and commercial sector the work involved would have been so great that duplication of meters was considered only in a few small sample areas.

The use of electricity by institutions and services was even more highly urbanised than in either the industrial or the domestic and commercial sectors. In both March and September 1960 the urban areas accounted for 96 per cent of the total service consumption. This very high percentage was the result partly of the definition and partly of the difference between urban and rural institutions. Restaurants, clubs and hotels were obviously more likely to be sited in the towns, except for special cases, but this was not necessarily so for institutions. In Uganda missions and the accompanying boarding schools, seminaries or hospitals, were for ideological reasons, generally sited outside towns. Agricultural research stations and training schools were similarly sited in rural areas. These rural institutions appeared in the statistics, however, as groups of domestic and flat rate power consumers. They tended to be more self-contained and therefore took on the consumption characteristics of a trading community, but the pattern was also affected by rural architecture and rural electricity sales activity. While in the urban areas, land was in general much less intensively used than in corresponding European towns, nevertheless urban institutions tended to be more compact in plan. The institutional and service tariffs were designed for single, or at least closely linked, buildings and hence did not apply to the scattered buildings in some rural missions. In addition UEB sales activity had been less intensive in rural areas and service tariffs were less widely known.

The division of Kampala and Jinja into sub-areas was the same as that used in Chapter 4 and shown in Maps 4 and 5, pages 42 and 46. Table V.1 shows the pattern of consumption in each area in Kampala.

Table V. I
**KAMPALA. CONSUMPTION OF ELECTRICITY BY INSTITUTIONS
 AND SERVICES. MARCH AND SEPTEMBER 1960**

	Con- sumers	March		September	
		Consump- tion '000 kWh	Intensity kWh (b)/(a)	Consump- tion '000 kWh	Intensity kWh (d)/(a)
	(a)	(b)	(c)	(d)	(e)
Bazaar	20	27	1360	37	1840
Kampala Road	25	159	6350	150	5970
Old Kampala	7	10	1380	9	1230
Mengo and Inner Suburbs	10	36	3590	41	4130
Kololo	2	3	1290	3	1270
Nakasero	11	205	18650	139	12630
Kiira Road	—	—	—	—	—
African Hous- ing Estates	6	30	4910	26	4400
Industrial Area	1	—	120	—	120
Kawempe	1	1	1230	2	2160
Outer Suburbs	3	12	4000	14	4730
Port Bell, Mbuya and Bugolobi	5	56	11100	69	13780
Mulago	1	155	155000	159	159330
Makerere	1	83	82690	49	49200
Nsambya (Lines)	2	8	4200	7	3600
Street Lights	—	68	—	133	—
TOTAL	—	853	—	838	—

The figures for intensity of consumption in Table V.1 were obtained by dividing the average monthly consumption for each area by the number of institutional or service consumers in it. The consumers were recorded over a period of nine months and consequently did not always correspond exactly with the actual users of electricity at the time consumption was measured. Even institutions, however, recorded relatively large fluctuations in consumption from month to month and it was unlikely that the work involved in drawing up accurate lists of consumers would have resulted in significantly greater accuracy.

The actual characteristics of the various areas are dealt with more fully in Chapter 6 and only the differences in institutional electricity consumption are considered here.

Kampala showed wide variations in both the total amount of electricity used and in the intensity of consumption. The highest consumption was by hospitals. Mulago, the biggest hospital in Uganda, was the largest single consumer.¹ Nakasero, with the next largest consumption, included the former European hospital, six clubs, the

Legislative Council building, police mess and the European Government Servants' Hostel. However, the hospital itself was by far the largest of those consumers and accounted for the high average consumption shown in Table V. 1. Other areas which had hospitals, Mengo, the Outer Suburbs and Port Bell, all show high ratings. The Port Bell area included a mental hospital, criminal lunatic asylum, two prisons, the Uganda Broadcasting Corporation main transmitter and a good hotel. The Mengo area covered the most heavily built up African part of Kampala and apart from the hospital the consumers were small bars and hotels. The difference between it and the Port Bell area shows up clearly in the table.

The contrast between the Bazaar and the Kampala Road business district was particularly noticeable. Although there was a difference of only five in the number of consumers, twenty in the Bazaar as opposed to twenty-five in the Kampala Road, there were striking differences in consumption totals and intensity. Both were predominantly business districts but the Bazaar was characterised by smaller enterprises and a higher residential density. The consumers were restaurants, bars, small hotels, a cinema, a mosque, the railway goods sheds and the fire brigade. In contrast the businesses along the Kampala Road and in the commercial area to the north of it were larger and the proportion owned by Europeans was higher. The restaurants catered for the Europeans and the Asian and African upper classes. Other institutional users included the National Theatre, the two best hotels in Kampala, the Posts and Telegraph administrative headquarters, the biggest non-governmental block of offices in the town² and the railway station. The difference in character in the services in each area resulted in very much higher consumption per head in the Kampala Road area as well as a higher total consumption.

Makerere College used institutional tariffs for cooking in four halls of residence, for the swimming pool and squash courts and for street lighting. It was the largest educational institution in Uganda and, like Mulago, a more or less self-contained unit. Consumption fell in September when part of the period was covered by the vacation.

The relatively high figures for consumption and intensity on the African Housing Estates were accounted for by the police mess and training college at Naguru. The other institutions were small consumers, clubs and community centres and a few street lights.

The figure for street lighting appears separately in the tables for Kampala and Jinja. Neither represents the total street lighting consumption over the entire urban area. In Kampala the statistics for street lighting in the Bazaar, Kampala Road, Nakasero, Old Kampala, Mulago, Kololo and the Industrial Areas were grouped together.

In effect, this meant that the figures for institutional consumption and intensity recorded for each of these areas were somewhat lower than they should have been, but to have included all the street lighting in one area would have introduced an even greater distortion.

The other two towns in the Victoria Area both showed high rates of institutional consumption. The consumers in Entebbe were two hospitals and three research establishments, which all had high *per capita* consumption, and six smaller users.

Table V. 2
VICTORIA AREA. TOTAL CONSUMPTION OF ELECTRICITY BY INSTITUTIONS AND SERVICES 1960

	Units '000 kWh	% Total
Hospitals:		
Kampala	2,619	
Entebbe	260	
Masaka	514	
Total	3,393	43.4
Prisons and Police:		
Kampala	633	8.1
Education and Research:		
Kampala	486	
Entebbe	221	
Total	707	9.0
Hotels and Restaurants:		
Kampala	1,234	
Entebbe	685	
Masaka	168	
Total	2,087	26.7
Others:		
Kampala	373	
Entebbe	629	
Total	1,002	12.8
TOTAL SERVICE CONSUMPTION	<u>7,822</u>	<u>100.0</u>

* The table covers only the major consumers, in effect 41 out of the 99 establishments. The lowest consumption was recorded for a restaurant, only 2,000 units. With this exception the lower limit was in the region of 7,000 units for the year.

Masaka also showed a relatively high intensity of consumption, again mainly as a result of the hospital and the hotel. The hospital used 514,000 units in 1960. The only other important use was for street lighting. The remainder, two educational institutions, a mission hospital which used under 400 units a month, the cinema and three clubs, were all small consumers.

The breakdown of service consumption in the Victoria Area in 1960 is given in Table V. 2.

In Jinja the same divisions were followed as used in Chapter 4. Table V. 3 shows the pattern of consumption in each area (See Map 4, p. 42).

Table V. 3
JINJA. CONSUMPTION OF ELECTRICITY BY INSTITUTIONS AND SERVICES. MARCH AND SEPTEMBER 1960

Area	Consumers	March		September	
		Consumption '000 kWh	Intensity kWh (b)/(a)	Consumption '000 kWh	Intensity kWh (d)/(a)
	(a)	(b)	(c)	(d)	(e)
Bazaar	7	13	1830	13	1860
Asian Residential	8	34	4220	37	4570
European Residential	8	15	1910	16	1990
Industrial Area and Bugembe	8	45	5610	96	11940
Light Industrial Area	—	—	—	—	—
Walukuba	4	2	520	2	610
West Bank and Nalufenya	4	6	1580	4	1080
Mpumudde	2	1	630	1	410
Street Lights	—	41	—	51	—
TOTAL	—	158	—	220	—

The Bazaar was relatively well defined but, as explained in Chapter 4, the industrial areas were somewhat amorphous. The Asian Residential area included the hospital but was otherwise relatively homogeneous. On the other hand, there were in the European Residential area a number of very large Asian residences and some institutions, such as the Railway African Club and Hindu Sabha, which would not normally be grouped with the Rugby Pavilion. The two African Housing areas, Walukuba and Mpumudde, are shown individually because they were physically separate and because they differed in character. Walukuba was a conventional African Housing Estate but Mpumudde was an area allocated for private African development in which municipal building regulations had been relaxed. It was an attempt to integrate African citizens into the municipal structure but had not been very successful.

The table illustrates the variation in intensity of consumption within the urban area. The rate for the Bazaar was similar to that in the

Kampala Bazaar and the consumers, restaurants and bars in the main, were also similar in character. The figures for the Asian Residential area were influenced by the presence of the hospital and were high. They contrasted strongly with those for the European Residential area, which were approximately 50 per cent lower. The latter included the best hotel in Jinja, but the remaining consumers were clubs, and *per capita* consumption was low. There was no area comparable to Nakasero or Kampala Road in Kampala.

The areas marked on the map as Other Major Industry, Military and Police and Bugembe were grouped as one and used more electricity than any other area. This was because, owing to the way electricity statistics were collected, the area covered the main Uganda barracks of the King's African Rifles, the neighbouring police lines, the local prison and the railway depot and station. This last included the main workshop for the new 28 mile line from Jinja to Bukonte, which was being laid during 1960. The workshop used power on tariff 6 and is therefore included under institutions. The KAR mess and school, the police lines and the railways were the main consumers, but there was also a company club and mission using tariff 16 for cooking. The great increase in consumption shown for September was not the result of changes by any single consumer, but the effect of increases by consumers on all tariffs in both parts of the industrial area. Consumption in the other parts of Jinja was relatively low. Consumption for street lighting is shown separately. The figure represents street lighting in the built up area, excluding the West Bank and Mpumudde.

Institutional and service consumption in Jinja was not therefore susceptible to any very detailed breakdown, but was dominated by the hospital, barracks, police lines and railway. The other characteristic of the town was that many consumers who might have been expected to use an institutional tariff did not. This was a reflection of low sales activity.

The towns in Elgon Area showed the influence of a more dynamic sales policy. Their consumption patterns are shown in Table V.4 which includes Masaka and Entebbe for purposes of comparison. Even Tororo which was a very much smaller centre than Masaka had 16 consumers as opposed to 13 for Masaka. Soroti and Mbale had 23 and 31 respectively. The figures for intensity of consumption were not unduly low, except for Soroti, which had few large consumers. Even the hospital used little electricity and the only other important users were three educational institutions and a mission. The greater part of the consumers were mosques, temples and clubs.

Mbale and Tororo with higher *per capita* consumption both showed the influence of greater use by hospitals. Tororo also had an important

Table V. 4
**SMALLER TOWNS. CONSUMPTION OF ELECTRICITY BY
 INSTITUTIONS AND SERVICES. MARCH AND SEPTEMBER 1960**

	March		September	
	Consumption '000 kWh (a)	Intensity kWh (b)	Consumption '000 kWh (c)	Intensity kWh (d)
Mbale	70	2260	105	3400
Masaka	67	5130	81	6240
Soroti	26	1120	32	1400
Entebbe	140	11710	177	14760
Tororo	37	2310	42	2630

secondary boarding school, lines for railway workers, a prison and a good hotel. The remaining consumers on the service tariff were bars and restaurants in the Bazaar and tended to bring down average consumption. The overall figure was little higher than that for the bazaars in Kampala and Jinja.

Mbale showed a slightly higher intensity on average and a considerably higher total. The nature of consumption was, however, similar to that of Tororo. Apart from the first class hotel and the hospital, there were seven educational institutions, four clubs and seven restaurants or bars. The high proportion of bars and restaurants may possibly have reflected the greater demand for urban entertainment by all races in a town the size of Mbale, as opposed to the smaller centres, e.g. Masaka and Tororo, which appeared to be less closely integrated with the social life of their areas.

The Elgon Area as a whole was notable for the high proportion of mosques and temples using tariff 4 and for the number of schools using service tariffs. It therefore seemed likely that an intensified sales drive in other parts of Uganda would uncover a fair number of potential consumers, even though some would only be changing to a better tariff, e.g. mosques in Victoria Area frequently used tariff 7 at 90 cents a unit instead of tariff 4 which was cheaper for the second and third blocks of units.

Electricity consumption on service tariffs was virtually an urban phenomenon in Uganda. The Kampala and Jinja Bazaars which were the most homogeneous of the urban areas considered showed a fairly consistent average intensity of 2,000 units per month, but other averages were distorted, either by variety in the size of consumers or by different levels of sales activity. There were therefore too few consumers on institutional tariffs to allow valid generalisations about the relationship between the function of urban areas and intensity

of consumption. The main points which emerged were that Entebbe as administrative capital had an expectedly high level of consumption and hospitals were the most important individual consumers. Experience in the Elgon Area where sales activity had been greatest appeared to suggest that service consumption could be expanded in the rest of Uganda, particularly in schools, where the use of tariff 16 for cooking was only just beginning. Such expansion would in general favour the consumer more than the UEB since it involved changes to or increased use of the cheaper tariffs.

Notes and References

1. The hospital was being rebuilt and new wings were coming into use from 1961 onwards. By 1963 enough new equipment had been installed to justify a special agreement with the UEB and Mulago became one of the Special Industries for tariff purposes.
2. This building was the headquarters of the UEB.

6

DOMESTIC AND COMMERCIAL ELECTRICITY CONSUMPTION IN TOWNS

Domestic and commercial electricity consumers were defined by reference to the tariff they used, rather than by their activities. The domestic tariff was for premises used exclusively for private residence. The other tariffs in the group were less clear cut in their application. The flat rate lighting (7) and power (3) were intended for small consumers and the vast majority were shops, cafes, filling stations or small workshops. The use of the flat rate power tariff by industrialists was referred to in Chapter 4. The security lighting tariff (9) applied to any premises but it has been grouped with domestic and commercial tariffs because it was relatively expensive and consumption was generally lower than on the service tariffs. In any case there were few users and the tariff had little effect on total consumption. All three tariffs were occasionally used in religious institutions, offices and schools and the flat rate lighting was also used in small factories.

These four tariffs were grouped together because they had certain common characteristics. They were all designed for small consumers. They were, with the exception of tariff 9, used by far greater numbers of consumers than any other tariff,¹ and they provided a high proportion of the revenue and were relatively expensive to connect and service.

The method of grouping does, however, distort the picture of consumption on any single tariff. If security lighting was ignored, three distinct patterns emerged. The domestic tariff had most users and consumption per head was in general high but varied according to standard of living and culture. The flat rate lighting tariff was virtually confined to commercial areas, where it had almost as many users as the domestic tariff, but average consumption was very much lower. The national average was thirty units per month.

The picture was further complicated by the duplication of meters within a single household, which was very common in all except the purely residential areas. The group average for intensity of consumption was therefore only related to actual consumption per household in residential areas. In other areas the figures for intensity are not a measure of the units used by each establishment. It was found that in the Masaka bazaar duplications accounted for about one third of

the meters. Intensity of consumption should therefore be considered as a method of comparing consumption in the various urban areas and not as an absolute standard. It is in some sense a measure of the relationship between various types of urban activity and electricity consumption, but nothing more. A high figure for intensity was likely where there was a high proportion of domestic or flat rate power users, i.e. residential or industrial areas. Low intensity might mean either that consumption on all tariffs was low or that the proportion of consumers using flat rate lighting was high, e.g. bazaars.

The towns in question varied in size and dominant function but they had certain characteristics in common. They were notable for the degree to which the various urban functions and racial groups found physically separate expression. This is not to say that areas were completely homogeneous, either racially or functionally. Although some were, there were frequent exceptions, but a broad pattern clearly emerged. In each town the chief foci were the bazaar and the Government offices. Industry was a later addition and usually sited on the outskirts of the town. Residential areas for each race were separated and clearly identifiable in plan and architectural character. The exclusiveness of the European areas was breaking down as the Asian and African elite moved in and some of the newer developments were designed to be multi-racial from the start.

The three racial groups, European, Asian and African, had different standards of living, different cultural traditions and performed different economic functions. There were of course exceptions to the general rule since social and economic differences were not enforced by law. Cultural differences meant, however, that even when Africans or Asians attained the same income as Europeans their way of living, and consequently their consumption of electricity, was not the same.

The bazaars were an Asian creation. The typical bazaar was a grid of streets lined with buildings of the same type. With few exceptions, each was a shop with a deep veranda, closed by floor-to-ceiling shutters but otherwise fully open to the street, with living quarters round a courtyard behind. In addition all the main streets had some shops with plate glass windows and parts of Kampala were indistinguishable from the shopping area in any western city. Overcrowding was normal in the bazaars and several households commonly occupied each plot. Business districts outside the bazaars were, where they existed, a later development and were spaciouly laid out with wide roads and open grass. Examples were the Kampala Road business district and Queen Elizabeth Way in Jinja. The same was true of industry. The planned industrial areas were well laid out and even more open in appearance because they were not fully built up.

Europeans were engaged mainly in administration and in some of the larger businesses and industries. The typical European residential area was characterised by detached houses in large plots. Households were small since children of secondary school age were educated outside Uganda. Increases in the population had necessitated a few blocks of flats and government hostels, but the majority of Europeans lived in scattered suburban developments.

There were two chief types of Asian housing outside the bazaars. The older consisted of a series of houses and courtyards built round an open space. The outer walls presented an unbroken blank to the world and the whole was reminiscent of a fortress. These developments were euphemistically known as 'Gardens'. Newer housing was much more varied. Blocks of flats and hostels had been built by religious organisations, and detached and semi-detached houses ranged from the palatial mansions of the very rich in Kampala and Jinja to small bungalows. They were built by Asian builders to Asian designs and were easily recognisable.

Until the end of the second World War African participation in urban life had been minimal. Since then it had been growing steadily under the impetus of changing economic and social conditions and Government encouragement. Commercial developments were still mainly outside the gazetted town boundaries, where competition from the other races was limited, but Africans were increasingly being employed in occupations which were better paid than their traditional one of unskilled labouring. African urban housing varied greatly. Many Africans lived in huts on their employers' plots. The Government African Housing Estates catered for a range of income groups. The owner-occupier estates at Ntinda (Kampala) and Mpumudde (Jinja) were intended for the rising middle classes. Most of the latter, in Kampala at least, preferred to live outside the municipal boundary, and suburbs of widely spaced detached houses, separated by banana groves, had grown up round Kampala.

The varying patterns of urban activity were reflected in different ways in the diversity of electricity consumption. Domestic consumption was most closely related to the standard of living of the consumer. It also depended on cultural factors: European consumption was consistently the highest. Europeans were able to afford and run most appliances. They generally cooked entirely by electricity, they needed more hot water for their method of bathing² and they employed servants, who are noted for being careless of their employers' electricity bills. Asians, though their customs and living standards varied greatly, tended to do at least some cooking over charcoal and could in general afford less electricity. The same was true in greater measure for Africans.

The UEB had calculated that on average the occupants of a European type house used 500 units a month, of an Asian, 200 units and of an African 12. These averages, however, did not hold over any large area or number of consumers. The main reason would appear to be that many European households were small and that Asians and Africans living in European areas used less electricity as a result of cultural factors. The figure for Asian residences appeared to be based on a limited sample. The African case is discussed below.

A more detailed picture of the pattern of consumption in Kampala and Jinja was obtained by dividing the towns into sub-areas. The criteria for determining the boundaries could not be called objective, but there is no reason to believe that they were not effective. The areas were defined by grouping the UEB meter reading cycles³ according to their dominant function. The boundaries of the cycles were in some cases difficult to determine, particularly in the most crowded parts of the bazaars or in the Kampala suburbs, where street names were non-existent. It was clear, however, that monthly fluctuations in the number of consumers were greater than an occasional slight inaccuracy in drawing the boundary of a cycle. The dominant function of an area was decided largely by the type of building. Such a course was possible only because the functional and racial differences outlined above were clearly expressed in building types and areal specialisation was very much greater than would be expected in a British town of comparable size.

Kampala was by far the largest town in Uganda and was more complex in organisation than the simple combination of bazaar, government offices and residential areas. There were two administrative centres, one on the slopes of Nakasero Hill for the Protectorate Government and municipal offices, and one across the valley in Mengo, the headquarters of the Kingdom of Buganda. There were numerous small commercial concentrations outside the main bazaar, and industrial development had taken place in three separate areas (see Chapter 4).

Table VI.1 illustrates electricity consumption in the various areas shown on Map 5, p. 46.

The most important business district in the town was on the western slopes of Nakasero Hill. It has been divided into the Bazaar and the Kampala Road business district. The aim was to separate the more modern shops and offices from the smaller concerns typical of the Bazaar, but there was inevitably some overlapping. One important bank had its head office in the Bazaar and some of the Bazaar shops near the Kampala Road were specialised concerns, for example chemists and retailers of electrical goods, which drew customers from all sections of the community. The Kampala Road and the small area to the

north and west contained the head offices of four banks, the General Post Office, law courts, all the cinemas but one, the department store, the bookshops and various other shops serving the European community. It was not continuously built up and the buildings differed greatly in standard. Small, poky *dukas* selling haberdashery and piecegoods or groceries in sacks alternated with modern blocks or improved shops with plate glass windows. In the main, however, the newer and larger scale undertakings predominated.

Table VI. I
KAMPALA. DOMESTIC AND COMMERCIAL ELECTRICITY
CONSUMPTION. MARCH AND SEPTEMBER 1960

Area	MARCH			SEPTEMBER		
	(a) Con- sumers	(b) Units '000s	(c) Inten- sity (b)/(a)	(e) Con- sumers	(f) Units '000s	(g) Inten- sity (f)/(e)
Bazaar	2,784	381	137	2,763	395	143
Kampala Road Business District	1,085	188	175	1,056	182	173
Old Kampala ..	1,026	217	211	993	212	213
Mengo and Inner African Suburbs	1,779	198	111	1,779	202	114
Nakasero	761	285	374	726	282	388
Kololo	946	410	434	920	417	454
Kiira Road .. .	479	122	255	478	128	267
Bugolobi, Mbuya and Port Bell	357	168	470	370	129	348
Nsambya (Lines)	226	22	99	226	20	87
Makerere College	204	127	621	262	141	539
Mulago Hospital	170	66	389	169	43	253
African Housing Estates:						
Kiswa	23	1	27	30	1	32
Nakawa	47	7	156	73	12	159
Naguru	236	11	47	237	12	50
Ntinde	150	8	51	158	8	49
Total	456	27	58	498	32	65
Kawempe	254	75	294	242	37	155
Industrial Area ..	540	124	230	300	111	222
Outer Suburbs ..	709	92	130	873	119	137

The Bazaar extended down the hill from the Kampala Road. The area shown on the map includes the main commercial street, the largest market, the bus station, godowns and part of the railway yards in the south and some predominantly residential streets in the north. Table VI. 2 clearly shows the contrast in electricity consumption between the two districts. Kampala Road had 1,000 consumers on domestic and commercial tariffs as opposed to 2,700 in the Bazaar, and the *per capita* average was 170 units per month as opposed to 140. The difference between the two areas is even more clearly illustrated by the figures for tariffs 1 and 7 alone.

Table VI. 2*

**KAMPALA BAZAAR AND KAMPALA BUSINESS DISTRICT.
DOMESTIC AND FLAT RATE LIGHTING ELECTRICITY
CONSUMPTION. MONTHLY AVERAGE 1960 Ø**

Area	DOMESTIC			FLAT RATE LIGHTING		
	(a) Con- sumers	(b) Units '000s	(c) Inten- sity (b)/(a)	(d) Con- sumers	(e) Units '000s	(f) Inten- sity (d)/(e)
Bazaar	1,193	241	202	1,000	27	27
Kampala Road	343	98	286	518	39	75

*The table omits the figures for the extreme north of both areas as the boundary between them was confused. The number of consumers omitted was 342. They used a monthly average of 82,000 units on tariffs 1 and 7.

Ø The monthly average was based on the figures for February, March, April, August, September and October.

The Kampala Road was outstanding for the fact that consumers on tariff 7 by far out-numbered domestic users. There was no other area in Uganda where such a separation of business from residential functions was achieved. Consumption on tariff 7 was 150 per cent above the national average, and domestic consumption, though not high, was above the UEB estimated average for Asian households.⁴ In contrast the Bazaar had a slight excess of domestic users, and consumption figures were close to the average.

The Bazaar was not the first centre of commercial activity, although it had become the most important. The original nucleus was Old Kampala, which grew up on the hill beneath Lugard's Fort. There were still some shops and cafes, but the upper western slopes with a view of the town, had become a high class Asian residential area. Various religious groups had their headquarters or clubs on the hill and the oldest Asian secondary school was on the western slope. The north was a middle class Asian residential area with three 'Gardens'. A new

secondary school, which had been built on lower ground farther north, has been included in the area on the map although it was not strictly part of Old Kampala. The large proportion of domestic consumers resulted in a higher figure for intensity of consumption than in either of the business areas.

The area shown as Mengo and the Inner African Suburbs was far from homogeneous. With the exception of Wandegaya it was all outside the Kampala Planning Area, but it included the township of Namirembe. The latter was a circular area about half a mile in diameter, in which Asians had been allowed to build. It had become a secondary commercial centre with shops, cafes and a well-known night-club. The Bulange, the impressive building that housed the Buganda parliament and government offices, was on the southern edge of the township and linked to the Kabaka's palace (the Lubiri) by an imposing avenue. To the north was a large mission hospital run by the Church Missionary Society, and the hill was crowned by Namirembe Cathedral. A printing press, children's home, school and staff houses were associated with the mission. The Catholic Cathedral, another impressive building, with its school and smaller hospital, was on Rubaga Hill to the south-east. The better houses near the Lubiri tended to be occupied by members of the Buganda royal family, aristocracy or government, and the two most important centres of African urban development, Katwe and Kisenyi, were to the south and east respectively. Katwe was the first African area to be provided with electricity and was in some respects an African business centre. As well as the usual shops, clubs, bars, garages and small craftsmen, there were offices of co-operative societies, political organisations and professional men who served an African clientele. Kisenyi was considerably less respectable and without street lights or tarmac roads. In the north, a black spot in the Kampala Planning Area, was Wandegaya, which was a small group of mixed Asian and African shops and services. It was included in the Mengo area because it was more characteristic of the inner than of the outer suburbs. There were a few small Asian housing developments in the north. Considering that the area was suburban in character and only the commercial centres and the small Asian housing schemes were in any way closely built up, the figure of 1,800 consumers compared favourably with that for the Outer Suburbs. As would be expected in such a varied area, consumption levels differed widely. For example, in Katwe the average was under 50 units *per capita*, but in Namirembe, nearly 200. There were still many potential consumers and by April 1961 another 200 consumers had been connected.

Europeans lived in isolated groups all round Kampala, but the

main concentrations were on Nakasero and Kololo Hills. Nakasero was the oldest European residential area and, like Old Kampala, was the site of social and sporting clubs, also the Protestant Church and European School.⁵ Even so it was not an exclusively European area. The houses of a number of Asian professional men were on the upper slopes, and on the lower eastern slopes there was accommodation for Asians, Africans and single Europeans. Eighty domestic users in this area averaged only 150 units per month each, compared with over 500 units for the 180 houses on the top of the hill.

Kololo was a post-war development and an attempt to relieve the housing shortage felt by Europeans and Asians. The main Asian development had been on the north side along the Kiira Road, but a few plots on the upper slopes of the hill were privately developed, and the houses were among the most impressive in Kampala. The southern and eastern slopes were occupied by European housing of varying standards, from flats to six-roomed houses. Consumption was consistently high. The corresponding Asian area on the Kiira Road similarly recorded the highest intensity for a predominantly Asian area, although it included a few African houses and shops, which tended to bring the average down.

Bugolobi Hill, Mbuya Hill and Port Bell were grouped together because they were all the sites of isolated groups of European houses. Consumption was high, as there were few consumers of other races or users of tariffs 3 and 7. The main exceptions were in the prisons and mental hospital at Port Bell.

The three institutional areas were separated because they have clearly defined boundaries and were obviously distinguishable from their surroundings. Nsambya was an African housing estate for civil servants. It also included the police training college and a few African houses and shops on Kibuli Hill. Makerere and Mulago were dealt with under 'Institutions' (Chapter 5). Both, however, were to some extent self-contained entities and used domestic and commercial tariffs in staff houses, and hostels, libraries and lecture theatres. In Makerere service consumption was less important, 65,000 units per month as opposed to 130,000 units for domestic and commercial tariffs, but in Mulago the opposite was true, 160,000 units against 50,000.

The African Housing Estates differed in character. Kiswa was an improved village and consumption was the lowest. Nakawa was the low income housing estate, but total consumption and intensity were raised by the PWD Engineering School and a forest research station. In Naguru, the better class estate, the presence of the police lines and college affected the totals. Ntinda had the most prepossessing appearance and was designed to provide Africans who could build

Table VI. 3
**KAMPALA INDUSTRIAL AREA. DOMESTIC AND COMMERCIAL ELECTRICITY
 CONSUMPTION. MONTHLY AVERAGE 1960***

(a) Con- sumers	(b) Units '000s	(c) Inten- sity (b)/(c)	(c) Con- sumers	(d) Units '000s	(e) Inten- sity (d)/(c)	(f) Con- sumers	(g) Units '000s	(h) Inten- sity (g)/(f)	(i) Con- sumers	(j) Units '000s	(k) Inten- sity (j)/(i)
56	3	50	204	93	456	244	16	64	17	3	200

* The monthly average was based on the figures for February, March, April, August, September and October.

their own houses with the basic services such as tarmac roads, water and street lighting.

Kawempe and the planned Industrial Area both had relatively high figures for intensity of consumption. Kawempe included the African shops, cafes and dance hall at Bwayise and some Asian residences, but, as explained in Chapter 4, the main reason for high consumption was the use of tariff 3 by industrialists. The same was true of the Industrial Area, as Table VI.3 shows.

African domestic consumption in the Outer Suburbs is dealt with in greater detail below. Not all the users in the area were African or on the domestic tariff, however. There were European housing estates along the Gayaza Road and scattered groups of European and Asian occupied houses on Makenkye, Gaba and Buziga Hills, together with a large mission hospital at Nsambya. The commercial centres in the area were small, the most important being Nakulabye, Natete and groups on the Gayaza Road. The total of 800 domestic and commercial consumers was low for the size of the area. The figure for intensity was influenced by the non-African residents and was not typical of African suburban consumption.

In the early years the UEB had concentrated on supplying areas of greater potential demand, but since 1959, when the Kibuga Scheme was begun, the growth in African suburban consumers and consumption had been spectacular, though of course in absolute terms it was still very small. Since it appeared that this was a field of future expansion, a more detailed study of African domestic consumption in the villages on the western fringe of Kampala was made, and the results were compared with those for other African areas.

The growth in the number of consumers and in average consumption is illustrated in Table VI. 4. The villages of Busega and Lunguja and of Kibuye, Luwafu and Konge along the Salama Road were all African residential areas in the Outer Suburbs. They were compared in Table VI.4 with Kiswa and Ntinda housing estates. Kiswa was an African village which had been brought within the Kampala Planning Area by the 1956 extension. As an experiment, planning regulations were relaxed to permit buildings in non-permanent materials, and roads, water and street lighting were provided. The result was a group of mud and concrete block houses, some thatched but most roofed with corrugated iron sheeting. They resembled rural dwellings, but being so close together had no gardens. Consumption of domestic electricity was low and stable. Even so it was higher on average than the UEB estimate of 12 units for an African house. Ntinda has already been mentioned as a government experiment in urban home ownership for Africans. Its houses were of permanent materials and neatly laid

Table VI. 4
**THE GROWTH OF AFRICAN DOMESTIC ELECTRICITY CONSUMPTION IN PARTS
 OF KAMPALA 1960-1961***

Area	Number of Consumers			Units per Month per Consumer			Total Revenue per month £		
	1960 Sept.	1961 Mar.	1961 Nov.	1960 Mar.	1961 Sept.	1961 Nov.	1960 Mar.	1961 Sept.	1961 Nov.
Busega and Lunguja	60	90	100	17	21	26	40	65	75
Salama Road	30	50	60	27	31	38	30	50	60
Kiswa	20	20	20	25	23	28	19	17	20
Ntinda	150	160	160	51	49	56	160	170	190

* The figures are all three monthly averages with the month shown on the table as the second month. The figures are taken from the UEB meter reading books.

out along tarmac roads. As would be expected, since this was a more prosperous and uniform group, consumption was considerably higher than in any of the other areas. The stability in number of consumers and in average consumption in the housing estates contrasted with the pattern of growth in the villages, where electricity was a more recent development.

The villages along the Salama Road were genuinely suburban. Homesteads of varying standards were scattered along the steep slopes of Makindye Hill. They ranged from the simple group of two or more mud and grass one-roomed huts common in rural Buganda, to spacious modern houses of brick and plaster. Steep tracks up the hillside and others wandering along the contours linked the houses, but they were in most places so badly eroded that meter reading had to be done by landrover. The 11 kV distribution network was less comprehensive than in Busega and Lunguja. It amounted to a line along the road and, for most of the distance, another parallel to it higher up the hill. It seemed likely that the higher average consumption was the result of a more selective connection policy.

The villages of Busega, Lunguja and part of Rubaga were the subject of an enquiry into the use of electricity and are therefore described in greater detail. The area was approximately 2½ miles long by one mile across. The southern and eastern boundaries were arbitrarily defined for the convenience of meter reading and ran along the Masaka Road and through Rubaga village. In the east and north the area was bounded by swampy branches of the Mayanja River. The papyrus swamps were followed by the Kibuga boundary and could be regarded as the natural limit of Greater Kampala. The land rose gently from the swamps to form rounded hills little more than 100 feet high. The hard infertile lateric layer that occurred at a higher level on the surrounding hills was therefore absent, and the whole area was suitable for agriculture.

However, although the first impression was one of rural greenery (dense banana gardens, with the occasional relict forest tree), this was by no means a rural area. In the first place it was crowded. Holdings appeared to be between three and four acres per household, which was well below the Buganda average of six to seven acres.⁶ Of the 26 houses visited none had more than a garden, though the usual food crops, matoke, cassava, sweet potatoes and beans, were grown. In no case was coffee noted as a crop and its scarcity was obvious even to a casual observer. Low coffee acreage clearly differentiated this suburban area from the true countryside and from the neighbouring villages, which had been less influenced by proximity to Kampala. North and south of Busega, where population density (and

incidentally, electricity consumption) was slightly lower, there was more coffee.

The villages were most clearly differentiated from the rural areas by the density of the road network. Within the small area of 2½ square miles there were approximately 11 miles of good road, and at least four more miles of track which could be negotiated by car. No part was farther than five miles from the centre of Kampala and there was a bus service to town on the Mityana-Masaka Road. Since fourteen miles was generally reckoned as the limit for workers cycling daily to Kampala,⁷ Busega and Lunguja were well situated for commuters.

The villages were almost entirely residential. There were two shops carrying a small stock of general goods, and industry was represented by a pottery. Lunguja Hill was the site of one of the oldest Native Anglican Church Missions in Uganda. The Mission ran a primary school and there were also two private schools, one specialising in domestic science.

The trend towards better housing which was noticeable throughout Southern Uganda was clearly in evidence in Busega and Lunguja. Of the 31 houses visited 18 were built of brick, concrete blocks or other permanent materials, 10 were well built mud houses and 3 were mud houses in a poor state of repair. (The discrepancy in totals arises because one man had three houses on the same plot and three men were building new houses of concrete blocks.) Four houses had tiled roofs and all the rest had corrugated iron roofs. Other signs of prosperity were seven garages, two cars and a lorry, but of course a garage does not necessarily mean a car. Where the occupation of the householder was noted, three were public servants, one was a mission chaplain, one a school owner and one was a shopkeeper in Nakulabye. Five households were estimated as belonging to the upper class and nine to the middle class, though this was a subjective classification made by a Muganda. All the households surveyed were Baganda except for one, where the head was a European. There was no sign that agriculture was the main source of income. Indeed as early as 1950 the area was noted for its high proportion of white collar workers.⁸

The electricity distribution network in Busega and Lunguja was built in 1959 as part of the Kibuga Scheme. The 11 kV lines followed the main roads and technically almost every house in the area could have been easily connected to the mains. The UEB, however, regarded eighty yards between consumers as the economic distance for 'rural' schemes near Kampala. This density had still to be reached in Busega and Lunguja. The number of consumers fluctuated by as much as ten per cent from month to month as people were disconnected for non-payment and later reconnected. At the time of the study there were 100 consumers out of approximately 400 households.⁹

Twenty-two consumers in three separate areas were interviewed in November 1961. The areas were the Masaka Road, Central Busega and the western fringes of Rubaga Village. The main variation from the general pattern was found in Rubaga. Monthly consumption figures were higher, but there were more large houses which had not been supplied with electricity because the owner was not in residence.¹⁰

Table VI.5 shows how electricity was used in the households surveyed. All used electric light. This was to be expected in an equatorial country where darkness lasts from seven at night till seven in the morning all year. Electricity was cheaper than paraffin for lighting—a fact remarked on by several consumers. Electric light was particularly appreciated in schools and in households with schoolchildren. In the domestic science school the lights were often on till midnight. Education was very highly valued in Uganda, but schoolchildren, particularly

Table VI. 5
BUSEGA AND LUNGUJA. USES OF ELECTRICITY. NOVEMBER 1961

	APPLIANCES		LIGHT BULBS	CONSUMERS
Radios	12	Hotplates 2	0-4	1
Irons	8	Stoves 2	5-9	10
Kettles	4	Toaster 1	over 10	8
Water heaters	3	Clock 1	unspecified	3

girls, often had to help with the housework during daylight, and could study only at night.

Electrical appliances were less popular than lighting and were, of course, more expensive to buy and to use. Radios led with a total of twelve sets. They had long been recognised as one of the most popular consumer goods and their number was not surprising. Several households, however, already had battery models and with transistors entering the market mains electricity consumption was likely to decrease. Radios were followed by electric irons—eight in number. The alternative to an electric iron was a large clumsy hand iron filled with charcoal. It was hard to manipulate and dirty. Electricity therefore had a clear advantage.¹¹ In view of the expense involved, the number of cookers, hotplates, water-heaters and kettles was high. All these items varied in price, but the cheapest kettle cost over seventy shillings.

Cooking and water heating by electricity were faster, cleaner and more convenient than by traditional methods, but the drawbacks were not only economic. Most people preferred the staple food bananas to be cooked over charcoal, as this improved the flavour. Even the praiseworthy attempt by UEB to popularise a specially made banana steamer had had little success.

Table VI. 6
**BUSEGA AND LUNGUJA. CONSUMPTION IN RELATION TO
 USES OF ELECTRICITY 1961**

Number of households using electricity for:	Units consumed per month*				Total Households
	0-9	10-30	40-99	100+	
lighting only	2		1		3
light and radio or light, radio and clock		7			7
light and iron		2			2
light and two or more appli- ances or light and cooking or water-heating	1	2	5	1	9
Total in survey	3	11	6	1	21
Total in Area	32	47	21		100

*The monthly average for October, November and December, 1961 taken from UEB meter books.

The table excludes one consumer in the 40-59 units group because it was not known what appliances he had.

Table VI.6 illustrates the relation between monthly consumption and electrical appliances. Consumers can be divided into three classes: those using an average of less than ten units per month, those using between ten and forty units, and those using more than forty units.

The first group, using under ten units a month on average, was under-represented in the survey. Thirty-two of the one hundred consumers in the area fell into this group, but only three were interviewed. Of these, two used electricity for lighting only and the third rarely used her appliances, which were in this case an iron, a radio and a kettle. She was exceptional and it can be assumed that the great majority of consumers using less than ten units per month have lighting only. The assumption is borne out by the figures for small shops, which were lit for much the same number of hours at night and generally used less than ten units a month. One other household had lighting only, but one bulb was outside and was used as a security light at night. As a result monthly consumption fell into the forty to fifty-nine group.

In the next group, those using between ten and forty units a month, people with either an iron or a radio predominated. They accounted for nine out of the twelve interviewed, the remaining three being one whose appliances were not known and two who rarely switched on the current. All the households which had only a radio and an iron used less than forty units a month. There were forty-seven consumers in this group in the area as a whole and it was the largest group.

The final category comprised those using over forty units. Consumption ranged from 40 to 130 units a month in the houses visited, and up to 310 units in the whole area. All that can be said is that these were people who cooked with electricity or who had a relatively full complement of electrical equipment which they use with varying frequency. Seven out of twenty such consumers were visited, and so the group was over-represented. These, however, were the consumers of the future and their importance cannot be over-estimated.

Over the previous year average consumption per household per month had almost doubled (Table VI.4). The only objections to electricity that were expressed by consumers were its expense and the oft-repeated fact that it did not cook bananas well. Apart from these complaints, enthusiasm was marked. Electricity had great prestige value, being thought of as 'only for the rich'. This was readily acknowledged by both consumers and admiring visitors. It was also cleaner and caused less trouble than charcoal or paraffin. Sales resistance was at a minimum and the main barrier to higher consumption, at least in this area, would appear to have been economic.

Table VI.6 shows that, at least below forty units per month, consumption was largely determined by the appliances owned. These had to be accumulated in competition with other things, such as clothes, and it therefore took time, possibly over a year, for a household to reach its full potential consumption. The same point was clearly shown in a survey carried out by the UEB five months after connection in a rural area between Kampala and Entebbe. Although the area was prosperous, with many opportunities for earning money, it was found that all but a few consumers were 'not carrying out their obligations,' i.e. they had been connected only on the understanding that they would use considerably more electricity than they were actually doing.

Nevertheless the findings in Busega and Lunguja, backed by the tariff analysis of other African housing areas (Table VI. 4) suggested that there were two categories of African domestic consumer. The first used electricity for lighting only and averaged less than ten units per month. Supplying these households was not likely to be an economic proposition except when there were other more important consumers nearby. The second group had a varying number of appliances and might reasonably be expected to use thirty to forty units a month about a year and a half after connection. The UEB estimated average of 12 units for African households therefore seemed even more unrealistic than most averages and unduly pessimistic.

Kampala, as the capital, had by far the largest number of domestic and commercial consumers of all races. Jinja, though more important industrially, had only 3,400 of these consumers as opposed to 11,800

in Kampala. Consumption levels were also uniformly lower. Map 4 shows the division of the town into functional areas and Table VI. 7. the consumption in each area. The urban structure was simpler and

Table VI. 7
JINJA. DOMESTIC AND COMMERCIAL ELECTRICITY
CONSUMPTION. MARCH AND SEPTEMBER 1960

Area	MARCH			SEPTEMBER		
	(a) Con- sumers	(b) Units '000s	(c) Inten- sity (b)/(d)	(d) Con- sumers	(e) Units '000s	(f) Inten- sity (e)/(a)
Bazaar ..	1,615	127	79	1,623	132	81
Asian Residen- tial ..	509	77	151	525	85	161
European Residential ..	317	93	295	311	95	310
West Bank and Nalufenya ..	307	104	339	300	111	371
Walukuba ..	124	2	19	193	4	19
Mpumudde	15	1	53	27	1	29
Industrial Areas and Bugembe ..	421	113	268	431	121	281

industry played a more important part than in Kampala. The main complication in delimiting sub-areas was caused by the boundaries of the UEB meter reading cycles, which were not always convenient.

The Bazaar was the oldest part of the town. There were fewer plate glass windows and specialist shops than in Kampala but the general character was the same. At the northern end were the market and a later commercial development where vehicle repairers and garages were concentrated.

The most obvious signs of the depression that had affected Jinja since the Owen Falls Dam had been completed were to be seen in Oboja Road. This road, parallel to the Main Street, had been partly built up with shops, offices and apartment blocks during the boom associated with the dam, but in 1960 many of the buildings were unused and an air of decay pervaded the street. Table VI.8 gives the figures for domestic and flat rate lighting consumption in the Bazaar. In comparison with those of Kampala, they are low.

The Asian residential area was fairly homogeneous and had grown up north of the Bazaar. The area included a variety of hospital premises, clubs and schools and consumption was markedly higher than in the bazaar. The old European residential area on Jinja Hill overlooking the steep banks of the Nile and separated from the Bazaar by the Government offices, was very much smaller than the corresponding

Table VI. 8
**JINJA BAZAAR. DOMESTIC AND FLAT RATE LIGHTING
 ELECTRICITY CONSUMPTION. MONTHLY AVERAGE 1960**

DOMESTIC			FLAT RATE LIGHTING		
(a) Consumers	(b) Units '000s	(c) Intensity (b)/(a)	(d) Consumers	(e) Units '000s	(f) Intensity (e)/(d)
798	92	115	612	11	17

*The monthly average was based on the figures for February, March, April, August, September and October.

section of Kampala. The area shown on the map included the Protectorate Government and municipal offices and the colourful homes of certain rich members of the Asian community, among them the pink and blue mansion of Uganda's leading millionaire industrialist. As on Nakasero, the older European institutions, clubs, hotel and church, were sited in this area. The figure for intensity was lower than might have been expected as the presence of the Government offices, the south-east corner of the Bazaar and the PWD installations near the Lake reduced the average. Consumption by 80 domestic users in the centre of the area was approximately 500 units each per month.

More recent housing development had taken place north of Jinja Hill. The town estate was at Nalufenya and open to all races, in practice Asians and Europeans, and the UEB had built a housing estate for European employees north of the main road to Kampala. Some of these houses had been occupied by Asians as the number of European workers on the dam fell. Consumption was high.

African residential development had not advanced as far as in Kampala. Africans had lost confidence in the municipality after clearance schemes in Kirinya, Nalufenya and Masese and suburban development was generally of a low standard.¹² Consumption on the government housing estate at Walukuba was predictably low. The other African development, an attempt to combine urban services and minimum building standards for Africans who could afford to build their own homes, was not judged a success in 1961.¹³ The relatively high level of consumption was due to the fact that a secondary school on the Kamuli Road was included in the statistics for the area.

The remaining area, which covered a large part of Jinja, was not homogeneous. It ranged from the West Bank industries and associated offices and some houses to the Busoga African Local Government headquarters on the Tororo Road. In between were the police lines and the main barracks of the King's African Rifles, the railway station and workshops and to the south the Light Industrial Area. Apart from

the small consumers in Bugembe village, who were offset by the three schools and a hospital, the majority of consumers in the area were either European domestic users or factories on the flat rate power tariff. Intensity of consumption was naturally high.

The consideration of domestic and commercial electricity consumption in Kampala and Jinja shows that marked variations in the pattern and the intensity of consumption occur. More detailed investigation would reveal greater differences, but a compromise which would allow a certain amount of generalisation was thought most useful. Variations were closely related to the functional and cultural structure of the areas concerned. Commercial activity inevitably lowered the average figure for intensity and was also associated with lower domestic consumption than in residential areas. Duplication of meters was, however, most common in commercial districts.

The extent of meter duplication was studied in the Masaka bazaar. The town was chosen because it had a well-developed bazaar of the traditional type and was also a centre of growing African commercial activity. The main bazaar was a small, closely built up area approximately half a mile long by a quarter of a mile broad with three main streets on a grid plan. The extensions of these streets were not fully built up and differed in character from the main bazaar. To the north the main road to Kampala was being developed as a newer shopping area and was the site of the cinema and the two groceries patronised by the European community. It had become the garage, vehicle repair and light engineering centre of the town and these activities predominated in the two streets parallel to it. To the east a partly built up road had been developed by African shopkeepers. The main bazaar and the peripheral areas were compared in a survey of meter duplication. Both were fully electrified. Table VI.9 shows the results for the two areas. The difference in the number of establishments using tariffs 1 and 7 and tariffs 3 and 7 stands out clearly. The former is characteristic of a bazaar shop with living quarters behind and the latter of a small workshop. The number of establishments amounted to 66 per cent of the number of meters in the main bazaar and 62 per cent in the peripheral area. Asians predominated in both areas, but there was a higher proportion of African establishments in the peripheral area. Africans tended to live away from their shops and the number using tariffs 1 and 7 was very low in both areas. It therefore seemed likely that increased African participation in commerce would lead initially to lower consumptions in business districts.

The number of establishments was 302 in the main bazaar and 196 in the peripheral area. These figures were used to calculate average domestic and commercial consumption by each establishment in

Table VI. 9
MASAKA BAZAAR. DUPLICATION OF METERS. OCTOBER 1960

Establishments using electricity on one or more tariffs	Electricity tariffs used according to establishments											Total Meters	
	1 only	2 only	3 only	7 only	1+3	1+7	3+7	1+3+7	1+7 (2,1)	3+7 (2,7)	1+3+7 (2,1) +7 (2,7)		Other (Meters) establishments	Total Meters
<i>Main Bazaar</i>													
African	2	3	22	—	2	—	—	—	—	—	—	3(8)	39
Asian	94	14	56	1	61	18	8	7	5	3	8(20)	275	413
European	—	—	—	—	—	—	—	—	—	—	—	1(4)	4
Establishments ..	96	17	78	1	63	18	8	7	5	3	12	308	
Meters	96	17	78	2	126	36	24	21	15	9	32		456
<i>Peripheral Area</i>													
African	16	1	14	—	2	5	—	—	—	—	—	3(8)	56
Asian	20	3	17	—	10	25	1	—	1	2	3(13)	82	135
European	3	—	1	—	—	—	—	—	—	—	—	—	4
Establishments ..	39	4	32	—	12	30	1	—	2	2	6	128	
Meters	39	4	32	—	24	60	3	—	6	6	21		195
<i>Total Establishments</i>	135	21	110	1	75	48	9	7	7	5	18		436
<i>Total Meters</i>	135	21	110	2	150	96	27	21	21	15	53		651

September 1960. The results were 128 units for the main bazaar and 135 units for the vehicle repair area where consumption on the flat rate power tariff raised the average. These figures can be compared with those for residential areas in Masaka. Even the least desirable of the Asian 'Gardens', east of the Kampala Road, had an average consumption of 155 units in September. The European residential area averaged 500 units and the African 28 units, though both included one or two consumers of other races. The median domestic consumption for all the members of each race living within the town boundary was 522 units for Europeans, 149 for Asians and 10 for Africans. The bazaar therefore compared unfavourably with all except the African residential area. It was clear that commercial activity was associated with a lower rate of consumption per household than in residential areas.

The pattern of domestic and commercial electricity consumption was repeated in the other towns in Uganda. All were broadly similar in character and composed of the same major groups—bazaar, residential areas for each race, government offices and a varying amount of industry. Tables VI.10 and 11 relate consumption to population in the towns. A few points may be noted. In Table VI.10 the seasonal decrease in consumption which was associated with slack commercial activity outside the cotton season is marked in Mbale and Tororo. The average intensity of consumption dropped by 20 units in Mbale and 40 units in Tororo between March and September. The drop for Tororo is very much exaggerated since, as explained in Chapter 4, the March figures are inflated by a ginnery which ran on tariff 3 for part of the season. Soroti which would be expected to show the same pattern does not do so. It is possible that a sales drive resulted in a change in the proportion of domestic consumers relative to those using commercial lighting and so caused an increase in average intensity.

Table VI. 10
DOMESTIC AND COMMERCIAL URBAN ELECTRICITY
CONSUMPTION. MARCH AND SEPTEMBER 1960

Town	MARCH			SEPTEMBER		
	(a) Con- sumers	(b) Units '000s	(c) Inten- sity (b)/(a)	(d) Con- sumers	(e) Units '000s	(f) Inten- sity (e)/(d)
Kampala	11,776	2,502	213	11,855	2,451	207
Jinja	3,308	517	156	3,410	550	161
Mbale	1,917	323	169	1,967	285	145
Masaka	1,054	134	128	1,092	166	152
Soroti	858	87	101	879	98	111
Entebbe	802	233	290	798	244	305
Tororo	558	132	237	581	114	196

Table VI.10 also shows that the number of consumers (meters) in each town decreased in the same order as the size of the towns, but that intensity of consumption did not. In Table VI.11 intensity of consumption is related to the percentage of Europeans in the total non-African population. Both can be ranked in the same order but the correlation is not otherwise very close. Neither of these facts is accidental. The percentage of Europeans was, before independence, undoubtedly a measure of the industrial and administrative importance of a town. The obvious cases were Entebbe, the administrative capital, and Tororo which was a small town but had a high percentage of Europeans employed in the cement and asbestos sheeting works, the phosphate mine and four higher educational institutions. The European population had the effect of raising the average consumption

Table VI. 11
INTENSITY OF URBAN DOMESTIC ELECTRICITY CONSUMPTION
IN RELATION TO EUROPEAN POPULATION

Town	(a) Total Non-African Population 1959*	(b) European Population 1959	% (b)/(a)	Average Monthly Intensity ∅ kWh
Entebbe	1,854	910	49	297
Tororo	1,547	259	16	217
Kampala+	23,646	3,263	14	210
Jinja	9,913	828	8	159
Mbale	5,136	397	8	157
Masaka	2,325	138	6	140
Soroti	2,027	99	5	105

*The non-African population was not an exact measure of the size of a town but since African consumers were so few it was thought adequate.

+ Including Namirembe, Port Bell and Kawempe.

∅ Calculated from the figures for February, March, April, August, September and October.

by using large amounts of domestic electricity and their spending power brought prosperity to the bazaars. It was not, however, the only factor influencing average intensity. Consumption on the flat rate power tariff by small industries was important and sales activity could not be discounted.

The chapter has shown that in 1960 urban domestic and commercial electricity consumption was predominantly non-African. Trends towards lower average consumption were marked. An increase in the number of African consumers and an increase in African participation in urban commercial activities were both likely to lead initially to lower average consumption. These trends, combined with a decrease in the number of European administrators have shown themselves in

a continued fall in intensity which (1964) shows no sign of stopping. However revenue continues to rise at a faster rate than consumption and so long as the cost of connecting and servicing the growing number of small consumers is covered, the wider distribution of electricity can only be of benefit to Uganda.

Notes and References

1. The total number of consumers in 1960 were: tariff 1, 17,846, tariff 3, 2,940 and tariffs 7 and 9, 8,509, of which less than 130 used tariff 9.
2. Europeans bathed in a bath or took showers. Africans and Asians of most classes used a bucket of water. The result was not necessarily less successful.
3. The cycles were the areas for which statistics were available.
4. This is not to suggest that all households were Asian.
5. All schools had been integrated by 1960 but most retained their original character.
6. The size of holdings was calculated by counting the number of dots on the 1:50,000 map and assuming that a dot, defined as a hut or group of huts by the Uganda Survey Department, represented a homestead. The area was surveyed from air photos in 1950 and it was certain that the population had increased since then. Three acres would seem a more likely estimate than four for an average holding.
7. W. Elkan, *Migrants and Proletarians*, (Oxford University Press, 1960), p. 45.
8. E. Munger, *Kampala, Uganda*, (Chicago Illinois, 1951), p. 40.
9. The figure 400 was taken from the 1:50,000 map and was probably an underestimate.
10. These were mostly large houses near Rubaga. Many were over ten years old. They were characteristic of an earlier period when building tended to be the prerogative of the aristocracy and chiefs. The houses in the rest of the area were newer and smaller.
11. Though there was a superstition that electric irons induced sterility.
12. C. and R. Sofer, *Jinja Transformed*, (EAISR, 1955), p. 59.
13. This might, however, be a premature judgement. Ntinda was counted a failure in 1956, (see A. W. Southall and P. C. W. Gutkind, *Townsmen in the Making*, (EAISR, 1957), p. 47), but was well established in 1960.

RURAL ELECTRICITY CONSUMPTION

The term rural has been used to describe the whole area not already classified as urban. All the nucleated settlements outside the main towns have been included. These townships and trading centres were in general small. The only exceptions were in Busoga, where Iganga had a non-African population of 1,098 in 1959 and Kamuli one of 904.

The percentage of the Owen Falls output sold in rural areas was in all cases very small. The activities of the UEB were, however, distinguished from those of other African electricity undertakings by its determination to sell electricity to small, and usually seasonal, rural consumers. The mileage of rural line was particularly impressive when it is realised that until 1964 there were no large consumers such as mines or manufacturing industries. Even so rural Uganda was not fully electrified, and even where electricity was available, it was only beginning to impinge on rural life. In rural townships and trading centres the use of electricity for communal purposes was limited. Street lighting was growing in popularity, schools, mosques and temples were lit by public supply and there were a few communal water pumps, but many centres had only one, or two at most, of these facilities.

The chief problem of rural electrification was that the expense of building a line had to be justified by a guaranteed revenue, usually from a large consumer such as a factory, or a large trading centre. Non-agricultural industries were virtually limited to a few brick works and quarries, and the majority of agricultural processing establishments operated seasonally. Table VII. 1 shows that out of 114 rural industries using mains electrical power, 97 were processing one of the four major agricultural products. The heading 'Other Industries' includes a cotton seed dressing station, two maize and oil mills and four irrigation

Table VII. 1
RURAL INDUSTRIES USING MAINS ELECTRICAL POWER 1960

Area	Coffee Fac- tories	Tea Fac- tories	Gin- neries	Sugar and Jaggery Works	Pumps	Other Indus- tries	Total
Victoria	30	9	17	1	2	5	64
Nile	4	2	15	1	3	4	29
Elgon	—	—	18	—	1	2	21
TOTAL	34	11	50	2	6	11	114

pumps on tea and sugar estates. Rural industrial electrification was therefore very closely tied to agricultural activities, and consequently to the tempo of the agricultural year.

Variations in seasonal consumption were a problem in all parts of the supply area, but were greatest in Elgon Area, where dependence on cotton was most pronounced and the drop in consumption from March to September was 81 per cent.

Cotton ginning showed the greatest variations in monthly consumption. Most ginneries worked for from four to six months of the year, between January and May.

Table VII. 2
NUMBER OF MONTHS WORKED BY RURAL GINNERIES IN THE VICTORIA AREA 1960

Number of Months Worked	1	2	3	4	5	6
Number of Ginneries	—	—	5	5	10	10

Table VII.2 shows the pattern for ginneries in the Victoria Area. Very few, however, ran at capacity for more than two or three months. Some, particularly in Busoga, combined oil seed crushing and flour milling with ginning and were able to spread their activities more evenly over the year. A pronounced seasonal ebb and flow was characteristic of the economy in the cotton producing areas.

The UEB began a drive to connect ginneries in 1958. It had not been entirely successful. In the 1960 season, 93 ginneries were operating in the electricity area, but only 50 were using mains power. There was, however, a pronounced regional difference (see Map 6, p. 89). Thirty-three out of 50 ginneries were supplied in Eastern Province but only 17 out of 43 in Buganda. This was partly because the industry was undergoing a transition in distribution and organisation. Cotton acreage had been falling steadily in Buganda to make way for coffee, and the outlook for Buganda ginners was poor. The industry was badly organised (see Chapter 4) and the Government was under pressure to improve the situation. In particular, the rise of African co-operative ginneries had introduced a new factor into an already complicated situation. Under the pool system each ginnery was allowed to gin a certain number of bales. A ginnery which exceeded its quota had to pay heavy fines to the local pool. The co-operatives, whether they owned new factories or had taken over former Asian owned establishments, frequently found that they were either unable to accept all

their members' cotton or were subjected to fines.¹ Many were among the most efficient ginneries in the country and regularly received premia for quality. They therefore had a good case for reform of the system and it was clear that changes were likely. Asian ginnery owners were consequently uncertain of the future and, with prices and profits virtually fixed under the guaranteed price system, many were content to work with obsolete machinery rather than make an expensive change to mains electricity. Several of these (twelve in Buganda), used the public supply for ginnery lighting. General uncertainty in Buganda had been intensified by the trade boycott in 1959 and, with shrinking cotton production and the prospect of independence, it was not surprising that the proportion of electrified ginneries was lower than in Eastern Province.

The coffee processing industry was more dependent than cotton on the public electricity supply. As Map 6 p. 89, shows, virtually all the important factories in the distribution area had taken a supply in 1960. Coffee factories were less subject to seasonal variations in consumption than ginneries.

Table VII. 3
NUMBER OF MONTHS WORKED BY RURAL COFFEE FACTORIES
IN THE VICTORIA AREA 1960²

Number of Months Worked	1	2	3	4	5	6	7	8	9	10	11	12
Number of Coffee Factories	1	1	—	2	3	3	3	—	1	4	2	7

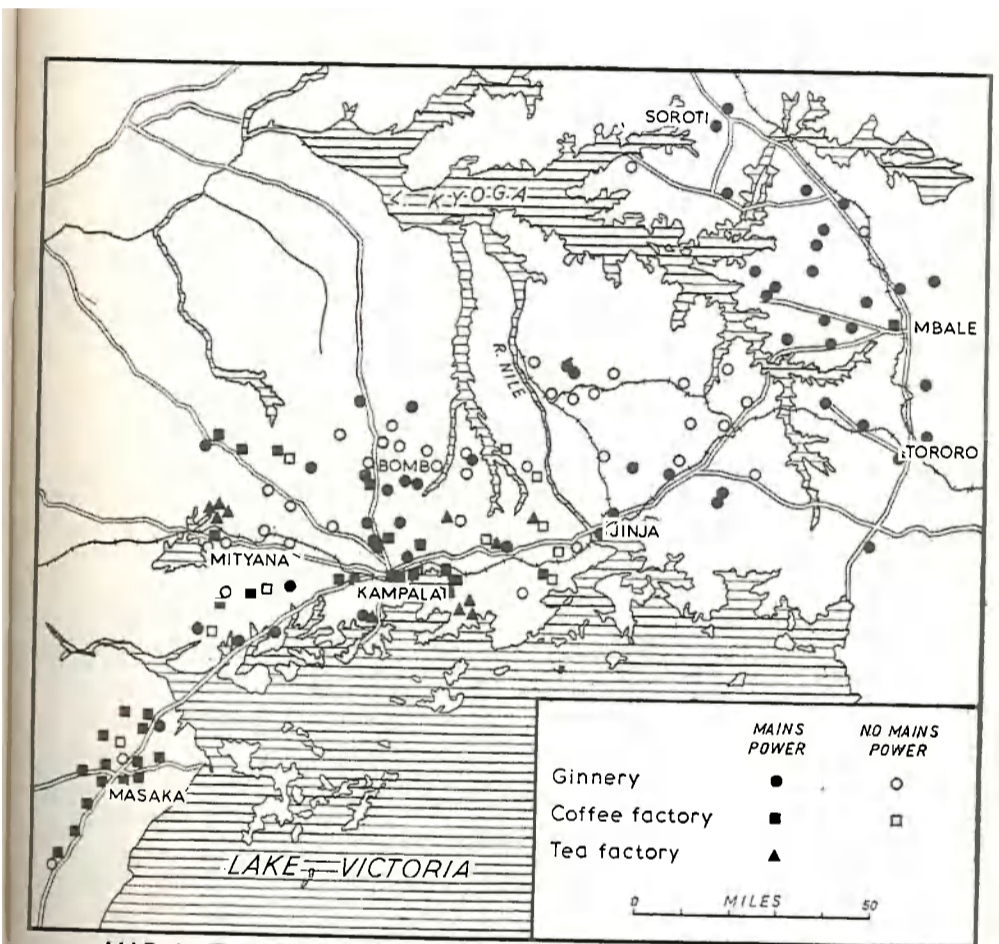
Table VII. 3 shows the months worked by all the factories on supply in Victoria Area.² The main seasons were from December to May and June to August, but some coffee was sold in most months and factories with storage facilities were able to operate all year.

The number of factories electrified was in part accounted for by the history of the industry. Rural factories were few (seven) in number until the Coffee Industry Ordinance, 1953, allowed more factories to be set up. New factories were thus built at much the same time as the electricity distribution system was provided, and the legacy of outdated machinery powered by diesel fuel, wood or waste products was very much smaller than in the ginning industry. The industry was, however, also in a state of transition in 1960 and 1961. Associations of African growers, who were first allowed to set up factories in 1957, were still being formed. Of the nine factories shown in Table VII. 3

as having worked for six months or less, two were estate factories with a small catchment area and four were newly established associations which were not fully organised. Some consolidation of electricity consumption by the industry was therefore to be expected, and it seemed likely that associations of growers would continue to proliferate unless the Government took action to prevent them.

All the cotton and most of the coffee produced in Uganda were grown by African peasant farmers. Tea and sugar were estate crops, and a small amount of coffee and some other crops were also grown on estates. A few were African-owned but the majority were owned by Asians or Europeans. The estates varied very greatly in size and efficiency. The largest were the two sugar estates at Lugazi and Kakira. Only the Lugazi factory used an industrial tariff (11). The other ran on cane waste. The sugar estates completely altered the landscape over wide areas. Forest and patches of cultivation gave way to rolling hills of sugar cane in various stages of growth. Production on both estates had expanded since 1945 and pressure on the available acreage had increased. The estates responded in two ways, by expanding wherever possible and by intensifying cultivation through irrigation. Since land alienation to non-Africans had virtually ceased after the collapse of estate agriculture in the 1920's, the sugar estates were forced to expand piecemeal by buying neighbouring estates as they came on the market. This was particularly true of the Lugazi Company. As a result sugar cane was sent from estates up to 10 miles from the main factory and the old factories on the smaller estates, hulleries or jaggery works, were either disused or adapted to some other purpose. Some estates had originally been rubber plantations and the trees were still standing, others were finding arabica or robusta coffee unprofitable and were turning to tea and sugar. Confusion was rife. The main exceptions were the established tea estates that were concentrated in three areas, one near Mityana, another on the Kibanga Port Road and the last north of the main road between Kampala and Jinja. Tea was an expanding industry and the factories were in most cases modern and well arranged. They used more electricity than the coffee industry in 1960 (see Table VII.4), and worked all year except for the short period needed to service machinery. The estates were to some extent communities, where varying numbers of employees were housed in close proximity. With few exceptions, however, only the manager's house was electrified, and the workers were in any case the lowest paid in the country. The chief exception was the sugar estate at Kakira, which had a total of 380 meters for staff housing in ten groups.

Map 6 illustrates the difference between Buganda and the rest of the supply area. Buganda has proportionally more industrial esta-



MAP 6 Distribution of Rural Agricultural Processing Industries

ishments, and a greater variety. This is yet another reflection of the greater prosperity of the Kingdom. Maize mills have been omitted from the map since only two were using an industrial tariff. In 1960 the UEB had just begun a drive to connect maize mills and there was a considerable potential to be taken up, particularly in Busoga.

Table VII. 4
VICTORIA AREA. RURAL INDUSTRIAL ELECTRICITY
CONSUMPTION 1960

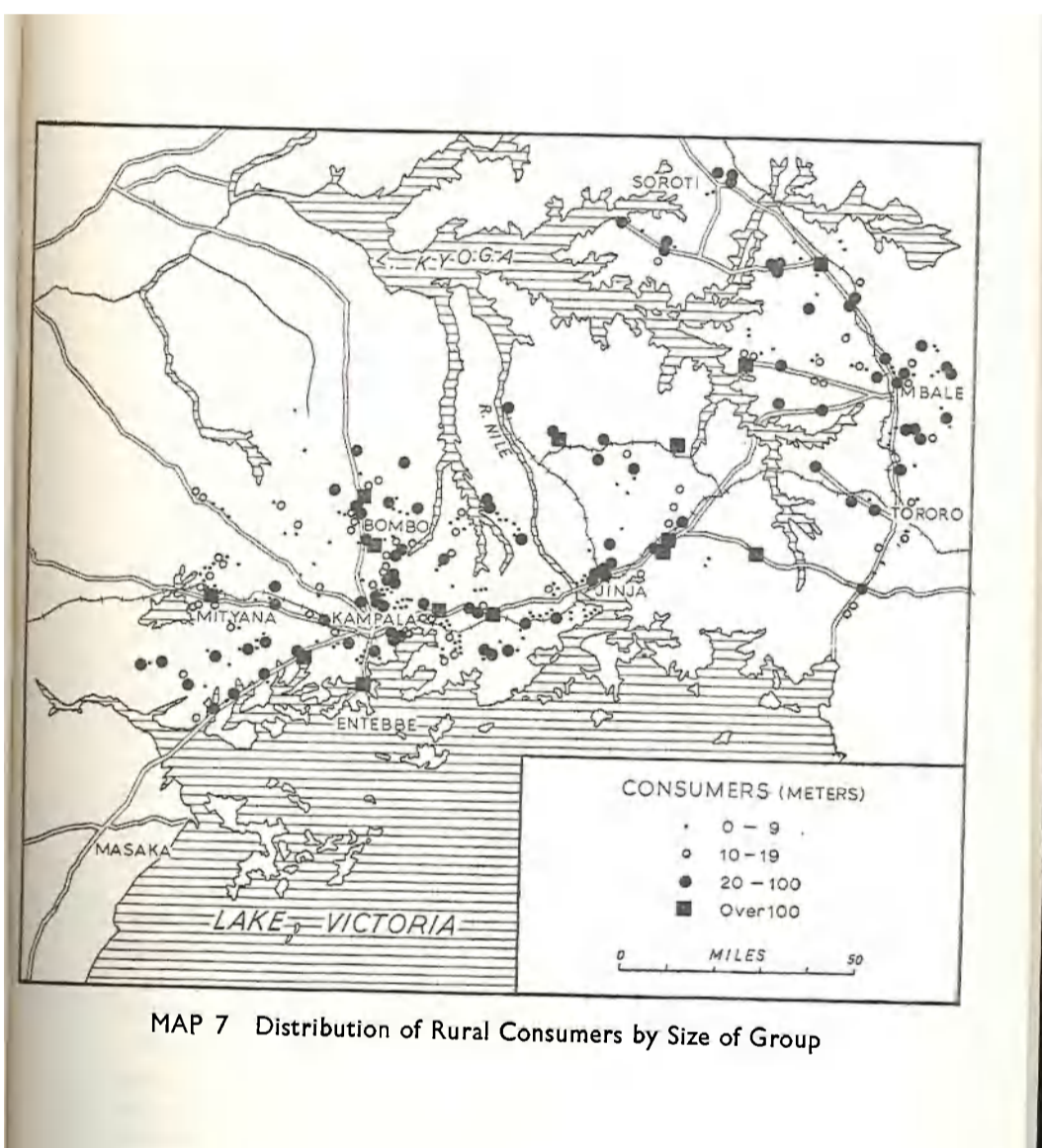
	'000 kWh	% Total
Agricultural Processing:		
Coffee	1,390	28.1
Tea	1,967	39.7
Cotton	949	19.2
Sugar	4	—
Total	4,310	87.0
Brickmaking and Quarrying	615	12.4
Printing and Publishing	29	0.6
TOTAL	4,955	100.0

Table VII.4 shows how the total rural electricity consumption was distributed among industries in Victoria Area. The almost complete dominance of agricultural processing, which used over 80 per cent of the units is clearly shown.

Although industrialists were the most important users of rural electricity, the UEB had supplied many groups of smaller non-industrial consumers. The definition covered a wide variety of users, but in general the groups consisted of domestic and commercial consumers associated with an industrial or service tariff user. This description applied equally to the rural agricultural research station, mission or trading centre.

Government and quasi-government institutions, such as research stations or educational establishments, were among the most important consumers. They combined a varying number of European domestic consumers and an industrial or service tariff for machinery and facilities for the staff. There were also Government hospitals at Bombo and Mityana. In Eastern Province some local government headquarters had been electrified, but very few in Buganda. The difference appeared to be the result of different local government policy and of sales activity.

The distribution of consumers by size of group is shown on Map 7. The majority of consumers were in groups of 20 to 100. The term consumer referred to meters and the actual number of establishments using electricity in any group was therefore smaller than the number shown. Buganda stood out as having a more comprehensive distribution system and more small groups. It was the most prosperous and densely



MAP 7 Distribution of Rural Consumers by Size of Group

populated district and the distribution was therefore not unexpected. The small number of consumers in Busoga was in part a reflection of the short time electricity had been available (since 1959 in most of the area) and in part of lower incomes and possibly lower sales activity. The large number of centres with 20 to 100 consumers in Elgon Area was striking. Trading centres and townships were well developed and, though they were not large, a high proportion of the shopkeepers used tariffs 1 and 7 together and this accounted for the size of the groups.

Missions varied greatly in size from very small primary schools with a single shelter to large seminaries and modern hospitals. Only the largest used electricity in 1960 and even among these the variations in units and in number of meters was great. The missions were generally sited outside towns and trading centres and frequently the two main confessions, Catholic and Anglican, had sites near each other. Inter-denominational rivalry encouraged the other to follow if one took an electricity supply.

The final rural consumer groups were the townships and trading centres. The larger ones were associated with one or more industrial establishments and often there was a mission not far away, e.g. Iganga and Wobulenzi. Consumption depended on the size of the non-African population. There was little difference between African and Asian consumption on tariff 7, either in townships or in the small African trading centres that were growing up among the older gazetted trading centres. Average domestic consumption did, however, vary between races. There were more Asian consumers and they used very much more electricity than Africans, though not as much as urban Asian consumers.

The rural commercial centres differed from urban areas in that meters on tariff 7 outnumbered those on tariff 1. This was so even in Iganga (190 to 220) and in Kamuli (180 to 220). The average intensity of consumption was in consequence much lower than in the towns.

Consumption levels also depended on the time electricity had been available. As in the more recently electrified suburbs of Kampala (Chapter 6), consumption took time to build up.

The adverse factors affecting electrification in the African suburbs of Kampala were repeated and intensified in the countryside. Homesteads were farther apart and incomes tended to be lower and more seasonal. There were no reliable figures for African rural incomes but the national statistics indicated that they had fallen since the peak years of booming cotton and coffee prices in the early 1950's.³ Part of the visible evidence of wealth in the countryside, cars, cycles, corrugated iron roofs and well-built houses, clearly dated from that time. An attempt was made to determine the income of rural African consumers

by using the Buganda Government annual graduated tax registers (analogous to income tax), but the assessments proved so varied that it was impossible to see any relation between electricity consumption and income as declared for tax purposes. A few members of the Buganda royal family and other large land owners had taken an electricity supply for their country houses but many were too isolated to afford it. There were also some small groups of scattered domestic consumers near Mukono and to the east of Bombo. Outside Buganda the only African consumers who were not in towns or other centres of population were on the road from Jinja to Kamuli.

The points made above emerged from a study of rural electricity supply. They are illustrated by more detailed studies of two areas, one very recently electrified and the other the area of earliest rural electrification.

The first was the electricity supply area extending north-west of Kampala along the Hoima Road. It was outstanding for the importance of industrial consumption and the short time that electricity had been available. The area stretched from Kisimbiri, eleven miles from Kampala, north-west to Katera, 52 miles from the capital. The boundaries north and south of the main road were at Semuto and Kiziba, some ten miles to the north, and Sekanyonyi, seven miles to the south. The south-east was supplied by 11 kV line from Kampala and the north by a 33 kV line from Mityana which passed through Sekanyonyi to a sub-station at Busunju which supplied the 11 kV network. There was a gap between Kakiri and Gobero. The distribution system was completed late in 1959 and lines which were being built north and west of Kiziba were partly electrified in 1962. The total number of consumers rose steeply from six in February 1960 to 109 in September. In the following six months the increase slowed down and numbers fluctuated round 115.

The appearance of the landscape changed gradually towards the north-west although rainfall and relief were relatively homogeneous. Throughout the area the main land forms were low hills rising from swampy valleys. The swamp surface was at approximately 3,600 feet and the average height of the hills was 4,000 feet, although a few rose to 4,200 feet. In the south-east, however, papyrus and swamp forest filled the valley floors and cultivation covered most of the lower hill slopes, while towards the north-west papyrus gave way to seasonal grass swamp, the forested and cultivated area dwindled and the hillsides became progressively more bare.

Cotton and coffee were grown throughout the area but cotton became more prominent in the north where coffee was approaching the limit of cultivation, a fact which was graphically illustrated at Kapeka, where

two coffee factories filled the foreground and behind them the swamps of the Mayanja River stretched unbroken for fifty miles. Crop processing was the only industry. There were six ginneries and seven coffee factories in the area.

Population density decreased from south to north. In the north, however, instead of being fairly evenly scattered over the hills, it tended to be concentrated along the main roads and tracks. Should rural incomes rise sufficiently to justify electrification the pattern of population distribution would be a distinct advantage. Between Katera and Kikandwa houses were rarely more than 100 yards apart and often less.

Opportunities for employment outside agriculture were limited and although one of the main roads to Bunyoro passed through the area, the influence of Kampala and modern developments did not appear very strong.⁴ There were no large missions or government institutions, and trading centres had always been small. Here, as in the rest of south Uganda, however, incomes had risen since the end of the second world war, and the new necessities such as corrugated iron roofs were increasingly common. The total Asian population in 1959 was only 378 and since the boycott many had left for the safety of the towns. Deserted *dukas* were common. Meanwhile African traders had filled the gap and taken advantage of increased local spending power. They were not confined to established trading centres but were also operating in new groups sited at four to five mile intervals. These new developments varied from a single bar to a small shopping centre, such as Gobero.

There were nine gazetted trading centres at intervals of eight to ten miles, but even these were not dominated by the Asian community. The two largest centres were Kakiri and Kikandwa, which had Asian populations of 75 and 49 in 1959. Kakiri had an Indian public school and both had small mosques. Semuto and Kapeka were relatively prosperous African trading centres with an Asian minority engaged mainly in cotton and coffee processing.

The only important consumers in the area were industrial. In 1960 three coffee factories and two ginneries accounted for 95 per cent of the electricity used in the area. There were one silent and five active ginneries, but only two were using industrial tariffs. Katera and Semuto used 50,000 and 43,000 units respectively in 1960. The other three ginneries at Kakiri, Lukoma and Busunju were all provided with service lines in the original distribution scheme but had delayed taking a power supply, although Kakiri used mains electric lighting. The future of the ginning industry, here as elsewhere, was not bright. With the exception of Katera, which was some 20 miles from Busunju,

all the ginneries were less than twelve miles apart. The advent of lorry transport and the decline of cotton acreages meant that the factories were too closely spaced and were enabled to operate only by the quota system. Naturally the owners were reluctant to change to mains electricity when their future was uncertain.

Although the ginning industry was faced with possible contraction, the coffee industry was expanding. The south of the area had always been within reach of the Kampala factories and the situation had not changed. In the north, however, until 1957 coffee processing was confined to estates and a licensed hullery at Kapeka. Since then six factories had either been taken over by co-operatives or were newly built. Two estates near Kapeka were in the process of being re-organised by associations of African growers. At Nakaweya, 45 miles from Kampala, there was another co-operative factory. Two more, south-east of Semuto, were outside the 1960 distribution area but were connected to a new line in 1962. Of the seven factories in the area, only one, an established co-operative west of Kiziba, produced over 1,000 tons in 1960, but the rest were expected to do so in the 1960-61 season. The distribution system completed in 1959 made power available to all the factories at Nakaweya and Kapeka, but the licensed hullery did not take a supply. In 1960 the re-organisation of the industry was still in progress and only the factory at Nakaweya and one at Kapeka used electricity in any significant amount (34,000 and 37,000 units each). These totals did not compare very favourably with those for cotton ginneries, but the future of the coffee industry was very much more promising. By 1962 all the African owned coffee factories were on supply, and increased industrial consumption depended on higher output rather than extensions to the system.

Non-industrial consumption in the area was very low. In October 1960 there were 101 non-industrial consumers, including four houses owned by cotton ginneries, but excluding ginnery lighting. Of these 84 were African and 19 Asian. In the following six months only thirteen new connections were made and all were Africans, indicating that the Asian position was unlikely to improve. The total non-industrial consumption in October was 1,843 units, an average of only 18 units per consumer.

Electricity was available in all the more important settlements in the area, with the exception of the African trading groups on the Hoima Road between Kakiri and Gobero. All the gazetted trading centres except Lukoma had a few consumers and so did many of the smaller African centres (see Table VII. 5). The average number of consumers in the eight trading centres was nine and outside them it was four.

The figures for African population in trading centres are not a reliable guide to African commercial activity. The number depends on how large a rural area was included in the gazetted boundary. African traders tended to live outside the trading centre and in consequence more often took electricity for shop lighting than for domestic use (see Table VII. 6).

Differences in consumption by Africans and Asians were negligible on tariff 7 but wide on tariff 1. Table VII.6 gives the median figures for consumption on each tariff in October 1960. The range of Asian

Table VII. 5

THE HOIMA ROAD AREA. NON-INDUSTRIAL ELECTRICITY CONSUMPTION IN POPULATION CENTRES. OCTOBER 1960

Centre	Population 1959		Total Meters	Total Establishments	Consumption Units		
	Non-African	African			Non-African	African	Total
<i>Gazetted Trading Centres</i>							
Katera	43	283	11	8	—	95	95
Kikandwa	49	58	10	8	66	30	96
Busunju	56	—	9	7	319	90	409
Sekanyonyi	33	—	5	5	—	87	87
Kapeka	42	593	14	10	10	166	176
Semuto	29	458	15	11	478	63	541
Kiziba	37	—	3	2	—	46	46
Kakiri	75	60	3	2	17	34	51
Lukoma	14	57	—	—	—	—	—
<i>Other Centres</i>							
Kisimbiri	—	—	3	2	—	47	47
Kikubampanga	—	—	8	7	—	82	82
Ndangira	—	—	2	2	—	31	31
Gobero	—	—	2	2	—	14	14
Wabikokoma	—	—	7	7	—	154	154
Bukatira	—	—	3	3	—	14	14
TOTAL			95	76	890	953	1,843

domestic consumption was great but the general level very much higher than for Africans. Duplication of meters was almost negligible and had little effect on consumption averages.

The Hoima Road area was possibly an example of the pattern of rural electrification to be expected in the less advanced parts of Uganda. Consumption was dominated by agricultural processing, and non-industrial consumers were few, scattered and unable to pay for much

electricity. Improvements were to be expected as the new consumers had time to accumulate electrical appliances, but the process was

Table VII. 6

THE HOIMA ROAD AREA. NON-INDUSTRIAL CONSUMPTION OF ELECTRICITY BY RACE AND TARIFF. OCTOBER 1960*

	Tariff 1	Tariff 3	Tariff 7	Total Meters	Total Establish- ments
<i>African Consumers</i>					
Number of Meters	32	1	49	82	68
Median consumption (units)	13	—	5	—	10
Upper Quartile ..	20	—	10	—	17
Lower Quartile ..	8	—	2	—	5
Range	0-74	—	0-32	—	0-93
<i>Asian Consumers</i>					
Number of Meters	11	—	8	19	15
Median consumption (units)	43	—	8	—	17
Upper Quartile ..	159	—	16	—	49
Lower Quartile ..	8	—	3	—	3
Range (units) ..	1-236	—	0-33	—	0-236

*The figures include 10 Africans and one Asian who did not use any electricity during October.

likely to be slower than in African suburbs, where eighteen months was shown to be a reasonable time lag. Increased Asian consumption was not to be expected except in limited areas, and the Hoima Road was not one of them.

The second area chosen for detailed study was immediately north of Kampala. It was physically similar and adjacent to the Hoima Road area, but had a very different pattern of electricity consumption. The limits of rural electrification could be fairly easily defined, except in the south, where rural conditions merged almost imperceptibly into suburban Kampala. Mile eight on the Bombo Road and mile nine on the Gayaza Road were taken as the southern limits of the area in order to include a Government agricultural research station at Kawanda, and Kasangati trading centre. Both Kasangati at mile nine and Gayaza at mile twelve were closely connected with Kampala and had some of the characteristics of dormitory villages but they also functioned as rural trading centres and Gayaza was an important mission station. The remaining limits of the area were set by the distribution lines, which ended at Nakaseke, Luwero, Kiziba, Ziobwe and Busika in 1960. The Nakaseke line was extended to Kiwoko Trading Centre and a sugar plantation three miles further west in 1961.

The area was one of the most densely populated parts of Buganda. Between Kampala and Wobulenzi the population density was 300 to

350 persons to the square mile in 1959. Communications were well developed. The roads from Kampala to Wobulenzi and Gayaza were tarmac and there was a dense network of well-kept secondary roads, especially in the south. Trading centres, many of which were large by Buganda standards, were situated at intervals of three to eight miles. Bombo and Wobulenzi were classed as townships and in 1959 had non-African populations of 432 and 282 respectively. Luwero, Nakaseke and Bamunanika all had over 100 non-African inhabitants. The number of Africans actually living in the trading centres was here, as in other areas, uncertain. The balance between Asians and Africans, however, appeared to be moving in favour of the Africans.

In 1960 there were 1,072 meters in the area and an average of 985 were actually in use. Revenue and consumption fluctuated from £3,143 and 221,000 units in March 1960 to £1,658 and 152,000 units in September.

The relatively high number of consumers was the result of many contributing factors. In the first place a disproportionately large number of government or quasi-governmental institutions was sited in the area. All these had European residential quarters and a certain amount of power driven machinery. The agricultural research station at Kawanda, which had 70 meters, was the largest. The next in size was the Empire Cotton Growing Corporation's Research station at Namulonge, with 60 meters, seven of which were on the industrial power tariff. The others were smaller, but still important. The agricultural research and training institution at Bukalasa near Wobulenzi had 27 meters, Kabanyolo, the Makerere University College Farm, had 15 and Namalerere agricultural research station 11. All these had as many meters as a small or medium sized trading centre, but their consumption and sub-station capacity was much higher. Even Namalerere had a total sub-station capacity of 50 kVA, which was equal to that of a small coffee factory, while the total at Kawanda was 204 kVA. Bukalasa and Namalerere took a proportion of their supply on 'services' tariffs and both used over 60,000 units in 1960. Namulonge, which had a small ginny and maize mill as well as power-driven machinery and pumps, used 120,000 units on the industrial tariff alone. These agricultural stations were the most important government or quasi-government institutions in the area. Others were the Geological Survey Department Office and the Government Hospital at Bombo and the Makerere College Department of Preventive Medicine site at Kasangati.

The presence of the agricultural research stations, which were steady and relatively large consumers, gave an early impetus to rural electrification in the area. The line to Namulonge, 28 miles long, was completed in 1949 and the supply reached Bombo in 1952, two

years before the Owen Falls Scheme was completed. The system was extended to reach Luwero and Kiziba in 1959 and Kiwoko and Kyampisi two years later.

The government or quasi-government institutions gave the initial impetus to rural electrification, but, except for Bukalasa, they were all close to Kampala. In the more distant areas the supply of electricity was dependent on industry. The coffee industry was dominated by the large factories in Kampala and, in contrast to the Hoima Road area, there was only one rural coffee factory. This was situated at Bombo and was an African-owned co-operative enterprise recognised as a licensed hullery. The machinery was modern and the factory well-run. In 1960 it worked for 11 months and used 278,000 units. Cotton ginning suffered from heavy over-capacity. There were 14 active and two silent ginneries in the area in 1960. The majority were concentrated in an east-west belt centred on Kalule, some 25 miles north of Kampala. All belonged to the Mengo quota zone and produced between 1,000 and 2,000 bales each in 1960. It seemed likely that if the industry were re-organised many would be forced out of business. The future was doubly uncertain since all the ginneries were Asian-owned. In these circumstances it was not surprising that some had not taken mains electricity even though all were close to the supply lines. The four most isolated ginneries, Gayaza and Matuga in the south and Luwero and Kiziba in the north, were on supply. Three more, barely five miles apart, to the east of Bombo and one to the west, made up the number of power consumers. In 1960 they used 349,000 units between them, a figure which did not compare very favourably with the 278,000 units used by the Bombo coffee factory alone. A further four ginneries took UEB electricity for factory lighting but not for power. Two, at Luwube and Wobulenzi, were inside the main distribution network, but the others, at Bamunanika and Ziobwe, were on a line which had no large consumers. The revenue from the 16 miles of line between Kalule and Ziobwe averaged £40 a month in 1960 and even during the 1961 cotton season was under £60 a month. The situation was similar north of Bowa. Nakaseke ginnery did not take a supply, and until the system was extended to the sugar estate west of Kiwoko there were no worthwhile consumers on the line.

Estate consumption was confined to the sugar factory already mentioned and a single establishment south of Namulonge. The remaining estates were small and unlikely to take an industrial electricity supply.

The distribution of mission consumers shown in Table VII.7 emphasised the advantages of the southern part of the area. The northern missions all had sub-stations of under 10 kVA and only

Table VII. 7
THE AREA NORTH OF KAMPALA. MISSION ELECTRIFICATION
1960

<i>Mission</i>						<i>Sub-stations capacity in kVA</i>	<i>Meters</i>
Gayaza CMS	..	..	..	..	..	50	28
Gayaza RCM	..	..	..	..	..	—	8
Bugema RCM	..	..	..	..	..	37	26
Ndeje PM	..	..	..	..	..	25	14
Nandere RCM	..	..	..	..	..	15	15
Katikamu	..	..	..	..	..	5	14
Mulage RCM	..	..	..	..	..	4	5
Lutete	..	..	..	..	..	8	2

Katikamu, north of Wobulenzi, had over 10 consumers. The five southern missions were all more or less important as centres of education. Gayaza which was the site of the leading Protestant girls' school in Uganda and a Catholic hospital, was outstanding. The school had 28 meters, a sub-station of 50 kVA and plans for further increases in consumption. Ndeje and Nandere, west of Bombo, were run by rival denominations and in such circumstances, if one mission takes electricity the other is unlikely to be far behind. However, apart from strengthening the number of steady institutional consumers in the south the missions were an important factor in determining the distribution of electricity supply lines in the area.

Table VII. 8
THE AREA NORTH OF KAMPALA. NON-INDUSTRIAL
ELECTRICITY CONSUMERS (METERS) IN POPULATION
CENTRES 1960

<i>Towns</i>				<i>Population 1959</i>		<i>Total Consumers (Meters)</i>
				<i>Non-African</i>	<i>African</i>	
Wobulenzi	..	..	..	282	552	106
Bombo	..	..	..	432	463	193
<i>Trading Centres</i>						
Matuga	..	..	..	12	35	7
Gombe	..	..	..	24	52	—
Namulonge	..	..	..	21	—	10
Luwero	..	..	..	151	71	58
Nakaseke	..	..	..	100	243	41
Busika	..	..	..	20	33	14
Bowa	..	..	..	35	3	17
Kiziba	..	..	..	35	393	28
Ziobwe	..	..	..	44	46	27
Bamunanika	..	..	..	145	105	60
Kasangati	..	..	..	—	330	37
Kiwoko	..	..	..	19	26	—
Gayaza	..	..	..	—	—	30
Luwube	..	..	..	—	—	13
Kalule	..	..	..	—	—	29
Waluvule	..	..	..	—	—	7

Table VII.8 shows that commercial centres in the area were consistently larger and had more consumers than in the Hoima Road Area. There were in addition many smaller groups scattered along the main roads.

It was clear that the area north of Kampala had certain advantages over the rest of the country for rural electrification. There was a disproportionately large number of steady institutional consumers in the area. These, together with the agricultural industries, allowed a relatively dense network of supply lines to be built at an early stage in the UEB's development. In addition the area was densely populated and prosperous and although, as always in south Uganda, the majority of the people lived in scattered homesteads, the trading centres were well-developed and supported large groups of consumers. New schemes were planned to connect many more African consumers (during 1963 and 1964) and the area was likely to remain ahead of the rest of the country.

As with other aspects of economic life in Uganda, rural electricity distribution and consumption had been strongly influenced, both directly and indirectly by government activity. The distribution of the agricultural processing industries which exerted the strongest influence over the rural transmission system had been affected by legislation and government institutions played an important part in establishing the profitability of the rural network. Differences in regional prosperity also had a marked influence, with consumption heavily concentrated in Buganda where prosperity was greatest and electricity had been available for longest. It was clear that increased use of electricity in rural areas depended on a rising standard of living and greater diversification of rural activities.

Notes and References

1. Annual Report of the Department of Co-operative Development, Uganda Protectorate, Entebbe, 1953 to 1960.
2. The total number of factories is twenty seven because three had only been connected at the end of the year and did not use any electricity.
3. The total paid to African growers for cotton and coffee was £27.6m in 1955 and £24.0m. in 1960. Uganda Protectorate Statistical Abstract 1962, Entebbe.
4. A. I. Richards, ed., *Economic Development and Tribal Change* (Heffer, Cambridge), p. 228.

8

ELECTRICITY AND DEVELOPMENT

It cannot be said that the high hopes expressed when the decision to build the Owen Falls Dam was taken have been fulfilled by the results of the first decade of operation. At that time the most optimistic expected that rapid industrialisation would alter the basis of the whole Uganda economy and that Jinja would become the heart of a great industrial complex. It is clear now that this extreme optimism was unjustified and that electricity has had a surprisingly small direct effect on development.

There was only one important project which would have been worth significantly less to Uganda, or might never have been undertaken, without hydro-electricity. This was the exploitation of the copper deposits at Kilembe. The scheme involved three closely linked components, the mine west of Fort Portal, the extension of the railway from Kampala to Kilembe and electricity for concentrating and smelting the copper. The mine could not be exploited unless the railway was extended and the railway extension was only worthwhile if a large volume of copper exports was assured. The copper smelter could not therefore be sited close to the mine since the reduced volume of blister copper produced, as opposed to copper-concentrate or ore, would not have justified building the railway. It is conceivable that while world prices for copper were high, concentrate could have been sent to Kenya or even outside East Africa for smelting, but with electricity available at Jinja, the logical site for a smelter was at the eastern end of the railway extension. Uganda therefore benefited from a welcome diversification of its predominantly agricultural exports and from the higher value of blister copper as opposed to concentrate. Copper exports were in fact worth £6.2 million or 9.6 per cent of Uganda's exports by value in 1964.

The other industry which, it might be argued, could not have survived without the Owen Falls scheme is the textile factory. The firm which founded the plant experienced such severe financial difficulties that it sold out to the UDC. If hydro-electricity had not been available at a price which, though not cheap, was in line with average world prices (the special industries tariff), it is quite possible that not even the UDC would have been able to carry on. By 1960 the firm had overcome its difficulties and had plans to double capacity and begin

three shift working. Exports to other East African countries were growing, and by taking an increasing share of the home market the firm was saving Uganda considerable sums in foreign exchange. The obverse of this favourable development was that the mill had only survived through the protection of a thirty-three and a third per cent duty on all imported textiles, a surcharge which had the effect of raising the cost of living in all parts of Uganda.

The development of Jinja has also been below expectations. It has indeed become the industrial centre of Uganda but it could still hardly be called an industrial town. In 1960 there were only two large concerns, the smelter and the textile mill. Only the mill employed a large labour force and both were small by international standards. They and the other smaller firms have since been joined by a steel mill and a number of other newcomers, including a second textile factory. There has, however, been little extension in the range of industries represented in Jinja. Existing industries were not big enough to draw in ancillary firms and the growth in the number of small market-oriented concerns characteristic of Uganda, has taken place mainly in Kampala. The provision of power for a few industries has therefore had very little cumulative effect. Even the new firms which were located in Jinja appear to have been sited there mainly for family reasons rather than because of the presence of electricity. This was certainly the case with the brewery and the plywood factory.

The impact of electricity has to some extent been limited by the nature of industrial organisation in Uganda. The typical industrial establishment in 1960 (and still five years later) was small, produced a very limited range of goods for a local market and was frequently poorly managed. A few such firms existed in all the towns but most were in Kampala. The owners and managers, often Asians and hence uncertain of their future, were in many cases not suited to make the best use of relatively expensive electric power. The economic use of mains electricity demanded higher standards of organisation and planning than had hitherto been necessary in large sectors of the agricultural processing and consumer goods manufacturing industries. As a result, although many such firms used public electricity it had little effect on their productivity and in some cases actually caused a needless increase in their costs (see Chapters 4 and 7).

The UEB was unique among similar bodies in developing countries in its determination to sell power in the rural areas. Nevertheless electricity had not had a marked effect on rural life. The supply lines had either been built to connect existing potential consumers or had reached the area at the same time as new consumers. There was again no evidence of rural electrification creating consumers or initiating

industrial development. Regional variations occurred, for example the cotton ginning industry was clearly in decline in Buganda and many ginneries had not taken a public electricity supply. On the other hand all the more progressive ginneries in Eastern Province had done so. The coffee processing industry provided most of the new rural industrial consumers over the years 1957 to 1962 as factories were set up or African growers took over from estates. However the process had resulted in surplus capacity in the industry in 1962 and some slowing down was to be expected. The main potential for future growth lay in the expansion of the tea industry. The relatively high level of managerial skills and degree of organisation essential for success also meant that the industry was able to make the best use of electricity. Even in 1960 the industry used more electricity than the cotton and coffee factories in the Victoria Area, and new centres of production were developing in Ankole. The supply to these areas was strengthened between 1962 and 1964 and the line to Kilembe Mine which was completed in 1965 brought the tea growing district round Fort Portal within the distribution network.

The impact of electricity on other aspects of life in Uganda has also been limited. The provision of mains electricity has undoubtedly improved services, particularly in the towns, but it does not appear to have resulted in any deep seated changes. For example hospitals in all parts of the country have benefited from the public supply, urban water undertakings have been improved and most shops in the towns and countryside are now lit in the evenings. Street lighting, though in decline since 1962 still exists in many rural villages, and Kampala at night with its well-lit roads encircling the seven hills with ribbons of light, ranks as one of the major sights of East Africa. However attempts to take electricity to the mass of the people have been frustrated by the expense. Outside the bazaars virtually everyone from the richest to the poorest lives in scattered houses. The UEB has had remarkable success in finding consumers in the suburbs of the main towns and in rural Buganda, but connection costs are unavoidably high and revenue, outside the former European suburbs, necessarily low. Further developments can be expected to keep pace with the standard of living.

Despite this somewhat pessimistic survey there is no doubt that electricity has a future in Uganda. The UEB has registered a growing profit since 1964, and by 1966 demand was gradually approaching the capacity of the Owen Falls power station. Severe shortages of power were experienced in Masaka and a diesel station was installed while the transmission system was strengthened. Since nearly one third of the total output was still sold to Kenya, it cannot be said that Uganda

was faced with an immediate power shortage but plans were far advanced for a second dam which would begin production by the end of the decade.

Sales of electricity have kept pace with the rate of economic development in Uganda. That rate might very well have been lower if there had been no adequate supply of electricity. While the Owen Falls Scheme did not initiate development, the money which was spent on it would certainly not have been available for any other purpose in Uganda and on balance the project must be judged worthwhile. Future growth of electricity consumption depends on growing industrial development, more and better use of managerial skills and a rising standard of living among the mass of the people. As these developments take place electricity will become increasingly important in all aspects of Uganda life.

Select Bibliography

- G. R. Barnley, 'The Mbwa Fly and Problems of its Control', *Uganda Journal*, Vol. 16 No. 2 1952.
- C. W. Bary, *Operational Economics of Electric Utilities* (Columbia University Press, 1963).
- F. Clements, *Kariba* (Methuen, London, 1959).
- Economist Intelligence Unit, *Power in Uganda 1957-60* (EIU, 1957).
- W. Elkan, *Migrants and Proletarians* (Oxford University Press, 1960).
- C. Erlich, 'Some Social and Economic Implications of Paternalism in Uganda', East African Institute of Social Research, Conference January 1959, Proceedings (reneoed).
- L. A. Fallers, *Bantu Bureaucracy* (Heffer, Cambridge, 1956).
- E. K. Hawkins, *Roads and Road Transport in an Underdeveloped Country* (Colonial Research Study No. 32, H.M.S.O.).
- G. H. T. Kimble, *Tropical Africa*, Vols I and II, (The Twentieth Century Fund, New York, 1960).
- I. M. D. Little, *The Price of Fuel* (Oxford University Press, 1953).
- Marketing Development Company Uganda, *A Survey* (1956).
- G. B. Masefield, *Agricultural Change in Uganda 1945-1960* (Food Research Institute, 1962).
- A. B. Mukwaya, *Land Tenure in Buganda* (East African Studies No. 1).
- P. G. Powesland, *Economic Policy and Labour* (East African Studies No. 10).
- Report on the Supply of Electricity in Great Britain* (Political and Economic Planning, 1936).
- A. I. Richards (ed.), *Economic Development and Tribal Change* (Heffer, Cambridge, 1954).
- C. and R. Sofer, *Jinja Transformed* (East African Studies No. 4).
- A. W. Southall and P. C. W. Gutkind, *Townsmen in the Making* (East African Studies No. 9).
- H. B. Thomas and R. Scott, *Uganda* (Oxford University Press, 1935).
- D. Walker, 'Power in Uganda, a Review Article', *East African Economic Review*, Vol. 4 No. 2 1958.
- C. R. Westlake, *The Uganda Electricity Survey 1947*.
- P. N. Wilson, 'Agricultural Survey of Moruith Erony Teso', *Uganda Journal*, Vol. 22 No. 2 1958.
- E. B. Worthington, *A Development Plan for Uganda, 1946* (Government Printer, Entebbe, 1947).
- C. C. Wrigley, *Crops and Wealth in Uganda* (East African Studies No. 12).

OFFICIAL PUBLICATIONS

- The Advancement of Africans in Trade* (Entebbe 1955).
- Classified Trades and Professions of Uganda* (Ministry of Commerce and Industry, Entebbe, 1958).
- Enumeration of Employees, June 1960* (East African Statistical Department, 1961).
- Joint Report of the Standing Finance Committee and the Development and Welfare Committee on Post-war Development* (Entebbe, 1945).
- Memorandum by the Government on the International Coffee Agreement, 1959* Sessional Paper No. 18 1958-59 (Entebbe).
- The Pattern of Income, Expenditure and Consumption of African Unskilled Labourers in Kampala* (East African Statistics Department 1951 to 1953, Uganda Unit 1957).
- Proposals for the Future of Coffee Processing and Marketing*, Sessional Paper No. 8 1962 (Entebbe).
- Recommendations of the Committee on the Composition, Function and Responsibilities of the Lint Marketing Board and the Coffee Industry Board*, Sessional Paper No. 5 1957-58 (Entebbe).
- Report and Recommendations on the Post-war Development of Medical Services in Uganda* (Entebbe, 1944).
- Report of the Commission of Enquiry into the Cotton Industry of Uganda, 1929* (Entebbe).

- White Paper on the Mechanisation of African Farming in Uganda* (Entebbe, 1954).
Annual Reports of the Department of Agriculture.
Annual Reports of the Buganda Government.
Annual Reports of the Department of Commerce (later the Department of Trade and the Ministry of Commerce and Industry).
Annual Reports of the Registrar of Co-operative Societies (later the Department of Co-operative Development).
Annual Reports of the Coffee Industry Board.
Annual Reports of the Coffee Marketing Board.
Annual Reports of the Lint Marketing Board.
Annual Reports of the Uganda Development Corporation.
Annual Reports for the Eastern Province.

INDEX

- Accounts, 35
 Airport, 51
 Aluminium hollow-ware, 17, 39, 47
 Amberly Estate, 6
 Ankole, 104
 Annual load, 35
 Arua, 22

 Bamunanika, 98, 100
 Biscuit manufacture, 26, 49
 Bombo, 14, 20, 90, 93, 98, 99, 100
 Boycott, 19, 23n., 87, 94
 Brewery, 39, 43, 47, 103
 Bude, 17
 Buganda, 6, 10, 11, 12, 18, 39, 86, 87, 88, 90, 97, 101, 104
 Buganda government, 37, 45, 68, 93
 Bugembe, 80
 Bugerere, 7
 Bujagali, 5, 35
 Bukalasa, 98, 99
 Busega and Lunguja, 71-77
 Busia, 17, 18
 Busika, 97, 100
 Busoga, 19, 28, 39, 85, 86, 92
 Busoga scheme, 15, 17
 Busunju, 93, 94, 96
 Butembe-Bunya, 7
 Bwayise, 48-49, 72

 Capitalisation of interest, 3, 7, 20, 23n.
 Cement, 6, 14, 37, 39, 51, 83
 Century storage, 5
 Cigarette manufacture, 39, 43, 44
 Clearance schemes, 79
 Coffee, *arabica*, 51, 88
 Coffee industry, 85, 86, 88, 99, 104
 Connection, 11, 15, 18, 19, 95
 Hoima Road Area, 93-95
 Kampala, 47, 48
 Legislation, 19, 39, 87, 88
 Masaka, 50
 Mbale, 51, 52
 North of Kampala, 99
 Seasonality, 11, 47, 50, 87
 Tariff, 29-30, 35
 Victoria Area, 44, 45, 85, 90
 Comprehensive distribution scheme, 15
 Consolidation schemes, 20
 Consumer unit, 19, 27
 Co-operatives, 19, 23n., 39, 51, 86, 95, 99
 Copper smelter, 15, 17, 39, 43, 102, 103
 Cotton ginning industry, 85, 86, 87, 104
 Connection, 11, 14, 18, 19, 86, 94
 Consumption, 28
 Elgon Area, 51, 85
 Excess capacity, 39, 94, 99
 Hoima Road Area, 93-95
 Jinja, 43
 Kampala, 47, 48, 49
 Legislation, 19, 39
 Masaka, 50
 North of Kampala, 98, 99
 Seasonality, 11, 49, 52, 86
 Tariff, 29-30, 35, 94
 Victoria Area, 44, 85, 90
 Cotton seed crushing, 39, 49, 86
 Cotton seed dressing, 85

 Devaluation, 3
 Diesel, 12, 17, 22, 87, 104
 Dundas, Sir John, 1

 East African Power Company, 25
 Eastern Province, 12, 86, 87, 104
 Egypt, 3, 5, 6
 Electricity consumption,
 General, 2, 11, 24, 30-33, 36
 Electricity distribution system, 9, 10, 12, 15, 16, 20, 21, 22
 Losses, 11, 30
 Electricity survey 1935, 2, 7n., 12
 Electricity transmission system, 3, 9, 10, 12, 13, 15, 20, 22, 104
 Elgon Area, 14, 20, 51, 53, 59, 60, 86, 92
 Empire Cotton Growing Corporation, 13, 98
 Entebbe, 9, 12, 37
 Domestic and commercial consumption, 82-83
 Industry, 50-51
 Institutions and services, 57, 59, 60, 61
 Tariffs, 25
 Transmission, 17, 18
 Estates, 11, 18, 39, 88, 95, 97, 99, 104
 Irrigation, 18, 20, 86
 Exports, 102, 103

 Fort Portal, 20, 102, 104

 Gayaza, 97, 98, 99, 100
 Gobero, 93, 94, 95, 96
 Government, 1, 2, 90
 Control of industry, 39, 88
 Influence, 101
 Institutions, 90, 98
 Gujarati, 49
 Gulu, 17, 20

 Hall, Sir John H., 1
 'Notes', 2, 7n.
 Hayden, F., 22n.
 Hoima, 20
 Hoima Road, 93-97, 99, 101
 Domestic and commercial Consumption, 95-97
 Hollerith system of accounts, 35
 Hospitals, 39, 44
 Consumption, 53-61
 Jinja, 78, 80
 Rural, 90, 92, 98

Index

- Special industry, 30, 104
 Tariff, 29
- Iganga, 13, 37, 85, 92
 Income, 92, 93, 94
 Interest rate, 3, 4
 International Bank of Reconstruction and Development, 20, 27
 Irrigation, 18, 20, 43, 85, 88
- Jinja, 12, 13, 15, 103
 Bazaar, 58, 60, 78, 79
 Distribution, 13, 14
 Domestic and commercial consumption, 77-80
 Industrial Area, 79
 Industry, 14, 15, 17, 39, 41-44, 49, 102, 103
 Institutions and services, 58-60
 Light Industrial Area, 43
 Population, 6, 7, 37
 Tariffs, 25
- Kabale, 22
 Kabanyolo, 98
 Kaberamaido, 20
 Kagulu, 37
 Kakira, 43, 88
 Kakiri, 93, 94, 95, 96
 Kaliro, 17
 Kalisizo, 18
 Kalule, 99, 100
 Kampala, 9, 11, 13, 14, 30, 63, 64, 103, 104
 Bazaar, 55, 56, 60, 65-67
 Distribution, 13, 14, 17
 Domestic and commercial consumption, 65-77
 Industrial Areas, 56, 70, 71
 Industry, 39, 41, 44-49, 99
 Institutions and services, 54-57
 Light Industrial Area, 47
 Population, 37
 Tariffs, 25
 Transmission, 12, 13, 15, 17, 18
- Kamuli, 17, 19, 37, 85, 92
 Kapeka, 93, 94, 95, 96
 Kariba, 7, 22n.
 Kasangati, 97, 98, 100
 Kasese, 20
 Katera, 93, 94, 96
 Katera-Semuto scheme, 19, 20
 Katwe, 14, 68
 Kawanda, 97, 98
 Kawempe, 37, 45, 48-49, 71
 Kenya, 102
 Kenya Export, 14, 17, 28, 30, 31, 35, 37, 104
 Kenya Export Agreement, 15, 22, 22n., 36n.
 Kenya Power Company, 18, 26, 31
 Kibanga Port Road, 88
 Kibuga, 45, 73
 Kibuga Scheme, 15, 17, 18, 20
- Kikagati, 24
 Kikandwa, 94, 96
 Kilembe mine, 13, 17, 20, 30, 102, 104
 King's African Rifles, 59, 79
 Kireka, 45
 Kiruba, 12, 13
 Kisenyi, 68
 Kisimbiri, 93, 96
 Kisumu, 18
 Kiswa, 69, 71-72
 Kiziba, 93, 95, 96, 97, 99, 100
 Kumi, 15
 Kyotera, 18
- Lake Kyoga, 18
 Lake Victoria,
 Lake level, 3, 5
 Legislative Council, 12, 22n., 56
 Lightning, 10, 11, 19
 Lira, 20
 Load factor, 30, 35
 Luganda, 49
 Lugazi, 13, 20, 88
 Lugogo, 13, 25, 29
 Luwero, 97, 98, 99, 100
- Maize milling,
 Connection, 20, 90
 Elgon Area, 51, 52
 Government restrictions, 39
 Jinja, 43
 Kampala, 45, 47, 48-49
 Masaka, 50
 Rural, 85, 98
 Victoria Area, 44
 Makerere, 56, 69, 98
 Masaka, 9, 17, 18, 22, 37, 104
 Bazaar, 62, 80-83
 Domestic and commercial consumption, 80-83
 Industry, 39, 49-50
 Institutions and services, 57, 59, 60
 Masaka scheme, 14, 15
 Masindi, 17, 20
 Matuga, 99, 100
 Maximum demand, 34, 35
 Mbale, 10, 14, 37
 Domestic and commercial consumption, 82-83
 Industry, 51-52
 Institutions and services, 59-60
 Transmission, 17, 18, 20, 22
- Mbarara, 22, 24
 Mbwa fly, 7, 8n.
 Mengo, 45, 56, 65, 68
 Mengo District, 17, 18, 99
 Meter duplication, 53, 62-63, 80-82
 Meter rents, 26, 30
 Ministry of Food and Agriculture, 1
 Missions, 12, 54
 Consumption, 99-100
 Jinja, 59

Index

- Kampala, 68, 71, 74
 Rural, 92, 94
 Tariff, 53
 Mityana, 17, 18, 19, 88, 90
 Mombasa, 6
 Mount Elgon—Pallissa scheme, 17, 18
 Mpigi, 17
 Mpumudde, 58, 59, 64
 Mukono, 18, 93
 Mulago, 55, 56, 69

 Naguru, 14, 59, 69
 Nairobi, 18
 Nakaseke, 97, 98, 99, 100
 Nakasero, 55, 56, 59, 65, 69
 Nakawa, 69
 Nakaweya, 95
 Namalere, 98
 Namirembe, 37, 68
 Namulonge, 13, 98, 99, 100
 Nile,
 Flow, 3, 5
 Nile Area, 14, 41, 44, 85
 Nile Waters Agreement 1929, 5
 Njeru, 13, 14, 25
 Nkenda, 20
 Northern Province, 12
 Ntinda, 64, 69, 84n.
 Nyendo, 50

 Oil milling,
 Elgon Area, 51-52
 Jinja, 43
 Kampala, 45, 47, 48-49
 Masaka, 50
 Rural, 85
 Victoria Area, 44
 Old Entebbe—Kampala Road scheme, 18, 20
 Onochoerciasis, 7
 Outer suburbs, 55, 56, 66, 71
 Owen Falls, 5
 Capacity, 3, 14, 34, 35
 Owen Falls Construction Company, 6
 Owen Falls dam, 14, 31, 78, 102
 Cost, 3, 6, 7, 15
 Labour, 6, 7
 Site, 6
 Technical report, 3, 8n.

 Pallissa, (see Mount Elgon—Pallissa scheme)
 Phosphate production, 51, 83
 Plywood manufacture, 39, 43, 103
 Population, 7n., 94, 96, 98, 100
 Density, 94, 97, 101
 Distribution, 11, 22
 Towns, 37, 83
 Port Bell, 17, 37, 45, 56, 69
 Printing, 48, 51, 90
 Public Works Department, 44, 45, 50, 51, 52, 69, 79

 Quota system, 39, 86, 95, 99

 Railway, 3, 5, 43, 47, 59, 102
 Revenue, 30, 31, 32, 33, 85, 98
 Rhodesia and Nyasaland, 35, 36n.
 Ripon Falls, 5, 6
 River blindness, 7
 Rural electrification, 11, 12, 14, 19, 85, 97, 103

 Salama Road, 71-73
 Sales department, 12, 15, 19, 49
 Sekanyonyi, 93, 96
 Semuto, 93, 94, 95, 96
 Serere, 18
 Settlement pattern, 11
 Seven Forks, 30
 Soap manufacture, 41, 45, 48, 49, 51, 52
 Soroti, 37
 Domestic and commercial consumption, 82-83
 Industry, 52
 Institutions and services, 59, 60
 Transmission, 15, 17, 20
 Special Industries, 10, 22, 30, 33 61n., 102
 Steel mill, 30, 103
 Street lighting, 28, 29, 56, 59, 71, 85, 104
 Sugar factories, 13, 39, 85, 88, 99
 Swahili, 49
 Swamps, 11, 93

 Tariff changes, 24, 26, 27
 Tariff structure, 15, 24, 25
 Tariffs,
 Domestic, 25, 26, 27, 28
 Electrode boilers, 26, 29, 38, 47
 Hotels and restaurants, 27, 28
 Industrial, 25, 27, 28, 29-30, 35, 38-39, 102
 Institutions, 28, 53-54
 Lighting, 25, 26, 27, 28, 29
 Power, 25, 27, 28, 29, 30, 38
 School Cooking, 27, 56, 59, 60, 61
 Tea factories, 85, 88
 Tea industry, 104
 Termites, 11
 Textile mill, 2, 14, 15, 17, 39, 43, 102, 103
 Thunderstorms, 10, 22n.
 Toro, 13
 Tororo, 28, 37
 Domestic and commercial consumption, 82-83
 Industry, 29, 51, 52n.
 Institutions and services, 59-60
 Transmission, 17, 18, 20, 22
 Trading centres, 12, 13
 Busoga, 17
 Domestic and commercial consumption, 19, 29, 92, 95
 Elgon Area, 92

Index

- Hoima Road Area, 94-96
Industry, 92, 94, 95, 99
North of Kampala, 97-101
- Uganda Broadcasting Corporation,
56
Uganda Development Corporation,
23n., 39, 52, 102
Uganda Development Plan 1946, 1,
2, 7n.
Uganda Electricity Board, 2, 3
Uganda Electricity Board Ordinance
1947, 3
Uganda Electricity Survey, 2, 3
Ugandanisation, 22
Urban housing, 63-65
- Victoria Area, 14, 44, 45, 57, 60, 86,
87, 90, 104
- Walukuba, 58, 79
Wandegaya, 68
Water works, 43, 44, 45, 50, 52, 104
Wayleaves, 10, 22n.
Western Province, 17, 30
Westlake, Sir Charles R., 2, 3, 7n.,
11, 12, 15, 22n., 36n.
Wobulenzi, 17, 92, 97, 98, 99, 100
Worthington, Dr. E. B., 1, 2, 7n.
Worthington plan, (see Uganda
Development Plan 1946)
- Zirobwe, 97, 100

East African Studies No. 27

OWEN FALLS

Electricity in a developing country

GAIL WILSON

Industrialization in the developing countries of Africa hinges on the provision of electric power. In this important study Gail Wilson has isolated the economic and geographical factors involved in the decision to harness the waters of the Nile to provide power for Uganda and Kenya through the Owen Falls project.

Shs 15/- in EAST AFRICA

The East African Studies series are published under the auspices of the Makerere Institute for Social Research.

Other volumes available:

- | | | |
|----|--|---------------|
| 20 | THE SUGAR INDUSTRY IN EAST AFRICA
Charles Frank | 15/- |
| 21 | DEVELOPMENT PLANNING IN EAST AFRICA
Paul G. Clark | 16/- |
| 22 | THE COMMON MARKET AND DEVELOPMENT IN EAST AFRICA
Philip Ndegwa | 15/- |
| 23 | TAXATION FOR DEVELOPMENT
Dharam Ghai | 20/- |
| 24 | THE CHANGING STRUCTURE OF A GANDA VILLAGE
Audrey Richards | 15/- |
| 25 | PLANNING EDUCATION FOR AFRICAN DEVELOPMENT
R. Jolly | (forthcoming) |
| 26 | THE SEAPORTS OF EAST AFRICA
B. S. Hoyle | 17/- |
| 28 | UGANDA'S MANUFACTURING SECTOR
E. J. Stoutjesdijk | (forthcoming) |
| 29 | THE DEVELOPMENT OF TRADE UNIONS IN UGANDA
Roger Scott | 27/- |



EAST AFRICAN PUBLISHING HOUSE

Koinange Street, P.O. Box 30571,
Nairobi, Kenya.

This work is licensed under a
Creative Commons
Attribution – NonCommercial - NoDerivs 3.0 Licence.

To view a copy of the licence please see:
<http://creativecommons.org/licenses/by-nc-nd/3.0/>