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THE POLITICS OF POWER IN AN ECONOMY IN TRANSITION:

ESKOM AND THE ELECTRIFICATION OF SOUTH AFRICA

1980 - 1995

Griffith Alan Veck

"A thesis submitted to the faculty of Commerce, University of the Witwatersrand, Johannesburg, in fulfilment of the requirements for the degree of Doctor of Philosophy".

Johannesburg, 2000.

ABSTRACT

This study traces the history of the programmes to electrify white-owned commercial farms on South Africa's borders and black households, schools and clinics in the period 1980-1995 by Eskom, South Africa's public electric utility. In particular the study investigates why Eskom undertook these programmes and their macro- and micro-economic impact on the South African economy.

The history of Eskom's attempt to assume responsibility for the management of Greater Soweto's electricity supply in the late eighties is also documented. Greater Soweto is South Africa's largest and most important black township, and is situated to the south-west of Johannesburg. The reasons for this initiative and its connection to Eskom's black household electrification programme is exposed.

The methodological approach to the study involves analysing political, economic and institutional intelligence concerning Eskom's electrification programmes gathered from primary and secondary literature sources and interviews with senior Eskom staff, and others, in qualitative, and, where appropriate, quantitative terms.

The results of this analysis suggest that politics played a crucial role in Eskom's decision to undertake these electrification programmes and that Eskom was an autonomous entity and lacked adequate regulatory oversight. With respect to the macro- and micro-economic benefits (GDP growth and job creation) arising from the programme to electrify black households between 1990 and 1995 these are shown to be very much smaller than those claimed by Eskom. The reasons for this difference are explored and explained in detail. It was also found that large scale cross-subsidisation was required to sustain both the farm and black household electrification programmes.

These findings required that matters of energy policy with respect to the sustainability of the programme to electrify black households be addressed. These policy issues are dealt with under three headings, financial issues, economic efficiency and equity. Finally suggestions are made for the way forward so that the electrification of black households in South Africa may be sustained.

KEY WORDS: SOUTH AFRICA, POLITICS, ESKOM, ELECTRIFICATION, REGULATION, FARMS, BLACK HOUSEHOLDS, ECONOMIC ANALYSIS.

DECLARATION

I declare that this thesis is my own unaided work. It is submitted for the degree of Doctor of Philosophy in the University of the Witwatersrand, Johannesburg. It has not been submitted before for any other degree or examination in any other university.

(Griffith ~~Alan~~ Veck)

10th day of April, 2000.

I dedicate this thesis

to the loving memory of my late parents

Hector and Annie Veck.

PREFACE AND ACKNOWLEDGEMENTS

This study attempts to close a gap that is perceived to exist in the literature on electricity supply in South Africa. The gap concerns the history of Eskom's programmes to electrify white-owned farms on the country's borders and black households, schools and clinics in the period 1980-1995. In the author's opinion the task requires more focus than general coverage; nevertheless, it is a big task, and would not have been possible without the input and advice of many people. The author himself spent close to a quarter of a century in the service of Eskom in various capacities ranging from Chief Civil Engineer to Chief Economic Consultant in the Corporation's Management Consulting Unit. This was good preparation so far as undertaking this study was concerned.

In acknowledging those who helped with this study the debt of gratitude preceding all others goes to my supervisors Professor K. A. (Katherine) Munro and Professor C. E. W. (Charles) Simpkins. Their direction and advice was crucial. I thank them for the many hours they spent with me discussing the project and attempting to improve the text. Professor Munro also endeavoured to teach me a few things about writing. Clearly any shortcomings in this area are mine alone. Above all, their kindness to a mature student is greatly appreciated.

My second debt is to the management of Eskom for allowing me unbridled access to the Corporation's various archives and to the management of the National Electricity Regulator who kindly supplied the photographs used in Appendix B.

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Dr Ian McRae:	Formerly Chief Executive Officer of Eskom and the National Electricity Regulator.
Dr John Maree:	Formerly Chairman of Eskom.
Mr Kevin Morgan:	Formerly Legal Advisor to Eskom and the National Electricity Regulator on Electrification issues.

Mr Johann du Plessis:	Formerly Group Regional Manager Eskom and General Manager the National Electricity Regulator.
Mr Douwe van Wyk:	Manager Eskom's National Electrification Planning Division (1992-1996).
Mrs Diane Theron:	Manager Eskom's National Electrification Planning Division (1996).
Mr Paul Maré :	Manager Eskom's National Electrification Planning Division (1996-1999).
Mr Koos Schoeman:	Formerly Financial Planning Manager Eskom's National Electrification Planning Division.
Mr Isaak van Gass:	Formerly Research Consultant (Social Sciences) Eskom's National Electrification Planning Division.
Mr Hendrick Barnard:	Formerly Manager Eskom's National Pricing Policy Department.
Mrs Shirley Salvoldi:	Manager Small Customer Pricing Eskom's National Pricing Policy Department.
Mr Kerry Blewett:	Senior Advisor Small Customers Pricing Eskom's National Pricing Policy Department.
Mr Jan de Beer:	Formerly Eskom's Executive Director Electrification and Industry Restructuring.
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GLOSSARY OF COMMON POWER GENERATING AND TRANSMISSION TERMS REFERRED TO IN THE TEXT

AVAILABILITY

The capacity of electricity generating plant available for use. Availability is usually expressed as a percentage of maximum generating capacity. The percentage availability may refer to a particular time or it may be the average taken over a period. Eskom's availability is usually measured as:

$$\frac{\text{Capacity hours available x 100}}{\text{Total capacity hours in year.}}$$

BASE LOAD STATION

A power station whose generating costs are low and which is, therefore, given load by day and night for long periods.

EFFICIENCY

The efficiency of the combined cycle of energy conversion is the ratio between the input of heat from the fuel burnt and the amount of heat in the units of electricity generated. Efficiency is usually expressed as a percentage.

WATT

The basic unit of electrical power.

KILOWATT – HOUR

The unit of electrical energy: one thousand Watts used for one hour (kWh).

MEGAWATT

One million Watts (MW).

Power stations sizes are usually denoted by the MW generated e.g., Eskom's largest station generates 3600 MW.

LOAD FACTOR

This is the ratio, usually expressed as a percentage, of the energy produced over a given period to the energy that could have been produced at full output over the same period. Eskom uses the following formula for ANNUAL STATION LOAD FACTOR:

$$\frac{\text{kWh sent out x 100}}{\text{Assigned sent out rating x hours in year}}$$

PEAK LOAD

The highest demand on the system for electric power during a period.

PEAK LOAD STATION

A high production cost power station which is only called upon to operate to assist with meeting an expected peak demand on the system, e.g., Eskom's Drakensberg Pumped Storage Station.

TRANSFORMER

Apparatus by which the voltage of an alternating current can be raised or lowered.

TURBO-GENERATOR

A machine to generate electricity driven by a steam turbine.

VOLT

The unit of electrical pressure.

KILO VOLT (kv)

One thousand volts. The unit used to characterise Eskom's electricity transmission system, e.g., an 11kv line.

LIST OF ABBREVIATIONS AND ACRONYMS USED IN THE TEXT

ANC	African National Congress
AWB	Afrikaner Weerstandsbeweging (Afrikaner Resistance Movement)
AZAPO	Azanian Peoples' Organisation
BEPA	Bureau of Economics and Policy Analysis: University of Pretoria
BOP	Balance of Payments
CODESA	Convention for a Democratic South Africa
COSATU	Congress of South African Trades Union
CP	Conservative Party
DBSA	Development Bank of Southern Africa
DTAs	Development Trust Areas
EPRET	Energy Policy Research and Training: University of Cape Town
ESI	Electricity Supply Industry
ETH	Eastern Transvaal Highveld
FNLA	National Forum for the Liberation of Angola
IFP	Inkata Freedom Party
NELF	National Electrification Forum
NER	National Electricity Regulator
NP	National Party
RDP	Reconstruction and Development Programme
RSC	Regional Services Council
SACP	South African Communist Party
SCC	Soweto City Council
SEP	Greater Soweto Electrification Project
SGTs	Self Governing Territories
SPD	Soweto Peoples' Delegation
SWAWEK	South West African Water and Electricity Corporation
TBVC	Transkei, Bophuthatswana, Venda and the Ciskei
TPA	Transvaal Provincial Authority
VFP	Victoria Falls Power Company
WHO	World Health Organisation

CHAPTER 1

INTRODUCTION TO THE STUDY

1.0 THE AIM OF THE STUDY

This study traces the history of Eskom's programmes to electrify 1) South Africa's white-owned commercial farms and 2) black, mainly urban, households in the period 1980 to 1995[1]. Emphasis will be placed on the changing political and economic events and institutional structures which nurtured and governed these programmes. The history of Eskom's attempt to take over the management of Greater Soweto's electricity supply and how this initiative is connected to the Corporation's black household electrification programme is also documented for the first time.

With respect to farm electrification the project's potential contribution to national security and political stability was considered to be a national priority. In the case of black households, the social contribution that electricity makes to people's quality of life is clearly important. The Department of Mineral and Energy Affairs (DMEA) in their first Annual Report (1980), and the late Mr Richard Castle, at an Eskom Commission meeting in 1980 (see Chapter 4), have commented thus on the first point and Eckert, Greyling and Van Seventer (1993, p.1) and Horvei and Dahl (1994, p.5) have commented thus on the latter point.

Political and economic events surrounding the farm electrification programme have not hitherto been documented at all. With respect to the stated knowledge surrounding the electrification of black households this has been described by Eckert, Greyling and Van Seventer (1993, p.2) to be in a state of flux. This is probably because the available historical information on black household electrification is largely uncoordinated, has seemingly been gathered without a central plan and much of it has been left without critical historical analysis and has simply been accepted as being correct. For example it is claimed that the programme to electrify black households promoted large-scale job creation and GDP growth in South Africa, (see the supplement to Eskom's 1991 Annual Report, "Eskom in Perspective"(p.17)). The magnitude of these claims are so large, however, that they can be called into question. Certain essential data, such as the cross-subsidisation involved in, not only the black household electrification programme but the farm electrification programme as well, have also only been superficially commented upon in the literature.

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[1] Eskom is South Africa's public electric utility.

By co-ordinating and analysing the extant historical data available and gathering supplementary data from interviews with people who were intimately associated with Eskom's programmes to electrify white-owned farms and black households in the period 1980-1995, this study aims to determine, not only the political dynamic underlying the programmes so that a casual interpretation of why Eskom undertook these programmes may be offered, but the impact of the programmes on the South African economy as well. With respect to the electrification of black households from 1990 this impact will be measured in terms of changes in Gross Domestic Product (GDP), the Balance of Payments (BOP), employment creation, micro-economic variables at industry level and concomitant socio-economic effects on health.

2.0 HYPOTHESES TO BE TESTED

From what has been said already in this introduction three hypotheses present themselves for testing:

1. Politics played a crucial role in Eskom's decision to electrify white-owned commercial farms and black households in South Africa between 1980 and 1995,the political forces obtruding rather than insinuating their presence;[2]
2. The job creating potential and the growth in GDP arising from Eskom's programme to electrify black households between 1990 and 1995 were grossly overstated by Eskom by orders of magnitude; and
3. Both the farm and household electrification programmes required large-scale cross-subsidisation in order for them to be sustainable.

The importance of these hypotheses rests on the fact that if they are correct, particularly with respect to 2 and 3 above, the proof will raise crucial questions on electrification policy and the efficient use of scarce resources so far as the continuance of Eskom's programme to electrify black households in South Africa is concerned.

The first hypothesis demands that a fourth and related hypothesis also be tested, namely that Eskom functioned without an effective mechanism to check its actions in the period 1980-1995

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[2] Concerning the political imperatives that conditioned Eskom's decision making with respect to the electrification of black households in South Africa it is further postulated that the government's reaction to unrest in black townships and the growing strength of white right wing opposition parties and the ANC's attitude to public utilities was of prime importance and that social justice and equity, as embodied in public utility regulatory theory, was not.

and was therefore able to make investment and other decisions which were dependent on changing political events rather than on the normative rules underpinning the regulation of public utilities. In short it is postulated that Eskom was an autonomous entity and lacked adequate regulatory oversight.

3.0 THE RATIONALE FOR UNDERTAKING THE STUDY

Whilst there may be a hoard of opinion surrounding the history of the electrification of white-owned commercial farms and black households in South Africa no definitive and organised historical study of the programmes exists. It is hoped that this study helps to fill that gap. Without such a study decision-makers are hampered in making intelligible the economic consequences of these past electrification initiatives and using knowledge of these consequences to guide future electrification policy formulation in South Africa. Furthermore, knowledge of the past consequences of money expenditure on electrification initiatives can influence the establishment of priorities for making funds available for the continuation of the electrification of black households in South Africa within national spending budgets.

Such priorities may be conditioned by statements such as "Energy is generally considered the basic need of the poor community. Electricity is a relatively cheap, safe and efficient form of energy. Moreover given the current South African socio-economic status (compared for example to other African countries) electricity seems to be the most appropriate energy carrier for the exploding urban population of South Africa. Its availability could affect small business development, educational development and upward mobility in the consumer market. The other relatively cheap alternatives of coal and fuelwood, although perhaps currently more affordable for the poor section of the population, would represent a serious environmental threat for the country in the longer term", (Spies, 1991, p.8). Such benefits are doubly attractive when it is remembered that the majority of black households in South Africa in 1980 relied on traditional sources of energy such as coal, fuelwood, paraffin and gas. According to Turvey and Anderson (1977, p.161) the costs involved in obtaining such fuels are high and the benefits obtained from their use are relatively small with electricity being far superior in quality to these alternatives.

The costs of obtaining the benefits of electrification cited above are also high, however. Therefore prior to policy-makers making decisions regarding the future of an on-going programme to electrify black households it is crucial to attempt to quantify the historical costs and benefits associated with the programme. It is also important to unearth the economic relationships and the political dynamics associated with the electrification process; e.g., how the programme impacted

the main macro-economic variables of the South African economy and the ability of consumers to pay for electricity as reflected in electricity usage patterns over time.

Whilst there are several entities involved in the electrification of black households in South Africa, this study concerns Eskom's electrification programme only. This is scarcely a limiting factor, however, as in the period 1990 – 1995 Eskom was the catalyst that drove the electrification of black households forward. An exception is the electrification of Greater Soweto, which was carried out under governmental direction. Eskom were, however, intimately connected with that programme through their attempts to take over the management of the township's electricity supply and through being required to provide most of the bulk electricity necessary to meet the townships needs. Eskom is also the largest generator of electricity in South Africa and generated some 98 per cent of the electricity used in the country in 1995, (various large local authorities generating the remaining 2 per cent). The main electricity transmission system in South Africa is also under the sole direction of Eskom and the Corporation is the only electricity supply entity able to raise the vast amounts of capital necessary for undertaking a nation-wide electrification programme. It is fair to say that without Eskom the electrification of the black households in South Africa on a national scale would be unthinkable.

4.0 THE PERIODISATION OF THE STUDY

The periodisation of this study occupies the 15 years from 1980 to 1995. The period was chosen for many important reasons which are briefly discussed below.

Prior to 1980 the domestic electrification process in South Africa was concerned with the provision of electricity to white (usually urban) areas. It was only from 1980 onwards that the electrification of the black households of the country got really under way. Furthermore, in 1980 the Department of Mineral and Energy Affairs (DMEA) was established forming a single ministry, which was responsible for energy policy in South Africa. Through the DMEA the government began to take a keener interest in Eskom's affairs.

The DMEA initially paid scant attention to household electrification but was concerned with the electrification of white commercial farms in remote border areas of South Africa, (DMEA Annual Report 1980). The electrification programme undertaken by Eskom from 1980 to 1990 was consequently concerned with the provision of power to these farms (see Eskom Annual Reports for the period) and it was therefore quite different in emphasis from the electrification programme that came after 1990.

The eighties saw Eskom continue with a massive (even by world standards) power station construction programme which had been started in the seventies and which would eventually result in the Corporation accumulating large debts and having an excess of electricity generation capacity. This excess capacity would ironically enable their programme to electrify black households in South Africa to become a reality after 1990. Eskom's economic performance in the early eighties also lead to the government's Commission of Inquiry into Electricity Supply in the Republic of South Africa, the so-called de Villiers Commission. Many far reaching institutional changes to Eskom resulted from this Commission and these greatly influenced the way Eskom thereafter approached the electrification of black households.

By the mid, to the late 1980's the electricity supply industry (ESI) in South Africa had also become fragmented. This fragmentation was to cause serious organisation problems for the electrification of black households. The fragmentation of the ESI was as follows:

a) Eskom became the virtual monopoly generator of electricity, had sole control of the national electricity transmission grid, was supplying bulk electricity to a large number of municipalities and to the black homelands and was also supplying most large users of electricity direct, i.e., industry and mining, as well as supplying approximately 50 000 domestic consumers around the country;

b) The Transkei, Bophuthatswana, Venda and the Ciskei (the TBVC states) and Self Governing Territories (SGT's) were in the main distributing electricity, bought in bulk from Eskom directly to a very small number of consumers in their territories; and

c) Approximately 450 (mainly white) local authorities were distributing electricity directly within their areas. They too were mostly buying electricity in bulk from Eskom.

The result of this fragmentation was that industrial, commercial and mining consumers were all well served with electricity, almost all white households and many Indian and coloured households were also receiving electricity. Black households were very poorly served with electricity, however. It is not difficult to see the results of Apartheid planning and social engineering when electricity supply in South Africa is examined in the1980s.

Important political events also occurred throughout the period from 1980 to 1995. For example the Black Local Authorities Act of 1982, which created local government structures for black urban areas, was passed. Such attempts at reform by the government were fought on an ideological basis by the Conservative Party. There was also increasing attempts by the ANC to

disrupt the South African economy. The mid to late 80's also saw the intensification of the liberation struggle by black communities. One strategy of which was the boycott of payments for services (including electricity in Greater Soweto) in black townships. These events had the effect of curtailing the electrification of black households between 1980 and 1990.

From 1989 onwards, after F.W. de Klerk had replaced P.W. Botha as President, the government once more introduced political reform into South Africa and the ANC was unbanned. Eskom also proceeded with their so-called "Electricity for All" initiative. During the period 1992 to 1995 the ANC also began to get actively involved in the electrification of black households. In an effort to speed up the process they organised a national meeting on electrification in Cape Town. The result of this meeting was the formation of the National Electrification Forum (NELF). During the latter part of 1994 the NELF reached agreement on some important recommendations concerning the reorganisation of the ESI which were accepted by the government. A particularly important development in this respect was the establishment of the National Electricity Regulator (NER), an institution that would have an important bearing on Eskom's programme to electrify black households and the regulation of the fragmented South African ESI.

The period starting in 1980 right up to the elections of 1994 which brought the ANC to power in South Africa, was then one of great political economic and institutional change, which materially influenced the electrification of white-owned commercial farms and black households. The periodisation of this study is, however extended to the end of 1995, one year into the ANC's administration, thus allowing the impact of the ANC's Reconstruction and Development Programme (RDP) on Eskom's programme to electrify black households to be gauged.

5.0 METHODOLOGICAL APPROACH TO THE STUDY

The methodological approach to the study involves analysing the political, economic and institutional intelligence gathered on Eskom's electrification programmes from 1980 to 1995 in qualitative, and, where appropriate, quantitative terms. There are therefore two units of study; the South African political economy and the South African electricity supply industry as embodied in the national electric utility Eskom.

So that the most objective quantitative research results are obtained the data used for estimating the economic impact of Eskom's black household electrification programme between 1990-1995 will be disaggregated into primary and secondary effects. The primary effects result from expenditures on the electrification programme by Eskom. The secondary effects are those induced

by the programme. For example in the form of altered household expenditure patterns, such as the purchase of electrical appliances. These effects are further disaggregated into the direct, indirect and induced impacts on the South African economy. The direct impacts may be regarded as the first-round impacts on budgeted expenditure by industry and households. The indirect and induced impacts are then the second-round impacts that are determined from multiplier analysis. The analyses undertaken in this study uses at all times historical data gathered for the period 1990 to 1995. As noted earlier the following economic indicators in particular are examined:

a) Gross Domestic Product (GDP): Estimating the effect of Eskom's black household electrification programme on South Africa's GDP allows the electricity usage/national wealth creating pathway of the country to be gauged. The assumption being that a country's standard of living is related to the electricity used per capita/GDP ratio. Meinel and Meinel (1979, p.13) have pointed out in this regard that consumers that have low per capita energy use show high income inequalities. This will be shown to be the case with respect to newly connected black electricity consumers in South Africa;

b) The Balance Of Payments: The effect of Eskom's black household electrification programme on the South African Current Account of the Balance of Payments will show how leakages on imported goods such as electrical appliances impacted the South African economy; and

c) Employment Creation: Employment creation is one of the prime goals of the South African government. It is important therefore to focus on the comparative job creating potential of Eskom's black household electrification programme, both directly and in terms of the associated indirect and induced impacts of the programme in historical terms. This allows the real, rather than the presumed, job creating potential of future electrification initiatives to be gauged.

Input-Output analysis is used to determine how the macro-economic variables listed above reacted to Eskom's black household electrification programme. This approach was chosen as being the most convenient and transparent for dealing with the interdependence of the various sectors of the economy impacted by the programme.

6.0 AVAILABILITY OF DATA

Certain historical data concerning electricity supply in South Africa and Eskom's electrification programmes was available from primary and secondary literature sources. Primary literature being composed of reports and papers describing original pieces of research (some of which were

commissioned by Eskom itself) yielding information not found in the public domain. For example, consumer response surveys covering wide areas of South Africa on induced household expenditure patterns resulting from Eskom's programme to electrify black households, also information pertaining to the industrial sectors impacted by this programme. In this regard the electrical appliance manufacturing sector and the construction sector of the South African economy are of prime importance. Primary literature also yielded data on the financial, economic and technical aspects of Eskom's electrification programmes. The maiden source of the primary literature used in this study was Eskom's Electrification Archive, the Pricing Policy Archive and the Heritage Archive.[3] Information supplied by secondary literature was also used in the attempt made to unravel the political dynamic underpinning Eskom's electrification programmes. Such literature also provided international data on electrification which would be used for comparative purposes; it also provided general economic information of use in the study. The secondary literature referred to in this study was, unlike the primary data used, composed of published works readily accessible in the public domain. Amongst the secondary literature examined were two previous studies of Eskom's history and a considerable body of literature on the regulation and management of public utilities. It will be appropriate to briefly review this literature. The reasons for this, and the review itself is presented in the following chapter.

In addition to this extant data and as noted in 1.0 above, an investigative effort involving interviews with senior personnel (some past, some present) of Eskom, the NER and the Transvaal Provincial Authority (TPA) was necessary. These interviews yielded data that supplemented the extant data found in the primary literature on Eskom's electrification programmes and filled in information gaps where these existed. The gaps were numerous because events surrounding Eskom's electrification programmes were not always written down but existed in the minds of those connected with the programmes. Cross-referencing of the facts so gathered was therefore essential and was carried out whenever possible hence care has been taken that the value of oral tradition is not over emphasised in this study. These interviews also enabled a composite picture of how Eskom's electrification programmes were organised and managed and how politics influenced these programmes to emerge; a picture that would otherwise have remained shrouded. The interviews were always conducted face-to-face rather than by questionnaires or via the post. The former method was considered superior to the others because the ensuing discussions could explore important questions relating to Eskom's electrification programmes in greater depth than would otherwise have been the case. Furthermore, after several interviews some trust was developed between interviewer and respondent, which resulted sometimes in frank comment

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[3] It should be noted that these archives are not particularly well catalogued or maintained.

being made about interpersonal relations within Eskom which affected the programme to electrify black households in particular.

So far as exercising the Input-Output (I-O) analysis referred to above was concerned sufficient expenditure data was found in primary literature sources. With respect to the I-O tables themselves the 1993 South African National tables were used to calculate the required multipliers.

7.0 THE SCHEMA OF THE STUDY

In addition to this introductory chapter, Chapter 1, there are nine other chapters to this study. The second chapter reviews some literature of importance to the study. The third chapter provides background information to the study and briefly reviews the development of electricity supply in South Africa from its inception in 1882 to 1980, the start of the periodisation of this study. The establishment of Eskom will be covered and the utility's importance in the South African energy economy will be explained.

Chapters 4 and 5 trace the history of the electrification of white-owned commercial farms on South Africa's borders and Eskom's first tentative attempts at electrifying black households in the period 1980 to 1990. The political dynamic underlying why the farm electrification programme was undertaken and why the electrification of black households in South Africa was curtailed during this period will be examined in detail in Chapter 4. The magnitude of both these programmes in terms of farms electrified, the costs involved and the extent of Eskom's programme to electrify black households will be dealt with in Chapter 5.

Chapter 6 examines the history of the electrification of Greater Soweto between 1980 and 1986 and describes Eskom's attempt to assume responsibility for the management of the supply of power to this township from 1985 onwards after the advent of the Black Local Authorities Act. The reasons why Eskom made this attempt and the political and economic problems involved will be made clear. The costs to the South African taxpayers of electrifying Greater Soweto will also be analysed.

Chapters 7,8and 9 examine Eskom's programme to electrify black households in South Africa in the period 1990 to 1995. Again the political dynamic behind this initiative and the magnitude of the programme will be examined. The costs associated with the venture to South African taxpayers, in the form of electricity users, will also be estimated. A comprehensive historical analysis of the macro-economic benefits of the programme is also presented and the results of this analysis are compared with the benefits that popular opinion thought would arise from the programme. The micro-economic impact of the programme on particular sectors of the South African economy is also analysed.

Chapter 10 concludes the study and includes a discussion on matters of energy policy and regulation arising from the results of the study. A way forward for sustaining the electrification of black households in South Africa and regulating the South African ESI is also suggested.

The study also contains two Appendices. The first of these briefly describes I-O analysis and gives the multipliers derived from the 1993 National I-O tables which were used to estimate the macro- and micro-economic benefits arising from the electrification of black households from 1990. The second appendix presents some photographs of newly electrified areas and electrification equipment.

Whilst the electrification of white-owned commercial farms, Eskom's attempt to take over the management of Greater Soweto's electricity supply and Eskom's national programme to electrify black households in South Africa from 1990 may appear disparate they are in fact not so. They are interrelated and interconnected one to the other and present a holistic picture of the electrification process in the period 1980 to 1995. The connection between them is the lessons Eskom learnt in electrifying white-owned commercial farms and in the attempt Eskom made to take over the management of Greater Soweto's electricity supply which were put to good use in Eskom's so-called "Electricity for All" initiative after 1990.

With respect to farm electrification Eskom had to overcome problems of manpower and capital shortages and the logistics of physically connecting widespread rural areas to the national grid in the most efficient way. Furthermore, in the late 80's rural tariffs were examined critically by Eskom and the true costs of electrifying rural areas began to be understood. In their attempt to take over the management of Greater Soweto's electricity supply in the late 80's Eskom, for the first time, had to deal with non-governmental black entities such as the Soweto Peoples Delegation. Problems of the politicisation of electricity supply to black townships therefore presented themselves. Eskom also realised that pure engineering solutions to electricity supply in

black townships would not work and that the social dimensions of such supply had to be taken into account as well.

Overcoming these problems conditioned the approach made by Eskom's management to their national electrification programme from 1990 onwards and allowed the Corporation to successfully electrify nearly one million black households, farm dwellings and various rural schools and clinics in the period 1990 to 1995.

CHAPTER 2

LITERATURE REVIEW: HISTORIES OF ESKOM AND THE REGULATION AND MANAGEMENT OF PUBLIC UTILITIES

1.0 INTRODUCTION

The purpose of this chapter is to very briefly review two recent histories of Eskom and literature on the regulation and management of public utilities. Reviewing earlier historical studies of Eskom will enable the following questions to be answered 1) How does the present study relate to these earlier studies? and 2) what does the present study add to the stated knowledge on Eskom's history? Reviewing the literature on regulation will expose the hypotheses underlying the normative theory of public utility regulation and identify the principles which should ideally have been used to regulate and manage Eskom. This review will therefore provide a basis for judging how efficient the mechanisms that were in place for regulating Eskom up to the formation of the NER in 1994 really were. This will allow a conclusion to be reached concerning whether the fourth hypothesis postulated in Chapter 1 of this study is correct or not.

2.0 PREVIOUS HISTORIES OF ESKOM

Two definitive studies of Eskom's history exist; one by Renfrew Christie (1984) and one by Nancy L. Clark (1994); these will be reviewed in turn.

2.1 The Christie Study

The Christie Study, Electricity and Class in South Africa (1984), was based on that author's doctoral thesis of 1978 entitled The Electrification of South Africa 1905 – 1975. The book examines the history of electricity policies of the South African government and industrialists during that period. Christie postulated that electricity was extensively used by the state to power the particular interests of apartheid and therefore served the interests of the state and the owners of property; his study purports to show how this came about.

Christie's study therefore sets out to show that electricity was not used in South Africa to serve the common good but rather to serve the particular interests of a certain class of society, the white minority, as opposed to the black majority. Christie mentions in this regard that electricity was used by the capitalist state and by the owners of property to serve their own particular interests of "control and capital accumulation" (p. 359). Christie further contends that :"electrical engineers and their controllers" (p. 359) (presumably he means the staff and management of the Victoria

Falls Power Company, the first monopoly supplier of electricity in South Africa, and Eskom and the South African government) tried to increase profitability in South African industry by adopting labour-saving mechanical devices to reduce the labour required in productive processes. The resulting created wealth accrued to the owners of property not the non-owners and particularly not the black 'working and peasant class of South Africa' " (p. viii).

Christie goes on to say that the technical achievements resulting from electrification were massive (p. 361) but its political and economic ones were equally so. This statement seems to dilute the strength of Christie's original hypothesis that only capitalist and industrial (white) society benefited from the electrification of South Africa between 1905 and 1975.

Christie's study differs from the present study in a number of ways. Firstly the time period is different, the present study covers the period 1980-1995 as opposed to the 1905-1975 period studied by Christie. The present study follows on then from just after where Christie left off; it therefore adds another chapter to the history of Eskom. Secondly the present study concentrates on a narrower field of research than does Christie's study , being concerned with Eskom's farm and black-household electrification programmes only and not with the larger socio-political concerns of state electrification covered by Christie[4].

Christie's study leaned heavily on material in the archives of the Prime Minister of South Africa and the private papers of Bernard Price the resident general manager in South Africa for the Victoria Falls Power Company.

2.2 The Clark Study

The second history of Eskom, Nancy L. Clark's Manufacturing Apartheid: State Corporations in South Africa (1994), deals with the history of state enterprises and their role in protecting the apartheid government. The motivation for this study according to Clark was that such corporations had "received scant scholarly attention" (p. xi) with scholars apparently giving "little thought to the state corporations briefly describing them only as the cornerstone of national capitalist development" (p. xi).

The state corporations studied by Clark included Eskom and covered the period 1920 - 1960 in detail. Some brief coverage (about 3 pages of text) is given to the period from 1960 to 1988. A chapter on the privatisation of state enterprises (chapter 7 pp. 164-169) gives some coverage of this issue and Eskom in the period 1970 - 1988 in general terms only. Like Christie's work Clark's

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[4] Certain conclusions drawn by Christie from his study will be seen to parallel conclusions drawn from the present study. These conclusions are documented in Chapter 10, the final chapter of this study.

study also centres on archival research; Clark used the Pretoria Central Archive and the Standard Bank Archive in Johannesburg. The present study was likewise centred on archival material.

Clark's research reveals that state corporations, rather than embodying narrow political interests operated on a complex series of political and economic planes[5]. Clark concluded that state corporations were ever changing, they did not operate on predetermined objectives and were seriously affected by the personalities of the men who ran them[6]. Clark attempted to answer questions such as why the state institutions were established in the first place and how their operations changed in response to political and economic pressures[7].

The present study attempts to complement both the earlier studies into the history of Eskom. The period researched here is later than covered by both Christie and Clark and brings the stated knowledge concerning Eskom's history closer to the present day. It is true that Chapter 2 of the present study does briefly cover the period examined by both Christie and Clark; it does however emphasise issues different from those covered by these two authors and is primarily concerned with marshalling background material for the present study. The field of research undertaken in this study is also much narrower (and the time span much shorter) than that covered by Christie and Clark. Certain questions concerning Eskom's management practices and motives run like a theme through the three studies, however.

3.0 REGULATION AND THE MANAGEMENT OF PUBLIC UTILITIES

The literature on the regulation and management of public utilities such as Eskom is vast; there are numerous specialised book-length publications and countless articles on the subjects by managers and public utility regulatory theorists and empiricists. This section, for the reasons already stated, reviews what a small selection of that literature has to say on certain topics which are considered of importance to the present study so far as the regulation of Eskom is concerned. The discussion is divided into two parts, a general discussion conducted around non-pricing issues and a more specialised discussion on public utility rate fixing. The general discussion is undertaken first.

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5 The present study tends to confirm that that was also the situation with Eskom.

6 This study confirms that this was also the case with Eskom.

7 This study also attempts to address this question, particularly with the changing nature of Eskom in the period 1980-1995.

3.1 General Discussion

3.1.1 Public utilities and regulation

The literature on regulation recognises that some industries, commonly called public utilities, in which competition is not fully effective, must be regulated by government to protect the public interest, (Phillips, 1988, p. 3); the literature also notes that "the term public utility is one of popular usage rather than precise definition", (Bonbright 1961, p. 3). Public utilities are, however, easily recognised and electric utilities are traditional examples of such enterprises. The question of whether a company is a public utility or not is, according to Crew and Kleindorfer (1980), essentially technical though there is a body of legal and historical precedent to support the views that an industry must be of some public or social significance to be considered a public utility. The technical features that define a public utility are, according to Crew and Kleindorfer (1980), those that give rise to economies of scale (this topic will be discussed again presently)[8], and lead to these entities being termed natural monopolies.

The traditional approach to defining a natural monopoly is that of a single product industry. Natural electric monopolies are, however, multi-product industries; as pointed out by Webb and Ricketts (1980, p. 74) they supply high- and low-voltage electricity to a variety of different consumers. Baumol (1977, p. 809) has suggested that in such a case a natural monopoly has the following characteristic "the cost of the sum of its output vectors is less than the sum of the costs of producing them separately". Baumol argues then that in defining a natural monopoly this is the characteristic sought, since it implies that every output combination can always be more cheaply produced by a single firm than by several competing firms. Simply put in mathematical terms for a multi-product cost function C(x) in a set of products N = (1, ... , n), if for any m output vectors $x^1, \ldots, x^m$ of the goods in N then $C(x^1 + \ldots + x^m) < C(x^1) + \ldots + C(x^m)$.

The literature also makes clear that public utilities differ in several respects from other enterprises in the economy and tend to operate more efficiently as natural monopolies (Phillips, 1988), but as Kaysen and Turner (1959, pp. 48-49) point out if this monopoly power is to be controlled for the general welfare it must be regulated[9]. In its common usage then the term public utility refers to a diverse group of businesses which should ideally be subjected to regulation by the state. One of the tasks of this study is to show whether Eskom was adequately regulated or not.

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[8] The point being made by Crew and Kleindorfer (1980) with respect to economies of scale is that there are clearly cost-savings in having, for example, in the case of electric utilities, one large supplier of power to a particular area as opposed to several small suppliers that duplicate power generation and transmission facilities.

[9] There are dissenters to regulation, however. Grey (1940) for example, argued that it was fanciful to believe that the power of monopolies can be harnessed to the public interest by the imposition of regulation (in the case of Eskom it will be shown that Gray's argument has some force).

What makes the public utility regulator's task difficult, however, is information constraints. Laffont and Tirole (1992, p. 1) suggest that information constraints "limit the efficiency of control of industries by government agencies". Two types of information constraint are usually specified in the literature on regulation, these are termed "moral hazard", which refers to the endogenous variables that are not observed by the regulator and "adverse selection", which refers to exogenous variables which arise when a public utility has more information than the regulator. In this respect Laffont and Tirole (1993, p. 2) have pointed out that the managers of electric utilities invariably know more about their business than do those charged with regulating the utility. Information constraints therefore inevitably mean a loss of control by the regulator over the public utility. This situation will be shown to be the case with Eskom. Whilst information constraints have always been important from the very beginnings of regulation, the literature emphasises that it is only in the last decade or so that such constraints have been analysed explicitly with regard to public utility regulation. The importance of information constraints is demonstrated by the prominence given to the subject in Laffont and Tirole's (1993) book on regulation. Armstrong, Cowan and Vickers (1993, p. 37) also assert that firms are in reality much better informed about many aspects of running their business than is the regulator; the problem facing regulators therefore is to design regulatory regimes that motivate the firm to use its superior information for the public good[10].

3.1.2 The importance of public utilities

One obvious important characteristic of public utilities is the services they provide to the economy in general and to individual consumers in particular. Eskom's black household electrification programme is a potent example of such a service. Phillips (1988, p. 9), commenting on the importance or electric public utilities, states that, between 1920 and 1970 the use of electrical energy doubled every ten years in the USA. The same phenomenon can be observed in South Africa. The contribution made by electricity to economic growth in South Africa will be discussed in the following chapter. The literature is clear that the economic significance of public utilities adds weight to the hypothesis that such enterprises should be regulated.

3.1.3 Environmental change, public utilities and regulation

The literature on regulation asserts that managers of public utilities have, since 1970, had to deal with a changing economic environment, the reasons for which are various. For example, prior to 1970 the rate of inflation as well as interest rates were generally low and stable world-wide (Phillips, 1988, p.11); with the oil crises of the 1970s this economic situation changed

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[10] This will be an important task facing the South African National Electricity Regulator, which was established in 1994, in the years ahead.

dramatically, however. Because the regulatory process is geared to the prevailing economic environment, Perry (1981, p. 5) notes that the task of regulators, to ensure that the benefits of progressively higher efficiencies achieved by the managers of public utilities are passed to consumers, became more difficult in the changing economic environment after 1970 as costs of production rose.

Inevitably during this period tariffs increased because of this situation and in South Africa and elsewhere there was public opposition to these increases (see Chapter 4). Gormley (1983, Chapter 2) gives a description of the situation in the USA and Joskow (1974) commented that the 1970s were years of change and experiment for public utility managers and regulators alike. Norgaard and Riley (1983) state that difficulties with public utility regulation arose in the 1970s because the regulatory process was geared to the past with regard to the management and pricing methodologies used. This, as will be shown, was the case with the regulation of Eskom.

Phillips (1988, p. 20) points out that after 1970 the issues brought before regulators in the USA shifted in emphasis from a utility's total revenue requirements to its tariff design, this also became an issue in South Africa as will be shown. Phillips goes on to say that prior to 1970 public utility tariffs were developed by the utilities themselves, especially by their engineers, and that the theoretical basis for their tariffs was often difficult to discern[11].

3.1.4 Economic factors of regulation

Phillips (1988, p. 43) asserts that regulation is an economic, legislative and legal concept. The legislature in the USA, for example, denotes which industries to regulate, the decision being based upon an industry's economic characteristics, prevailing social philosophies and political considerations. In South Africa, it will be shown that social philosophies incorporated in the politics of apartheid were major influences in the way Eskom operated and was regulated.

Kaysen and Turner (1959) have suggested that regulation may be necessary when competition cannot exist for long and an unregulated market will not produce competitive results. Such a situation can arise from an economic viewpoint, due to the capacity of one firm to supply the demands of the market. Where such a situation arises ruinous competition may result if more than one firm operates in that market. This is why one electric utility (a natural monopoly) usually serves an entire market as is the case with Eskom in South Africa.

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[11] As will be shown this was certainly the case with Eskom (see Chapter 3) and was one of the reasons for dissent by electricity consumers in South Africa.

In the literature regulation is predicated in some instances on the idea that decreasing costs can be achieved by a monopolist exhibiting economies of scale, being allowed to operate in a particular market, (Phillips, 1988, p. 47). This was an issue in Eskom's take-over of the Victoria Falls Power Company in 1948. There are, however, as pointed out by Stelzer (1980), three types of decreasing costs, short-run, long-run and those which reflect technological progress. Stelzer asserts that long-run decreasing costs provide a justification for the regulation of public utilities since short-run decreasing costs may be found in many industries and therefore they do not provide a rationale for detailed regulation. Eskom, like many public utilities, is probably characterised by long-run decreasing costs and is therefore a prime candidate for detailed regulation. This is because long-run decreasing costs arise from the fact that at any point in time, the unit costs of adding capacity declines as the size of the additional production facility increases. Eskom always adhered to the philosophy of increasing the size of their electric power generating sets over time, as will be shown when the Corporation's generation expansion programme from 1970 is discussed in Chapter 3.

When economies of scale permit only one supplier in a market the public is not assured of obtaining the benefits accruing from decreasing costs however, the monopolist may even raise prices. Phillips (1988) asserts therefore that the presence of a monopolist calls for at least some degree of regulation. He specifically points out that significant permanent economies of scale, indicating large-scale monopolistic operations appear to be found especially in the generation and transmission of electric power, and electric utilities should therefore be regulated.

3.1.5 Non-economic factors of regulation

Non-economic factors are also important in shaping public policy decision making and the regulation of public utilities. With respect to such factors Phillips (1988 p. 53) comments on what is perhaps the most important of these factors, the strict control of entry into the public sector. Such control is used for two main purposes, namely to allow only suitably qualified firms into the market, and to protect the existing firms already in the market[12]. Anderson (1980, pp. 23-24) suggests that this form of regulation i.e., entry into a market, is justified on the grounds that it protects consumers and provides them with a platform for airing grievances and controlling the social and political power of monopolists where essential services such as the supply of electricity is concerned. With respect to Eskom, this form of regulation did not in fact protect customers from high rises in electricity tariffs in the early 1980s (see Chapter 4).

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[12] The National Electricity Regulator of South Africa, as will be shown, is currently having difficulty with this aspect of regulation.

3.1.6 The origin of regulation

Crew and Kleindorfer (1988, p. 93) suggest that "once the notion of overwhelming scale economies and therefore of a natural monopoly is accepted, a seemingly clear explanation and justification of monopoly regulation appears to be readily available in terms of simple neo-classical analysis". The origins of monopoly regulation can be discerned then, as stemming from a simple trade-off between market power and scale economies, which suggests an ongoing concern with economic efficiency as the basis for public utility regulation. Glaeser (1957, p. 196) argues, however, that the practice of regulation did not develop along the lines of economic efficiency but rather that the prime concern was equity and a notion of fairness. He mentions that the "regulation of private industry has been attempted by government from the earliest times, and all attempts at such regulation owed much to a very ancient ideal of social justice, which, as applied to the economic life of the early Church fathers, became their very famous doctrine of *justum pretium* or 'just price' ".

The literature on regulation suggests then that the underlying hypotheses which explain the origin of regulation can be traced to the desire for economic efficiency, fair prices, social justice and equity[13] rather than economic efficiency per se. The pricing structure of public utility outputs in terms of the literature on regulation will be discussed below.

3.1.7 The goals of public utility regulation

According to Lewis (1966, p. 219) the task of public utilities is to provide the public with as much of a product and as good a service as the public want and is willing to pay for[14] and that the principal goal of public utility regulation, within the limits set by its authority and its capacity, is to translate this task into operating terms and see that it is carried out. Phillips (1988, pp. 164-165) observes that in carrying out this goal regulators have a) sought to prevent excess monopoly profits and inequitable price discrimination among different groups of consumers, b) sought to ensure that public utilities continue to develop and expand within consumer demand, c) sought to provide services to the maximum number of consumers, d) sought to develop rate structures (tariffs) which promote growth and development such as the provision of electricity to rural areas, and e) concerned themselves with safety issues, such as those attached to the generation of electricity by nuclear means, and the efficiency of public utility managers and staff. Shepherd and Gies (1968) add that an important economic goal of regulation is to ensure the efficient allocation

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[13] It will be shown that with respect to the provision of electricity in South Africa equity was narrowly defined up to 1990 along apartheid political lines and that economic efficiency and growth objectives were the prime concerns of regulation so far as Eskom was concerned.

[14] This has always been considered by Eskom's management as one of the Corporation's prime functions; within of course the political constraints of apartheid politics.

of scarce resources. This goal would suggest the adoption of a marginal costing regime for the output of a public utility. This topic will be discussed in more detail below.

Other goals of public utility regulation which are mentioned in the literature and are considered important by regulators are, social (as opposed to economic) objectives. Social objectives are sometimes difficult to define, however. Bonbright (1961, p. 110) commenting on these objectives refers to the importance of tariff structures which make the supply of utility services responsive to social needs, e.g., tariff structures that make the provision of electricity to black households in South Africa affordable.

Averch and Johnson (1962) assert that public utilities are not isolated from the rest of the economy, an assertion supported by Phillips (1988, p.62) who points out that public utilities "have always operated within the framework of a competitive system in providing their customers with products and efficient service. They must therefore obtain capital, labour and materials in competition with unregulated industries[15]". Phillips (1988) goes on to say that the goals of regulation should, as a consequence of this competition also seek to encompass the encouragement of new methods, improved quality, increased efficiency, cost cutting and the development of new markets.

3.1.8 The rationale for regulation

This section looks briefly at four theories of the rationale of public utility regulation commonly cited in the literature.

a) Public Interest Theory

This theory is the oldest theory of regulation and Mitnick (1980) suggests that it is more often "implied rather than articulated". The theory holds that public utilities are regulated to protect consumers from abuse arising from market imperfections as a consequence of a public utility's monopolistic power. In this theory regulation is therefore purported to be a legal substitute for competition in a particular market. Posner (1974) asserts that the theory is based upon two assumptions, the first being that markets tend to operate in a very inefficient way if left alone, the second being that the transaction costs of regulation are virtually zero[16]. Because regulation is not

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[15] It will be shown that Eskom was burdened with such competition during the decade 1980-1990 in particular with respect to the resources needed by the Corporation to carry out the electrification of white-owned commercial farms in South Africa. Eskom's regulatory mechanism, the Electricity Act of 1922, as amended, was of little use to them in this endeavour.

[16] This second assumption is, however, wrong. Regulation is not costless either in terms of money or the allocation of scarce resources.

costless there may be an inadequate staff complement with respect to the regulation of public utilities; certainly with respect to Eskom the numbers of people charged with the regulation of the Corporation will be shown to have been few in number. The term "public interest" itself is, however, a rather vague term. Crew and Kleindorfer (1998, p. 105) comment on this and suggest that monopolistic regulation, with respect to public utilities, is a response to public outcry, or demands by the public to correct inequitable or inefficient practices by a utility. It will be shown that after 1980 there were several instances where consumers complained about Eskom's tariff structures rather suggesting that the regulation of the Corporation was inadequate with respect to the public interest.

b) Captive Theory

Captive theory, according to Crew and Kleindorfer (1988, p. 175) holds that regulating bodies, which are primarily established to protect consumers as per public interest theory, are eventually captured by the industry they are supposed to regulate, i.e., they become tools of public utilities themselves. It will be shown that because of Eskom's dominance in the South African Electricity Supply Industry the Corporation to all intents and purposes effectively captured the bodies put in place to regulate the Corporation. Posner (1974) suggests that capture theory can be divided into two classes, the economic theory of regulation and the political scientists' formulation. The political scientists' formulation draws attention to the role of pressure groups in capturing the regulatory process. It will be shown that the white commercial farmers in South Africa exerted such pressure on Eskom via the government that the Corporation's mandate to operate at neither a profit or a loss was put in jeopardy, i.e., one of the rules regulating Eskom between 1980 and 1990 had no effect so far as the electrification of white-owned commercial farms was concerned, see Chapter 5.

c) Interest Group Theory

Interest group theory depends on the hypothesis that regulation, and the behaviour of regulators themselves, is dependent on the desires of interest groups, and the agendas of political parties. Interest group theory, according to Trueman (1971), focuses on the formation of mergers between the regulated industry and consumer groups, the former obtaining some greater profits and the latter obtaining lower prices than they would have done in an unregulated market, these benefits being obtained at the expense of unorganised consumer groups. In South Africa, and as mentioned already, white commercial farmer organised themselves into a powerful consumer group. Support for the farmers coming from a government that wanted the farmer's vote in the decade 1980-1990. Also as previously mentioned the type of consumer behaviour exhibited in interest group theory penalises certain consumers on occasions and therefore regulation posited on this theory does little

to enhance broad social welfare policies. Regulators can be seen in the case of interest group regulation as mere arbitrators between various special interest groups and the public utility.

d) Equity-Stability Theory

This theory tries to explain the need for regulation in terms of replacing the market with institutional arrangements which better promote equity, i.e., fairness and social welfare improvement. Regulation under this theory places great emphasis on equity to the detriment of economic efficiency where this impinges on equity considerations. The Equity-Stability theory is therefore concerned with social objectives and stability as opposed to economic efficiency objectives and change. Equity and fairness are, however, judgmental issues and regulation based upon this theory could send wrong economic signals to consumers with respect to tariff structuring. This theory does not seem to have had great influence with respect to the regulation of Eskom and its dealings with South African Society as a whole.

From the brief descriptions given above it is clear that these theories, each of which attempt to explain the rationale of public utility regulation, have common areas of overlap and some of Eskom's actions, as will be shown in this study, can be explained with reference to them.

3.1.9 The Averch-Johnson effect[17]

This section briefly comments on what Crew and Kleindorfer (1988, p. 121) describe as one of the major issues in the economic theory of regulation: the Averch-Johnson effect.. Crew and Kleindorfer (1988) assert that the Averch-Johnson effect has received "more attention in the recent literature on the economic theory of regulation than any other topic".

Averch and Johnson showed mathematically that the marginal rate of technical substitution of capital for labour (-dL/dK) is lower for a public utility that is regulated than for a firm operating under cost-minimisation. The Averch-Johnson effect is described by Crew and Kleindorfer (1988, p. 123) as follows: "Given the assumed convex shape of production isoquants it follows immediately that under regulation capital is over-utilised and labour under-utilised relative to any cost-minimising solution", a simple, but elegant, mathematical formulation of the basic Averch-Johnson effect can be found in Crew and Kleindorfer (1988, pp. 121-123).

This effect is extremely important since it shows that under regulation an inefficiency can be introduced in the capital/labour ratios of public utilities. What results then is that in attempting to

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[17] An empirical study of the Averch-Johnson effect for selected American and Canadian electric utilities was undertaken by Neil Wilson Mather in his doctoral dissertation entitled: "An Empirical Study of Public and Private Supply of Electricity". University of Wisconsin - Madison, (1975).

prevent monopolists exploiting consumers, and thus concerning themselves with equity considerations, regulation can introduce economic inefficiency into the public utility management process.

The Averch-Johnson effect shows that under regulation public utilities are sometimes encouraged to over-build e.g., electric utilities build more power stations and increase their capital stock more than would be the case under the cost-minimising pressures of the market. It will be shown that Eskom's management policies resulted in an Averch-Johnson effect.

3.2 Public Utility Rates

The literature on public utility regulation and management is, as has been shown in the discussion so far, concerned with a wide range of issues that are designed to provide consumers with high standards of service, safety of operations and efficiency of management. Phillips (1988, p. 163) points out that one of the issues that regulatory commissions in the USA spend much of their time on is rate regulation. Rate regulation has two dimensions, these being 1) control of the rate level i.e., the earnings of public utilities and 2) control of the rate structure itself. The time spent by regulatory commissions on these topics indicates how important is the oversight of public utility tariff levels to the regulatory process.

Armstrong, Cowan and Vickers (1994, p. 13) suggest that where a market is supplied by a single firm (which is essentially the case with Eskom) in the absence of regulation the monopoly could charge prices that would result in "a dramatically inefficient allocation of resources". They further maintain that one way to curb the problem of market power by a monopoly supplier is via price regulation. Laffont and Tirole (1992, p. 19) also emphasise the importance of the normative aspects of natural monopoly pricing to successful regulation.

Phillips (1988, p. 168) also asserts that the method of establishing public utility rates constitutes one of the most fundamental differences between public utilities (i.e., the public sector) and the remainder of the private enterprise system. In the non-regulated industries rates are usually determined by market forces, i.e., supply and demand. Public utility rates are, however, usually determined by the regulator because of the absence of these market forces. It will be shown that in the case of Eskom rate levels, and the structure of electricity tariffs, were determined by the corporation itself, generally without interference from the bodies charged with regulating the Corporation.

The following section briefly discusses three pricing regimes that are commonly considered in the literature on public utility pricing to constitute the benchmark, or ideal case, for tariff structuring. Here the regulator and the utility have symmetrical information. Such information would include

consumer demand characteristics, the utility's cost structure and importantly, the opportunities available to the utility for instituting cost reductions in the production process. The benchmark case covers three pricing possibilities, namely, marginal cost pricing, average cost pricing and non-linear pricing. Determining the desired ideal pricing structure is important for regulatory purposes and policy making since it is only by establishing a benchmark that the economic and social costs to consumers of a utility deviating from this benchmark can be gauged.

3.2.1 Marginal cost pricing[18]

When a firm offers a price for its product to all consumers that equals marginal cost, then output is efficiently allocated. A price in excess of marginal cost results in a loss of welfare or allocative inefficiency. Mathematically the marginal costing rule can be simply explained thus: Let C(Q) be the firm's cost of producing a total output Q, and let $C_i(Q)$ be the firm's marginal cost. If aggregate demand at price P is Q(P) efficient marginal cost pricing occurs at price P_i if $P_i = C_i(Q(P_i))$[19]. It is sometimes argued in the literature (see Armstrong, Cowan and Vickers (1994), Crew and Kleindorfer (1988), Laffont and Tirole (1992), and Hotelling (1938), for example) that the government should make lump sum monetary transfers to public utilities to ensure that marginal cost pricing is observed, i.e., provide a direct subsidy to the firm out of public funds. This suggestion demonstrates how important these authors consider marginal cost pricing to be with respect to public utility rate fixing. Setting the price of a public utility's output at the marginal cost level will also ensure that the important regulatory goal of efficient resource allocation is achieved, see section 3.1.7 above.

3.2.2 Average cost pricing

Care must be taking in applying marginal cost pricing rules, however, because for public utilities exhibiting increasing returns to scale setting the price of their output equal to marginal cost results in the utility making a loss. In such cases the literature suggests that setting price equal to average cost is best in terms of overall social welfare subject to the constraint that the utility breaks even, see Armstrong, Cowan & Vickers (1992, p. 16). Setting a public utilities price equal to average cost can therefore be viewed as a practical compromise between the desire for the efficient

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[18] Ruggles (1971, pp. 11-12) gives a brief history of the development of marginal cost pricing beginning with the work of Dupuit, a French engineer in 1844, and ending by describing the modern treatment of the concept from Harold Hotelling in 1938 onwards. Ruggles (pp. 16-30) also gives a detailed assessment of the controversy surrounding marginal cost pricing in terms of its welfare basis. Chapter 4 of Webb and Ricketts (1980) is also a useful source of information on the benefits of marginal costing with respect to energy pricing.

[19] There are two caveats to this rule. Firstly where externalities occur in either the production or consumption of a public utility's output then the cost function C(Q) should be modified to include these costs. Secondly if there are other distortions in the economy, then it may be desirable to adjust the marginal cost to counterbalance these.

allocation of resources, i.e., pricing the utilities output at marginal cost, and the need for the firm to at least break even and not make a loss. The financial health of public utilities is clearly important if they are to meet what Lewis (1966) (see section 3.1.7 above) describes as the task of public utilities.

3.2.3 Non-linear pricing

A solution to the problems of increasing returns to scale mentioned above, rather than a mere compromise via average cost pricing, is where the regulator adopts a non-linear pricing regime for a public utility as opposed to the situation where the price is the same for each unit of the utility's output, i.e., where a linear pricing regime is in force.

A common class of non-linear price mentioned in the literature on public utility pricing (see Armstrong, Cowan & Vickers (1992, pp. 18-24)) is the so-called two-part tariff; this is the type of tariff favoured by Eskom. A two-part tariff requires consumers to pay a fixed charge A in order to buy any quantity of the utility's output , e.g., electricity, and in addition a marginal price P per unit of output, (a kilowatt-hour, say). The total charge for electricity for example would then be A + Pq where q is the amount of electricity consumed.

A two-part tariff results in a first-best allocation of resources with price equal to marginal cost, with the addition of the fixed charge A allowing the unit price of the utility's output to be fixed at marginal cost while covering the utility's fixed costs[20]. Two-part tariffs do, therefore, have the effect of keeping many consumers in the market in the case of a homogeneous customer base. Thus is was that in the case of Eskom and the electrification of white-owned commercial farms such a tariff was introduced to make it easier for such farmers to afford to have their farms electrified and to ensure that none dropped out of the market for electricity on the grounds of their inability to pay.

3.2.4 Criticism of marginal cost pricing

The literature on public utility rate fixing offers several criticisms of marginal cost pricing, three important ones are considered below.

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[20] This arrangement breaks down when consumers are heterogeneous, however, because those who are prepared to pay very little for the product (or those who cannot afford the fixed charge) would drop out of the market. This situation is clearly inefficient since some consumers would be quite prepared to pay a price at least equal to the marginal cost of the product for some units of the product. For example black households that would use a small amount of electricity for lighting purposes only. As will be shown, although Eskom favours the two-part tariff it is doubtful whether the variable part of the tariff was structured around a marginal price for each unit of electricity sold.

a) In the absence of lump sum transfers i.e., subsidies to public utilities by government to finance deficits arising from marginal cost pricing, as suggested in the literature, see section 3.2.1 above, the government must resort to taxes that distort income distribution, capital formation and private consumption expenditure; in this situation distortions are caused elsewhere in the economy. This is illustrated in modern public finance theory thus: if the government raises R1 society pays $R(1+\beta)>R1$, β being the shadow cost of public funds[21].

b) Whilst many economists have supported marginal cost pricing several of them have expressed reservations about it as a policy recommendation. Laffont and Tirole (1992, p. 29) mention Allais' view in this regard. Allais (1974) asserts that the absence of a budget constraint in such a pricing structure would create inappropriate incentives for cost reductions by the utility.

c) A practical criticism of marginal cost pricing, which directly applies to electricity supply and the building of new power stations, was raised by Wilson (1945) and was cited by Ruggles (1971, p. 24). Wilson raised the objection that in making investment decisions under marginal cost conditions there would be no test of the accuracy of the forecast[22].

3.2.5 In Defence of marginal cost pricing

A practical defence of marginal cost pricing for the outputs of public utilities was made by Farrell (1971, pp. 44-63). Farrell develops a thesis based upon the hypothesis that whilst the objections raised against marginal cost pricing are formidable they constitute no reason for abandoning this pricing rule and setting prices at some other level. Farrell considers the objections to the marginal pricing rule to largely exist in economic theory only and that in the practical world they rarely, if ever, occur. He accepts that the adoption of a simple pricing rule does not mean that deviations from that rule may not be necessary under certain conditions, but argues that this is quite a different matter to doing without the rule.

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[21] Ruggles (1971, p. 31) commenting on this point says "before the system (the marginal cost system: author's addition) can be considered complete some consideration must be given to the method of financing these subsidies". In the literature, many supporters of marginal cost pricing have failed to consider this question according to Ruggles (1971).

[22] This is be a very weak criticism, however, since past experience would be a guide to the accuracy of the forecast.

3.2.6 Choices with regard to public utility rate fixing

In spite of the theoretical criticisms of marginal cost pricing Laffont and Tirole, (1992, p. 33) suggest that marginal cost pricing should be the leading normative approach to models of rate making (tariff structuring) in regulated public utilities. Clearly the eminently practical defence of marginal cost pricing by Farrell (1971) provides support for this suggestion. Phillips (1988, pp. 171-172) has also lent support to marginal cost pricing in his comments on the preferred tariff structures for public utilities. He asserts that in recent years increasing public utility rates have added a new dimension to the tariff structuring problem and that tariff design has become the single most important issue in public utility ratemaking. He comments further that economists have concluded that the traditional approach for public utility tariff design based upon average total costs should be replaced with a marginal cost approach to ensure the efficient allocation of scarce resources and promote their conservation.

Literature on tariff structuring and the regulation of public utilities does, however, accept that the adoption of marginal cost pricing presents both theoretical and practical problems, an example of one such problem being provided in item c) of section 3.2.4 above. Phillips (1988, p. 172) even goes as far as to suggest that the concept is "feared by some customers". He may be referring to large consumers of a public utility's product, for example, mining and manufacturing enterprises that require large bulk electricity supplies for new investments they may make. The fear here is that marginal cost pricing for such power supplies may require existing electricity tariffs to suffer substantial increases over tariffs based on average costs.

These fears aside, the literature on public utility pricing does suggest the adoption of tariffs based upon marginal cost principles as being the ideal solution for tariff structure setting for the output of public utilities.

4.0 CONCLUSIONS

This chapter has attempted to show where the present study fits into the extant literature on the history of Eskom. It is suggested that the present study adds a further chapter to this literature bringing the stated historical knowledge on Eskom closer to the present day.

With respect to the review of the literature on the regulation of public utilities there is vast literature in welfare economic foundations and public policy decision making underlying the normative basis for natural monopoly regulation. Only a very few authors have been examined here, however, and the hypotheses underlying the practice of public utility regulation commented

upon are those that, as will be shown (when hypothesis four is analysed), had a direct bearing on the management of Eskom in the period occupied by this study.

CHAPTER 3

HISTORICAL OVERVIEW OF THE DEVELOPMENT OF THE ELECTRICITY SUPPLY INDUSTRY IN SOUTH AFRICA: 1882-1980

1.0 INTRODUCTION

This chapter provides a brief historical overview of the development of the electricity supply industry in South Africa from its inception to 1980. The purpose of the chapter is to provide background information to the study. This is attempted by reviewing, and bringing into perspective, events of an earlier period to that covered by the study itself, some of which had an important influence on Eskom's electrification programmes from 1980 onwards. Reviewing the history of Eskom prior to 1980 will also show how Eskom was regulated up to that date and help prove that an autonomous spirit did indeed exist amongst Eskom's managers up to that time. In particular the chapter addresses the following questions. 1) How important was electricity to the development of the South African economy? 2) What were Eskom's priorities, so far as providing electricity to the nation, really centred upon? and 3) Was the electrification of South Africa's black households neglected or not up to 1980? Prior to addressing these questions it is appropriate to begin the chapter by outlining how electricity benefits the industrial sector and households in South Africa.

2.0 THE INDUSTRIAL AND DOMESTIC BENEFITS OF ELECTRICITY

Industrial development in the twentieth century has seen the composition of energy supply move towards electricity and liquid fuels thus removing some of the constraints of other energy forms to economic growth. For example electricity removed the limitations which were imposed on factory processes in the manufacturing sector by mechanical energy systems involving belt driven machinery for transmitting power. Factory reorganisation was therefore made possible and the electric motor enabled increases in productivity to occur from improved factory layouts and better working conditions, (Schurr, 1979, p.21). The locations of different industries were likewise influenced. Geographical constraints on factory locations previously imposed by railways for coal delivery for mechanical plant fell away with the advent of the national electricity grid and stand alone electricity generating sets driven by liquid fuels. As Landes (1972, pp. 282-288) puts it,

"Electricity freed the machine and the tool from the bondage of place...it made power ubiquitous and placed it within reach of everyone...by its flexibility and convenience electricity transformed the factory".

Mining enterprises also benefited with electric power enabling deeper and deeper ore bodies being recovered. Gold miners in particular were transported to very deep level workings by electric hoists, a feat which would have been quite impossible by means of steam power. The working conditions in mines were also made acceptable via air conditioning and electric lighting. It is important to note, however, that in adopting electricity as a major power source in manufacturing and mining it was not substituted marginally for other factors of production such as capital and labour. Instead electricity produced results that could not have been achieved by capital and labour alone.

Electricity has then the potential to remove the constraints that steam power has traditionally placed on industrial development. Without an adequate supply of reliable electricity the mining revolution that resulted from the discovery of diamonds and gold in South Africa and the subsequent manufacturing revolution could not have occurred. Landes (1998, p.40) commenting on energy and industrial revolutions says "All industrial revolutions have at their core an enhancement of the supply of energy, because this feeds and changes all aspects of human activity". Tireless electrical energy is particularly important for encouraging such change. In South Africa for example the developments resulting from electricity being used in the manufacturing and mining sectors were necessary preconditions for economic "take-off" being met.

These preconditions according to de Kock (1924), cited in de Jong (1975, Vol. 2 p. 124), were 1) the provision of better and cheaper transport facilities to the interior of the country, 2) more capital being made available for railway development and communication systems such as telephones and the telegraph, 3) export products, in addition to wool, being developed which could absorb the high transportation costs from the interior to their final markets so that foreign exchange could be earned, 4) a market for agricultural products in the interior being established and 5) sources of revenue, other than import duties, being found for the treasuries of the two Boer republics of the Orange Free State and the Transvaal and the two British coastal colonies of the Cape and Natal.

The domestic use of electricity has also brought many benefits to mankind. These include electric light, allowing the day to be effectively lengthened, home entertainment has been enhanced by radio and television, and time savings have accrued by rural black families spending less time

gathering fuelwood. Health benefits have also come about from electric space heating and refrigeration. Electricity has also the potential to raise the living standards of the previously disadvantaged people of South Africa by providing them with reliable, clean and safe power in their homes. Increased production of goods and services by the amplification of human effort from the use of electricity has therefore enabled marked improvements in living standards to occur.

The removal of constraining influences to industrial development by the use of electricity in South Africa resulted then in increased local regional and national economic growth in the mining and manufacturing sectors of the economy. The following sections, demonstrate the type and magnitude of this growth, later chapters will comment on the domestic benefits brought about by the provision of electricity.

3.0 ELECTRICITY SUPPLY

3.1 The Period 1882 – 1902

As is the case in the rest of the world the history of electricity supply in South Africa is one of continuous change. In this respect the introduction of electricity into the country was inextricably linked to the discovery of diamonds in Kimberley and gold on the Witwatersrand and the changing economic milieu of the country, i.e., from an agrarian society to an industrial society.

Diamonds were discovered at Kimberley in the Northern Cape in 1867. The history of the diamond diggings in Kimberley can be divided into three distinct phases. The first of these was the time of the small claims digger who had very little capital. The second phase, which extended from about 1875 to 1888, is where small diggers lost their place as a consequence of the diggings becoming deeper and requiring a more capital intensive engineering approach to diamond extraction. During this phase small diggings were bought up by share companies. These companies were continually being merged to control diamond production and sales. The third and final phase, which started in 1888, was when Cecil John Rhodes and Barney Barnato founded the De Beers Consolidated Mines, leading to monopolistic power in the industry and the control of world diamond sales, (de Jong, 1975, Vol.3 p.16). The provision of electricity was an essential ingredient to this third stage development which aided de Kock's fifth precondition for economic take off cited above.

In 1886 gold was discovered on the Witswatersrand in the Transvaal and certain farms in the Heidelberg district were proclaimed public diggings.[23] Claims were soon bought up by various diamond barons from Kimberley and there was therefore considerable capital available for developing the goldfields from profits made at Kimberley. Because the gold found on the Rand was not alluvial, extracting the gold required underground mining and the South African economy was not able to supply all the capital needed for this, however, because of it's underdeveloped state. There was then an influx of foreign capital made possible by the business connections that the diamond barons had built up over time. As a consequence there was no room for the small miners who had found success at Kimberley, only heavily capitalised enterprises could hope to extract the available gold on the Rand. By 1890 mining shafts were getting deeper and deeper and electricity was necessary in the mines for the reasons stated earlier if the mining industry was to develop further. With the discovery of gold two important events followed rapidly, Johannesburg was founded and so was the South African Chamber of Mines in 1887. The Chamber of Mines was an institution that was to play a significant role in the development of the gold mining industry in South Africa.

In addition to the more illustrious diamond and gold discoveries coal was also discovered during this period. Commercial coal mining first took place at Newcastle in Natal in 1885. In 1887 coal was also discovered at Boksburg in the Transvaal and two years later at Brakpan and Springs, also in the Transvaal. The major coal fields of South Africa are in the southern and south-eastern Transvaal, northern Natal and the northern Free State. All these coal fields were conveniently located for providing coal to the diamond and gold mines for use in steam generation for ore crushing, hoisting the ore from underground and providing power for compressed air. As deeper ore bodies were mined electricity replaced steam power on the gold mines. Electricity usage in coal mines themselves also increased, for such activities as hoisting, conveying and drilling as the coal mining industry developed.

With the discovery of diamonds, gold and coal economic benefits and disbenefits came about in South Africa, the era of pre and early capitalism ended and the beginnings of modern capitalism emerged. The immediate benefit of the mineral discoveries was that preconditions for economic take off materialised. In 1876 a telegraph line was built from Cape Town to Kimberley and an undersea cable from Cape Town to Europe was laid. Kimberley was connected to the coastal

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[23] This proclamation was made on the 8th September 1886, see Staats Courant Zuid Afrikaansche Republic, p.8;, vol.2.SJP Kruger State President, W Edward Bok, Secretary. This document was Johannesburg's birth certificate. Prior to the proclamation one George Harrison went to Pretoria, the capital of the Transvaal, and filed the following affidavit with the State Commissioner: "My name is George Harrison and I come from the newly discovered goldfields...I have long experience as an Australian gold digger and I think it a payable goldfield". How right he was. Harrison sold his claim for £ 10 and promptly disappeared, Triscott (1893).

states by telephone in 1882. Of particular importance were the substantial capital inflows for investment in the diamond mines, the railways and the expansion of telegraph and telephone lines. In 1861 there were only 3,2 kilometres of railway line in South Africa. After the discovery of diamonds and gold Kimberley and Johannesburg were linked to the harbours by rail. By 1891 there was 4 048 kilometres of railway line and by 1980 South Africa was criss-crossed by 23 447 kilometres of rail, (Swart, 1983, p.100). After 1870 investment for development could be raised without a great deal of difficulty and the revenues of the Free State and the Cape Colony increased dramatically. Kimberley was the first South African industrial community and for the first time problems of capital formation and labour became important. Competition between black and white people, not for land or capital, but for a place in industry also resulted from the discovery of diamonds, (de Kiewiet, 1972, p.89). Economic disbenefits arising from the mineral discoveries included the speculative motive, which gave rise to repeated over-straining of the existing capital infrastructure and financial crises. Coupled to these problems there was the withdrawal of labour, entrepreneurship and capital away from sectors of the economy, which were unconnected with the mining industry.

Perhaps the most important social consequence resulting from the diamond, gold and coal discoveries was the rapid urbanisation that made its appearance in the interior of South Africa. Urbanisation caused a sudden change in South Africa's historical development. Prior to 1870 the economy of the interior of South Africa was agrarian with white immigrants becoming farmers. People were widely spread throughout the interior of the country. In contrast diamond diggers, and the gold and coal miners, congregated in or near to the workings and mining camps were erected which grew into the cities of Kimberley and Johannesburg. As other gold fields were discovered a whole string of towns was established along the world's richest gold reef, viz., Springs, Brakpan, Benoni, Boksburg, right down to Carltonville and from there into the Free State where towns such as Welkom and Virginia were established. With the development of manufacturing industries which can be traced to the mining industry, towns such as Vereeniging, Vanderbijlpark and Sasolburg resulted, an area called by Van Jaarsveld (1973, p.9) the "Ruhr" region of South Africa, cited in Swart (1983, p.99). Because electricity was the motive power in the development of the gold mines of South Africa it can be asserted that without electricity this urban development would have been seriously curtailed. As these urban areas expanded the municipalities demanded ever more electricity. A new social order also gradually emerged with black townships being developed next to white municipalities from which labour was drawn.

As the South African economy began to develop as a consequence of the gold and diamond finds, four categories of electricity supply came about, these were as follows:

1. Municipal undertakings which largely supplied electricity for lighting purposes, public transport and small industrial developments;[24]
2. Privately owned electric companies, which supplied electricity mainly in bulk to the gold mining industry and also to certain municipalities;[25]
3. Privately owned mining companies which generated electricity for their own use[26]; and
4. The railways, which generated electricity for their own use prior to 1910.

The mining companies installed their own electricity generating plant because they believed that that was the most economical and efficient option available to them and, in addition, it would ensure a secure supply of power. The railways also decided to generate their own electricity simply because there were few, if any, suppliers that could meet their particular needs. They too were also concerned with security of supply and this influenced their decision, (Vos, Vol. 2, p.12). So far as the various municipalities were concerned some of them built small power stations for the same reason as the railways i.e., because there was no other supply of electricity available to them. Legislation of the time protected the right of local government to supply themselves with power by ensuring that no electricity supplier could operate in municipal areas without the permission of the local authority.[27]

The private electric companies were formed when it was realised that the gold mining industry would be demanding in the future, far more power than they had available from their own generating plant and would not necessarily want to enter the electricity supply business but concentrate on their gold mining activities, (Vos, Vol.2, p.9).

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[24] Kimberley was the first town in South Africa to have street lighting from electricity in 1882. By 1891 Johannesburg's streets were also lit by electricity, likewise by 1892 Pretoria, by 1895 Cape Town, by 1897 Durban, by 1899 East London, by 1900 Bloemfontein and in 1906 Port Elizabeth had an electricity supply system for street lighting, (Poole, 1982); see also Eskom, (1982).

[25] Examples of these companies are the Victoria Falls and Transvaal Company, the Rand Central Electric Works, the Rand Mines Power Company and the General Electric Power Company. These companies will be discussed later in this chapter. Details of these companies are given in Vos (Vol.1, pp.40-191).

[26] Examples of these companies are the De Beers Consolidated Company and the Robinson Mining Company, both of which generated their own electricity at Kimberley and on the Witwatersrand, (Vos, Vol. 1, p.2 and Searle, pp.6-7). Both the Vos files and the Searle paper are undated.

[27] For example the Natal Law No 20 of 1891, the Natal Ordinance No 6 of 1911, Ordinance No 17 of 1916 of the Cape Colony, Ordinance No 27 of 1912 of the Orange River Colony and the Transvaal Local General Ordinance of 1912.

The German firm of Siemens and Halske foresaw the possibilities of using electricity in lieu of steam power as an energy source for the goldmines.[28] As a matter of business policy the Siemens and Halske concessions[29] were ceded in 1895 to the Rand Central Electric Works Ltd., (RCEW) which they established. The RCEW then proceeded to build an electric power station at Brakpan, which was completed in 1897. This was the first electricity supply undertaking built in South Africa, (Vos, Vol.1, p.2).

Another concession for electricity supply to the Witwatersrand was granted in 1897 to the Simmer and Jack Mines Ltd; for the supply of electricity to five gold mines owned by the Consolidated Goldfields Group which were part of the Rhodes/Beit/Rudd mining consortium, (Hadley, 1913). Upon receipt of this concession the Simmer and Jack Mines, in a like manner to Siemens and Halske, established in 1898 a subsidiary called the General Electric Power Company Ltd., and the concession was ceded to this company which then built the Driehoek Power Station which was commissioned in 1898[30].

Another interesting initiative took place in the five years from 1895-1890, which had a considerable influence on electricity supply in South Africa. This concerned the possibility of using the Victoria Falls to generate hydro-electricity for use by the mines and also for assisting the development of areas around the Witwatersrand which were without electricity, (Vos, Vol.1, p.2).

This scheme was the brainchild of Professor George Forbes.[31] He approached Cecil John Rhodes and explained to him the political benefits of harnessing the power of the falls so that electricity could be supplied to the gold mines of the Witwatersrand[32]. Rhodes gave Forbes permission to

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28 Siemens and Halske were already established in South Africa having obtained in 1887 the concession (or licence) from the government of the South African Republic to supply electricity to the Johannesburg and Pretoria Municipalities, (Hadley, 1913); also see Jacobs (1941).

29 Since in 1894 they had in addition obtained the concession for transmitting electricity to the gold mines of the Witwatersrand. The conditions of the concessions may be found in Agreement No 376/1894 of the South African Republic represented by W.J. Leyds the State Secretary, cited in Hadley (1913).

30 The Simmer and Jack grant was ceded to the General Electric Power Company Ltd; by Deed of Cession No 1422/M/1903 dated the16th of March 1899 registered in the Deeds Office in Pretoria on the 24th of August 1903, cited in Hadley (1913). and Vos (Vol.2, p.15).

31 Forbes was the designer of the two-phase generators in place at the recently completed Niagara Falls hydro-electric scheme in Canada. This scheme was at the time the largest electric power generator in the world, Searle, (p.8)

32 Rhodes had acquired the mineral rights for the area between the Limpopo and Zambezi Rivers from Lobengula the king of the Matebele and Moshone in 1888. Rhodes had in addition obtained from Queen Victoria political power over this area in 1899 under a Royal Charter granted to Rhodes's British South Africa Company.

investigate the scheme. The investigations indicated the Victoria Falls scheme was indeed a viable proposition. In 1901 the African Concessions Syndicate Ltd; was formed and obtained the lease for exploiting the entire electric power potential of the Zambezi River, (Paulet, Lord Henry, 1934).

The period between 1899 and 1902 was the time of the Anglo-Boer war or, as it was sometimes called, the Second War of Independence. Hostilities broke out on the 11th October 1899 and lasted until the 31st of May 1902 when the Treaty of Vereeniging was signed at Pretoria. The war seriously disrupted the generation of electricity by the RCEW[33] In particular commandos of the Boer forces destroyed part of the plant and buildings at the Brakpan power station; some of the commandos were recognised as former employees of the RCEW. The attack took place at about 1 a.m. on the 20th of January 1901.[34]

3.2 The Period 1903 – 1914

This period encouraged entrepreneurs to concentrate on bringing electricity to the developing parts of South Africa and flamboyant individuals began to seize commercial opportunities connected with electricity supply. There was for example Lewis and Marks the owners of the Vereeniging Estates Ltd. These estates bordered the Vaal river and the riparian rights to this water was held by the estate owners. There was also coal on the estates. Thus the three prime requirements for erecting a power station were available to Lewis and Marks, i.e.; space, energy sources and a cooling medium. This opportunity was not lost on these two men and they promptly built a weir, called the Sammy Marks or Leslie weir, in the river and obtained wayleaves to erect power lines between Vereeniging and the gold fields of the Witwatersrand, (Hadley, 1913).

Another influential figure during this period was H.C. Behr a consulting engineer to the Consolidated Goldfields Group. He developed a design for an electrically driven winding gear that could be used underground for transporting ore to the surface from great depths. Such an undertaking could not be achieved using steam power and allowed even deeper mining to take place.

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[33] Report of the directors of the RCEW presented to the shareholders at the Sixth Ordinary General Meeting of the company held at Winchester House, Old Bond Street, London, on Tuesday the 31st July 1900 at 12 o'clock noon, (Vos, Vol. 1, p.121).

[34] See the minutes of the meeting between Colonel Colin McKenzie, the Military Governor and managers of the RCEW held at Johannesburg on 22nd January 1901, (Vos, Vol. 1, p.132)

Another innovator was Robert Hammond, who in 1905, showed that large central power stations could produce much cheaper electricity very reliably when compared with numbers of small stations[35]. Cheap power was of vital importance for the gold mining industry and of course for South Africa's macro-economic development in general, (Main, 1936). Hammond also had the vision to see that the Victoria Falls Power Scheme proposed by Professor Forbes would be an ideal large electricity generating undertaking meeting his criteria as a source of cheap power. He did, however, have a preference for large fossil-fired power stations located at the mines, which supplied them with coal.[36]

Although the RCEW Brakpan power station had been built in 1897 its management foresaw the increased demand for electric power which came about after the Anglo-Boer war. They accordingly got the Transvaal Colonial Government to ratify the concessions which had been granted to them by the former Transvaal Republican Government. This was achieved in 1906 and the concession was extended to 1948. Armed with this they proceeded to raise capital to expand the RCEW.

The promoters of the Victoria Falls electric power scheme were equally aware of the potential demand for electricity by the gold mines of the Witwatersrand and they too wanted to be in the forefront of those supplying power to meet this demand. Accordingly they commissioned the consulting engineering firm of Douglas Fox and Partners of London to check the robustness of the feasibility report prepared by Professor Forbes concerning power provision from the Victoria Falls and which had been completed in 1900, (Vos, Vol. 2, pp.19-24). The full report is contained in Annexure 35 of the Vos Files.

Whilst this was being done the Victoria Falls promoters, the African Concession Syndicate Ltd., approached Rhodes' Consolidated Goldfields Group and the Eckstein Group, another large gold mining syndicate, with offers to supply them with electric power from the Victoria Falls. This offer was, however, rejected.[37] The African Concession Syndicate Ltd., were quite undeterred by the rejection of their offer and immediately floated the Victoria Falls and Transvaal Power Company Ltd., and registered it in Southern Rhodesia on the 17th of October 1906. In common

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35 See a notice of appreciation for Hammond's work in the South African Institute of Electrical Engineers Commemorative Journal 1909-1930 on the Institutes' 21st Anniversary.

36 Eskom's large modern power stations developed since the 1960's are all located at the mouth of the mines supplying them with coal.

37 This rejection was the direct result of A.W.K Pierces' (the consulting engineer to both Rhodes's Group and the Eckstein Group) view that the Falls scheme would be of no value to these companies because the power would be both expensive and unreliable compared to electricity purchased from the existing power stations located on the coalfields of the Transvaal, (Vos, Vol. 2, p.27).

South African parlance the company was known the Victoria Falls Power Company, or simply the VFP, and this appellation is used throughout this text. All rights and concessions held by the African Concessions Syndicate Ltd., were ceded to the VFP. The VFP now proceeded to buy out the RCEW[38] and furthermore formed an agreement with Lewis and Marks to take over their wayleaves for power line construction to the Witwatersrand and buy water from the Sammy Marks weir and also coal from the Vereeniging Estates Ltd., (Hadley, 1913). The VFP then came to an agreement with Consolidated Goldfields that they would supply them with electric power from a new power station, which they would build in the Transvaal by 1909, (Price, 1916).

Another important event occurred in 1909, the Rand Mines Group (which was the largest mining house in South Africa at the time) decided to electrify as much of its mining equipment as possible. They did not, however, wish to generate their own power. This event presented an opportunity for W.C. Harper who made an agreement with the Rand Mines Group to supply their electricity needs[39]. He likewise concluded a similar agreement with the Eckstein Group. All in all seventeen mines were to be supplied with power. The agreement called for the supply of compressed air as well.[40]

Upon concluding this agreement Harper returned immediately to London to raise finance to build the power station which would be necessary to supply the electricity and compressed air he had contracted to deliver, (Vos, Vol.2, p.112). Harper also attempted to gain technical support for the venture from Charles Hesterman Mertz a prominent consulting engineer to the electric power industry and, as will be shown, an important figure in the development of South Africa's electricity supply industry.[41] Harper saw that it would aid his cause in raising the necessary

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38 See the minutes of an extraordinary general meeting of the VFP held on Monday March 25th 1907 at Winchester House, Old Bond St; London, EC; also the 1st prospectus of the VFP dated 15th December 1906, (Vos, Vol., 2 p.48); also see van der Walt (1967).

39 Harper was in South Africa at this time advising the Johannesburg Municipality in a legal dispute concerning defective gas engines in their municipal power station, (Price, 1916).

40 A letter setting out the conditions that the Rand Mines sent Harper confirming their agreement with him, can be found in Vos (Vol. 1, p. 23).

41 Charles Hesterman Mertz was born on the 5th October 1874 in Gateshead-upon-Tyne England. His father Dr John Theodore Mertz was a distinguished engineer and director of companies. Charles' mother come from a well connected Quaker family in the north-east of England. The north-east of England is a region famous for engineers. Within a few miles of Mertz's birthplace George Stephenson the railway pioneer was born and in the same area Charles Parsons developed the steam turbine used to generate electricity in power stations. Mertz studied electrical engineering and in 1899 established himself as a consulting engineer specialising in power generation. On the 1st January 1902 William McLellan, a Scot and engineer, joined him as a partner in the practice. The firm Mertz and McLellan gained a world-wide reputation in the field of power station design and railway electrification which is why Mertz was invited to visit South Africa to advise on these subjects. Mertz was tragically killed on the night of the 14th October 1940 when a German bomber scored a direct hit on his house at Melbury Road London, (Rowland, 1960, p.95). The firm

capital if he could solicit Mertz's approval for his scheme. Mertz, however, was not forthcoming with his approval and this caused Harper to fail to raise the capital he required. Harper subsequently sold his contracts to the VFP.[42]

In the event the Rand Mines agreed to the sale but stipulated that the VFP had to establish a separate undertaking which was to be registered in the Transvaal. This was because at the time, and as already noted, the VFP was only registered in Rhodesia. The new company, which was named the Rand Mines Power Supply Company Ltd., (RMPS) was to supply electricity and compressed air exclusively to the Rand Mines and the Eckstein Group. The system for producing this energy was to be a stand-alone system not connected to the existing VFP system.[43]

During this period the gold mines were facing severe labour shortages as a result of the Anglo-Boer war which had so destroyed the infrastructure of South Africa. So far as the provision of labour for the gold mines was concerned, the state was required to intervene in the supply. This was because not only was black labour reluctant to work on the mines because of the dangerous conditions, but the nature of gold mining on the Rand was susceptible to rises in costs including labour costs. Rising labour costs added a risk factor to investments in the gold mining industry. The gold mines had always had an insatiable appetite for labour with eighty-eight thousand Africans being employed on the Rand as early as 1898, (Packenham, 1979, p32). Labour was then drawn from South Africa itself and from countries beyond the borders of South Africa. Chinese workers were even brought to South Africa. The Chamber of Mines was instrumental in

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founded by Mertz, now named Mertz and McLellan, is still in existence in the UK and is one of the world's foremost consulting engineering firms in the electric power industry.

42 The Harper contract was of course of vital importance to the VFP. It is interesting to speculate on the connection between Mertz and the VFP. What is clear is that great pressure was put on Harper by the VFP. The objective being that Harper would fail to raise the required capital to built his power station; c.f.; letters between Lord Winchester (the chairman of the VFP) and H. Wilson Fox the legal advisor to the VFP, also extracts from notes of meetings held on the 14th July 1908 those present at these meetings being Lord Winchester, Isaac Lewis, Wilson Fox and W. A. Harper, also letters from Wilson Fox concerning the sale of the Eckstein contract, and further letters from Wilson Fox to Dr Geheinrath Rathenue advising that Harper be "kept on a wire until Harper became amenable", all dated July 1908. Copies of these letters and the Memorandum of Agreement eventually signed between Harper and the VFP can be found in Vos (Vol. 2, pp.85 – 131). Eventually Harper was paid £30 000 for his contracts irrespective of the Rand Mines agreeing to the sale. If consent was obtained Harper would, in addition, receive 150 000 paid up Ordinary Shares of £1 each of VFP stock, or 200 000 fully paid up shares of a new company to be formed, The Rand Mines Power Supply Company Ltd., with a capital of one million pounds sterling; c.f., Memorandum of Agreement dated the 2nd December 1908 between Harper and the VFP. Harper would in addition be appointed to design the new power station needed to generate the electricity and produce compressed air required by the mines on the Witwatersrand in South Africa.

43 That the VFP fully expected these stipulations is evident in their dealings with Harper, c.f., note 42 above. As a result the Rand Mines Power Supply Company Ltd; was established on the 1st of June 1908, this company was a wholly owned subsidiary of the VFP and was controlled and managed by them.

making these arrangements and its importance was thereby assured. Nattrass, (1990 p.137) points out that one of the most hotly debated issues in South African economic history concerns the impact of gold mining development on South African labour practices.

A commission appointed by the Transvaal Colonial Government pointed out at the time that the gold mining industry was not taking sufficient cognisance of the advantages of electricity with respect to labour saving, i.e.; for driving machines and generally mechanising tasks that had traditionally been done by hand. The important point here is that it is clear that the industrial advantages of electricity were becoming known at this time.

There was considerable power station construction during this period, the VFP built four stations, the first at Brakpan in 1906 and the second, in 1909 at Simmerpan. These two stations were interconnected soon after they were commissioned and a central control system was established at Simmerpan.[44] The other two power stations were built to meet the requirements of the Rand Mines and the Eckstein Group for electricity and compressed air. The first of these stations was completed in 1911. It soon became evident that the Rand Mines and the Eckstein Group required more electricity than this station, which was located at Rosherville, could provide. Another station was therefore built at Vereeniging, cooling water was provided from the Sammy Marks weir and coal from the Vereeniging Estates Ltd., which the VFP had acquired, as noted already.

Because of public concern over the monopolistic supply of electricity, which had arisen as a result of the VFP take over of the RCEW and the agreement they had made with Lewis and Marks. The Transvaal Colonial Government deemed it necessary to appoint a Commission of Inquiry, The Power Companies Commission, 1909, to examine the desirability of the establishment of large electric power companies. The Commission's report was tabled in the Transvaal Parliament on the 17th of April 1910.It stated that "the establishment of large power companies was desirable providing they were effectively supervised by the government. Because such large undertakings could produce power more cheaply than smaller ones it would follow that the gold mines and other industries would benefit. The coal industry and the labour market would not be affected whilst the railways would benefit by increases in the volume of traffic." Prior to this the Commission's report had been presented to the Minister of Mines, the Hon Jacob de Villiers. K.C., MLA at an Extraordinary Session of the Legislature Assembly of the Parliament of the Transvaal on the 7th April 1910 (Item 6 (1) of the notes of Proceedings of the Legislature Assembly: Thursday the 7th April 1910).[45] As a result of this Commission the Transvaal Power

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[44] This is the present location of Eskom's electricity control system for the whole of South Africa.

[45] Details of evidence given at this commission and the Report presented to the Transvaal Colonial Parliament can be found in Vos (Vol. 3, pp.1-55).

Act of 1910 followed, an Act for the licensing and regulation of power undertakings.[46] The idea of a single power authority had also been put forward for electricity generation in Great Britain in 1910 it is probable that this influenced the Power Companies Commission.[47]

So far as railway electrification was concerned during this period at the outbreak of the Anglo-Boer war in 1899 South Africa had four major railway systems. These were the Cape Government Railway (CGR), the Natal Government Railway (NGR), the Oranje-Vrystaat Goeverment Spoorwee (OVGS) and the Nederlandsche ZuidAfrikaansche Spoorweg Maatschappij (NZASM). With the fall of the two Boer Republics in 1900 the OVGS and the NZASM became the Imperial Military Railway (IMR) which was renamed the Central South African Railway (CSAR) after the Anglo-Boer war had finished. With the establishment of the Union of South Africa in 1910 the NGR the CGR and the CSAR were amalgamated to become the South African Railways and Harbours (SAR&H); this combined company had some 12 000 km of track. Prior to 1910, however, the first of the remaining railway companies to advocate rail electrification was the CSAR in 1904. Lord Milner, the Governor of the Transvaal Colony, was very supportive of this idea, but it was only from 1912 that the SAR&H administration seriously looked at the possibilities of electrifying their railway along the line from Durban to Volksrus. To provide the power the SAR&H were compelled to build their own power station. The outbreak of the First World War in 1914, however, curtailed the programme to electrify the railways of South Africa, (Searle, pp.25-29).

Although the First World War of 1914-1918 to a large extent cut South Africa off from her foreign suppliers of industrial goods progress on the electrification of the railways continued. This progress was achieved by local endeavour. During the period of the war the Manufacturing, Gas, Electricity and Water sectors of the economy accounted for some 7,4% of the GDP, in 1918

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[46] The main features of the Act, which incidentally only applied to the Transvaal, were as follows:

1. An ordinary body , styled the Power Undertaking Board was to be established;
2. This Board was empowered to grant licences for power generation and establish the boundaries of each undertaking so licensed;
3. Charges for electricity were to be uniform for all consumers;
4. A licensed electricity undertaking could be expropriated by the state after 37 years had elapsed from the date the licence was issued.

The Power Undertaking Board can been seen as a forerunner to the National Electricity Regulator (NER) which was established in 1994. One of the requirements of the NER being the granting of licences to supply electricity to entities that meet certain financial and technical conditions, see Chapter 7.

[47] The Power Bill of 1910 was given Royal Assent by His Excellence the Deputy Governor in the name of and on behalf of His Majesty the King on the 28th April 1910.

the figure was 9,5%[48] demonstrating a continued growth in these sectors of the economy. At the end of the First World War a report was prepared (The Mertz Report) which was to have far reaching consequences concerning the supply of electricity in South Africa. By this time the VFP had expanded rapidly and at one stage it was the largest electric utility in the British Empire. The economic value of the VFP was based upon the fact that centralised electricity generation allowed tariffs to be reduced over what they had been when there were several enterprises competing for the electricity market. The VFP also pioneered long distance transmission lines allowing consumers far from the central power stations to have a supply of power. The VFP also began to exploit the enormous coal resources of South Africa for generating electricity, these deposits were generally of low quality being ideal for domestic consumption as opposed to coal of high calorific value which could be used for export purposes.

It is rather ironic, however, that a mere four years after the founding of the VFP an act was passed limiting its future existence, i.e. the Power Act of 1910 of the Transvaal Colonial Government. This Act came into force only three days before Union, and is significant in that it made provision for the eventual expropriation of the VFP. The importance here is that that act embodied two basic concepts, these being, 1) that the state viewed the provision of electricity as a public service, and this would be important for the future of the electrification of white-owned farms and black households in South Africa, and 2) that electricity supply should be placed under the authority of the state, i.e., that electricity supply should be regulated.

3.3 The Period 1918 – 1922

3.3.1 The Mertz report

During 1918/19 Charles Hesterman Mertz, paid several visits to South Africa at the invitation of the government to study the question of electricity supply on a national scale and also the electrification of the railways. In April 1920 Mertz presented his report entitled "Electric Power Supply in the Union of South Africa", to the Prime Minister (General J.C. Smuts) under cover of a letter dated April 1920.[49] The report was divided into five sections which were as follows:

1. The Industrial Future of South Africa;
2. The Generation, Production and Distribution of Electricity;
3. The Demand for Electricity;

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[48] Central Statistical Services bulletin October 1967. There are no separate figures available for the electricity sector.

[49] A copy of this letter can be found in Vos (Vol. 4, p.62).

4. The Existing Situation in South Africa with respect to Electricity Supply; and
5. Considerations and Recommendations for the Future Regarding Electrification Policy.[50]

Mertz also put forward a scenario of transmission networks, which were to result from the electrification of the railways with the generation of electricity being confined to several large power stations. Electricity supply so far as he was concerned should be centrally controlled, a la the way the British electricity supply industry was being organised at that time.

3.3.2 Implications of the Mertz Report

Mertz's idea was that the electrification of the railways would make possible an electricity supply network which would supply electricity to towns along the railway lines; this would in turn promote the economic development of South Africa. Within a month of the Mertz report being presented to the government the Minister of Railways and Harbours J.W. Jagger announced in Parliament on the 24th of May 1920, that the Cape Town-Simonstown suburban line and the Durban-Pietermaritzburg line would be electrified and that work would start in 1921. The decision to electrify the Durban-Pietermaritzburg line was changed, however, in favour of the Pietermaritzburg-Glencoe line and that Colenso would be the site for the first SAR&H power station.[51] Construction of this power station, which was designed by Mertz & McLellan, was started in 1922 and the first electricity generating sets were commissioned in 1924. The Pietermaritzburg-Colenso line was completely electrified by April 1926, (Searle, p.29).

Immediately after the Mertz report had been submitted to Parliament a committee, under the chairmanship of the Government Mining Engineer, Robert (later Sir Robert) Kotze was constituted to investigate the far-reaching implications of the report. The SAR&H was represented by Sir William Hoy, the General Manager, D.A. Hendrie, the Chief Mechanical Engineer, and T.A. Park, the Electrical Superintendent. The committee also included the Director of Irrigation and the Chief Inspector of Machinery representing the government. Dr H.J. van der Bijl was also appointed to the committee, (Eskom 1973, p.11).[52]

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[50] Mertz also put forward the idea of distilling petrol from the low-grade coal deposits in South Africa. This idea was of course taken up later by the Nationalist Government and resulted in the founding of Sasol and the development of the town of Sasolburg, (Eskom 1973, p.10).

[51] Colenso was close to coalfields and the Thukela river which would supply water to the station for cooling purposes.

[52] Hendrik Johannes van der Bijl was born on the 23rd November 1887 in Pretoria. After the British occupation of Pretoria, the family moved to Gordons Bay. Hendrik attended the Victoria College in Stellenbosch (today the University of Stellenbosch), where he read physics, mathematics and chemistry. He graduated in 1908. He furthered his studies in Germany at Halle and at the University of Leipzig. Later he was offered an appointment as a lecturer in the physics department at the Technische Hochschule in Dresden. Van der Bijl concentrated on research in connection

Van der Bijl, a very influential member of the Kotze committee, considered that there were two fundamental requirements for the industrialisation of South Africa. The first and foremost was the need for organising the country's electric power supply so that the extensive use of cheap electricity could be used for this industrialisation process. The second was the need to establish an iron and steel industry on a national scale. The report of the Kotze Committee and the Bill drafted by it were presented to the Minister of Mines and Industries the Hon F.S. Malan on the 4th of March 1924 and a few weeks later the Bill was introduced to Parliament. The first of van der Bijl's requirements was incorporated into the Bill. On the 31st of May 1922 the Bill was referred to a select committee. The Johannesburg City Council and the VFP opposed the Bill and appeared before the committee. Other bodies such as the Chamber of Mines also seemed rather doubtful about the Bill's recommendations for the state's involvement in electricity supply. Most of the arguments against it were effectively countered by Van der Bijl who said; "I don't mind who provides the power, as long as it is done and we can be sure that nobody else can do it better". The Bill went forward including the provision that the state was to become involved with the provision of electricity to South Africa via the Electricity Supply Commission.

Van der Bijl's interest in scientific research was overwhelming and he hoped that after his contract for 3 years as Technical Advisor to the Department of Mines and Industries was completed he would return to America. However, events were to overtake this desire. He made the following announcement in 1923:

> "My contract to remain as Technical Advisor was for three years and as I was longing to get back to scientific research work, I planned to return to the United States at the conclusion of that period. But in February 1923 General

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with the transmission of electric current through liquids, gases and vacuums. His work progressed so rapidly and successfully that the American Telephone and Telegraph Company and the Western Electric Company, which shared a mutual research facility, offered him a position. At the age of 26 Van der Bijl found himself in New York working on problems concerning long-distance telephone calls. Whilst there he married an American woman. Meanwhile, General J. C. Smuts, the leader of the South African government persuaded Van der Bijl to return to South Africa as a scientific advisor to the Department of Mines and Industries in 1920. It was in this position that he started working on plans for the establishment of a public electric utility to provide cheap electricity for the development of the South African economy. He was offered the position of Chairman when the Electricity Supply Commission was eventually founded. After Eskom was operating Van der Bijl turned his attention to the steel industry and by 1934 the South African Iron and Steel Corporation (ISCOR) was producing steel. During the Second World War van der Bijl became Director-General of War Supplies and later Director of Supplies, appointments which afforded him the status of Minister. By the end of the war in 1945 Van der Bijl could look back on being responsible for founding important South Africa enterprises and the steel making town of Vanderbijl Park was named after him. Van der Bijl died on the 2nd December 1948 aged 61 years.

> Smuts prevailed on me to accept the Chairmanship of the Electricity Supply Commission which was duly established in March 1923."

Van der Bijl had succumbed to Smuts' blandishments and remained in South Africa, becoming the first Chairman of Eskom, (Eskom, 1973, pp. 11&94-96).

3.3.3 The Electricity Act

The Electricity Act, Act No 42 of 1922, came into being that year. It put in place the fundamentals for the orderly development of the electricity supply industry in South Africa. The Electricity Act was in fact modelled on the Transvaal Power Act of 1910, which it superseded. Whilst the Transvaal Power Act applied, as the name suggests, only to the Transvaal, the new electricity act was to have effect over the Union of South Africa as a whole. In draughting the act the legislators also drew heavily on the experience of Britain's Central Power Generating Authority. The act dealt with two principal matters. The first part of the Act concerned the establishment of an Electricity Supply Commission to effect, maintain and manage electricity supply undertakings throughout South Africa and also provide for the co-ordination of existing electricity supply entities. The second part of the Act provided for an Electricity Control Board, which would exercise control over the supply of electricity by the Commission. The Electricity Supply Commission was to be known as Escom or Evkom depending on whether reference to it was in English or Afrikaans.[53]

Eskom established electricity supply undertakings on a regional basis e.g., the Rand and Orange Free State Undertaking, to supply electricity efficiently, cheaply and abundantly to the following class of users:

1. Government Departments;
2. The South African Railways and Harbours;
3. Local Authorities; and
4. Industry in general.

And what was important so far as this study is concerned the Act ensured that Eskom was to be responsible for investigating, initiating and stimulating the supply of electricity where no such supply existed i.e.; to white-owned commercial farms and black townships in South Africa.

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[53] The name of the Electricity Supply Commission was changed to Eskom, in 1987 this appellation having no association with either the English or Afrikaans abbreviations, see The Eskom Act (Act No 40 0f 1987). For convenience the name Eskom will be used throughout.

The legal basis for Eskom's financial activities was likewise laid down in section seven of the Act. The establishment of general and reserve funds, prices to be charged for electricity, details of audit requirements and the reporting of financial statements were also all dealt with in the Act. Eskom was empowered to raise loans to acquire or extend any electricity undertaking. It was also entitled to obtain advances from the Treasury (from moneys voted by Parliament) to enable it to perform its functions during the first four years of its existence. Parliament was, however, to retain control over Eskom's borrowings in various ways. Firstly the approval of the Governor General had to be obtained and he was to approve the individual loans themselves. Secondly Eskom could not circumvent these provisions by changing prices charged for electricity sufficient to yield a profit that could be used for capital development purposes. The principle that revenue should only cover the cost of production and redemption payments and replacement costs was to remain sacrosanct for fifty years until 1971 when the idea of ploughed-back profits for capital expansion purposes was accepted by Parliament.

The Act also ensured that Eskom was not afforded special privileges so far as the supply of electricity was concerned and therefore entrepreneurs could submit tenders for supplying electricity whenever Eskom intended to establish a new undertaking i.e., the supply of electricity to a new area. In addition where an undertaking had been in operation for five years entrepreneurs could tender for the supply of electricity in that area.

The Act allowed Eskom to raise money for capital expenditure by issuing securities, debentures and stocks on the local money market, these being secured by Eskom's fixed assets. Foreign loans would be underwritten by the government. A fund had to be maintained, however, from which interest and redemption payments were to be made. So far as Eskom's accounts were concerned each undertaking had to maintain its own books.

One of the most important principles entrenched in the Act was that Eskom had to sell electricity at cost. Eskom could not therefore make a profit. The advantage that accrued to Eskom from this was that the Corporation was exempt from paying tax. Eskom does not pay tax to this day although, as will be shown, it is now allowed to make a profit on its operations. The price charged for electricity on a national basis was arrived at by taking account of capital repayment charges, operating and maintenance costs and a sum for strengthening Eskom's capital reserves.

Whilst the Act made provision for entrepreneurs to enter the electricity supply market as mentioned above it also allowed Eskom, with government approval, to expropriate any private

electricity supplier after that supplier had been in operation for a minimum of 38 years from the date of issue of its licence to operate.[54]

3.3.4 The Electricity Control Board

In the Transvaal Power Act of 1910 there was a controlling body, The Power Undertakings Board, which oversaw the workings of electricity suppliers. As noted above the Electricity Act of 1922 provided for the establishment of a similar institution called The Electricity Control Board. The powers of this board were substantially wider than those enjoyed by its predecessor, however, and especially so with regard to the licensing of electricity suppliers.[55] In particular the Electricity Act of 1922 made it clear that no electricity supply undertaking could operate without a license. The following institutions were, however, exempt from this ruling:

1. Government Departments;
2. The SAR&H;
3. Municipalities; [56]
4. Small undertakings of less than 500kw; and
5. Electricity institutions for the sole use of private persons.

The licenses issued by the Electricity Control Board had to contain a schedule of standard tariffs and every license holder had to supply electricity to every applicant, and the license had to ensure continuation of supply. With respect to electricity licenses the Electricity Act of 1922 covered three important issues. Firstly the holder of a license to supply electricity had the right to apply to the Water Court for permission to extract water from a river as well as the right to build a dam on a river whether the license holder held riparian rights to the water or not. Secondly a licensee could apply to the Governor General for permission to expropriate the necessary land to build a power station or obtain the necessary wayleaves for purposes of transmitting electricity along power lines. Thirdly a licensee could, after giving notice to the local authority, break up streets for the purpose of reticulating electricity or for other works which were necessary for the delivery of power to consumers.

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[54] This clause was in fact similar to the expropriation clause embodied in the Transvaal Power Act of 1910 mentioned already. Licences to supply electricity issued under this act remained in force under the new act, i.e.; the Electricity Act of 1922.

[55] Administratively the Electricity Control Board was senior to the Electricity Supply Commission having been founded on the 29th of August 1922. This Control Board can also be looked at as a forerunner of the National Electricity Regulator founded in 1994.

[56] The Johannesburg Municipality still operates its own power stations and supplies electricity direct to consumers.

3.4 The Period 1923 To 1950

3.4.1 The Electricity Supply Commission (Eskom)

The establishment of Eskom as a public electric utility, i.e., an institution owned by the people of South Africa, was announced in the Government Gazette with the following notice on the 6th of March 1923:

> "It is notified that His Royal Highness the Governor General has been pleased, under the power invested in him by Section One of the Electricity Act No 42 of 1922 to establish the Electricity Supply Commission referred to in that section as from 1 March 1923 and to appoint Dr Hendrik Johannes van der Bijl, M.A; Ph.D; as Chairman and wholetime member, and James Renwick Fulton and Robert Niven as part-time members of the Commission"

Van der Bijl had a very clear picture of the direction he wished Eskom to develop along. He recognised that the Corporation would be crucial to future industrial development in South Africa.[57] He also wanted to ensure that haphazard growth would not take place but rather growth would proceed along carefully planned lines. Van der Bijl, whilst he welcomed government interest in Eskom, sought to ensure that the government had limited power over the Corporation[58]. Van Der Bijl believed that giving monopoly power to a large supplier of electricity was the most economically sensible way of supplying power, since it avoided duplication of power lines and other essential plant. As noted Eskom was also able to borrow money from the government to finance its development during the first four years of its existence. In fact Van der Bijl borrowed R16 million (1999 rand) from the state to put his plans into action, within 10 years the loan had been paid back, (Eskom 1973, p.26). The first meeting of Eskom took place in Cape Town on the 20th March 1923 and it was decided that the Commission's Head Office was to be established in Johannesburg on the 1st of May 1923.

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[57] In this respect reference is made to his comments whilst he was a member of the Kotze Commission.

[58] This point is important. This philosophy of governmental non-interference became entrenched in Eskom and was a concern voiced in the National Electrification Forum's Report on the South African Electricity Supply Industry, (NELF (a), 1994, p.26). This point will be discussed further in chapter 6. It was also an important consideration in the government's decision to undertake a Commission of Inquiry into Electricity Supply in South Africa in 1984 see Chapter 4.

3.4.2 Eskom's development

One of Eskom's first priorities was the electrification of the railways in accordance with the recommendations made in the Mertz report. A meeting with the Railways and Harbours Administration (RHA) was therefore arranged only three days after the Commission's own inaugural meeting. Close liaison between Eskom and the RHA, as a consequence of Eskom's secretary, Mr Andrew McColm being Sir William Hoy's parliamentary assistant, made the meeting possible at short notice. The negotiations which followed lead to the RHA offering to hand over to Eskom the power station they were in the process of building at Colenso in Natal. This offer was accepted by Eskom and the power station was taken over in 1927. Meanwhile, on the 21st April 1925 agreement had been realised between Eskom, the RHA and the Durban Corporation that Eskom would build a new large power station at Congella to meet the needs of the RHA. As a consequence of these negotiations the Durban Undertaking came into being, (Searle, pp.49-50).

On the 22nd April 1924 agreement was also reached between Eskom, the RHA and the Cape Town Corporation for a new power station to be built at the mouth of the Salt River. As in Natal the RHA originally intended to build their own power station for the electrification of suburban railway lines in Cape Town, the building of Salt River power station, however, made this unnecessary. The RHA was then instrumental in the establishment of both Eskom's Durban and Cape Town Undertakings.

In 1922 the Rand Strike and the Rand Revolt had paralysed the gold mining industry and the demand for electricity by the gold mines had been curtailed. In 1923, however, with these upheavals over the gold mines once again increased their demand for electricity as they sought to increase gold production. Because gold, diamonds and coal are wasting assets after 1925 the government of South Africa expressed their concern about the consequences of mining these assets, (de Jong, 1975(Vol.4), p.114). The solution to these concerns was, however, not sought in prolonging the life-cycle of the mines but rather by encouraging diversification of economic activity through the development of a manufacturing sector in South Africa. For the reasons already given electricity would also play an essential role in the development of this sector. The development of the manufacturing industry was, however, closely allied to the development of mining in South Africa. The foreign exchange earned from mining provided the finance necessary for major developments to take place in the manufacturing sector. Workshops were erected to repair mining machinery that had originally been imported. Factories were built for manufacturing goods needed by the mines, for example, hoists and trams to move ore and structural steelwork fabrication for buildings needed at the mines. It was a natural step therefore

for the mining houses to diversify their profit base by investing in the South African manufacturing sector.

A factor which curtailed the early growth of the manufacturing sector was that prior to 1924 the dominant economic philosophy in South Africa was that of trade liberalism and the repression of labour, (Abedian and Standish, (eds) 1992, p.7). Government was therefore insufficiently involved with fostering the development of manufacturing industries in the country. In 1925, however, a coalition of white business and farming interests came to power, in the shape of the PACT government. It was this coalition that initiated governmental involvement in the development of the manufacturing sector in South Africa. The government became the owners of major industrial enterprises including the South African iron and steel manufacturing giant ISCOR. The Industrial Development Corporation (IDC) was also established to encourage growth in the manufacturing sector and the IDC eventually owned interests in a wide variety of manufacturing industries. Whilst the policies put forward by the PACT helped develop the South African manufacturing sector they failed to encourage the sector's independence from the mining sector, (Lumby 1976). Even by 1980 the manufacturing sector was still almost wholly dependent on the mining sector for its foreign exchange needs, (Nattrass, 1990, p.272).

Manufacturing development was stimulated in the period 1923-1950 due in part to the continuing urbanisation of a large part of South Africa's population which had been increasing since the early days of the mineral discoveries and particularly from 1920 onwards. Urban facilities grew as a consequence which caused a demand for various goods used in an urban environment. With electricity being readily available to white households electrical appliances and radios were in demand. After 1939 industrialisation grew at a rapid pace and secondary industry began to dominate the South African economy. It can be argued, as does Marais (1963,p.308), that it was after 1939, not after the First World War, that industrialisation took off in South Africa. As a consequence of this growth the manufacturing sector has diversified its output from the manufacture of goods for internal domestic consumption only and the mining sector, to the production of machinery, chemicals, metal products and some electrical equipment. Manufacturing expanded then from the simpler requirements of the domestic markets to products that could be exported. As this manufacturing development took place electricity supply, because of its comparative advantage over other energy forms in manufacturing processes, became more and more important.

Returning now to the history of electricity supply itself in South Africa the VFP was in 1923 the sole supplier of electricity to the gold mines and the associated manufacturing sector. In that year the company applied for a licence from the recently established Electricity Control Board to build

a new power station at Witbank. Witbank was chosen as the location for this station because of the large amounts of cheap coal which was available in the area. Witbank itself was at this time a small town but was in the centre of the Eastern Transvaal coal fields, and therefore had the potential for industrial development, thus expanding the manufacturing sector, (Searle, p.53).[59]

Eskom was quick to see the commercial possibilities of supplying electricity to a burgeoning industrial area and consequently opposed the application of the VFP for an electricity supply licence on the grounds that Eskom would like to build a power station themselves at Witbank. This act of opposition was of course, under their mandate, and well within their legal rights. The VFP, however, saw this as an attempt by a state established electricity supply company to curtail free enterprise in the electricity supply industry.[60] Eskom acted very wisely when they realised how the VFP viewed their opposition and proposed that although they would build the Witbank station, and thereby establish the Witbank Undertaking, the VFP should operate and manage the power station.[61] The Witbank power station, which was commissioned in 1927, was connected to the VFP transmission system by South Africa's first 132kv line to Brakpan.[62] With this connection in place the VFP started negotiations with the Rand Mines Group to take cheap power from the Witbank power station. With the success of their negotiations the VFP system was connected to the RMPS' system making it one of the world's major interconnected power systems. The entire system was controlled from Simmerpan, (Eskom, 1973, p.14).

To provide water to cool the Witbank power station Eskom was obliged to build a dam in the Olifants River. The water so impounded secured an adequate supply of water not only for the power station but for the town of Witbank as well. This water, together with the cheap electricity, which could be purchased from the Witbank power station was the basis for the future industrial expansion of the Witbank area. This was one of the first instances in South Africa of a rural area undergoing industrial growth as a result of electricity supply.

Another rural development area was Sabie. The Sabie gold mines had in 1920 approached the Department of Mines for an electricity supply scheme to be developed. When Eskom was established the request was transferred to them. Mr A. M. Jacobs, Eskom's Chief Engineer, was

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59 Iscor was eventually to establish a large steel-making facility at Witbank and it is interesting to speculate whether the VFP knew of these plans.

60 This is clear from the objections made by the VFP to this move by Eskom, (Vos, Vol. 2, p.32).

61 This station was to be the largest in South Africa at this time and would have the reputation of producing the cheapest electricity.

62 As previously noted there were two separate power systems serving the gold mines of the Witwatersrand, the VFP system taking power from the Brakpan and Simmerpan power stations and the RMPS' system taking power from the Rosherville and Vereeniging power stations.

assigned the task of investigating the electricity needs of these mines. Jacob's survey found that without a suitable supply of cheap electricity some of the mines in the Sabie area would be forced to close. He recommended that hydro power be used to solve the problem.[63] The Sabie river hydro station was commissioned in July 1927. Although small in size this station was, like the Witbank power station, an example of how electricity supply to rural areas enabled such areas to prosper. By keeping the Sabie gold mines operational the entire Sabie area began to develop economically.[64]

Despite the depression of 1929–1932 sales of electricity continued to increase gradually except for sales to the railways which fell as a result of a smaller demand for transport. Whilst the depression did curb the growth in the electricity supply industry the discovery of new gold fields west of Randfontein and the increase in the price of gold in 1933, after South Africa abandoned the Gold Standard, gave Eskom the stimulus it had been waiting for.

After the depression of 1929-32 the gold mining industry expanded and there was an increased tempo in the demand for electricity by the mines. Van der Bijl was quick to see that a new power station was needed to meet this demand. There were, however, two problems to be overcome if this station was to be built. The first problem was that the VFP had a virtual monopoly of supplying electricity to the Witwatersrand gold mines. The second problem was the serious lack of cooling water for a new power station in the area close to these mines. The Vaal Barrage was already taxed to its limits in supplying existing power stations. The first problem was overcome by Eskom offering to build a new power station at Henley on Klip inviting the VFP to operate and manage it on their behalf as part of the VFP network, a la the Witbank power station. The second problem was solved by using cooling towers to recycle cooling water, thereby reducing the amount of water drawn from the source needed to cool the station. Thus it was that in 1934 the building of the Klip power station commenced. This was to be a very large station by the

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63 This was a very interesting decision since due to the arid nature of South Africa hydro power has since this scheme never been taken as a serious option by Eskom. The exceptions are the Hendrik Verwoerd and the Vanderkloof Hydro Stations. The former, which has been renamed Gariep, was commissioned in 1971 and the latter in 1977. Eskom also became involved in the Cabora Bassa hydro scheme in the early 1980's. These schemes will be referred to again later in this chapter.

64 The Sabie river hydro station has a particularly distinguished history. Firstly, it was in those days a remote outpost of the Eskom empire, and from 1935 onwards it was managed single-handed by Mr Raoul Martin a German immigrant who had fought in the Anglo-Boer war. Escom issued him with a rifle to keep the lions of the area away from the hydro station. Mr Martin retired at the age of 82 when the station was finally closed down. Many of his experiences are recorded in letters he wrote to Eskom's managers in head office and are preserved in Eskom's Heritage Archive at Megawatt Park, Sandton.

standards of the day generating 396MW.[65] Klip power station set the pattern for future Eskom stations i.e.; they would be large and be located directly on coalfields providing cheap electricity by their ability to burn poor quality coal that could be bought at a low price. Because of their size economies of scale were also obtained. Further developments in this, the Rand Extension Undertaking, followed and Eskom, in conjunction with the VFP, decided to build yet another power station to meet the needs of railway electrification in the Transvaal and the needs of the newly discovered Free State Goldfields. This power station was to be located about 9kms south of Vereeniging in the Orange Free State, and was to be named the Vaal power station, (Eskom, 1973, p.20). It was connected to the Free State Gold fields by an 88kv transmission line.

Another Eskom development during this period was the Border Undertaking which supplied electricity to the Eastern Cape. Its establishment was a direct result of three municipalities requesting Eskom to take over ownership of their power generating and transmission systems. The first municipality to do this was East London in 1946 and Eskom took over that municipality's West Bank power station in September of 1947. In 1948 Eskom purchased both the King Williams Town power station and Kimberly's Alice Street power station. These three facilities formed the nucleus of the newly created Border Undertaking, (Eskom, 1973, p.20).

3.4.3 The expropriation of the VFP

The year 1948 was a very important one in the history of electricity supply in South Africa. In March of that year the VFP's licence to supply electricity was due to expire. For several months prior to that date Eskom and the VFP had been negotiating a deal whereby Eskom would take over the VFP. This was done on the 1st of March 1948 just before Eskom's silver jubilee. This was the biggest business merger that had been negotiated in South Africa up to that time and therefore deserves some special mention.

The VFP had never lost sight of the possibility of its electricity supply undertaking in South Africa being expropriated by the state, (Searle, p.64). This was because the license granted to the company, in terms of the Power Act of 1910, annulled all concessions granted to them by the government of the South African Republic and the government of the Colony of the Transvaal for supplying electricity in their territories. Furthermore, the VFP's expansion prospects had been sealed when their agreement with Eskom had been signed whereby Eskom would own the new

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[65] This station was at this time the largest in the Southern Hemisphere and indeed one of the largest in the world; it was four times as large as Witbank power station and was to generate even cheaper electricity than that station.

Witbank power station and for the VFP to merely operate it. The question of concern to the VFP was then not whether the state would expropriate them, but when would they do it?

The expropriation question was the subject of a conversation between Van der Bijl and the Prime Minister J. C. Smuts on the 24th November 1944. Van der Bijl subsequently wrote Smuts a letter concerning this matter. In this letter Van der Bijl asked Smuts what policy the government was going to adopt concerning the expropriation of the VFP bearing in mind there was controversy over when this could be legally carried out. The time difference attached to this controversy was three years between the earliest and latest dates for the take over. The Prime Minister replied on the 18th December 1944 saying that the later date would obtain, this being considered the fairest course of action.[66]

There the matter stood, all that remained was for Eskom to agree a suitable price with the VFP for their assets in South Africa. The mining industry attempted to enter the negotiations with a suggestion that Eskom should offer the VFP shareholders a price slightly higher than the ruling market price for their shares; they were clearly very anxious to speed up the expropriation issue.[67]

In the meantime Eskom had made an analysis of the profits earned by the VFP since 1924. This analysis concluded that if Eskom expropriated the VFP in 1950 the annual savings from then on to the South African economy would amount to between £2,5 million to £3 million per annum. Eskom also believed that the VFP had in hand £6 million in liquid assets plus the whole of their undertaking in South Africa.[68]

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66 Copies of these letters can be found in Vos (Vol. 7, p. 49)

67 The gold mining industry, represented by Sir Ernest Oppenheimer, was most anxious for Eskom to expropriate the VFP because then they would pay less for electricity. He wrote a letter to Van der Bijl on the 2nd January 1947 in this regard. The letter, in Oppenheimer's own hand and written from his home Brenthurst in Parktown Johannesburg, was marked Personal VFP Expropriation and addressed to Dear Hendrik it said, "As you know I am most anxious that the ES Commission should expropriate the V FP Co. It will lead to 1/- (one shilling, author's addition) reduction in milling costs. I have referred to this matter in public speeches but avoided quoting figures." He urged Van der Bijl to meet him saying that he had a scheme by which the VFP could be taken over on a cheaper footing than dealing with Bernard Price (the General Manager of the VFP) and suggested that their secretaries arrange a private meeting. A copy of the original letter can be found in Vos, (Vol. 7, p.66). There is no record of this approach by Oppenheimer being pursued by Van der Bijl, not even a reply to the letter. In the event negotiations between Van der Bijl and Price continued to take place.

68 Eskom's Commercial Manager, Mr Percy Furness, prepared a summary of the financial situation regarding the expropriation of the VFP, Furness showed that electricity consumers would have considerable savings if the VFP was expropriated. He further pointed out that with the exception of Eskom the VFP was the only other licensed electricity supplier of note in the Union Of South Africa. (Minutes of Commission's meeting 5th December 1946).

Eskom thought that the VFP would value their undertaking at £15 million. It was also believed that the profits made by the VFP had written off their capital assets entirely. As a consequence if Eskom purchased the VFP's capital assets for some higher figure the state would be effectively paying for them twice over.[69] Negotiations between the VFP and Eskom commenced in February 1947. Eskom's stance was based upon the financial analysis referred to above. Price[70] suggested that Eskom should consider offering a price for the company's undertaking in South Africa as it stood leaving out of the question any investments or cash assets held by the company in London. Price "casually" mentioned a figure of £25 million less £10 million liquid assets. Eskom offered a price of £13,5 million, which was rejected and a counter offer of £17,5 million was made by the VFP. On the 28th February 1948 Eskom replied rejecting this counter offer and reaffirmed their original offer of £13,5 million saying that this offer must be accepted or rejected within ten days from the 28th January 1948. If the offer was rejected the government would be advised. Price's keen displeasure at this ultimatum was shown in a lengthy letter, dated 6th February 1947 which, he sent to Van der Bijl. Price quotes in his letter the feelings of the Chairman and Board of the VFP which were as follows:

> "While we are ready to give the Commission's letter every attention and examined their proposal we must flatly refuse to be bound by the time limit... The negotiations are too big to be rushed and it is unseemly for one party to adopt such an overbearing attitude".

Price went on to make Eskom another offer in the sum of £15,5 million. Eskom subsequently offered the VFP £14,5 million, which was accepted.[71] This brought an end to the supply of electricity and compressed air to the gold mines and other consumers in the Transvaal and the Orange Free State by a private electric utility and these services were passed over to Eskom a public utility. The take over was a logical step in the provision of electricity to South Africa because, as mentioned already, electricity is vital for a country's economic growth and it is doubtful whether the VFP as a private utility would have been able to raise the capital required

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69 The basis for Eskom's opinion can be found in Power Supply to the Witwatersrand Gold Mines, a document prepared by Eskom to determine the price to be paid for the VFP's capital assets upon expropriation dated the 31st December 1946. The original document can be found in Vos (Vol. 7, pp.59-65).

70 Bernard Price was born in London in 1877 and qualified as an electrical engineer there. In 1908 he joined the VFP as chief engineer and became General Manager in 1926 and resident director for the VFP in South Africa in 1936. He was a benefactor of the University of the Witwatersrand and with the Carnegie Corporation was to co-found the Department of Geophysics at the University. He served for many years on the University Council. In recognition of his services to the University he received the honorary degree of Doctor of Science. He died on the 9th July 1948 only seven days after the expropriation of the VFP and not many days before his 71st birthday.

71 Documentation concerning these negotiations can be found in Vos (Vol. 7, pp.70-90).

for the expansion in electricity supply that South Africa would need in the decades ahead. The take over was also another step in Van der Bijl's ideal of establishing in South Africa an electricity supply system that would meet the needs of the entire country.

The take over was doubly important when it is recalled that the VFP, which had been founded 42 years before, was one of the largest electric utilities in the British Commonwealth. It had grown in direct proportion to the growth of the gold mining and manufacturing industries of South Africa. It had also brought domestic electricity to areas that had been without power, via its supply to various white municipalities on the Witwatersrand. It was also a principle supplier of electricity to many industries which had grown to serve the gold mines.[72] The area formally covered by the VFP electricity supply licence became the Rand Undertaking.[73] The VFP continued to exist as a legal entity separate from Eskom after the take over but the RMPS was taken over as a wholly owned subsidiary of Eskom. After the 1st of January 1949 all the assets of the VFP and RMPS were brought onto Eskom's books. As a consequence of the take over Eskom staff compliment rose from 2692 to 7850.[74]

3.5 The Period 1950-1980

The years 1950-1960 were ones of intense activity for Eskom. The newly formed electric utility faced many urgent priorities and problems so far as the demand for power was concerned. This was because there was country-wide industrial development taking place in South Africa and also, because of the Second World War, there was a backlog in obtaining generating plant. This backlog being directly related to the time needed to convert the manufacturing sector of countries that could supply such plant to Eskom from war to peace-time production. The fifties decade can also be seen as a period of transition in the history of electricity supply in South Africa. The first half of the decade was a time of shortages. There were shortages of raw materials required for the building of power stations such as cement, bricks and steel, there was also a shortage of skilled manpower so far as Eskom was concerned and finally there was a shortage of capital. These years were characterised then by a concomitant shortage of electricity. During the second half of the decade problems of power shortages were overcome by interconnecting power stations one to another which introduced economies of scale into the supply of electricity in South Africa. The country's electricity transmission system was also expanded from 1955 onwards.

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72 The VFP had also been active in the Second World War providing weaponry for the allied cause in its Rosherville workshops, (Searle, p.64).

73 This Undertaking was eventually expanded by Eskom and became the Rand and Orange Free State Undertaking.

74 The staff compliment included staff of the power stations, which belonged to Eskom but were operated by the VFP i.e., the Witbank and Klip power stations.

The Rand Undertaking was the worst hit by equipment shortages. This situation being partially attributable to the extensive industrial development taking place in this area and also to the power demands of the new Free State gold mines which were going into production at this time, (Eskom, 1973, pp.22-23) [75].

Gold mining was during this period, as it is today, of extreme importance to the South African balance of payments and because of gold mining's dependence on electricity, electricity was as well. The establishment of the Bretton Woods system in 1944 reinforced the monetary role of gold and instilled continuing long-term confidence in gold. This confidence underpinned the investment required for opening up the Free State goldfields after the Second World War. Similarly the breakdown of the Bretton Woods system and the rises in the price of oil from 1972 with consequential world-wide inflation ensured gold's attraction as a desirable store of value. Only electricity could keep South Africa producing this commodity in large quantities.

The development of the Free State mines lead to an extensive industrial development area coming about in what was essentially an agricultural enclave. The so-called Vaal Triangle was also being rapidly developed with the newly built steel manufacturing facility at Vanderbijlpark being extended. Also in this area the production of synthetic fuels from coal at Sasolburg demanded great amounts of electricity. Coupled to all this industrial activity there was in addition a uranium industry being developed in which the demand for electricity was particularly intensive. The mining of phosphates and base metals was going on in the Northern Transvaal and the cities of Durban, Cape Town, Pretoria, East London and Port Elizabeth were also undergoing considerable industrial development. There was also at this time a network of border industries being established as well in the so-called Bantu Homelands. Bringing electricity to these border areas provided Eskom with a springboard for extending the supply of domestic electricity to them in later years.

To keep the gold mines productive Eskom, in conjunction with the South African Chamber of Mines, had to devise an urgent scheme of power quotas whereby each mine received a monthly supply of electricity based upon the consumption that they had taken for the previous three months. Mines were also warned to prepare for power cuts in the event of a generator break-down. Each mine was warned in advance and by careful planning i.e.; control of the running time

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[75] This increased activity arose because in 1949 the pound sterling was devalued and this caused increased export activity from South Africa (the currency of South Africa was of course at this time sterling) this increased activity contributing to the demand for electricity in the manufacturing sector.

of machines and load transfer, the power supply to the gold mining industry was scarcely impeded at all. Municipalities and other bulk buyers of electricity were however, also restricted to fixed maximums of power in 1950. New applications for power were held in abeyance, unless the application was for an essential service or of national importance until new generating capacity could be built. Needless to say the provision of electricity to the rural areas of South Africa suffered during this period and such supplies were not taken into account in Eskom's generation expansion programme, (Eskom, 1973, p.23).

Some idea of the demand for electricity during the decade 1950 to 1960 to meet the needs of the mining and manufacturing sectors may be obtained by examining Eskom's power station building programme. In the early fifties Eskom was carrying out work on eight power stations simultaneously. At the existing power stations of Colenso, Congella, Vaal and Witbank additional equipment was being installed and four new power stations were being built, these being Hex River at Worcester in the Cape, Vierfontein near Klerksdorp, to meet the increasing needs of the Free State goldfields, Umgeni in Pinetown and Salt River No 2 in Cape Town. Between 1945, at the end of the Second World War, and 1955 Eskom's generating capacity more than doubled.

The decade 1960 to 1970 was, like the preceding ten years, one of intense capacity building so far as fossil-fuel power station construction was concerned. In addition, hydro-electric power sources were investigated as well which resulted in the construction of South Africa's first large hydro station. A particular significant milestone was reached in this decade when nuclear power as an energy source for generating electricity was considered. Of great economic importance was the construction of an interconnected national transmission network, which was also started in this decade.

With respect to hydro-electric power Eskom informed the government in 1961 that it was ready to accept responsibility for the financing, building and operation of hydro-electric stations wherever they would be technically feasible and also for the provision of power transmission systems from these stations. This initiative was sparked off by the Orange River project being built by the Department of Water Affairs which was announced in 1961.[76] This scheme was

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[76] Until it was decided to proceed with the Orange River project Eskom had only one small hydro-electric power station, the Sabie station. There were potential schemes such as the use of the Kimberly Big Hole and the Paarl Mountain scheme which had been examined for their pumped storage capabilities, (Eskom, 1973). There are, however, few sites in South Africa which are suitable for building hydro-electric stations and even fewer are the sites situated near large electricity demand centres. The potential sites, even if developed, would require costly transmission lines to connect them to consumers. In spite of these drawbacks the Department of Water Affairs, to this day, notifies Eskom (in terms of Section 67[2] of the Water Act No 54 of

primarily a water conservation project but the hydrological analysis revealed that the hydro power potential of the dams which formed part of the scheme was considerable, particularly the main dam, named the Hendrik Verwoerd Dam (now the Gariep dam). It was calculated that if the wall of this dam was raised an additional 18,3 metres its hydro potential would be increased by a sufficient amount to make it suitable for use in the generation of electricity. Eskom agreed that they would pay a fixed tariff per unit of water to the Department of Water Affairs to defray the additional costs of raising the dam wall. A new undertaking was formed by Eskom to operate and maintain the hydro-electric power station that could, because of the raising of the dam's wall, be built on the Orange River Scheme. This undertaking was appropriately named the Orange River Undertaking.

Because Eskom's development plans had reached such vast proportions in the 1960's the Vaal Triangle was replaced as the centre of electric power generation by the Eastern Transvaal. The choice was governed by the vast coal reserves of the Eastern Transvaal and the adequate water reserves required for cooling power stations which were available in the region. In 1962 Eskom announced plans for their first large power station to be built in the Eastern Transvaal 16km south of Ermelo. This station, known as Camden, was joined to Komati power station by means of a 275kv transmission line. Most of the power from Camden was transmitted to the industries of the Witwatersrand and the gold mines of the Orange Free State and also to the growing industrial developments of the Northern Cape. To transmit the power a 400kv line was built, this being the first 400kv line in Africa. This line formed the beginnings of the South African national grid which was approved by the government. Camden power station and the hydro power potential of the Orange River were important links in the national grid, which would eventually connect the power stations of the Transvaal with the electricity distribution system of the Cape Undertakings.

With respect to the Cape Province the price of electricity in the Western Cape was dependent on the cost of transporting coal to that area by rail; a distance of some 1 500km from the Eastern Transvaal.[77] Because the hydro station scheduled to be built on the Orange River was half way between the Eastern Transvaal and the Cape Eskom decided to build a transmission line from the Transvaal to the Orange River Undertaking and on to the Cape rather than build a new power station in the Cape Province to meet that provinces' increasing demand for power.[78] With the

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1956) if any water schemes that they are developing have hydro-electric potential. It is left to Eskom management to decide if they wish to exploit this potential.

[77] In 1971 the cost of coal in the Eastern Transvaal was R2/ton whereas in the Cape the cost was R7/ton.

[78] See Eskom's 1960-1970 power generation plan prepared by Eskom's Power Generation and Distribution Department, Johannesburg, 1960.

construction of the national grid, Eskom took immediate steps to begin a major power station construction programme to provide the grid with all the power South Africa would need for its industrial growth and to meet the needs of white municipal areas, (Eskom, 1973, p.32).

In 1964 plans were therefore drawn up for this purpose. Electricity supply to white-owned commercial farms and black households did not feature in that planning. Eskom decided that four new power stations would be built between 1964 and 1970 all in the new centre of electricity generation the Eastern Transvaal. In 1964 work commenced on Arnot and Hendrina power stations. With the building of these stations Eskom began observing their economies of scale philosophy by increasing the size of the electricity generating sets on the Arnot station over those of Hendrina by 75 per cent. In 1965 Eskom announced the construction of the third of these four stations at the Grootvlei mine in Balfour. In 1967 the building of the fourth power station was announced, this was the Kriel power station, which was situated between Oogies and Bethal in the Transvaal. Kriel was the first of a so-called "new generation" of super power stations, which would be built in future by Eskom. At Kriel, and subsequent stations, the electricity generating set sizes increased by 260 per cent over those installed at Hendrina a mere three years previously. Each of Kriel's generating sets had a capacity of 500MW. In 1968 Eskom also began work on the construction of the Hendrik Verwoerd (now named Gariep) hydro-electric power station, (Eskom, 1973, p.33).[79] So far as transmission line construction was concerned the 400kv line between Camden Power Station in Ermelo, also in the Eastern Transvaal, and the Western Cape was completed. The Western Cape claimed further attention in July of 1967 when Eskom purchased the farm Duinefontein, situated 25km north of Cape Town, for the erection of the African continent's first nuclear power station, which was to be known as Koeberg.[80] The construction of this power station commenced in 1974.

During the period 1960 to 1970 the development of the national grid was economically important, not only from the domestic viewpoint but also from the international perspective. The development of a national grid followed similar developments in other countries, particularly

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[79] As noted, the price Eskom paid for water for this power station made a significant contribution to the costs of building the Hendrik Verwoerd dam which was principally used to store water for agricultural purposes. Electricity consumers therefore helped subsidise farmers since this hydro station was not strictly required so far as future electricity demand was concerned.

[80] Dr J.T. Hattingh who was Eskom's chairman in 1955 had attended an international conference on the peaceful uses of nuclear power in Geneva in that year. In 1956 he also attended a conference in Vienna on the use of nuclear energy for electricity generation. In 1957 a Commission of Inquiry into the use of nuclear energy in South Africa was undertaken under the chairmanship of Mr D.D. Forsyth. Eskom was represented on that Commission by Mr I. de Villiers Eskom's Chief Electrical Engineer. As a result of what was learnt by the Commission a task team was formed by Eskom in the early sixties to consider how Eskom should proceed with the development of nuclear power. The recommendation of the task team was that Eskom should proceed with the building of a nuclear power station, (Eskom 1973, p.36).

industrially mature countries in Europe and also the USA. Such a grid could transmit electricity generated in South Africa to countries bordering the Republic and conversely it was capable of bringing power into South Africa that was generated in neighbouring countries (then under white control) by connecting it to the electricity networks of those countries[81]. To take advantage of this opportunity an important change in the Electricity Act was promulgated in 1964. The Act was amended to allow Eskom to supply electricity to contiguous territories or conversely receive electricity generated in those territories at any point on the South African border.

The first international connection was made between South Africa and Mozambique. In 1966 the governments of South Africa and Portugal commenced discussions on the benefits afforded by such a connection. The idea was that the Zambezi River could be dammed at Cabora Bassa[82] and a hydro-electric station could be built there. It was initially planned that Eskom would purchase about half the power generated at this station the other half would be used for development in Mozambique. The economic viability of the scheme depended on Eskom's power purchases. The power that would be generated at Cabora Bassa would be brought to South Africa via a transmission line some 1 360km in length and be fed into the national grid.[83]

Also in 1966 Eskom entered into an agreement with a subsidiary of the Industrial Development Corporation of South Africa, namely the South West Africa Water and Electricity Corporation generally known as SWAWEK. Eskom was to act as their agent for the development, distribution and supply of electricity to South West Africa as Namibia was known at that time. The prime purpose of the agreement was for Eskom to build a fossil-fuelled power station at Windhoek and a hydro-electric power station at the Ruacana waterfall on the Kunene river on the Angola border and connect these stations by a transmission line.[84]

In 1967 an agreement was also reached between Eskom and the Kingdom of Lesotho for the supply of bulk electricity to that country. For this purpose an 88kv transmission line running from Ladybrand in the Orange Free State to a point on the Lesotho border near the capital Maseru was built. In 1968 negotiations also took place between Eskom and Swaziland concerning the supply

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81 The states concerned being Mozambique, Rhodesia (now Zimbabwe) and South West Africa (now Namibia).

82 The name has subsequently changed to Cahora Bassa.

83 The electricity was transmitted in direct current form and converted to alternating current at the Apollo Converter Station outside Pretoria.

84 Construction of the Ruacana hydro-electric station was only started in 1973 since it required that certain dams had to be built in Angola for the successful operation of the scheme, (Eskom, 1973,p.40).

of bulk electricity to that country, although the delivery of power was only to be made in the next decade.

There was then in the period 1960 to 1970 considerable co-operation between South Africa, the so-called front-line states and the land-locked independent states of Swaziland and Lesotho, so far as electricity supply was concerned. The front-line states schemes were, however, short lived as a result of the withdrawal of the Portuguese from Africa and the fall of Rhodesia. This topic will be discussed further in Chapter 4. Finally, and also in 1968, Eskom concluded an agreement with Mozambique for the supply of electricity to Ressano Garcia. This supply was made available on the 29th of July 1969.

The period, 1970 to 1980 presented financial, economic and even political problems for Eskom.[85] It was a period that saw consumer and governmental concern with Eskom's tariff increases in particular. The effect that the increases in electricity tariffs had on the cost structure and competitiveness of the South African economy over a number of years in this period prompted the Minister of Economic Affairs, to request the Board of Trade and Industries on the 7th March 1977 to inquire into, and report on, Eskom's tariff policy and structure. Furthermore, in December 1970, at the very start of the period, the government published their Economic Development Programme in which it was reported that only "moderate" economic growth would be expected in South Africa for the next five years". This prognosis did not, however, deter Eskom from continuing with its already substantial generation expansion programme which involved the building of power stations and transmission lines. This programme required large tariff increases to sustain it during this period and undoubtedly brought upon Eskom the governmental attention that occurred in the years from 1980 onwards. This topic will be discussed fully in Chapter 4.

As a result of capital shortages in the early 1970's it became increasingly difficult for Eskom to raise money for their development programme on foreign markets. As a consequence of this capital shortage interest rates also rose (see section 3.1.3 Chapter 2). Faced with this problem Eskom gave attention to internal capital formation. The result was that a request was made to the Minister of Energy Affairs for an amendment to the Electricity Act of 1922, which would authorise Eskom, within statutory limitations, to generate capital which could be used for development purposes by a charge against revenue.[86] Eskom also wanted the Act amended to

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[85] Facts presented here for the years 1970 to 1980 are condensed from Eskom's Annual Reports for this period.

[86] Eskom was encouraged to make this request to government because in 1969 the Franzen Commission had recommended, inter alia, that the share of internal funds, as a source of financing the capital expenditure of public sector enterprises, should be increased to reduce their dependence on borrowed funds.

make it possible for them to combine all of South Africa's power stations in a new generating undertaking. This undertaking would be called the Central Generating Undertaking, commonly called the CGU. The CGU would supply power in bulk to all of Eskom's distribution undertakings. This, it was thought, would allow Eskom to operate all it's power stations in a manner aimed at achieving the lowest overall cost of generation thereby cutting operating and maintenance costs. The Electricity Act was amended in 1972 in line with Eskom's request, and a Capital Development Fund was established, and money was laid aside each year thereafter for this fund.

The period saw an increasing trend developing in costs for power station equipment. This was a world wide phenomenon. In addition fuel costs began to escalate. Initially these costs, particularly coal costs, were masked by rising transportation costs especially rail haulage costs. These rising costs forced Eskom to begin to increase their tariff levels each year in the period 1970 to 1980 at a higher rate than had hitherto been the case. Two reasons were given by Eskom for the electricity tariff increases during the 1970 to 1980 period. Firstly, increases were necessary because of escalating operating costs, and secondly, increases were necessary to finance expansion.

The period 1970 to 1980 was also one that saw fluctuations in electricity sales. Overall there was a growth in sales which succeeded in sending Eskom a wrong economic signal. It encouraged the Corporation, despite changing political and economic events such as student and township unrest in the mid seventies, and difficulties in raising capital and high interest rates in the early seventies, to forge ahead with a massive expansion programme which, this study will show was partly unnecessary.

With respect to this expansion programme, in what was an act of economic faith, Eskom announced in 1974 that two new stations of massive proportions (3 600MW each) would be built. The first was named Matla (the Sotho word for power) and was to be built 4km south west of the Kriel power station. The second was named Duvha (the Venda word for sun) which was to be built 14km south east of Witbank. In addition a new pumped storage station named Drakensberg was announced for Natal and in the Western Cape another pumped storage station at Palmiet, just outside Cape Town, was also to be built. In 1975 two gas turbine stations were also ordered. The first, being at Acacia near Cape Town and the second being at Port Rex near East London. These stations were to be used to help meet the expected power requirements of the coastal areas. To add to this frenetic construction activity Eskom began to plan for two more giant power stations also of 3 600MW which would be constructed in the 1980's. The first was Tutuka power station, which was to be situated at Standerton. Eskom considered that this station was so urgently needed

that the contracts to build it were not open to public bidding procedures i.e., competition, but were negotiated contracts with the main suppliers of plant for Matla power station.[87] The other station was initially called Ilanga, but this name was eventually changed to Matimba. This station was to be built at Ellis Ras in the North Western Transvaal.

3.6 Growth in the Mining and Manufacturing Sectors to 1980

Having described the development of the electricity supply industry up to 1980 and Eskom's role in the development of the mining and manufacturing sectors it is appropriate now to provide some facts on the growth of these sectors. It is suggested that such growth was made possible by supplies of reliable, and by world standards, cheap electricity. This statement in itself is not particularly powerful, however since this can be said of many other aids to industrial growth. The pertinent question therefore is how much would industrial growth have been curtailed without electricity? Whilst it may not be possible to answer this question it is harder to deny the importance of electricity in industrial growth than to extol it.

The following tables illustrate the magnitude of development in the mining and manufacturing sectors of the South African economy up to 1980. Firstly mineral production from 1915 to 1980 is shown in Table No 3.1 below.

Year	Physical Volume of Production of Minerals (1980 = 100)			
	Total	Gold	Diamonds	Coal
1915		41,5		
1935		48,8		
1950	35,5	53,8	19,1	23,3
1960	66,1	98,5	31,2	33,6
1970	107,7	148,5	76,1	47,7
1980	100,0	100,0	100,0	100,0

TABLE NO 3.1 GROWTH IN THE PHYSICAL OUTPUT OF THE SOUTH AFRICAN MINING SECTOR: 1915 – 1980
Source: South African Statistics (1986).

From Table 3.1 the growth in the physical output of South Africa's major mineral exports tripled in the period 1950-1980. Such an increase is in the most part due to the development of the

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[87] Interview with Mr J de Beer, 13 November 1996.

electricity supply industry in South Africa. Without electric power deep level mining would have been impossible and these increased outputs would not have been realised.

So far as the manufacturing sector is concerned Table No 3.2 below illustrates the net output and the numbers employed in manufacturing for selected years.

YEAR	NET OUTPUT (R MILLIONS 1970 PRICES)	NUMBER OF PEOPLE EMPLOYED IN THE SECTOR	AVERAGE CAPITAL/EMPLOYEE (1970 RANDS)
1919	175 890	119 767	687
1936	342 938	218 966	667
1951	1 189 381	536 275	855
1970	3 101 889	1 095 557	1 481
1976	4 517 513	1 362 079	1 639

TABLE NO 3.2 MANUFACTURING NET OUTPUT AND JOB CREATION: 1919 – 1976
Source: Manufacturing Census (1918-1976).

The average yearly growth rate in net output in the period 1919 to 1976 amounted to 5,9 per cent, (Nattrass, 1990, p.165). It can also be seen from Table No 3.2 that the capital employed per employee in the manufacturing sector increased over the years indicating more sophisticated manufacturing processes being employed i.e., processes becoming more mechanised and requiring electricity. The average yearly growth rate in capital intensity between 1919 and 1976 was, however, relatively low being 1,5 per cent, (Nattrass, 1990, p.165). The structural changes in the manufacturing sector are demonstrated by the data presented in Table No 3.3 below.

	1916	1945	1960	1976
No of Establishments	3 638	9 316	10 264	15 461
No Employed/Establishment	24	39	63	88
Gross Output/Establishment (1970 Rand)	52 900	117 800	349 600	753 500
Average Investment/Establishment in Plant and Machinery (1970 Rand)	31 600	39 200	77 500	151 800

TABLE NO 3.3 STRUCTURAL CHANGES IN THE MANUFACTURING SECTOR: 1916 – 1976
Source: Nattrass, (1990, p.168).

From Table No 3.3 it can be observed that the numbers of enterprises increased fourfold in the sixty years between 1916 and 1976. Furthermore, the capital intensity in plant and machinery increased nearly five times.

4.0 ESKOM'S VIEW OF THE SOUTH AFRICAN ECONOMY IN 1980

The foregoing discussion gave an overview of Eskom's extraordinarily large power station building programme, which really commenced after the Second World War, gained momentum in the period 1970 to 1980, and continued into the 80s. Nowhere in the world at that time was an electric utility undertaking such a task, not only with respect to the number of stations under construction and being planned but also so far as their size, i.e., their electricity generating capacity, was concerned. These stations could be ranked among the largest fossil-fired power stations in the world. They still do to this day. Because of the implications to Eskom that would result from this expansion programme it is necessary to consider why Eskom considered building these stations in the first place. To answer this question requires an examination of Eskom's view of the South African economy during this period.

Considering Eskom's view of the dynamics of the South African economy will also make clear why the Corporation continued to pin their faith in the future on their forecasting model which will be discussed presently. The first clue is provided in 1980 when Eskom complained that they were hard pressed to meet the demand for electricity. Eskom maintained that they did not have enough generating capacity and that they were also short of skilled manpower. Eskom's expansion programme was viewed as "a continuous process and that the construction of power stations and their financing should be as far as practical, free from short-term economic events. Expansion therefore should not be slowed down or accelerated as dictated by short-term economic criteria". Eskom went on to maintain that their inability to meet electricity demand in 1980 was attributable to the "cautious economic thinking which emerged in the late 60's and which was further influenced by the oil crisis in the early 70's and the recession in the mid 70's". Eskom further claimed "that they had at this period in history complied with a request made in the interests of the national economy to delay certain capital projects", and this in their opinion had been an unwise dictate, (Eskom Annual Report 1980 pp.11-12).

The principle explanation Eskom put forward for their inability to meet electricity demand in 1980 was that they had lost 3-4 years of generating expansion because of their compliance with this request. They went on to state that what was required so far as generation planning and forecasting was concerned was "bold planning and foresight", and that "when projecting electricity requirements in the 10-20 years after 1980 economic trends formed the only basis upon which to proceed". This philosophy had underpinned their whole generating expansion programme up to 1980. Eskom was firmly convinced in 1980 that an average annual growth rate

of electricity demand of nearly 9 per cent would continue into the future. This implied to the Corporation that by the end of the 1980-1990 decade, Eskom's installed generating capacity would have to increase from 17 500MW to 34 000MW i.e., in short it would have to be doubled. The generating capacity would thereafter have to further increase to 65 000MW by the beginning of the second millennium, (Eskom: Annual Report, 1980, pp.11-12).

Growth in electricity demand after 1980 would, according to Eskom, come from three sources, these being:

1. The increasing industrialisation of South Africa;
2. The swing from oil-based energies to electricity, and, referring to their electrification programme;
3. The increasing economically active black population and the electrification of black townships,[88] (Eskom: Annual Report, 1980, p.12)

This last statement is of enormous importance since it effectively says that up to 1980 electricity supply in South Africa had been concerned with the provision of power to the mining and manufacturing sectors of the economy and white municipalities. Black household electrification scarcely featuring at all.

So far as the shortage of skilled manpower was concerned Eskom considered this to be critical to their ability to provide sufficient electricity to meet the demand that they clearly saw arising. Eskom was then bullish in their sentiments regarding the economic, financial and political future of South Africa in the period 1970 - 1980. This view was to continue in spite of indicators that said otherwise; for example the political unrest that had occurred in Soweto in 1976. Eskom at this time seemed to be politically naïve.[89] Eskom seemed then to be optimistic of the future after 1980 and the demand for electricity was forecast to grow at a high rate and growth was confidentially expected to continue at this high rate until the turn of the century. It was considered that whilst there would be fluctuations in electricity demand from year-to-year the expected average growth would exceed 7 per cent per annum over the next 25 years.[90]

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88 The electrification of Greater Soweto had just began and it is clear that this influenced Eskom's comment. Greater Soweto , the largest black township in South Africa, being strategically placed on Eskom's front door-step near their head office in Johannesburg. The electrification of Greater Soweto will be discussed in Chapter 6.

89 The eventual appointment of a more politically orientated chairman for Eskom was an indication that this was also the view of the government. This issue will be discussed further in Chapter 4.

90 Eskom believed that what had happened in the past would continue to happen in the future. This view was conditioned by the fact that over the previous 30 years Eskom had recorded an average

Because of the time required to plan and build power stations, Eskom felt that only a massive uninterrupted expansion programme such as they were undertaking during this period would enable them to meet South Africa's future energy needs. Eskom's expected growth rate in electricity demand as predicted in their forecasting model involved building some 20 base-load power stations between the years 1980 and 2005. Nuclear power it was thought, would be a necessary part of this programme (see Eskom's Generating Expansion Plan 1980 – 2005) also Eskom's Annual Report, (1980,p.12).

5.0 ESKOM'S FORECASTING METHODOLOGY FOR ELECTRICITY DEMAND

This section discusses Eskom's approach to electricity demand forecasting up to 1980, an approach which as will be shown in the following chapters, would come back to haunt the Corporation in the years ahead.

Modelling and forecasting energy requirements from the mid seventies onwards into the eighties had, because of the 1973-74 oil crisis taken on greater importance. Mega-models had been developed which were so complex that nobody really understood them, (Baumgartner and Midtuun, 1987, p.3). The complexities involved in building and exercising energy models, and the nature of the process upon which they depend, prompted Sir James Ball to pose the question "where do the forecasting artists get their inspirations from?"[91] Sir James suggested that up to 50 per cent of forecasting work was art and not science. This meant that most forecasters resorted to post hoc adjustments of their model's variables and demand equations to achieve suitable results.

Formal forecasting models in the period since the oil crisis fell back on approaches such as discounted least squares, adaptive growth curves, Kalman Filters, ARIMA (Box-Jenkins) models or Poisson smoothing techniques[92]. It is suggested that using such approaches is, however, only one part of energy modelling. There is also the need to consider societal influences in the process.

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annual growth in electricity sales of 8,8 per cent per annum, see Eskom Annual Reports for the period 1951-1981.

91 Sir James Ball's, opening address to the Fourth International Symposium on Forecasting, organised by the International Institute of Forecasters at the London Business School 8-11th July 1984. Sir James was at the time a professor at the London Business School and a major figure in the development of macro-economic forecasting models, cited in Baumgartner and Midtuun, (1987, p.9).

92 See various papers presented at the symposium cited above.

These influences become very important as the horizon considered in the forecasting scenario is lengthened[93]. They can range from the forecasters' interests and ideology to the political acceptability of the models' underlying assumptions and governmental energy policy. By leaving important goals and political values implicit in forecasting models, forecasts tend to project short-term growth rates into long-term forecasts without initially examining what is involved in this assumption. Eskom's electricity demand forecasting model was guilty of this. Eskom in effect assumed that societal change was projected forward in the guise of "business as usual". This seemingly trivial assumption of constant growth rates of electricity demand tended to mask the inconceivable consequences of the assumption in the long-term.

In the case of South Africa the dramatic changes in political development in the years from 1976 forward brought electricity supply into prominence as a political issue. This, as will be shown, was particularly so in the case of the electrification of white-owned commercial farms on the borders of the Republic, and also in the case of the electrification of Greater Soweto and Eskom's national programme to electrify black households in the 90's.

Eskom's electricity forecasts after 1970 therefore contained a policy bias which was not explicitly accounted for in their methodology. This resulted in the Corporation avoiding the probability that the economic, political and social structures in South Africa would break down, evolve and possibly change in the future, and feed back into policy changes which would invalidate the basis on which the forecast was made in the first place.

What seems certain, however, is that the many relationships that impacted electricity demand forecasting prior to 1976 could no longer be inferred after the Soweto riots in that year. From past events, new relations emerged and old relationships changed.[94] Eskom's electricity demand forecasting methodology did not take these changes into account at all. They assumed that because, over the preceding 30 years from 1945-1975, the demand for electricity grew at some 4 per cent above the growth in GDP such growth would continue until the turn of the millennium. This was a grave error.[95]

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93 In the case of Eskom forecasts of electricity demand 15-20 years in advance were regularly made. Considering South Africa's volatile political environment in the period up to the ANC coming to power in 1994 Eskom's forecasts therefore took heroic leaps into the future.

94 This will be dramatically demonstrated in the discussions undertaken in the following chapters concerning Eskom's changing stance on the electrification of black households in South Africa.

95 For a description of the logic and mathematics underpinning Eskom's generation forecasting model (see Norman ,1977).

Eskom's generating forecasting model was then responsible for an incredibly large power station building programme which was the most ambitious in the world at the time and was a recipe for considerable controversy. It required vast capital expenditure and was eventually to lead to an over capacity of generating plant, which ironically was what helped the programme to electrify black households in South Africa get started after 1980 (see Chapter 5). This programme was of course non-existent when all Eskom's giant power stations were planned. The main recipients of all this electricity were scheduled to be the South African mining industry, the manufacturing sector, the SAR&H and bulk supplies to white municipalities. To carry all the potential power to the various parts of South Africa, the forecasting programme called for new power lines to be built. The Rand, Orange Free State and Natal undertakings were connected with a new 132kv line and a third 400kv line into the Western Cape from the Eastern Transvaal power stations was built during the period 1970 to 1979. An additional 400kv line from the Camden power station to Natal was also built as was a 400kv line to serve the output of the Drakensberg pumped storage scheme. There were also two 275kv lines built to strengthen electricity supply to the Sandton area near Johannesburg and the West Rand.

6.0 THE REORGANISATION OF ESKOM

In 1978 in an effort to become more efficient and to try and curtail costs Eskom reorganised their distribution undertakings into six regions. From the accounting point of view, however, the undertakings were preserved as separate statutory entities. Each region was headed by a manager, who had formerly managed the relevant undertaking. The regions so formed were, The Rand and Orange Free State, Eastern Transvaal, Natal, Northern Cape, Western Cape and Eastern Cape Regions. The activities of the Eastern Cape Region included those of the Border, Cape Eastern and Orange River Undertakings. Responsibility for the activities of the former CGU were transferred partly to the regions concerned and partly to the relevant departments of Eskom's new head office situated at Megawatt Park in Sandton, north of Johannesburg, (Eskom; Annual Report 1978, p.17).

7.0 THE DE KOCK, WIEHAHN AND RIEKERT COMMISSIONS

In 1977 three Commissions of Inquiry were appointed by the government; these being the de Kock, the Wiehahn and the Riekert Commissions. The terms of reference of the de Kock Commission was to investigate monetary policy in South Africa. The Wiehahn Commission was charged with investigating labour legislation and the Department of Labour. The Riekert

Commission was also to investigate labour legislation but here the emphasis was on improving labour utilisation in South Africa. The findings of the three Commissions were presented to Parliament in 1978 and 1979 and suggested inter alia that the South African economy had reached the stage where the state should begin to play a less significant role in developing the economy and that the market should be free to play a larger role. This finding was of political importance with regard to Eskom at this time since Eskom was a public utility and had been founded by the state. Furthermore, Eskom had, to all intents and purposes, monopoly status in the South African electricity supply industry and might be better privatised. Because of this it is possible that the findings of these Commissions influenced the government's attitude towards Eskom and this issue will be discussed further in the following chapter when the de Villiers' Commission of Inquiry into Electricity Supply in the Republic of South Africa is considered.

8.0 CONCLUSIONS

This chapter has traced in broad perspective the development of electricity supply in South Africa from 1882 to 1980. It has attempted to show that private entrepreneurial activity for profit was the initial driving force behind this supply which was required to meet the demand for electricity from the gold and diamond mining companies that operated in South Africa at the turn of the century. At the start of electricity supply in South Africa, except for some street lighting projects, no attempt was made to supply electricity for general domestic use.

The principle private electric utility was the Victoria Falls Power Company Ltd., (VFP) which was controlled from London. This company was eventually taken over by the newly established Electricity Supply Commission (Eskom) in 1948. This takeover effectively brought to an end private electricity generation of any note in South Africa. Eskom, which operated at neither a profit or a loss, would, it was reasoned, be able to supply industry the railways and the mining sector with electricity at a cheaper rate than had been the case under the VFP thus increasing South Africa's competitive edge in export markets. Additionally as a public utility Eskom could afford to pay greater attention to the widespread supply of electricity for domestic purposes.

With respect to the supply of domestic electricity Eskom supplied bulk power to most municipalities. The municipalities in turn resold this power at a profit to consumers in their area of supply. In other instances electricity generated by Eskom was distributed directly by the Corporation in municipal areas and rural localities. Domestic electricity, with very few exceptions, was supplied to white households only. Deep rural areas were also generally left unsupplied with electricity, even in the case of white-owned commercial farms. Farms and black

households in South Africa were therefore very poorly supplied with power and as a consequence there was a huge backlog of domestic electricity provision to be dealt with after 1980. A degree of rural electrification did, quite naturally, occur in areas adjacent to main supply grids, but serious attempts to electrify areas remote from established supply points had to wait for the period after 1980.

Eskom's main consumers up to 1980 were the mining, industrial and transportation sectors of the economy, and the white municipalities, essentially the same mix of consumers as the VFP supplied. In 1980, at the end of the period covered in this chapter the breakdown of Eskom's sales of electricity was as shown in Table No 3.4 below:

CATEGORY OF CONSUMER	PERCENTAGE OF TOTAL SALES
Municipal supply (bulk)	**29,9**
Direct Sales and Street Lighting	**1,2**
Industry	**34,1**
Mining	**29,8**
Traction	**5,0**
	100,0

TABLE NO. 3.4 PERCENTAGE OF ELECTRICITY SALES TO THE DIFFERENT CATEGORIES OF CONSUMERS: 1979
Source: Eskom's Annual Report, (1979, p.20).

It will be observed from Table No 3.4 that only 1,2 per cent of Eskom's electricity sales were directly supplied to consumers. These sales included the rural areas mentioned above; 68,9 per cent of the power generated by Eskom was supplied to the mining, industrial and traction sectors of the South African economy and 29,9 per cent to white municipalities. This large percentage of electricity sales to municipalities does demonstrate the rapid urbanisation of South Africa.

Jones (1989) has suggested that the impact of urbanisation on energy use is profound, and is the single most important factor impacting the growth of domestic energy consumption. It also facilitates a modernisation process which leads to changes in energy preferences, e.g., from fuelwood to electricity, and the preference for labour and time saving electrical appliances. Urbanisation is then an important factor in the electrification of rural areas because as people leave rural areas the cost per individual electrification connection increases as a result of diseconomies of scale. This increasing cost makes it difficult for rural electrification schemes to pay for themselves. According to the Urban Foundation the urban black population was estimated to increase to 11 million by 1990, cited in Van Gass, (1993, p.2). This was the date when Eskom's "Electricity for All" programme started, (see Chapter 8). Viljoen (1989, p.131) has

estimated that rural-urban migration reduces the average total population growth in rural areas of South Africa from over 3,5 per cent to less than 1 per cent per annum. These facts will certainly impact the sustainability of the programme to electrify rural areas. The table below presents some data on the urban/rural population nexus in 1980.

	WHITES	COLOUREDS	ASIAN	BLACKS
URBAN PERCENTAGES	88,4	76,6	90,6	38,3
RURAL PERCENTAGES	11,6	23,3	9,4	61,7

TABLE 3.5 URBAN AND RURAL POPULATIONS IN SOUTH AFRICA: 1980
Source: Swart (1983, p.102).

At the beginning of 1980 the total sent out rating in service generating capacity of the Eskom system amounted to 15 056MW. This electricity being generated by the power stations shown in table No 3.6 below.

POWER STATION	ASSIGNED SENT-OUT RATING MW
Coal fired stations, Eastern Cape	
West Bank	
Sub-total	**80**
Coal fired stations, Natal	
Colenso	184
Ingagane	465
Umgeni	222
Sub-total	**771**
Coal fired stations, Transvaal and O.F.S	
Arnot	1 980
Camden	1 520
Grootvlei	1 140
Hendrina	1 900
Highveld	440
Klip	372
Komati	925
Kriel	2 850*
Matla	575*
Taaibos	440
Vaal	282
Vierfontein	336
Wilge	221
Sub-total	**12 981**
Coal fired stations, Western Cape	
Hex River	114
Salt River 2	228
Sub-total	**342**
Total coal fired stations	**14 174**
Gas turbine stations	
Acacia (Western Cape)	171
Port Rex	171
Total gas turbine stations	**342**
Hydro-electric stations, conventional storage	
Hendrik Verwoerd	320
Vanderkloof	220
Total hydro stations	**540**
Total all Escom	**15 056**
Other power sources	
Cahora Bassa	1 384

TABLE NO. 3.6 ESKOM POWER STATIONS (AND THEIR SENT OUT RATINGS) IN SERVICE AT THE 31ST DECEMBER 1979

Source: Eskom Annual Report, (1979, p.60).

*Power Station still under construction in 1979.

Eskom's massive generation expansion programme that had its beginnings after the Second World War, and which continued with increasing fervour into the eighties, was responsible for the electricity infrastructure revealed in Table No 3.6 above. Eskom's generation expansion programme was, however, based upon a naïve forecasting methodology and resulted in excess capital demands being made on the South African economy.

In the years 1970 to 1980 the first glimmerings of serious financial and economic problems for Eskom could be observed. These problems occurred because in spite of a slowing down in electricity sales and a warning from the government that only "moderate" economic growth was to be expected in this period, Eskom, with complete confidence in their generation planning forecasts, pressed ahead with a massive power station and transmission line construction programme. After 1980 these financial and economic problems burst into life and, together with changing political circumstances, caused events which seriously impacted Eskom's programme to electrify black households and white-owned commercial farms. These events are discussed in detail in the following chapters which concentrate on describing these electrification programmes.

CHAPTER 4

THE REASONS WHY ESKOM UNDERTOOK A FARM ELECTRIFICATION PROGRAMME AND RESEARCH INTO BLACK HOUSEHOLD ELECTRIFICATION: 1980–1990

1.0 INTRODUCTION

Prior to describing Eskom's programmes to electrify white-owned commercial farms and black households in South Africa in the period 1980-1990 it is appropriate to determine 1) Why was the farm electrification programme actively encouraged by the government? and 2) Why, with the exception of the electrification of Greater Soweto which was carried out by the government itself, was the electrification of black households from 1985-1990 curtailed?[96]

The purpose of this chapter is to attempt to answer these questions. To do this it is necessary to examine certain changes in the political and economic environments of South Africa and Eskom's own changing financial and economic circumstances and institutional structure in the period concerned.

2.0 POLITICAL CHANGES AND ELECTRIFICATION

The political changes that influenced the electrification of white-owned commercial farms and black households in South Africa are threefold, 1) The situation on the borders between South Africa and the contiguous black states, 2) The electoral struggle the government was waging with right-wing groups, and 3) The Black Local Authorities Act which was promulgated in 1982. Each of these three areas of change will be discussed in turn.

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[96] The electrification of Greater Soweto and Eskom's association with this project, is discussed in detail in Chapter 6 of this study.

2.1 The Front-Line States

A major political event, which would influence the electrification of white-owned commercial farms on the borders of South Africa from 1980 was the coup in Portugal on Thursday the 25th April 1974 which ousted the government. As a consequence the Portuguese army was withdrawn from Portugal's African colonies which they had held for close to five hundred years. This coup had everything to do with the wars that the Portuguese were fighting in Mozambique, Angola and Portuguese Guinea, and which they seemed to be losing, and a dictatorship that clung to power in Portugal itself, (Sparks, 1990, p.298). Thus the curtain of African colonial history rang down on Portugal. Portugal was the first European nation to colonise Africa and it was the last to leave. Trouble at home has sounded the death knell for many colonial empires from Rome onwards, Portugal's was no exception.

Prior to the Portuguese withdrawal from Africa South Africa had been somewhat protected from incursions by Um Khonto we Sizwe guerrillas [97] and from immediate confrontation with black states to the north of the Republic. This protection was achieved by a line of white controlled countries, which stretched from the Indian Ocean in the East to the Atlantic Ocean in the West. Specifically these were Mozambique, Rhodesia (as Zimbabwe was then known), Angola and South West Africa (as Namibia was then known), which was administered by South Africa. These states provided the Republic with a measure of security. This was because prior to confronting the South African police and defence force the ANC's military wing had to effectively breach a cordon of Portuguese or Rhodesian troops and then face an equally daunting task of retreating through this white held territory after they had struck in South Africa. With the Portuguese withdrawal from Africa all this changed.

After the withdrawal of the Portuguese, Mozambique, under Samora Machel, allowed a second front to be opened up on a beleaguered Ian Smith in Rhodesia. In 1979 the Rhodesians were forced to terminate their bush war and hand over power to a black government. This event meant that in 5 years South Africa had gone from having a protective ring around the country to a situation whereby the country was in effect surrounded by states sympathetic to the ANC and the black liberation movement. The independence of the two Portuguese colonies, Angola and Mozambique, and Zimbabwe in 1980 left South Africa vulnerable to infiltration on a wide front and it was at this time

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[97] Um Khonto we Sizwe was the military wing of the African National Congress.

that a policy of destabilising the front-line states was formulated, by the South African government, (Arnold, 1992, p.47).

Events in Angola now claimed the attention of the South African government. Resulting from an approach by the United States Central Intelligence Agency South Africa was persuaded to assist Jonas Savimbi and UNITA and increase pressure on the two other political groups vying for power in Angola. These groups being the Popular Movement for the Liberation of Angola (MPLA), which was led by Agostino Neto (and had the advantage of controlling Luanda the capital of Angola), and the National Front for the Liberation of Angola (FNLA) which was led by Holden Roberto, (Maier, 1996, p.14).

The Prime Minister of South Africa at this time was J.B. Vorster, P.W. Botha was his Minister of Defence and General Magnus Malan was chief of the South African defence force. Without discussing strategy with Vorster, and in violation of South Africa's "good neighbour" policy, Botha seized the opportunity to launch an attack into Angola. This attack took place on Wednesday the 17th of September 1975, (Stockwell 1979). The attacking force quickly moved 500 miles into Angola and logistical support for this force was provided by troops based on the border between South West Africa and Angola. The force captured the port cities of Mocamedes, Benguela, Lobito and Porto Amboim. This attack eventually failed, however, due to a counter attack by Cuban forces and the South Africans were forced to retreat.[98] The fiasco was exposed; but the important point so far as the future programme to electrify white-owned commercial farms on South Africa's borders from 1980 onwards was that a new regional military strategy was taking shape in South African defence circles with P.W. Botha and the Department of Military Intelligence as the key drivers. Botha saw South Africa as a regional military superpower. The strategy was simple. If South Africa could dominate the Southern African region with overwhelming military force then the border states could do little to adversely influence the continuation of the apartheid regime in the Republic, (Grundy, 1983,pp.7-8). Neighbouring states would, it was thought, be intimidated and dissuaded from allowing the ANC to use their territory for launching military strikes into South Africa, (Arnold, 1992, p.49).

The next political event of importance that would influence border farm electrification was the so-called "information scandal". This scandal saw Voster and Cornelius Mulder, Voster's heir apparent,

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[98] This venture was carried out under a cloak of secrecy, the press was effectively gagged by a government ploy of telling them what was going on and then demanding their silence, (Sparks, 1990, p.305) also see Maier, (1996, p.16).

and then Minister of Information, fall from power allowing P.W. Botha to be elected as Prime Minister of South Africa. Malan was brought into the Cabinet as Minister of Defence and another Botha supporter Constant Viljoen took over from Malan as Chief of the Defence Force, (Sparks, 1990, p.308).

All the pieces were now in place for a massive military build-up to commence and power increasingly shifted from the Nationalist Party per se to the Nationalist Party's security establishment. Such a military build-up would require diligence on South Africa's borders; which in turn meant keeping farmers there and building a buffer zone that would discourage guerrilla attacks into the Republic by making South Africa less vulnerable to infiltration.[99] The electrification of border farms was, the government thought, one of the ways of achieving this goal. Only Eskom had the capability of undertaking a farm electrification programme. As will be shown presently the government therefore exerted pressure on the Corporation to proceed with this scheme.

2.2 The Electoral Struggle

With respect to the electrification of black households in South Africa a political factor that was to have an important bearing on this issue was that from the mid 80's to the beginning of the 90's a struggle ensued between the government, that was beginning to introduce political reform into South Africa, and the Conservative Party (CP).[100] This struggle was one, which had concerned Afrikanerdom during most of the 20th century. It centred on the protection of Afrikaner identity and how state institutions could be used to protect the status of Afrikaners in South Africa. Two views of how this could be done emerged. These were the right wing or "verkrampte" viewpoint, which defined Afrikaner nationalism by emphasising it's "primordial characteristics"[101], and a more moderate or "verligte" viewpoint which defined Afrikaner nationalism inclusively by emphasising

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[99] During the early 80's farmers on South Africa's borders with Namibia, Botswana, Zimbabwe and Mozambique were leaving their farms. The exact number that left is unknown but they were sufficient in numbers to cause these border areas to become depopulated, (DMEA Annual Report, 1981, p.73). Such depopulation making it easier for guerrilla attacks on the Republic to take place.

[100] That the electrification of black households was part of the government's reform initiative is clear from the electrification of Greater Soweto that was started in 1980, and which will be discussed in detail in Chapter 6 of this study.

[101] These characteristics are the use of the Afrikaans language, the deep rooted folk culture of the Afrikaner nation, the mythology surrounding this issue and the need for a white Fatherland for Afrikaners.

racial and later territorial aspects.[102] Within each faction there was, however, intra-ethnic conflict and thus internal disagreement, (van Rooyen, 1994, p.117). Such a situation, according to Horowitz (1985, p.331) provided each faction with electoral opportunities, where voters could be mobilised by appeals to ethnic interests, threats and hatreds. The CP demonstrated these opportunities in the February 1984 by-election in the Soutpansberg where the government lost its seat to them. In November of that year in by-elections in Primrose, George and Parow there was a marked swing (22 per cent), from the government to the CP, (van Rooyen, 1994, p.124). This swing occurred despite Hernus Kriel's assurance to voters that the government's "policy is still separate development" (The Argus 10th November 1994).[103]

These results indicated that formally safe government seats, particularly in the Transvaal, had been marginalised. Despite these electoral setbacks the government continued to introduce further reform measures during 1985.[104] The Congress of South Africa Trades Union (COSATU) was also founded during the year this being the first non-racial trade union body formed in South Africa. During 1985, however, there was increased political unrest in the country and the government was forced to introduce a state of emergency in 36 magisterial districts.

In September 1985 P.W. Botha made a speech in Durban that reverberated around the world. The speech became known as the "Rubicon" speech.[105] The Rubicon speech was expected to announce reforms that would include a change in race relations. The speech took a hard line on change, however, as a result of accusations by the verkrampte element in government and the population that the government was bowing to foreign pressure for constitutional change in the country. In the speech Botha therefore rejected international demands for political change in South Africa and this resulted in massive disinvestment, economic sanctions and a rapid decline in the value of the Rand. The Rand fell by 35 per cent in thirteen days. This speech heralded a hard-line political approach by the government in the second half of the 1980 - 1990 decade, which would influence the electrification of black households. In October 1985 there were by-elections held in Sasolburg, Bethlehem, Springs,

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[102] The emphasis here is on a non-racial South Africa based on common values with a central role for the Afrikaner in the government of such a country.

[103] Hernus Kriel was the government candidate in Parow.

[104] For example they repealed the Mixed Marriage and Immorality Acts and the Prohibition of Political Interference Act.

[105] It has become known as the Rubicon speech because Botha said he had crossed the Rubicon of Reform. Ironically this speech was allegedly orchestrated by F.W. de Klerk who was later to release Nelson Mandela from custody, see Van Rooyen (1994, p.125) and Arnold (1992, p.69). At this time de Klerk was the leader of the Transvaal National Party and a right wing member of Botha's cabinet.

Vryburg and Port Natal. The result of these elections was that the government's majority declined in three of the five constituencies by between 50-70 per cent and the Sasolburg seat was lost to the CP, (van Rooyen, 1994, p.125).

Despite Botha's speech and the by-election setbacks, significant political developments did take place during 1986 including a visit from the Commonwealth Eminent Persons Group. This visit was, however, rendered useless by the South African Defence Force carrying out cross-border raids on ANC bases in neighbouring states during their stay, (Sparkes, 1990, p.351). The reason for these raids was that the government was anxious to prove that they were not yielding to outside demands concerning reform in South Africa and that the white electorate could depend upon them to preserve white dominance in the country, (van Rooyen, 1994, p.126) Those events lead to what was termed the "end of South Africa's Prague Spring", (Sunday times 16th August 1987). The Kliprivier by-election followed in September 1986 and the government again found a swing away from them and towards the CP.

In 1987 there was a general election and this took place against a backdrop of a countrywide state of emergency. The government's election platform emphasised reform and security. The election slogan was "Reform Yes, Surrender No". The CP focused its attention on the worsening unrest in South Africa, economic decline and the failure of the government's attempts at power sharing with coloureds and Indians via the Tricameral Constitution of 1983.

The result of the election was an increased support for the right wing parties from about 14 per cent in 1981 to 30 per cent in 1987.[106] The number of right wing seats in the government increased from 7 in 1981 to 22 in 1987. This change resulted in the CP becoming the official opposition. This was also an election that effectively saw the demise of the HNP as a political force leaving the CP as the voice of the right wing faction in South Africa. Support for the CP was centred in the mining and agricultural towns of the Transvaal and the Orange Free State. The consensus of opinion amongst journalist was that the election results would force the government to reduce its reform initiatives.[107] The election results also had a detrimental effect on the South African economy since internationally

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[106] The dominant right wing parties were the Conservative Party (CP) under Dr Andries Treurnicht and the Herstigte Nasionale Party (HNP) under the leadership of Mr Jaap Marais.

[107] For example Rapport, 10th May 1987 said "No one can ignore the swing to the right", Business Day 8th May 1987 said "Voters crossed all cultural, religious and language barriers to enter the White Laager and to shut out the rest", the Southern African Report 8th May 1987 said "swing to right reduces pressure for reform", and The Sowetan 8th May 1987 said "Those who did not scurry back into the laager took another step back to the oxwagon days by voting for the CP.

it was seen as a blow to the reform process initiated by Botha in the early 80's. In this, international opinion was correct since after the election the government decided to slow down the reform process, which would include the electrification of black townships, and greater emphasis than ever was placed on security.

In March 1988 three very important by-elections were held in Standerton, Randfontein and Schweizer-Reneke. The CP's election strategy concentrated on the negative consequences of the government's attempt at reform and the depressed state of the economy. The CP also accused the government of selling out the whites. The government countered the CP's strategy with an exhibition of military strength and the SADF attacked ANC bases in Angola and banned anti-apartheid organisations. In spite of this show of strength by the government the three by-elections were won by the CP. The bitterest pill that the government had to swallow was perhaps the loss of the Standerton seat that the government had won in 1948 when they defeated the then UP prime minister General Smuts at that venue. P.W. Botha in response to this electoral setback said that the government would "give priority to the security of South Africans", (Die Burger, 4th March 1988); it was also reported that senior government politicians had decided "that a brake would now be placed on racial reform".

Following the March 1988 election came the October 1988 municipal elections. The CP's plan was to gain control of as many town and city councils as possible and thus halt the government's reform process. In the election the CP gained control of 101 out of 150 local councils in the Transvaal i.e., 76 per cent. Many of the town councils thus controlled by the CP re-introduced apartheid.

Early in 1989 P.W. Botha suffered a stroke. With a general election scheduled for September 1989 a leadership struggle between P.W. Botha and F.W. de Klerk began. The result was a victory for de Klerk and the NP caucus elected de Klerk the new party leader on the 2nd February of that year. The struggle was acrimonious and the government feared it would become an election issue and damage their performance in the coming election. F.W. de Klerk's rise to power provided hope that reform would continue if the government won the September election. The government's election manifesto suggested this and included promises such as group control over their own affairs being retained (Tricameral Constitution), voters rolls for each racial group and separate residential areas and schools, with public amenities being opened to all races.

The CP concentrated their election campaign on three issues. These were the selling out of the whites by the government, mismanagement of the economy and the recent settlement in Namibia which the

CP considered had been prejudicial to the whites living there. Both the government and CP rejected majority rule and both refused to negotiate with the ANC.

The September election was the government's worst showing since 1948. They lost 29 seats, 17 to the CP and 12 to the Democratic Party (DP). The CP increased its number of seats from 22 to 39 i.e., it almost doubled its number of seats. The CP also won seats in both the Orange Free State and the Cape Province, i.e., outside the Transvaal, traditionally the party's strongest base. A large number of government seats were also marginalised, but the CP was not able to capitalise its strong showing in urban areas during the 1988 municipal elections.[108] The CP had the support of about half the Afrikaner nation and this left the government, which still held a slim overall majority in parliament, with one option for survival, that was to accelerate reform and win over English speakers from the DP.[109]

The impact of the electoral struggle between 1984 and 1990 on the electrification process was such that as the pressure increased on Botha to reverse his reform initiatives there was clearly no chance that he would be prepared to endorse the provision of electricity to black households within South Africa. Providing electricity to such households would have given the CP another weapon with which to attack the government. For example, electrification would be costly and the economy was in a recession. The existing situation had already allowed the CP to accuse the government of mismanaging the economy and "impoverishing whites through it's redistributive policies" (Market Opinion Surveys, M.& M., July 1989) cited in Van Rooyen, (1994, p. 136). The electrification of black households would almost certainly require cross-subsidisation and therefore would indeed have to be paid for in part by white electricity consumers. [110] This would justify the CP's claim so far as this measure was concerned. It seems reasonable to suggest that the government could not possibly risk undertaking a programme to electrify black households as a consequence. Furthermore, both the

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[108] This was probably because of the economic consequences of the CP's reintroduction of petty apartheid in places like Boksburg and Carltonville. Blacks retaliated with consumer boycotts causing serious financial losses in these areas.

[109] This reform process including the release of the surviving Rivonia trialists Govan Mbeki and Walter Sisulu (Nelson Mandela was, however, still kept incarcerated) and the effective unbanning of the ANC. Beaches were opened to all races and the government announced its intention to repeal the Separate Amenities Act.

[110] That Eskom thought that the electrification of black townships would require cross-subsidisation is clear from interviews with Dr I.C. McRae, 28th August 1996, Mr John Bradbury, 13th November 1996 and Mr Douwe van Wyk, 29th November 1996. That their assumption was correct will be shown in Chapters 8 and 9 of this study when Eskom's programme to electrify households in black urban areas from 1990 onwards will be discussed.

government and the CP were committed to the policy of homelands for blacks hence if the electrification of black households was to be undertaken it should be in these homelands thus making them more attractive for blacks to live in.[111] Widespread provision of electricity to black households in South Africa would make it more comfortable for blacks and they would then wish to remain within white South Africa and not return to the homelands.[112] The result was that CP could use the electrification of black households in South Africa as a political weapon against the government. The government in slowing down their reform process from 1985 onwards, thereby also effectively curtailed the electrification of black households in South Africa.

2.3 The Black Local Authorities Act

A further political change which affected the electrification of black households is now considered. In 1982 the Black Local Authorities Act, which created local government structures for black urban areas was passed.[113] Up until the passing of this act black urban areas were administered by provincial and central government administrations in terms of the Black Administration Act of 1927. The new Black Local Authorities Act, which would become of critical importance in the problems concerned with the electrification of black townships and Greater Soweto in particular, was a genuine attempt to introduce reform initiatives in black communities by creating improved economic and social conditions. Dr. P.J. Riekert, the chief director of the Western Transvaal administration Board commenting on the act said that it

> "would serve to defuse pent-up frustrations and grievances against administration from Pretoria...Defusion of this kind has become an urgent necessity which cannot be postponed much longer"
> (Riekert, in Van Vuuren et al [eds.], 1983, p.156).

The Act would effectively allow black municipalities to run their own affairs including the management of their electricity supply. The onus was also passed onto black authorities for supervising the influx-control system by making it illegal for blacks to be granted urban status if they

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111 The first Eskom Management Board Meeting that dealt with the electrification of black households (23rd June 1986) duly considered this issue. This will be discussed in the following chapter.

112 This sentiment was held by the Transvaal Provincial Administration, Interview with Dr Ian McRae, 4th September 1997.

113 The need for the creation of a form of black self-government in black townships had been identified as urgent by the Riekert Commission in 1977.

did not have a permanent job and so-called "approved accommodation". This meant that shack-dwellers or blacks who rented rooms had to return to their homelands. The new black councils were, however, only there on the whim of the government. Dr P. Koornhof the Minister for Co-operation and Development could remove councillors, appoint others or dismiss whole councils and nominate new ones as the need arose. These councils effectively then implemented apartheid policies if they wished to remain in power. They could hardly be said therefore to represent the black electorate in the townships, see Riekert, in Van Vuuren et al [eds.] (1993, pp.144-166).

Polls to elect black councillors on the 28th of August 1983 were very heavily boycotted. There was a 5 per cent poll in Greater Soweto, 11 per cent in the townships of Port Elizabeth, 15 per cent in the Vaal Triangle, 19 per cent in Durban and 20 per cent on the East Rand. Few respected black leaders offered themselves for election as town councillors. For the most part councillors were regarded as puppets of the white government, (Sparks, 1990, p.332).

With respect to the electrification of black townships, what was to prove disastrous, was the fact that under the new administrative structure, the townships were to be financially self-supporting, (Bekker and Humphries, 1985, p.113). The required revenue necessary to run their own affairs had to be provided by the township residents themselves. The fiscus was therefore released from the financial burden of the black townships of South Africa under the new dispensation. Because most townships had a low level of industrial and commercial development the tax base required to run the townships was generally insufficient to meet their existing running expenses let alone additional expenses that would be incurred with respect to the supply of electricity. Because of the lack of capital developing an electrification infrastructure in black townships by the municipality was therefore, in almost all cases, out of the question. As noted Greater Soweto was the exception having been electrified by the government between 1980 and 1986. In the event, to increase their revenue, councils were forced to substantially raise rents in the townships so that enough money was available to administer the areas. These events were to lead to unrest and boycotts of payments for services and this situation added another dimension to the problems Eskom would eventually face in the mid and late 80's so far as the supply of bulk electricity to Greater Soweto was concerned.[114]

Economic events between 1980 and 1990, just like political events, also had an important impact on the electrification of white-owned commercial farms and black households in South Africa. The next

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[114] This issue is discussed in detail in Chapter 6.

section considers these economic events beginning with a very brief overview of the decade and continuing with a more detailed examination of Eskom's economic performance. Eskom's economic performance is of particular significance since this was mainly responsible for the government undertaking the de Villiers Commission mentioned above; a commission whose recommendations profoundly affected the electrification of black households in South Africa.

3.0 ECONOMIC CHANGES AND ELECTRIFICATION

3.1 General Overview of the Decade

During the decade 1980 to 1990 the South African economy grew very slowly. The average rate of economic growth was 1,4 per cent per annum and during the years 1982, 1983 and 1985 negative growth in GDP was recorded. Inflation was persistently high the average for the period being of the order of 14,5 per cent. Per capita incomes fell and as a consequence real living standards, in aggregate, declined, (Dagut, [ed] 1991, p.57). The period was also characterised by rising unemployment levels and rising oil prices as a result of the oil crises in the previous decade.[115] Of particular importance to Eskom, as a consequence of their capital demands to meet the needs of their massive generation expansion programme, was the fact that gross domestic savings and investment as a percentage of the GDP fell from about 35 per cent and 31 per cent respectively in 1980 to about 22 per cent and 19 per cent in 1990. In a similar vein net domestic investment fell dramatically from about 20 per cent in 1980 to a mere 3 per cent in 1990. The poor performance of the South African economy in the decade 1980 to 1990 was the result of fundamental problems that had been evident from 1960 onwards. Nattrass, (1990, p.324) has listed three such problems that in her opinion were significant, these being, 1) underdevelopment patterns, 2) institutional controls over the movements of blacks between regions and 3) racial discrimination in the market place.

Although P.W. Botha's reform process was attempting to address these problems, and was supported by the findings of the Riekert, Wiehahn and de Kock Commissions, (which suggested that the free enterprise system practised in South Africa had reached the stage where political and social reforms with respect to white supremacy were a prerequisite for continued economic development) the political events described above were curtailing this reform process, and negatively impacting the

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[115] Rising diesel oil prices would add to the political pressures being brought on Eskom to electrify white-owned commercial farms in South Africa. This issue will be dealt with in the following chapter.

economy. For example foreign investment was withdrawn as a result of Botha's Rubicon speech and financial and trade sanctions resulted from the debt standstill which was put in force against South Africa by foreign governments. The consequences of these events were a depreciation of the Rand and currency shortages. To exacerbate these domestic problems there was a slow rate of growth in the world economy during this period.

The South African economy during this decade contracted then, precisely when Eskom needed an expansive economy with increasing electricity sales earning sufficient revenue to pay for their massive expansion programme. How the contraction of the domestic and international economy affected Eskom's economic performance from 1980 to 1990 is important because it captured the attention of the government in the early eighties, the result being the de Villiers Commission of Inquiry into Electricity Supply in South Africa; Eskom's performance in this period is therefore discussed in the following section. For convenience the period is divided into two parts, the years prior to the de Villiers Commission i.e., 1980 to 1984, and the period following this Inquiry.

3.2 Eskom's Economic Performance: 1980-84[116]

Eskom's economic performance is examined under four headings, these being, 1) Electricity sales and Revenue, 2) Electricity Tariffs, 3) Capital Expenditure and Borrowings and 4) Generating Plant Purchases. Each will be considered in turn.

3.2.1 Electricity sales and revenue

During 1980 total electricity sales reached record proportions, 87 539kwh were demanded. This figure being 8,6 per cent above the amount demanded in 1979. Eskom's total revenue from these sales was R1 772 million an increase of R 243 million over the revenue for 1979. Charges against revenue amounted to R1 870 million, however, and therefore a deficit of R98 million was posted.

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[116] Statistical data quoted in this section and the next was gathered from Eskom's Annual Reports for the period. Specifically the following items in the Annual Reports were examined: Eskom's Balance Sheets, their Source and Application of Funds, the Electricity Supply Account (consisting of Electricity Sold, Operating Expenditure, Loan Charges, and Total Charges Against Revenue), Schedules of Borrowings (including Internal Registered Stock, Foreign Bond Issues and Direct Placings), Contributions to the Capital Development Fund, Reserve Fund and Redemption Fund. Investments in Eskom's Foreign Loan Bonds and Schedules of Principle Equipment Installed in Various Power Stations.

This figure brought Eskom's accumulated deficit to R18 million on account of Eskom having a surplus revenue of R80 million in 1979.

Growth in total electricity sales in 1981 was 7,2 per cent, indicating a decline of 1,4 per cent from 1980. Revenue from these lower sales was R2 141 million with charges against revenue amounting to R2 218 million resulting in a deficit of R77 million and deepening the accumulated deficit to date to R95 million. Internal finance via the Capital Development Fund (CDF) supplied R841 million this sum represented 30 per cent of Eskom's financing needs for the year.[117] It was Eskom's opinion that the recession overseas was responsible for impacting South Africa's export market and thus triggering the decline in the demand for electricity, (Eskom Annual Report, 1981, p.16). Of Eskom's three major electricity consumers, industry, mining and bulk electricity sales to municipalities, only the last named had a higher growth rate in demand for electricity than the growth in the preceding five years.

The year 1982 was a particularly difficult year for Eskom with the growth in total electricity sales at a very low 2,4 per cent, the lowest growth rate recorded since 1947 when growth was 2,2 per cent. The effect of the downturn in the South African economy was shown by the fact that the industrial sector registered a negative growth rate of 0,4 per cent in electricity demand. Electricity sales to the mining sector grew by only 0,9 per cent as against 4,8 per cent in 1981. Electricity demand for transportation purposes likewise showed a negative growth rate of 4,8 per cent for the year, in 1981 the electricity demand in this sector had been a positive 4,6 per cent. Traction sales were largely associated with the export of minerals, which had dropped in volume over the previous twelve months. Only the bulk electricity sales to municipalities grew in a reasonable fashion being 8 per cent, still down, however, by 3,3 from 1981. Revenue from sales in 1982 amounted to R2 695 million whilst total charges against revenue was R2 753 million, the resulting deficit being R58 million, with the accumulated deficit standing at R154 million. Charges rose primarily due to coal cost increases of 19,8 per cent and Operation and Maintenance costs at Eskom's power stations and substations rising by 50 per cent.

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[117] Eskom had three funds for internal financing purposes: The Redemption Fund, The Capital Development Fund and The Reserve Fund. The Reserve Fund was used to finance expenditure for the betterment of plant, exceptional repairs and emergencies. The Capital Development Fund, was used to finance part of Eskom's capital expansion and replacement of assets taken out of service. The Redemption Fund was used to amortise local loans, (Eskom's Annual Report, 1982, p.10).

In 1983, which year marked Eskom's 60th birthday, growth in total sales of electricity continued to tumble, falling to 2,2 per cent even lower than the previous year. This figure was the lowest electricity sales recorded for 36 years. The figure was flattering, however, since electricity sales growth only reached 2,2 per cent due to a demand surge in the last quarter of 1983 as a result of the commissioning of the Sasol 2 and 3 plants and the new Alusaf Aluminium producing plant in Richards Bay, (Eskom, Annual Report, 1983, p.13). Sector by sector electricity demand painted a sorry picture in 1983, with the mining and manufacturing sectors showing lower increases in the demand for electricity than the previous year. Bulk sales to municipalities recorded a growth of barely 1,2 per cent in 1983. This figure being much below the average growth between 1978 and 1983 of 8,4 per cent and despite a steep increase in the demand for electricity from the ongoing electrification programme in Greater Soweto, which is discussed in Chapter 6. Overall the low growth in the demand for electricity was attributed by Eskom to the deepening drought in South Africa, a domestic recession and low growth rates in the economies of Western nations trading with the Republic, (Eskom Annual Report, 1983, p.7). Revenue for 1983 was R3 302 million but charges against this revenue amounted to R3 405 million, i.e., R652 million or 25 per cent above the charges for 1982. The accumulated deficit in 1983 rose to R257 million. Eskom was confident, however, that this deficit would be recovered after 1984 as the economy improved and predicted that electricity sales would grow by about 3 per cent above GDP over the following 10 years, (Eskom Annual Report, 1983, p.14).[118]

After the depressing sales of 1983 electricity sales in 1984 showed quite dramatic increases which seemed to vindicate Eskom's optimism. Sales to municipalities were particularly encouraging. Of particular significance was the electricity sales to Greater Soweto which increased from 31.5 million kWh in 1983 to 226,1 million kWh in 1984 reflecting the rate at which the electrification of Greater Soweto was being undertaken. Industry similarly demanded more electricity in 1984 than it had in 1983 largely due (in Eskom's opinion) to a recovery in export related mineral beneficiation industries, (Eskom Annual Report, 1994, p.20). Electricity sales to the mining sector also increased in 1984 compared with 1983. Rural electricity sales similarly grew due to the expansion in the electrification of white-owned commercial farms, this electrification programme is discussed in the following chapter. The year 1984 was then a vast improvement over the previous year so far as the sale of electricity was concerned with the farm electrification project playing its part in this recovery.

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[118] Eskom's forecasting model, described in Chapter 3, seemed still to have currency in 1983 in spite of the changing political and economic forces indicating to Eskom planners that what had happened in the past was not happening currently and would probably not happen in the future.

Revenue in 1984 increased by 16 per cent over that of 1983 and amounted to R3 832 million. Charges against revenue once more exceeded revenue, however, and amounted to R3 998 million resulting in Eskom's accumulated deficit increasing by 63,4 per cent to R419,5 million.

3.2.2 Electricity tariffs

Eskom's electricity tariffs varied in each of its regions. In 1980 the average increase was 7,8 per cent higher than the 1979 average. Electricity on average cost 2,024 cents per kWh. The costs of producing electricity in 1980 rose, however, by nearly twice the tariff increase to 13,9 per cent, i.e., from 1,876 c/kWh to 2,136 c/kWh, clearly contributing to the financial deficits mentioned above.

The tariff adjustments for 1981 were implemented in January and the effective tariff increases ranged from between 4,4 per cent in the Cape Northern Region to 6,5 per cent in the Orange River Region. The weighted mean of the increases in the different regions was 5,5 per cent. Eskom's tariff increases were aimed at balancing revenue with the charges against revenue. Eskom warned consumers that larger tariff increases could be expected in future.

In spite of Eskom's warning the tariff increase of 1982 was still a shock to the South African economy which was anyway grappling with a situation of increasing inflationary trends. In 1982 the price of electricity rose on average by 22,9 per cent, This was made up of an average increase in January of 13,1 per cent and an average increase in July of 6,6 per cent. Eskom put forward many reasons for this massive tariff increase, citing rises in the coal price to its power stations during the year and the unavailability of the Cohora Bassa hydro-electric scheme in Mozambique.[119] Because of diminishing electricity sales and in spite of this enormous tariff increase, revenue was still insufficient to cover Eskom's costs (which included the costs of their massive generation expansion plan), (Eskom Annual Report 1982, p.19).

Eskom warned consumers, that whilst they were making every effort to keep costs down, if no significant decrease in the escalation of these costs came about, tariff levels in 1983 would have to be higher than the 1982 level so that Eskom's monetary deficit could be brought under control. In the event the revised tariffs when they came into operation in 1983 were on average 19,9 per cent above those of 1982.

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[119] In 1982 55,2 million tons of coal was burnt by Eskom, the average cost of coal increased to R11,75/ton i.e.; a 21 per cent increase over the cost in 1981, (Eskom Annual Report, 1982, p.22).

The modest 6 per cent increase in the price of electricity introduced in 1984 was solely due to a direct request by the government to Eskom to keep their tariffs as low as possible. The assumption being that this would cause the inflation rate in South Africa to decline during the year. In the event it did not and this placed severe financial strain on Eskom in meeting increasing operating expenditure with declining income. The 6 per cent tariff increase was less than half the tariff increase that Eskom had originally scheduled for the year 1984, (Eskom Annual Report, 1984, p.11).

The effect of these tariff increases was reported in the Financial Mail of November 4th 1983 (p.31) when it was stated that "Escalating tariffs were now threatening the viability of certain major industries, especially those in the export sector. To make their concerns clear organised industry commissioned the Financial Research Unit in the University of Stellenbosch in 1983 to analyse Eskom's accounts".

3.2.3 Capital expenditure and borrowings

In 1980 Eskom raised loans on both the international and domestic financial markets. In October Eskom floated their first foreign bond issue (No 129) since 1975. In spite of volatile financial conditions on the local money markets, Eskom managed to raise two public stock issues and agreements for loans were concluded with the Standard Bank, Barclays Bank and Nedbank. The year 1980 was an important one so far as Eskom's financial policy was concerned, instead of arranging finance when payments for local project commitments became due Eskom ensured the availability of finance for their massive expansion programme at a much earlier time by careful forward planning. So far as providing finance for the Capital Development Fund, i.e., internal financing of their expansion programme, was concerned R476 million was put aside in 1980. The Capital Development Fund was of course of extreme importance to Eskom for supplementing the domestic financial market's ability to meet Eskom's capital needs. Total borrowings at the end of 1980 amounted to R 6 424 million.

In 1981 capital was initially freely available on domestic financial markets and 60 per cent of Eskom's requirements were met from this source, the remaining 40 per cent had to be obtained from overseas borrowings. As the year progressed, however, stringent monetary policy was put in place due to South Africa's worsening Balance of Payments position and interest rates doubled between the opening and closing of the year, see Reserve Bank Annual Report, (1981). American interest rates

also reached new heights in 1981. The relatively high levels of these rates taken together with the Reserve Bank's reduction of the 2,5 per cent discount rate on dollar forward cover had a marked increase in Eskom's indebtedness with total borrowings at the close of 1981 reaching R8 155,5 million. It is evident that because of the decrease in electricity sales and the increasing cost of external financing in 1981 Eskom would not have been able to meet its financing requirements if it had not been for their Capital Development Fund.[120]

In 1982 the continuation of stringent monetary policy in South Africa kept interest rates at high levels with foreign interest rates fluctuating widely.[121] During the year there was heavy demand for Eskom stock with sales amounting to R1 173 million. These sales allowed Eskom to meet 70 per cent of its funding requirements from domestic financial markets. Eskom's total borrowings at the end of 1982 reached R10 625,2 million.

In 1983 local financial markets were characterised by fluctuating interest rates and a general shortage of money. This situation resulted in fierce competition taking place for available money with the South African government being the dominant borrower on the capital market taking half the available funds. Eskom's main source of finance was the sale of its own stock and the Corporation's resulting total borrowings reached R 14 676,6 million by year end. A falling demand for electricity further complicated Eskom's financial position in 1983. In 1983 the Financial Rand was abolished allowing a relaxation in exchange control for non-residents and terminating the spot rand/dollar quotation by the South African Reserve Bank. This move gave the local foreign exchange market more freedom to determine market related exchange rates which would be beneficial to Eskom's continuing demand for money to finance its, by now extraordinary large, even by world standards, generation expansion plan[122].

Because of worsening economic conditions in South Africa in 1984 Eskom revised their forecast of electricity generation requirements downwards by 1 per cent i.e., from 7 to 6 per cent. During the year Eskom obtained funding for their expansion programme from local and foreign money markets

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[120] Eskom was hopeful in 1981 that half the future financing it required for its expansion programme would be obtained from internal financing via the Capital Development Fund, (Eskom Annual Report, 1981, p.19).

[121] These high interest rates resulted from banks being confronted with debt rescheduling problems and the inability of some South American and Third-World countries to meet their debt repayments.

[122] Eskom's generation expansion programme during the 70's and 80's was, as far as can be determined, the largest such programme to be attempted by any electric utility in the world, both historically and during this period.

and internal funding from the Capital Development Fund. These loans brought Eskom's total borrowings to R19 154,9 million by the end of 1984, a staggering 30 per cent increase over the previous year.

3.2.4 Generating plant requirements

To meet Eskom's generation expansion plans 2 400MW of new plant was brought into service in 1980, exceeding by 800MW that commissioned in the previous year. This increase in plant brought Eskom's total available generating capacity to 18 349MW. Plant under construction or on order at the 31st of December 1980 amounted to 10 644MW. This plant was required for four fossil-fired power stations, Duvha, Lethabo, Matla and Tutuka the Drakensberg pumped-storage station and the Koeberg nuclear power station in Cape Town.

In pursuance of their expansion plan Eskom brought into service in 1981, 1 700MW of plant, and at the end of the year no less than eight power stations were under construction these were, in addition to the ones named above, Matimba and Khutala both of which were fossil-fired stations.[123] The addition of these two stations brought the plant on order at the end of 1981 to 15 366MW i.e., an addition of 4 722MW over the previous year.

The increase of generating plant into the Eskom system continued into 1982 with another 1 700MW being brought into service and there was a total of 22 130MW on order. This meant that during 1983 an additional 6 764MW of plant was placed on order by Eskom.

The year 1983 saw 1200MW of new plant being brought into service and 22 260MW of plant on order, an addition in the latter case of only 130MW over 1982. This indicated that Eskom's generating expansion programme was beginning to slow down, if only marginally. This trend was to continue, however, into 1984 when, for the first time in the 80's the plant on order year-on-year did not increase, but fell by 1 551MW. The plant brought into service in 1984 amounted to 1 565MW, which included the first generating set of 965MW at the Koeberg Nuclear Power Station situated outside Cape Town.

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[123] This last-named station would be renamed Kendal prior to its commissioning.

3.2.5 Summary of Eskom's economic situation: 1980-1984

This summary will take the form of two tables, Table No 4.1 will show year-by-year statistics concerning electricity sales, revenue, the accumulated deficit, average tariff increases and the debt carried by Eskom. Table No 4.2 will show the generating plant available for meeting South Africa's demand for electricity and the estimated growing excess generating capacity over the period.

YEAR	Electricity Sales: Percentage Increase	Revenue (R Millions)	Accumulated Deficit (R Millions)	Average Percentage Tariff Increase	Total Borrowings at year end (R Millions)
1980	8,6	1 772	18,36	7,3	6 424,9
1981	7,2	2 141	95,74	5,5	8 155,5
1982	2,4	2 695	153,65	22,9	10 625,2
1983	2,2	3 302	256,65	19,9	14 676,6
1984	8,8	3 832	419,50	6,0	19 154,9

TABLE NO. 4.1 INDICATORS OF ESKOM'S PERFORMANCE: 1980-1984
Source: Eskom Annual Reports for the Various Years.

It can be seen from Table No 4.1 that whilst electricity sales continued to drop from 1980 to 1983 revenue increased, this increase was achieved by Eskom charging high tariffs particularly in the two years 1982 and 1983. A criticism that can be levelled against these high tariff levels, in addition to those levelled by industry, is that Eskom was financing an increased portion of their generation expansion plan from this source of funds. This meant that electricity consumers in the early 80's were paying up-front the money needed for new power stations before they were being built. The irony being that not all stations were really required, see the notes below on Eskom's excess generating capacity. The accumulated deficit (costs over revenue) continued to increase in real terms over the whole period. What was of greater significance, however, was the increasing year on year total borrowings. Servicing this enormous debt was problematic for Eskom due to its increasing operating and maintenance costs and its decreasing sales of electricity, which, although yielding increases in revenue year on year depended on tariff increases which were beginning to prove unpopular.

CAPACITY (MW)	1980	1981	1982	1983	1984	
Assigned sent out rating*	17 339	18 989	20 523	21 673	23 168	(1)
Peak demand*	13 668	14 674	15 532	15 639	17 296	(2)
25% Reserve	3 417	3 669	3 883	3 910	4 324	(3)
(2) + (3)	17 085	18 343	19 415	19 549	21 620	(4)
Excess capacity (1) - (4)	254	646	1 108	2 124	1 548	(5)
15% Reserve	2 050	2 201	2 330	2 346	2 594	(6)
(2) + (6)	15 718	16 875	12 862	17 985	19 890	(7)
Excess capacity (1) - (7)	1 621	2 114	2 661	3 688	3 278	(8)

TABLE NO. 4.2 ESKOM'S EXCESS GENERATING CAPACITY: 1980-1984
Source: For item marked thus* : Eskom Annual Reports for Various Years.

Table No 4.2 presents a particularly intriguing situation, here is shown Eskom's increasing excess capacity in generating plant see rows (5) and (8). The 25 per cent spinning reserve i.e., the reserve generating capacity held by the utility to meet emergencies (Row 3) is considerably above that considered normal for the power generation industry world-wide which is about 15 per cent.[124] This meant that a power stations' availability of around 85 per cent is considered the norm, whereas Eskom's availability in the period 1980-1984 was of the order of 75 per cent maximum.

The question of availability is of great economic importance since an improvement in availability would reduce the plant needed to meet the maximum system demand and reduce Eskom's capital expenditure. For example the capital cost of plant in 1983 was R660 per kW and the operation and maintenance cost, excluding fuel, was R15 per kW per annum, the annual cost of capital in 1983 was 14 per cent. A 1 per cent improvement in availability would then be worth about R33,6 million. There was therefore every incentive for the Corporation to attempt to increase their plant availability to curtail this increasing capital expenditure.

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[124] Author's telephonic communication with Mr S McFadzean, 12th November 1997.

Eskom had complained that in 1980 (see Chapter 3) and again in 1981 that they were hard pressed to meet electricity demand (Eskom Annual Report 1981,p.10). It seems, however, that the Corporation had excess generating capacity available. This plant was then unavailable for service presumably because of Eskom's inability to manage their stations efficiently, e.g., poor maintenance regimes etc.

The excess capacity was also the result of Eskom's inability to correctly forecast future electricity demand as has been noted earlier. It is, however, necessary in this respect to point out that the planning and building of large power stations takes many years to complete (about 8 years from the planning stage to the commissioning of the first turbine generator set) but in any event, as has already been shown, Eskom's forecasting methods were wanting in macro-economic sophistication during the period under review.

3.2.6 Effect on electrification

There is little doubt that the events described in the last section had a profound effect on the electrification of black households between 1985-1990 in so far as they amounted to the single most important reason why the government initiated the de Villiers Commission of Inquiry into Electricity Supply in South Africa in 1984, (the findings of this Commission, which had the effect of curtailing the electrification of black households will be discussed in section 4.0 below). In summary the following issues can be seen to be of concern to the government. 1) Eskom's massive debt situation. This was of concern to the government because the foreign portion of the debt was underwritten by the government. Eskom's domestic debt was secured by the Corporation's assets. 2) Eskom's massive generation expansion programme, which resulted in unwanted (excess) generating capacity in the 1980's. This expansion programme had been put in place at great cost in a depressed economy. 3) The very high tariff increases levied by Eskom since 1980 to pay for this partly unnecessary expansion programme, which had an adverse impact on the South African economy and 4) Eskom's seeming inability to manage their power stations efficiently. There was, in addition, as a result of the points made above, widespread consumer dissatisfaction with Eskom particularly in the manufacturing and mining sectors of the South African economy, see Farrando, Barnard and McDougall (1991, p.6), Eskom Annual Report (1985,p.8) and the Financial Mail (November 3rd 1983, p.31). As a result of the de Villiers Commission Eskom was restructured, along lines that would inhibit the Corporation's ability to play a role in the electrification of black households between 1985-1990. This institutional change will be considered presently. For completeness sake, and prior to discussing the de Villiers Commission findings of 1984 and Eskom's restructuring,

Eskom's economic performance between 1985 and 1990 will be briefly considered next. The connection between the Corporation's performance in this period and the electrification of black households will also be commented upon.

3.3 Eskom's Economic Performance: 1985 – 1990[125]

3.3.1 Electricity sales and revenue

In the years 1985 to 1990 following Eskom's reorganisation, with the exception of 1988, the growth rate in Eskom's sales of electricity showed a downward trend. The growth of total electricity sales year-on-year was as follows; 1985 5,2 per cent (down 3,7 per cent from that recorded in 1984), 1986 4,5 per cent, 1987 4,4 per cent; 1988 saw an increase of 5,7 per cent (up 30 per cent on the previous year) and in 1989 the downward trend continued with an increase in electricity sales of only 3,7 per cent, the lowest growth rate for the past five year period. This downward trend reflected the economic situation in South Africa after P.W. Botha's "Rubicon" speech. In contrast to the general declining trend electricity sales to municipalities increased because of the sales of distribution networks to them in some instances by Eskom. Municipalities that purchased these networks still bought electricity in bulk from Eskom and they distributed it to Eskom's former customers that the Corporation had previously supplied direct. In this way municipalities demanded more bulk power from Eskom to service these consumers leaving Eskom to sell less power direct to industry and certain domestic customers. The Johannesburg Municipality in particular also required increasing amounts of bulk electricity to meet the burgeoning demand from the newly electrified Greater Soweto. By 1988 municipalities were purchasing 10,1 per cent more electricity than in the years prior to 1985 and sales to municipalities represented 40 per cent of Eskom's total sales. Revenue (in real terms) during the years 1985 to 1989 increased year-on-year mainly resulting from increased tariff levels but also due to Eskom reducing it's operating costs through such strategies as cutting back on staff levels. For example in 1985 Eskom employed 66 000 people by 1989 the staff compliment was down to 51 544 some 23 per cent, (Eskom Annual Report, 1989, p.29). Charges against revenue increased, however, due to rising generation costs and loan repayments which rose as a result of increases in interest rates.

An important change in Eskom's accounting procedures was introduced during this period. In 1985 Eskom decided to report it's financial activities in conventional business accounting terms i.e.,

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[125] The same four headings will be used in examining Eskom's economic performance between 1985-1990 as was used for the period 1980-1985 just discussed.

depreciation accounting (possibly because the Corporation was now being managed along more business orientated lines as a consequence of the findings of the de Villiers Commission which will be discussed presently). Under this new accounting system fixed assets were not depreciated but the debt used to finance them was amortised instead. In adopting this system Eskom had to adjust upwards it's accumulated deficit, which stood at R380 million in 1985, to R489 million. Revenue in 1985, however, exceeded charges by R200 million reducing the accumulated deficit to R289 million. In 1987 a net income of R702 million finally liquidated this deficit and for the remaining years of the period Eskom succeeded in increasing it's surplus year-on-year.

3.3.2 Electricity tariffs

The price of electricity continued to rise for the first two years of the period under discussion. In 1985 there were two tariff increases, 10 per cent in January of that year and another 10 per cent in September. The reasons given by Eskom for the increases was that the low tariff increase of 1984 had been too low to cover the increasing costs faced by the Corporation resulting from higher interest rates and rising operational costs. There was an announcement, however, in 1985 that Eskom was committed to keeping future tariff increases below the level of inflation, (Eskom Annual Report, 1985, p.17). Furthermore, from 1986 pooled tariffs would be introduced. These pooled tariffs would be of concern to farmers with respect to the electrification of white-owned commercial farms in South Africa as will be shown in the following chapter.

In 1986 there was a further two tariff increases, again of 10 per cent each, one in January of that year and the other in July. Eskom explained that these tariff increases were necessary to "bring the price of electricity to the level required for a sound financial structure" (to be put in place at Eskom), (Eskom Annual Report, 1986, p.13). An off-peak tariff was also announced during the year for large electricity consumers particularly in the industrial and mining sectors of the South African economy and this allowed such consumers to reduce their electricity costs. The importance to Eskom of this was that with large consumers using off-peak electricity the Corporation's base-load power stations could be operated more efficiently.

The year 1987 saw tariff increases continue but at a lower rate than in the proceeding two years. The increase in 1987 being 12 per cent (the inflation rate for the year was 16 per cent). The year 1988 saw

the price of electricity rise by 9,3 per cent (inflation for the year being 13,1 per cent).[126] In 1989 Eskom was approaching the end of it's massive generation expansion plan, and this of course eased the financial burden that the Corporation had long carried. Even so tariff increases of 9,5 per cent were announced (the inflation rate for the year was 15,2 per cent). It was therefore argued by Eskom that, under the management of the restructured Corporation, the real price of electricity was declining.

3.3.3 Capital expenditure and borrowings

The period 1985 to 1989 embraced the debt standstill, which was a direct result of P.W. Botha's August 1985 so-called "Rubicon" speech. The debt standstill made it more difficult for Eskom to raise money for the continuation of it's existing generation expansion programme since now money had to be raised, exclusively on local capital and money markets. To ease it's financial position Eskom took three important steps. Firstly reductions in capital projects were instituted. These were achieved by delaying the completion of certain power stations, which were under construction. For example, Tutuka and Lethabo power stations were deferred by 18 months, four generating sets at Matimba were likewise delayed and the completion of Kendal power station was deferred by 9 months. Finally the start of construction of Majuba power station was postponed until early 1987. Secondly Eskom's operating expenses were cut back. This was partly achieved by Eskom's policy of reducing staff after the appointment of a new Chairman Dr John Maree in 1984. Thirdly Eskom adopted stringent adherence to its budgets which had been modified after the imposition of the debt standstill. Operating expenses had been reduced by R1 000 million and another R1 000 million had been cut from Eskom's capital expenditure budget. To further ease the need for capital Eskom had increased the cost of electricity by a higher amount than would have been the case without the debt standstill, (Eskom Annual Report, 1986, p.17). What also helped Eskom meet it's capital requirements was the reduced demand for electricity during the period of the debt standstill and the fact that the availability of existing power stations was increasing from the low level of between 73-75 per cent in the early 80's to about 87 per cent in the period 1985-1989. All these factors allowed Eskom the luxury of deferring the completion of the stations mentioned above, with the concomitant savings in capital requirements, which in turn affected the Corporation's borrowing requirements.

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[126] The inflation quoted here is measured by the average increases in PPI for the year.

Despite it's reduced capital requirements Eskom was of course still a major borrower. In 1985 Eskom raised R4 900 million in local loans and on foreign markets. After August 1985 no foreign loans could be raised, however, because of the debt standstill. In 1986 Eskom financed 32 per cent of it's total funding requirements from internal sources thus reducing the pressure the debt standstill was putting on South African financial markets. By the second quarter of 1986 this pressure lessened, as a result of Eskom's ability to fund it's own capital requirements and the low economic activity in South Africa, and Eskom successfully raised R1 743 million from local sources.

In 1987 local financial markets were characterised by relatively low interest rates and considerable liquidity existed. Eskom quite early raised loans totalling R3 518 million for their capital requirements. This was also a year when Eskom made every effort to maintain contact with overseas bankers and investors despite the debt standstill. By these means existing foreign loans were extended. Furthermore, export credit facilities continued to be used to source finance from overseas for some of Eskom's generating plant being installed in their power stations under construction. On the local financial markets Eskom stock proved popular and one large loan, Eskom 168, was floated. Eskom therefore fared very well in raising capital in 1987.

Eskom's funding requirement for 1988 was R2 291 million and this amount was also raised with relative ease. Eskom's financial position was seemingly rapidly improving compared with its financial position between 1980 and 1985. For example accumulated borrowings in 1984 amounted to R19 154,9 million whilst in 1988 this figure was R24 334 million indicating lower year-on-year increases than those between 1980 and 1985 in real terms. In 1989 total borrowings reached R24 630 million showing that debt accumulation was diminishing rapidly although total debt was still substantial. Eskom's debt/equity ratio was also rapidly showing improvement. Eskom's funding requirements for 1989 were obtained from South African money and capital markets and amounted to R2 469 million this figure being relatively low compared with previous years because of the decline in the Corporation's generation expansion programme. Eskom reported that their funding requirements would reduce even further from 1989 onwards, (Eskom Annual Report, 1989, p.38).

3.3.4 Generating plant requirements

During the period 1985 to 1990 no new generating plant was ordered by Eskom. There was of course plant on order from contracts signed in the previous period, 1980 to 1985, as a consequence of Eskom's generation expansion programme. Each year between 1985 and 1990, the amount of plant

on order, diminished as more plant from the expansion programme was brought into service. As already noted this made Eskom's financial situation easier to manage.

In 1988 Eskom for the first time mentioned their increasing excess capacity of generating plant, (Eskom Annual Report, 1988, p.26). The amount of plant excess to peak load requirements in 1988 was about 4 000MW[127]. With an installed capacity at that time of 33 176MW this amounted to about 12 per cent. By 1989 the excess capacity had reached 4 363MW. This situation provided Eskom with the opportunity to place unwanted generation plant into reserve storage in the period 1985-1989 Eskom's so-called "mothballing" programme.

3.3.5 Effect on electrification

Three important issues concerning the electrification of black households in South Africa in the period 1985–1990 can be identified as a consequence of the events described in the last section. Firstly declining trends in electricity sales and an increasing level of excess generating plant presented Eskom with an ideal opportunity to initiate a national electrification programme.

Secondly, the "mothballing" of plant presented Eskom with a dilemma. This "mothballed" plant, together with the prevailing excess generating capacity, provides irrefutable proof that there was indeed sufficient plant available, without recourse to building new power stations, for carrying out a major programme to electrify black households. The decision to "mothball" plant came back to haunt Eskom in the early 90's when ANC policy makers asked why such plant had been "mothballed" and not used for providing electricity to the poor.[128]

Thirdly, the period 1985-1990 saw Eskom's overall financial and technical (improvements in availability, more modern plant being used for generation) situation improve over that in the years 1980 to 1985. The years 1987 to 1990 were the ones in which this improvement was the greatest. This situation provided Eskom with the platform required to attempt a nation-wide programme to electrify black households in South Africa after 1990.

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[127] This excess capacity had obviously been accumulating over the years, see, Table No. 4.2 when it was postulated that in 1984 with an availability of 75 per cent Eskom had an excess capacity of 1 548MW and 3278MW with an availability of 85 per cent.

[128] See Chapter 7.

It can be argued then that Eskom's economic performance in the period 1985-1990 was such that it encouraged the Corporation to undertake a programme to electrify black households. Such a programme would bolster poor electricity sales, revenue from such sales would help amortise the costs of Eskom's generation expansion programme and at least part of the excess generating capacity that Eskom had available would be taken up by an electrification programme. Two events, quite outside Eskom's control, mitigated against the Corporation putting an electrification programme in place, however. Firstly there was the political situation described in section 2.0 above which would not allow the government to lend support to such a programme, and secondly there was the institutional changes which will be discussed below.

4.0 INSTITUTIONAL CHANGES AND ELECTRIFICATION

With respect to institutional changes and the electrification of black households these centred on the restructuring of Eskom which resulted as a consequence of the findings of the 1984 Commission of Inquiry into the Supply of Electricity in South Africa. The Commission and its findings will be discussed first then the restructuring of Eskom will be analysed.

4.1 The Commission of Inquiry into the Supply of Electricity in the Republic of South Africa: (The de Villiers Commission)[129]

In 1984 the government initiated a Commission of Inquiry into Electricity Supply in South Africa, the findings of which were to have a pronounced effect on the electrification of black households in South Africa. In addition to the influence that Eskom's economic performance between 1980-1984, and described above, had on the initiation of the Commission of Inquiry there were other influences at work as well. There was the recommendation of the Wiehahn, Riekert and de Kock Commissions that the state should play a less prominent role in the South African economy leaving the way open for the privatisation of Eskom which was also probably a reason for the Commission. Furthermore, by 1984 Eskom had become so powerful that its position dominated the South African electricity supply industry with Eskom acting in the country's interests as they alone saw them. As the Financial Mail

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[129] This was the second such inquiry. As noted in Chapter 3, on 7th March 1973 the Minister of Economic Affairs requested the Board of Trade and Industry to inquire into, and report on, the suitability of the tariff policy and structures applicable to the supply of electricity in South Africa. From the seventies to the mid-eighties the government seemed then to be targeting Eskom, this demonstrates how important the Corporation's decision making really was so far as the South African economy was concerned.

of November 4th 1984 (p.31) reported, "For many years Eskom has run its affairs as if a law unto itself". This "situation had a historical precedent and Eskom's autonomy was written into the Electricity Act of 1922 no doubt to keep Eskom out of the political arena. Eskom was beholden to no shareholders, it paid no taxes, it used no state funds and government had no say in its day-to-day management. The only control over Eskom was the Electricity Act itself and the State President's power to appoint Eskom's Chairman. Because of Eskom's importance in the South African economy these considerations may also have been factors in the government's decision to undertake an Inquiry into Eskom's affairs.[130]

The Commissions' appointment read as follows: "It is hereby notified for general information that the State President has been pleased to appoint Dr Willem Johannes de Villiers a member and Chairman and the following members of a commission of inquiry into the supply of electricity in the Republic of South Africa: Dr W. J. L. de Villiers, Mr L. F. Rive, Mr D. L. Keys, Mr A. B. Dickman, Mr A. J. van Wyk, Mr J. Wilkens and Mr J. C. de Waal.[131]

The Commissions' terms of reference were to inquire into and report on all aspects of the supply of electricity in the Republic of South Africa with special reference to:

a) the responsibility and functions in regard to the supply of electricity of government, including local authorities, vis-à-vis the responsibility and functions of the private sector in this regard;
b) the principles applicable to the supply of electricity and policies in this regard;
c) the effectiveness of existing legislation relating to the supply of electricity;
d) the structure and functions of existing institutions involved in the supply of electricity in the Republic of South Africa;

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130 This was suggested to the author by Mr J. Messerschmidt, Eskom's Executive Director, Distribution, in a telephone conversation on the topic of the de Villiers' Commission, 18th January 1999. There is also a statement in the Final Report of the National Electrification Forum's deliberations on restructuring the South African Electricity Supply Industry (ESI), (NELF (a), 1994, p.26). (which will be discussed in Chapter 7), that suggests that the Electricity Control Board (see chapter 3) exercised little control over the ESI after 1989, This situation may well have also been the case prior to that date prompting the government to investigate the ESI and Eskom in particular.

131 Mr Rive and Mr Wilkens were in fact members of the Electricity Supply Commission at the time of their appointment to the de Villiers' Commission. Mr Rive resigned as a member of the Electricity Supply Commission while Mr J. Wilkens withdrew from participating in the affairs of Eskom during the tenure of the Commission. Because of their business connections with Eskom, Messrs Keys and de Waal did not participate in the parts of the inquiry relating to the procurement function. Mr A. B. Dickman was to become, in the early 90's, an economic advisor to Eskom's Executive Director of Finance Mr M. L. Davis who was an active supporter of Eskom's Chairman Dr John Maree so far as the business approach to the electrification of black households in South Africa was concerned.

e) the cost effectiveness of such institutions, including the policy followed in the acquisition of raw materials;
f) the impact of capital formation, price determination, methods of financing and the existing tariff structure on the financial policy of the country with special reference to inflation, economic growth, the creation of infrastructure and decentralisation;
g) the functions and responsibilities of members of the Electricity Supply Commission and of the Electricity Control Board; and
h) any other matter concerning the supply of electricity, including matters submitted for investigation to the Commission of Inquiry by the Electricity Supply Commission.

The de Villiers Commission held its first meeting on Wednesday 29th of June 1984 in Pretoria. After analysing its terms of reference the Commission decided to confine its inquiry to "an in-depth study of Eskom's strategy", Commission Report, (p.3).[132] The Commission would, however, be "mindful of the possible effects of its findings on monetary policy as well as financial and other planning"; The Commission also resolved to complete its inquiry "as speedily as possible", Commission report, (p.3).

4.1.1. Summary of the findings of the Commission of Inquiry

The Commission's assessment of the potential effectiveness of Eskom's strategy for the future was particularly concerned with the Corporation's generation expansion programme and the methodology which underpinned its formulation. The Commission went so far as to instruct Eskom to recalculate its forecasts of electricity demand in accordance with de-facto information on electricity demand for the years 1973-1983. The results of this exercise revealed of course a discontinuity in the energy demand pattern and that trends in electrification demand subsequent to 1973 had been greatly overstated by Eskom.

It was the Commissions' opinion that the average annual growth rate of electricity consumption in South Africa would increase by 5 per cent per annum, instead of Eskom's estimate of an average of 7 per cent per annum, until 1990 and thereafter at a slightly lower growth rate. The Commission calculated that after 1989 the annual saving in capital at a load growth of 5 per cent instead of 7 per

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[132] This decision was made because Eskom was the major supplier of electricity in South Africa. As noted previously Eskom generated 98 per cent of the power used in the Republic at the time. Because, the electricity supply business was largely fragmented in South Africa an in-depth study of the industry at large would have been a very time-consuming affair and quite beyond the abilities of the members of the Commission to do in the short time they had available to complete their work.

cent would exceed R2 000 million per annum and increase to R3 000 million per annum in 1993, R6 000 million in 1997 and about R10 000 million in the year 2000. The difference in cumulative capital cost in the case of 5 per cent as against 7 per cent load growth would be R15 625 million in 1993, R41 345 million in 1998 and R105 745 million in 2003.

The Commission concluded that Eskom was a virtual monopoly acting as a supplier and forecaster of future electricity demand as well as the planner of future electricity requirements and, in addition, Eskom was the largest capital investor in any industry in South Africa. The Commission also pointed out that "the magnitude of Eskom's capital requirements accentuates the necessity for accurate load forecasts, but the responsibility for this task rests solely with Eskom. This is an unsatisfactory state of affairs, as Eskom will have to bear the blame for either an inadequate supply of electricity or for an excessive capacity", Commission's Report, (p.14).

The Commission went on to make a very important statement, one which heralded an era of greater government involvement in Eskom's affairs than hitherto. It said that whilst Eskom was fundamentally directed towards providing an abundant supply of electricity, and should have a share, and play a role in the determination, application and implementation of the country's energy and electricity policies, the Corporation should, however, act within the framework of the priorities and limitations of the government's development strategy, Commission's Report, (p.14).[133]

4.1.2. The Commission's recommendations and their impact on electrification

So far as the electrification of black households in South Africa was concerned the Commission made several key recommendations which would affect such a programme. These recommendations were as follows:

a) A two tier control structure should replace the existing Eskom management structure. The first tier was to be a Board of Control composed of officials from various government departments and

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[133] This recommendation is important since it was argued earlier that the Wiehahn, Riekert and de Kock Commissions may have been partly responsible for the government initiating the de Villiers Commission and these three Commissions recommended a reduced government role in the economy. As will be shown presently the government's development strategy with respect to Eskom had all to do with privatising the Corporation thus eventually reducing the state's role in electricity supply in South Africa.

major electricity consumers. The Board of Control, which after a decision by the government, would be called the Electricity Board was essentially a stakeholder board for overseeing Eskom's management policies and strategies. The Electricity Board was to be financed by means of a levy on the sale of electricity, (White Paper on Energy Policy, 1985, p.19). The second tier was to be an internal Eskom Management Board to supervise the day-to-day running of Eskom's business.[134]

This recommended structure was to provide a new mechanism aimed at encouraging the involvement of both government and major electricity consumers, the stakeholders, in Eskom's affairs. The Electricity Board would take responsibility for determining policy and strategy, including future growth rate estimation, Eskom's generation expansion programme as well as the effect such a programme would have on electricity tariff levels. With shareholders participating in expansion programme formulation and determining the effect of this programme on tariff levels it would seem unlikely that programmes to electrify black households in South Africa would be sanctioned. This was because such a programme would in all probability require cross-subsidisation. Such cross-subsidisation would hardly come from the government because of the political milieu in the country with the government fighting an electoral rearguard action with the CP. Likewise, cross-subsidisation would not readily come from large electricity consumers such as the mining and manufacturing sectors. This was because stakeholder representatives for these sectors on the Electricity Board would be reluctant to sanction increases in their own electricity tariff levels thus making themselves less competitive in the market place.

b) Escor should assume a leading role in the conservation of energy thus preventing prices for electricity rising too rapidly and Eskom making excessive capital demands on the South African economy.

This recommendation also made the electrification of black households in South Africa problematic since such initiatives would undoubtedly require large capital inputs. Returns from such projects would probably be small, particularly in the early years, and as noted above a degree of cross-subsidisation would also be required which would drive up tariff levels in key

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[134] The de Villiers' Commission also suggested that The Electricity Supply Commission be renamed Escor but this recommendation was not taken up by the government when they eventually implemented the recommendations of the Commission; instead the name Eskom was chosen. The name Eskom then replaced the Afrikaans Evkom and the English Escom and as noted previously is, for convenience, used throughout.

sectors of the economy i.e., mining and manufacturing. The consequences of this recommendation rather echoed the last recommendation so far as limiting electrification programmes was concerned.

c) The concept of different undertakings in Eskom was to be discarded and tariff structures were to be modified so that 1) The unit cost of transmitting electricity to an agreed reference point was to be determined and the cost of distribution calculated from that point to the actual consumer connection, and 2) that tariffs for individual groups of consumers should be built up from mean pooled costs.

   This was a very important recommendation for both the electrification of white-owned commercial farms and black urban and rural areas. The recommendation essentially meant that tariffs should be nationalised and no inter-sectoral cross-subsidisation would be allowed, hence the electrification of farms and black households could not be subsidised by other types of electricity consumers and each electrification project would ideally have to be financially viable in its own right. Furthermore, the costs of supplying electricity to farms would be charged to the point of power delivery and not the nearest reference point. The significance of this last point will be made clear in the following chapter. The fact that the electrification of black areas could not be cross-subsidised by other electricity consumers effectively curtailed them in the period 1985 to 1990. In any event for the reasons given in a) above the government was politically constrained from cross-subsidising the electrification of black households and industry would probably object if they were called upon to do so.

d) Eskom should in future discard the principle of operating at neither a profit or a loss in favour of a "sound assets and income structure"; i.e., Eskom should now be managed along "business lines".

This recommendation was perhaps the most profound one so far as the electrification of black households was concerned and was probably made with the privatisation of Eskom in mind. It meant that the electrification of black households would have to be looked upon in business terms and a return on the investment would be required i.e., sound business principles would henceforth dominate Eskom's management practices. Such a requirement would undoubtedly at the very least serve to curtail the electrification of black households in South Africa.

These recommendations and the political situation in South Africa after 1985 seemed to effectively close the door on most schemes to bring electricity to black households in South Africa. This was because Eskom was, under the recommendations of the de Villiers Commission, prohibited from cross-subsidising electrification projects and the government could not do so as a result of their electoral battle with the CP, and clearly business would not wish to do so and in the process make themselves less competitive in the market.

The recommendations of the de Villiers Commission were therefore profound for nascent electrification projects and heavily diminished what could be achieved with respect to them. The recommendations of the de Villiers Commission were accepted by the government and the Electricity Act, as amended, was further amended to make these recommendations law.

4.2 The Restructuring of Eskom

Following the findings of the de Villiers Commission Mr (later Dr) John Maree was appointed Chairman of Eskom by the Prime Minister P.W. Botha. This appointment ensured that Botha had an ally in charge of the country's prime energy carrier.[135] Maree immediately set about restructuring the Corporation taking into account the findings of the de Villiers Commission of Inquiry.

The underlying principle in the restructuring of Eskom was that the Corporation should be cost conscious, have closer contact with the needs of electricity consumers and be governed by sound business principles. To achieve this aim the management of Eskom was decentralised, (Eskom Annual Report, 1985, p.10). The government was at this time, also embarking on a decentralisation policy. Eskom's decentralisation plans were therefore in line with government thinking and involved dividing the Corporation into 52 Strategic Business Units (SBUs), each of which had typically between 1000 and 2000 employees. In an attempt to make them efficient they were organised as self contained business operations with responsibility for the cost effective management of their service

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[135] Maree came to Eskom from Barlow Rand where he had returned after being Chairman of Armscor, a position that Botha had also appointed him to. That Maree was politically well connected is never in doubt and this was forcibly demonstrated by the fact that on his appointment he immediately pointed out to Mr (later Dr) I.C. McRae, Eskom's Chief Executive Officer that McRae was to be sure to leave the interface between Eskom and the government to himself whilst McRae devoted his energies to the job of managing other aspects of Eskom's business, particularly the technical aspects. Eskom's previous Chief Executive Officer, Mr Jan H. Smith had, under the Chairmanship of Dr R.L. Straszacker, much more freedom of contact with government than McRae was destined to have under Maree, interview with Dr McRae, 4th September 1996. Maree's political contacts were confirmed to the author in an interview with him, 13th November 1998.

provision. (Eskom Annual Report, 1985, p.10). This was incidentally a reversion to the requirements under which each of Eskom's undertakings had to manage its own resources and maintain it's own books. As will be shown in the following chapter it is rather ironical that it was this aspect of the reorganised structure which allowed the electrification of a black township (Elandskraal) to get underway in spite of the political milieu of the period and the restrictions that the de Villiers Commission's recommendations put on such electrification projects. SBUs were located in Eskom's five line functions. These were the Resource Services Group which was responsible for data processing and education. The Generation Group which was responsible for the running of power stations and the procurement of fuel and water. The Operations Group which was responsible for expansion planning and controlling the national grid. The Engineering Group which was responsible for the construction of power stations, and transmission lines and the Distribution Group which was responsible for managing the distribution of electricity throughout the whole of South Africa. For distribution purposes the country was divided into 12 regions each of which operated as a separate SBU.[136] Each region was further divided into 26 areas, and each area was subdivided into 85 districts. District managers had the closest contact with electricity consumers and were considered to be a vital point of interaction between Eskom and it's customer base. This closeness that developed between Eskom's district managers and the needs of people in their districts also helped in the electrification of Elandskraal mentioned above. This regional restructuring was also implemented to achieve greater operational efficiency within Eskom.

The whole middle level of the previous reporting structure within Eskom was disbanded with the advent of the new reorganisation and the Corporation was changed to a flatter structure with communication lines to top management being considerably shortened. Furthermore, the new structure had the potential to provide more efficient communication channels between Eskom's head office and the regions and hence to electricity consumers themselves.

One of the very important considerations of the new restructuring process was to improve Eskom's financial position and Maree gave immediate attention to this requirement. This of course, was obviously necessary to normalise the situation the Corporation found itself in with regard to it's

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[136] These regions were: Central Transvaal controlled from Pretoria, Southern Transvaal controlled from Johannesburg, Eastern Transvaal controlled from Witbank, Northern Transvaal controlled from Nelspruit, Western Transvaal controlled from Klerksdorp, Eastern Natal controlled from Durban, Western Natal controlled from Pietermaritzburg, Orange Free State controlled from Bloemfontein and Welkom, Southern Cape controlled from Worcester, Eastern Cape controlled from East London, Western Cape controlled from Bellville and finally the Northern Cape controlled from Kimberley, (Eskom Annual Report, 1985,p.11).

growing debt situation. There was another reason, however, why this issue was of prime importance and this had to do with the possible privatisation of the Corporation which the government was considering at the time, (Eskom Annual Report, 1987,p.9). Clearly if Eskom was to be sold off its financial strength would be of critical importance to any prospective buyer. The Corporation's debt/equity ratio running at about 3,5/1 had to be reduced as a first measure.[137] The possible privatisation of Eskom also curtailed the Corporations efforts to electrify black households since financing such projects may not have been seen by a prospective private utility as being profitable and therefore a less desirable investment than providing power to the mining and manufacturing sectors. As an aid to the privatisation process the restructured Corporation was also concerned with examining ways of divesting itself of activities which had no bearing on it's core business, e.g., maintaining Eskom owned townships at power stations, these could be proclaimed for example and houses sold to employees.[138]

Eskom's new corporate structure came into being in January 1986 and was to remain in place for the period 1986 to 1991 when Eskom was again restructured (see Chapter 7). During that time efforts were directed at improving the Corporation's financial position so that an eventual listing on the Johannesburg Stock Exchange could be achieved and the public utility turned into a privatised supplier of electricity. Progress on the privatisation issue was reported in Eskom's Annual Reports from 1987 to 1990. In 1990 the government decided that it would not proceed with this initiative, (Eskom Annual Report, 1990, p.9).[139]

To manage Eskom a la the de Villiers recommendations there was the Electricity Board, now termed the Electricity Council, and the Management Board. The Electricity Council, consisting of 17 members, drawn from both the private and public sectors, was appointed in May 1985. The Council met at monthly intervals and was a non-executive body with members being appointed by the

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137 The privatisation issue was addressed in detail in 1989 and study groups were formed to prepare reports and recommendations concerning this issue. These groups were made up of Eskom executives and consultants from the private sector and they analysed the legal aspects of privatising Eskom, manpower issues, options regarding the structure of the privatised Eskom and the implication privatisation would have on the Corporation's financing and tariffing structures, (Eskom Annual Report, 1989, pp.10 and 41), also interview with Mr Kevin Morgan 15th July 1996.

138 Historically as new power stations were built Eskom also developed townships to house workers and staff that would eventually manage and operate the stations. There was a strict hierarchy of house types in these townships depending on the status of the occupant in the stations workforce.

139 This decision was made after de Klerk replaced P.W. Botha and reintroduced reform initiatives in South Africa. It is possible that Eskom was seen as being of use as a public utility to spearhead the electrification of the black townships of South Africa as a high profile reform initiative. The electrification of black townships having languished since the electrification of Greater Soweto.

Minister of Economic Affairs and Technology. Its purpose as noted already, was to formulate policy and the setting of objectives, and it was responsible for the overall control of Eskom. One of its very important functions was to appoint the Management Board, which was the executive body responsible for the day-to-day running of Eskom. The Management Board was at all times subject to the directives of the Electricity Council. The Council was heavily representative of the Afrikaans political establishment. The Management Board was made up of Eskom's senior staff, the Chairman was Eskom's Chief Executive (I.C. McRea) and the General Managers of Eskom's main line functions.

5.0 CONCLUSIONS

The following conclusions can be drawn from the discussions undertaken in this chapter and serve to answer the questions posed in the introduction to the chapter.

a) In the first half of the decade, to ensure that South Africa's borders with the front line states were protected, and to further enhance their destabilisation policy, the government encouraged the electrification of white-owned commercial farms on these borders. This electrification programme was undertaken by Eskom.

b) After 1985 two constraining factors to the electrification of black households in South Africa emerged. Firstly the electoral struggle between the government and the Conservative Party caused the government to officially halt its reform initiatives.[140] This decision was reported in Die Burger 4th March 1988. This had the effect of curtailing electrification development in South Africa itself. That an electrification programme had been one aspect of the government's reform process, and was part of their political agenda, is certain. This being confirmed by a statement made by Maree, Eskom's Chairman, and a confidant of P.W. Botha, when he observed that "Eskom had noticed the government's aim to stimulate the electrification of black urban areas and farming communities, (Chairman's Review, Eskom Annual Report, 1985, p.8). Secondly in their efforts to answer criticism of Eskom and to make the Corporation more efficient, the government initiated the de Villiers Commission of Inquiry into Electricity Supply in South Africa. The recommendations of the Commission, which were accepted by government in 1985, made it virtually impossible for Eskom, the only entity in South Africa with the capability of

[140] It was prior to these reform initiatives being halted that the government undertook the electrification of Greater Soweto.

doing so, undertaking a national programme to electrify black households which would almost certainly be non-viable financially and would require cross-subsidisation. Undertaking such projects would also impede the government's desire for Eskom to be eventually privatised. The reorganisation of Eskom in 1986 was such that it aided this privatisation effort and this too then had the effect of curtailing electrification projects. Without the fiscus cross-subsidising electrification projects they could therefore not be undertaken and for the political reasons already given the government could not provide the funds to cross-subsidise such projects either.

The outcome of the events described in this chapter was that between 1980 and 1990 the electrification of white-owned farms on South Africa's borders was actively encouraged by the government and was carried out by Eskom with alacrity. From 1985 onwards the electrification of black households in South Africa languished. Some small household electrification projects were, however, undertaken. These had financial backing from sources other than the government. Eskom also undertook some research into ways to make electrification cheaper. These projects will be discussed in the next chapter when Eskom's electrification initiatives in the decade 1980 – 1990 are discussed.

CHAPTER 5

DESCRIPTION OF ESKOM'S PROGRAMMES TO ELECTRIFY WHITE-OWNED COMMERCIAL FARMS AND BLACK HOUSEHOLDS : 1980-1990

1.0 INTRODUCTION

This chapter has a twin purpose. Firstly it describes Eskom's programme to electrify white-owned commercial farms on South Africa's borders in the period 1980-1990. A programme which was encouraged by the government for the reasons discussed in the previous chapter. Secondly it describes Eskom's involvement in the electrification of black households in the period 1985-1990, taking into account the factors which constrained this initiative and which were also discussed in the previous chapter. The important questions that arise with regard to the farm electrification programme are, 1) How did Eskom manage to make the provision of electricity to border farms affordable? 2) How many farms were electrified? and 3) What was the cost of electrifying these farms to the South African economy? With respect to the electrification of black households the important questions that have to be addressed are, 1) How were the findings of the de Villiers Commission accommodated by Eskom vis-à-vis the electrification of black households and 2) What was the extent of the programme to electrify black households from 1985-1990? The farm electrification will be considered first.

2.0 THE ELECTRIFICATION OF WHITE OWNED-COMMERCIAL FARMS

2.1 Agriculture and the State

One of the major functions of agriculture in developing economies, in addition to the production of food for domestic consumption, is to earn foreign exchange for the purchase of inputs for expanding a country's industrial base. This situation was less of a problem for South Africa after 1870 than for many other developing countries due to the mineral wealth of the country which was a large foreign exchange earner.[141] The mining revolution of 1870 undoubtedly caused a structural change in white

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[141] Agriculture in South Africa can be divided into two sections, the market-orientated white-owned commercial farms and the subsistence-orientated black-owned farms. According to Houghton (1973,

agriculture in South Africa and farmers, who had previously produced for their own use, because of a lack of profitable markets for agricultural produce, saw the possibilities of profit from the demands for food from the burgeoning mining towns. Agricultural output after 1870 only increased slowly, however, and was lower than the demand resulting from the mining towns, (de Jong 1975 Vol.4, p.34). From Union in 1910 successive governments devoted much attention to agriculture. Whilst the production for food was clearly of major concern the important farmer's vote was as well, and with about 65 per cent of the working population being involved in agriculture this was a very important consideration.

After about 1902 at the end of the Anglo-Boer war and prior to Union the government concerned itself with developing the agricultural sector and defensive policies to control the detrimental effects of unstable markets for agricultural produce. Their concern was prompted by drought, disease amongst sheep and cattle and soil conservation problems. The promotion of co-operative's on the European model and the establishment of provincial agricultural credit banks, were also undertaken, (de Jong, 1975 Vol.4, p.37).

From Union in 1910 two areas of governmental attention can be discerned with respect to agriculture. Firstly there was indirect involvement which encompassed efforts to promote productivity in agriculture by means of education, and secondly direct involvement by means of the provision of credit from the Land and Agricultural Bank which had been formed from the amalgamation of the provincial banks mentioned above. The Land Bank was established in terms of the Land Bank Act, Act No 18 of 1912. Irrigation schemes were also begun and soil conservation schemes were put in place.

After the depression of 1929-1932, which resulted in a disastrous decline in agricultural prices, the government directly interfered with the market-mechanism in the agricultural sector. Two cereals were earmarked for special attention, maize and wheat. The Maize and Wheat Control Act of 1931 resulted, (Houghton, 1973, p.52). In 1937 in order to ensure more effective and uniform agricultural marketing and price policies the Marketing Act, Act No 26, of 1937 was promulgated. This Act

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p.46) the difference between the two farming sections manifests itself in cultural differences and "fundamental attitudes to the exploitation of the natural environment". There is also a notable disproportion of land in South Africa between white and black-owned farms. In 1980 black agriculture held about 15 million hectares whilst white agriculture held about 88 million hectares, (Nattrass, 1990, p.100). The Land Act (1913) prohibited blacks from owning land in South Africa but this situation was also exacerbated by tribal custom which also disallowed this.

allowed control boards for tobacco, milk and wheat to be formed, subject to the Minister's approval, (de Jong, 1975, Vol.4, p.47).[142] A very deep relationship can be discerned to have developed between South African farmers and the government after 1910. This relationship was characterised by financial help being given to farmers in times of need. This financial help was significant and biased in terms of the race groups receiving it, however, (Nattrass, 1990, p. 119). For example in the period 1965 to 1970 state aid to white farmers provided nearly 20 per cent of the average farmer's income, (The Marais/du Plessis Commission, 1970).

State aid to agriculture therefore came in a number of different forms. The most important of which was the payments made to farmers to stabilise various farm commodity prices. In 1975 almost 75 per cent of government aid to agriculture was earmarked for this purpose, (Nattrass, 1990, p.120). Other important inputs into the agricultural production process such as fuel, fertiliser and water were also subsidised.[143] These subsidies had the effect of widening the gap between the white commercial farming enterprises and the black subsistence farms. Frankel (1933), cited in Nattrass (1990), estimated that between 1910 and 1936 R224 million was spent by the state on white agriculture as against R1,25 million on black agriculture, a ratio of 200:1.

The operation of the Land Bank in favour of white agriculture is another case in point. Wilson (1971, p.136) has pointed out that the Land Bank not only made credit available for farmers but that farmers began to look increasingly to the state to solve their financial problems. State involvement in South African agriculture has therefore been historically more widespread than in any other economic sector with the possible exception of transport services. An anonymous author writing in 1960 commented upon this situation as follows:

> "Having been a neglected industry during the 19th Century, farming has become the most cared for branch of our economy. There is no other economic activity on whose development so much public money, has been spent". Our First Half Century, (1960, p.242).

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[142] Farmers exercised the most influence on the control boards and their interests were protected in this way. For example domestic prices could be kept at a high level and surplus crops could be exported by means of subsidies. Furthermore, inefficient, as well as efficient farmers were financially protected.

[143] Water resources for irrigation is a particular case in point in the period 1980 – 1990. To illustrate how the price of water for irrigated agriculture was subsidised farmers in the Loskop region near Witbank were paying as little as 6 cents for a cubic meter of water whereas the domestic price in Witbank was over R1 i.e., a ratio of 17:1.

It is appropriate at this juncture to briefly comment on agricultural policy in South Africa in the decade 1980 – 1990.

2.2 Agricultural Policy: 1980 - 1990.

The 1980-1990 decade was a time of financial crisis in South African agriculture, whereas the 1960s and 1970s had been characterised by income growth and apparent prosperity, (Spio and Groenewald, 1998, p. 176). According to these authors this financial crisis was erroneously attributed to drought conditions in South Africa after 1981. Drought, however, merely exacerbated a looming crisis whereby credit and tax policies rendered debt attractive and removed farmer's incentives to reduce their indebtedness.

Agricultural policy in South Africa until the late 80s was then responsible for farmers' attitudes towards debt. Such policy supported the dualist public support system that favoured white commercial farmers over black farmers in a similar vein to that of earlier periods. Policy toward white commercial agriculture was clearly set out in the 1985 White Paper on Agricultural Policy. This White Paper was concerned with the optimal use of resources taking into account the policies of apartheid. Optimal resource use, a prime concern of this white paper, was to be achieved by means of production and marketing considerations.

One of the principal objectives of agricultural policy in the 1980-1990 decade was self-sufficiency in food production via government support for white commercial farmers, (Vink, Kirsten and van Zyl, 1988, p. 72). Government support included the protection of farmers from foreign competition by various subsidies and access to the latest mechanical and biological techniques. By these means South Africa achieved the aim of self-sufficiency in most farm products, (Vink, Kirsten and van Zyl, 1998, p 73). This policy should be seen, however in the global context, most industrial countries adopting the aim of self-sufficiency in food production in the post second world war period.

Farm subsidies were, as they had been in earlier periods, one of the methods of achieving the goals of the 1985 White Paper on Agricultural Policy, and subsidies again under-pinned the government's agricultural policy in the 1980s[144]. The subsidies came in the form of drought aid and other disaster

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[144] The cost of electricity to farmers was at no time during the 1980-1990 decade subsidised by the government. As will be shown, electricity supply to farmers was subsidised, however, this subsidy coming from other electricity users.

payments. The government also subsidised farm losses in the wheat, maize and dairy industries and also to ensure that prices for these commodities were kept as low as possible. Between 1985 and 1988 the government also took responsibility for export losses incurred by the Maize Board, these losses amounting to about R400million by April 1988 (Brand Committee Report, 1988).

Changes in the political economy of South Africa in the 1980-1990 decade began to affect the government's policy towards white commercial farmers, however. Within the ongoing reform process a number of important policy shifts can be discerned, the main ones according to Brand et al., (1992), being:

a) The lifting of controls over the movement of labour in South Africa;
b) Budget allocations supporting white commercial farmers from 1980 were reduced from 1987 onwards;
c) There was a change in the tax treatment of white commercial farmers in the late 1980s. One of the most important changes was the reduction in the subsidies provided by government with respect to the length of time capital purchases could be written off; and
d) There was a general reduction in the use of price controls and a shift to a market-based agriculture economy.

From the mid 1980s onward then despite stated policy the agricultural sector faced increasing deregulation and market liberalisation. This liberalisation could be linked to the failure of the Land Bank to continue the high cost of borrowing by white commercial farmers and by the end of the 1980-1990 decade, South African white commercial farmers were becoming increasingly exposed to market forces. As will be shown presently this liberalisation process in the agricultural sector made it easier for Eskom to begin a campaign to increase the price farmers paid for electricity in the late 1980s.

In spite of the changing political economy in the decade 1980 – 1990, further money was to be spent on the agriculture sector, however, this time for electrifying white-owned commercial farms. The reasons, were twofold, for security purposes, as shown in the previous chapter and because of economic necessity resulting from high diesel oil prices as a consequence of the oil crises of the 1970-1980 decade. This expenditure on electrification can be looked at as no more than a continuation in the government's involvement with ensuring that the agriculture sector of the South African economy

was privileged, and to some extent cosseted. This cosseting process was also motivated by the need for the government to secure the important farmer's vote.

2.3 Security Issues

This section expands on the comments made in the previous chapter and brings the security aspects of the electrification of white-owned commercial farms in South Africa into clearer perspective. From 1980 onwards the Defence Department sought to encourage the defence of areas that were under attack or infiltration. Area defence necessitated the South African Defence Force taking advantage of specialist knowledge of the terrain by the people of a locality. Farmers were obvious choices for providing such knowledge, (Grundy, 1983, p.8). The Defence Act was therefore amended in 1982 to allow such men in particular locales to use their knowledge in aiding the Defence Force as the need arose.[145]

In addition the National Key Points Act allowed the Minister of Defence to designate such points. A National Key Point was any place or area that was so important that its loss, damage or disruption or immobilisation prejudiced the defence of the Republic. When a Key Point had been declared people living there were obliged to undertake security precautions, e.g., weapons and communications equipment storage and training to repel terrorists. To this end a plan was formulated to establish a series of fortified Key Points which would be linked by radio along South Africa's borders, (Grundy, 1983, p.9). Security on the Mozambique border was particularly troublesome. Leistner (1989), cited in Casto (1998, p. 53), observed that "Since 1975, when Frelimo assumed power in Mozambique, many South Africans have regarded the Marxist-Leninist regime as a serious threat to state security". Casto (1998, p. 53) claims that the ANC was "allowed to operate freely against South Africa from Mozambique bases".

The problem was, however, that border farms, were being abandoned and isolated rural communities began to be vulnerable to attack. Both the Departments of Defence and Agriculture were therefore anxious to stem the depopulation of those border areas. This depopulation was considerable. For example approximately 30 per cent of farms along the border from Mozambique to Botswana in 1981, no longer had white resident farmers. The remaining farmers were heavily armed and erecting

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[145] Mr Hendrik Barnard told the author in an interview, 9th February 1999, that the majority of the farmers on South Africa's borders were members of commando units.

security fencing. The feeling amongst border farmers was that terrorism would increase. What was of extreme importance was that the abandonment of border farms placed in jeopardy the concept of a "ring of steel" around South Africa's borders, which was popular in Defence Force circles, (Grundy, 1983, p.9).

That the electrification of border farms was an important ingredient in enabling this "ring of steel" to be maintained is evident by remarks made by the late Mr Richard Castle, a senior member of the National Party in Natal and an Eskom Commissioner, in Commission Meeting No 8/1980 held on the 3rd September 1980.[146]

The minutes of this meeting state that Mr Castle "emphasised the problems with the depopulation of the border areas and the need to maintain a total strategy for the defence of the country. He did not advocate any Eskom subsidy for an electrification infrastructure for such areas, but ways and means should be devised to provide and maintain such infrastructure from sources that should be earmarked for that purpose". This point of view was supported by the Commission. The sources of finance for the development of such an electrification infrastructure, as will be shown presently, eventually came from cross-subsidisation by other electricity users.

2.4 Economic Issues

Farmers were also leaving border areas because the economic future for them was unsure. Drought, high costs, labour shortages and poor infrastructures were key reasons, (Grundy, 1983, p.9). A particularly onerous burden that farmers had to bear was the price of diesel oil, which had increased above the rate of inflation from 1976 onwards. This section expands on this issue.

Diesel oil was a very important factor of production in agriculture as well as being used for generating electricity for lighting farm dwellings. If cheap electricity could be supplied to farms as a replacement for diesel oil this particular financial burden would be alleviated somewhat. Electricity would also enhance farmers security by enabling security fencing to be electrified (David Robbins in his book Driving South (1993, p.6) mentions these electrified security fences. He describes them as a "formidable obstacle ... at 220 volts it gives a nasty kick ... at 3000 volts it is lethal") and floodlights fitted. This would, it was hoped, encourage farmers to remain in border areas. As a consequence, and

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[146] The minutes of this meeting can be found in File CA 641/5 Vol. 1, Eskom's Electricity Pricing Department Archive.

as will be presently shown, under pressure from the government, Eskom began to electrify farms from 1980 onwards at a greater rate than ever before in the history of the Corporation.[147]

Figs No 5.1 and 5.2 below presents in graphical format trends in the differentials in the price of electricity and the farm price for diesel oil. Fig No 5.1 shows the relative change in Eskom tariffs as opposed to the farm price for diesel oil in the period 1973 to 1989. It is clear from this graph that Eskom's electricity tariff for farms increased significantly less than diesel oil prices. What was particularly important was the fact that Eskom's tariff increased uniformly unlike the wildly oscillating swings in the price of diesel oil. Farmers supplied with grid electricity by Eskom could therefore plan ahead with greater certainty than those that relied on diesel oil for generating electricity.

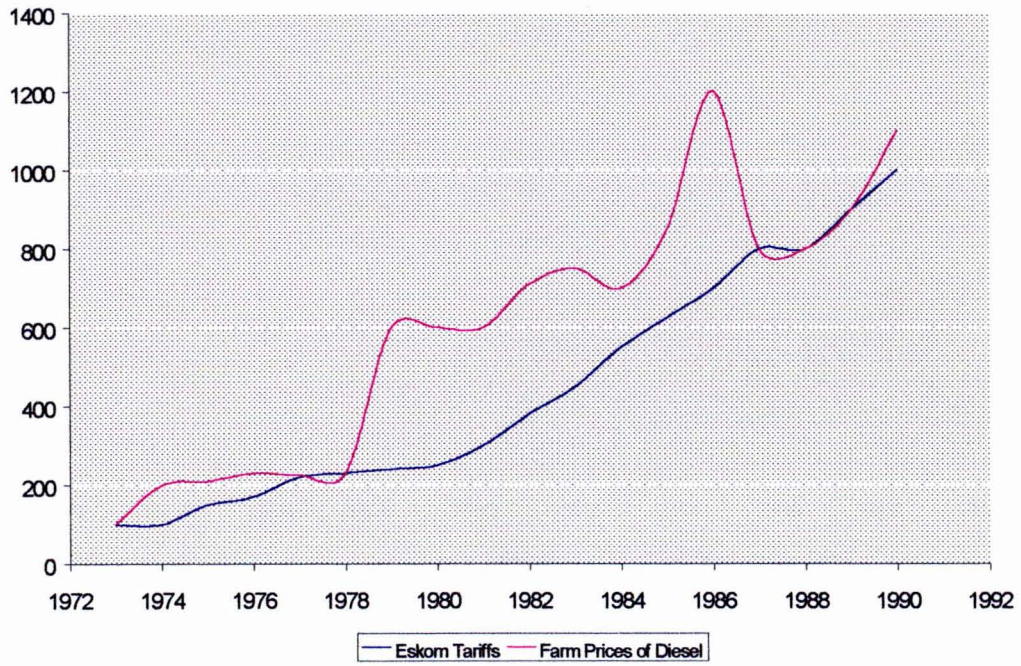

FIG NO 5.1 TRENDS IN THE RELATIVE CHANGE IN ESKOM TARIFF LEVELS VIS-À-VIS THE FARM PRICE FOR DIESEL OIL: 1973 – 1990 (1973=100)
Data Source: Eskom (Agrelek)

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147 The rise in liquid fuel prices was always the public reason that Eskom gave for electrifying the border farms at great expanse. Oil price increases are mentioned specifically in Eskom's Annual Reports for the period, (1980, p.13, 1982, p.27 and 1983, p.29). Electricity supplied to farmers was on average 60 per cent cheaper than liquid fuels, telephonic conversation between the author and Mr. N. Bezuidenhout, 17th February 1999.

Fig No 5.2 shows the situation when both Eskom's electricity tariff for farms and the farm price for diesel oil are divided by the Producers Price Index for various years. What is of significance in this case is that from 1978 Eskom's tariffs have shown a pattern of change which is more predictable than the fluctuations in the price of diesel oil which increased significantly in 1979, falling from then until about mid 1984 whereupon the price of diesel oil again surged upwards. Such fluctuations again demonstrating that Eskom's electricity tariffs were much more predictable energy price indicators when farmers were formulating their costs for budgeting purposes.

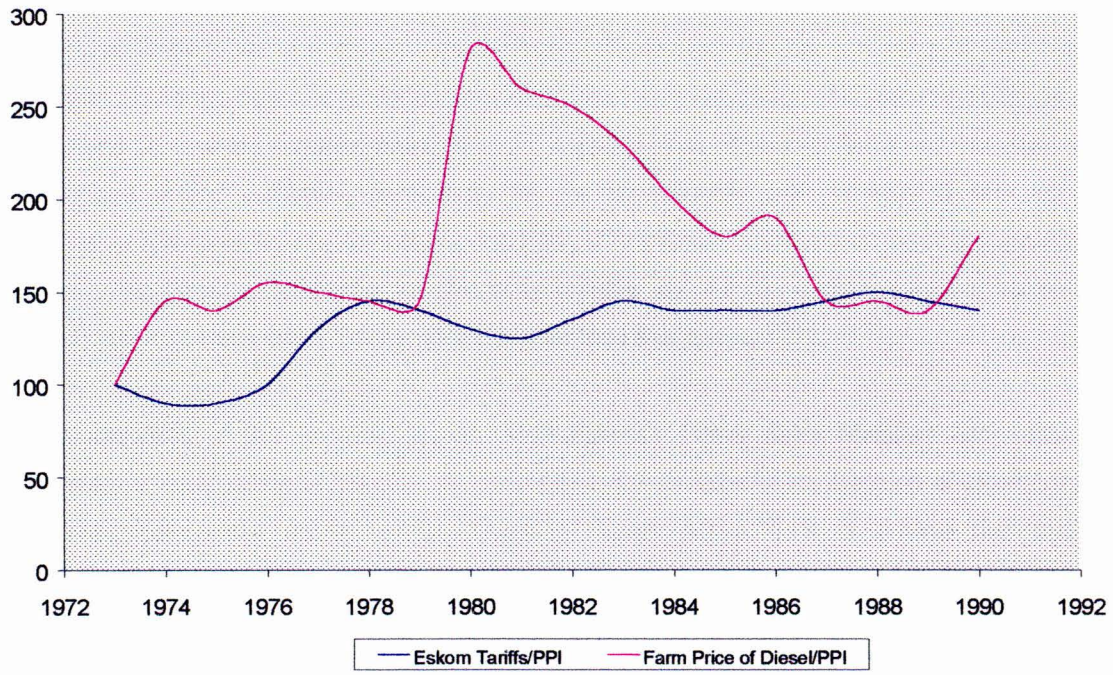

FIG NO 5.2 TRENDS IN THE RELATIVE CHANGE IN ESKOM TARIFF LEVELS AND FARM PRICE FOR DIESEL WHEN DIVIDED BY THE P.P.I.: 1973 – 1990 (1973=100)
Data Source: Eskom (Agrelek)

2.5 Manpower and Tariff Issues

In undertaking the electrification of farms in South Africa in the decade 1980 to 1990 Eskom had to overcome problems concerned with manpower shortages and the tariffs to be charged for electricity supplied to these farms. Solutions to these problems changed in scope prior to, and after, the de

Villiers Commission of Inquiry. In arriving at these solutions negotiations were undertaken with the South African Farmers Union and were highly politicised. Prior to 1980 the tariff charged by Eskom for supplying electricity to farms was cost reflective. Farmers who applied for electricity provision were those who could afford this tariff. This situation changed after 1980 with many farmers who wished to be supplied with electricity, as a consequence of the increasing oil prices, finding the costs of electrification prohibitive. Because of this, and the government's strategic need to electrify farms on the borders of South Africa, the government became actively involved with the problems attached to electricity tariffs for the farming community, and the speed with which Eskom could carry out the farm electrification programme.

In 1980 Eskom reported that it was hard pressed to respond to farmer's demands for an electricity supply. Some farmers had to wait in excess of a year to be connected to the national grid after they had accepted Eskom's financial terms for providing them with electricity. The main problems that Eskom faced in meeting farmers demands to be supplied with electricity being the shortage of materials and skilled personnel, particularly for the investigation and planning of new rural electrification schemes, (Eskom Annual Report, 1980, p.26). Eskom's inability to meet the pressing demands of the farming community for electricity supplies and the Corporation's high connection fees caused them to come under considerable criticism from that quarter.[148]

As a consequence of this criticism during 1980 Eskom's Power Sales Manager had various correspondence with certain of Eskom's Regional Managers concerning the question of electrifying white-owned commercial farms on the borders of South Africa.[149] It is evident that some governmental pressure promoted this correspondence.[150] The main concern of course was how to

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148 This criticism is cited in a letter from the Eastern Transvaal Regional Manager to Eskom's Power Sales Manager, Ref ETR:3/4/TPO. File CA 641/5 Vol. 1. Eskom's Electricity Pricing Department Archive.

149 These letters preserved in Eskom's Electricity Pricing Department Archive, File CA 641/5 Vol. 1 were written to the managers of 1) The Rand and Orange Free State, 2) The Eastern Transvaal, 3) The Northern Cape and 4) The Natal Regions. It is important to note that the first three of these regions all had boundaries running along the extreme West, North and Eastern borders of the Republic, i.e.; they bordered Namibia, Botswana, Zimbabwe and Mozambique, whilst the Natal Region had borders with Swaziland and the mountain kingdom of Lesotho.

150 This statement is supported by a letter send to Mr. F.W. de Klerk the then Minister of Mineral and Energy Affairs, who was the minister in charge of Eskom, by Mr. Jan H. Smith Eskom's Chairman stating that Eskom was looking into the plight of the farmers and providing grid electricity to them with all possible speed and urgency, see letter dated 11th of December 1980 ref. CS 130/21, File CA 641/5 Vol.1, Eskom's Electricity Pricing Department Archive.

increase the speed of electrifying these farms. In this respect various suggestions were put forward by Eskom's Power Sales Manager for consideration by the various Regional Managers.

These suggestions were as follows, 1) Eskom would allow municipalities to extend existing rural networks, 2) Eskom would allow multi-permission areas to be established,[151] 3) Regional Managers were to investigate the logistics of Eskom providing electricity to each of their areas of responsibility and to put forward proposals for making such electrification possible. Each of these suggestions posed problems for Eskom. For example Eskom's Regional Managers were anxious to avoid farming co-operatives or municipalities building rural electrification schemes to supply farmers. This was because they thought that the interests of all rural consumers should be considered not just farmers, and Eskom should therefore retain the planning function for rural electrification schemes.[152] In this regard, the Regional Manager of the Eastern Transvaal noted that "whilst it was considered that Eskom's prime task was the provision of bulk electricity and that rural electrification was a burden which results in a very small proportion of our sales and which requires a large number of staff and equipment, it was their duty to provide the service".[153] This was a typical response from other Regional Managers as well. It seems clear that these managers did not want their power diluted by municipalities or from co-operatives undertaking rural electrification projects. Co-operatives erecting, operating or maintaining their own electricity networks would require qualified and experienced people to undertake such work. Regional Managers were also worried that such people would be persuaded to leave Eskom and join these co-operatives and Eskom already had severe staff shortages. The issue was a delicate one and was debated at a meeting between Eskom's Financial Department and Regional Managers on the 20th November 1980. As a result of this meeting a directive from Mr I. D. van der Walt, Eskom's Senior General Manager, on this subject to all regional managers was issued.[154] The theme of this directive was the participation by farmers in the construction of rural electrification networks and the problems that could arise as a consequence.

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[151] Multi-permission areas were areas where several holders of permits to supply electricity to a particular area existed, such areas included farms that undertook to supply electricity to themselves through co-operative effort in a certain geographical area.

[152] This view serves to confirm a point which was made in the previous chapter concerning Eskom's role in electricity supply in South Africa as the Corporation saw it, i.e., that Eskom knew what was best for the country so far as this was concerned.

[153] Extract from a letter from the Regional Manager of the Eastern Transvaal to the Manager (Power Sales), dated 15th September 1980, Ref. ETR:3/4/TPO, File CA 641/5 Vol. 2, Eskom's Electricity Pricing Department Archive.

[154] See Document Ref CS 204 dated 28th January 1981, File No CA 641/5 Vol.1, Eskom's Electricity Pricing Department Archive.

This directive stated that "although Eskom might prefer to retain full responsibility for planning, operation and maintaining all circuits supplying farmers it cannot resist the pressure from the farming community to be allowed to assist in some aspects of this work". It was agreed that such help be permitted but subject to the principal of Eskom's "present and possible future interests being safeguarded". The directive did not, however, define how regional managers were to deal with the situations that might arise if farmers were allowed to help with the construction of rural electrification networks. It was recognised that the work could be undertaken either by 1) farmers undertaking construction work as contractors to Eskom or 2) farmers being allowed to plan and construct complete rural electrification schemes under licence or permit from Eskom.

Regional Managers were allowed to deal with each application for farmers participating in rural electrification projects as they arose, subject to certain basic guiding principles being followed. These were that 1) The extent of the work to be performed by farmers was to be approved by Eskom, 2) Eskom would supply all materials to be used on electrification projects, and 3) That the final acceptance of these rural electrification projects undertaken in this fashion should be approved by Eskom. Construction work furthermore was to be completed in accordance with Eskom's established standards for such work. It would also be the farmers sole responsibility to work in terms of the current Factories, Works and Machinery Act.

The financial arrangements were also laid out in the directive and the cost of the extension works accruing to farmers would take account of the contribution that the farmers made to such costs. Eskom would not make cash payments to farmers for labour and transport supplied by them, e.g.; use of their farm labourers to dig foundations for electricity pylons or ferrying these labourers back and forth from the farm to the construction site. Eskom was at pains to point out in the directive for farmer's undertaking such work, (p.2 of the directive), that it was to be clearly understood that the farmers themselves would be responsible for the operation and maintenance of electrification schemes which they had helped build. In an emergency, such as severe storm damage, Eskom would only assist after it had seen to the needs of customers supplied with electricity from its own distribution networks. It seems that in spite of Eskom's Regional Managers reluctance to allow farmers to become involved in building rural electrification schemes, because of governmental pressure to proceed with such electrification initiatives with all possible speed, and Eskom's manpower shortages, Eskom allowed this.

2.6 Farm Tariffs Prior to the de Villiers Commission

In addition to the pressure being put on Eskom concerning the rate of electrifying white-owned commercial farms and small holdings different provincial agricultural unions and the South African Farmers Union itself began to demand that Eskom reduce their charges for connecting farms to the national grid. That Eskom bowed to this demand is evident from the fact that in 1981 Eskom made application to the Electricity Control Board for an amendment to the licences of all the Corporation's electricity distribution regions with a view to lowering tariff charges to farmers.[155] In determining electricity tariffs for a particular category of consumer like farmers, the users were grouped according to similarities in electricity usage patterns, similar costs of supply and similar geographical areas. This was done so that a fair and equitable tariff could be designed for each consumer category. Inter alia Eskom's application to the Electricity Control Board concerned the introduction in all of Eskom's undertakings of a new electricity tariff, Tariff D, for small power user supplies in rural areas.

The existing tariff for rural consumers was Eskom's Tariff B. Tariff B was a two-part tariff made up of a basic charge composed of a network capital cost charge for a portion of the power line delivering electricity to a particular farm, this being the so-called monthly rental or extension charge, and a charge for the necessary step-down transformer. In addition there was also an energy charge for the amount of electricity used by each consumer. This energy charge was further subdivided into a high energy charge for the first 500 kWh used and a lower energy charge for the amount of electricity used above 500 kWh.

The new tariff, Tariff D, involved pooling the costs of providing a new electricity transmission network between all the farmers in a particular geographical area. This was to bring down the monthly rental charge to farmers newly connected to the electricity grid.[156] The amount of energy charged at the high energy rate was also increased from 500kWh to 800kWh. This arrangement led to all monthly rentals for newly connected farms being reduced by 40 per cent from what would have

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[155] Details of the application can be found in the letter addressed to the secretary of the Electricity Control Board from Eskom's Senior General Manager dated the 22nd June 1981 and cited in the notes of the meeting held 3rd August 1981 between the Electricity Control Board and the Senior General Manager and other officials of Eskom Ref. CS 204, in File No CA 641/5 Vol., 2, Eskom's Electricity Pricing Department Archive.

[156] Monthly rental charges were amortised over 23 years, (Ferrando, Barnard and McDougall, 1991, p.8).

been normally payable.[157] Older more established farmers with small, or no monthly rentals, would, however, be required to pay a little more on the energy portion of their electricity bill each month and thereby subsidise the cost of supplying electricity to newly connected consumers, (Salvoldi, 1994, p.4).

Theoretically this arrangement should have worked well. In the event many more farmers applied for connections than had been envisaged by Eskom and only about 47 per cent of these, and the farmers already connected to the grid, used more than 800 kWh of electricity.[158] This meant that Eskom began to subsidise the farming community.[159]

In accordance with Regulation No 3 of the Electricity Act Eskom had to advertise in the Government Gazette and certain newspapers the proposals for the new Tariff D and their application for amending licences for electricity supply in their various distribution undertakings. The advertisement which was placed in the September 1981 issue of the Gazette ran as follows:

> "The request by organised agriculture for a tariff specifically for rural consumers who are not large power users, is recognised by the introduction of the new tariff, "Tariff D". This tariff D will be applied to consumers defined as rural small users. Tariff B will in future not apply to the existing rural consumers. The monthly extension charge at present payable by these consumers will be reduced by 40% when Tariff D is introduced. As a consequence of the introduction of the new Tariff, the payment made by existing rural consumers may immediately or eventually increase marginally".

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157 It is curious to note that the 40 per cent reduction on monthly rentals was never specifically mentioned in Eskom's Annual Reports. Reference to it can only to be found in the DMEA Annual Report for 1981 where mention is made of the 40 per cent reduction in extension charges, (monthly rentals) and the introduction of a new rural tariff, for farmers presumably Tariff D.

158 Interview with Mr. H. B. Barnard, 16th June 1997, also see Salvoldi, (1994, p.9).

159 Knowledge of electricity usage patterns is of critical importance in tariff design and general electricity supply planning. The problem of under usage will reappear again when the electrification of black households in South Africa is analysed. The magnitude of the subsidies provided to farmers with respect to electricity in the decade 1980- 1990 will be estimated later in this chapter.

At a power sales meeting in Eskom on the 10th and 11th September 1981 the implementation of Tariff D was discussed.[160] Examination of the minutes of this meeting clearly demonstrate how far Eskom was prepared to go to ensure that farmers were connected to the national grid. Eskom's concern does give credence to the hypothesis that the government were active in the farm electrification programme in the period 1980 to 1984. For example Eskom were keen to diffuse any objection to the 40 per cent reduction in monthly rentals to farmers from other electricity users. They therefore reduced the monthly rentals to consumers charged in accordance with Tariff A by 20 per cent and Tariff B and C consumers monthly rentals by 40 per cent.[161]

Considerable debate also surrounded an item, which dealt with up-front cash payments by farmers which would bring their monthly rental bill down to levels which each farmer thought he could afford. Farmers could in this scheme pay for monthly rental charges in full in which event their electricity supply would not be subject to a monthly rental charge. Alternatively farmers could make a part payment and subsequent lump sum payments thus reducing their monthly rental bill. By this means farmers could make considerable savings over the 23 year period that Eskom required monthly rental charges to be payable before they were amortised. Eskom was then from 1980 onwards making every effort to make electricity affordable for farmers. Computerised sets of tables were prepared which allowed the reciprocal relationships between cash contributions and monthly rentals to be quickly and easily calculated allowing this further financial concession to be easily implemented.

Following this meeting Eskom's Manager (Power Sales) wrote to each Regional Manager concerning Tariff D.[162] Of importance is the following paragraph in that letter:

> "In view of the urgency of this matter a summary of the matters discussed and agreed, (at the meeting referred to above: Author's addition) together with explanations as required, is attached hereto. This summary together

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160 Notes on this meeting can be found in File CA 641/5 Vol. 2, Eskom's Electricity Pricing Department Archive.

161 Broadly speaking Tariff A was the tariff for larger electricity users, e.g., mines, Tariff B was for small power consumers and Tariff C was for domestic supplies. Reductions in monthly rentals for such consumers in reality meant very little so far as Eskom's revenue was concerned, and this point was discussed in the meeting of the 10th and 11th, since such monthly rentals were low and could not be compared with the costs associated with connecting farms in remote rural areas to the national grid.

162 Letter Ref. CA 010/12/1 & CS 204 dated 23rd September 1981 File No. CA 641/5, Vol. 2, Eskom's Electricity Pricing Department Archive.

with annexures, is to be regarded as a directive to work to pending the approval of Tariff D by the Electricity Control Board."

The Electricity Control Board approved the tariff and this allowed farm electrification to proceed at a high rate of connections. During the period 1980 to the end of 1984 the farm electrification on the borders of South Africa, and within the country was made possible by farmers helping Eskom build rural electrification schemes and the very attractive financial incentives that existed for farmers as a consequence of Tariff D. After the de Villiers Commission of Inquiry this situation changed somewhat.

2.7 Farm Tariffs After the de Villiers Commission

As noted already the de Villiers Commission of Inquiry had given much attention to the way in which Eskom had increased its tariff levels over the years from the start of the Corporation's generation expansion programme. The Commission found that a significant cause of consumer dissatisfaction with Eskom's tariffs arose from the covert nature with which certain aspects of their various tariff structures were arrived at.[163]

As a consequence, and also as noted already, the de Villiers Commission recommended that Eskom's electricity tariffs be nationalised, i.e., that the concept of different tariff structures in different regions be discarded and a national tariff structure with annual increases be implemented. They further recommended that electricity costs for different groups of consumers be pooled.[164]

In 1985 Eskom introduced a "kilometre factor" into Tariff D. This meant that, in addition to all the concessions that had been made to farmers concerning the supply of electricity to them up to that

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[163] The coal adjustment mechanism was a case in point. Advertised tariffs were subject to a coal adjustment on a quarterly basis. Before Eskom's distribution regions were connected to the national grid the base costs to Eskom of the coal specified in the license granted to each region reflected the costs to Eskom of the coal burnt in power stations in each region. Even after the establishment of the national grid in 1972 this regional influence in the base cost of coal persisted and this was not made clear in the different tariff structures. This, according to Ferrando, Barnard and McDougall (1991, p.6), "was due to bureaucratic inertia in revising the licences granted to the regions by the Electricity Control Board".

[164] As will be shown presently the concept of pooling costs was totally misunderstood by the South African Agricultural Union. They thought that by this the de Villiers Commission meant that all electricity consumers costs would be pooled not just separate categories. This created the expectation that large businesses would subsidise the agriculture sector. This was of course not the intention of the de Villiers Commission.

date, each farm connected to the national grid would now be given 1 km of line free and the farmers would not have to pay for this via monthly rentals.[165]

This change in the tariff was introduced because the South African Agricultural Union still considered that the monthly rentals were inhibiting farmers, not yet connected to the national grid from obtaining a supply of electricity and, at their request, Eskom changed Tariff D to include this kilometre factor. This ensured that it would be made even easier for farmers still without electricity to be connected to the grid. In an effort to ensure that Tariff D was still financially viable Eskom increased the high energy rate in the tariff from 800 kWh to 1 000 kWh. By this means Eskom considered that their costs of supplying electricity to farms would still be covered even with the kilometre factor in place.

Prior to the announcement of the new Tariff D, "Last minute representations to Eskom by the SAAU and the Minister of Agriculture resulted in a 2 km factor being introduced", (Ferrando, Barnard and McDougall, 1992, p.8). This was another concession to the farming community and meant that new consumers would only pay a monthly rental, or extension charge on line lengths in excess of 2 km rather than on 1 km. Tariff D was not checked for financial viability as a result of this change.[166] It is clear that considerable governmental pressure was being put on Eskom to continue electrifying white commercial farms and agricultural holdings in South Africa.[167]

The first announcement of these tariff changes was made by the head of Eskom's Power Marketing Division, Mr Martin Opperman. The announcement read as follows:[168]

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[165] This concession was introduced because electricity supplied under Tariff D was particularly affected by costs of monthly rentals. In reality monthly rentals formed a relatively small percentage of Eskom's total revenue by tariff category except for Tariff D contributions e.g., Tariff A contributed 1.4 per cent, Tariff B 4.1 per cent. Tariff C 1.0 per cent Tariff D, however, contributed 16.7 per cent, (Ferrando, Barnard and McDougall, 1991, p.10).

[166] Interview with Mr. H. Barnard, 16th June 1997.

[167] In the Chairman's Review in Eskom's 1985 Annual Report Maree mentioned the government's aim to stimulate the electrification of farming communities, (p.8). In the 1986 Annual Report Maree said that despite the debt standstill Eskom was "able to keep our major projects on line", these projects included rural electrification programmes, (p.7). In the Chief Executives Report in the 1986 Annual Report it was similarly mentioned that "every effort is being made to assist farmers in remote agricultural areas", (p.11).

[168] A transcript of this interview is preserved in file CA 641/5 Volume 2, in the Eskom's Electricity Pricing Department Archive.

STATEMENT BY MARTIN OPPERMAN, HEAD OF POWER MARKETING TO SABC.

RE: ESCOM EXTENSIONS IN THE EASTERN CAPE DURING 1985

Ref 5/1/5 Date 22/11/85

1985 was a year of many happenings in Eskom especially as regards our service to the Platteland. Organised agriculture have been pressing for many years for a more uniform system of charging for rural electrification. Under the old system the cost of electrical energy was recovered by way of the standard tariff charges, while Eskom's capital expenditure to supply a customer was recovered from each customer individually by means of a monthly extension charge which he had to pay over and above the standard tariff charges.

All farmers that take small supplies therefore pay the same standard tariff but do not all pay the same level of monthly extension charge. A client who is situated very close to a suitable Escom line would pay a relatively small extension charge while another client who is far from a suitable line would pay a very high extension charge.

Under the new system, with effect from the beginning of 1986, monthly extension charges for small rural supplies will be abolished altogether and the associated loss of revenue will be recovered by way of a small adjustment to the standard tariff. This uniform method will be of great value, especially to those clients who pay high extension charges. In order to ensure that extensions will not be made in an injudicious or uneconomical way those clients that require, on average, more than 2 km of network or who have to be coupled to a very expensive network, will be required to pay a monthly capital charge in addition to the standard tariff.[169]

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[169] This statement is rather confusing. Extension charges, or monthly rentals, were not really being abolished altogether except in the case of farmers requiring less than 2km of network. The recovery of associated losses (it was hoped) being made by the increased level of high energy charge (1000kwh from 800kwh).

> This new system will obviously have the effect of making many supplies that were previously considered to be uneconomically expensive, acceptable to the farmers. The number of applications that we have received during the past months has been very much above the average and additional applications are streaming in daily. We are, however, not in a position to handle all the applications immediately, firstly as a result of our limited manpower and secondly because of the serious shortage of capital that Escom is experiencing at present. Our ability to furnish additional supplies is therefore limited and we ask the community to please bear with us.

The next problem Eskom faced with farm tariffs was one connected with the pooling of costs. When the SAAU realised how pooling was to be structured they tried to get the structure changed to include all electricity consumers into the pool so that the agricultural sector would be cross-subsidised by them. Their efforts to do this continued during almost all of the period 1986 to 1990. In these years there was various correspondence between provincial agricultural unions, the South African Agricultural Union itself and Eskom. On occasions both the Minister for Agriculture and the Minister of Energy and Mineral Affairs were brought into the fray. Typical of this correspondence was a letter from the Natal Agricultural Union which had the support of farmers in the Eastern Transvaal and officers of the SAAU.[170] This letter inferred that there was confusion within Eskom as to the intentions of the de Villiers Commission with regard to pooling and that the agricultural sector should not be responsible by itself for the costs of electrifying rural areas especially when the "strategic nature of power in remoter parts of the country" was being considered hence the financial costs should be spread throughout the economy.[171]

In their negotiations with the various farming unions during this period concerning pooling Eskom always maintained that they were merely endeavouring to implement the recommendations of the de Villiers Commission, which now had the force of law. Furthermore, Eskom was charged with providing cost effective electricity to the nation as a whole, which of course included bulk electricity supplies to Greater Soweto; this being a time when the provision of electricity to black local authorities was being mooted.

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[170] Letter Ref. 14, dated June 1987 in File No CA 641/5, Vol.2, Eskom's Electricity Pricing Department Archive.

[171] This statement again confirming the strategic nature of supplying electricity to border farms. The provision of electricity to farms did of course increase their value, but this was never a point of debate when the issue of their electrification was being discussed.

Powerful support for the way Eskom saw the pooling of electricity charges came from the mining sector. This concern is evidenced in a letter sent to the South African Agricultural Union from the Chamber of Mines of South Africa.[172] In this letter the Chamber made it clear that they were aware, through their representative on the newly formed Electricity Council, Mr. G.Y. Nisbet, that proposals had been made to the Electricity Council by the SAAU at the August meeting that "the government should accept responsibility for the new Tariff D connections." The Chamber made it clear to the SAAU that they opposed the proposal on the following grounds; Firstly that Eskom had repeatedly indicated to the Chamber that it would not favour one consumer or group of consumers, at the expense of others, and secondly that new connections to mines, Tariff A consumers, were pooled amongst those consumers only, hence the farming and mining sectors of the South African economy were being given equal treatment by Eskom, which was equitable. The fact that mines consumed 30 per cent of the electricity generated by Eskom was pointedly made, and for mines to be expected to cross-subsidise Tariff D consumers would be unacceptable to the Chamber.

In spite of this support and support from other sectors of the South African economy as well for Eskom's pooling strategy Eskom was, nevertheless, concerned with the force of the farmer's attack on the restructured Tariff D. Eskom's management felt that the farmers would not capitulate easily but would take their arguments to "higher authorities" and this "would make life very difficult for Eskom". Hence Eskom should prepare itself should the SAAU get themselves really organised so far as their attack on Tariff D was concerned[173]. What Eskom did as a consequence of this suggestion was to prepare a belated financial analysis of Tariff D in which they showed that the Corporation was under recovering on Tariff D and that Tariff A consumers (large electricity users) were in fact already subsidising electricity supply to the agricultural sector in spite of the dictate of the de Villiers Commission.[174] Up until this financial analysis was undertaken it seems that Eskom had simply assumed that by increasing the level of the high energy rate component of Tariff D the Corporation's costs for supplying white-owned commercial farms with electricity were being covered.

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[172] Letter dated 16th October 1987, unreferenced, File No 641/5, Vol. 2, Eskom's Electricity Pricing Department Archive.

[173] Internal Eskom memorandum dated 10th March 1988 from the Power Marketing Manager to the Southern Cape Regional Manager. File No 641/5 Vol. 2 Eskom's Electricity Pricing Department Archive.

[174] See Preliminary Report on Tariff D (Rural Tariff), dated 7th September 1988 Ref. CA 641/5 & CA 643/3, File CA 641/5 Vol. 2, Eskom's Electricity Pricing Department Archive.

In the meantime on the 23rd March 1988, and just as Eskom had envisaged, the SAAU sent a letter to their minister Mr Danie Steyn in which they outlined their grievances and their official standpoint in the matter of Tariff D. They stated it was of national importance that the expansion of electricity supplies to all small users in the country be continued. A particular barb was a comment concerning the government's seriousness about the electrification of farms in light of Eskom being allowed to restructure Tariff D via pooling various categories of electricity consumers. It was pointed out that the SAAU's view was that all consumers should be pooled, i.e., inter-sectoral cross-subsidisation should be put in place.[175]

To state Eskom's case regarding Tariff D Eskom's Chairman John Maree met Dr. D.S. de Villiers the Minister for Administration and Privatisation (de Villiers was the Minister in charge of Eskom) during the first week of September 1988. As a result of this meeting Maree addressed a letter to de Villiers dated the 12th September 1988 enclosing documentation referring to the financial analysis Eskom had by then carried out with respect to the amount of money they were losing by supplying farmers with electricity at Tariff D rates and the subsidy they extracted from Tariff A consumers to balance the under recovery on Tariff D. Maree also expressed the opinion that they limit the development of non-economic supplies of electricity to rural consumers. It was also suggested that during 1989 the strategy for electrifying black households from 1990 onwards, and the implementation of this strategy, would have to be decided upon.[176]

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[175] This letter was not available for examination, the synopsis given above was taken from a memorandum from Eskom's Chief Distribution and Marketing Manager to Eskom's Marketing Manager dated the 24th October 1988 Ref. CA 088/2/1 dealing with this issue, File No 641/5 Vol. 2, Eskom's Electricity Pricing Department Archive.

[176] Letter dated 12th September 1988, unreferenced, File No. CA 641/5 Vol. 2, Eskom's Electricity Pricing Department Archive. By 1988 Eskom was beginning to address the question of the electrification of black households in South Africa, see Eskom Annual Reports, (1987, p.25; 1988, p.9; and 1989, p.15). It is interesting to speculate why the government did not openly subsidise the electrification of white border farms considering the strategic imperative that arises time and again in connection with the programme. A possible reason is that the budget for the South African Defence Force for 1960 was R44 million, by 1982 it had risen to R3 068 million, likewise the South African Police budget had risen from R29 million to R482 million in the same period; even accounting for inflation these costs represent significant growth patterns. If electricity consumers could finance the electrification of the border areas then this would ease the government's defence expenditure. The year 1984 seems to be the exception. In that year the government decided to subsidise rural consumers extension charges, for the last nine months of the year, (Eskom Annual Report, 1984, p.33). The DMEA Annual Report likewise mentions a R2 million subsidy for rural electrification in the Northern Transvaal border area. This subsidy may, however, have been a payment to help farmers as a consequence of the inclement weather during the year with flooding in the Transvaal, in this regard see Eskom Annual Report (1984, p.17).

Eskom's Management Board discussed the financial consequences of Tariff D at their meeting of the 25th October 1988 and resolved that from the 1st January 1989, or as soon as possible thereafter, all new Tariff D consumers would be charged on a basis such as the combined income from energy charges and monthly line rentals would render these new consumers self supporting.[177] Eskom put this recommendation to provincial agricultural unions in a series of meetings that the Corporation had with them in late 1988. Eskom also mentioned the prospect of the electrification of rural black areas at these meetings. After these meetings the SAAU wrote to Minister de Villiers concerning Tariff D. In this letter the SAAU expressed the opinion that if the government was serious about electrifying rural developing black areas then the government should be responsible for the costs and that the electricity tariffs paid by farmers should not be increased to help finance such schemes. With regard to Tariff D itself the SAAU stated that Eskom had brought to their notice their concerns with the under recovery of the present Tariff D and the possibility of various new electricity tariffs for farmers which would take its place. The SAAU mentioned that Eskom had proposed that these new tariffs would be put in place at the beginning of 1990.The SAAU informed the Minister also that increases in the price of electricity to farmers would result in a negative impact on agriculture and prevent the possible development of new electricity supply schemes for farmers. The suggestion was also made, that, because of the economic importance of agriculture in South Africa, the "authorities" should carry the possible increased costs of Tariff D consumers. The SAAU wanted to know the Minister's views on the matter.[178]

The Minister (who had of course been briefed by Eskom as noted above) responded on the 6th April 1989,[179] saying that it was not possible for the Ministry to subsidise electricity supplies to farmers and that Eskom must supply power on an economic basis. The Minister went on to say that it was only where security issues were important would the government pay Eskom to supply uneconomic power. Resources such as capital were to be used as efficiently as possible. Subsidies for services for non-economical reasons must therefore take place on a priority basis. The Minister closed by saying that if the SAAU looked at the principles of this, they would understand his viewpoint. What is important about this letter is that by April 1989 the political milieu of South Africa was changing and P.W.

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177 Letter from the General Manager (Distribution and Marketing) to Eskom's Chief Executive dated 28th November 1988, ref. CA 641/5, File No. 641/5, Vol. 2, Eskom's Electricity Pricing Department Archive.

178 See letter to Minister de Villiers from the SAAU dated 6th March 1989 Ref. S.4/14 SAAU Elektrisiteitskomitee - Speciale Vergadering, 12 Mei 1989, File No 641/5 Vol.2, Eskom's Electricity Pricing Department Archive.

179 Letter from Minister D. J. de Villiers to the SAAU Ref. M3/1/2/1/8, File No 641/5 Vol.2, Eskom's Electricity Pricing Department Archive.

Botha had been replaced by F.W. de Klerk. It seemed that the strategic importance of electrifying border farms was waning and the electrification of black households in South Africa was waxing.

The SAAU continued to complain about the prospects of a self-supporting farm tariff, however, they pointed out, probably quite rightly, that only Eskom was to blame for the under-recovery of Tariff D from their farm electrification programme. The SAAU suggested that incorrect assumptions regarding the amount of electricity farmers used had been made, and even more surprisingly and rather cheekily, that Eskom had allowed themselves to be swayed by the Minister of Agriculture's request for a free 2 km of transmission line for each farm customer. The SAAU also made the politically interesting statement that if Tariff D was increased then electricity would become so expensive that farmers would be "unable to apply it to enhance the socio-economic living standards of non-white labourers on their farms".

The SAAU was, however, seen to support the idea of limiting the development of non-economic supplies of electricity to rural consumers. This stance must be considered in the light of Eskom's growing involvement with the electrification of black households in the country as reported in their Annual Reports from 1987 onwards. If non-economic schemes such as these were proceeded with, any cross-subsidisation required may, as a special case, possibly have to be carried by all electricity consumers including farmers, much in the same way the SAAU had wanted the costs of electrifying white-owned commercial farms to be shared amongst other electricity consumers.

The farmers stance concerning cross-subsidisation of electrification costs is perfectly understandable given their history of privileges. The year 1989 was, however, seemingly a turning point so far as the political bargaining power of white commercial farmers in South Africa was concerned. With Eskom pressing for full cost recovery for electricity supply to agriculture and being supported in this endeavour at ministerial level, and additionally by the recommendations of the de Villiers Commission, it was clear, that from 1990 onwards every effort would be made to ensure that farm electricity tariffs would be self supporting.

2.8 Numbers of Farms Supplied with Electricity: 1980 – 1990

Prior to giving statistics on the numbers of farms electrified in the decade 1980 to 1990 it is appropriate to point out that farm electrification schemes had been ongoing from the establishment of Eskom in 1948 onwards. These schemes were, however, only developed in areas where farmers

themselves could pay for them and in the early years the numbers of connections made were small indeed. This also being the time before the building of the national electricity grid. Electricity supply to farms prior to the national grid could only be provided where the farms were fairly close to a municipal centre that was electrified and the farmer could pay for the supply to be taken to his farm. What usually happened was that small groups of farmers would apply to Eskom for power and Eskom would investigate the viability of supplying them. The schemes were usually very small. For example in 1948 forty two applicants in Klipheuvel and Agter Paarl applied for electricity. The scheme to bring electricity to their farms consisted of 26 miles of 11kv transmission line and 3 miles of low voltage cables, the total cost being £24 490, (Eskom Annual Report 1948). Year-on-year more farmers were connected.

With respect to the period 1980 – 1990 applications for the provision of electricity to farms were usually made at the nearest Eskom office. The costs of supply was influenced by a variety of factors, e.g.,

a) The number of farmers applying for electricity in the same area;
b) The geographical situation of the farms; and
c) The proximity of suitable rural power grids and sub-stations.

Such factors were built into the tariff calculations. Discussions were then held between groups of farmers and Eskom at public meetings to determine electricity requirements and so that the costs involved could be explained as well. Quotations for the supply of electricity given to each applicant contained full particulars about the scheme that the particular farmer was to be connected to. Despite Eskom's manpower shortage problems and the claim by farmers that connecting their farms to the national grid was generally beyond their means without cross-subsidisation the tempo of farm electrification increased in the decade 1980 to 1990, and more farms were provided with electricity in this period than in the previous fifty years, (Eskom, (Agrelek), p.5, undated).

The number of farms which were electrified in South Africa between 1980 and the end of 1984 prior to the de Villiers Commission increased by a percentage year-on-year greater than the increase over the previous decade which was 8,6 per cent/annum. Comparative figures are given in Table No 5.1 below.

PERIOD	PERCENTAGE INCREASE
1980 – 1981	9,3
1981 – 1982	8,6
1982 – 1983	10,5
1983 – 1984	10,5

TABLE NO 5.1 YEARLY PERCENTAGE INCREASE IN FARMS ELECTRIFIED IN SOUTH AFRICA: 1980-1984
Source: Eskom Annual Reports for the various years.

The number of farms electrified year-on-year between 1980 and the end of 1984 together with the cumulative totals is shown in Table No 5.2 below.

YEARS	1980	1981	1982	1983	1984
NO OF FARMS ELECTRIFIED/YEAR	3551	4082	4229	5631	5920
TOTAL NO OF FARMS ELECTRIFIED	45 156	49 238	53 467	59 098	65 018

TABLE NO 5.2 NUMBER OF FARMS ELECTRIFIED IN SOUTH AFRICA: 1980 – 1984
Source: Eskom Annual Reports for the various years.

What is of more interest, however, is the percentage increase in farm electrification in Eskom's regions running along South Africa's Western, Northern and Eastern borders in the period 1980 to 1984. These regions were the Northern Cape, Rand and Orange Free State and the Eastern Transvaal regions, they all bordered the so-called "front-line" states. The following tables provide details of the yearly percentage increase in the farms electrified in the Northern Cape and Eastern Transvaal regions compared to the average increase for all Eskom's regions which increased by 9,7 per cent over the period 1979 to 1984.

PERIOD	PERCENTAGE INCREASE
1979 – 1980	20,7
1980 – 1981	13,7
1981 – 1982	3,3
1982 – 1983	13.1
1983 – 1984	3.7

TABLE NO 5.3 PERCENTAGE INCREASE IN FARM ELECTRIFICATION NORTHERN CAPE REGION, BORDERING SOUTH WEST AFRICA AND BOTSWANA: 1980-1984[180]

Source: Eskom Annual Reports for the various years.

PERIOD	PERCENTAGE INCREASE
1979 – 1980	10,0
1980 – 1981	7,8
1981 – 1982	15,6
1982 – 1983	15,9
1983 – 1984	10,2

TABLE NO 5.4 PERCENTAGE INCREASE IN FARM ELECTRIFICATION EASTERN TRANSVAAL REGION, BORDERING MOZAMBIQUE AND SWAZILAND: 1980-1984

Source: Eskom Annual Reports for the various years.

The Rand and Orange Free State region which had borders with Botswana and Zimbabwe was, compared with Eskom's other regions, already well supplied with electrified farms by 1980, this is demonstrated in table No 5.5 below.

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[180] By comparing Tables No 5.3 and 5.4 it can be seen that the emphasis was to electrify more farms in the Cape Northern Undertaking in the years 1980-1981 and 1982-1983 and more farms in the Eastern Transvaal Undertaking in the years 1981 – 1982 and 1983 – 1984 to even out farm electrification in both undertakings.

UNDERTAKINGS	1979	1980	1981	1982	1983	1984
NORTHERN CAPE	3 149	3 801	4 322	4 487	5 074	5 260
EASTERN TRANSVAAL	5 906	6 495	7 003	8 095	9 382	10 338
RAND AND ORANGE FREE STATE	13 220	14 248	15 709	16 957	18 823	20 824

TABLE NO 5.5 COMPARISON OF TOTAL NUMBER OF FARMS ELECTRIFIED IN THE NORTHERN CAPE, EASTERN TRANSVAAL AND THE RAND AND ORANGE FREE STATE REGIONS: 1979-1984.
Source: Eskom Annual Reports for the various years.

Notwithstanding this fact the yearly percentage increase in the electrification of farms in the Rand and Orange Free State region in the period 1979 to 1984 was still higher than the national average taken from Table No 5.1 above. These statistics also support the hypothesis that the government's need to develop a buffer zone on South Africa's borders influenced the rate of farm electrification in areas bordering the front-line states.

In the period 1985 to 1990 in spite of the arguments going on between the SAAU and Eskom concerning Tariff D and the pooling of electricity consumers a rather interesting phenomenon was taking place concerning the electrification of white-owned commercial farms in South Africa. Contrary to expectations, and the protestations of the SAAU, that farmers could not afford to be connected to the rural reticulation network without cross-subsidisation from all electricity users, applications to be connected continued to flood into Eskom in increasing numbers year-on-year.

In 1985, 11 449kms of line had to be built to accommodate the farm electrification programme, this being an increase of some 11 per cent over the previous year, (Eskom Annual Report, 1985, pp.13 & 57). Table No 5.6 below demonstrates that in the years 1986, 1987 and 1988 the year-on-year percentage increase in farm electrification in South Africa as a whole even exceeded the yearly increases in the years 1980 to 1984, see Table No 5.1, when the strategic need for such electrification was probably at its height. This increased rate of electrification was probably due to the 2km rebate offered to farmers after 1986.

YEARS	1985	1986	1987	1988	1989
TOTAL NUMBER OF FARMS ELECTRIFIED	70 364	78 809	88 709	101 749	110 121
PERCENTAGE INCREASE YEAR-ON-YEAR	8,2	10,7	11,2	12,8	7,6

TABLE NO 5.6 TOTAL NUMBER OF FARMS ELECTRIFIED IN SOUTH AFRICA: 1985 – 1989
Source: Eskom Annual Reports for the various years.

The rate of farm electrification between 1960-1990 is shown in Fig No 5.3 below. The increasing rate in the number of farms electrified from 1980 to 1990 is dramatically illustrated by an increasing slope in the graph for this period.

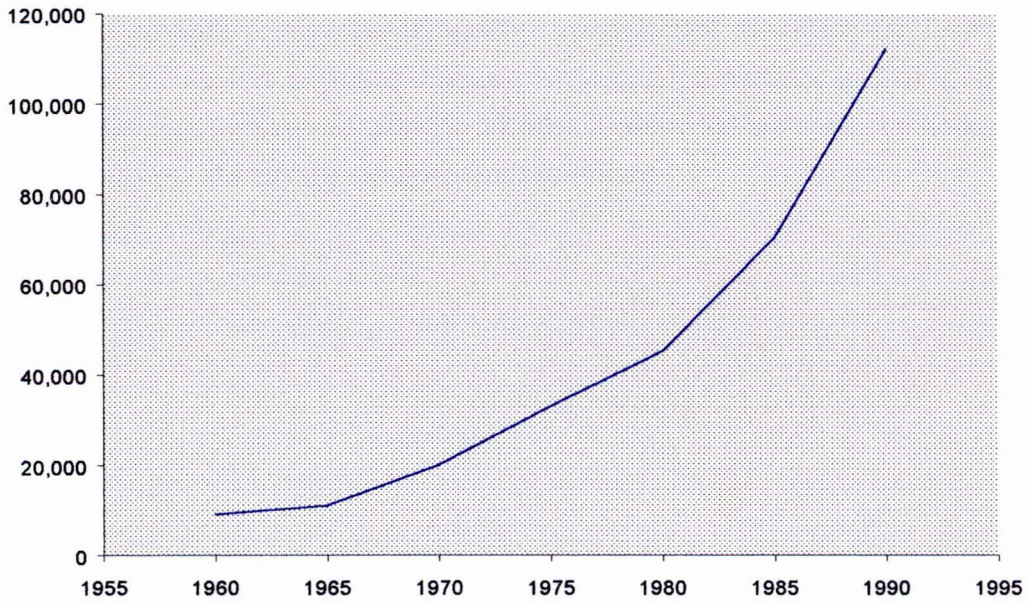

FIG NO 5.3 NUMBERS OF FARMS SUPPLIED WITH ELECTRICITY: 1960 – 1990
Source: Eskom Annual Reports for the various years.

Although the exact number of farms on, or very close to the borders of South Africa and the front-line states, is not recorded, this number would of course be much smaller than the actual number of farms electrified by Eskom between 1980 and 1990. The analysis given above therefore suggests that the very favourable terms on offer by Eskom for electrifying farms was responsible for attracting greater and greater numbers of farms faced with rising diesel oil prices. The security issue seems then to have

started a farm electrification programme of great financial significance to Eskom, the magnitude of which will be estimated in the following section.

2.9 Economic Impact of Farm Electrification

The economic impact that the farm electrification programme in the decade 1980 –1990 exerted upon the South African economy can be characterised on the cost side of a cost-benefit equation by estimating the subsidies that were required to enable the electrification programme to be sustained. In a study, undertaken by Salvoldi of Eskom's Electricity Pricing Department in 1994, it was estimated that the non-recovered capital expenditure on rural reticulation lines serving the farming community amounted to 65 per cent, on average i.e., only 35 per cent of the capital costs were recovered via the monthly rentals in the period 1980 - 1990. Estimating the subsidies paid to farmers as a consequence of this non-recovered capital in that period is therefore a straightforward calculation since the length of lines built and the numbers of farmers connected to the rural electrification grid are given in Eskom's Annual Reports for the period. Table No 5.7 below is constructed to allow the subsidies paid to farmers from the farm electrification programme to be estimated.

ITEM	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
No of Consumers (Total)[1]	45 156	49 238	53 467	59 098	65 018	70 364	78 809	88 709	101 749	110 121
No of Consumers connected Year-on-Year[1]		4 082	4 229	5 631	5 920	5 346	8 445	9 900	13 040	8 372
Reticulation Line total length (km) [2]	66 604	71 296	78 398	87 717	95 835	107 284	123 284	138 546	151 971	161 058
Reticulation Line connected Year-on-Year (km) [2]		4 692	7 102	9 319	8 118	11 449	16 000	15 262	13 425	9 087
Cost of Line per Kilometre (R)[2]	5 400	6 200	7 100	8 200	9 200	10 200	11 900	13 600	17 200	17 700
Total Capital Cost of Lines (R Millions)		29,09	50,42	76,42	74,69	116,78	190,40	207,56	230 91	160,84
Cost of Line per Consumer (R)		7 127	11 923	13 571	12 616	21 844	22 546	20 966	17 708	19 212
Unrecovered capital (R millions) (65 per cent on average)		18,91	32,78	49,67	48,55	75,91	123,76	134,91	150,09	104,55
Cumulative cost (R millions)		18,91	51,69	101,36	149,91	225,82	349,58	484,49	634,58	739,13
Monthly Capital Rates (%)[2]		1,00	1,00	1,00	1,00	1,00	1,22	1,22	1,22	1,35
Subsidy (R millions)		2,27	6,20	12,16	17,99	27,10	51,18	70,93	92,90	119,74

TABLE NO 5.7 FARMER'S SUBSIDY FROM UNDER RECOVERY ON LINE CAPITAL CHARGES: 1980 – 1990

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1 Data Source: Eskom's Annual Reports for various years.

2 Data Source: Eskom's Electricity Pricing Department.

The subsidy shown in Table No 5.7 being the loss in monthly rentals sustained by Eskom year-on-year since 1980. This loss, being made good by cross-subsidisation from other electricity users, in particular those consuming large amounts of electricity and being charged according to the rates set for different consumers in accordance with Tariff A. There was, in addition, another subsidy that applied to farmers in the 1980 to 1990 decade. This subsidy arose because of the unrecovered high energy component of Tariff D. Statistical records of farmers using less than the assumed break even amount of high energy rate electricity are unfortunately incomplete, however. Salvoldi in her 1994 estimates of the costs of supplying white-owned commercial farms with electricity has suggested that a figure of about R 47 million/ year would have been on average the subsidy paid to farmers for this unrecovered high energy component in the latter part of the 1980 – 1990 decade. Accepting this figure, in the period 1987 to the end of 1989 the total subsidies paid to white commercial farmers were approximately those shown in Table No 5.8 below.

	1987	1988	1989
SUBSIDY (R MILLIONS)	**117, 93**	**139,90**	**166,74**

TABLE NO 5.8 TOTAL FARMER'S SUBSIDY: 1987 – 1989

In summary Eskom's financial problems with Tariff D for the period 1980 to 1990 stemmed from three issues, these being 1) An under recovery on line capital charges, 2) An under recovery on the high energy component of Tariff D, brought about by the fact that only about half of all white commercial farmers supplied with electricity ever used more than 650 kWh of power per month and, 3) More farmers than Eskom estimated applied for, and were supplied with, electricity during the period.

The last section has dealt with the cost side of the cost-benefit equation for white-owned commercial farm electrification in the decade 1980 to 1990. The benefit side is unfortunately not open to quantification. This is because the historical data necessary to do this is simply not available in any rational form with respect to the relationship between electricity usage and increased farm productivity during the period. Even the amount of electricity supplied to farmers in the years 1980 – 1987 is mere speculation.[181] Sales of farm machinery that would use electricity as a means of increasing output (irrigation pumps) or processing farm products (drying kilns) during the period is similarly subject to dispute. This is because individual farmers bought

[181] Interview with Mrs Shirley Salvoldi and Mr. Kerry Blewett , 25th March 1999.

such machinery from many manufactures through agents and no central register of such sales exists.[182] The benefit-side of the cost-benefit equation in historical terms is then a totally unknown quantity. Only the cost-side of the equation can be estimated and even this is subject to some heroic assumptions.

Having said this some general comments can, however, be offered concerning the national economic benefits of electricity usage by farmers. Firstly South African agricultural products are not allowed to be exported in unprocessed form "but should be delivered to foreign countries only after processing at a higher rand value" (Eskom (Agrelek), p.1) i.e., beneficiation is practised with regard to exporting agricultural products. In this way South Africa's trading position with the rest of the world is improved. South African farmers are becoming more and more involved in these beneficiation processes as a consequence of the co-operative system presently in affect. Nearly all processing systems prescribe high standards with respect to temperature control, speed control and electronic measuring methods all of which require electricity. The electrification of white-owned commercial farms in the decade 1980 to 1990 did, therefore, in all probability, play an increasing role in providing agricultural products for exports and earning valuable foreign exchange for the South African economy. Furthermore, the demand for electrically driven equipment such as irrigation pumps, hammer mills and drying kilns as a direct result of the electrification of white-owned commercial farms would have undoubtedly stimulated economic activity in the manufacturing sector of the South African economy and helped this sector increase its contribution to GDP and create new job opportunities.

In spite of the increasing mechanisation and electrification of white-owned commercial farms in South Africa the agricultural sector has continued to lose ground to both the mining and manufacturing sectors with respect to contributions to GNP. In the first two decades of this century agriculture contributed more than 20 per cent to GNP. In the decade 1980-1990, when the electrification of farms reached its height, that contribution fell from 6,1 per cent in 1980 to 5,0 per cent in 1990, (National Department of Agriculture 1988, p.12).

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[182] Telephonic conversations with Dr J. Rankin, and Mr P. Blignaut, 14th April 1999.

3.0 THE ELECTRIFICATION OF BLACK HOUSEHOLDS: 1985 - 1990

3.1 Constraints

In addition to the farm electrification programme, between 1985-1990 Eskom investigated how electricity could be provided to black households in the so-called self-governing states and to the 20 million people who did not have electricity in their homes and who mainly lived in about 60 black townships in South Africa. This last initiative was mentioned in Eskom's 1987 Annual Report, (p.3).

Eskom was faced with the following constraints in this regard. Until the replacement of P.W. Botha by F. W. De Klerk, and for the political reasons already given, it is suggested that the government could not actively encourage the electrification of black households. Furthermore, the de Villiers Commission recommendations had made it clear that the electrification of black households in South Africa should only be carried out if the development could be shown to be financially self-supporting, i.e., such developments could not be cross-subsidised. These constraints made it difficult for Eskom to undertake such an electrification programme. This section describes what action Eskom took in this regard as a consequence, bearing in mind two major problems which the Corporation had to overcome, these being:

a) The costs involved in bringing electricity to potential users; and
b) The shortage of manpower needed to build the required reticulation networks and substations.

These constraints were no different to the ones that Eskom had overcome in electrifying white-owned commercial farms. The fact that such farms were electrified and black households, were not, speaks volumes for the political importance of farm electrification during this period.

Eskom reported these constraints in their 1987 Annual Report, (p.3). It was also mentioned that generally local authorities had neither the money nor the manpower to help undertake electrification projects in their areas of supply, thus further curtailing the electrification of black households.

In addition to these two constraints on electrification initiatives a dichotomy developed within Eskom, concerning how the Corporation should become involved with the electrification of black households. Two viewpoints dominated. One was held by the newly appointed Chairman Mr John

Maree, the other by the Chief Executive Officer Mr Ian McRae. As Landes has observed with respect to history, "people matter", (Landes 1998, p.102). The history of the electrification of black households in South Africa is no exception. Maree and McRae had the power to make decisions concerning electrification issues they were, however, in many respects quite different from each other, and it was probably inevitable that a conflict of opinion over the matter of electrifying black households would arise. Taking account of the personalities of these two men and the different pressures upon them makes the history of Eskom's black household electrification programme after 1985 easier to understand. It is useful therefore at this juncture to give a brief profile of each of these men.

3.2 Profile of Maree and McRae[183]

Maree was born on the 13th August 1924 in Middelburg in the Karoo where his father was a dentist. During the depression of 1929 to 1932 the family moved to Springs in the Transvaal. Whilst Maree had a traditional Afrikaans upbringing, which would have normally led him into a career in the professions or the civil service, these options did not appeal to him. Instead he wanted to become a businessman. He was driven from a very young age by an ambition to "be somebody", (Sunday Times Magazine, 14th May 1989, p.26). Money and power derived from business was perhaps seen as a means to this end.

In 1948 Maree entered the University of the Witwatersrand and read commerce, graduating with the degree of B. Com. He won the Alexander Aiken Medal in his final year as the most distinguished graduate in the Department. He was awarded an honorary D. Com degree from the University of Stellenbosch in 1988. Maree's first job was as a clerk at the Johannesburg Stock Exchange. By 1965, however, he was managing director of a group of industrial companies. In 1970 he was appointed Executive Chairman of Rand Mines Properties and by 1974 he was on the Board of Barlow Rand. Five years later, at the personal request of the Prime Minister Mr. P.W. Botha, he was seconded to the Department of Defence as Chief Executive of Armscor. In 1982 he returned to Barlow Rand but was soon, again at the request of P.W. Botha, on the move to a new business challenge, this time as Chairman of Eskom. Maree was very well aware of the power of publicity and in his tenure at Eskom he undoubtedly changed the public image of the Corporation and the business culture within it from a staid parastatal to a business orientated enterprise by exposing himself and Eskom to public scrutiny.

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[183] The information in this section is drawn from interviews with the two men and comments made to the author by the people interviewed during the course of this study. Additional information was gleaned from the sources cited.

McRae, who was born of Scottish parents in Germiston in the Transvaal on the 24th September 1925, started his working life as an apprentice fitter at Eskom. He was to remain with the Corporation for over forty years rising to Chief Executive. McRae eventually read mechanical engineering, also at the University of the Witwatersrand, on an Eskom bursary, and graduated with a BSc (Engineering) degree. In December 1989 the honorary degree of Doctor of Engineering was conferred upon him by the same university. This degree was awarded, according to the citation, "because of his vision of South Africa as a growth centre of the continent and that electricity has the potential to provide the economic upliftment for all the peoples of South Africa", (ERI Perspective, No 56, February 1990). Electrification and the socio-economic upliftment process was of extreme importance to McRae and time and time again in interviews with the author he spoke about this issue.

Whilst both men are ambitious, there is a spirituality about McRae that seems absent in Maree. What may appear to be a trifling example of this may be found in the different answers these men gave to a question posed to them by the Engineering News Journal in 1992 and 1995 respectively. The question being "Who would you most like to meet?" McRae's reply was Mother Theresa of Calcutta, Maree answered Reagan's TV coach. Another instance of McRae's spirituality was provided to the author in an interview with him on the 28th of August 1996 when he said that his vision of providing electricity to black households as a means of uplifting black people's social condition came to him in church.

McRae and Maree's views of electricity as a motive power for social upliftment were, however, not dissimilar. Their belief rested, amongst other things, on the correlation between per capita GDP, the level of electrification and the capital expended on electrification projects in poor countries.[184]

How the electrification process was to be organised and financed was, however, a point of contention between the two men. McRae's view was that Eskom should become involved in a programme to electrify black households with tariffs being set at affordable levels which would,

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[184] The literature is supportive of their views, see Dunkerley (1981), Barnes (1985), Cecelski and Glatt (1982), Fluitman (1983), Jechautek (1985) and Munasinghe, (1987). These authors make the assertion that rural electrification is a tool for national socio-economic development and should be encouraged. Munasinghe (1987, p.263) also asserts that the national objective of rural electrification is the achievement of high economic growth and a more equitable distribution of income. With respect to the expenditure on electrification world-wide. Munasinghe (1987) points out that during the decade 1980 – 1990 $ 50 – 60 billion was expended, (p.8). Furthermore, countries like Costa Rica, Brazil and Thailand were all spending considerable sums of money on rural electrification during the 1980 – 1990 decade. The government of Costa Rica in particular was deeply involved in the electrification programme in that country being convinced that this initiative would improve the general standard of living in poor areas, see Central American Rural Electrification Study, National Rural Electric Co-operative Association, Washington, DC, (1986).

in all probability, involve cross-subsidisation. By this means McRae believed that poverty and poverty-related violence and general crime levels in South Africa's black townships would be reduced; this belief was always evident when he discussed the electrification of black households. McRae also believed that Eskom should become involved in the management of the electricity supply to Greater Soweto so that the payment for services could be "normalised" (McRae's term) and further unrest curtailed or at least minimised. Maree's viewpoint was that the Corporation should not become involved in such electrification programmes except in those areas that could satisfactorily demonstrate, that they could afford to pay for electricity supply, and which could also be relied upon to do so. Advice and help in their electrification initiatives could, however, be given to the so-called self governing states provided that payments for this service were received.[185] This second viewpoint found support in the recommendations of the de Villiers Commission of Inquiry.

Thus it was then that two conflicting viewpoints on the electrification of black households in South Africa developed during this period and claimed adherents from Eskom's top managers. Each of these viewpoints can be readily understood. Eskom's Chairman Maree for example was, prior to his appointment at Eskom, a well respected successful businessman in South Africa. He was used to satisfying shareholders; furthermore, he was bound by the de Villiers Commission's findings and finally he was obliged to follow the government's leadership with regard to the provision of services in developing areas of South Africa. He was well aware of the political difficulties of implementing reform initiatives with public money at this time. The adherents to his viewpoint were quite naturally drawn from the financial arm of Eskom. McRae on the other hand was something of a crusader with a highly developed social conscience and had a different business background to Maree having all his working life served a public utility without shareholders to satisfy. His working environment had, however, over many years enabled him to see, on a regular basis, the advantages that electricity provided for social upliftment. McRae drew adherents to his viewpoint on electrification from social scientists and human resources personnel within Eskom, and often also from engineers. It is probably safe to assume that up until 1990 the Electricity Council being government appointees, would have supported Maree's view on electrification; after that date their views would have tended to favour Eskom becoming involved with such a programme as the government began to accelerate social reform in South Africa.

As the decade proceeded and political events changed the desires of these two men with respect to the electrification of black households coincided and eventually in the early 90's, they formed the formidable team that drove Eskom's massive electrification programme forward. Until that time,

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[185] This viewpoint became Eskom's official policy on the electrification of developing areas between 1985 – 1990 as will be shown in the next section.

however, McRae, at considerable risk to his career often acted at odds with Maree in a clandestine manner so far as the electrification process was concerned.[186]

3.3 Electrification in the Self-Governing States

The formulation of Eskom's policy and strategy for electrifying black households in the so-called self-governing states was given in the minutes of an important Management Board meeting that took place on the 23rd June 1986. The record of the meeting reads as follows.

RECORD : 289
HEADING 1 : ELECTRIFICATION
HEADING 2 : DEVELOPING AREAS
HEADING 3 : POLICY/STRATEGY
MEETING : 040
ITEM : 9
DATE : 23 JUNE 1986
ELECTRIFICATION OF DEVELOPING AREAS

Agreement had been reached on the following, subject to approval at Ministerial level:

(1) Trustlands within self-governing states/homelands
   (a) The SA Development Trust (SADT), as agent of the Govts of the National States (NS) (excluding independent States), should accept the responsibility to do small distribution within the Trustlands.
   (b) This will be done in consultation with Escom which would supply the required training and provide assistance with resources and manpower to enable the SADT to do small supply distribution.
   (c) The SADT will negotiate with Escom and the relevant Govt to transfer at an appropriate time the responsibility for small distribution to the NS.
   (d) The Dept of Development Aid will also be approached for financial assistance.

(2) Urban and semi-urban areas other than Trustlands
   (a) Each NS must in time accept responsibility for small supply, distribution within towns in those NS's
   (b) Until such time as the NS are in a position to execute this responsibility, it will remain the responsibility of the SADT, as agents of the Govts.
   (c) Escom will negotiate directly with these agents on supply points and associated matters and the provision of assistance i.t.o. (in terms of, author's addition) resources, manpower and training.
(3) Rural areas other than Trustlands
   (a) The same arrangements as for the Trustlands will be applied.
   (b) Escom will provide assistance with resources and manpower for electricity reticulation.
   (c) Escom will then be responsible only for bulk supply of electricity.

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[186] McRae's actions in this regard first manifested themselves in the problems of non-payment for services in Greater Soweto and will be described in the following chapter when that topic is discussed.

Escom should play a leading role in assisting with the provision of electricity in developing areas and the following was proposed:

(1) Policy
  (a) Escom would generally be a bulk supplier.
  (b) Escom would support the Undertaker (supply authority) in a developing area with training, technical expertise, construction work, operating and maint and admin for a defined period.
(2) Strategy
  (a) Areas in which Local Authorities, Govt depts (Development Aid/SA trust and other Undertakers) provided electricity services had to be clearly defined.
  (b) Other Undertakers had to be encouraged to develop distribution networks wherever possible in these areas.
  (c) Escom will assist in identifying other undertakers.
  (d) The defined Undertaker (other than Escom) should admin, render accounts and collect revenue from the consumers concerned with any necessary assistance from Escom.
  (e) Escom will undertake work in developing areas to supply bulk supplies where necessary.
  (f) Escom will assist with suitable technological development of appropriate wiring and distribution standards.
  (g) Funding the development will be obtained by the Undertaker (and Escom, where relevant) from the Development Bank of SA or other development sources.
  (h) Escom will be reimbursed for any expenditure incurred.
  (i) Any work done by Escom will be i.t.o. a formal agreement to be entered into with the appropriate Undertaker and, where necessary, Govt.

The aforementioned policy and strategy would be confirmed with the relevant government departments at a forthcoming meeting.[187]

This policy/strategy directive made it abundantly clear that, whilst Eskom would supply bulk electricity to developing areas, they expected to be paid for it. Furthermore, the Corporation would only undertake development projects, and raise money for these, where it was guaranteed that they would not suffer financially from doing so. Eskom would, however, be supportive of any undertaker that sought to bring electricity to developing areas with training etc., and some research on cheaper ways of electrifying such areas would be undertaken by the Corporation.

3.4 Electrification of Black Households in South Africa

Eskom's concern with the electrification of black households in South Africa itself in the period 1985-1990 concentrated on research into cheaper ways of electrifying such households. In the 1987 Annual Report, (p.31), Eskom's Chief Executive Officer Ian McRae announced a scheme

[187] The Management Board Note is presented here in the exact form shown in Eskom's records. The name Escom is therefore retained.

aimed at assisting local authorities speed up the electrification of 60 black townships that Eskom had earmarked for electricity services provision. These townships were those that lay adjacent to already electrified white towns and Eskom estimated that electricity could be brought to an additional 3 million people by 1992 if an electrification programme could be initiated.

As a result of the recommendations of the de Villiers Commission of Inquiry, Eskom could not directly finance the electrification of these townships nor could township tariffs be cross-subsidised. Eskom could, however, provide technical advice to the adjacent white municipalities, (for which they would be paid) which would allow these townships to be cheaply provided with electricity. Such actions fell under the electrification policies that had already been set for Eskom by its Management Board. Eskom therefore became engaged in a research programme concerned with drafting the technical specifications governing the provision of electricity to black townships. These simplified specifications did not compromise electrification safety standards in any way but did allow the installation of electricity in simple dwellings to be made less difficult and at low cost.

The conventional practice in the electrification of white urban areas favoured underground cables, miniature substations and individual home metering. Such an approach was costly in all respects both in planning, construction and maintenance. Eskom was convinced that both black "urban and rural developing areas could be rapidly and relatively cheaply electrified by using appropriate technology such as bundled aerial conductors, pole mounted transformers and pre-paid metering systems", (Sunday Times: 30th August 1987). So far as cost was concerned one connection box could be provided to each home allowing the use of a single light fitting and a plug outlet for between R150 and R300. Such technology would allow the cost of electrifying the 60 townships mentioned above to be reduced to R348 million against an estimated R700 million (1987 rand) that would normally be required if conventional electrification procedures were adhered to, (Business Day: 26th August 1987).[188]

As a consequence of the constraints the de Villiers Commission placed upon Eskom such a scheme would still require commitment and money from both the government, local authorities, Regional Service Councils, development aid agencies and possibly overseas financing. Because of the probable inability to pay for such services by low income black communities, such money was not forthcoming during this period and the plan languished. A complicating factor in making the scheme self-sufficient was of course the direct competition faced by electricity from traditional forms of energy such as wood, coal, candles and paraffin, (Eskom Annual Report, 1988, p.37).

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[188] These figures were confirmed in an interview with Dr I.C. McRae, 4th September 1996.

Wood was, during this period, the dominant fuel used by blacks in rural areas. For example 12-14 million tons of fuelwood were consumed annually (mainly in rural areas). This usage, caused environmental problems such as denudation of woodlands and the destruction of tree cover, (Business Day: 26th August 1987).[189] With respect to the electricity needed to serve the 60 townships that Eskom had earmarked the Corporation had sufficient excess generation capacity, (see Chapter 4), at this time to cope with the potential increase in electricity demand that would arise if these townships were electrified.

Eskom's 1989 Annual Report (p.9) carried for the first time a separate entry on "Electrification Projects" and stated that there were 48 electrification projects under way affecting about one million households and approximately ten million people countrywide[190]. The Durban City Council's initiative mentioned in footnote 190 below was a significant departure from the policy of separate control and development of "homeland" infrastructures. What was of importance to Eskom was that it ran counter to Eskom's development philosophy of transferring responsibility for electricity provision from local authorities to private entities as the Corporation was endeavouring to do with the supply of electricity to Greater Soweto (This initiative will be discussed in the following chapter).

Eskom's Annual Report for 1989 (p.9) also described a joint venture project that Eskom was involved with and which was being undertaken in line with Eskom's philosophy of supplying electricity to black households in South Africa in conjunction with entities that would provide

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189 Such denudation was also responsible for land erosion, making farming more difficult and costly. Costs associated with these economic externalities are not usually taken into account in the benefits associated with the electrification of black households in South Africa yet they play an important role in cost-benefit calculations for electrification schemes in developing areas; see Turvey and Anderson, (1977), Munasinghe, (1987) and van Horen (1996).

190 Diligent enquiries have proved fruitless so far as obtaining detailed information on these projects. These projects seemed to have been investigations being carried out by Eskom concerning which developing areas were ready for electrification. This is the explanation given to the author by Mr John Bradbury in an interview on 13th November 1986. This lack of detailed historical record is a problem so far as Eskom's electrification initiative is concerned, and the problem will appear again in Chapter 7 when Eskom's electrification programme of the 1990's is discussed. What is certain is that in 1989 The Durban City Council became the first local authority to take over full control of electricity supply to adjacent "homeland" townships going against national policy trends. The Durban Council began supplying electricity to KwaZulu's townships and served approximately 20 000 KwaZulu consumers in the Umlozi, KwaMakutla, KwaMashu, Ntuzuma and KwaNdegezi townships. Prior to this the Council sold bulk electricity directly to the Kwa Zulu government which supplied it to these townships. The tariff to these townships was no longer subsidised as it had been when the Kwa Zulu government was responsible for the service. The new tariff, which was more expensive, was brought up to a level charged elsewhere in Durban. It was reported that some 92-94 per cent of consumers paid their first account after the Council took charge of the billing. Demand for electricity in the area increased by 16 per cent in 1989, (Weekly Mail, 22nd September 1989).

funding, such as private enterprise, see Policy item 2(g), strategy, in the Eskom's Management Board directive discussed above.

Eskom's partners, in this, their first joint venture with private sector companies for bringing electricity to a black township, were Volkswagen S.A., the Development Bank of Southern Africa and members of the Midland Chamber of Industries. The location of the project was KwaNobuhle near Uitenhage in the Eastern Cape. In a joint statement to the press Eskom and Volkswagen said "this privatisation action would be of immense benefit to KwaNobuhle and could serve as a model for the further development of the electricity supply infrastructure in South Africa", (City Press 20th November 1988).

The joint venture company, was called Kwanolec, and in line with Eskom's research into cheaper ways of electrifying townships Kwanolec abandoned expensive underground cables in favour of overhead wires mounted on gum poles. Because it was considered dangerous to connect electricity to anything but brick dwellings Kwanolec developed a Ready Board which could be safely mounted within any type of home from a rondavel to an informal shack. Electrical appliances could be plugged into the Ready Board at 3-15 amp sockets, in addition a light socket and a switch was provided. The Ready Board also had a meter attached which was activated by the insertion of a card which purchased a set amount of electricity with a gauge showing the rate of consumption, (The Argus, 13th February 1989). No cash was therefore involved in operating the meter as the meter card was purchased at dispensers. This meant of course that there was no need for accounts to be prepared for individual customers. By these means the non-payment for electricity, which was a major problem in Greater Soweto, see the following chapter, could, in theory, be avoided.

Each connection cost Kwanolec R400 but consumers were charged R50 only, R30 of electricity coupons were also given free to each consumer when their home was electrified. Kwanolec supplied about 11 000 consumers in KwaNobuhle hence these consumers were subsidised to the tune of R3.8 million in connection fees alone. In addition R4 million was put up in the form of share capital to establish Kwanolec and R25 million more was obtained by way of a loan from the Development Bank of Southern Africa, (Dingley 1990, p.13). Eskom provided the management and technical personnel on a contract basis to build and run the project and the project was considered to be a success both financially and socially by the parties concerned with it and the local community itself, (Interview with I. C. McRae September 4th 1997).

One of the chief problems with this project was that if such ventures were continued the numbers of separate electricity suppliers would increase over time and there were at this time already over

400 different electricity suppliers in South Africa and the independent states. This method of attacking the backlog in electrification therefore compounded the problem of the fragmentation of the electricity supply industry in South Africa and the so-called homelands.[191]

3.5 The Fragmented Domain of the ESI

Some idea of the magnitude of this fragmentation may be obtained from the following facts. From the seventies onward the government policy of Grand Apartheid to create ethnically based "independent states" and "self governing territories" was being put in place.[192] The independent states were legally separate from South Africa, had their own parliaments and could pass laws within their boundaries. A number passed legislation concerning electrification and in fact established their own electric utilities in the 1980's. The result was of course that the electricity supply industry in the area was further fragmented as follows:

a) Transkei: An electric utility called TESCOR was established in terms of the Transkei Corporation Act of 1985. TESCOR operated a small hydro-power station (Colywobbles) but bought most of it's electricity in bulk from Eskom;
b) Ciskei: Electricity was supplied by the Department of Works and purchased in bulk from Eskom;
c) Bophuthatswana: An electric utility called BECOR was established in terms of the Bophuthatswana Electricity Act of 1985 which purchased bulk electricity from Eskom and distributed it within the territory;[193]
d) Venda: An electricity division of the Venda National Development Corporation was established called VEC which purchased electricity in bulk from Eskom and distributed it throughout Venda;
e) Kangwane: Initially electricity was supplied by the Department of Public Works but in 1980 the Government of Kangwane and Eskom entered into a joint venture arrangement and KESCOR (Pty) Ltd., was established to distribute electricity bought in bulk from Eskom throughout the territory;
f) Gazankulu: Like Kangwane electricity bought in bulk from Eskom was distributed initially by the Department of Works, then a government owned company named GEZCOR (Pty)

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[191] The question of the fragmentation of the electricity supply industry in South Africa became a highly charged debate during the period 1990 to 1995. This debate will be discussed in Chapter 7.

[192] In all, ten such homelands were created; four independent states, the Transkei, Boputhatwasna, Venda, and the Ciskei and six self governing territories, Kangwane, Gazankulu, Lebowa, KwaNdebele, Qwa-Qwa, and Kwa Zulu, (Morgan, 1994, pp.13-14).

[193] BECOR in fact built a fossil-fuelled power station, which was never operated and was eventually sold for scrap. Interview with Mr Kevin Morgan, 15th July 1996.

Ltd., was established as a vehicle for forming a joint venture with Eskom, thereafter Eskom took over the distribution of electricity in the territory;

g) Lebowa: Initially electricity bought in bulk from Eskom was distributed by the Department of Public Works but during the late 1980's Eskom began distributing electricity to new consumers in the area direct;

h) Kwandebele: Again in this case electricity bought in bulk from Eskom was distributed by the Department of Public Works but in the late 1980's Eskom began to distribute electricity to parts of the territory;

i) Qwa-Qwa: Also in this case electricity bought in bulk from Eskom was distributed by the Department of Public Works;

j) KwaZulu: Initially electricity bought in bulk from Eskom was distributed by the Department of Public Works but from 1990 Eskom began distributing electricity to rural areas of the territory in conjunction with the Durban Municipality.

Many former Eskom employees joined these various entities to manage the distribution of electricity and to carry out some small-scale electrification projects. South African consulting engineers were also heavily involved in such projects in these independent states and Self Governing territories.[194]

The fragmentation of the electricity supply industry had, by the mid to late 80's then became acute. In summary, the situation was as follows:

a) Eskom was virtually the monopoly generator of electricity in South Africa and in sole charge of the national grid. The Corporation was supplying bulk electricity to a large number of municipalities and to the independent black states and self governing territories as outlined above. In addition Eskom was supplying electricity directly to about 50 000 individual households throughout the country;

b) Some of the independent states and self governing territories were distributing the bulk electricity they purchased from Eskom directly to consumers within their territories;

c) Approximately 451 (mainly white) local authorities in South Africa were supplying electricity directly within their areas and in areas adjacent to their boundaries. Only 4 of these municipalities generated power themselves all the others bought bulk electricity from Eskom. Under the Black Local Authorities Act of 1982 a small number of black local authorities had started to distribute electricity bought in bulk from Eskom within their boundaries, Greater Soweto purchasing by far the greatest amount of this electricity; and

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[194] Interview with Mr Douwe van Wyk, 29th November 1996.

d) Provincial administrations and a number of regional Service Councils were distributing electricity bought in bulk from Eskom to mainly disadvantaged communities in rural areas.

The result of the fragmentation in electricity supply management was that in the period 1980-1990 industrial mining and commercial consumers were well served with electricity generated almost totally by Eskom. In addition, almost all white domestic consumers and most Indian and coloured consumers were being supplied with power. The farming community was also being rapidly connected to the national grid in large numbers. Black consumers in the independent and self governing states were very poorly served with electricity supply, however, and in black rural and urban areas of South Africa itself only a small percentage of homes had an electricity supply.[195]

3.6 The Elandskraal Project

During the period 1985-1989 Eskom initiated one other electrification project under its own aegis. This project, the so-called Elandskraal project, was the forerunner of the type of electrification installation the Corporation was to become involved with in its black household electrification initiative from 1990 onwards.

Elandskraal is a settlement situated some 40km north of Marble Hall in the Groblersdal district of the Eastern Transvaal. The town is located on land between two parts of the Moutse district of KwaNdebele that falls within South Africa. The early residents of Elandskraal were people that had been relocated there from the Moutse district, which had suffered violent unrest in 1985 and 1986. The cause of the unrest being the dispute concerning whether the Moutse district fell within Lebowa or KwaNdebele.

Eskom undertook the electrification of Elandskraal from about 1987 onwards. Progress was quite slow initially. Indeed up until January 1992 electricity penetration in the township was only about 36 per cent. The origin of the funding for electricity provision in Elandskraal is interesting and controversial. It was reported that funding was provided by the Eastern Transvaal Undertaking without the knowledge of Eskom's head office in Johannesburg, the money coming from the Region's farm electrification budget.[196] The slow progress with the electrification of Elandskraal

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[195] Interview with Mr Kevin Morgan, 25th July 1996.

[196] Interview with Mr J. du Plessis, 27th January 1998. Mr du Plessis was at the time of the Elandskraal project the senior manager in charge of three of Eskom's regional SBUs including the Eastern Transvaal Region wherein Elandskraal was located. It seems that du Plessis, and certain other managers in the Eastern Transvaal Region, supported Eskom's CEO Ian McRae's attitude towards the electrification of black households in South Africa. Mr. D. van Wyk, in an interview

tends to support this assertion. What seems to be certain is that by 1991 Eskom had spent about R2.1 million on the project, (Viljoen, 1993, p.1).[197]

It will be recalled that the de Villiers recommendations made each of Eskom's regional SBUs responsible for it's own finances. The Elandskraal project derived then an impetus from the very measures seeking to curtail projects such as the electrification of black households. The fact that the Eastern Transvaal regional SBU looked after its own budget allowed senior staff in the area to perform some slight of hand with the farm budget from 1986 onwards. That many senior members of the SBUs staff were members of the McRae faction lends further credence to the fact that Elandskraal was a project deliberately undertaken to show how effective the newly developed approach to the electrification of the black households could actually be. Thus it was that this initial project was undertaken in a clandestine fashion. The fact that it was quite a small project and in a location rather remote from Eskom's head office in Johannesburg may have allowed it to remain undiscovered at least in its initial phases.

Elandskraal consisted of 2050 erven (not all of which were occupied in 1987). The township was formally planned with a regular arrangement of gravel roads. There were churches and schools and there was formal and informal housing existing side by side. Elandskraal was then an ideal township for Eskom to test the efficiency of the low cost reticulation technology, which it had been developing.

Elandskraal is also interesting from another perspective. It is one of the few electrification projects undertaken by Eskom that had the benefit of some data collection of a socio-economic nature both before electrification and after electrification.[198] This was probably because it was the first such project that Eskom was involved with. Furthermore, the planners of the project wished to show how effective the electrification of such a township could be both from the social and economic perspective. Certainly there are no such detailed records available for the majority of electrification projects undertaken by Eskom from 1990 onwards in what was considered their "Electricity for All" initiative. It is appropriate to provide here some of the most important data that was collected so far as this project was concerned because the changes in energy usage can be

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with the author 29th November 1996 also mentioned the Elandskraal Project and intimated that acquisition of the funding for it had been irregular.

197 In an interview with Dr John Maree, 28th October 1998 he claimed that the Elandskraal electrification programme was known to himself. It is certain that he made no attempt to stop the programme. This was probably because by the late 80's the government's reform process under F.W. de Klerk was resuming and the electrification of black households was once more seen as being part of that process.

198 Another such project was the Orange Farm development. This project will be briefly discussed in Chapter 8.

chronicled, i.e., fuelwood and paraffin, as can the views of new electricity consumers concerning this form of energy.

So far as fuel usage in Elandskraal is concerned the facts are these. Prior to electrification paraffin, fuelwood, coal and candles were important energy sources, the dominant fuel being paraffin with about 73 per cent of households using it. No historical data on the quantities of these fuels used prior to electrification is available, however, (Viljoen, 1993, p.20).

After the introduction of electricity Viljoen reports that the pattern of energy usage changed and electricity became the main energy carrier with 98 per cent of the households provided with electricity using it as the dominant energy source particularly for lighting.[199] The use of candles therefore declined dramatically. Coal usage also declined but less dramatically as this was still used extensively for cooking purposes. The use of fuelwood was largely unaffected by the electrification of Elandskraal. This was because it could be gathered fairly easily in the area or purchased quite cheaply, (Viljoen, 1993, p.25).

Appliance ownership in the township in 1992 was as follows, lights, kettles, irons, radios, hotplates, televisions, fridges, stoves and ovens, heaters and hi-fis in descending order of percentages owned. The impact of electrification on household budgets due to purchase of appliances was R2 350 which figure was about half the expenditure on electrical appliances in Greater Soweto, (LHA Report, 1987).

The average expenditure on electricity in Elandskraal households was R25,21 per month also about half the expenditure in Greater Soweto with a wide range from R0 to R297,93 per month. The standard deviation being R39,33. At a cost of 21c per unit (Eskom's S1 tariff) the average monthly household consumption of electricity was 120 kWh. About 18 per cent of those connected used zero electricity and relied on traditional energy forms with about 46 per cent of those connected using less than 95 units of electricity per month, (Viljoen, 1993, p.29). The distribution of electricity usage was therefore heavily skewed with a long tail into the higher consumption categories.

A large shopping centre was developed in Elandskraal in 1990 by STK - The Trust Corporation Ltd. This centre had 40 shops of varying sizes. The centre subsequently failed and by 1993 only one shop was still trading. Electrification costs were not considered to be the issue so far as this failure was concerned, the problem was simply the lack of trade in the area. Due to the failure of

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[199] The data quoted in Viljoen was obtained from surveys carried out by Social Surveys cc, and cited in his study.

the shopping centre most of the remaining businesses operated from formal and informal structures scattered throughout the township. The types of business was varied including a bottle store, garage, restaurant, baker, butcher, electrical goods sales, welder, dressmaker, disco, a supermarket and many general dealers which composed about 46 per cent of all businesses. Electricity accounted for less than 10 per cent of the businesses running costs.

Prior to electrification, petrol generators were used to produce electricity for business purposes, paraffin, gas and candles were also extensively used. As with households in Elandskraal paraffin was the most widely used fuel in business premises. Unlike household usage wood was not used at all by businesses. The monthly cost of fuel to business was R58,40. Nearly 60 per cent of businesses in Elandskraal operated prior to electrification.

The biggest single perceived advantage that electricity brought to Elandskraal was lighting and refrigeration although the ability to use a wide variety of electrical appliances was also considered important. The population of Elandskraal was reported to see no disadvantages to electricity. The impact of electricity on common life styles was recorded as being:[200]

a) Electricity made life easier, changed lifestyles;
b) Electricity saved time e.g., so far as cooking was concerned;
c) Electricity was perceived as a cheap form of energy;
d) Only 2 households expressed concern that expenditure on electricity and appliances was beyond their means; and
e) Generally the impact of appliance purchase on household budgets was not of concern since hire purchase was extensively used and anyway purchases were staggered over several months.

The impact of electricity on business was that:

a) Electricity was seen as an advantageous form of energy (candles etc., were kept, however, in case of interruptions in service);
b) A wide range of appliances and machinery could be introduced into businesses making them more efficient; and
c) Electricity was not an essential energy form in the businesses in Elandskraal, they could operate without it, but it was the preferred energy form.

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[200] The views expressed in this section were gathered from surveys carried out in Elandskraal by Social Services cc., in mid January 1993 and early and late February 1993, cited in Viljoen (1993, pp.51-54).

So far as economic development was concerned:

a) In Elandskraal there was little evidence of job creation particularly in the formal and informal business community;
b) The introduction of electricity did not save the shopping complex from closure;
c) The impact of electrification on social welfare was considered to be limited;
d) The impact of electrification was not as marked as the popular press made out;
e) The process of electrification should not be seen in isolation and should take into account the rural poverty that prevails in South Africa; and
f) In future electrification projects it was considered important that Eskom linked itself with development agencies such as the Development Bank of Southern Africa, (DBSA) and retailing experts so that the economic viability of such projects could be investigated. (It will be recalled that the de Villiers recommendations were concerned also about the viability of electrification projects.)

An earlier post electrification study of Elandskraal by The South African Development Trust was undertaken in 1990, cited in Van Gass (Nov 1990). This study suggests that electrification contributed significantly to the economic and social upliftment of the township. It was claimed that 127 new jobs had been created as a consequence of small business development which was viable because of electricity and 36 new businesses were founded. Furthermore, it was reported that there was a significant increase in electrical appliance ownership after electrification. Confirmation of this economic activity can be found in another study at Elandskraal by Van Biljon (1990). Van Biljon asserted that small businesses were established and in some cases firms doubled the number of employees in a short period, and electrification considerably increased the turnover of a number of small businesses. The media also commented favourably on the benefits brought to Elandskraal by electrification. The Sunday Times, 12th January 1990 stating that "There is a vibrant activity in Elandskraal taking off after the slow growth of the past few years before electricity was provided in the area. Where doing business meant groping in the semi-darkness with the ineffective light of a gas lamp or candle, today the shop windows and shelves are brightly lit...today electricity has completely transformed the life of the Elandskraal businessman and his clients". Comparing these claims with the later, more thorough study by Viljoen reported on above it seems clear that this initial development at Elandskraal was not sustainable.

Whether or not the electrification of Elandskraal had been undertaken in a clandestine fashion by Eskom's Eastern Transvaal regional SBU without the Maree faction in Eskom's head office

knowing seemed of no consequence by 1990 since during this period (exact date unknown) both McRae and Maree visited the township.[201] It was clear to the visitors that there were positive social benefits arising to the residents of Elandskraal from the electrification project. What McRae and Maree observed was the situation reported by the South African Development Trust, and Van Biljon, which in hindsight has proved to be unsustainable. What was important to these men, however, was the magnitude of the economic benefits that could potentially arise from such projects. These economic benefits were important since from 2nd February 1989 F.W. de Klerk had replaced P.W. Botha and the process of political and social reform in South Africa was once more being accelerated and these changes included the provision of services (which would include the supply of electricity) to developing areas of the country. The ANC had also been unbanned and de Klerk gave every indication that the NP was serious about constitutional change, (Van Rooyen, 1994, p.139). How the conditions Maree found in Elandskraal and the changing political milieu affected Eskom's actions with regard to the electrification of black households is discussed in Chapter 7 when the reasons why Eskom undertook a programme to electrify black households in the period 1990-1995 are exposed.

4.0 CONCLUSIONS

This chapter has shown that the costs of electrifying white-owned commercial farms in South Africa in the decade 1980 to 1990 had to be subsidised by other electricity users. This subsidy was necessary because of 1) Eskom's failure to estimate correctly the number of farmers that would apply for electricity, especially when the favourable financial conditions of Eskom's farm Tariff, Tariff D, became clear to them, 2) the fact that only about half those connected used the amount of electricity at the high energy rate necessary to make these electricity connections financially viable, and 3) there was an under recovery on the capital costs of putting the farm electrification infrastructure in place. It was shown that the government was concerned with the security situation on South Africa's borders, and the electrification of white-owned commercial farms was an important consideration for the defence of the country against insurgents crossing the borders of South Africa and the front-line states for attacks on South Africa. The electrification of white-owned commercial farms was also conditioned by the significant rise in diesel oil prices after the two oil crises of the 1970's. The important farmer's vote was also probably a major consideration in the government's pressure on Eskom to supply farms with electricity, taking into consideration the government's continuous electoral battle with the Conservative Party from 1985 onwards. It

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[201] Interview with Mr J. du Plessis, 27th January 1998.

seems doubtful, however, that the government's support for the farm electrification programme up until 1988 influenced the outcome of this electoral battle.

With respect to the electrification of black households this was curtailed and was, unlike the electrification of white-owned commercial farms, not openly encouraged by the government as a consequence of the difficult political situation they faced with opposition to their reform initiatives. The electrification of black households therefore concentrated mainly on research projects which allowed Eskom to refine their approach to the problems that they would eventually encounter in electrifying black households, e.g., the introduction of bundled conductors, Ready Boards and pole mounted transformers. Eskom was, after the de Villiers Commission of Inquiry, only able to undertake electrification projects which were self-sustaining and where the consumers concerned were able to pay for the electricity supplied.[202] A project that did fall into this category was the joint venture at KwaNobuhle near Uitenhage in the Eastern Cape. This project did give Eskom an opportunity to test out the efficiency of their research into making black household electrification as cost effective as possible. The Elandskraal project also proved enlightening and it was this project that initially caused Eskom to realise that whilst electricity is an important ingredient in economic growth and social upliftment in developing areas, by itself, it is insufficient to make these objectives sustainable. The early economic benefits at Elandskraal did, however, encourage Eskom to undertake the electrification of black households after 1990 as will be shown in Chapter 7.

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[202] The farm electrification programme was of course an exception to this but in fairness the fact that this programme was being cross-subsidised by other electricity consumers was not known to Eskom until the late 80's, and anyway as noted already, Eskom's minister in replying to the SAAU on the subject of electrification costs mentioned that the government would consider cross-subsidising projects that were related to the security of South Africa.

CHAPTER 6

ESKOM AND THE ELECTRIFICATION OF GREATER SOWETO: 1980-1990

1.0 INTRODUCTION

The major black household electrification programme that took place in the decade 1980-1990 was the electrification of Greater Soweto. The Greater Soweto Electrification Project (SEP) was a government initiative, Eskom was therefore not involved in the infrastructural development connected with the SEP but was responsible for supplying nearly 90 per cent of the bulk electricity required by the project. From 1988 onwards Eskom did attempt to take over the management of Greater Soweto's electricity supply, however.[203] The purpose of this chapter is to analyse this initiative. To do this certain questions present themselves, these are 1) Why did Eskom attempt to become involved in managing the supply of electricity to Greater Soweto? 2) What lessons did Eskom learn from this attempt? and 3) How could the lessons learnt help Eskom with their nation-wide programme to electrify black households from 1990 onwards? For a complete understanding of the complexities of the SEP the reason why Greater Soweto was electrified and the project's size and cost will also be discussed in this chapter.

2.0 SOWETO: AN OVERVIEW

The South Western Township, commonly known as Soweto, is located about 15kms south-west of Johannesburg. The township was founded in 1930 when the Johannesburg City Council (JCC) purchased about 1 300 hectares of land on the farm Klipspruit No 8 for housing migrant labour. Today Soweto covers an area of some 8 000 hectares and is made up of 29 individual townships in Soweto itself plus Diepmeadow (an amalgamation of the former areas of Diepkloof and Meadowlands) and Dobsonville, the whole forming Greater Soweto. In 1954 the JCC introduced the "site and service" scheme in terms of which the Council assumed responsibility for the

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[203] The negotiations involved in Eskom's attempt to take over the management of Greater Soweto's electricity supply are for the first time made public in this chapter due to the authors access to Eskom's record of these negotiations and interviews with senior Eskom staff that took part in the negotiations.

provision of serviced sites for workers who were in turn expected to erect their own houses. [204] Between 1954 and 1960 33 000 of these sites were allocated to residents by the JCC.

During the late 1950's and early 1960's the government began to put great emphasis on the homeland ideology and in 1958 the government decided that no further loans would be made for sub-economic urban black housing in what was considered as white South Africa. In keeping with the policy of Grand Apartheid all blacks in so-called white urban areas were deemed to be sojourners. In accordance with the Housing Act, Act No 4 of 1966 Administration Boards became responsible for the planning of services and the development of black township land and blacks could not now own land or immovable property in the townships. The Administration Boards became therefore the de facto owner of all fixed property in black urban areas, (Bekker and Humphries, 1985, p.20). Through policies of curtailed development of black urban areas in South Africa the government hoped to create a feasible residential alternative in homelands, and settlement in these areas was encouraged, (Bekker and Humphries, 1985, p.73). This policy had serious implications for the residents of Greater Soweto since now they were unable to buy their own houses and the home-ownership scheme whereby about 12 000 people already held mortgages was cancelled. In lieu of this scheme the state introduced a monthly rental plan for housing in Greater Soweto. There were at this time about 50 000 houses in the township. Industrial and commercial premises had very restricted development, however, due to the extremely complicated licensing requirements for such developments which were then in force.

The administration of Greater Soweto continued to be in the hands of the Johannesburg Municipality until 1973. After this date the West Rand Administration Board assumed control of the township under the Bantu Affairs Administration Act. Greater Soweto was granted full municipal status in accordance with the provisions of the Black Local Authorities Act of 1982 and the first black council elections took place in 1983. Three city councils were returned to office, The Soweto City Council, The Diepmeadow City Council and The Dobsonville City Council.

The population of Greater Soweto continued to grow from its founding in 1930 but statistics on the numbers of people living there were generally incomplete until the late 1980's when even then they varied from researcher to researcher. For example according to the South African Township Annual of 1988 (p.SA4) the population of Greater Soweto was close to 2 million; Davies & Bristow (1988, p.89) on the other hand estimated that in 1988 the population was over 2 700 000. Mashabela (1989, p.150), however, believed that the population of Soweto itself in

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[204] Serviced sites were those which were provided with water, sanitation and refuse removal and which were connected together by crude access roads.

1989 was about 1,5 million. If the populations of Diepmeadow and Dobsonville are added to that of Mashabela's estimate, the population of Greater Soweto was, in the late 80's, about 1,8 million, which is close to the figure quoted in the South African Township Annual of 1988. It is likely then that at the end of the period covered in this chapter the population of Greater Soweto approached 1,8 million.

There is also a lack of reliable information pertaining to the numbers of houses in Greater Soweto in the period 1980 - 1990. What is known, however, is that Greater Soweto had a critical housing shortage in the early 1980's. The population density in the township at the time was estimated to be 100 people per hectare,[205] (South African Township Annual, 1988). In 1988 there were also 8 squatter camps in Greater Soweto and no exact estimate existed for the number of shacks in these camps or the number of people living in them. According to the Planact Report on the Soweto Rent Boycott (1989, p.33) there were 26 000 families on the waiting list for houses in Soweto itself at that time.

A consolidated overview of the housing situation in Greater Soweto in 1988, excluding the squatter camps, is as follows:

ITEM	NUMBER
Formal Housing Units	**117 495**
Occupants per Unit	**12**
Shacks	**43 000**
Occupants per Shack	**5**
Hostels for men	**8**
Hostels for Women	**1**
Total No of beds in Hostels	**38 000**

TABLE NO 6.1 AN OVERVIEW OF THE HOUSING IN GREATER SOWETO: 1988
Source: I.R. Information Services, cited in Eskom, The Soweto Report, (1990,p.2)

The total population arising from these statistics amounts to 1 662 940 which roughly agrees with Mashabela's estimate given above. Because of the acute housing shortage in Greater Soweto, however, a culture of sub-letting arose, (Mashabela, 1989, p.148). This means that if these sub tenants and the residents of the squatter camps are taken into account this would give rise to further numbers of people living in the area than are recorded in the statistics cited above. This would explain Brand's estimate that there was a need for a further 66 160 houses in Greater

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[205] This is in contrast to a population density of about 23 people per hectare in Johannesburg.

Soweto in the late 80's, (Brand 1989, p.27). In addition to these confusing statistics concerning housing in Greater Soweto there was no reliable listing of residential names verses their addresses in the period 1980-1990.

The important point of outlining the housing and population statistics of Greater Soweto is that the lack of reliable data made the provision and management of services, including the supply of electricity, to the township a very difficult task from the budgeting point of view in the 1980-1990 decade. For example deciding on the cost of connecting individual dwellings to an electrification infrastructure was subject to heroic assumptions. This in turn made the management of the SEP difficult with respect to the collection of electricity bills and deciding on who in fact should be billed. It is suggested that the subsequent dissatisfaction of electricity consumers in Greater Soweto with the service provided was in some part related to the lack of reliable data concerning house ownership and the numbers of people living in the township, clearly the situation only got worse as the population grew in numbers. The SEP was then fraught with difficulties from its inception.

3.0 THE SOWETO ELECTRIFICATION PROJECT

Following the Cillie Report into the Soweto riots of 1976 several important development projects were undertaken in the black townships of South Africa, the electrification of Greater Soweto was one such project.[206] To set the project in motion, approval was given by the government for consulting engineers to commence with the planning of the SEP in June 1979. The entire project was planned to take 4 years to complete i.e.; until the end of 1983.

It would be a mistake to assume, however, that the SEP was the first electricity scheme for Greater Soweto. Approximately 20 per cent of houses in the township had some form of electrical power prior to the SEP. Table No 6.2 below shows the numbers of houses which were being supplied with electricity in Greater Soweto prior to the SEP:

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[206] The fall of Rhodesia and the withdrawal of the Portuguese from Mozambique and Angola encouraged the black liberation movement in South Africa. Soweto students were particularly militant and rioted in 1976. These riots were encouraged by Steve Biko's black consciousness movement and rapidly spread to 160 communities. Before these riots were finally brought under control seventeen months had elapsed and there were more than 700 people dead, including Biko himself; many people were imprisoned and many fled South Africa.

AREA	No OF ELECTRIFIED HOUSES
Soweto	15 950
Diepmeadow	1 011
Dobsonville	3 808
TOTAL	20 769

TABLE NO 6.2 ELECTRIFIED HOUSES IN GREATER SOWETO: 1979
Source: LHA Report (1987, p.19)

This total figure represented 20,6 per cent of the 101 022 houses estimated to exist in Greater Soweto in 1979. The bulk electricity supply to Greater Soweto for the houses in Soweto and Diepmeadow already electrified was generated at the Orlando Power Station, which was owned by the Johannesburg Municipality. Dobsonville was supplied with electricity by the Roodepoort Municipality. The supply of electricity for the new SEP would, however, be mainly supplied by Eskom. For example in July of 1986 when the SEP was completed Eskom supplied 204 MW of power to the project out of a total demand of 238 MW, i.e.; Eskom supplied 86 per cent of the electricity demanded by the project, (LHA Report, 1987, p.48).[207] This demand included the supply of power to houses and also that required for street lighting.

The SEP was unusual in that it had two complete sets of designs carried out for the project simultaneously by two different consulting engineers the Ecoplan group and the Van Niekerk group. The Ecoplan design was eventually preferred. Dr Piet Koornhof the Minister of Co-operation and Development appointed the Greater Soweto Planning Council (GSPC) to supervise the project. The GSPC was composed of 5 members namely Mr Louise Rive (Chairman) the chairmen of the three Soweto councils and Mr John Knoetze the chairman of the West Rand Administration Board (WRAB).[208] The principle contractor was the Township Electrification South African Consortium (TESACON) which consisted of two firms, Siemens, a German firm with offices in South Africa, and General Electric, an American firm also with offices in South Africa. This consortium was responsible for the high and low voltage reticulation system of the SEP. The large house wiring contract was sublet. The total number of houses in Greater Soweto that was included in the house wiring contract was 104 000. After completion, the SEP, with the greater part of the electricity required being supplied by Eskom, was to be managed initially by the Johannesburg Municipality.

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[207] This extra load on the Eskom system could easily be met due to the excess generating capacity available to the Corporation.

[208] The WRAB no longer exists.

Because 20 769 houses in Greater Soweto already had an electricity supply, there was, after 1980, two quite separate electricity supply schemes operating in the area, namely the new SEP, which principally used electricity supplied in bulk by Eskom, and the older scheme, which was, as already noted, supplied with electricity by the Johannesburg Municipality from their Orlando power station. It is unclear whether any interconnection existed between the two schemes.

Estimating the future demand for electricity in Greater Soweto was fraught with difficulties because the exact numbers of people to be supplied with electricity was unknown. It is not surprising therefore that the estimates for the demand from the SEP at its completion by both design consultants was wrong. The closest estimate was that by the Ecoplan group which came within about 20 per cent of the actual demand, (LHA Report, 1987, p.47). In determining the possible electricity demand from the SEP one of the design parameters over which engineers had limited control was the so-called After Diversity Maximum Demand (ADMD) per house. Generally this is specified on the level of 100 or more households, i.e.; the maximum demand expressed on a per-house basis experienced when 100 or more households are served. The ADMD depends on such parameters as income, climate and size of dwelling.[209]

The total load and energy consumption estimated in the Ecoplan design was determined by estimating the load requirements for an average 4 roomed house. The load being demanded by 4 lights, 4 socket outlets, 2 outdoor lights, 1 geyser and 1 stove.[210] An estimate was also made of the peak electricity demand that the SEP would be required to meet in its completed form. This estimate was necessary for the financial planning of income derived from and costs associated with the SEP, generally electricity only makes up about 20 per cent of the costs of providing services in black townships on average. The cost of roads is of the order of 40 per cent and the road layout itself materially influences the design of the township services including the supply of electricity, (Cameron, 1982, pp.69-74). The road layout of the different suburbs of Greater Soweto varied and this added a constraint on the economic (and technical) efficiency of the design of the SEP.

The electrification of Greater Soweto was a major reticulation project which demanded more electricity than many large white municipalities. Greater Soweto was, together with the city of Roodepoort, the eleventh largest consumer of electricity in South Africa. In terms of peak load

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209 The need for this calculation demonstrates the difficulty engineers faced in designing the SEP because the essential data regarding house numbers were unavailable in Greater Soweto. The scheme was therefore probably overdesigned and thereby made more costly than might have been the case if accurate housing data had been available to the designers.

210 These estimates took on considerable economic importance in later years since they formed the basis for the designs of Eskom's massive electrification programme in the 90's.

demand the township challenged Germiston for sixth position nation wide, (Eskom Statistical Yearbook, 1987). The SEP required "great technical skill and expertise to execute properly. Most of the technical choices made were sound and based on the realities of the situation", (LHA Report, 1987, p.2 Executive Summary). These realities included the economics of the SEP and the political climate in which it was built, conditioned, as it was, by the 1976 Soweto riots. The electrification of Greater Soweto was not completed within the original time frame envisaged by the planners. It was, however, completed by 1986. Many administrative and political problems associated with the SEP surfaced after 1985. These will be described presently.

4.0 THE IMPORTANCE OF SERVICES PROVISION TO GREATER SOWETO

The efficient provision of services, to Greater Soweto was important because:

a) Greater Soweto was the biggest supplier of labour in the PWV area (which had a population in excess of 7 million people) and which produced more than 41 per cent of South Africa's GDP;

b) The leadership of the most influential black political groups and trades union lived in Greater Soweto. This meant that the area was effectively the centre of such organisations as COSATU and black political thinking in South Africa. Whatever action such people took regarding the acceptance or non-acceptance of essential services delivery could be expected to be copied in other black townships;

c) Greater Soweto "displayed the highest level of socio-economic and political development of all major black urban areas of South Africa", (Brand Report, 1989, p.14). This meant that political unrest in this area for any reason, including poor municipal services delivery, could be confidently expected to be better organised than in any other black urban area of the Republic and would therefore be more difficult to control; and

d) Greater Soweto was an area in which some of the most sophisticated black people in South Africa resided and they demanded a service comparable with that which was provided to their white counterparts in Johannesburg. They purchased a range of electric appliances and had acquired western so-called first-world tastes in this regard. In spite of the need for efficient services provision in Greater Soweto municipal services problems arose.

5.0 THE DYNAMICS OF THE GREATER SOWETO MUNICIPAL SERVICES PROBLEM

As already noted Greater Soweto was until 1973 controlled by the Johannesburg City Council. After that date control passed to the West Rand Administration Board. The forerunners of black local authorities, the Urban Black Councils came into effect in the late seventies and gradually phased out this white controlled Administration Board. Finally in 1983 Greater Soweto was granted full municipal status and several political, youth, community and student organisations became active in Soweto municipal affairs.[211]

Civic bodies such as Sofasonke, Makgotla and Dikwankwetha participated in the 1983 Greater Soweto council elections.[212] Continual bickering, however, marked the earliest initiatives concerning the provision of efficient municipal services including electricity supply. These different bodies refused to negotiate with each other on the management of services and their costs, (Eskom, The Soweto Report, 1990, p.9). As a consequence the quality of services provision in Greater Soweto deteriorated

Following civic unrest as a consequence of deteriorating services provision in 1985 the Soweto Civic Association (SCA), together with several other community organisations, was banned. In order to continue the struggle for more efficient municipal services the SCA established a new organisation called the Soweto Peoples Delegation (SPD). To make it difficult for this group to be banned it was composed of very prominent people, these being Archbishop Desmond Tutu, Mr Cyril Ramaphosa, The Rev Frank Chikane, Mrs Albertina Sisulu, Sister Bernard Ncube, Mrs Ellen Kuwayo and the Rev Lebamang Sebidi. This group of people became one of the most influential groups in the negotiations for better municipal services delivery to Greater Soweto between 1985 and 1989.

So far as electricity supply was concerned, in comparison with other black townships in South Africa, Greater Soweto was particularly well served. From about 1986 onwards over 95 per cent of formal dwellings in the township had an electricity supply. As a result of mismanagement, maladministration, poor maintenance and the lack of development capital the electricity

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211 These were the Soweto Civic Association (SCA) the Congress of South African Student's (COSAS) the Soweto Student's Congress, the Soweto Youth Congress, the Azanian Student's Movement (AZASM) and the Azanian People's Organisation (AZAPO). These groups campaigned against the creation of black local authorities before and after the 1983 elections to choose black councillors, (Mashabela, 1989, p.142)

212 The Sofasonke party was a Zulu based political party which controlled Diepkloof. They were between 1983 and 1995 opposed to Eskom taking over the management of electricity supply to Greater Soweto, Interview with Mr Paul Maré,19th March 1998.

reticulation system was, however, from late 1987 on the brink of collapse and residents began to withhold the payments of municipal rates and taxes, the Soweto Rent Boycott had begun. With respect to the condition of the electrification infrastructure in 1988 the accrued damage to substations and the electrical network was estimated to be R30 million, (Die Afrikaner 3 Sept 1988). The lack of revenue from the non-payment of services and general vandalism further exacerbated this critical situation, (PLANACT Report, 1990, p.53). In addition to the problem of non-payment for electricity many electricity consumers in Greater Soweto were illegally connected, (Business Day 29th February 1988). The situation with regard to electricity supply management had by 1988 deteriorated to such an extent that the authorities no longer sent out electricity accounts and meters were never read. Furthermore, payment records were in disarray and haphazard, (Eskom, The Soweto Report, 1990, p.5).

6.0 THE SOWETO RENT BOYCOTT AND ESKOM

6.1 The Causes of the Rent Boycott

The so-called Soweto Rent Boycott, which occurred during the period 1985 to 1989, was in effect a misnomer for a much more complicated boycott which embraced the non-payment of house rents, municipal rates and taxes and all municipal service charges, amongst which were the charges for electricity.

The causes and implications of the Soweto Rent Boycott were as follows:

a) People had been paying rent for homes for up to 55 years without acquiring the ownership of their homes;
b) The quality of municipal services was generally very bad;
c) Municipal services cost more on all counts than the much better services afforded to white rate-payers in Johannesburg; and
d) Residents could generally not afford the municipal charges being levied nor could they in many cases even understand them.

Residents of Greater Soweto complained to the authorities about these issues and were ignored. As a consequence they started to default on their payments for municipal services. The authorities responded by evicting large numbers of residents and prosecuting others. The net result of these actions was increased community resistance and the continuation of the services payment boycott. A vicious circle of cause and effect was therefore brought into play and this grew in magnitude.

Finally in mid 1986 community solidarity resulted in what was to become known as the Soweto Rent Boycott. By this time the Greater Soweto city councils were only collecting about 20 per cent of the revenue they needed to run the public services. This situation prevailed into the early 90's. Many attempts were made to resolve the boycott. All these attempts failed, however, and the Greater Soweto City Councillors persistently failed to heed the complaints of the township's residents, (Eskom, The Soweto Report, 1990, p.6).[213]

6.2 Electricity's Role in the Rent Boycott

There is some confusion as to whether the Soweto Rent Boycott emanated from increases in municipal service charges or the rents for the houses[214]. What is certain is that the "electricity master plan levy" of R12 per month was an important item in the general discontent consumers showed to municipal services provision[215]. Electricity charges were by far the largest of the services charges in Greater Soweto and amounted to between 60-70 per cent of the total services bill for each resident. These charges were then a central issue in the Soweto Rent Boycott. Because of this Eskom's Chief Executive Officer Dr I.C. McRae was convinced that to "normalise" the situation in Greater Soweto it was essential for Eskom to address the problems connected with the management of the electricity supply to the area. The strategic importance of this move so far as McRae was concerned, was because:

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213 Also interviews with Dr I.C. McRae 4th September 1996, Mr I. Van Gass, 16th January 1997 and Mr. V.C. Milne, 27th November 1998.

A survey containing the views of Greater Soweto residents concerning the supply of services is presented in a March 1989 report entitled "The Soweto Rent Boycott". This study was commissioned by The Soweto Delegation and undertaken by the consulting firm PLANACT in conjunction with research staff from the Centre for Policy Studies in the University of the Witwatersrand. The most important views cited in this report are as follows:

a) Most of the residents of Greater Soweto could not afford the current service charges (pp.5 & 66). PLANACT concluded that raising service charges to recover a combined debt of R701 million for unpaid services etc., would be a "recipe for political instability". Subsidisation should therefore be sought and an affordable service charge introduced. It is suggested that the introduction of an affordable tariff for services would, however, not necessarily have solved the problem of non-payment since Sowetans in general questioned the legitimacy of the Greater Soweto City Councils, which fact is acknowledged on pp.23 and 74 of the PLANACT Report;

b) The billing system for services was too complicated and very confusing for consumers (p.63);

c) There was poor communication between the Soweto Councils and consumers; and

d) Sowetans perceived the cost of services to be very expensive (p.24).

214 This confusion was exacerbated by the Greater Soweto Municipalities' accounting system, which combined all costs into one account, which was not understood by consumers. The account was also complicated by the addition of a number of levies including the "Electricity Masterplan Levy", (Eskom, The Soweto Report, 1990, p.7).

215 The "Electricity Masterplan Levy" was seen as a "form of racial taxation", (Van Gass, 1989, p.25).

a) Eskom could gain experience by becoming involved in the management of electricity supply in Greater Soweto and this experience could be applied to other black townships in South Africa, see also Botha, (1989, p.16);

b) Failure to find a solution to Greater Soweto's electricity problems would damage Eskom's credibility and impair the Corporation's efforts to manage the electricity supply to other black townships, which may be electrified in future;

c) The solving of electricity supply problems in Greater Soweto would also involve for the first time a parastatal negotiating with black extra parliamentary groups. Such negotiations would give Eskom national and international exposure and credibility. Eskom's international credibility would become important at the end of the 80's when joint ventures between foreign countries offering aid for social upliftment in South Africa, and Eskom, would be attempted; and[216]

d) Furthermore, if electricity supply could not be managed well in an almost completely electrified area like Greater Soweto, how could it work in lesser developed black areas.

6.3 Attempts to end the Rent Boycott

From 1987 onwards organisations such as the SPD and the Soweto Electricity Advice Centre (SEAC) attempted to bring the Soweto Rent Boycott to an end by negotiations with the Soweto City Council,[217] (Mashabela, 1989, p.145). These attempts invariably failed.[218] As a consequence of the objections raised to the service charges being levied in Greater Soweto and the continuation of the Rent Boycott, in May 1987, the Soweto City Council served eviction notices on prominent political leaders who were taking part in the boycott. These leaders were Dr Nathan Motlana, who was at the time the Chairman of the Soweto Civic Association, Mrs Albertina Sisulu, the then co-president of the UDF and Mrs Winnie Mandela. The council failed, however, to take legal action against these three. In addition the council terminated the electricity supply to residents who had not paid their services bill. In the event the electricity was immediately reconnected illegally by members of local youth groups, (Mashabela, 1989, p.219).

In June 1987 the President of the Sofasonke Party, Mr Ephraim Tshabalala urged residents to pay municipal services charges to his party for deposit with the Soweto City Council. The previous Greater Soweto town clerk (Mr Nico Malan) warned residents that such payment would not

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216 One such Joint Venture did of course come about in the late 80's as described in the previous chapter.

217 The Soweto City Council was the most powerful of the three councils and it was this council that bought electricity in bulk from Eskom and resold it to the Diepmeadow and Dobsonville City Councils.

218 In this regard Mr Barnard Moleke the SEAC's ombudsman declared that the city councillors were not prepared to debate the matter and thought that there was nothing wrong with the high service charges in Greater Soweto, (Mashabela, 1989, p.145)

prevent them being evicted for non-payment, (Mashabela, 1989, p.219). Following this, in July 1987 Mr Steve Kgame the President of the Urban Councils Association of South Africa called for the eviction of all rent boycotters. In a reply to this Mr Tom Boya the President of the United Municipalities of South Africa, and a rival organisation to the Urban Councils Association of South Africa, came out against the evictions of rent boycotters and suggested that Soweto City Councillors should meet members of the community to discuss grievances and that tenants should be required to only pay service charges until such grievances had been resolved.

The second municipal elections in Greater Soweto under the Black Local Authorities Act took place in October 1988. At these elections the Sofasonke Party won control of the Soweto City Council. It's platform was based on the non-eviction of rent boycotters and that no charges for services would be required until the services had been improved. This put Eskom in an invidious position vis-à-vis payment for the bulk electricity supplied to Greater Soweto since it appeared that the new city councillors were not supporting the government's requirement that services be paid for and this could perhaps cause the TPA to discontinue payment to Eskom for bulk electricity supply to the township.[219]

Shortly after the inauguration of the Sofasonke Party as the newly elected Soweto City Council (SCC) in 1988 the mayor, Mr Sam Mkwanazi, and the Chairman of the Executive Committee, Mr Payne Tshabalala suggested to the TPA that a conference should be arranged with all parties who had a vested interest in the Soweto Rent Boycott. The purpose of the conference was to attempt to find a solution to the problems of non-payment for municipal services which faced the new council. The conference became known as the "D'Nyala Beraad". Because of Eskom's Chief Executive Officer Dr I.C. McRae's standing with local politicians in Soweto as a result of meetings he had had with them he was invited to the conference.[220]

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[219] The TPA had since the start of the rent boycott, been ensuring that Eskom was paid for the bulk electricity supplied to Greater Soweto, Interview with Mr. V.C. Milne, 27th November 1998.

[220] These meetings had been undertaken in a clandestine fashion. Eskom's Chairman Dr John Maree was quite unaware of them. They had taken place in Soweto between McRae and community leaders. McRae took considerable risks in going into the township at this time and on several occasions he was secreted away by the community leaders during police raids on the township. McRae's purpose in undertaking these meetings was connected with his belief that electricity was a catalyst for social reform. He believed that it was imperative to understand the problems associated with electricity supply to Greater Soweto if his vision of supplying electricity for social upliftment was to succeed. The meetings had been arranged for Dr McRae by the Rev Frank Chikane and the Rev (now Bishop) Peter Storey, Interview with Dr McRae, 29th August 1996.

The "D'Nyala Beraad" was held between the 25th and 27th November 1988. This was one month after the municipal elections which had brought the Sofasonke Party to power.[221] Members of the Beraad were drawn from the TPA, the Johannesburg City Council, the Central Witwatersrand Regional Services Council, the DBSA, the Department of Finance, the Rand Water Board, the Witwatersrand Metropolitan Chamber plus the S.A. police and Eskom. The purpose of the Beraad was to formulate a strategy to "normalise" municipal services and in particular the electricity supply to Greater Soweto. The recommendations arising from the Beraad were as follows:

a) The SCC and the residents of Greater Soweto would be consulted and invited to become actively involved in municipal services projects to improve the quality of life in Greater Soweto;
b) Some of the municipal services should be privatised and that agents be appointed to manage the provision of such services;
c) Consideration would be given for the introduction of a R50 per month flat rate for municipal services in Greater Soweto. This was to be an interim measure to raise more revenue for such services until their provision could be normalised; [222]
d) Electricity should be cut off in the event of non-payment;
e) That arrear debt be frozen;[223]
f) That an in-depth study into the privatisation and management of local authorities be undertaken; and
g) That measures be undertaken to improve the image and legitimacy of the black local authority system in South Africa, (Eskom, The Soweto Report, 1990, pp.71-73).

6.4 The Soweto Steering Committee

McRae took advantage of the conference to lead Escom into direct participation in proposals for solutions to Greater Soweto's electricity supply problems when he was asked to form a steering committee to study certain aspects of services provision, in particular the supply of electricity to Greater Soweto. To this end McRae approached a number of individuals and organisations inviting them to serve on the steering committee. There were 43 people eventually on the

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221 Mr Tshabalala and Mr Mkwanazi approached the TPA concerning arranging the D'Nyala Beraad. No official notes on the approach could be found, but this fact was mentioned to the author by Dr McRae, Interview 4th September1996.

222 This recommendation was, within days, rejected by the SPD. The rejection was based on the premise that small electricity users would in effect be subsidising larger users.

223 For the period 1985 to 1990 the debt for electricity alone amounted to about R 300 million, (Eskom, The Soweto Report, 1990, p.10)

committee representing the following organisations; Eskom, the TPA, the Central Witwatersrand Regional Services Council, the Johannesburg City Council, the Soweto, Dobsonville and Diepmeadow City Councils, the Rand Water Board, Standard Merchant Bank, Anglo American Corporation, Liberty Life, The Urban Foundation, Organised Business in Greater Soweto, and finally members of the legal profession.[224] The steering committee had only a nominal black presence these being from the business community and not from the political centre.[225]

The constitution of the so-called Soweto Steering Committee was important, and it was necessary to identify the most prominent and influential interest groups in Greater Soweto and the leaders who represented them. It was, however, early days for Eskom to attempt to do this and it transpired that some parties that should have been on the committee were not invited, whilst others, that had been invited to participate should not really have been involved.[226]

6.5 Findings of The Steering Committee[227]

The Steering Committee identified the following issues as being the most important for solving the electricity supply problems in Greater Soweto:

a) Identifying the weakness of the present services provision management;
b) Determining the reasons for the non-payment of services;
c) Identifying possible investors who would provide capital for purposes of forming an electricity supply management company;
d) Deciding on the nature of a legal entity to be established to manage electricity supply;
e) Identifying the financial risks associated with such an electricity supply company; and
f) Determining the staffing requirements of such a supply company and the training required to ensure it worked efficiently.

Six sub-committees, answerable to the Soweto Steering Committee, were formed to investigate each of these issues. Each sub-committee was chaired by a member of Eskom's Management

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[224] It is important to mention that the Black City Councils were represented by white officials in every case.

[225] McRae's involvement could not of course be kept from Maree. Maree reacted by reminding McRae that he should concentrate on the technical and administration aspects of Eskom leaving the political side of the business to himself. McRae seems to have ignored this warning and became increasingly active in the Soweto negotiations, interview with Dr I.C. McRae, 4th September1996.

[226] Interview with Mr I.G. Van Gass, 16th January 1997.

[227] This section is condensed from "the Interim Report on the Findings and Proposals of the Soweto Steering Committee" (1988).

Board. In the interim report prepared by the Steering Committee based upon the findings of these sub-committees, the following general information was presented concerning electricity supply in Greater Soweto at the end of 1988.

	SOWETO	DIEPMEADOW	DOBSONVILLE
Approximate number of consumers	90 000	30 000	5 300
Average monthly consumption per consumer (kWh including 25% loss factor) [228]	600	500	500
Average tariff structure:			
Charge per kWh	10,5c	9c	6,6c
Average cost of bulk electricity to City Councils (per kWh)	8,5c	8,5c	8,5c
Average level of non-payment	80%	77%	49%

TABLE NO 6.3 STATUS OF ELECTRICITY SUPPLY IN GREATER SOWETO: 1988.
Source: Interim Report on the Findings and Proposals of the Soweto Steering Committee, December 1988.

In addition to this information, the following items of importance were addressed with regard to electricity supply:

6.5.1 Problems with non-payment[229]

a) 7 500 electricity meters were broken, 5 000 in Soweto and 2 500 in Diepmeadow and Dobsonville. These figures represented about 6 per cent of the total number of meters installed in Greater Soweto;

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[228] During the year ending 31 December 1988 Eskom had supplied the City Council of Soweto with electricity in the sum of R70,3 million. Of this the Soweto City Council had resold electricity in the amount of R18,3 million to the Diepmeadow City Council and R3,1 million to the Dobsonville City Council. In addition the Johannesburg Municipality also supplied electricity to the Soweto City Council. The ratio of energy supplied between the two suppliers was about 86 per cent from Eskom, and 14 per cent from Johannesburg, (LHA Report, 1987, p.48). Hence the total cost of supply amounted to some R80 million. The 25 per cent loss factor mentioned in Table No 6.3 above included both technical and non-technical losses. The non-technical losses involved illegal connections, interview with Mr P. Maré, 6th February 1998.

[229] The Interim Report expressed the following concerns with respect to the non-payment issue:

"In view of the high level of non-payment by consumers to the various Councils and the relatively low tariffs, the Councils find it difficult to pay for the bulk supply of electricity they receive. This means that Eskom is at risk since the Transvaal Provincial Administration is under no legal obligation to make good the debts of the Soweto City Council, as it has in the past".

This observation had a prophetic ring about it, because when the Metropolitan Council took over the Administration of Greater Soweto's affairs from the TPA in 1990 Eskom was not paid for the bulk electricity they continued to supply to Greater Soweto.

b) Many of the meters still in working order had not been read since 1985;

c) Many meters had been by-passed illegally;

d) Records did not reflect who the electricity consumers were nor whether electricity bills had been paid or not. Furthermore, the processing of accounts was almost non-existent;[230]

e) The quality of electricity supply was very poor with frequent interruptions; and

f) It was found that many council members had no idea of how electricity was supplied, distributed or paid for.[231]

6.5.2 Financial issues

a) Existing electricity tariffs, as well as being unequal between the Dobsonville, Diepmeadow and Soweto Councils, were set at levels which were too low to cover the total costs of electricity supply (which would include maintenance and administration charges etc.). If the tariffs were standardised, however, Dobsonville residents would be faced with increases since their tariff was below those of Soweto and Diepkloof (see Table No 6.3 above). Increases in the tariffs would probably increase the level of non-payment for services in Greater Soweto as a consequence; and

b) A considerable amount of capital would be required to upgrade the existing electricity distribution network to acceptable levels.

6.5.3 The legal position

Electricity was supplied to Greater Soweto under the Electricity Act of 1922 as amended. This act provided for the supply and sale of electricity within the area of jurisdiction of the local authority, to be under the control of that authority, except where some other body had lawfully acquired the rights of supply in that area by agreement with the local authority. Because of the Soweto City Council's poor management of the electricity supply infrastructure and the administration of electricity accounts, it was recommended that in future an alternative organisation be established which would legally acquire the right to manage Greater Soweto's electricity supply. The following structures were investigated in that regard:

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230 This meant that consumers had no faith in the accuracy of electricity accounts. In addition accounts usually reflected amounts for total services, i.e., rent, levies etc., as well as for electricity.

231 In the Interim Report there is a clear indication that the report compiler(s) found proof of electricity being managed in an inefficient manner and that there was concern in the minds of Soweto residents that the City Council was an illegitimate body.

a) Co-operatives;
b) Trusts;
c) A Partnership;
d) A specially constructed statutory body;
e) A private entity; and
f) A section 21 company.[232]

6.6 Proposed Interim Solution

The Steering Committee recognised the urgency of the problem concerning electricity supply in Greater Soweto. It resolved therefore to try and implement an interim solution to the problem in the short-term whilst contriving to grapple with the problem in the long- term. As mentioned above the Steering Committee was of the opinion that in the long-term an alternative organisation to the Soweto City Council should take over the management of electricity supply in Greater Soweto. First, however, the situation had to be "normalised" to make it attractive enough for such an organisation's interest to be aroused. This meant that the non-payment problem had to be solved first. Any solution to this problem, it was realised, would involve upgrading the standard of services to the township. The Committee proposed the following interim solution to the electricity supply problems in Greater Soweto:

a) A separate entity be established to take over the management of electricity supply in Greater Soweto which would be composed of a partnership between Eskom and other interested parties and would have separate legal status and operate independently of Eskom itself, the Soweto City Council and the stakeholders; and
b) Once the entity had been established it would enter into negotiations with the TPA and the Soweto, Dobsonville and Diepmeadow City Councils to obtain the right to supply electricity to Greater Soweto in the short term utilising the existing distribution networks belonging to the three city councils.

The modus operandi for the proposed take-over would be as follows:

a) An educational and communication programme aimed at informing residents, consumers and other interested parties on the efficient use of electricity would be put into practice; daily press, radio and television programmes would be organised and brochures and newsletters would be used as well;

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[232] A section 21 company is a non-profit company.

b) The Greater Soweto electricity distribution system, including the metering system and maintenance depots, would be upgraded technically in order to ensure a reliable supply of power; and

c) The payments of accounts would be facilitated by the provision of an adequate number of payment offices, the efficient handling of complaints and by responding to service calls.

A very important decision was that the failure to pay for electricity would result in the supply being cut off. To put these ideas into practice it was suggested that, in addition to skilled personnel drawn from Eskom, the independent electricity management entity would, as far as possible, include the existing staff members from the electricity departments in the three city councils of Greater Soweto. Bridging finance to set up the entity and to run it until it was financially independent would be sought from the TPA.

7.0 ESKOM'S NEGOTIATIONS WITH THE TPA

For Eskom and its future partners to take over the management of Greater Soweto's electricity supply system it was first necessary for representatives of the Corporation to negotiate with the TPA. These negotiations took place over seven months from the 22nd May 1989 to the 15th December 1989. There were eleven meetings, nine with three Chief Directors of the TPA namely, Messrs Van der Walt, Opperman and Milne and two with the Administrator of the Transvaal himself; thus demonstrating the importance of the supply of electricity to the township, (Eskom, The Soweto Report, 1990, p.40).

At the end of the discussions Eskom's representatives concluded that the TPA were at pains to confirm the autonomy and legitimacy of the Soweto City Council and that the TPA appeared reluctant to accept that the Steering Committee's proposals were indeed fair to the council. Eskom's representatives further considered that throughout the negotiations the TPA were keen to persuade Eskom to act as agents for the Soweto City Council. Eskom made it clear, however, that this was totally unacceptable. (Eskom, The Soweto Report, 1990, p.40).[233]

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[233] The TPA's role in Eskom's electrification programme was always problematic. Even when Eskom began their concentrated effort to electrify black households in South Africa from 1990 onwards there appeared to be reluctance on the TPA's part to accept Eskom's role in the process (see chapter 8). The TPA also voiced its concern about Eskom having talks with the SPD and other parties (see next section). At the meeting between the TPA and Eskom of the 15th June 1989 Eskom explained that such discussions were important since the SPD was a powerful force in the rent boycott. The TPA's concern rested on the fact that such talks would undermine the legitimacy of the Soweto City Council, interview with Dr I.C. McRae, 4th September 1996.

In spite of the difficulties in the negotiations between Eskom and the TPA certain agreements were, nevertheless, reached, these were as follows:

a) The electricity tariff to be charged in Greater Soweto would be no higher than that charged by the Johannesburg City Council;
b) The proposed entity to take over the supply of electricity to Greater Soweto would not be burdened with the accumulated debt or arrear payments for electricity owing to or by the Greater Soweto City Councils;
c) Eskom's participation in the management of electricity supply to Greater Soweto would be conditional on sufficient funding being made available for the proposed entity to be able to meet it's obligations. It was agreed that the TPA would be responsible for arranging such funding;[234]
d) The proposed entity would be autonomous, i.e., it would be politically and commercially independent from the Soweto City Council; and
e) The proposed entity would negotiate with the Soweto City Council prior to announcing the electricity tariff for the township. If agreement on this matter could not be reached then arbitration would be sought, (Eskom, The Soweto Report, 1990, p.41).

Following these agreements a meeting was arranged between Eskom, the TPA and the Central Witwatersrand RSC. The object of the meeting was to try and persuade the RSC to fund the proposed entity. Unfortunately the meeting was marred by the Chairman of the RSC attacking Eskom for negotiating with the SPD. Both the RSC and the TPA again made it clear that RSC funding would only be made available if Eskom acted as the Soweto City Council's agents. Eskom opposed this. There followed three months of silence between the parties. Eskom then tried to make contact with the TPA by mail. On the 22nd November 1989 a meeting between Eskom, the TPA and the RSC took place. The question of funding was not discussed at this meeting, (Eskom, The Soweto Report, 1990, p.41).

On the 28th November 1989 a letter was sent by Eskom to the Director of the TPA requesting a meeting to discuss the financial arrangements for setting up the proposed entity to manage Greater Soweto's electricity supply. This resulted in a further meeting between Eskom and the TPA on the 15th December 1989. At this meeting it was agreed that, in view of the difficulties thus far encountered with regard to funding the proposed entity the DBSA would be approached for funding.

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[234] This condition was necessary as a consequence of the de Villiers Commission requirements regarding the financial viability of any electrification project that Eskom became associated with.

It was McRae's impression that during the eight months Eskom was involved in negotiating with the TPA that organisation was strongly opposed to Eskom becoming involved with Greater Soweto's electricity supply problems. Further, in view of the lack of support given to Eskom by the TPA in their negotiations with the SCC, McRae believed that they would have progressed further without the TPA's involvement.[235]

8.0 ESKOM'S NEGOTIATIONS WITH THE SPD

In attempting to "normalise" the supply of electricity to Greater Soweto McRae was prepared to have discussions with all bona fide community leaders, which included the Soweto People's Delegation (SPD). Talks with the SPD commenced on the 2nd August 1989. After this meeting the SPD released a press statement confirming that a meeting had taken place; (Business Day 3rd August 1989).[236] The SPD's proposals for any alternative to the existing electricity supply arrangements to succeed depended on the following conditions.

a) Non-racialism in electricity supply planning, i.e., separate policies and supply methods of electricity for Greater Soweto and Johannesburg were unacceptable;
b) The SCC was to be excluded in the planning of the new electric entity to serve Greater Soweto;
c) Electricity should be efficiently supplied to Greater Soweto;
d) Community participation would be necessary in establishing the new entity to serve Greater Soweto;
e) The entity was to operate on a non-profit basis;
f) Grant finance was to be made available for upgrading services in Greater Soweto;
g) Non-payment arrears should be written off; and
h) A new electricity tariff for Greater Soweto should be structured.

In addition to these eight fundamental principles the following requirements were to be included in the electricity supply planning process:

a) A Central Electricity Fund should be established from any profits made from the sale of electricity to Greater Soweto;

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235 Author's interviews with Dr I.C. McRae, 4th September 1996 and Mr I Van Gass, 16th January 1996.

236 In addition a facsimile was received by Eskom from the Reverend Frank Chikane dated 8th August 1989, detailing the SPD's proposals for the new entity to manage the electricity supply to Soweto, (Eskom, The Soweto Report 1990).

b) Residents would elect representative committees on a block basis to deal with issues relating to electricity supply including problems of affordability and payment exemptions and problems with meter reading; and
c) Electricity Advice Centres with full-time staff were to be established.

Eskom responded to the SPD proposals as follows:

a) The proposed entity[237] (Econolec) would be non-racial and also be non-political;
b) Econolec would operate independently and not countenance any political representation in the company structure;
c) Econolec would be committed to supplying electricity efficiently and adequately. However, the electricity tariff would dictate how efficient this supply would be;
d) Profit was subject to negotiation;
e) Grant finance would only be supplied to the extent that it was available;
f) Because neither Econolec nor Eskom itself would be playing a role in the formulation of state policy the writing off of non-payment arrears should not be treated as a pre-condition for the establishment of Econolec; and
g) Econolec would introduce electricity tariffs in Greater Soweto which would be no higher than those paid by consumers in Johannesburg. Cross-subsidisation was a possible means of making the provision of electricity more affordable to the poor, providing the more affluent consumers in Greater Soweto were prepared to pay relatively more for their electricity, (Eskom, The Soweto Report, 1990,pp.47-48).[238]

Eskom and the SPD had in all, starting with the meeting of the 2nd August 1989, ten meetings in which Eskom imparted to the SPD "all the facts, information, knowledge, viewpoints and background relevant to the proposed take-over of electricity supply to Greater Soweto"; at a final meeting on the 30th November 1989 it was re-confirmed that both parties were committed to finding a mutually acceptable solution to Greater Soweto's electricity supply problems, (Eskom, The Soweto Report, 1990, p.49). No such solution was found, however, and there was no further contact between the parties. The principle reason for this was that with the release of ANC

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[237] By this time the proposed independent electricity supply entity had been given a name, Econolec. Econolec was represented solely by Eskom staff.

[238] The cross-subsidisation here would meet the requirements of the de Villiers Commission recommendations since the tariff for the poor would be built up from mean pooled costs amongst electricity consumers in Greater Soweto. An interesting parallel exists here between the tariff structures for white commercial farmers in the early eighties when they were pooled as a group to make the electrification of white-owned commercial farms an easier proposition.

prisoners in late 1989 and the political events of February 1990 (see Chapter 7) the SPD leadership fell away in disarray.[239]

9.0 ESKOM'S MEETINGS WITH OTHER INTEREST GROUPS AND COMMUNITY LEADERS IN GREATER SOWETO

To ensure that the community would be informed of it's proposals regarding the management of electricity supply in Greater Soweto, Eskom, represented by Econolec, approached various interest groups and community leaders for discussions on the subject. These discussions again centred around the eight fundamental issues raised by the SPD. The interest groups included the Urban Foundation, the South African Institute of Race Relations, prominent Soweto women representing a broad spectrum of sectors and interest groups, and Bernard Moleke of the Soweto Electricity Advice Centre.[240] A meeting with prominent black business leaders also took place at the Carlton Centre in Johannesburg on the 9th November 1989. A meeting also took place with AZAPO on the 19th October 1989 again at the Carlton Centre. Finally meetings were held between Econolec and Eskom employees living in Greater Soweto.

10.0 ASPECTS OF ESKOM'S NEGOTIATION APPROACH[241]

In their negotiations with the three key interest groups concerned with electricity supply in Greater Soweto, i.e., the TPA, the SCC and the SPD, Eskom was unable to use the round table, multi-party conference approach, instead shuttle diplomacy had to be used. This approach was time consuming and meant that each set of agreements arrived at with one party had to be agreed again with the other influenced parties. The underlying reason for the shuttle-diplomatic approach was because:

a) The TPA refused to have discussions with the SPD indicating at all times that the SCC was the legitimate representatives of the people of Soweto;

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239 For example Archbishop Tutu and the Rev Frank Chikane withdrew from township debates, Cyril Ramaphosa became prominent in the ANC's political structure, Albertina Sisulu rejoined her husband Walter and became, once more, active in the UDF.

240 The Soweto Ladies Group was vociferous in their condemnation of the SCC and praised Econolec and Eskom on their preparedness to talk with the SPD. Interview with Dr I.C. McRae, 4th September 1996.

241 The information in this section is derived from an interview with Mr I Van Gass, 16th January 1997.

b) The SPD on the other hand indicated that they could not be publicly associated with the SCC who were considered to be an illegal, undemocratic and incompetent entity which did not represent the people of Soweto;
c) The SCC in response to the SPD's criticism of them were not willing to have discussions with the SPD; and
d) In addition the Johannesburg City Council also refused to have talks with the SPD.

The shuttle-diplomatic approach had several weaknesses, these were:

a) In order to save time there was the temptation to make changes to Econolec's proposals without involving all the other parties;
b) An attitude of distrust arose because each party did not know what Econolec was saying to the other parties, e.g., the SCC accused Econolec of colluding with the SPD to undermine the SCC's image in the community; and
c) There was a high degree of political fragmentation in the negotiations, which slowed down the process and made consensus impossible.

It was Econolec's contention that the solution to the problems of non-payment for services, could only be found if all the major parties concerned were prepared to look beyond their political agendas and self-interests. This situation was not forthcoming up to the end of 1989 and Econolec's attempt to take over the management of Greater Soweto's electricity supply by the end of the 1980's failed as a consequence of this.

11.0 THE FINANCIAL IMPACT OF THE SEP

With respect to the capital costs of service provision in black townships in South Africa the breakdown of costs has been estimated to be as shown in Table No 6.4 below.

ITEM	PERCENTAGE OF COST
Roads	**40**
Storm Water Drainage	**20**
Electricity Supply	**20**
Water Supply	**10**
Sewerage Services	**10**

TABLE NO 6.4 BREAKDOWN OF THE COSTS OF SERVICES TO VARIOUS BLACK TOWNSHIPS
Source: Cameron, (1982, pp.69-74).

According to Cameron (1982) the road layout of townships materially influences the costs of services and because different townships have different road layouts it is difficult to generalise about the costs of service provision. The cost of providing an electrification infrastructure was estimated to be 20 per cent of the total capital costs of services provision, see Table No 6.4 above..

As already noted the planning of the SEP took place in 1979 and the project was initially expected to be complete by December 1983. The estimated costs of the project in 1979 are shown in Table No 6.5 and Table No 6.6 below.

ITEM	Soweto & Diepmeadow (R Millions)	Dobsonville (R Millions)	Total (R Millions)
E H V SYSTEM[242]	**19, 920**	**1, 012**	**20, 932**
11 KV & LV RETICULATION SYSTEM	**57, 900**	**2, 340**	**60, 240**
LIGHTING	**6, 490**	**0, 650**	**7, 140**
METERING	**7,570**	**0,355**	**7,925**
BUILDINGS, COMPUTERS & VEHICLES	**2, 482**	**0, 118**	**2, 600**
MISCELLANEOUS ITEMS (Unspecified)	**0, 156**	**0, 007**	**0, 163**
SUBTOTAL	**94, 518**	**4, 482**	**99, 000**
PROFESSIONAL FEES INCLUDING SITE INSPECTIONS	**7, 638**	**0, 362**	**8, 000**
GRAND TOTAL	**102, 156**	**4, 844**	**107, 000**

TABLE NO 6.5 CAPITAL COSTS FOR GREATER SOWETO'S ELECTRICITY DISTRIBUTION SYSTEM (1979 Rand)
Source: Condensed from the Ecoplan estimate May 1979.

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[242] Cost of substations, supply lines and feeder cables.

ITEM	Soweto (R Millions)	Diepmeadow (R Millions)	Dobsonville (R Millions)	TOTAL (R Millions)
WIRING UPGRADED HOUSES	3, 734	0, 101	0, 724	4, 559
WIRING NEW HOUSES	12, 430	6, 467	0, 041	18, 938
SUBTOTAL	16, 164	6, 568	0, 765	23, 497
PROFESSIONAL FEES				1, 200
INSPECTIONS				1, 400
CONTINGENCY SUM				0, 104
GRAND TOTAL				26, 201

TABLE NO 6.6 COSTS FOR HOUSE WIRING: NEW AND UPGRADED HOUSES GREATER SOWETO (1979 Rand)
Source: Ecoplan Estimate May 1979.

The numbers of new and upgraded houses that were estimated to be connected to the SEP are given in Table No 6.7 below.

TYPE OF HOUSE	Soweto	Diepmeadow	Dobsonville	Total
NEW HOUSES	49 324	25 663	162	75 149
UPGRADED HOUSES	21 966	1 011	3 808	26 785
TOTAL	71 290	26 674	3 970	101 934

TABLE NO 6.7 NUMBER OF HOUSES TO BE CONNECTED TO THE SEP
Source: Ecoplan Estimate May 1979.

Known financing for the SEP in 1979, composed of government backed loans, is shown in Table No 6.8 below.

LOAN No	FUNDING AGENCY	TERM (YRS)	FOR RETICULATION (R Millions)	FOR HOUSEWIRIING (R Millions)
1	Barclays Bank Volkskas Merchant Bank UAL & Standard Merchant Bank (Public Issue)	20	20	
2	S A Post Office	20	80	20
3	As per loan No 1	20	50	
4	West Rand Administration Board	Unknown		25
		TOTAL	150	45

TABLE NO 6.8 KNOWN FINANCING FOR THE SEP (1979 Rand)
Source: LHA Management Consultants Report, (1987, p.82).

Due to various problems the SEP was not completed until December 1985. Ecoplan made an effort to estimate how the capital requirements would be affected as a consequence of the delays in the project. They did this by escalating their original estimates for the work involved by 10 per cent per annum from May 1979. The total escalated amount for the capital required for the electricity distribution system amounted to R 153 million (from R107 million, Table No 6.5) and to R 35 million (from R 26,201 million, Table No 6.6) for the capital required for the house wiring contract. The total escalated amount then for distribution and house wiring for the SEP was R188 million which was less than the amount raised from the government backed loans of R195 million (see Table No 6.8). The financial situation seemed then to be under control.

In attempting to reconcile the estimated and actual costs of the SEP and the known financing at the completion of the project in December 1985, the 1985 costs of reticulating and wiring a household in the SEP are examined, see Table No 6.9 below.

ITEM	COST/HOUSE (R)
132 KV &11 KV SUBSTATIONS & 11 KV LINES	220
11 KV & LV RETICULATION	1 380
CONTROL & SUPERVISORY EQUIPMENT	20
SUB TOTAL	1 620
HOUSEWIRING	414
TOTAL	2 034

TABLE NO 6.9 RETICULATION AND WIRING COSTS PER HOUSE: GREATER SOWETO (1985 Rand)
Source: Seymore (1986).

The total number of houses that were reticulated and wired under the SEP in Greater Soweto was 101 000. Using this figure and the costs given in Table No 6.9 for reticulating and wiring a house the total capital spent was R164 million for the reticulation contracts and R42 million for the house wiring contracts i.e., a total of R206 million in 1985 Rand. Consequently the estimated costs were exceeded as was the funds available of R195 million, Table No 6.8. This figure of R206 million is interesting, however, since as far back as August 1981 Minister Koornhof, speaking in the South African Parliament, said that the total estimated cost of the Soweto Electrification Project was estimated to be R204 million plus R24 million capitalised interest, (Financial Mail 21st August 1981). In the event with the delays to the SEP the cost of the project at its completion in 1985 was put at R280 million i.e., R206 million as a capital cost and capitalised interest of R74 million, (The Financial Mail 25th March 1985). The capital cost of R206 million therefore appears to have been an accurate estimate of the final capital costs of the SEP in 1985 Rand.

With respect to repaying the loans made for the electrification of Greater Soweto the adverse political situation extant in the area caused the Greater Soweto City Councils to lower the proposed electrification master plan levy (see footnote No 214 above) of R17 to R12 per household. This move of course made the Councils financial position even more perilous and lessened their ability to pay the loans raised to electrify Greater Soweto. Because of this adverse financial position it became incumbent on the Greater Soweto City Councils to request the government to help repay these loans, (as already pointed out the loans were in any event underwritten by the government). The result was then that the South African taxpayer helped pay for the SEP.

According to the LHA Report, (1990, p.83) the loans for the electrification of Greater Soweto probably attracted interest from the day they were taken out or shortly thereafter and therefore

interest was accumulating on the unpaid capital from 1979. Furthermore, construction and equipment costs were escalating on a yearly basis (for all of which cost data is not available) which means that any attempt to do a definitive financial analysis on the project would be rather meaningless. What does seem certain, however, is that the figure of R206 million (1985 Rand) for the capital cost to electrify Greater Soweto as completed in December 1985 is accurate. This amount, together with the accumulated interest thereon, was the South African taxpayers contribution to the project. The figure of R280 million quoted in the Financial Mail of the 25th May 1985 for this contribution is therefore probably an accurate estimate. This figure excluded of course cross-subsidising the non-payment for bulk electricity supplied to the township by Eskom.

The last section has dealt with the cost side of the cost-benefit equation for electrifying Greater Soweto in its construction period from 1979 to 1986. Just as in the case of the electrification of white-owned commercial farms considered in the preceding chapter the benefit side of the SEP equation cannot readily be quantified with any degree of certainty. This, once again, is because sufficient historical data is simply not available. For example there is no time-series data of electrical appliance purchases available. Likewise there is no record of the increasing amounts of electricity used by individual households over time as the advantages attached to electricity usage became accepted. Clearly there are benefits attached to the electrification of Greater Soweto.[243] With respect to the SEP, however, such benefits can only be expressed qualitatively and are as follows:

Firstly there would be an increase in GDP. This would arise from the exogenous shock to the South African economy from black investment levels in the purchase of electrical appliances and to economic activity resulting from the infrastructural and household reticulation programme attached to the SEP. Increase usage of electricity would further boost this increase in GDP. As a consequence of this economic activity there would be job creation both as a direct consequence of the SEP and indirectly as a consequence of the SEP's impact on the South African economy in total. With respect to employment the initial number of new jobs created in the construction phase of the SEP would be a once-off occurrence. Likewise the number of jobs created to meet the increased demand for electrical appliances. Thereafter job creation from the SEP would depend on further expenditure on replacing or maintaining such appliances and the physical electrification reticulation network.

Other benefits attached to the SEP would involve the possible establishment of new small businesses both within the formal and the informal sectors of the economy. There would

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[243] How such benefits can be calculated will be demonstrated in Chapter 8 when Eskom programme to electrify black households from 1990 onwards is considered.

additionally be health benefits attached to electricity replacing coal and wood burning stoves with respect to chest ailments, burns and poisoning, (see Terblanche 1993). Unfortunately so far as the SEP is concerned there appears to be no data available that could be used to quantify these benefits in the 1980-1990 period. Nevertheless it must be noted that as well as the SEP costing the taxpayer money it must have given rise to the economic benefits mentioned above in various degrees.

An additional cost, over and above the ones quantified above, connected to the increased purchase of electrical appliances is that such appliances in South Africa have a large imported content, There would then have been a negative impact on the South African balance of payments as a result of such purchases. There would, in addition, be the negative externalities (air pollution etc.,) attached to generating the power for the SEP so that the benefits outlined above may be realised. Once more, however, so far as can be ascertained, the historical data necessary to enable a quantification of such externalities to be made is unavailable. This subject is discussed further in Chapter 9.

12.0 CONCLUSIONS

The SEP was an important learning experience for Eskom. Eskom's negotiations in Greater Soweto represented the Corporation's first major negotiation in the world of urban black politics. This experience helped shape Eskom's approach to future electrification projects in the 90's. The main lessons Eskom learnt from their experience in Greater Soweto were as follows:

a) The proceedings and resolutions of the D'Nyala Beraad were poorly documented and defined. This provided the TPA with an opportunity to work independently of the Beraad and continue their support of the SCC to the detriment of Eskom's efforts to take over the management of the electricity supply to Greater Soweto;
b) The Beraad probably evoked negative responses among black community leaders. It may have been seen as a paternalistic exercise managed by white officials formulating plans for the solution of black problems. Eskom realised in hindsight that if electrification projects were to be successful black leaders who were viewed as being legitimate by the community concerned would have to be involved in these projects;[244]
c) The McRae Steering Committee, which was established as a result of the D'Nyala Beraad, was similarly bereft of legitimate community leaders. As a consequence of this omission the

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[244] Interviews with Dr I.C. McRae, 4th September 1996 and Mr I Van Gass, 16th January 1997.

report prepared by the committee could be viewed with a degree of scepticism. It is true that deciding on who should constitute the committee was difficult at the time of its formation and it was only during the course of the negotiations undertaken by Eskom in their efforts to take over the management of Greater Soweto's electricity supply that the most influential community members were identified. Eskom realised that for future electrification projects identifying key community leaders was absolutely essential for their success and this policy was applied in the Corporation's national electrification programme from 1990 onwards, see Chapter 8. A potential problem was of course the fragmented political thinking in Greater Soweto. This led to groups like the SPD declining to serve on the same committee as the SCC, and as noted, resulted in shuttle, rather than round table diplomacy. Eskom realised also that such shuttle diplomacy was a recipe for disaster in getting an efficient management system in place for electricity supply to Greater Soweto. It is suggested that the McRae Steering Committee report was therefore not an adequate base on which to formulate a proposal for the management of electricity supply in the township;

d) After the completion of the McRae (steering committee) report Eskom conducted meetings with the various municipal councils in Greater Soweto to try and gauge their responses to Eskom's proposals. In each instance the meetings were informal and only involved certain selected councillors. Upon being formed, Econolec mistakenly assumed that the positive responses of these councillors meant that the municipal councils themselves had accepted the proposals put forward in the report; this was found to be incorrect. An inappropriate negotiation strategy was therefore followed concerning the city councils of Greater Soweto and resulted from a lack of understanding of how they operated.[245] This situation was not repeated in Eskom's national electrification programme from 1990 onwards;

e) Eskom's approach to the SPD was heroic and showed open-mindedness, but by not publishing the points of agreement to the residents of Greater Soweto, a valuable support base was lost;

f) Eskom's negotiations with the TPA were perhaps the critical cause of Econolec's failure to take over the management of electricity supply to Greater Soweto. From the documentary evidence presented in this chapter it is suggested that throughout the negotiations the TPA vacillated between wishing to solve the problem of electricity supply in Greater Soweto and resisting the inclusion of SPD representatives in the entity for so doing. The TPA recognised the necessity for Eskom to have talks with the SPD and other anti-establishment groups, but were concerned that in so doing Eskom was conniving with the "enemies" of the State. The TPA was always concerned with establishing the political independence of the SCC, since the council was approved by the government, as part of its reform process. As such they

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[245] Interview with Dr I C McRae, 4th September1996.

constantly wished Eskom to act as agents for the council. Furthermore, whilst the TPA was having meetings with Eskom, they were also having meetings with the SCC concerning electricity supply. It was a point of concern to Eskom whether the TPA was undermining Eskom at these meetings;[246]

g) It is possible that the lack of support provided to Eskom by the TPA allowed the SCC to reject Eskom's offer to undertake the management of the electricity supply of Greater Soweto via the independent entity Econolec. It was Eskom's contention that to counter the TPA's actions, which certainly did not support Eskom's efforts to take over and manage Greater Soweto's electricity supply, the Corporation in future electrification initiatives would have to obtain sanctioning from high levels of government, ideally of course the Minister in charge of Eskom.[247]

It also became clear that solutions to problems of supplying electricity to black households in South Africa demanded socio-political solutions alongside the solution of the technical and economic problems involved. Eskom's planning for future electrification projects required then an in-depth knowledge of urban planning and community development. In Greater Soweto the community did not take ownership of the project, and the SEP was managed by engineers and financial mangers. In future Eskom electrification project teams would include other disciplines such as social scientists and public relations practitioners as well, see Chapter 8.

Eskom's Chairman Dr John Maree seemed to have very little involvement with the Corporation's efforts to take over the management of the electricity supply to Greater Soweto via Econolec. When questioned on this in an interview with the author[248] he said that he had never believed that Eskom would succeed in the negotiations. He had not interfered, however, in them because of McRae's belief that it was of vital importance to take the management of the electricity supply to Greater Soweto away from the SCC if political stability was to be achieved in the township. It is possible of course that he did not wish to lend his weight to McRae's efforts because the establishment of Black Local Authorities was part of the government's reform process and was seen as a means of diffusing political unrest and frustration with white dominated Administration Boards that impinged on township dwellers way of life.[249]

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246 Interview with Dr I C McRae, 4th September1996.

247 Interview with Dr I C McRae, 4th September 1996.

248 28th October 1998.

249 In an interview 4th September 1996 Dr McRae mentioned to the author that Dr Maree had once instructed him to cut off electricity supply to Greater Soweto (date uncertain) because of non-payment. He refused on the grounds that such an action would have raised unfavourable publicity abroad. It seems that Eskom itself was never involved in cutting-off electricity to Greater Soweto between 1985 and 1990. It was reported in the Planact Report (1989, p.53), however, that twelve households had

Eskom failed then in their attempt to take over the management of electricity supply to Greater Soweto in the late 1980's. However, up until 1990 the TPA ensured that Eskom was paid for the bulk electricity supplied to the township.[250] After this date, when the Metropolitan Council took over responsibility for the administration of Greater Soweto from the TPA, Eskom was not paid for the bulk electricity they supplied to the township. As a consequence Greater Soweto's debt for electricity accumulated. Eskom continued, however, to supply the township with electricity in spite of the non-payment; the costs being carried by other electricity users who effectively cross-subsidised electricity consumers in Greater Soweto thus contravening the requirements of the de Villiers Commission. From 1990, however, the political milieu in South Africa was changing and the provision of electricity to black households using cross-subsidisation became the norm, see Chapters 8 and 9. Eventually, in 1992, Eskom did succeed in taking over the management of Greater Soweto's electricity supply and immediately set about upgrading the service being offered to the township. Although the non-payment for electricity continued, little by little, working together with provincial and local governments, the Soweto Civic Association and Community Leaders and applying the experience they had gained in their abortive negotiations of the late 80's, the non-payment for electricity supply to Greater Soweto began to diminish, (Eskom Annual Report, 1994, p.16). By 1995 then the situation with respect to electricity supply in Greater Soweto seemed to have greatly improved to that which obtained between 1980 and 1990.

The last two chapters have discussed the major electrification initiatives which took place in South Africa in the decade 1980 to 1990, and Eskom's involvement with them. The remaining part of this study deals with the nation-wide electrification project undertaken by Eskom between 1990 and 1995, their so-called "Electricity for All" initiative.[251]

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their electricity disconnected at some time during 1988. It does seem there were power cuts then but no pattern in frequency or duration was evident. These cuts could well have been as a result of the SCC's inefficiency in managing the electricity supply to Greater Soweto. Residents, however, were of the opinion that these power cuts were part of a deliberate policy to break the boycott on rents and service charges in the township, (Planact Report, 1989, p.53).

250 Interview with Mr V.C. Milne, 27th October 1998.

251 The term "Electricity for All' was first coined by Mr P. Doepel, a strategic planning specialist in Eskom who was a confidant of Dr I.C. McRae, and who accompanied him on occasions in his clandestine visits to Greater Soweto Interview with Mr J. de Plessis, 27th January 1998.

CHAPTER 7

THE REASONS WHY ESKOM UNDERTOOK A BLACK HOUSEHOLD ELECTRIFICATION PROGRAMME: 1990-1995

1.0 INTRODUCTION

Prior to recording the main events associated with the history of Eskom's programme to electrify black households in South Africa in the period 1990-1995 it is appropriate to determine why Eskom decided to undertake this programme in the first instance. The purpose of this chapter is to answer this fundamental question. Just as in deciding why Eskom undertook their electrification programmes in the preceding period (see Chapter 4), certain changes in the political environment of South Africa, changes in Eskom's own financial and economic circumstances and institutional changes in both the South African electricity supply industry and Eskom itself have to be examined in deciding on this particular case as well.

2.0 POLITICAL CHANGES AND ELECTRIFICATION

The political changes that are discussed in this section embrace the reforms undertaken by the government between 1990 and 1994, when the ANC came to power, and the ANC's National Meeting on Electrification which allowed them to be seen as a legitimate political party dealing with a national development problem (electrification).

2.1 Government Reforms

In the period 1990 to 1995 the process of political change and reform in South Africa gained momentum. In early 1990 Nelson Mandela was released from prison. On 2nd February 1990, exactly a year to the day that de Klerk had replaced P.W. Botha, the ANC, the South African Communist Party (SACP) and the PAC were unbanned and the existing state of emergency in the country was lifted. In June, to demonstrate his commitment to reform, de Klerk stated that "whites could not turn back the clock and take refuge in the past", (The Argus 8th June 1990).

In 1990 the government, the ANC and the SACP met and it was announced that the Group Areas Act and the Population Registration Act would be repealed, furthermore, white schools would be opened to all races, military service was to be shortened and there was to be a moratorium on the death penalty, (van Rooyen, 1993, p.139). In spite of, or perhaps because of, this reform process,

Schlemmer, Stack & Berklow (1991, p.163) pointed out that it was hazardous to assume continuing liberal attitudes amongst whites in the context of fundamental political changes. This viewpoint was underlined by the results of the continuing electoral struggle being fought between the CP and the government when the government lost five by-elections in 1991 and 1992.

There were four losses in 1991, these being at Randburg, Maitland, Ladybrand, and Virginia and in February 1992 the Potchestroom seat was won by the CP. This particular by-election victory was significant because the CP believed it signified that they had the support of the majority of the whites. The loss at Potchestroom forced de Klerk to call a referendum.[252] This referendum was not only necessary to renew de Klerk's mandate to continue his negotiations with the ANC at the Convention for a Democratic South Africa (CODESA), which was underway at the time, but also to counter the discontent among members of parliament who thought that the speed of the reform process was too fast and their "perceptions that the NP had lost control over the process of reform", (van Rooyen, 1994, p.150).

The wording of the referendum called for a simple choice between approval (a yes vote) and disapproval (a no vote) for the reform process, rather like the Fourth Republic's referendum with respect to France's African possessions on the 28th September 1958, when French citizens were given the choice of voting "Yes" for interdependence or "No" for separation. The government applied considerable funds to the build-up to the referendum, which included greater media coverage than had been hitherto seen in South Africa for a political event. It has been estimated that the government spent 20 times the amount of money on advertising the referendum and informing the population of South Africa why they were calling for "a "yes" vote than the CP did in calling for a "no" vote, (Cape Times 19th March 1992). According to the government and reported in the Sunday Times on the 8th March 1992,"a "yes" vote means that we will sit around a table as South Africans and work out the best method of installing a democratic system in which all the country's inhabitants feel secure. A "no" vote will be a declaration of war against the majority of the country".

The CP's "no" campaign was then very much under-funded compared to the government's campaign and their media coverage was by and large restricted to their own publications The Patriot and Die Afrikaner. The "yes" vote on the other hand was handsomely supported by nearly all of South Africa's independent newspapers. In the event the government won the referendum, the voting being 1 924 186 "yes" votes to 875 619 "no" votes. Only one referendum region returned a "no" majority, Pietersburg in the Northern Transvaal, a principally agricultural and

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[252] That the referendum was to take place was announced in parliament the day following the government's defeat at Potchefstroom.

mining area, the majority here being 12 208, (van Rooyen 1994, p.52).[253] After the 1992 referendum all further general elections and by-elections were suspended and the role of the CP in South African politics was effectively ended. In their last two years in office, i.e., up to the General Election of April 1994, which brought the ANC to power, the de Klerk administration pressed on resolutely with reform in accordance with the mandate given to the government as a result of the referendum.

A programme to electrify black households in South Africa fitted nicely into the government's reform initiatives. Such a programme could be an important and obvious force aiding social upliftment and therefore, in contrast to the last years of the Botha era, it could be encouraged. Eskom could once again be used as an instrument to aid governmental policies and, as will be shown in the following chapter, the Corporation avidly sought to put an electrification programme into force.

In addition to the political events described above, in 1990, at their Economic Debate in Harare, the ANC made the following important statement concerning parastatals in South Africa.

> "Public corporations operating in such areas as electricity supply all provide major inputs to development through an infrastructural base a future government will need to transform the public sector into a vehicle for development,"

This statement could be considered as a threat of nationalisation if Eskom did not address development issues. As if this statement was not enough in The ANC/COSATU Proposals for an Economy Beyond Apartheid, (Section 5, p.3), the following announcement was made "The transformation of the economy will require a viable state sector. Nationalisation would be an essential part of the reconstruction programme of such a state". It was also evident that de Klerk was preparing South Africa for an eventual political take-over by the ANC, hence Eskom's way forward was clear and the electrification of black households became a major consideration for the Corporation. So far as the ANC's continuing interest in electrification was concerned they organised in February 1992 a National Meeting on the subject. This meeting and its ramifications are discussed in the next section.

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[253] Herman Gillomee, writing in the Cape Times 10th March 1992, suggested , that the CP had made a fatal error in agreeing to take part in the Referendum, since due to voters apathy the poll could have been as low as 30 per cent of the white electorate who would have voted "yes". If this had been the case it would have effectively vindicated the CP's contention that only a minority of whites supported the reform process.

2.2 The ANC's National Meeting On Electrification[254]

After their unbanning in 1990 the ANC was able for the first time to articulate and debate publicly in South Africa their views on the provision of essential services. So far as the electrification of black households was concerned the proceedings of a national meeting on electrification organised by the ANC and held at the University of Cape Town in February 1992 allowed the ANC's position on the electrification process to be publicly known; the meeting also had one far-reaching institutional consequence. It is appropriate therefore to consider next the most important issues raised at this meeting.

This meeting, where Trevor Manuel was the keynote speaker and Ketso Gordhan was the Chairman, was made possible by funding from the Swedish International Development Authority.[255] The meeting was attended by representatives of the ANC's Department of Economic Planning, Regional Executives of the South African Communist Party, Regional Development Forums, Civic Organisations, Trades Union, Local Government, Municipal Electrical Engineers, Eskom, The South African Chamber of Business, The Development Bank of Southern Africa, Academics from various universities, Electrical Contractors, The Association of Consulting Engineers, and certain service organisations such as the Farm Workers Research and Resource Project. The government was not represented at the meeting and this prompted Trevor Manuel to say in his keynote address:

> "In a letter addressed to me, the Minister of Mineral and Energy Affairs, George Bartlett said. As indicated by the Director General, Dr P.J. Hugo, the Department of Mineral and Energy Affairs is currently undertaking an investigation into appropriate structures for electricity distribution in South Africa. These investigations initiated by the National Energy Council in 1991, are not yet complete. The Director General is therefore not in a position to attend"(p.4).

Manuel was clearly worried that the government was restructuring the electricity supply industry without consultation with the ANC and went on to say in this regard:

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254 Details given in this section are taken from the Proceedings of the ANC National Meeting on Electrification. Page numbers quoted are taken from papers presented at the meeting and reported in these proceedings. An interview with Mr. J. Du Plessis on 27th January 1998 also provided insights into the mood of the meeting, particularly the ANC's attitude towards Eskom.

255 Manuel was at the time the Head of the Department of Economic Planning of the ANC, Ketso Gordhan was a member of that department. Manual subsequently became the Minister of Finance in the ANC government and Gordhan became the city manager for Johannesburg.

> "The honourable Minister is saying unashamedly we will investigate; we will identify the weakness from our own perspective; we will serve them up on terms favourable to ourselves; then we will inform you; and if the ANC manages to get into power, then there will be nothing left to restructure", (p.4).

He also pointed out that resource provision and allocation in South Africa had always been controlled and used systematically to the advantage of the white minority at the expense of the majority. With respect to electricity supply he said that it served mining and industry and the well being of the majority of South Africans had never featured in its planning.[256] He further claimed, that electricity had been used to disempower the majority, and that Eskom had sufficient generating capacity to supply everyone in South Africa with electricity without having to build one further power station[257], but that 70 per cent of the people in South Africa did not have access to electricity, which amounted to about 27 million people.[258] Manuel said finally that parastatals such as Eskom refused to deliver formal inputs to the national meeting on electrification after having initially agreed to do so.[259] Manuel's keynote address summed up the ANC's view of the electrification process in South Africa in 1992 and their relations with government and Eskom so far as this process was concerned.[260]

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256 This of course was true as has been demonstrated in Chapter 3 but with de Klerk's reform initiatives this was changing.

257 Manuel was of course referring to Eskom's excess electricity generating capacity which has already been commented upon.

258 This figure varies depending on the source, generally speaking, however, it seems that it was between 27 and 30 million.

259 It was reported to the author that Eskom was forbidden by their minister, Dr Dawie de Villiers, even to attend the meeting because it "had overt political overtones". McRae, however, dispatched two Eskom representatives Mr J. du Plessis and Mr Douwe Van Wyk. They were instructed to act as onlookers only and not to become involved in debate: Interviews with Dr McRae, 24th September 1996, and Mr J. du Plessis, 27th January 1998.

260 The ANC's invitation to the government to attend the national meeting was worded in a most unfortunate manner, for example, it invited the government "to purge themselves and to participate in the restructuring of the provision of electricity", (p.3). It is possible that this wording was such that the government could not accept the invitation to attend. If this is the case it is historically most regrettable as the government's presence would have allowed public debate between the ANC and the government concerning the electrification initiative, a chance which was forever lost. Such a debate would have given history a clearer picture of the government's stance on electrification in 1992. According to du Plessis so far as Eskom was concerned it was, during the meeting, the target of unremitting criticism, which in some respects was undeserved given that within Eskom there was a very active pro-electrification faction under the leadership of Dr. I.C. McRae and that Eskom had already embarked on a programme to electrify black households (see Chapter 8), interview with Mr J. du Plessis, 27th January 1998.

2.2.1 Issues debated at The National Meeting on Electrification

There were three principle issues debated at the ANC's national meeting on electrification, these were:

a) The Restructuring of the Electricity Supply Industry (ESI);
b) The Capacity to Plan and Implement Electrification Projects; and
c) The Problems of Financing Electrification Initiatives.

Each of these issues will be considered seriatim.

(i) The Restructuring of the ESI

So far as this issue was concerned the speakers at the meeting clearly identified the fragmentation that then existed in the electricity supply industry as a major cause of the failure to make electricity available and affordable to all the peoples of South Africa, even taking into account the government's reform initiatives.

Blame for the status quo in 1992 was placed by Paul Theron of the Science and Technology Group of the ANC on, "the policies of racial segregation and separate development pursued by successive white minority governments in South Africa (and) the formation of a number of quasi independent homeland states in the 60's and the establishment of a parallel system of black local authorities in urban areas in the 1980's", (pp.12-13).

According to Charles Dingley of the University of Cape Town, who dealt with the problem of "Institutional Frameworks for the Electricity Supply Industry", (pp.21-31), the highly fragmented ESI had three major drawbacks; these being inefficiency, electricity tariff differentials between black and white consumers and the inhibition of the flow of resources needed to supply the 30 million people who, in 1992, did not have access to electricity. Dingley also made the very important point that the South African ESI had been designed in the 1920's to meet the needs of that time and even when stripped of "its apartheid debris" he questioned whether the ESI in its current form possessed the right structure to take South Africa into the future, (p.31).

These were very telling points indeed and even Eskom, agreed with them in the main as has been previously noted. Other speakers at the meeting also identified the fragmented structure of the ESI in South Africa as a major problem curtailing the electrification programme and there was agreement that some kind of rationalisation was called for. Debate centred on what form this

rationalisation should take and the time frame for undertaking a rationalisation process to avoid delays in the electrification programme.[261]

In his summing up of this section of the meeting Ketso Gordhan, referring to electrification and the restructuring of the ESI, identified two broadly contrasting views that had been expressed.

The first view was that existing white municipalities had the experience, technology, human and financial resources and were best placed to undertake electrification, (p.201). Gordhan suggested that they should expand their scope of operations to include township areas. This approach would result in electrification taking place within the system of local government. The second view was that regionally based, special purpose agencies with broad representation should be created to distribute electricity, (p.202). These suggestions clearly left little room for Eskom, irrespective of the fact that the Corporation was at this time already electrifying black households in South Africa.

Notwithstanding these views Gordhan advocated a national strategy to deal with the electrification issue. He considered that public intervention was necessary for rapid electrification to come about. Existing legislation, which of course included the Electricity Act, would, he thought, have to be changed if electrification was to proceed at a local level. Gordhan also advocated a national electrification strategy,[262] (p.204).

(ii) Capacity to plan and implement electrification projects

So far as the ANC's second critical issue was concerned, i.e., the planning and implementation of accelerated electrification initiatives the meeting considered that there were adequate technical resources and experience available in South Africa to plan and execute an electrification programme, see contributions to the meeting by Whitehead, (p.81) and Isaacs, (p.105).

There was, however, support for the notion that more parties had to be drawn into the planning and implementation process; for example it was suggested that the process would have to be more representative of all stakeholders such as contractors, trades union and local communities, see Petersen (p.120). In line with the general condemnation of Eskom at the meeting it was explained by delegates that reliance should not be placed on Eskom to plan and implement electrification

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[261] This. as it turned out, was to be a very problematic undertaking as will be shown in the following section of this chapter.

[262] This national strategy was a moot point and is still under discussion and will be considered further in Chapter 10.

projects. Municipalities and the private sector should be the driving force behind the electrification process.[263]

An important requirement identified by the delegates for planning and implementing a successful electrification programme was the availability of resources, both monetary and equipment. Although the majority of the delegates at the meeting agreed that the electrification initiative would not be hampered by the lack of resources. Howard Whitehead, the executive Director of Durban Electricity, did point out in his paper (pp. 75-83) some important limitations to these resources. These obstacles were, according to Whitehead, three in number, technical, financial and the lack of human resources. His most telling point was that whilst white municipalities did indeed have adequate capacity they were staffed to generally cater for forecasted growth and for dealing with current affairs; they had little capacity available to tackle a country-wide electrification programme.[264]

There is little doubt that Whitehead's views were prophetic and, as history showed, it was left to Eskom to bear the greatest burden in the national electrification programme, which they had anyway initiated in 1990.

Gordhan, in his summary of this topic said that the resources were available to electrify black households and that the meeting had shown that the meeting had shown that the key "constraint to planning and implementing a national electrification initiative was the lack of political will", (p.203). Gordhan's advice to the meeting on how to overcome this shortcoming was ominous; he said that if regulation failed then mass-action should be used, (p.203). What this mass-action was to be composed of is unclear. If non-payment for services was what Gordhan was referring to then this was already in force.

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263 It was claimed by L.H. Nape Maeba of the ANC's Science and Technology Group that the electricity distribution structure in South Africa should be changed from top to bottom because the system had not worked for the majority of people simply because it was not meant to, (p.73).

264 Whitehead's views were conditioned by a survey which had been carried out on 17 major municipal undertakings (date unknown) which purported to show that in the 17 municipalities surveyed 1000 engineers and technicians, together with 3000 electricians and semi-skilled workers connected 29 407 new consumers per annum. If the electrification programme required more connections than that to be made per annum then it would require more staff to be added to those already employed. He added that only the financially sound larger municipalities, supported by a diverse customer base could hope to undertake a major electrification programme. Smaller municipalities would require grant funding to undertake such a programme, (pp.82-83).

(iii) Financing electrification initiatives

The third issue considered at the meeting, the financing of electrification initiatives, would, according to Theron, cost about R800 million per annum (1992 rands), (p.17) or 1 per cent of the government's annual Public Works Budget. Like other members of the ANC present at the meeting Theron advocated the involvement of others beside the central government in financing the programme to electrify black households in South Africa. He cited Eskom's positive net income from 1981 to 1990 and the capital resources accumulated by Eskom as a source of electrification funding.[265]

Patrick Bond of Planact (an organisation which has been referred to already in connection with the SEP) vigorously attacked South Africa's existing financial system and claimed that the country had a surplus of "financial funds searching for outlets" within the big insurance companies, pension funds, banks and building societies, (p.174).[266] Like other speakers at the meeting Bond also attacked Eskom, accusing the Corporation of over-capacity and criticising the decommissioning and mothballing of older power stations and Eskom's foreign funding programme for the building of new power stations, (pp.155-158). He further targeted Eskom as a major barrier to change, (p.190). Bond's approach to the financing of the electrification programme rested on the argument that new forms of community-controlled financial institutions that dispersed democratic control over resources to communities had to be established if the electrification initiative was to be successfully carried out (p.163).[267]

The new institutions spoken of by Bond were to be community-controlled and composed of Community Loan Funds, Credit Unions, Mutual Banks, Rural Finance Centres and a Women's

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265 Like many ANC delegates Theron seemed unaware of the financial problems that Eskom had faced in this period, and that in some years during the period he referred to Eskom had in fact a negative net income and an inventory of unpaid accounts for the supply of bulk electricity to Greater Soweto, see Chapters 4 and 6.

266 These funds would of course be searching for profitable investment opportunity. Providing electricity to underdeveloped areas required development funding which appeared to be in short supply as demonstrated by the fact that some state-related institutions such as the Independent Development Trust (IDT) and the Development Bank of Southern Africa during this period were attempting to raise foreign finance for development projects. For example the IDT director Jan Steyn was trying to raise 100 million American Dollars through a J.P. Morgan syndication, and claiming that this was necessary because there was not sufficient capital available in South Africa "to create the flexibility needed by development initiatives", (The Financial Mail 22 November 1991).

267 Bond was very critical of the role that Eskom had played in the programme to electrify black households up to that time. He clearly saw electricity as a basic need and its provision a basic right. That Bond was politicising the electrification programme seems clear by Bond making claims that the "anti-apartheid tactic of the rent boycott ensured that electricity would remain at the centre of mass interest and action", (p.166). This conflicts with Eskom's understanding of the non-payment problem, which was that it was poor service delivery by Black Local Authorities that was responsible.

Bank, (p.178). These institutions were to fill the needs that the existing financial system in South Africa in 1992 was unable or unwilling to meet; these institutions would in Bond's words use "bulk funding assistance", and the community would control and dispense the funds allocated to them (p.186)[268]. A particularly interesting institution suggested by Bond was the Women's Bank which brought the gender issue into prominence. Such a bank would of course reduce the risk of alienating from the electrification programme the single largest and most oppressed constituency in the country. The institutions that Bond argued for were in 1992 largely non-existent and up to the present little or no progress seems to have been made in setting them up, certainly in a form that would have been helpful to an electrification programme meeting the objective of "electricity for all".

Ketso Gordhan in his summing up of the debate on the financing initiatives said that the meeting had determined that "there was no serious problem of financing a major electrification programme provided a creative approach was used", (p.204). He concluded by saying, that, "South Africa can certainly afford a major electrification programme, (p.204). Which statement seemed optimistic given the report in the Financial Mail of the 22nd November 1991 cited above.

2.3 Summary

In his key-note address to the ANC National Meeting on Electrification Trevor Manuel emphasised that by holding the meeting the ANC were demonstrating that they had the capacity to formulate policy on key areas of social and economic development, (p.206). The key areas referred to being the restructuring of the ESI, the capacity to plan and implement electrification projects and the financing of electrification initiatives.

Little policy formulation came out of the meeting, however. The delegates that took part in debates mostly spoke in general terms only. This forced the ANC's Department of Economic Planning to repeat in their Concluding Press Statement of the meeting with respect to the all important financing issues what Ketso Gordhan had said in his summary of the meeting "that electrification would be affordable for the national economy, provided that the necessary political will exists to fund such a programme", (p.207).

This statement said very little by way of an electrification policy pronouncement. It gave the impression that the ANC were groping for solutions to a problem that had important political undertones, i.e., how to provide electricity to the 27-30 million people in South Africa without it, and which was to become a key issue in the ANC's 1994 Reconstruction and Development

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[268] A problem that would in all probability arise with these new institutions, was of course the lack of financial and management capacity in some communities, particularly the more rural ones.

Programme (RDP). At the final plenary session of the meeting an event of the utmost importance to the electrification initiative occurred, however. To reduce the meeting's dilemma concerning positive action in formulating electrification policy many of the delegates, particularly the civic associations, trades union and local government representatives called for a forum to be constituted to drive the process of electrifying black households forward into the future. In spite of what had been said at the meeting concerning the government it was stated that the government would also have to be part of this forum if anything was to be achieved.

In response to this call for action Mr Johann Kruger made an offer on behalf of the Development Bank of Southern Africa (DBSA) to provide professional and practical assistance for convening a working committee on electrification within three weeks, see the Concluding Press Statement to the ANC's National Meeting on Electrification, quoted on p.207 of the proceedings. This offer was accepted by the meeting.

Mr Kruger immediately convened a meeting between the ANC, the Department of Mineral and Energy affairs, the DBSA and Eskom in November 1992. The purpose of this meeting was to plan a strategy for establishing and managing a major electrification programme in South Africa that would have government support. The fact that government support was mentioned does establish that Eskom were acting alone so far as their ongoing electrification programme was concerned.

The meeting resulted in the formation of the National Electrification Forum (NELF) which became the catalyst for institutional change within the South African ESI. The following section discusses the deliberations of the NELF and the resulting establishment of the National Electricity Regulator (NER). It is important to record the deliberations underpinning the formation of the NER since the NER would be an institution that would have the power to influence how Eskom would be governed and Eskom's electrification programme.

3.0 INSTITUTIONAL CHANGES AND ELECTRIFICATION

3.1 The National Electrification Forum and the Establishment of the National Electricity Regulator

The NELF was charged with recommending ways to accelerate the electrification of black households in South Africa and was representative of all stakeholders in the South African ESI and consisted of members from the ranks of government (national, provincial and local) political

parties, businesses, electricity consumers, trades union, civic associations and of course Eskom.[269] Despite the criticisms of Eskom voiced at the ANC's meeting on electrification Dr I.C. McRae was appointed Chairman of the NELF. This appointment rather demonstrated the importance of Eskom in the electrification process.

The structure of the NELF was as follows:

a) A plenary where about 75 stakeholder groups were represented and which was responsible for ratifying decisions taken by the NELF and for providing strategic input to working groups established to undertake research on particular issues of importance to the electrification programme;
b) A Management Committee which consisted of the key stakeholders which was responsible for the overall management of the NELF and served as a decision making body; and
c) The working groups themselves. These groups were charged with making recommendations to the Management Committee, (NELF(a), 1994, p.2).

The different working groups investigated the following issues:

a) The Restructuring and Regulation of the ESI;
b) Financial issues affecting the restructuring of the ESI, including the question of electricity charges between Eskom and municipalities;
c) Human resources issues arising from the restructuring of the ESI; and
d) The end use of energy and environmental issues.

The restructuring of the fragmented ESI was an overriding consideration of the NELF since unless this issue could be resolved it would become difficult to put in place an efficient co-ordinated electrification programme. Without a co-ordinated approach to the problem disparate attempts at electrification only would result. Furthermore, the fragmentation of the ESI had also been the subject of criticism by the ANC and required immediate attention. The findings of the Reconstruction and Regulation Group were also the only ones to be submitted to Cabinet. These findings, upon their acceptance, resulted in changes to legislation which had an effect on the electrification of black households in South Africa. The following discussion therefore concentrates on the work and findings of this group.

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269 Interview with Dr I.C. McRae, 24th September 1996.

As a basis and starting point for their work the Restructuring and Regulation Group studied a paper prepared for Eskom by Linegar (1992) dealing with regulatory frameworks in the electricity supply industry at large. The paper's usefulness was acknowledged by the NELF, (NELF (c), 1994, p.3). This paper attempted to formulate the likely evolution of the ESI and identified a number of key issues that would have to be considered in building a regulatory framework for the ESI in South Africa. This was then a particularly important document since it linked the structure of a future South African ESI to the regulation of that ESI. It therefore introduced into the debate the concept of a National Electricity Regulator (NER).[270]

The link between the structure of the ESI and regulation was of critical importance since as pointed out in Chapter 2 regulation can only really be defined in relation to a particular industrial structure. Factors such as the ownership of the entities within the ESI and the economic power (e.g., monopoly) that they would posses would be important. Additionally, the question of whether competition could be allowed within the ESI and how this would effect the electrification programme would have to be answered. Such issues would have an influence on the nature and extent of the regulatory framework that it was hoped would be established. Furthermore, any regulatory framework that was established would have to be flexible and yet robust if it was to be successful in the changing political and economic milieu of South Africa. It would have to be capable of change and be able to adapt itself to accommodate any future ESI restructuring that may become necessary.

Linegar's paper made it clear that the ESI in South Africa had been in the past characterised by diversity (Chapter 3 also showed this to be the case). For example during different periods in the history of electricity supply in South Africa privately owned electric utilities, local government, parastatals such as Eskom, provincial government, regional service councils and even railway companies had all been involved at different levels of intensity in the electricity supply business. As shown in Chapter 3 what the history of electricity supply in South Africa made patently evident, however, was that the supply system had failed to deliver an adequate service to black consumers and whites in remote areas of the country.[271] The result of this was that the working group on structure and regulation started its task at the beginning of 1993 when 65 per cent of black households, 75 per cent of black schools and 80 per cent of black rural clinics did not have a supply of electricity, (Morgan 1994, p.1).

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[270] The NER was duly established in October 1994 also under the Chairmanship of Dr I.C. McRae who took that position after his retirement from Eskom in that year.

[271] Black in this instance excludes coloured and Indian people who were generally far better served so far as electricity supply was concerned.

The Restructuring and Regulation working group, as well as attempting to design a structure that would be able to cope with the task of overcoming this situation, had also to ensure that the ESI would remain well managed, financially sound and technically competent to undertake the task ahead. This was of great importance, not only in redressing the injustices of the past, but in ensuring that South Africa would continue to have the competitive advantage of low priced electricity, which was critical to export industries, with a reliability of supply.

The results of the deliberations of the Restructuring and Regulation working group which were completed in 1994 are discussed below.

3.2 Recommendations on the Restructuring of the ESI[272]

(i) The ESI should remain under public ownership

Although it was recommended that the ESI should remain under public ownership it was also recommended that the state should not be directly involved in the supply of electricity. This meant that the appropriate legal form of supply could be either parastatals (incorporated in terms of legislation) or local government electricity departments. This policy decision would of course make the electrification initiative easier to manage and it would ensure its continuance vis-à-vis a privatised electricity supply industry.

This decision was made on the following grounds:

a) Privatising the ESI was not politically acceptable;
b) Eskom was considered to be now providing an acceptable service;
c) Private electric utilities would not readily undertake an electrification programme with the same enthusiasm as a public utility, i.e., Eskom;
d) The privatisation of Eskom, or parts of Eskom, would result in increases in the price of electricity. There were it was considered many reasons for this, including the duplication of assets. A privatised entity would also be liable for income tax and it would of course have to pay dividends to its shareholders. All these issues would mitigate against a national electrification programme; and
e) Privatisation would not necessarily bring the significant gains in efficiency necessary to offset the probable increase in the price of electricity, because it was considered that now Eskom was well-managed, technically sound and financially healthy.[273]

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[272] This section is based upon an interview with Mr Kevin Morgan, 25th July 1996. Additional information was obtained from NELF (c), (1994,pp.5-7)

(ii) The ESI should remain under stakeholder control

The view here was that the ESI should be supervised by councils appointed by stakeholders. Such councils should include representation from central government, local government, electricity consumers and trades union.

(iii) Competition within the ESI was not possible nor was it desirable

It was considered that there would be minimal economic benefit in allowing competition within the ESI (particularly so far as the generation of electricity was concerned) and taking account of Eskom's excess generating capacity. Competition, like privatisation would it was decided, act as a limiting influence on a national electrification programme.

(iv) An appropriate governance framework should be put in place for the ESI

This was decided upon because the NELF concluded that the lack of a proper governance framework for the ESI in the past had contributed materially to its unsatisfactory performance, particularly with regard to the electrification of black households in South Africa. The NELF did not finalise its proposals on the governance issue, however.

(v) There should only be one electricity supplier per local government area

This decision was made because many of the problems concerning electricity supply which had beset South Africa, including the problems attached to the electrification of black households, had been occasioned by having several different electricity suppliers supplying power within one economically-tied area e.g., Johannesburg and Greater Soweto. Where a new local government council (formed by the consolidation of previously separate "white" and "black" towns) applied to supply electricity directly, it would henceforth have to supply the new area in total. An applicant would no longer be able to elect to continue to supply "white" consumers only and request Eskom to provide electricity to "black" areas. Where the new council was not able to effectively supply

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[273] This comment provides an interesting contrast in the way the NELF working group members saw Eskom vis-à-vis the way delegates to the ANC National Meeting on Electrification two years earlier had viewed Eskom.

the whole area Eskom would take over the supply of both "white" and "black" areas. This would alleviate some of Eskom's problems concerning access of supply to some areas the country.

(vi) Acknowledgement of the rights of local governments

Central to the NELF's work was the acknowledgement of the key role that local government would in future play in the provision of services particularly the supply of electricity to black households. The NELF was also aware of how important the contribution of electricity tariffs was to local government finance. In fact, without the financial contribution from electricity, most local governments would not be able to provide other services. The NELF accordingly confirmed the following:

a) The supply of electricity within the areas of local government should be under its control, although this would not mean that local governments would have to provide that electricity;
b) Local government would be entitled to receive some financial compensation from the supply of electricity within its area subject to national norms; and
c) Local governments would have to approve the electrification programme for bringing power to black households within their jurisdiction and ensure that the electrification programme was integrated into plans for the provision of other services.

(vii) Recognition that the ESI needed to be nationally controlled and co-ordinated

This decision revolved around the fact that electricity was vital to economic prosperity and social upliftment and therefore the provision of electricity at the lowest possible cost was critical in achieving these aims.

3.3 Recommendations on the Regulation of the ESI

With respect to the regulation of the ESI the Electricity Control Board established in terms of the original Electricity Act (see Chapter 3) was supposed to have acted as a regulator of electricity supply in South Africa since 1922. Because of the dominant position of Eskom in the South African ESI the Electricity Control Board had, according to the NELF, little influence on the ESI, hence as a regulatory body it was ineffective, (NELF (a) 1994,p.26). The purpose of regulation was considered by the NELF to have three dimensions, these being Economic Regulation, Legal Regulation and Social Regulation. Specifically the purpose of Economic Regulation was to:

a) Ensure that the regulated entity carried out its business in an efficient and effective manner;
b) Ensure that the regulated entity did not exercise discrimination among the different classes of consumers in its electricity tariffs; and
c) Ensure that the regulated entity achieved similar financial returns to those that would be achieved by a similar entity subject to market forces.

The purpose of legal regulation was to ensure that the laws governing electricity supply in South Africa were not broken, e.g., with regard to such items as safety regulations and land expropriation for public purposes such as the building of a power station. With regard to social regulation this would ensure that the regulated entity met social objectives principle amongst these being the electrification of black households in South Africa, (NELF (b), 1994,p.34).

These then were the minimum regulatory requirements for the ESI as the NELF saw them. The normative rules for regulating a public utility like Eskom and the ESI as a whole that should have been observed by the Electricity Council were discussed in Chapter 2 of this study.

As a consequence of these requirements the NELF recommended placing the "whole ESI under the oversight of a national regulator", (NELF (a), 1994, p.26). Legislation could then be prepared to either put in place a new regulatory authority i.e., a National Electricity Regulator (NER) or amend the Electricity Act to give greater powers to the Electricity Control Board. In the event the first option was chosen.

3.4 Summary

The National Electricity Forum was a very influential body that gathered together, between 1992 and 1994, people of diverse skills, many from within the existing South African ESI, and others from outside the ESI.

Because the constitution of the newly elected government of National Unity had not been finalised by the end of 1995 it was impossible for a final structure for the ESI to be formulated by that date. The NELF's recommendations were, nevertheless, of great import since they were formulated by the first group of specialists to address the problems of a coherent framework for a new South African electricity supply industry that would have to meet the challenges of future developments, challenges like the government's RDP which included a programme for electrifying the black households of South Africa.

The NELF examined, and gave opinions on, what would probably be the most troublesome issues with respect to the restructuring and regulation of the ESI. In these deliberations the question of the electrification of black households and Eskom's role in undertaking this task was subject to much consideration. It is clear that the NELF regarded the programme as being of vital consequence to the economic, social and political well being of South Africa[274]. Their approach was nonetheless pragmatic and suitable emphasis was given to other, equally pressing problems as far as electricity supply was concerned. So far as Eskom was concerned the work of the Restructuring and Regulation Working group recognised the central position the Corporation occupied in the whole electrification process. This recognition was of course very important, and threw into sharp contrast the view of Eskom which emanated from the ANC's National Meeting on Electrification. As a consequence of this recognition the electrification of black households in South Africa and Eskom have become synonymous.

As previously noted the findings of the working group on Restructuring and Regulation were the only ones of the various NELF committees to be submitted to Cabinet in the period covered by this study. These recommendations were accepted and, in order to implement them, two acts of parliament were passed by the House of Assembly and the Senate during November 1994. These Acts were:

a) The Electricity Amendment Act, which provided that all suppliers of electricity (including Eskom and local government suppliers) would be required to operate under the authority of a license issued by a National Electricity Regulator, (NER); and
b) The Mineral and Energy Laws Rationalisation Act, which made the South African mineral and energy laws applicable to the TBVC states and the SGT's and which would allow Eskom to take over the electricity supply to these areas.[275]

On the 1st March 1995 the NER was officially established. Licences to supply electricity were issued to Eskom and various municipalities on the 1st September 1995. The NER also set down certain criteria that electricity suppliers had to meet if they were to obtain a license, e.g., adequate suitably qualified staff, approved tariffing structures, financial integrity etc. Ironically these criteria were impossible to enforce. This was because if electricity supply rights were taken away from municipalities that did not meet these criteria they would be crippled financially.[276]

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274 Interview with Mr. K. Morgan, 25th July 1996.

275 The existing Electricity Act allowed Eskom to distribute electricity within the Republic of South Africa only.

276 With respect to this issue Dr I.C. McRae and Mr Kevin Morgan of the NER met the Minister of Mineral and Energy Mr Pik Botha and also Mr Rolf Meyer. McRae and Morgan were instructed

Municipalities invariably funded other services from the revenue earned from selling electricity, which they in turn bought in bulk from Eskom.[277]

The dichotomy was then that the NER had the legal power to withdraw an electricity supplier's license but in many cases it dared not do so. The NER was therefore in 1995 quite incapable of undertaking the task of restructuring the South African ESI. As a consequence an Electricity Working Group was appointed (which reported jointly to the Minister of Provincial Affairs and Constitutional Development and the Minister of Minerals and Energy) to investigate the financial relationship between local government and the electricity supply sector as a first step in this restructuring process. This working group was made up of personnel from Eskom, the three tiers of government (central, provincial and local) and the Treasury. It is suggested that a serious omission to the membership of this working group was the labour movement and key electricity consumers in industry and commerce. Their presence would surely have added an essential element into the debate with respect to acceptable wage levels and the levels of tariffs that industry could sensibly afford. The working group was still pondering the problems associated with the financial relationship between Local Government and the electricity supply sector at the end of 1995.[278]

In spite of the problems attached to the NER its establishment was an important institutional change that occurred in the period 1990-1995 with respect to the electrification of black households in South Africa. It was an institution that allowed Eskom to expand its area of supply in its endeavours to carry out a nation-wide electrification programme. The other important institutional change that occurred in this period that would influence the electrification of black households in South Africa was the restructure of Eskom, this is considered next.

3.5 Restructuring of Eskom

In 1991 Eskom was restructured. This restructuring "was designed to support the electrification programme and accelerate harmonisation with the country's changed socio-political climate", (Eskom Annual Report 1991, p.8, Chief Executive's Report). The mood amongst Eskom's

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not to remove licences to supply electricity held by offending municipalities because of the financial problems that would ensue, interview with Mr Morgan, 25th July 1996.

277 This point was subsequently recognised in the White Paper on the Energy Policy of South Africa (December, 1998, p.42, section a).

278 In the White Paper on Energy Policy in the Republic of South Africa of December 1998 mention was made of this Electricity Working Group. It would seem that many of the problems attached to the restructuring of the South African ESI which existed in 1992, and mentioned in this section, are still unresolved, see Postscript in Chapter 10.

executive with regard to the electrification of black households at the time of this restructuring process can be summed up in a statement made in Eskom in Perspective (1991, P. 16) which said "every household has a need for energy. Electricity is the cheapest source of energy, outstripping coal, gas, paraffin and candles. Also, the customer has to invest time and money into bringing the latter forms of energy into his home. The question is no longer whether the poor can afford to have electricity. The question is: can the poor afford not to have electricity".

Four line functions were created in this restructuring these being Generation, Transmission, Sales and Customer Services and, of the utmost importance to Eskom's electrification programme, a Marketing and Electrification Group under an Executive Director Mr A.J. Morgan, who was to become Eskom's Chief Executive Officer after Dr McRae retired. Within this group a National Electrification Planning Division was established. Finance, Human Resources and Technology (Engineering) became staff functions. The restructuring exercise was to take place over several years and be refined in the process. To make Eskom's task of electrifying black households in South Africa easier the Corporation's 12 distribution regions were reduced to 5, these being Bloemfontein, Cape Town, Durban, Johannesburg and Pretoria. This reorganisation seemingly concentrated on Eskom's public sector role, unlike the reorganisation of 1985 (see Chapter 4) when the private sector role was emphasised with the possibility of privatising Eskom being an important consideration in the way the Corporation was restructured at that time.

4.0 FINANCIAL AND ECONOMIC CHANGES AND ELECTRIFICATION

This section discusses Eskom's own financial and economic performance in the period 1990-1995. Again, just as for the period 1980-1990 (see Chapter 4), the topics covered are: 1) Electricity Sales and Revenue, 2) Electricity tariffs, 3) Capital Expenditure and Borrowings and 4) Generation Plant. In addition, a very important macro-economic study concerning black household electrification that was commissioned by Eskom's Chairman Dr John Maree is commented upon.

4.1 Eskom's Economic Performance: 1990 -1995[279]

4.1.1 Electricity sales and revenue

In 1990 total electricity sales grew by 1,4 per cent, down from the 3,7 per cent growth recorded in 1989. The highest growth rate in terms of supply category was in bulk electricity sales to municipalities, which increased by 8,5 per cent. This high growth rate was partly due to the fact that certain municipalities had taken over the supply of electricity to consumers in their area and which Eskom had formally serviced directly (which fact accounted for a decline of 11,4 per cent in electricity Eskom supplied to the domestic sector in 1990). Eskom did, however, then provide increasing amounts of bulk electricity to the municipalities concerned. Negative growth in electricity sales took place in all other supply categories except for rural supplies, which increased by 5,9 per cent. This increase Eskom attributed to aggressive marketing. Marketing electricity became an important pursuit from 1990 onwards and in each of Eskom's distribution regions marketing departments had been strengthened by the creation of sales teams. In particular there were specialists agricultural and industrial sales staff in 50 districts throughout South Africa.[280] The low growth rate in electricity sales in 1990 reflected a depressed South African economy with Eskom forecasting that the low growth rate in electricity sales would continue into 1991, (Eskom Annual Report, 1990, p.9).

Electricity revenue in 1990 amounted to R10 736 million (R9 271 million in 1989). After net interest, finance and abnormal charges had been met Eskom's net income was R845 million (R 728 million in 1989).[281] To counter losses in revenue growth from reduced electricity sales Eskom took up initiatives for reducing operational expenditure and estimated that by these means R120 million had been saved in 1990. The Corporation's debt/equity ratio stood at 2,7 in 1990 (1989: 2,8).

True to Eskom's forecast 1991 was characterised by low economic growth in the national economy (GDP showed a negative growth of 0,6 per cent). Electricity sales growth was, however, marginally above that of the previous year and amounted to 1,8 per cent. Revenue increased to

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279 The references for the statistics quoted in this section are the same as those used in analysing Eskom's Economic Performance for the period 1980 to1990 cited in Chapter 4.

280 Supporting their specialist sales staff there were two marketing divisions, Agrelek for the agricultural market and Industrelek for the commercial, mining and industrial sectors. The idea behind the formation of these marketing divisions was the promotion of safe and efficient use of electricity and the desire to increase Eskom's share of the energy market.

281 Abnormal charges were for such things as the non-payment for electricity. As noted Eskom was from 1990 not being paid by the TPA for electricity supplied to Greater Soweto.

R11 726 million whilst operating expenditure was R7 173 million. The net income received by Eskom was R988 million. Once again Eskom claimed that tight financial controls had resulted in the Corporation offsetting some of the inflationary pressures on its operating costs, but still R325 million was set aside to cover abnormal items of which R291 million related to payment arrears being carried by Eskom. These occurring from some municipalities failing to pay, partly or in full, for the supply of bulk electricity, (Eskom Annual Report, 1991, p.5).

In 1992 South Africa's economic growth improved and amounted to a 2 per cent increase in GDP. Eskom's turnover was, however, nearly 8 per cent up on 1991 reflecting a further revenue increase of R923 million. There was, as a consequence, an improved net income of R1 489 million. The improvement in net income, was a direct result of Eskom acquiring ownership of the Greater Soweto electricity distribution network. This acquisition reversed "the provision for arrear debts previously provided", (Eskom Annual Report, 1992, p.15).[282] Eskom's electricity sales for 1992 declined, however, by minus 0,4 per cent. This was the first time since 1945 that electricity sales volumes had had a negative growth with sales in the industrial, commercial and mining sectors down 2,4 per cent on volume. Sales of domestic electricity increased by 40,9 per cent, however, due to new connections being made as a consequence of Eskom's programme to electrify black households.

During 1993 South Africa's GDP again rose, this time by 1,1 per cent and electricity sales rebounded from the decline in 1992 to a level of 4,1 per cent, this being the largest growth in the previous five years. Sales revenue rose accordingly to R 13 793 million and again it was reported by Eskom, that operating costs were curbed by good management practices. Arrears debts still continued to plague the Corporation, however, and R167 million was set aside to cover these. Net income, even allowing for arrear debts, amounted to R 1 646 million, an increase of some 10,5 per cent over the previous year.

Eskom's Revenue for 1994 increased by 11,8 per cent to R 15 417 million with electricity sales showing an increase overall of 3,9 per cent. Net income amounted to R2 268 million a 37,8 per cent increase over 1993. The upturn in electricity sales was reported by Eskom to be the result of increased activity in the agricultural and metals section of the economy. Arrears for the non-payment of electricity which still persisted was particularly troublesome to Eskom because its financial policy required the Corporation to recover the costs of supplying electricity to each consumer group and earning a real return on assets, (a la the recommendations of the de Villiers Commission), (Eskom Annual Report, 1994, p.14). The continuing non-payment by certain

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[282] The value of this network quoted in Eskom's Financial Statements 1992 was R204 million.

municipalities threatened the success of this policy. In spite of non-payment problems Eskom pressed on resolutely with its electrification programme.

In 1995 there was a modest sales growth of 2,8 per cent and revenue increased by 11 per cent to R 17 114 million. Operating expenditure also increased, however by 13,6 per cent to R 11 315 million. Arrear debt increased by R 302 million giving an accumulated debt of R1 175 million.[283] In 1995 several older less efficient power stations were decommissioned, allowing Eskom to replace this expensive electricity by cheaper power from their more modern stations. The cost of this decommissioning exercise was R247 million. Eskom's debt/equity ratio continued to improve, however, and stood at 1,44 as against 1,73 in 1994. Net income amounted to R2 716 million, an increase of 19,8 per cent over the previous year.

4.1.2 Electricity tariffs

Eskom's rational so far as tariff setting during 1990 was that a low electricity price would help South Africa's fight against inflation and encourage export-driven economic growth. Eskom's tariff policy was therefore to keep the price increases for electricity year-on-year below the ruling rate of inflation as represented by the PPI. The price increase for 1990 had, however, been set prior to this policy and amounted to 14 per cent. This new pricing policy, required that over the next five years the price of electricity would be reduced by 20 per cent in real terms, (Eskom Annual Report, 1990, p.8). The 1991 electricity price increase of 8 per cent (effective from the 1st January 1991) was therefore below the rate of inflation.

In 1992 the electricity tariff rose by 8,3 per cent and Eskom was aided in its bid to maintain tariff levels below inflation by low increases in the costs of primary energy used at power stations. This primary energy included raw water, nuclear fuel, oil and coal. Water, oil and nuclear fuels increased in price by 7,9 per cent over 1991 while the cost of coal increased by 8 per cent.

The electricity tariff increase in 1993 was 8 per cent and flat rate tariffs were introduced for domestic consumers in black townships, (Eskom Annual Report, 1993, p.68).[284]

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283 Eskom found comfort in the fact that large electricity consumers e.g., the Mining and the Manufacturing sector contributed about 80 per cent of the Corporation's revenue. Clearly these consumers together with paying domestic consumers were cross-subsidising the non-payers in spite of the recommendations of the de Villiers Commission. The reform process being undertaken by the government made it politically difficult for Eskom to discontinue the supply of electricity to non-payers, in fact McRae was wholly opposed to cutting off the supply of electricity to non-paying black consumers, interview with Dr McRae 30th October 1996.

284 The rationale behind the introduction of the flat rate tariffs will be explained in Chapter 8 when Eskom's electrification programme for 1990 to 1995 is discussed.

In 1994 the electricity tariff rose by 7 per cent, again below the rate of inflation, and this was the lowest electricity price increase since 1984. In spite of the introduction of the flat rate tariff for black townships in 1993 the problem of non-payment for electricity continued. Eskom did mention in their Annual Report (1994, p.10) that the aspirations of the RDP's electrification programme would not be met if the non-payment for services continued to be the norm amongst newly connected townships.

The electricity price increase in 1995 was 4 per cent against an inflation level of 8,7 per cent. This being the lowest tariff increase in the years 1990 to 1995. Again the low increases in Eskom's primary energy costs helped the Corporation keep its tariffs well below national inflation levels, e.g., the cost of coal, which was Eskom's major primary energy requirement, and the commodity that they almost exclusively relied upon to generate electricity, rose in price by only 6,7 per cent during 1995 below the level of inflation in South Africa, (Eskom Annual Report, 1995, p.25).

4.1.3 Capital expenditure and borrowings

In the 1990 Annual Report (p.8) Eskom's Chairman Dr John Maree said that "Eskom's long-term financial position remains strong and will continue and improve as we utilise current excess capacity and reduce capital expenditure". This reference to Eskom's excess capacity was an important signal that the Corporation was contemplating using this excess capacity for an electrification programme and no new power stations would be required to service the programme. Because of its excess generating capacity Eskom fully expected to move to a position of relatively low capital requirements in the period 1990 -1995. As a result of declining electricity sales during 1990 provision had to be made for Eskom to continue with the mothballing of several power stations and suspend operations at associated collieries. The capital expenditure involved amounted to R 128 million. This mothballing exercise was, as previously noted, criticised by the ANC, see of the Proceedings of the ANC's National Electrification Meeting (p.156). Mothballing older power stations was, however, a sound economic move under the electricity demand conditions prevailing. With this mothballing exercise Eskom removed less efficient power stations from the system and produced the required electricity with more efficient stations. Capital expenditure for operational purposes was reduced by R 120 million partly due to staff reductions, for example Eskom had 51 554 employees in 1989 and 50 000 in 1990, (Eskom Annual Report, 1990, p.4). In 1990 Eskom was forced to raise R 1 208 million more than the R 3 139 budgeted because of higher than assumed loan repayments and, although Eskom was, because of its declining expansion programme, reducing its capital requirements, the Corporation

still remained vulnerable to increasing interest rates. Eskom's total borrowings stood at R 26 590 million at the end of 1990 as against R 24 630 at the end of 1989.

In 1991 net capital expenditure amounted to R 3 335 million a reduction of R 327 million over 1990 which indicated a slowing down of Eskom's capital expansion programme. To reduce finance charges on its interest bearing debt Eskom introduced a programme of financial risk management in 1991, (Eskom Annual Report, 1991, p.19).[285] Because of higher than budgeted sales and lower operating and financing costs together with reduced capital expenditure a greater than budgeted inflow of funds occurred in 1991. A reduced borrowing programme was therefore reflected in the Corporation's accounts, the variance being R 1 027 million. As a consequence of the political reform programme underway in South Africa in 1991 Eskom was, however, able to borrow more by way of foreign loans than expected, R 407 million actual as against R 250 million budgeted. A surplus of capital resulted which was used mainly to redeem money market liabilities but also for funding the programme to electrify black households which Eskom had by now embarked upon.

In 1992 Eskom incurred capital expenditure of R 3 611 million. Most of this was financed from internal cash flows as Eskom's balance sheet continued to strengthen as did its debt/equity ratio, which was 2,21 as against 2,49 in the previous year, (Eskom Annual Report, p.11). Because favourable conditions prevailed in the South African capital market Eskom was able to satisfy its loan requirements without difficulty. In 1992 the Corporation also successfully floated its first public long-dated bond issues in the international capital market since 1985, the E170 and E171, the total issue amounting to R 780 million. Net interest and finance charges amounted to R 2 987 million (a decrease of 8 per cent over 1991). These charges were covered 1,52 times by net operating income. Eskom claimed that because of careful operating and capital expenditure the budget for interest and finance charges was curtailed by R 293 million. Whilst the bonds mentioned above were well received by investors financial rectitude was important at this time because of the rather unstable political situation in South Africa (ANC posturing and the CP and government's electoral battles) which could influence Eskom's ability to raise loans on foreign capital markets.

Eskom's planned funding requirement for 1992 (R 2 147 million) had to be raised to R 3 000 million in 1993 as a result of higher loan repayments from increased capital expenditure on the electrification of black households. Because it was foreseen that vast capital expenditure would be needed for this project in future years Eskom launched the Electrification Participation Note

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[285] The risk management strategy was composed of a variety of instruments including forward exchange cover.

which was designed to share the financial risk attached to the electrification programme between Eskom and various investors, (Eskom Annual Report, 1993, pp.9&19).[286] Arrear debts attached to the electrification programme continued to rise and a provision of R 248 million was made for this contingency in 1993. With respect to foreclosing on their debts Eskom began, during the year, taking over certain local authorities electricity reticulation systems with these assets bolstering the Corporation's Balance Sheet. Net interest and finance charges in 1993 amounted to R 3 147 million giving an increase of 5,4 per cent over 1992. Capital expenditure on fixed assets increased from R 3 242 million in 1992 to R 3 591 million in 1993 primarily as a result of the resumption in construction activities at Majuba power station and the completion of Kendal power station. Capital expenditure on Eskom's electrification programme in 1993 was also considerable and amounted to R 584 million, (Eskom Annual Report, 1993, p.4). There was, however, high availability in South African capital markets in 1993 due to the lifting of sanctions against the country. Major funding was raised on the local capital market and this amounted to R 2 497 million, R 657 million was raised on foreign capital markets. Eskom's net interest bearing debt stood at R 28 027 million.

In 1994 Eskom's Chairman Dr John Maree described the non-payment for electricity as one of "the most significant financial threats facing Eskom", (Annual Report, 1994, p.9). Eskom continued, however, partly financing its capital expenditure from income, which expenditure included the cost of the Corporation's programme to electrify black households in South Africa. The result of this internal financing was that borrowings expressed as a percentage of total assets was reducing, and the debt/equity ratio fell to 1,7 with net interest and finance charges increasing by only 1,2 per cent to R 3 186 million. Net expenditure on capital items such as plant and equipment used in the building of Majuba power station, and transmission lines amounted to R4 192 million. The electrification programme took up R 808 million of that total, (Eskom Annual Report, 1994, p.15). Although the South African capital market in 1994 was the severest bear market in the previous decade, with interest rates rising by 4 percentage points in a five month period, Eskom's financial planning was largely unaffected by this because of hedging strategies which had been put in place in 1993. Eskom did, however, draw up contingency plans to deal with possible disruptions in the financial markets as a result of the forthcoming General Election in April 1994 which brought the ANC to power, (Eskom Annual Report, 1994, p.15). In 1994 the level of non-payment for electricity by certain municipalities continued to plague Eskom with arrears reaching over R 900 million by the 31st December 1994.[287]

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[286] Eskom's Electrification Participation Note will be discussed further in Chapter 9.

[287] This topic will be discussed further in Chapter 9 when the financial impact of the electrification programme is analysed. Eskom in gentlemanly fashion never identified municipalities that fell into arrears with electricity payments in their Annual Reports for the period.

Eskom's capital budget for 1995 indicated a requirement of R 4 950 million. Better than anticipated electricity sales reduced that requirement to R 3 765 million, however. Foreign market loans amounted to R 940 million with Eskom's interest bearing debt rising to R 27 278 million at the end of 1995. Arrears from the non-payment for electricity continued into 1995 and increased by a further R 302 million to R 1 175 million thus adversely effecting Eskom's profitability, (Eskom Annual Report, 1995, p.31). Net interest and finance charges on loans amounted to R 2 716 million an increase of 19,8 per cent over 1994. In spite of this, however, Eskom's debt/equity ratio fell to 1,44 showing a strengthening in the Corporation's asset situation.

4.1.4 Generating plant requirements

In 1990 Eskom reported having 4 686 MW of excess generating capacity available, (Eskom Annual Report, 1990, p.17). In actual terms this amounted to over 9 x 500 MW generating sets or 1.5 Kriel power stations, Kriel being the first of Eskom's "new generation" super power stations to be completed. This excess generating capacity could be used for supplying electricity to black households in South Africa without a new power station being built. The generating plant brought into service in 1990 included the final turbine-generator set at Letaba power station, thus bringing another major power station in Eskom's massive generation expansion programme which the Corporation had embarked upon in the mid 70's to completion.

In the years between 1990 and 1995 the generating plant on order by Eskom began to diminish as more new power stations were brought forward to completion. By 1993, only the Majuba power station was left to be completed. The construction of Majuba was continued in 1994 and 1995. In 1994 Eskom decommissioned six of their older smaller power stations. Even after this decommissioning programme Eskom was left with some 2 720 MW of excess generation capacity.[288]

In 1995 the only plant on order by Eskom was for the Majuba Power Station situated at Volksrust, (Eskom Annual Report, 1995, p.18). Majuba was the last of the power stations ordered by Eskom under the Corporation's massive generation expansion programme of the late 70's, 80's and 90's to serve a demand for electricity that ironically materialised only in part.

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[288] This excess generating capacity was greater than the generating capacity of the rest of Sub-Saharan Africa, Eskom Statistical Year Book (1993), and was quite large enough to service the requirements of Eskom's electrification programme in the period 1990-1995.

4.1.5 Summary

The most important statistics discussed in this section are brought together for convenience in Table No 7.1 below.

YEAR	ELECTRICITY SALES: PERCENTAGE INCREASE	REVENUE R (MILLIONS)	TARIFF INCREASE PERCENT	TOTAL BORROWINGS R (MILLIONS)
1990	1,4	10 736	14,0	26 590
1991	1,8	11 726	8,0	27 266
1992	-0.4	12 649	8,3	27 616
1993	4,1[289]	13 793	8,0	28 027
1994	3,9	15 417	7,0	27 884
1995	2,8	17 114	4,0	27 278

TABLE NO 7.1 ESKOM OPERATING STATISTICS: 1990 – 1995
Source: Eskom Annual Reports for various the years.

4.2 The BEPA Macro-Economic Study on Electrification

With the change in the government's attitude to political, social and economic reform after Mr F.W. de Klerk came to power in 1989, the seeming success of the electrification of Elandskraal mentioned already in Chapter 5 and the ANC's statement on the role of parastatal institutions in the South African economy, noted above in the discussion on political changes, it seems probable that Eskom's Chairman Dr John Maree thought it expedient to review his policy on the electrification issue. What is certain is that Maree commissioned in 1989 the Bureau for Economic Policy and Analysis (BEPA) in the University of Pretoria to determine the direct and indirect economic consequences of providing the necessary number of transmission and reticulation structures needed to electrify 7,5 million black urban homes between 1990 and 2015, (De Wet, 1990).[290]

In summary the BEPA analysis estimated that 1) the influence of such an electrification programme on employment, i.e., the job creating effects of the programme would amount to between 1 800 000 and 2 250 000 new jobs by the year 2015 and 2) the impact on South Africa's GDP, i.e., the percentage economic growth rate would amount to a minimum cumulative

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[289] As Eskom's electrification programme really got under way electricity sales increased substantially, non payment was, however, a major problem.

[290] The results of the BEPA study, which in the author's opinion are flawed, are discussed in detail in Chapter 8.

increases of 24 per cent by the year 2015, BEPA Report, (1990). What the analysis did not attempt to do was to calculate the financial impact of this investment on Eskom itself.[291] In spite of this omission the macro-economic benefits postulated in the report that would arise from a large-scale black household electrification programme must have been very encouraging so far as Eskom's Chairman was concerned. In any event in 1990, Eskom proceeded with a programme to electrify black households in South Africa.

5.0 CONCLUSIONS

The discussions undertaken in this chapter endeavoured to provide sufficient information for answering the following question; why did Eskom undertake a programme to electrify black households in South Africa in the period 1990-1995? Using this information the reasons suggested for Eskom's decision are as follows:

5.1 Political Changes and Electrification

a) The government's reintroduction of its political reform initiatives in the period 1990-1995 after they had been curtailed in the last half of the preceding decade was a major influence in encouraging Eskom to undertake their black household electrification programme.

b) The ANC's statement in Harare concerning the role they saw parastatals playing in the future infrastructural development process in South Africa also sent Eskom a clear signal. This signal said that if Eskom failed to embrace, and contribute to this development process, the Corporation may be nationalised if the ANC came to power. The history of Eskom up to the time the Corporation undertook its programme to electrify black households in South Africa suggests that nationalisation was anathema to Eskom's management. For example, Eskom's first Chairman, Dr van der Bijl, sought to limit the government's involvement in Eskom's decision-making (see Chapter3). That this spirit prevailed into the eighties is evidenced by the Financial Mail (3rd November 1993) accusing Eskom of "being a law unto itself". Even after the de Villiers Commission of Inquiry and the government's attempt to exert a greater influence on Eskom (for purposes of privatising not nationalising the Corporation) it was reported in the NELF's Final Report on the Restructuring and Regulation of the South African Electricity Supply Industry in 1994 that Eskom's influence was so great that it rendered the Electricity Control Board ineffective. Which was why

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[291] An analysis of the financial costs of Eskom's electrification programme would only be undertaken in 1992. This analysis will be reported upon in detail in Chapter 8.

perhaps it was decided that the Control Board should be replaced by a new National Electricity Regulator. Nationalisation then went against Eskom's tradition and if undertaking a programme to electrify black households was one way of avoiding this Eskom's management would find the means to undertake such a programme. It can be argued then that Eskom's decision to undertake a black household electrification programme was aimed at placing the Corporation in a favourable light with both the government and the ANC thereby avoiding the possibility of nationalisation; thus demonstrating that politics was central to that decision.

5.2 Institutional Changes and Electrification

With respect to electrification and the institutional changes that occurred in the period 1990-1995 it is suggested that these were consequences of the political agendas of Eskom, the government and the ANC. In the case of the restructuring of Eskom, it inter-alia, offered practical proof to the ANC, and the government, that Eskom was paying attention to the changing political milieu of South Africa and that the Corporation could be relied upon to undertake development projects without government interference. The wisdom of undertaking such projects was demonstrated to Eskom by the politicisation of the electrification of black households at the ANC's National Meeting on Electrification in Cape Town, in 1992. The replacement of the Electricity Control Board by the National Electricity Regulator can be viewed in part as stemming from the desire by the ANC for an independent institution that could undertake the task of restructuring a fragmented ESI thus ensuring that social objectives, such as the provision of electricity to black households, would be met. The NER, because it could issue electricity supply licences, would also be important to Eskom as they sought to increase their areas of supply. It would have the effect then of also ensuring the sustainability of Eskom's black household electrification programme.

5.3 Financial and Economic Changes and Electrification

a) So far as Eskom's financial performance was concerned from 1985 to 1992 it was dominated by falling electricity sales. This situation surely encouraged Eskom to initiate a programme which would boost such sales and long-term profitability. Hence a nation-wide electrification programme which would increase Eskom's customer-base would have been welcomed.[292]

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[292] From interviews with Dr I.C. McRae it is clear that he thought the non-payment issue would be solved by sound management of electricity supply to black households. McRae categorically refused to accept that a "culture of non-payment" existed amongst black householders. Furthermore, at the start of their electrification programme Eskom firmly believed that the average monthly electricity consumption amongst newly connected black households would be greater than it eventually turned out to be. On both these issues Eskom was to be proved wrong, see Chapter 9.

b) By 1990 the rate of increase in Eskom's total borrowings had begun to fall (by 1995 they were falling in absolute terms). This situation, taken together with the fact that Eskom's massive generation expansion programme was coming to an end and there was excess generating capacity available may also have encouraged Eskom to undertake a programme to electrify black households and glean the political benefits arising from such a programme. The money could be found, the generating capacity was available and so was the manpower; evidently the will was as well.

c) With respect to the very substantial macro-economic benefits that the BEPA analysis postulated would arise from the electrification of black households in South Africa it is suggested that these, at the very least, provided Eskom's Chairman Dr John Maree with the exigency he needed to overcome the constraints the de Villiers Commission of Inquiry had placed on such a programme. The BEPA results therefore allowed Maree to get Eskom involved in a programme to electrify black households and encouraged him to wholeheartedly throw his weight behind the programme.[293]

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[293] In an interview with Dr Maree, 23rd October 1998 he was at pains to point out the magnitude of the benefits to the nation that would arise from Eskom's electrification programme. And after all it was Eskom's duty, as a public utility, to maximise the benefits accruing to the nation from electricity usage. With this thought in mind a legitimate question that does present itself, considering the government's renewed attempts at reform and social upliftment from the time de Klerk came to power in 1989, is why didn't the government instruct Eskom to undertake a programme to electrify black households as part of their reform initiative? The simple answer is probably that they had no need to. Both Maree and McRae had every reason for involving Eskom in such a programme on their own volition. This was because, as noted already, Maree, on his own admission, was highly political and he doubtless would have wished to be considered supportive of the government's reform initiatives as would the Electricity Council which was appointed by the government. The threat of nationalisation discussed above would also play a role in Eskom undertaking a programme to electrify black households. With respect to McRae he had long wanted Eskom to become involved in a programme to electrify black households for altruistic reasons. Furthermore, no record could be found by the author of a government directive to Eskom to undertake an electrification programme. In interviews with both Maree and McRae they both maintain that Eskom's efforts to electrify black households from 1990 was an Eskom initiative. Having Eskom undertake this programme on its own volition did of course enable the government to limit their confrontation with the CP on the subject of reform and black social upliftment. The government could not be accused therefore, as they had been in the previous decade, of using state institutions for the benefit of blacks.

CHAPTER 8

DESCRIPTION OF ESKOM'S PROGRAMME TO ELECTRIFY BLACK HOUSEHOLDS: 1990-1995

1.0 INTRODUCTION

Having determined why Eskom decided to undertake a nation-wide programme to electrify black households (commonly called the "Electricity for All" programme) from 1990 this chapter concentrates on describing the programme itself and attempting to answer the following questions:

1) How large was the task facing Eskom?
2) How did the programme get under way?
3) Was there a cohesive plan underpinning the programme?
4) How did Eskom's electrification programme fit into the ANC's Reconstruction and Development Programme (RDP)?
5) How many houses, schools and clinics were supplied with electricity between 1990-1995? And
6) What was the capital cost of the programme?

In addition issues concerning the non-payment for electricity and the level of electricity sales to newly connected consumers will be addressed.

2.0 THE SITUATION WITH REGARD TO HOUSEHOLD ELECTRIFICATION IN 1990

In 1990 almost all white dwellings in South Africa were electrified. Black dwellings in contrast, both in urban and rural areas, had very little access to electricity. To try and see what this statement means with regard to the numbers of unelectrified houses in South Africa reference can be made to statistics gathered over many years by Eskom. These statistics reveal that in 1990 the numbers of electrified and unelectrified dwellings in the Republic, the TBVC states, (the Transkei, Bophuthatswana, Venda and the Ciskei), the Self Governing Territories (SGTs) and Development Trust Areas (DTAs) were as shown in Table No 8.1 below.

GEOGRAPHICAL REGION	ESTIMATED TOTAL NO OF DWELLINGS	PERCENTAGE OF DWELLINGS ELECTRIFIED	NO OF DWELLINGS ELECTRIFIED
RSA METROPOLITAN AREAS	2 139 000	80	1 711 200
RSA CITIES & TOWNS	1 288 000	51	656 880
TBVC STATES	1 129 000	5	56 450
SGTS	1 398 000	11	153 780
DTAS	85 000	38	32 300
TOTALS	6 039 000		2 610 610

TABLE NO 8.1 NUMBER OF URBAN ELECTRIFIED HOUSES IN THE RSA, TBVC STATES, SGTS AND DTAS: 1990
Source: Eskom's National Electrification Planning Division.

According to Eskom's figures the number of dwellings that had access to electricity (excluding white commercial farms which, by 1990 had largely all been electrified) amounted to approximately 2,6 million leaving about 3,4 million dwellings unelectrified[294]. If white-owned electrified farms are included in the total of dwellings with access to electricity then the number was in excess of 2,7 million. The total number of homes in the RSA metropoles and towns from Table No 8.1 amounts to 3 427 000 which does tend to agree with the NELF data base for such houses in 1991 which amounted to 3 505 585. Some confidence in Eskom's figures is engendered then both from the NELF findings of one year after Eskom estimates and Trollip's figures for 1990.

Furthermore, from the EPRET[295] household database Table No 8.2 below is derived which shows the total number of unelectrified rural households both in the RSA and "homeland" areas.

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[294] Trollip (1993, p.24) estimated that by 1990 about 2,5 million homes in urban areas had access to electricity which generally agrees with Eskom's estimate given in Table No 8.1 above.

[295] EPRET (Energy Policy Research and Training) is a major study underway at the Energy Development Research Centre (EDRC) in the University of Cape Town. The purpose of the EPRET project is to develop policy options for widening access to basic energy services for the urban and rural poor in South Africa.

GEOGRAPHICAL REGION	RURAL RSA	RURAL HOMELANDS	TOTAL
WESTERN CAPE	95 244	0	95 244
NORTHERN CAPE	42 612	53 517	96 129
ORANGE FREE STATE	176 404	50 213	226 617
EASTERN CAPE	70 544	394 810	465 354
NATAL	127 375	823 927	951 302
EASTERN TRANSVAAL	130 236	88 012	218 248
NORTHERN TRANSVAAL	45 872	616 780	662 652
PWV	95 644	168 478	264 122
WESTERN TRANSVAAL	95 021	111 120	206 141
TOTALS	878 952	2 306 857	3 185 809

TABLE NO 8.2 NUMBERS OF UNELECTRIFIED HOUSES IN RURAL RSA AND HOMELANDS: 1990
Source: EPRET household data base (1990), cited in Horvei and Dahl (1994,p.13).

From Table No 8.1 if the houses in the TBVC states the SGT's and those in the Development Trust Areas which were unelectrified are assumed to be in rural areas then this total amounts to 2 369 470, which generally agrees with the figure of 2 306 857 given in Table No 8.2. These comparisons do indicate that the Eskom statistics of house numbers in the rural areas of the homelands also largely agree with the EPRET data base and further confidence can be placed therefore in Eskom's statistics in this respect.

With respect to urban areas in the RSA from Table No 8.1 Eskom believed that 1 058 920 homes were without access to electricity. EPRET, estimated this figure to be 1,9 million if peri-urban areas were included. The characteristics of these homes is given in Table No 8.3 below.

DWELLING TYPE	NUMBER
FORMAL LOW INCOME	400 000
PLANNED SHACKS	500 000
UNPLANNED SHACKS	400 000
BACKYARD SHACKS	600 000
TOTAL	1 900 000

TABLE NO 8.3 URBAN AND PERI-URBAN UNELECTRIFIED HOUSEHOLDS RSA: 1990
Source: EPRET Household Database (1990), cited in Horvei and Dahl (1994, p.12).

If the figure of 1,9 million is correct this indicates that in 1990 when Eskom was contemplating embarking on a major programme to bring electricity to the black households of South Africa and the homelands there were at least 5,2 million homes that had been identified as having no access to

electricity[296]. This in itself constituted a formidable electrification programme for any government, let alone a public utility.

In reality, the electrification task was even greater than the figures shown above indicated. The reason was that the numbers of homes without electricity estimated from Tables No 8.1, 8.2 and 8.3 above, did not conform to later descriptions of homes that the NER decided needed to be electrified and which referred to any structure, room, outbuilding, lean-to shack or construction which, regardless of whether it conformed to any building standards, was used as a temporary or permanent habitation. The NER used this definition in their calculations of how many houses needed to be electrified in South Africa from 1995 onwards. These figures are given in Table No 8.10 at the end of this chapter.

3.0 THE ELECTRIFICATION OF BLACK HOUSEHOLDS SCHOOLS AND CLINICS

3.1 General

In it's 1990 Annual Report (p.3) Eskom announced that it supported a new "democratic outward-looking South Africa and that "the goals of bringing affordable electricity to all" were closer to becoming a reality". The political advantages of this viewpoint were seemingly clear to Eskom and they went on to report that the government had decided that it did not regard Eskom as a suitable candidate for privatisation (or seemingly for nationalisation, author's addition) in the near future, (Eskom Annual Report, 1990, p.9). It will be recalled that the possibilities of privatising Eskom had been a consideration from the time that Maree had been appointed Chairman and this possibility had formerly influenced the Corporation's approach to becoming involved in a programme to electrify black households in South Africa. It is likely that the government now saw the benefits of Eskom continuing as a public utility so that it could aid their reform programme by providing electricity to black households. Eskom's announcement then indicated that the Corporation was aware of the changing political milieu in South Africa and that it was eager to be seen to be supportive of the reforms going on. It is clear that by 1990 Eskom had decided to embrace the hair shirt of a costly electrification programme. This indicated that the differences in McRae's and Maree's viewpoints in this regard were at last a thing of the past. Perhaps The South African Development Trust report on the post-electrification benefits in Elandskraal mentioned in Chapter 5 helped to achieve this. The Viljoen report on Elandskraal was still some two years away and it was only after the completion of Viljoen's study that it was realised that the Development

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[296] The figure of 5.2 million homes is made up as follows: 3,4 million urban (Table No 8.1) + 0.9 million unelectrified houses in rural RSA (Table No 8.2) + 0.9 million peri-urban (Table No 8.3).

Trust Report presented an optimistic scenario and had overstated the benefits of electrification; just as the BEPA report was to do. By the time this was realised, however, Eskom's electrification programme was under way.

So far as the electrification of black households in general was concerned, in Eskom's supplement to their 1991 Annual Report "Eskom in Perspective"(p.16) it was stated that almost "two thirds of South Africa's population did not have electricity at home and this approximates to 23 million people living in 3 million households country wide".[297] Eskom saw its challenge as making electricity available and affordable to these people.[298] Eskom estimated that 700 000 of the 3 million houses without electricity could be electrified by Eskom direct and the Corporation committed itself to electrifying these 700 000 houses by 1996.[299] It was estimated that 160 000 connections could be made each year. The remaining unelectrified houses, the 2,3 million, fell within the jurisdiction of local authorities i.e., they were outside Eskom's area of supply. Eskom did, however, pledge itself to co-operate with these authorities and that there was "considerable scope for rationalisation of resources which can eliminate duplication and ultimately benefit the consumers", (Eskom in Perspective, 1991, p.16). Eskom also claimed that, a la the BEPA report, their electrification programme would create about 300 000 jobs by 1995 and improve South Africa's GDP growth by 3,4 per cent. Eskom also quoted in Eskom in Perspective (1991, p.17) another interesting statistic also gathered from the Elandskraal survey that business turnover had increased on average by more than 50 per cent after electrification and "if this trend was multiplied several thousand times then electrification assumes national urgency".[300]

3.2 Orange Farm

In 1990 an important electrification project presented itself to Eskom, this was at Orange Farm, a squatter community near Vereeniging. Orange farm started as an overflow community from Soweto and Sebokeng with squatters living on Wheeler's farm near Evaton, which eventually grew too small to accommodate them whereupon they moved to Orange Farm. At Orange Farm they could purchase erven of 120 square metres for R500 each. Purchasers could then erect shacks and apply for a very favourable loan from the National Housing Council with which to build a

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297 This figure for unelectrified households in South Africa does broadly agree with the figure of 2.8 million found from the data given in Tables 8.1; 8.2 and 8.3 above.

298 This mission statement was tempered in 1991with the caveat that this electricity was for "those who want it and are prepared to pay for it", (Eskom Annual Report, 1991, p.6)

299 Eskom had of course by this time to hand the results of the BEPA report which as mentioned already, encouraged the Corporation to undertake an electrification programme.

300 These statistics were like those from the BEPA report suspect since they were probably based on the South African Development Trust and van Biljon surveys at Elandskraal in 1990. The figures found in these surveys appear to be unsustainable if the later Viljoen report is taken into account, see Chapter 5.

permanent dwelling, which would then replace the shack. Services at Orange Farm were very rudimentary e.g., there was no water borne sewerage, a shared water supply existed, there were dirt roads and of course no electricity.[301]

One of the first mentions of Eskom becoming involved in providing electricity to Orange Farm can be found in a letter to Eskom's Vereeniging District Manager from Mr S. Boyle of Eskom's Electrification Planning Division.[302] This letter said that Eskom had "been approached by both the community and the authorities at Orange Farm to advise and assist in the electrification of the settlement". It also stated that because of the "size of the project (eventually 12 000 erven) a great deal of policy-setting and planning will be required before any work can be done on the electrification proper". The authorities referred to in the letter were the Transvaal Provincial Administration (TPA).

Certain events concerning Orange Farm prior to the receipt of this letter by Eskom are worth recording.[303] Dr I.C. McRae had targeted Orange Farm for electrification and together with Mr J. Du Plessis visited the then squatter camp, which was administered by the TPA, to asses the situation. A meeting was arranged between the TPA, McRae and du Plessis, a number of Orange Farm residents also attended the meeting. At this time Orange Farm had no town council but the residents nominated representatives to attend the meeting to speak on their behalf. The TPA estimated that people were moving into the area at the rate of 1000/day. McRae asked the TPA representatives to outline their plans for the area, particularly with regard to electrification. The TPA responded by saying that they could not support the electrification of the area because firstly the homes in Orange Farm were informal, secondly the provision of electricity to such homes was against the policy of the provincial service and thirdly the residents themselves did not want electricity; and in any event they could not pay for it and anyway other services such as the provision of water was more important.[304] McRae asked the Orange Farm representatives at the

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301 Interview with Mr. J du Plessis 17th December 1997. These facts were confirmed in an interview with Mr. V.C. Milne, 27th October 1998.

302 Letter dated the 12th March 1990, ref. DA/01/SB: Eskom's Electrification Archive.

303 These events were explained to the author in separate interviews with Dr I.C. McRae, 30th October 1996 and Mr J. du Plessis, 17th December 1997.

304 The TPA's viewpoint with regard to the electrification of Orange Farm is hard to fathom. Electrifying the area would make sense since in early 1990 de Klerk's commitment to repealing the Group Areas Act did away with the idea that residents of such places as Orange Farm were mere sojourners and hence the Orange Farms of South Africa would become facts of life and electrifying them would only serve to show de Klerk's commitment to change. But discussions with Mr V.C. Milne, does throw some light on the TPA's attitude. He explained that at this time of dramatic political change in South Africa there was a lack of clarity concerning the provision of services in townships especially informal settlements like Orange Farm and it therefore rather depended on who was approached within the TPA as to what viewpoint emerged. Furthermore, the TPA's experience in Greater Soweto with respect to the non-payment for services conditioned the thinking of some TPA officials. Finally this was the period when the TPA was being replaced by the Metropolitan Council and this could have complicated the matter. Interview with Mr V.C. Milne 27th October 1998.

meeting if they wanted electricity they all confirmed that they did. McRae now decided that in order to confirm this view he would talk to the townspeople themselves. This he proceeded to do by driving around the township and questioning residents on a random basis. He found an overwhelming desire for electricity. Returning to the TPA offices at Orange Farm McRae told the TPA officials of his findings and said that Eskom would be prepared to electrify Orange Farm at no risk to the province. Eskom was prepared, he said, to start the project by electrifying 500 to 1 000 homes, assess the results of this initiative, and proceed from there. The residents would form a committee to decide which houses should be electrified. The TPA agreed to this plan and as a result the letter mentioned above, ref. DA/01/SB was sent.

In July 1990 Eskom arranged for a survey to be carried out of the more established section of Orange Farm by the Consultor Group (Pty) Ltd., to ascertain the resident's ability and willingness to pay for electricity so that the Corporation's longer-term plans to electrify the entire township could be put in place. The key results from this survey are given below.[305]

The average household income was R773/month.

The breakdown on energy expenditure per household / month was as shown in Table 8.4 below.

ITEM	EXPENDITURE (RANDS)
COAL	29,24
PARAFFIN	24,93
BATTERIES	16,77
CANDLES	9,35
FUELWOOD	5,92
GAS	3,15
BATTERY CHARGING	2,09
TOTAL	91,45

TABLE No 8.4 HOUSEHOLD ENERGY EXPENDITURE/MONTH: ORANGE FARM (1990 Rand)
Source: Consultor Group (Pty) Ltd., (1990).

The community's willingness to pay for electricity was R39,00, this amounted to a usage of about 200 kWh / month. This was less than what would subsequently be Eskom's break-even rate for supplying electricity to black households in South Africa. This topic will be discussed later in this chapter.

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[305] The results of this survey were very important to Eskom since this was the first large squatter-camp that they would electrify, hence it would give them some guidance on how to proceed in other such camps. The sample at Orange Farm was 260 households.

The electrical appliances which potential electricity consumers indicated they would purchase immediately after the installation of electricity are as shown in Table No 8.5 below.

APPLIANCE	PENETRATION IN HOUSEHOLDS (PER CENT)
STOVE	90,4
FRIDGE	79,6
IRON	76,2
KETTLE	58,8
TELEVISION	37,3
HEATER	23,5
HI-FI	16,2
OTHER (UNSPECIFIED)	16,5

TABLE NO 8.5 POTENTIAL SALE OF ELECTRICITY APPLIANCES: ORANGE FARM: 1990
Source: Consultor Group (Pty) Ltd., (1990).

Residents attitude to high mast lighting in the areas was also tested, this revealed that 98,8 per cent were in favour of it.

The results of the survey were encouraging enough for Eskom to proceed with the electrification of Orange Farm and an article in the Engineering News Journal (7th-13th September 1990) entitled "Plans for 3 million houses in the PWV"[306] confirmed this when it said with respect to the Orange Farm development that "9 000 stands had been completed to date that 70 000-100 000 stands were planned that services were rudimentary" and "electricity was to be supplied by Eskom". The Citizen (27th December 1990) also reported that "Eskom has for the first time started with the provision of electricity to an informal settlement in the PWV area. This scheme at this time only consists of 25 structures in Orange farm near Evaton. Prepaid meters are used to enable households to budget and cards in units of R10 can be bought to activate supply". Eskom then, by this small initial involvement in the electrification of Orange farm, embarked on their nation-wide electrification programme.[307]

The issue of the non-payment for electricity was clearly, still a thorn in Eskom's side, however, and it was this that made the willingness-to-pay survey at Orange Farm so important. So far as the non-payment issue was concerned it was reported (Business Day 27th November 1990) that

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[306] The title of the article is, however, erroneous since the plan for Orange Farm was concerned with 3 million people (not houses) being settled in an area between Soweto, Vanderbijlpark, Vereeniging and Alberton.

[307] Orange Farm was eventually completely electrified by Eskom during the period 1990 to 1995.

township arrears soared to R96 million in 1990 and legal action was contemplated by Eskom in some of the areas affected. Eskom said they were not prepared to write these debts off but would "strive to negotiate a solution".

3.3 National Electrification Programme: Decision to Proceed

Apart from their work at Orange Farm and the public announcement in the supplement to their 1991 Annual Report cited above Eskom's electrification programme was officially decided upon by its Management Board on the 2nd May 1991 the relevant item in the minutes of the Board's meeting reads as follows:

RECORD: 255
HEADING 1: ELECTRIFICATION
MEETING: 4/1991
ITEM: 7.1
DATE: 2 May 1991

ELECTRIFICATION PROGRAMME IN DEVELOPING/REMOTE AREAS

RESOLVED
that the following stance be adopted regarding the electrification programme:

Eskom will

a) promote and encourage the electrification of SA;
b) make its resources available to support electrification for sound business reasons;
c) concentrate it's efforts on providing electricity wherever it is viable to all who want it and undertake to pay for it;
d) focus on viable schemes which have the support of the community, and initially focus on the densely-populated communities;
e) co-operate and work with the authorities and other suppliers of electricity to promote electrification on any appropriate basis;
f) provide appropriate quality products and services;
g) promote and encourage investment in electrification projects and assist in mobilising finance;
h) actively participate in and facilitate the development, and promote the acceptance and implementation of cost-effective technology and standards for the ESI;
i) promote the use of electricity to create or improve business opportunities for suppliers and customers;
j) promote the effective, efficient and safe use of electricity;
k) support the development, instillation and use of alternative electricity generation technology where appropriate.

A further item taken from Eskom's Management Board Meetings minutes on the electrification programme and dated the 22nd October 1991 reads as follows:

RECORD: 267
HEADING 1: ELECTRIFICATION
HEADING 2: DEVELOPING AREAS
HEADING 3: FINANCIAL PERSPECTIVE
MEETING: 291(4)
ITEM: 9
DATE: 22 OCTOBER 1991

ELECTRIFICATION PROGRAMME: A FINANCE GROUP PERSPECTIVE
A comprehensive discourse on perspectives in the Finance Group on preferred fundamentals that should command the Eskom approach to and involvement in ventures to accelerate the provision of electricity to underdeveloped households, presented under cover of a memo dated 18-10-1991 from the GM (Finance) to the Chief Executive was deliberated and Dr. Willem Kok expounded the underlying principles validating the opinions and recommendations.[308]

DECIDED

1. that additional research be conducted to arrive at plausible assumptions to form the basis of planning for accelerated electrification of underdeveloped households, and that cognisance be taken of issues raised in the preamble;
2. that all available avenues be pursued by Eskom to fulfil the established objectives for accelerated electrification;
3. that all electrification projects be subjected to sound economic evaluation, indicating clearly the risk profile;
4. that the total electrification programme be co-ordinated on a national tier with a pooling of resources and a national prioritising of projects to ensure that, where feasible, economical projects be advanced first and ensuring that projects be evaluated on a common basis;
5. that a formal progress monitoring and reporting structure be constituted;
6. that all possible grant funding opportunities for electrification projects be pursued, but planning for electrification projects should not be based on this funding source;
7. that, once the salient issues on electrification are clarified, the financial implications of electrification on Eskom be outlined to the investment community.[309]

Two comments need to be made regarding what was decided at Eskom's Management Board Meeting, Record 267. So far as decision (4) is concerned it is clear that Eskom was getting prepared to undertake non-economic electrification projects as well as those which clearly yielded tangible economic benefits, the words "where feasible" offering the basis for this assertion. With respect to decision (6) it would appear that Eskom was getting prepared to finance the electrification programme itself if funding was not forthcoming from other sources. As already noted Eskom's programme was set at electrifying 700 000 houses between 1990 and 1996.

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[308] Dr Kok was (with other members of Eskom's Financial Group) the author of an internal report "A Finance Group Perspective" (1991), which was the basis for the deliberations referred to in the minutes.

[309] Record No 255 and Record 267 taken from Eskom's Management Board meetings appear here exactly as recorded in the minutes of those meetings.

3.4 Planning and Managing the National Electrification Programme

According to Mr J. du Plessis[310] whilst Eskom was prepared to undertake this nation-wide electrification programme, in spite of decision number (4) in the minutes above and their restructuring, neither Eskom, nor the government had a cohesive electrification policy, strategy or central plan which would direct this programme. This was probably because at this time the Corporation was essentially a supplier of bulk electricity and local authorities looked after the distribution of power to the individual end user. The government, likewise, had no policy for bringing electrification to consumers in the lesser developed areas of the country simply because up until de Klerk's reform process began to really take effect black people residing in the Republic of South Africa were regarded merely as sojourners and their homes were really considered to lie in the independent black states created by the South African government.

Mr Paul Maré,[311] who in 1995 took over as manager of Eskom's electrification programme, is also clear on the question of policy formulation and planning with respect to Eskom's electrification programme from 1990 onwards. He too confirmed that there was no central co-ordinated planning or firm policy on which projects should be undertaken first so far as the electrification programme was concerned. According to him Eskom simply allocated certain sums of money to each of its five new distribution areas each year and they were then responsible for spending it on appropriate electrification projects within their boundaries of supply. According to Maré the modus operandi used by Eskom's various distributors as a test of whether or not a particular electrification project would go ahead was as follows:

(a) The number of people in an area that seemed to be ready for electrification was surveyed;
(b) The distance of the area from the national grid was determined;
(c) The cost per electrical connection i.e., the reticulation costs were then worked out;
(d) A survey was then undertaken to determine the resident's desire for electricity and to gauge their willingness-to-pay for the power;
(e) If the answers to items (a) to (d) were encouraging, then engineering plans for the reticulation system were prepared, and the actual electrification was then carried out.

These surveys were, however, only carried out in proclaimed areas and after discussions with the authorities had been undertaken to determine suitable areas for electrification.[312] These discussions

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310 Interview with the author 17th December 1997.

311 Interview with the author 6th February 1998.

312 Proclaimed areas are those where a legal process had been gone through which, amongst other things, allowed for the provision of services to commence, e.g., connections to municipal sewers.

usually took place at all levels of local government, i.e., municipal councils and even metropolitan councils. One of Eskom's strategies in their electrification programme was the taking over of electricity supply to consumers direct rather than supplying power in bulk to various councils. In this way the Corporation hoped to stop the "haemorrhaging of the non-payment for electricity in black townships" (Maré's phrase), which was, as already reported, even prior to Eskom initiating their nation-wide electrification programme, of constant concern to the Corporation.

So far as the electrification of "Related Homeland Areas" (where Eskom still maintained electricity supply rights or may be asked to take over the supply of electricity by the "Homeland" government) was concerned four of Eskom's Distributors were assigned areas of responsibility, these are shown in Table No 8.6 below.

DISTRIBUTOR	RELATED HOMELAND
BLOEMFONTEIN	Part of Bophuthatswana and Qwa Qwa
CAPE TOWN	The Transkei and Ciskei
DURBAN	KwaZulu
PRETORIA	Part of Bophuthatswana, Venda, Lebowa, Gazankulu, Kwandebele and Kangwane

TABLE NO 8.6 ESKOM'S DISTRIBUTORS AREA OF RESPONSIBILITY FOR HOMELAND ELECTRIFICATION
Source: Eskom's National Electrification Planning Division.

Maré also mentioned that to manage the electrification programme each distributor had a "Co-ordinating Division" with planners and specialists in the development of small businesses, marketing, sales, engineering design services, maintenance services and customer relations. This division was established with the prime purpose of interacting with local communities in areas earmarked for electrification. This interaction was considered absolutely essential after Eskom's experience in trying to take over the supply of electricity in Greater Soweto.[313]

Each distributor worked with a standard Eskom Five Year Business Plan, which was common to the whole Corporation. A key statement in this plan for the period 1992 - 1997 reads as follows:[314]

"A volatile environment and nebulous future confronts us. South Africa is in flux of transition. The process of democratisation suggests that a new government of the day will take office in the not too distant future. To ensure that Eskom can fulfil its destiny our value to the community at large has to be evident. This will only be the case if we are acclaimed for successfully embarking on a national electrification programme".

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[313] Comment made to author in an interview with Mr. I van Gass, 16th January 1996.

[314] A copy of this Business Plan can be found in Eskom's Electrification Archive.

The identification of suitable electrification schemes in each distribution area was therefore of prime importance and the responsibility of the Electrification Co-ordinating Division at Distributor level. Eskom's electrification personnel in Megawatt Park considered that to plan future electrification projects successfully every effort had to be made to "get as close to the consumer as possible" and so far as the taking over of electricity supply rights were concerned every effort was to be made to ensure that such take-overs would yield benefits to both parties concerned i.e., Eskom and the supplier that was to be taken over. Priority was to be given to take-overs in urban areas.[315] Usually in these cases Eskom planned to charge a flat fixed tariff for existing consumers until such time as they were connected to pre-payment meters and Ready Boards which operated under Eskom's S1 tariff.[316] It was of course in Eskom's commercial interest to limit the time period between the imposition of the fixed tariff and the implementation of the S1 tariff so that financial losses accruing as a consequence of these take-overs of any electricity supply rights were kept to a minimum.[317]

Focusing as they were on electrification in black households in urban areas which Eskom hoped had the ability to pay for electricity presented Eskom with an equity problem since this decision ensured that certain areas would be denied access to electricity. Eskom realised this and as a consequence made every effort to alleviate the dissatisfaction with their electrification programme's perceived inequity by enlisting the help of community based organisations such as Civics and NGOs in planning their choice of areas to be electrified.[318]

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315 Comment made to the author by Mr. Koos Schoeman, 9th July 1996.

316 The need to provide an electricity pricing structure specifically for black households was necessary to further Eskom's vision of "Electricity for All". The Corporation therefore designed a single rate tariff (the S1 tariff) which could be easily understood by every electricity consumer and which was applicable to budget or prepayment metering. The aim of the tariff was to make electricity available to low-usage consumers at a minimal cost. The important feature of this tariff was that it could be kept low by using the excess generating capacity available thus providing Eskom with "the opportunity to penetrate the market (i.e., black households, author's addition) while it is financially viable to do so", (McAdam, 1989, p.7). Hence, as mentioned previously, Eskom's power station expansion programme, which had been severely criticised in the de Villiers Commission of Inquiry, was the vehicle used by Eskom to travel forward into their national electrification programme. Using their excess generation capacity Eskom calculated that they could supply consumers with electricity at a cost of 16c/kWh. The Corporation further decided that a nominal connection fee of R30 be charged. This was based on "the psychological reasoning that a commodity too freely available often has a low perceived value and is consequently abused", (McAdam, 1989, p.11). This tariff was designed to encourage the electrification of black households. Only later in 1992 did Eskom attempt to calculate the true cost of the programme. Just like the farm electrification programme between 1980-1990, when costs where only considered some eight years after the programmes inception, political, not financial considerations seemed to be driving Eskom's electrification initiative to electrify black households.

317 Interview with Mr Paul Maré 19th March 1998.

318 Interview with Mr Paul Maré 19th March 1998.

In addition to the urban, peri urban and rural clusters of houses without access to electricity in South Africa there were also in 1990 farm workers dwellings that were similarly without power. Hofmeyer (1993, p.20) has estimated that only 32 per cent of farm workers dwellings on farms that had been electrified had access to electricity from these farms. These electrified dwellings used electricity mainly for lighting, the use of electricity for cooking and heating purposes was low. The EPRET project estimated that in 1994 there were about 600 000 farm workers dwellings on farms, which had been electrified and about 450 000 of these did not have access to that supply, (Hofmeyer 1993, p.55). These statistics only compounded the daunting task of Eskom's "Electricity for All" programme. The electrification of farm workers dwellings was invariably accomplished by extending the electricity supply from the farm to these dwellings. The capital cost of these connections was shared by the farmer, the State and Eskom. The farmer always remained Eskom's customer and was billed by Eskom, the farm workers were the consumers but had no independent metering. The government offered farmers a R300 subsidy per connection to encourage the electrification of farm workers dwellings, (Hofmeyer, 1993, p.50). Such connections were, seemingly, not a priority for Eskom between 1990 and 1995, however.[319]

Maré also pointed out that one of the critical problems faced by Eskom in their efforts to electrify black households in South Africa was that of supply rights. For example, in black townships Eskom did not usually have supply rights, neither could they bring electricity to squatter camps in unproclaimed areas. Eskom could, however, electrify peri-urban areas. Eskom therefore had to breach certain boundaries to enable their electrification programme to grow in magnitude. To finance their expanding electrification programme Maré has estimated that from 1991 onwards at least 2-5 per cent of Eskom's tariff to large consumers cross-subsidised the electrification programme.[320] These cross-subsidies between 1990 and 1994 were not transparent and whilst consumers were certainly aware that there must be an element of cross-subsidisation involved in Eskom's electrification programme the magnitude of the amount involved was probably unknown to them.

According to both Maré, du Plessis and van Wyk[321] Eskom accepted that their electrification programme from 1990 onwards would not be financially viable. To try and limit the financial losses that could arise, the Corporation put in place the following control mechanisms:

a) A programme of demand-side management to stimulate the off-peak use of electricity;

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319 Interview with Mr Paul Maré 20th June 1998.

320 The financing of the electrification programme and the subsidies involved between 1990 and 1991 are discussed in detail in the following chapter.

321 Interviews with the author respectively on the following dates, 6th February 1998, 27th January 1998 and 29th November 1996.

b) A programme to bring down the capital costs of electricity reticulation to black households by innovative construction methods, composed principally of labour intensive construction and bundled conductors etc., as already commented upon; and
c) A programme to minimise administration costs.

Mr Jan de Beer[322] was convinced that various groups supported Eskom's electrification programme because it was "political suicide" (de Beer's description) not to. His view was that the trades union were encouraged by the possibilities of GDP growth and the (as they erroneously thought) extraordinarily large job creating potential of the programme. The environmentalists were emotionally captured by the "greening" possibility of reduced air pollution and even the AWB (the ultra-rightwing organisation in South Africa led by Eugene Terre'Blanche) apparently supported the programme on the grounds that electrification would bring the black birth rate down in South Africa. As has been mentioned already the ANC showed their interest in the electrification programme from the Harare meeting in 1990 onwards. According to de Beer Eskom did keep in contact with the ANC with respect to the progress of the electrification programme prior to them becoming the government in 1994, this was done through the Civic Associations in South Africa. Also according to de Beer violence in certain areas of the country did disrupt Eskom's electrification programme and this was particularly so in Natal where conflict between the IFP and the ANC was rife. In this violence Eskom was at pains to remain non-aligned and in this they were successful. This violence was frequently reported in Eskom's Annual Reports, e.g., (1993, p.10).

An important restriction to Eskom's electrification programme between 1990 and 1995, which has already been mentioned, was that in planning the programme it concentrated on the electrification of urban and peri-urban areas. In fact the macro-economic analysis which took place prior to the commencement of the programme emphasised this point, see the BEPA report. There was very good reason for Eskom deciding to initially concentrate on the urban areas of the country. Firstly, rural areas of South Africa were then, and still are, characterised by poverty and unemployment, (Horvei and Dahl, 1994, p.1). Development in such areas is complex and requires well thought out development policies, particularly policies concerning the provision of services including electricity. Certainly Eskom had no such policies at the commencement of their electrification programme. Secondly, there were obvious difficulties associated with the ability-to-pay for services in rural South Africa because of low income levels amongst rural blacks. These difficulties would also probably extend to electricity provision. Thirdly, rural electrification can be very costly, much more costly than its urban counterpart, hence it was natural that Eskom would concentrate on the urban component particularly when it became clear that the Corporation would probably end up funding the electrification programme. Eskom estimated that connection costs in outlying rural areas, i.e., areas furthest from the national grid would cost about R5 000 each. For

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[322] Interview 13th November 1996.

connections in truly deep rural areas the cost could double and approach R10 000 per connection[323]. Fig No 8.1 below gives the average cost per connection in 1995 Rand for urban and rural customers. Fourthly, rural electrification would require government involvement with respect to development policy formulation. Fifth, other energy carriers would probably have to be brought into the rural development equation in addition to electricity usage, e.g., fuelwood, paraffin, batteries, gas etc. If energy provision was to be planned for rural development purposes, such planning would therefore be outside the scope of Eskom as a lone agent. Sixth the distance of rural settlements from the national electricity grid is often considerable, particularly in the deep rural areas of South Africa hence the energy development plan for such areas would involve off-grid electricity sources and this could bring the private sector into the planning equation. Seventh, farm workers habitations are numerous in rural areas and these dwellings would require long cable runs from electrified farms for them to be provided with power. Hofmeyer (1993(a)) estimated that over one third of farm workers households in South Africa would require these long cable runs to provide them with electricity. Eighth, rural electrification would ideally have to be part of a broad-based development programme that would improve per capita income and engender social upliftment. Such a programme would require governmental direction, and Eskom could only play a supporting role in this process, the Corporation could not sensibly undertake ad-hoc rural electrification projects as a consequence. Taking the difficulties mentioned above into account it is easy to see why Eskom opted for an urban electrification initiative to start their programme of electrifying black households in South Africa.

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[323] Interview with Mr D. Van Wyk 13th November 1996.

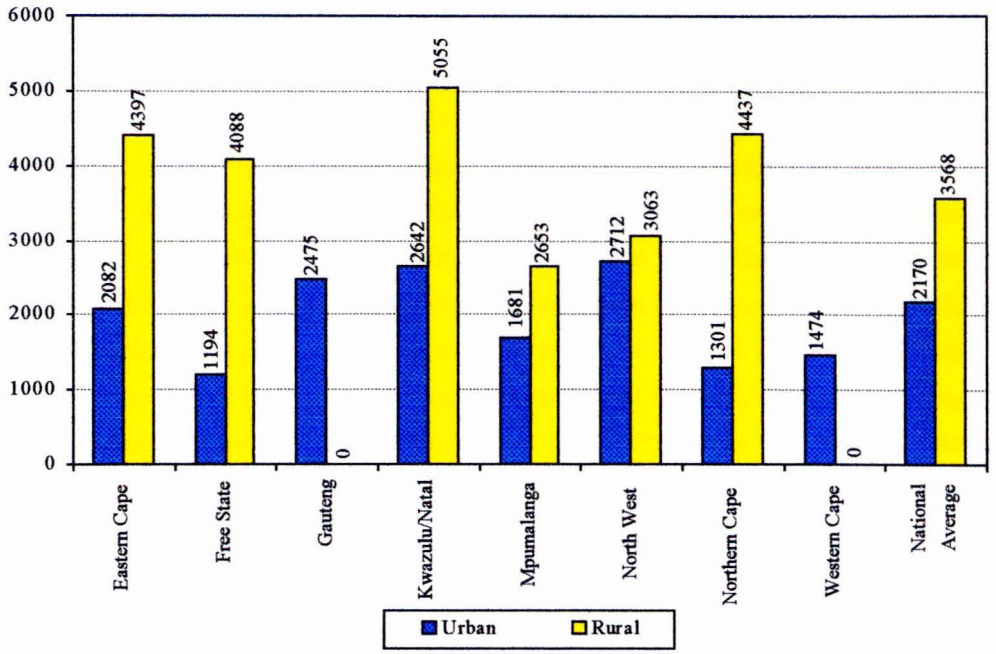

FIG NO 8.1 AVERAGE COST PER ELECTRIFICATION CONNECTION (1995 RAND)
Source: NER Progress Report, (1995, p.19).

3.5 Eskom's National Electrification Programme Commences

Thus it was that Eskom's urban electrification programme got under way and at the end of the 1990/91 period 30 588 household connections had been made with respect to this programme by Eskom's five Distributors, the capital expenditure on the programme amounting to R100 million. In 1992 Eskom increased the pace of the electrification programme and the Corporation's Annual Report (p.11) claimed that 640 homes were being connected to the national electricity grid daily. The figure for connections by Eskom's Distributors in 1992 amounted to 145 522 and this does indicate that the 640 claimed connections per day was probably an accurate assessment of the average daily activity on the programme. The total capital requirements for the electrification of these houses amounted to R 442 million. In their 1992 Annual Report Eskom once again highlighted the job creating potential of their electrification programme saying "one of electrification's most important spin-offs is job creation". The NELF was also mentioned as being important in developing strategies and a new structure for the South African ESI so that the electrification of black households could be accelerated. Business Day of the 19th October 1992 claimed, however, that the establishment of the NELF was delayed; reporting that the "ANC's conference (The ANC's National Meeting on Electrification analysed in Chapter 5 authors addition) failed to reach consensus on the forum's membership". It was also noted in the report

that the Housing Forum had taken 13 months to become established. Fortunately the NELF, under the guidance of the DBSA and Eskom, did begin their deliberations in early 1993.

It was also clear from Eskom's 1992 Annual Report (p.11) that obtaining funding for their electrification programme was a constraining influence on the programme. To demonstrate the financial burden carried by Eskom with regard to the electrification programme, the Daily News reported on the 8th October 1992 that in Edendale and Imbali near Pietermaritzburg Eskom was electrifying 30 000 houses at a cost of R 200 million and, that "Mr Brian Edwards, Chairman of the Natal Midlands Joint Services Board (JSB) said that Eskom would provide most of the finance but the JSB would provide R 4 million per year for 4 years" i.e., R 16 million out of R 200 million or 8 per cent. During the year Eskom did approach the World Bank with a request for help with regard to funding for their electrification programme but the Bank responded by saying that that for them to provide such funds a "consensus government would have to be in power in South Africa".[324]

In 1992 as more and more black households were being electrified local authorities were transferring their electricity reticulation networks to Eskom in increasing numbers (because of non-payment of accounts) by ceding their electricity supply rights to the Corporation. As a consequence Eskom's domestic customer base was growing and Eskom's management claimed that progress was being made in overcoming the problem of the non-payment of electricity accounts as a consequence of these transfers, (Eskom Annual Report, 1992, p.16). As mentioned already, however, in spite of these assurances the contingency sum for arrears shown in Eskom's financial statements for the year was above that of the previous year. With respect to electricity supply take-overs in the SGTs the Lebowa Cabinet approved in principle that Eskom should take over the distribution of electricity in Lebowa in early 1993. Negotiations with the KwaNdebele government were also undertaken with a similar outcome in mind. Eskom was then gradually breaking down the barriers that curtailed its supply rights and the expansion of its electrification programme. The right of supplying electricity to Greater Soweto was also finally concluded in 1992. As noted already, the acquisition of the electricity reticulation network in that township, which was judged to be worth R 204 million, helped amortise Greater Soweto's arrear debt for electricity supply. This debt had been carried by Eskom from 1990 when the TPA was replaced by the Metropolitan Council and the bridging finance for bulk electricity supplied to Greater Soweto failed to materialise.

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[324] Interview with Mr K. Schoeman, 30th July 1996, and confirmed in a statement to that effect in Eskom's Annual Report, (1992, p.11). Mr. Schoeman had been a member of Eskom's team negotiating with the World Bank for funding for their programme to bring electricity to lesser developed areas of South Africa and had prepared a report on this issue which was presented to the World Bank.

With respect to this take-over The Sowetan (24th June 1992) reported that "Soweto traders met in Jubalani Standard Bank Hall to discuss various issues relating to electricity supply in Greater Soweto. The meeting was a joint venture of the Greater Soweto Chamber of Commerce and Industries and the Soweto Independent Shopkeepers Association. Chamber Executive Director Mr Max Legodi said the Soweto Civic Association would explain the take-over of the administration of the electricity supply to Soweto". This was in line with Eskom getting Civic Associations involved in their take-overs of supply networks. These take-overs meant that Eskom now had electricity supply rights in a greater number of areas than ever before and their domestic consumer base had nearly doubled between the beginning of 1991 and the end of 1992. This growth meant that Eskom now directly serviced 541 866 consumers up from 278 033 in January 1991.

In 1993 Eskom created a new management portfolio, that of Electrification and Industry Restructuring, (Eskom Annual Report, 1993, p.13). This portfolio was established to ensure electrification targets were met, to eliminate the backlog of domestic electrical connections and to cope with increasing demands for such connections. This portfolio was an important addition to Eskom's Management Board given the limitations of the existing electricity distribution industry to cope with the problems of electrifying black households in South Africa. Considering the fragmentation of the South African ESI the new portfolio was doubly important since in the medium-term it was doubtful that the ESI could have dealt with the backlog of domestic connections in the black townships. Mr J de Beer was put in charge of this new Eskom portfolio.

Eskom's electrification programme was claiming more attention then from Eskom's Management Board and Eskom's Chairman Dr John Maree commenting in the 1993 Annual Report (p.11) said that "Electrification should be seen as a national priority". Maree also said that to "reflect the change taking place in South Africa and be more representative of Eskom's stakeholders" the Electricity Council had been reshaped and four black members of the ANC were appointed to it. These were Dr E. Kuzwayo, Mrs N. Majija, Mr M. D. Mofokeng and Mr G. Mantashe. In addition Dr B. L. Fanaroff the National Secretary of the National Union of Metal Workers of South Africa, representing organised labour, was made a member of the Council. Dr Fanaroff was also a member of the NELF and it may be assumed that he, and these four new Electricity Council members, would certainly have shown a keen interest in Eskom's black household electrification programme.

In 1993 the electricity supply to Greater Soweto underwent an upgrade and Eskom began to work closely with consumers in the township to overcome the electricity payments problem. Community involvement was reported as being "intense" and the community employed so-called "electricity representatives" to carry out "first line maintenance and meter reading, the delivery of bills and liaison with Eskom", (Eskom Annual Report 1993, p.22). In addition, to managing the electricity supply to Greater Soweto, Eskom continued to take over the supply to other townships.

Business Day (11th January 1993) reported that Eskom was considering taking over the electricity supply to eight more Transvaal Townships. These were believed to include Katlehong, Bekkersdal and the Lekoa complex and that Eskom was already supplying Greater Soweto, Alexandra, Vosloorus and Tsakane with electricity direct.

In 1993 the Black Local Authorities Act fell away resulting in municipalities becoming single entities, e.g., Greater Soweto became part of the Johannesburg Metropolitan Transitional Council (TMC). This change did not help enhance Eskom's electrification programme, however, since after these amalgamations electricity supply rights remained unchanged, i.e., whoever had the right to supply electricity to the area prior to the change had the right after the change. Hence Eskom still had to cross boundaries to expand their electrification programme, i.e., they had to negotiate to, or were asked if they would, take over the supply of electricity prior to providing power to an area. To some extent this had the effect of slowing down their electrification programme.[325] Black townships, however, sometimes preferred Eskom to manage their electricity supply rather than entrust it to the adjacent white municipality and tried to get Eskom to do this. Such a case was reported in The Star (12th January 1993) when it was said, that "often residents in black townships wanted Eskom not the White Municipal Council to electrify their townships. For example in De Aar in the Karoo the De Aar Civic Organisation (DACO) opposed the scheme (a scheme by the white controlled municipality to electrify the adjacent black township) and wanted Eskom to take charge of the installation".

The demand for electricity in black townships kept growing and because these demands could not all be met and remained unassuaged there was considerable theft of electricity. Business Day (19th February 1993) reported that "stealing power became a big problem for Eskom to try and deal with. For example, Kazin West Rand Township residents drew power illegally from underground and overhead cables to electrify their homes. The practice called "Operation Kahanyisa" meaning "Switch On" involves residents of the town. Paul Maré, Eskom's National Electrification Manager describes this as an "extremely dangerous" practice. Furthermore the practice jeopardised the current to those legally connected. Operation Kahanyisa started in 1991 when those who had applied for electricity could no longer wait for it. Their campaign will go on as long as necessary until they get electricity". This theft of electricity added to Eskom's financial woes with respect to the electrification of black households and clearly complicated their attempts to control the financial impact of the programme. Such activities demonstrated the wisdom of Eskom establishing the new management portfolio to deal with the problems attached to their electrification programme.

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[325] Interview with Mr Paul Maré 19th March 1998.

Not only was the theft of electricity a problem, the electrification programme in some areas of the Witwatersrand and Natal suffered on occasions because of the political violence which occurred in these areas and also because of Eskom's failure to take over certain electricity supply rights. Events such as these added to Eskom's electrification planning problems and may have been partly responsible for the paucity of data, which exists concerning specific electrification projects. To deal with communities needs, especially their expectations concerning the timing of electrification projects in specific areas Eskom established local forums involving communities and these were considered to be very effective.[326]

In spite of problems met in electrifying black households in 1993 Eskom's Chairman Maree claimed that Eskom had "changed the lives of another three million people by making electricity available to their homes", (Eskom Annual Report, 1993, p.8). During the year Eskom electrified 208 801 houses and in addition 16 074 farmworker's dwellings were supplied with electricity, the capital expenditure involved amounted to R 584 million.

Eskom's Annual Report at the end of 1994 was the first under the newly elected ANC Government which had come to power in April of that year. The section on the progress of Eskom's electrification programme in this Annual Report included information on the requirements of the ANC's Reconstruction and Development Programme (RDP) and how Eskom's black household electrification programme would be influenced by the RDP. In line with the requirements of the RDP Eskom was expected to electrify additional houses over and above its own programme to electrify 700 000 houses. This requirement meant extending Eskom's electrification programme beyond 1996. Eskom was, in addition, required to contribute "R 50 million per year to the electrification of schools and clinics and other community development activities - particularly in rural areas", (Eskom Annual Report, 1994, p.3).

With the advent of the RDP, in 1994, which was to attempt an alleviation of the dualistic structure of the South African economy, society and polity, Eskom formulated new guiding principles around which its electrification programme would be governed.[327] As noted previously Eskom's electrification programme was at the time proceeding without strict policy guidelines. The ANC's call for an accelerated and sustainable electrification programme prompted Eskom to examine policies that would allow them to meet that challenge. This action can be seen as tacit confirmation that up to this time such a policy was not in place. Much of the motivation for rural

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326 Interview with Mr Paul Maré 19th March 1998.

327 The RDP aimed at ensuring ... "integrated growth, development, reconstruction and distribution into a unified programme. The key to this link is an infrastructural programme that will provide access to modern and effective services like electricity, water, telecommunications, transport, health, education and training "(p2.) And what was most important "a home must include... a household energy supply (whether linked to grid electricity supply or derived from other sources such as solar energy)", (p.8).

electrification initiatives in developing countries relates to the potential role of electricity in economic and social upliftment. Research indicates, however, that electricity on its own brings little by way of such upliftment unless it is ably supported by other developments.[328] Hence the RDP's emphasis on associated developments, this was an important consideration for Eskom because it impacted on the sustainability of its existing electrification programme. If these "other developments" could not be undertaken Eskom's programme would not have its desired economic and social effect and this would certainly have a bearing on the sustainability of the ANC's programme to bring electricity to black households in South Africa as reflected in the RDP. Bearing this in mind Eskom formulated policy proposals for a "National Strategy on Electrification to Advance Rural Development" in November 1994. Eskom's electrification programme up to this time had concentrated on urban areas, it was clear that now rural areas would have to be targeted as well.[329]

The principle points in Eskom's new electrification policy were as follows.[330]

(i) Public policy requirements

(a) For Eskom to achieve its portion of the electrification objective as identified in the RDP clear policy objectives and priorities would be required, e.g., the required spread of connections between urban and rural areas in the nine provinces of South Africa;

(b) Funding guidelines would have to be established involving South Africa's public funding agencies which would reflect government policy priorities in a consistent way so that Eskom could plan its future electrification programme;

(c) Guidelines for cross-subsidisation from other domestic consumers and consumer groups would have to be worked out. Eskom required government policy-makers, together with Eskom's Electricity Council, to balance the benefits of electrification with the implications of higher input costs for South Africa's energy intensive economy particularly the mining and manufacturing sectors; and

(d) Eskom considered that infrastructural developing policies, especially those concerned with land reform, national housing projects and resulting demographic movements, would have a major influence on targeted electrification connections.[331]

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328 The introduction of electricity doesn't automatically stimulate economic growth, it's effect depends upon the level of development in the area, (this has been shown in the case of Elandskraal) the availability of capital and other resources and the other programmes and projects being implemented. Foley (1992, p.145) supports this viewpoint he says that "rural electrification does not cause development. Electricity is a derived demand occurring only when an area has reached a certain economic level".

329 Interview with Mrs D. Theron 20th July 1995.

330 Summarised from Theron, D. (1994, pp.3-8).

(ii) Project selection and financing

The RDP called for electrification to be "financed from within the ESI as far as possible via cross-subsidisation from other electricity consumers. Where necessary the government would provide concessionary finance for the electrification of poor households in remote and rural areas". Eskom considered that this requirement could be implemented as follows:

(a) Potential electrification projects would be classified into three categories, financially viable, socio-economically desirable and socio-economically non-viable; and
(b) Projects within Eskom's right of supply areas which were financially viable in terms of Eskom's financial evaluation criteria would be undertaken and financed by Eskom through normal commercial means[332]. Projects which were socio-economically desirable would be considered amongst other energy supply options and evaluated as but one of a number of services like education, health, sanitation and water supply; such projects would be submitted for concessionary funding from the government[333]. Projects in rural areas which were not financially viable would be the subject of cost-benefit analysis to determine if they were socio-economically desirable according to a set of guidelines which would be developed within the context of the overall goals of the RDP. Socio-economically non-viable projects should not be undertaken by Eskom.

(iii) Planning

With the implementation of the RDP and the demise of apartheid Eskom thought that demographic patterns of the "Homelands" would probably alter. Furthermore, the job-creation programme in the form of public works proposed by the RDP and the housing development programme would also affect the movement and final residence of many people. Eskom was acutely aware of the effects of these plans on the RDP's electrification programme and considered the following policies to be important for dealing with events that may occur as a result:

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331 Eskom's concern here was a very real one and was that there may not be a sufficient number of houses to electrify if the RDP's target of building 1 million houses over the five year period 1995 - 2000 was not achieved.

332 Eskom's financial evaluation criteria were onerous so far as the electrification of black households was concerned and required an 18 per cent return on investment. Separate interviews with Mr Jan de Beer and Mr John Bradbury, 13th November 1996.

333 A wide range of funding sources for rural electrification was potentially available such as the DBSA, The Independent Development Trust, the three tiers of government and foreign sources comprising of aid packages for service provision from Western European governments. In addition the RDP proposed a National Electrification Fund to raise capital finance from investors in electrification projects. This last point will be further commented upon in the following chapter.

(a) Only people where there was the long-term assurance of residence would be provided with electricity;[334]

(b) Cost savings would be achieved by co-ordinating electrification with housing schemes, and areas where housing development was taking place would have a higher priority rating than other areas so far as the possibilities of being granted access to electricity was concerned. Eskom would liase with National/Regional Housing Boards on this issue; and

(c) Eskom would keep track of land reform developments and would be prepared to supply black farmers with appropriate supplies.

It was clear that Eskom was concerned about the demands that they thought would be placed upon them by the Government of National Unity with respect to the electrification of black households. The policies as outlined above was Eskom's response to those demands. Eskom's management were trying still it seems to approach their programme to electrify black households in South Africa with something akin to a business viewpoint, although all the while they were cross-subsidising their electrification programme. It is evident from the policies discussed above that Eskom was concerned about the sheer cost that would be entailed in a rural electrification programme and its ability to bear such costs. Eskom was then preparing the way for others to at last contribute some of the funding for the electrification programme knowing that in 1995 its target for connecting new households to the national grid would be 300 000 as called for by the RDP.

The RDP's overall electrification targets are shown in Fig No 8.2 below. Eskom's target year-on-year was to be 250 000 connections in 1994 and 300 000 from 1995 onwards. The RDP's electrification targets for each of South Africa's provinces were not set by the government but were decided by the respective electricity distributors in consultation with communities, (NER Progress Report, 1995, p.9). The targets for each province for 1995 are given in Table No 8.7 below. Only Eskom managed to meet these provincial electrification targets, in fact the Corporation exceeded its target. The rest of the EDI did, however, meet the overall provincial electrification requirements of the RDP, (see Fig No 8.2 below), which were less than the rest of the EDI set themselves. The funding for Eskom's portion of the RDP's electrification programme was to come from it's own revenue and Eskom was also required to give R 300 million to local authorities in 1997 for them to electrify permanent settlements in designated townships in legally authorised development areas set out by local governments for permanent settlements. The rationale behind this directive was that it helped "towards levelling the playing field between

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[334] Eskom calculated that for every rural electricity consumer who moved to an urban area and who's home was not reoccupied, there would be a direct negative cash flow impact on Eskom that varied between R 500 and R 2500. Interview with Mrs D Theron, 20th July 1995.

Eskom distributors on the one hand and local government distributors on the other hand who did not have access to the internal Eskom tariff", (NER Annual Report, 1996, p.12).[335]

Eskom's Financial Group analysed the financial impact of the Corporation's electrification programme on Eskom itself (for the first time) in 1992 (see Els 1992). The report on this analysis mentions the complicating factor of Eskom having to provide funding for electrification programmes by local authorities; several of Eskom's financial managers worst fears had in fact now materialised.[336]

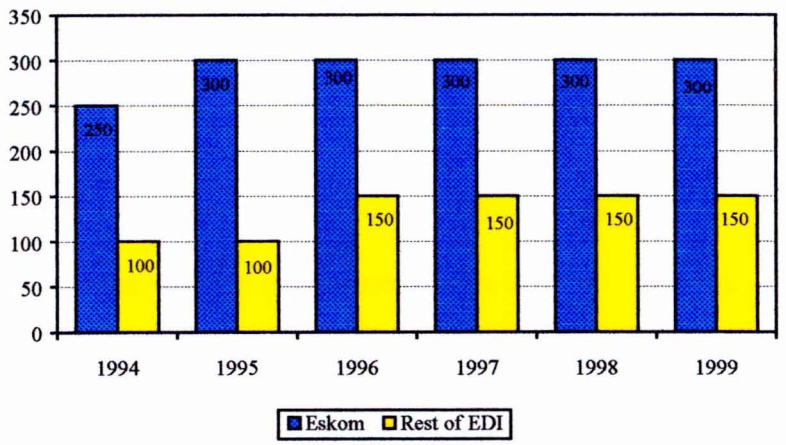

FIG NO 8.2 RDP ELECTRIFICATION TARGETS: 1994 – 1999
Source: NER Progress Report (1995, p.9)
EDI: Electricity Distribution Industry.

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335 What this internal Eskom tariff refers to is not clarified in the NER Progress Report. Presumably it simply means the greater sources of capital that Eskom had access to for undertaking the electrification of black households in South Africa when compared with local government.

336 This issue is discussed in detail in the following chapter.

PROVINCE	LOCAL GOVERNMENT	OTHER	ESKOM	TOTAL
EASTERN CAPE	13 877	0	46 000	59 877
FREE STATE	16 243	0	18 000	34 243
GAUTENG	27 353	0	44 000	71 353
KWAZULU/NATAL	27 768	50	53 000	80 818
MPUMALANGA	6 422	13 492	34 000	53 914
NORTH WEST	9 194	20 000	24 000	53 194
NORTHERN CAPE	6 885	0	6 000	12 885
NORTHERN PROVINCE	6 751	5 000	63 000	74 751
WESTERN PROVINCE	16 449	0	12 000	28 449
TOTAL	130 949	38 542	300 000	469 484

TABLE NO 8.7 ESI ELECTRIFICATION TARGETS PER PROVINCE: 1995
Source: NER Progress Report (1995, p.10).

Whilst it was all very well for the government to insist that Eskom was to fund a great part of the national electrification programme the perennial problem of non-payment for electricity persisted in 1994 and presented Eskom with serious policy problems since the Corporation was funding their expansion and electrification programmes from internally generated monies. This non-payment forced Eskom to cross-subsidise newly connected electricity consumers from revenue obtained from those who paid for electricity. Eskom suggested to government that if the non-payment situation continued the electrification objectives of the RDP would not be achieved, (Eskom Annual Report, 1994, p.10). Was this an invitation for the government to become involved with the non-payment issue? If it was it had little effect and non-payment and the theft of electricity continued[337].

In 1994 the recently elected ANC Government raised the question of the privatisation of Eskom.[338] Eskom, however, pointed out that it was playing an important role in the delivery of RDP goals.[339] The inference here was clear, if Eskom was privatised then projects that focused on the social upliftment of the previously disadvantaged community may be looked at with disfavour by a

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337 Interview with Mr Paul Maré 26th March 1998.

338 It is curious that the government raised this issue considering their statement concerning parastatals at the Harare Conference of 1990, their subsequent comments at their National Electrification Meeting in 1992 and their increasing demands upon Eskom to take responsibility for electrifying even greater numbers of houses than they had originally envisaged. It is clear from the NELF deliberations that that forum did not consider the privatisation of Eskom to have any merit at all if the electrification of black households in South Africa was to be undertaken.

339 Interview with Dr I.C. McRae 6th November 1996.

privately-owned electric utility with shareholders to consider. Perhaps Eskom's message was heeded since certainly the privatisation issue was not proceeded with.[340]

After the ANC came to power foreign countries felt more comfortable about providing aid to South Africa and a joint venture, to electrify Khayelitsha in the Cape, between Eskom, Electricity de France and East Midlands Electricity (a UK private electric utility) was completed in 1994. This project was opened by the late President Mitterand of France. Such joint ventures were, however, not the norm and by and large Eskom acted alone in their nation-wide electrification programme. During 1994, with the continuation of Eskom's take-overs of various municipal domestic electricity supply networks, there was an improvement in the volume of payments for electricity services, which interestingly enough was lead by Greater Soweto, (Eskom Annual Report, 1994, p.16). It seems that slowly Eskom was demonstrating that service levels for electricity delivery in black townships could be improved and consumers were responding positively to the Corporation's efforts in this regard.

Domestic electricity sales to newly electrified consumers continued to be low, however, and averaged only 80 kWh /month.[341] This figure was much lower than the break-even figure of 355 kWh/month that Eskom needed to keep the electricity price at an affordable level for these consumers i.e., the new S1 tariff that Eskom had put in place at the commencement of its electrification programme. Even with increased levels of payments then Eskom was still facing a shortfall in revenue over expenditure so far as its electrification programme was concerned. This situation directly paralleled that of the electrification of white-owned commercial farms in the period 1980-1990 with farmers using less electricity than Eskom required for a break-even on their Tariff D.

As Eskom's electrification programme continued, it was reported in their Annual Report (1994, p.20) that many of the houses still to be electrified were situated far from the national grid in deep rural areas characterised by low population densities. Only about 12 per cent of the houses in these rural areas had access to electricity in 1994. Eskom warned that bringing power to these areas would be very costly. This warning was probably for the benefit of the government since Eskom's own electrification programme had been, as mentioned already, concentrating on urban areas. With the advent of the RDP, however, it was clear that rural areas were to be targeted as well and because Eskom was funding its portion of the RDP's electrification programme there may also have been concern within the Corporation regarding the potential cost of electrifying these rural areas.

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[340] The privatisation of Eskom and black household electrification are, however, not mutually exclusive issues as will be shown in Chapter 10.

[341] The important question of electricity consumption in newly electrified households will be discussed in more detail presently.

At the end of 1994, Dr I. C. McRae retired from Eskom and became the Chairman of the NER. Mr Allen Morgan, also an engineer, replaced him as the CEO of Eskom. This was a propitious appointment so far as Eskom's electrification programme was concerned, since, as already noted, Morgan had been Eskom's Executive Director Sales and Customer Services and Electrification prior to becoming CEO and in that capacity had been intimately involved with the Corporation's electrification programme. The programme did not therefore suffer a change in momentum after McRae's departure and in 1994 Eskom connected 254 383 houses and 16 838 farm workers dwellings to the electricity grid at a capital cost of R 808 million.

Again in 1995, it was reported by Eskom that the non-payment for electricity provision continued to be "a significant threat", (Eskom Annual Report, 1995, p.31). The payment arrears by the 31st December 1995 amounted to R 1 175 million (which figure included outstanding interest charges). Part of the problem it seems was the accounts inherited from the Transkei Electricity Supply Corporation (TESCOR) when Eskom took over the supply of electricity in the Transkei. Eskom also admitted publicly for the first time in 1995 that they were cross-subsidising the costs of supplying electricity to black households due to these consumers low electricity consumption levels and their "low affordability levels", (Eskom Annual Report, 1995, p.32). To counterbalance this fact it was also reported that for every 100 houses electrified between 10 and 20 new "activities" were started in the informal industrial sector. The number of concomitant jobs that were created was estimated to number 14, (Eskom Annual Report, 1995, p.10). If Eskom's informal job creation was accurate then 43 848 jobs were created in the informal sector in 1995 alone as a consequence of the electrification programme.[342] The number of houses connected to the national grid as a result of Eskom's electrification programme in 1995 amounted to 313 179 thus exceeding the target of 300 000 set by the RDP.

In 1995 the NER started actively becoming involved in the South African ESI and in addition the government introduced a process to investigate the structuring of state-controlled enterprises. This process was designed to be carried out by "sectoral task teams and reconstruction and transformation committees", (Eskom Annual Report, 1995, p.15). These task teams were in addition to the Electricity Working Group (mentioned previously in Chapter 7) created to recommend a future structure for the South African ESI. The findings of these task teams would clearly have an influence on Eskom's electrification programme after 1995.

It is necessary now to briefly discuss one further topic of great importance to the viability of Eskom's electrification programme. This topic concerns electricity consumption by consumers connected to the national grid as a consequence of Eskom's electrification programme. It is upon

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[342] This issue will be further commented upon in the next chapter.

this statistic, that the viability of Eskom's electrification programme turned, hence it deserves special mention.

Eskom's return on their electrification capital investment was sensitive to:

a) The cost of connections;

b) Operation and maintenance costs;

c) The electricity tariff levels; and

d) Revenue losses.

Eskom had at least partial control over the first three items but item (d), revenue losses, was to a considerable extent completely outside their control, especially with respect to the amount of electricity used by each household. So far as this was concerned the financial break-even usage for Eskom's electrification programme was, as previously mentioned, 355 kWh/month. At the end of 1995 NER estimates of the average electricity used by each newly connected black household on the electrification programme amounted to only 83 kWh/month see Fig No 8.3 below.

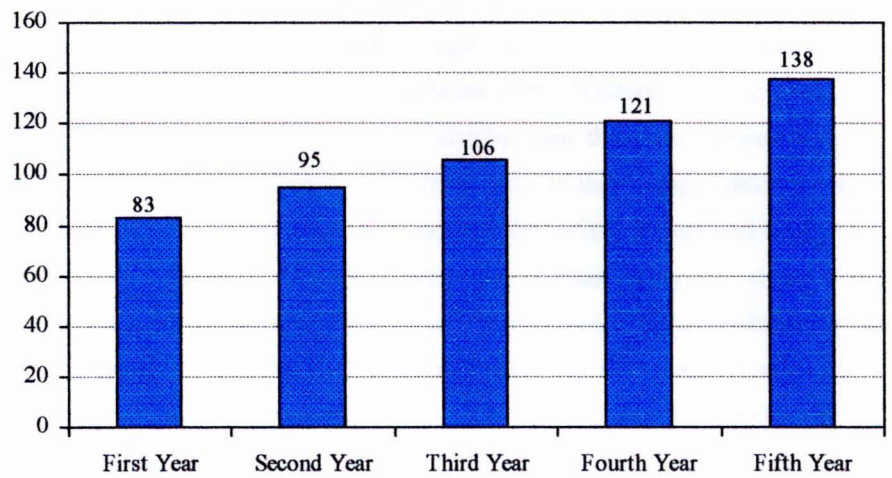

FIG NO 8.3 AVERAGE ELECTRICITY CONSUMPTION PER HOUSEHOLD FOR FIVE YEARS AFTER CONNECTION: KWH/MONTH
source: NER Progress Report, (1995, p.17)

The major problem of trying to estimate actual electricity consumption growth in the electrification programme is that, although Eskom's Distributor's monthly reports do give figures for sales for each area of supply, these figures are difficult to analyse since some settlements had only been electrified in the recent past whilst others had been electrified from the inception of the electrification programme in 1990/91. The best that can be done is therefore to examine average growth figures. Available averages in sales in kWh/month in Eskom's 5 Distribution Areas for the period 1993-1995 are shown in Table No 8.8 below.

DISTRIBUTOR	1993	1994	1995
BLOEMFONTEIN	76	79	78
CAPE TOWN	137	123	124
DURBAN	73	88	83
JOHANNESBURG	70	67	83
PRETORIA	51	55	59

TABLE NO 8.8 AVERAGE SALES OF ELECTRICITY BY DISTRIBUTOR: 1993 – 1995 IN kWh/MONTH
Source: Eskom's National Electrification Planning Division.

Clearly these figures are very much below the break-even consumption figure of 355 kWh/month in each year and for every Distributor. Putting too much reliance on these figures is problematic, however, because in many cases electrified households supplied power to "backyard shacks" thus inflating the amount of electricity bought by the household itself.[343]

The problem with average figures for electricity consumption by black households is that as the numbers of electrified dwellings increased in a particular area the average consumption decreased. For example, a study by Thorne and Qangule, (1994), showed that between 1993 and 1994 the number of electricity consumers in Khayelitsha in the Western Cape increased from 6 000 to 10 000, the newer consumers using less electricity than the older consumers due to the slower acquisition of electrical appliances. This trend brought the average consumption of electricity in the townships per household down to about 100 kWh/month. Viljoen and Kidgell (1994) examined electricity consumption in 20 settlements in the Northern Province, eight of which had been electrified for more than a year. These researchers found that monthly electricity consumption per household varied from 20-30 kWh confirming the very low usage of electricity by consumers newly connected. Although studies such as these are few in number, so far as Eskom's electrification programme in the period 1990-1995 is concerned, they are of prime importance since if the consumption figures quoted in them are accurate they bode ill for the viability and sustainability of an ongoing nation-wide electrification programme. The problem of low electricity consumption will also be exacerbated when Eskom's electrification programme is mainly concerned with the electrification of deep rural areas where the ability-to-pay for electricity will no doubt on average be lower that that found in urban areas.

What is important is that electricity consumption estimates made by Eskom for newly connected consumers at the start of their electrification programme were much higher than were subsequently achieved and this shortfall in electricity sales added to revenue losses. The result was that considerable cross-subsidisation was required (see the following chapter) to sustain Eskom's electrification programme. Clearly larger and larger subsidies would be required as the

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[343] Interview with Mr Paul Maré 26th of August 1998.

electrification programme moved from urban to rural to deep rural areas of South Africa. To compound the problem of revenue losses further in the period 1990-1995 there was, as mentioned already, considerable theft of electricity as well in the newly electrified areas. Maré has estimated that the costs to Eskom as a result of such theft for various years were as shown in Table No 8.9 below.[344]

	1990/91	1992	1993	1994	1995
COST OF ELECTRICITY THEFT (R MILLIONS)	4,5	19,7	28,4	34,5	43,5

TABLE NO 8.9 COSTS OF ELECTRICITY THEFT: 1990-1995.
Source: Mr. P Maré Eskom's Electrification Manager (1998).

In Eskom Annual Report parlance the theft of electricity is usually termed "non-technical losses". Each electricity meter had a unique code so in theory it should have been easy to trace electricity consumption patterns. In the case of the theft of electricity, however, meters were bridged and sales were not recorded. There was also a breakdown in Eskom's record-keeping so far as non-technical losses were concerned in the years up to 1995 hence there were electricity sales that could not be charged against a particular meter and this made the theft of electricity easier to accomplish. In addition to non-technical losses there were of course technical losses, these resulting from such things as line losses, transformer problems and loading and reticulation design. These losses have been variously estimated by Eskom to be anything from 10 to 15 per cent.[345]

All in all then revenue losses to Eskom from their electrification programme were considerable as was the amount of cross-subsidisation demanded by the programme.[346] Certain of these losses, for example losses as a consequence of low electricity sales to black households, were generally quite beyond Eskom's control. These losses do, however, help to explain Eskom's efforts to market electricity between 1990 - 1995 thus increasing electricity sales and capturing segments of the energy market which were the province of other energy carriers such as gas, fuelwood and coal.

3.6 Numbers of Connections and Capital Requirements

To close this section some overall statistics are presented in tabular and graphical form which serve to summarise the achievements of Eskom's programme to bring electricity to black

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344 It must be emphasised that this, by Mr Maré's own admission, was a very crude estimate, it is given merely to indicate that the theft of electricity amounted to considerable sums of money in the years 1990 to 1995

345 Interview with Mr P Maré 26th August 1998.

346 These revenue losses and the amount of cross-subsidisation required as a consequence will be discussed in detail in the next chapter.

households in South Africa in the period 1990 to 1995. To show the magnitude and importance of Eskom's electrification programme the numbers of connections made by local government and others are also given so that comparisons may be made and the extent of Eskom's achievement can be seen.

Firstly, Table No 8.10 below shows the population of the different provinces of South Africa, both urban and rural, the number of houses in each province and the number of these houses which had access to electricity on the 31st December 1995.

PROVINCE	TYPE	POPULATION	NO OF HOUSES	NO OF HOUSES ELECTRIFIED	NO OF HOUSES NOT ELECTRIFIED	% HOUSES ELECTRIFIED	% HOUSES NOT ELECTRIFIED
EASTERN CAPE	RURAL	4 475 073	897 436	51 874	845 562	5,78	94,22
EASTERN CAPE	URBAN	2 149 715	495 315	33 053	162 262	67,24	32,76
EASTERN CAPE	**TOTAL**	**6 624 788**	**1 392 751**	**384 927**	**1 007 824**	**27,64**	**72,36**
FREE STATE	RURAL	1 300 293	241 852	78 633	163 219	32,51	67,49
FREE STATE	URBAN	1 500 167	357 266	241 532	115 734	67,61	32,39
FREE STATE	**TOTAL**	**2 800 460**	**599 118**	**320 165**	**278 953**	**53,44**	**46,56**
GAUTENG	RURAL	351 213	68 560	37 262	31 298	54,35	45,65
GAUTENG	URBAN	6 827 915	1 682 288	1 307 335	374 953	77,71	22,29
GAUTENG	**TOTAL**	**7 143 128**	**1 750 848**	**1 344 597**	**406 251**	**76,80**	**23,20**
KWAZULU/NATAL	RURAL	5 186 023	987 188	138 120	849 068	13,99	86,01
KWAZULU/NATAL	URBAN	3 396 259	808 552	636 551	172 001	78,73	21,27
KWAZULU/NATAL	**TOTAL**	**8 582 282**	**1795 740**	**774 671**	**1 021 069**	**43,14**	**56,86**
MPUMALANGA	RURAL	2 080 631	393 279	146 442	246 837	37,24	62,76
MPUMALANGA	URBAN	887 545	195 637	116 253	79 384	59,42	40,58
MPUMALANGA	**TOTAL**	**2 968 176**	**588 916**	**262 695**	**326 221**	**44,61**	**55,39**
NORTH WEST	RURAL	2 440 829	480 919	98 703	382 216	20,52	79,48
NORTH WEST	URBAN	1 081 723	229 120	160 053	69 067	69,86	30,14
NORTH WEST	**TOTAL**	**3 522 552**	**710 039**	**258 756**	**451 283**	**36,44**	**63,56**
NORTHERN CAPE	RURAL	263 247	64 076	30 007	34 069	46,83	53,17
NORTHERN CAPE	URBAN	546 799	118 977	90 516	28 461	76,08	23,92
NORTHERN CAPE	**TOTAL**	**810 046**	**183 053**	**120 523**	**62 530**	**65,84**	**34,16**
NORTHERN PROVINCE	RURAL	4 661 202	936 598	221 931	714 667	23,70	76,30
NORTHERN PROVINCE	URBAN	487 023	118 799	84 596	34 203	71,21	28,79
NORTHERN PROVINCE	**TOTAL**	**5 148 225**	**1 055 397**	**306 527**	**748 870**	**29,04**	**70,96**
WESTERN CAPE	RURAL	574 270	136 086	64 010	72 076	47,04	52,96
WESTERN CAPE	URBAN	3 276 825	797 227	702 351	94 876	88,10	11,90
WESTERN CAPE	**TOTAL**	**3 851 095**	**933 313**	**766 361**	**166 952**	**82,11**	**17,89**
GRAND TOTAL	RURAL	21 296 781	4 205 994	866 982	3 339 012	20,61	79,39
GRAND TOTAL	URBAN	20 153 971	4 803 181	3 672 240	1 130 941	76,45	23,55
GRAND TOTAL	**TOTAL**	**41 450 752**	**9 009 175**	**4 539 222**	**4 469 953**	**50,38**	**49,62**

TABLE NO 8.10 ELECTRIFICATION STATISTICS BY PROVINCE AS AT 31ST DECEMBER 1995
Source: NER Progress Report (1995, p.12)

Secondly, Fig No 8.4 below presents statistics on the numbers of black households electrified in the period 1990-1995 by various entities.

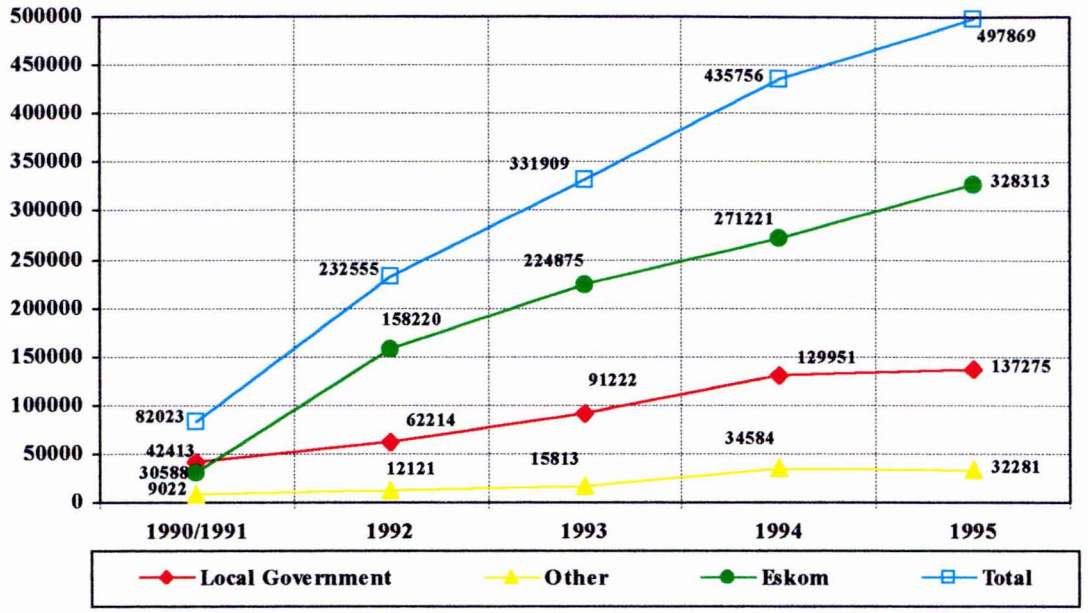

FIG NO 8.4 YEARLY ELECTRIFICATION CONNECTIONS BY VARIOUS ENTITIES: 1990 – 1995

Source: Eskom's National Electrification Planning Division.

*The number of connections by Eskom include farm worker's dwellings.

It is possible to effect a broad reconciliation between the figures for houses that had access to electricity in 1995 given in Table No 8.10 i.e., 4 539 222 and the number of electrified houses in Fig No 8.4 and Table No 8.1. Adding the total of houses electrified by Eskom, local government and others between 1990 and 1995 given in Fig No 8.4 to the total of electrified houses in 1990 given in Table No 8.1 the total comes to 4 190 722. It seems from this that although Eskom had underestimated the number of houses to be electrified at the start of their electrification programme by an order of magnitude they had estimated the numbers of electrified houses in South Africa and the "homelands" in 1990 fairly accurately.

Thirdly, the comparison between the numbers of connections made by Local Government, Eskom and others in 1995 by province is shown in Fig No 8.5 below. This figure clearly demonstrates the magnitude of Eskom's contribution to the electrification of black households in South Africa in 1995. It can be observed that it was only in the Western Cape that Local Government made more connections than Eskom.

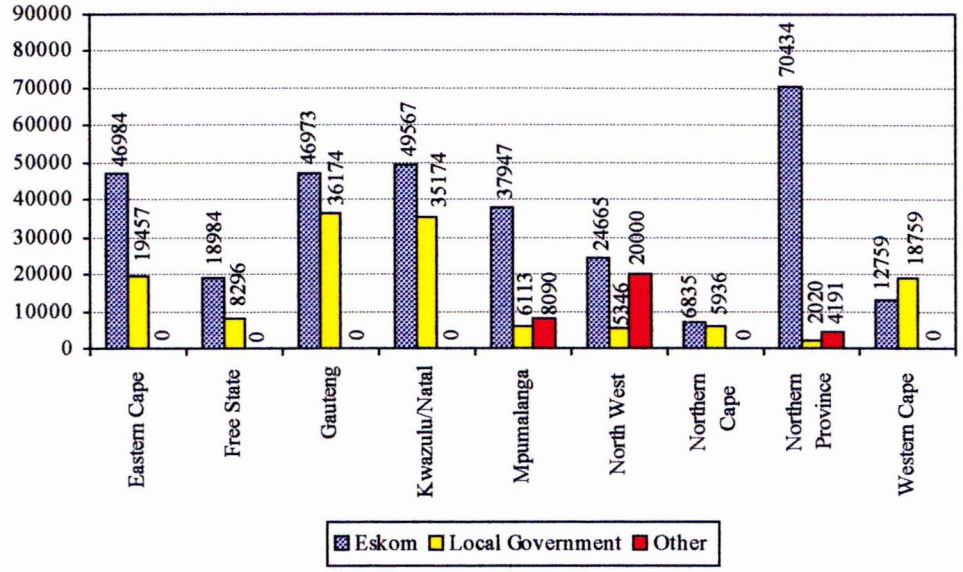

FIG NO 8.5 ELECTRICAL CONNECTIONS BY ESKOM, LOCAL GOVERNMENT AND OTHERS IN 1995

Source: Eskom's National Electrification Planning Division.

Fourthly, Table No 8.11 below shows the number of schools provided with electricity between 1991 and 1995 in the different provinces of South Africa.

PROVINCE	TYPE	1991-1993	1994	1995
EASTERN CAPE	URBAN	3	3	8
	RURAL	38	64	34
	TOTAL	41	67	42
FREE SATE	URBAN	7	7	50
	RURAL	41	58	49
	TOTAL	48	65	99
GAUTENG	URBAN	6	6	76
	RURAL	14	22	0
	TOTAL	20	28	76
KWAZULU/NATAL	URBAN	4	6	0
	RURAL	49	83	82
	TOTAL	53	89	82
MPUMALANGA	URBAN	6	6	0
	RURAL	27	49	228
	TOTAL	33	55	228
NORTH WEST	URBAN	17	17	50
	RURAL	32	62	17
	TOTAL	49	79	67
NORTHERN CAPE	URBAN	6	6	2
	RURAL	12	40	35
	TOTAL	18	46	37
NORTHERN PROVINCE	URBAN	28	8	0
	RURAL	53	128	363
	TOTAL	81	136	363
WESTERN CAPE	URBAN	2	2	8
	RURAL	9	16	25
	TOTAL	11	18	33
GRAND TOTAL	**URBAN**	**79**	**61**	**194**
	RURAL	**275**	**522**	**833**
	TOTAL	**354**	**583**	**1 027**

TABLE NO 8.11 NUMBER OF SCHOOLS ELECTRIFIED: 1991 – 1995
Source: NER Annual Report (1996).

According to the NER Annual Report (1996) approximately 19 000 schools were without electricity at the end of 1995. From Table No 8.11 it can be seen that only 1 964 schools had been electrified from 1991 to 1995. The NER placed great emphasis on the fact that, electrifying schools should take precedence in future electrification initiatives, and about 90 per cent of schools in South Africa still had to be electrified in 1995, (NER Annual Report 1996). This simple statistic and the NER's concern adds emphasis to the comment made by Archer and Moll (1992, p.147) that: "After 40 years of apartheid it should occasion no surprise that the educational sector is

among the most contested terrains in South African society. Whatever the political order to emerge a safe wager is that education will be at the very top of the priority ranking in a new resource allocation".

This new resource allocation would surely be driven by recognition of the skewed distribution of income and skills which existed in South Africa in 1995 as a result of Apartheid's policy of providing separate educational facilities for black and white scholars which involved large differentials in the quality of tuition provided by the State and which inhibited the development of human capital in the country. Correcting this situation was clearly of critical importance to the ANC if a redistribution of income was to emerge in a naturally sustainable manner. The provision of a composite skills base from primary schools upwards would help in this endeavour and aid in improving the inventory of human capital in South Africa. Electrifying schools accelerates this process by exposing scholars to new technical skills such as computer literacy. A lack of electricity impedes this process as pointed out in Business Day (24th December 1991) when it was stated that the lack of electricity in 81[347] per cent of schools limited their potential "to provide a well-rounded education programme including audio-visual aides or technical education involving tools". Electric light also allows tuition to continue after dark thereby lengthening the day and enabling workers participating in the acquisition of life-skills such as reading and writing after their working day is over.

The electrification of clinics is likewise of concern. No information could be obtained on the numbers of clinics in South Africa, or their location, let alone those that had been electrified prior to 1995. What is known, is that in 1995, 37 clinics only were electrified, (NER Annual Report 1996). The locations of these are given in Table No 8.12 below.

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[347] This figure seems low when the statistics presented above are considered.

PROVINCE	No of Clinics
EASTERN CAPE	1
FREE STATE	4
GAUTENG	1
KWAZULU/NATAL	0
MPUMALANGA	0
NORTH WEST	0
NORTHERN CAPE	1
NORTHERN PROVINCE	23
WESTERN CAPE	7
TOTAL	**37**

TABLE NO 8.12 NUMBER OF CLINICS ELECTRIFIED: 1995
Source: NER Annual Report (1996).

It can be seen from this table that 23 of these clinics (i.e., 62 per cent) were located in the Northern Province whilst in KwaZulu/Natal, Mapumalanga and the North West Province no clinics were electrified. The electrification of clinics must surely be seen to work hand-in-hand with the electrification of schools in developing human capital stock by ensuring that adequate primary health care in both urban and rural areas is provided. Electricity also allows the safe storage of drugs by refrigeration and opens up the possibilities of health service provision after dark in comfortable surroundings.

Because many black rural schools and clinics, like certain centres of habitation, are far from the national grid it is very costly to bring grid electricity to them. This suggests that other forms of electricity may be the solution to this problem, e.g., photovoltaics. Given the importance of education and health services in promoting the development of human capital it is suggested that the electrification of schools and clinics deserve special attention so far as energy policy formulation is concerned. In a country groping its way towards the goals of income redistribution and efficient services provision for those formally deprived, the decision of which and how many schools and clinics to electrify should therefore not be left to Eskom alone to make, but the government should become involved in this process as well.[348]

Finally Table No 8.13 gives the number of connections made by Eskom between 1990 and 1991 in each of the Corporation's distribution regions and the capital expenditure incurred on their electrification programme over this period.

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[348] The question of a cohesive electrification policy will be considered in the concluding chapter of this study.

YEAR DISTRIBUTOR	1990/91	1992	1993	1994	1995
			HOUSEHOLD CONNECTIONS		
BLOEMFONTEIN	2 628	26 425	41 711	44 338	37 718
CAPE TOWN	3 149	14 470	23 381	47 243	56 057
DURBAN	17 165	41 027	42 703	43 851	53 253
JOHANNESBURG	2 229	28 508	45 954	45 814	46 973
PRETORIA	5 417	35 092	55 052	73 137	119 178
TOTAL	**30 588**	**145 522**	**208 801**	**254 383**	**313 179**
			FARM WORKER CONNECTIONS		
BLOEMFONTEIN		4 316	6 436	7 537	6 988
CAPE TOWN		6 599	7 347	5 496	4 928
DURBAN		834	1 322	2 334	1 071
JOHANNESBURG		86	125	76	0
PRETORIA		863	844	1 395	2 147
TOTAL		**12 698**	**16 074**	**16 838**	**15 134**
			CAPITAL EXPENDITURE (R MILLIONS)		
BLOEMFONTEIN	7	68	132	121	141
CAPE TOWN	10	47	65	140	191
DURBAN	52	123	138	215	270
JOHANNESBURG	8	78	101	89	100
PRETORIA	23	126	148	243	354
TOTAL	**100**	**442**	**584**	**808**	**1 056**

TABLE NO 8.13 NUMBER OF ELECTRIFICATION CONNECTIONS, WITH CAPITAL COSTS MADE BY ESKOM: 1990-1995

Source: Eskom's National Electrification Planning Division.

4.0 CONCLUSIONS

This chapter has shown that, despite difficulties encountered with the non-payment for electricity, and the seeming lack of a cohesive planning regime involving government input embracing the incorporation of land reform schemes and urban and rural growth points, Eskom, working alone, exceeded their original plan to electrify 700 000 houses in the period 1990-1996 by 252 473 connections by 1995, the total number of houses electrified being 952 473. Furthermore, although Eskom's forecasted electrification programme provided for the supply of electricity to urban formal low income and informal planned houses only, the Corporation succeeded also in electrifying 60 744, farm workers dwellings, between 1990 and 1995. With regard to the electrification of schools and clinics this was shown to lag far behind the efforts made to electrify households. The emphasis on household electrification can perhaps be understood, however, given the poor living conditions of the majority of black South Africans and the unrest caused by poor services provision that occurred in Greater Soweto in the period 1985–1990. With the advent of the RDP government intervention in Eskom's electrification programme was seen to take place. The RDP intervention did not mean, however, that a detailed governmental electrification policy for South Africa had been formulated, such a policy was still a thing of the future. The RDP simply meant that Eskom's electrification programme was to be expanded to include rural areas which, as the average connection costs have shown, would put an increasingly heavy financial burden on Eskom in future and tend perhaps to slow down the process of bringing electricity to black households.

CHAPTER 9

THE FINANCIAL AND ECONOMIC IMPACTS OF ESKOM'S BLACK HOUSEHOLD ELECTRIFICATION PROGRAMME: 1990-1995

1.0 INTRODUCTION

The purpose of this chapter is to quantify the financial and economic impacts of Eskom's programme to electrify black households in South Africa in the period 1990-1995. The important questions that have to be addressed in this regard are as follows:

1) Was the financial cost of the programme greater than expected?
2) What was the magnitude of the cross-subsidisation necessary to sustain the programme?
3) How large were the economic benefits arising from the programme? And
4) How did these economic benefits compare with the postulated benefits?

The financial cost of the programme will be considered first and then the various economic benefits will be discussed. The economic benefits will be divided into their socio-economic, micro-economic and macro-economic components for ease of exposition.

2.0 THE FINANCIAL IMPACT

Prior to presenting a table of historical capital, operating and maintenance costs and revenue arising from Eskom's programme to electrify black households in South Africa in the period 1990-1995 some attempts which were made in 1992 to estimate the programme's financial impact on Eskom itself will be discussed. These results are important since, as will be shown, they allowed Eskom to know in advance the magnitude of the subsidies the Corporation would be called upon to provide to sustain the programme to electrify black households up to 1995.

Three different reports that estimated the financial impact of Eskom's electrification programme were produced. Early in March 1992 the first report was completed. On the 10th April 1992 a second report was produced and quickly thereafter in mid-June 1992 the third report was produced (see Els 1992). Each of these reports were based upon the same analytical approach, and subsequent analyses simply recorded newer information as it came to hand thus enriching the results. Because these reports were important in formulating financial strategies for Eskom in

meeting their electrification programme there is value in briefly discussing the third and most up-to-date of Eskom's reports here.

The methodology for all three reports was that Eskom's electrification programme was modelled on the basis that it was a stand-alone project taking into account:

a) Cost savings resulting from the restructuring of Eskom in 1991 described earlier;
b) Eskom's projected financial results for 1992 which were known with a degree of certainty;
c) The 1992-1997 electricity sales projections;
d) Expected primary energy costs over the period;
e) Eskom's capital investment plans for the period;
f) The targeted connections for the period; and
g) Energy consumption per dwelling.

The targeted connections for the period were increased in the third report from 700 000 in the previous reports to 912 000 as a result of detailed research undertaken by Eskom's Marketing and Electrification Departments. In arriving at this number of potential connections the following factors were taken into account:[349]

a) Permanence of occupation, i.e., problems of migration;
b) Lack of infrastructure i.e., distance from the national grid and access to other services such as water;
c) Affordability criteria; and
d) Alternative energy sources, i.e., use of fuelwood, candles etc.

The electrification consumer mix was further refined in this third report from the formal urban, high-density informal and low density informal households specified in the two earlier reports, to Townships, villages, informal squatter camps and rural farm worker dwellings. The breakdown was as shown in Table No 9.1 below.

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[349] This targeted figure was very close to be actual number of household connections made by Eskom in the period 1990 – 1995 which amounted to 952 473, households and 60 744 farmworkers dwellings making comparisons between the theoretical and actual financial impact of Eskom's electrification programme very meaningful.

AREA CLASSIFICATION	TOWNSHIPS %	VILLAGES %	INFORMAL %	FARM WORKER %
ESTABLISHED	85	40	30	10
GROWING	10	45	40	30
SUBSISTENCE	5	15	30	60

TABLE NO 9.1 CONSUMER MIX ESKOM'S ELECTRIFICATION FINANCIAL REPORT: 1992
Source: Eskom Financial Planning Department Report (1992, Annexure A, p.3).

The connection costs varied from R 1 000 to R 5 000 each depending on the length of line from the grid to the supply point.[350] The energy consumption per dwelling, which has previously been targeted as being one of the most critical pieces of information in determining the viability of Eskom's electrification programme was based on the location of the consumer. In an "established" area the consumption was estimated to grow from 110 to 450 kWh/month. In a "growing" area the range would be from 90 to 300 kWh/month and in a "subsistence" area the range was estimated to be 60 to 160 kWh/month. Operating Costs presented a problem since little information was available on this item at the time. Indications from Eskom's Distributors suggested that these costs ranged from R 20 to R 30 per month per household. A figure of R 12 per household was eventually used in the analysis. The tariff used was Eskom's S1 Tariff amounting to 18,84 cents/kWh in 1992.

Based upon the information outlined above Income and Cash Flow Statements were produced, these are shown below in Table No 9.2 and Table No 9.3 respectively for the years applicable to this study.

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350 These were very reasonable assessments if the actual costs shown in Fig No 8.1 in the previous chapter are compared with them.

ITEM	1992	1993	1994	1995
REVENUE	13,8	57,2	128,1	237.0
PRIMARY ENERGY	1,3	5,4	12,0	22,6
OPERATING COSTS	11,5	53,6	96,8	145,4
DEPRECIATION	16,7	53,5	99,6	151,9
INCOME	(15,7)	(53,3)	(80,3)	(82,9)
FINANCE CHARGES	40,7	137,7	272,7	440,1
NET INCOME	(56,4)	(193,0)	(353,0)	(523,0)

TABLE NO 9.2 ABRIDGED INCOME STATEMENT IN MILLIONS OF RAND: ESKOM'S ELECTRIFICATION FINANCIAL REPORT 1992
Source: Eskom Financial Planning Department Report (1992, p.5a).

ITEM	1992	1993	1994	1995
NET OPERATING INCOME	(15,7)	(55,3)	(80,3)	(82,9)
NON CASH ITEMS	16,7	53,5	99,6	151,9
	1,0	(1,8)	19,3	69,0
FINANCE CHARGES	40,7	137,7	272,7	440,1
OPERATING CASH FLOW	(39,7)	(139,5)	(253,4)	(371,1)
CAPITAL EXPENDITURE	469,2	563,9	730,2	738,7
NET FUNDING REQUIREMENT	508,9	703,4	983,6	1 109,8

TABLE NO 9.3 CASH FLOW STATEMENT IN MILLIONS OF RAND: ESKOM'S ELECTRIFICATION FINANCIAL REPORT 1992
Source: Eskom Financial Planning Department Report (1992, p.5a)

The salient features arising from these income and cash flow statements are the following:

a) Net income was negative in every year peaking at R 523 million in 1995;

b) There were operating losses in every year peaking at R 82,9 million in 1995; and

c) Debt, represented by net funding requirements, occurred in each year peaking at R1 109,8 million in 1995.

In Table No 9.4 below the results of updated (calculated in 1998) historical costs incurred and revenues earned in the years 1992 to 1995 from Eskom's electrification programme are presented.

ITEM	1992	1993	1994	1995
CAPITAL COSTS	441 871 000	584 414 000	807 992 000	1 055 467 000
PRODUCTION COSTS[351]	53 479 763	131 198 853	227 890 115	348 507 058
REVENUE	31 650 625	66 982 447	120 347 606	190 830 113
NET FUNDING REQUIREMENT	463 700 138	648 630 406	915 534 509	1 213 143 945

TABLE NO 9.4 ESKOM'S ELECTRIFICATION PROGRAMME HISTORICAL COSTS AND REVENUE IN RAND: 1992 – 1995
Source: Eskom's National Electrification Planning Division.

Examining the results of Eskom's 1992 financial analysis given above in Table No 9.3 and the historical financial figures gathered for Eskom's actual electrification programme given in Table No 9.4 reveals an interesting comparison bearing in mind the number of electrical connections estimated in the 1992 financial analysis was very close to the actual number of connections achieved by Eskom in their electrification programme up to the 31st December 1995.

The net funding requirement, i.e., the actual financial shortfall that occurred from Eskom's electrification programme in the years 1992 to 1995, and which had to be cross-subsidised by other electricity users, was year-on-year, very similar to that postulated in the ex-ante financial analysis undertaken by Eskom. These figures are compared for convenience in Table No 9.5 below.

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[351] The Production Costs are the costs of generating the electricity delivered to the electrification programme and the operation and maintenance costs involved in the production process.

YEAR	1992 ANALYSIS	HISTORICAL APPRAISAL
1992	509	464
1993	703	649
1994	984	916
1995	1 110	1 213

TABLE NO 9.5 COMPARISON OF PROJECTED AND ACTUAL ELECTRIFICATION FUNDING REQUIREMENT IN MILLIONS OF RAND:1992 - 1995

It can be seen from Table No 9.5 that it was only in 1995 that the historical costs exceeded the projected costs.

The fact that Eskom's management knew from 1992 that continuing with their black household electrification programme would negatively affect their financial position suggests that the political imperative for doing so was paramount. The fact that the financial impact of the electrification programme on Eskom was only analysed some two and one half years into the programme also tends to support the view that politics, not economics, was the deciding factor in Eskom's decision to undertake the programme in the first place. Because the programme would require large cross-subsidisation it is suggested that the BEPA analysis which postulated that the programme would provide the nation with very large macro-economic benefits was therefore all important so far as that decision was concerned.

Before discussing the macro-economic analysis one further point in connection with the ex ante study and the historical figures resulting from Eskom's electrification programme needs to be considered. Comparisons between the capital costs of Eskom's electrification programme shown in Table No 9.3 reveal that the programme's projected capital costs in the years 1993, 94 and 95 were all less than the actual, as shown in Table No 9.4 above. The years 1994 and 95 were particularly troublesome in this regard. The actual extra capital expenditure over the budgeted expenditure being R 317 million in 1995 alone. The divergent capital costs in the years 1994 and 1995 can at least be partially explained by Eskom making more peri-urban and rural connections at high cost than had been envisaged in the theoretical financial analysis as a consequence of the RDP. The establishment of the RDP was the essential departure point between Eskom's theoretical financial appraisal of its electrification programme and reality. It was obvious therefore that as the electrification programme embraced more peri-urban and rural areas, particularly deep rural areas of the country, the capital costs involved would greatly increase. This problem was discussed earlier when reasons were given for Eskom electing to concentrate, at least initially, on electrifying black households in urban areas. In May 1993 Eskom had issued

their Electrification Participation Note 01, to fund the electrification of some of the houses Eskom had originally targeted for electrification. Eskom was of course aware that rural electrification would be more costly than urban electrification and with more and more rural areas being scheduled for electrification after 1994 it is easy to see why in October 1994, and according to Eskom, to meet "the changed dynamics of the programme" the Corporation proposed the issue of a new Electrification Participation Note i.e., EP No 02.[352]

The broad characteristic of the Participation Note was that investors would share the financial risks being undertaken by Eskom as a consequence of the Corporation embarking on their electrification programme.[353] The risks mentioned being that Eskom may not be able to escalate electricity tariffs in an economically viable fashion and the possibility of actual electricity consumption levels being lower than forecast, which, as has been shown already, was a known fact. Several socio-economic inducements were added for potential investor's consumption e.g., the purchase of participation notes would "make enormous strides towards bringing electricity to the nation as a whole" and they would "seek to provide a meaningful kick start to the economy over the next few years" they would in addition "bring immeasurable environmental and health benefits to millions of people as well as benefits to the country and it's ecosystem as a whole"[354] and finally they would "provide the private sector with a direct investment into one of the most significant components of the Reconstruction and Development Programme", (Participation Note prospectus, 1994, p.28). Calling into question "kick starting" the economy Professor Colin MaCarthy of Stellenbosch University observed in Business Day (6th September 1991) that "economic quick fixes did not exist". Whilst MaCarthy's comments were directed at the Nedcor Old Mutual scenarios for South Africa where housing for the poor was postulated as a way of "kick starting" the economy, it seems that electrifying black households in South Africa was now being viewed in the same light. Eskom's Participation Notes were therefore not without risk and building on what McCarthy said in 1991, and as will be shown in the next section, Eskom's electrification programme was as equally incapable of "kick starting" the South African economy into life as was the scheme to house the poor.

Three other financial analyses concerned with electrifying South Africa's black households deserve mention. These are the Van Horen analyses (1993 and 1994) and an analysis undertaken by Mark Davis (1997). These analyses considered a long-term national electrification programme

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352 See Theta Securities Prospectus 1994.

353 Investors were assured that "the risk of bad debts has been largely eliminated by making use of prepaid meters in all new connections", (Participation Note Prospectus 1994,p.19). From what has been said already, concerning some consumer's ability to "bridge" such meters this was an optimistic view.

354 The health benefits of Eskom's electrification programme will be discussed in the next section.

spanning 20 years from 1992 to 2011. Future scenarios were developed embracing urban and rural electrification. Both analyses report the need for cross-subsidies and the fact that debt accumulation would be substantial at the end of the period i.e., 2011. The importance of the studies rests on the future economic impact of electrifying black households in South Africa and not on their historical content since they are both essentially concerned with future electrification financial problems.

3.0 THE SOCIO-ECONOMIC IMPACT

Widespread access to electricity impacts the socio-economic condition of a country in many ways. Unfortunately historical data on the socio-economic aspects of Eskom's electrification programme is rather sparse and apart from recording the numbers of electrical connections made in rural clinics and schools, which has already been commented upon, little else has been recorded in detail with respect to those developments in the period 1990 -1995. What has received some attention, however, is the health impacts of electrifying both urban and rural homes, including farm workers dwellings, and the social consequences of fuelwood gathering. These two topics will therefore be the theme of this section.

3.1 Health Hazards

With regard to health hazards the provision of electricity to homes can reduce respiratory disease from the inhalation of coal and fuelwood fumes. Evidence from studies undertaken in China, India, Nepal, Nigeria, Papua New-Guinea and South Africa itself all suggest that there is a strong relationship between indoor combustion of coal and biofuels with their accompanying high concentrations of airborne particulate matter and respiratory infections. The most serious of these infections are bronchitis and pneumonia in children, and chronic bronchitis and other pulmonary diseases in adults, particularly amongst women, (Smith, 1987). It therefore follows that with the elimination of coal and wood-burning stoves that would eventually come about from the complete electrification of the black households in South Africa a major contribution to the health of the South African public could be achieved.

The impact of wood and coal burning stoves used for cooking and heating purposes have also been the subject of research in the period of this study. Such stoves have generally high emission factors of $C0_2$ which is an important green-house related gas. Data for South Africa published by the President's Council in 1991 states that with respect to such stoves households contribute 8 million tons of CO_2 annually to air pollution. Because South Africa has a dual economy the

situation with regard to air pollution is exacerbated. This is because not only is there air pollution from first-world production factors but also from the vast number of coal and wood-burning stoves existing in the lesser developed areas of South Africa.

So far as the geographical distribution of South Africa's coal resources is concerned they are confined to two areas of the country, the Eastern Transvaal Highveld (ETH) and the Waterberg coalfields. More than 80 per cent of South Africa's coal comes from the ETH, however, and about 75 per cent of the fossil-fuelled electricity supplied to South Africa is also generated in this area by Eskom, (see Chapter 3). Furthermore the greatest concentration of black townships such as Greater Soweto and Alexandra are also located in this region. Although Greater Soweto had been electrified by 1986 and many of the larger black townships in the ETH were undergoing electrification between 1990-1995 coal burning stoves were still widely used for cooking and space heating purposes in these townships. Hence the problem of health hazards emanating from the use of coal-based energy sources is concentrated in the ETH.

In the rural areas of South Africa the use of fuelwood is widespread, particularly amongst farm labourers dwellings. Terblanche (1993) has monitored the exposure of such households to fuelwood emissions. Total volatile organic compounds were measured inside cooking areas and outside dwellings. In addition personal monitoring was carried out on 15 children aged 8-12 years. The results of these studies confirmed the findings of other studies carried out in Africa and the conclusion was that "the levels of both gaseous and particulate pollutants measured in indoor environments have potentially serious health risks", (Terblanche, 1993, pp.38-42). The levels of carbon monoxide recorded inside cooking huts were also a cause for concern and added to the risks of biomass fuel usage indoors.[355] Terblanche (1993, p.43) also reported that in winter in many unelectrified houses in South Africa "the whole family will gather round the fire and may even spend the night there in the case of severe winter conditions". The infant mortality rate for acute respiratory illness in South African rural areas as a consequence is almost 15 deaths per 100 000 of the population compared with 2 deaths for North America, WHO (1988). This indicates the importance of electricity provision in combating the health hazards of traditional fuel usage in homes in South Africa's black townships and rural areas.

Whilst information on the health effects of domestic coal burning was sparse in the period 1990-1995 there was a study undertaken in the PWV by Terblanche, Nel and Opperman, (1992). This study consisted of personal monitoring of 45 children between the ages 8-12 years in coal-burning townships; the results indicated extremely unacceptable levels of exposure to air

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[355] Peak levels of 900ppm lasting from a few seconds to minutes were recorded. The one hour health standard for such a situation in the USA is 35ppm, (Terblanche 1993, p.41).

pollutants, (Terblanche, Nel and Opperman, 1992, pp.41-44). Another problem connected to Eskom's electrification programme between 1990 - 1995 and health hazards in the PWV region was that whilst there were many electrified areas, including Greater Soweto, there were also many unelectrified houses which emitted air pollution from coal burning stoves which carried great distances thereby affecting the health of people actually living in electrified houses. A further complication was that in partially electrified houses[356] about 45 per cent still used coal-burning stoves for cooking and about 40 per cent used wood for space heating purposes.[357] This suggests that partial electrification will not control the health hazards occasioned by fossil and biomass fuel usage. Eskom's "Electricity for All" initiative is then much more relevant than the coiners of the phrase thought possible in curbing respiratory illnesses.

The most common pollutants produced by all domestic fuels are particulates followed by sulphur dioxide (mainly from coal), nitrogen oxides from coal, wood, paraffin and gas, and the volatile organic compounds produced from the usage of all biomass fuels and coal. The health problems which can be caused by exposure to these air pollutants from domestic fuel usage varies from acute eye irritations, chronic pulmonary disease and cardio-vascular disease, (Terblanche, 1993, p.45). Access to electricity can mitigate against these health hazards particularly those arising from the use of coal and wood burning which were the most widespread fuel usage categories in black households and the most dangerous.

Because of its concern with health matters, and to also promote electrification, Eskom funded a three year research project to try and quantify the health benefits of its original electrification programme; it will be recalled that this programme involved electrifying 700 000 homes in the period 1991 to 1996.[358] This research project was undertaken by the Medical Research Council's Community Health Research Group in conjunction with Eskom; results from this research are reported in Yach et al (1994). Part of this research was to determine the impact of Eskom's electrification programme on the financial repercussions of changes in the demand for health services.

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356 Houses with a plug for lighting and a few basic electrical appliances such as kettles or irons etc.

357 In fully electrified houses the householders, in 2 per cent of the cases, also used coal for cooking purposes, (Terblanche, 1993, p.50). Van Gass, (1992, p.311) has also stated that 22 per cent of newly electrified houses in Greater Soweto continue to use coal stoves. Kgatle, (1988, p.19) also confirms that the use of coal stoves in electrified dwellings is because they perform multiple functions such as cooking and heating.

358 As has been shown in Chapter 8 this electrification programme was amended to include the requirements of the RDP introduced by the Government of National Unity in 1994.

The first stage of the investigation was to determine the extent to which the access to electricity lead to its actual utilisation. The focus was directed on lower income groups of the South African population comprising blacks, coloured and Asian households. Monthly household energy consumption figures by electrified and unelectrified households were used to estimate the expected change in air pollution levels. This estimate was then translated into an impact on respiratory infection morbidity and mortality rates.

With respect to paraffin usage the total health impact of paraffin poisoning was represented as 30 hospitalisations for every million litres of paraffin sold. Using monthly energy consumption figures paraffin consumption was calculated both for the energy used prior to and post Eskom's electrification programme. Additionally the impact of the electrification programme on the number of burn mortality cases was estimated. This was done by using the burn mortality rate of South Africa's white population as a proxy for newly electrified black households.

The results of the analysis, see Table No 9.6, suggests that as a consequence of electrification for the duration of Eskom's programme to electrify 700 000 houses between 1991 and 1996, morbidity due to respiratory infections would fall by an average of 76,5 per cent, paraffin poisoning was expected to decrease by a total of 4 899 cases and an average reduction of 35 065 burn cases could be expected. In financial terms the direct savings to South Africa's health services as a consequence of Eskom's electrification programme amounted to R 763, 63 million (1994 rand), (Delport, cited in Yach et al 1994). In addition to these savings there would of course be benefits to the economy from a reduction in man hours lost in the workplace from respiratory illness as a direct result of the electrification of black households. No historical studies on such benefits could be found, however.

COST ITEM	RESPIRATORY INFECTIONS	PARAFFIN POISONING AND BURNS	TOTAL
Reduction in total cost of transport to GP's	R3 203 664.11	R0.00	R3 203 664.11
Reduction in total cost of transport to specialists	R469 694.65	R0.00	R469 694.65
Reduction in total cost of ambulance transport to hospital	R6 444 061.47	R0.00	R6 444 061.47
Reduction in total cost of public & private transport to hospital	R981 971.39	R0.00	R981 971.39
Reduction in total GP consultation cost	R49 165 142.17	R0.00	R49 165 142.17
Reduction in specialist consultation cost	R29 065 263.00	R0.00	R29 065 263.00
Reduction in total state hospitalisation cost	R267 407 648.30	R406 893 573.30	R674 301 221.60
Reduction in total private hospitalisation cost	N/A	N/A	R0.00
Reduction in total drug costs	N/A	N/A	R0.00
Reduction in total direct cost	**R356 737 445.10**	**R406 893 573.30**	**R763 631 018.40)**

TABLE NO 9.6 DIRECT HEALTH COST SAVING DUE TO ELECTRIFICATION, (1994 RAND)
Source: Delport, 1994, Table 5 cited in Yach et al (1994).

Whilst the figures in table No 9.6 are impressive they are of course only estimates since historically electricity usage data suggests that low-income households can generally not afford to use the amount of electricity (i.e., equivalent to white household usage) required to dispense with coal and fuelwood usage entirely, see the statistics in Table No 8.8 in the previous chapter). The health hazards attached to traditional energy usage will therefore remain in South Africa for many years to come. In this respect Terblanche, (1993, p.74) has estimated that the health risk of living in partially or unelectrified areas is 130 per cent higher than living in a totally electrified area. The striking lack of significantly decreasing health risks from living in a partially electrified area re-emphasises the importance of total electrification. Lerer in Yach et al, (1994) supports this assertion stating that "it is clear electrification is the key to the reduction of indoor air pollution". Lerer does add a note of caution regarding the juxtaposition of indoor household pollution and air pollution from Eskom's power stations supplying electricity to newly electrified areas. It is important to note in this respect, however, that emissions of SO_2 per unit of energy generated can be controlled and managed much more efficiently by Eskom in their power stations, by for example very high chimneys which disperse the emissions of SO_2, thus diluting the health hazard in a much more effective manner than can be expected from the emissions arising from coal and wood-burning stoves in black households.[359] It would appear that the important negative socio-economic externality concerning the health hazard associated with coal and fuelwood usage can be internalised by a total electrification programme. To demonstrate the effects of electrification with regard to sulphur dioxide and particulate emissions Figs No 9.1 and 9.2 are presented below.

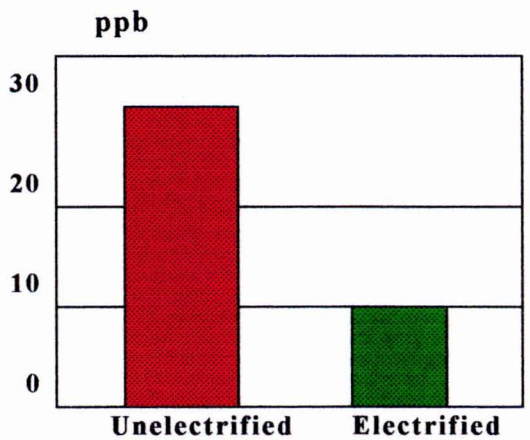

FIG NO 9.1 ELECTRIFIED AND UNELECTRIFIED HIGHVELD BLACK TOWNSHIPS: SULPHUR DIOXIDE CONCENTRATIONS
Source: Turner (1990, p.20 Fig No 10).

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[359] Chimneys in Eskom's modern power stations are 300 metres high and are built for just this purpose.

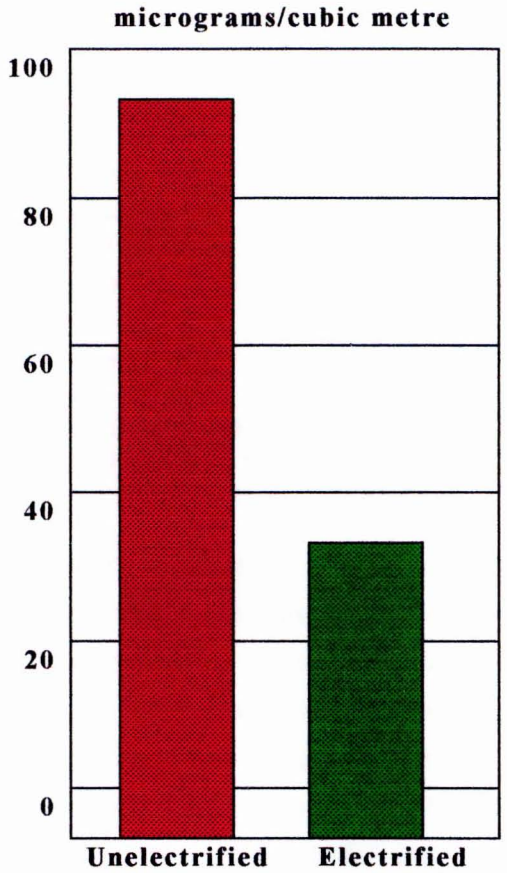

FIG NO 9.2 ELECTRIFIED AND UNELECTRIFIED HIGHVELD BLACK TOWNSHIPS: PARTICULATES CONCENTRATIONS
Source: Turner, (1990, p.20 Fig No 10).

It can be seen from these figures that so far as sulphur dioxide emissions are concerned electrification can reduce the hazard by about 70 per cent and with respect to particulates the reduction amounts to about 67 per cent.

3.2 Fuelwood Gathering

The use of fuelwood for cooking and heating has a further socio-economic negative externality in addition to the respiratory diseases associated with the combustion process that may be alleviated by electricity provision to rural areas. This additional externality concerns the private costs of buying fuelwood in South Africa, which is considered to be a cheap energy source but does not

take into account the costs of replanting deforested areas of the country.[360] With respect to fuelwood use and deforestation Gander, (1991, p.14) has estimated that the fuelwood usage per capita/per annum used by households in selected areas of South Africa is as shown in Table No 9.7 below.

REGION	KG/PER CAPITA/PER ANNUM
EASTERN TRANSVAAL	792
WESTERN TRANSVAAL	818
NATAL	934

TABLE NO 9.7 FUELWOOD USAGE IN SELECTED AREAS OF SOUTH AFRICA: 1991
Source: Gander, (1991, p.14).

Eberhard, (1986, p.105) estimated that on a national scale the per capita usage of fuelwood per annum amounted to 800kg, which figure seems to confirm Gander's later regional findings. The total consumption of fuelwood per annum has also been estimated and amounts to 12 million tons and the replacement regime is considerably less than this figure, hence fuelwood in South Africa is gradually being denuded, (Van Gass and Barnard, 1991, p.10). One of the problems of tracking fuelwood usage is the fact that it is an unregulated fuel source, and this adds to the destruction of fuelwood sources by private individuals for either their own use or for selling. Fuelwood shortages are a feature of all developing economies as a consequence, (Pearson and Stevens, 1989, p.132). The cost of fuelwood as a percentage of household income varies throughout South Africa and costs are higher in urban than in rural areas where often families undertake fuelwood gathering rather than buying it. Fuelwood purchases are then informal and not part of the economic structure of South Africa, yet they have important consequences on the amount of disposable income an urban family is left with after such purchases. In South Africa's metropoles the costs of fuelwood as a percentage of household income at the start of Eskom's electrification programme was almost zero in Durban, in Pretoria it amounted to about 7 per cent, in The Vaal Triangle the figure was about 13 per cent (Van der Berg, 1990, p.47); this figure represents a significant percentage of a households' disposable income.

Another aspect of fuelwood usage is the shadow price of the fuel as represented by the opportunity cost of the time spent gathering it. Gathering fuelwood is usually undertaken by women, children or unemployed members of a family. According to Jooste and Nortje (1987,

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[360] Fuelwood is in fact not a cheap energy source. Van Gass estimates that on average it is three times more expensive than electricity per unit of energy generated, (Van Gass 1992).

p.55) the time taken to gather fuelwood amongst farm workers (the group that uses this energy carrier the most) is shown in Table No 9.8 below.

HOURS/WEEK SPENT GATHERING FUELWOOD	PERCENTAGE OF FARM WORKERS HOUSEHOLDS
1 – 2	13
3 – 4	14
5 – 6	10
7 – 8	20
GREATER THAN 8	6

TABLE NO 9.8 TIME SPENT GATHERING FUELWOOD
Source: Jooste and Nortje, (1987, p.55)

These figures show that 20 per cent of farm worker households spend at least 1 day per week gathering fuelwood for cooking and heating purposes. In addition to this time there is of course the time required to prepare a fire, heat water for cooking or washing and the time taken to cook a meal over a fire. These times are all in excess of the time taken to do the same tasks if electricity is available to replace fuelwood. Eskom's electrification programme has then the potential to increase a household income by people utilising the time spent in gathering fuelwood on more productive pursuits such as low-input sustainable agricultural cultivation or making a contribution to inward industrialisation in the form of home industry development. Electrifying rural areas would furthermore, allow families more time together as the time spent in gathering fuelwood is reduced and in particular it would relieve women of arduous chores.

The comment about fuelwood shortages in developing countries made above by Pearson and Stevens, (1989) can be translated into a local context for South Africa where fuelwood gathering has already caused shortages which began to be felt as early as 1991 at the beginning of Eskom's electrification programme. Table No 9.9 below illustrates the degree of fuelwood shortages reported by percentage of farm workers in selected areas of South Africa.

DEGREE OF FUEL WOOD SHORTAGE	AREA (% FARM WORKERS)		
	NATAL MIDLANDS	NATAL CENTRAL REGION	EASTERN TRANSVAAL
SLIGHT SHORTAGE	11	27	42
SERIOUS SHORTAGE	24	18	8

TABLE NO 9.9 FUELWOOD SHORTAGES IN SELECTED AREAS OF SOUTH AFRICA
Source: Gander, (1991, p.24).

It is clear from Table No 9.9 that serious shortages of fuelwood do occur in areas of South Africa with 24 and 18 per cent of farm worker households reporting such shortages in Natal. The social costs associated with the time spent gathering fuelwood and the economic externalities attached to the denudation of the resource suggest that methods aimed at reducing fuelwood usage should be part of an educational programme attached to Eskom's electrification programme so that these externalities can be internalised, especially as households become used to using electricity over time. There is unfortunately, so far as can be determined, no definitive historical cost/benefit data available in South Africa on the opportunity cost of replacing fuelwood by electricity.

4.0 THE MICRO-ECONOMIC IMPACT

4.1 The Radio and Television and the Electrical Appliance Manufacturing Sectors

An important aspect of Eskom's electrification programme in the period 1990 -1995 was the impact it had on the sales of electrical appliances.[361] This section discusses this topic. Electrical appliances convert electrical energy into useful services within households and businesses. Appliance ownership patterns can therefore be seen as a barometer of the economic benefits, which arise from Eskom's electrification programme. Important influences on the sales of electrical appliances are climate and the availability and costs of other energy forms and since these vary throughout South Africa, appliance sales and energy usage patterns differ in various areas of the country. Consequently a multiplicity of energy carriers are used by many households. As well as these influences differences in the economic and social conditions of electricity consumers newly connected to the national grid from 1990 to 1995 also make it difficult to discern national trends in electricity usage and appliance ownership, (Van Gass, 1993, p.2). So far as the multiplicity of energy carriers used by households is concerned Data Research Africa (DRA) (1993, p.20) concluded that 95 per cent of electrified houses in South Africa still depended on other energy sources besides electricity in the period 1990 to 1995.

Usually the first use of electricity in a home is for lighting, which for many households is the most important benefit of Eskom's electrification programme. Eskom found, however, that newly electrified households were still using candles for lighting in rooms which did not have electricity plugs, extension cords not being very much used, (Van Gass 1993, p.7). This rather forcibly

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[361] In this section the term "electrical appliances" is taken to mean radios, hi-fi equipment and television sets as well as the more conventional goods such as kettles, irons etc.

demonstrates the multiplicity of energy uses. Research conducted by DRA (1993, p.66) suggested that the major reasons for this are as follows:

a) Lack of confidence in the reliability of electricity supply;
b) The use of traditional fuels for certain tasks;
c) Some non-electrical appliances handle a wide range of uses, e.g., coal stoves can be used for heating as well as cooking;
d) Affordability, i.e., the costs associated with electric appliance purchases;
e) The aim of "saving electricity" was important; and
f) In low income formal and informal houses access to electricity was not a feature of every room in these houses.

Appliance purchases were usually spread out over time by most households with preference, necessity and affordability governing which appliance was purchased first. Minimum electrical appliance purchases were, in rank order, Iron, Stove, Fridge and Kettle. The introduction of electricity, however, leads to rapidly changing appliance usage patterns as traditionally used non-electric appliances were replaced by electrical appliances, (Van Rensburg, 1994, p.33). Newly connected electricity consumers generally preferred new to second hand appliances and the purchase of the latter was a rare event, (Van Rensburg, 1994, p.31). The quality of the appliances bought was an important characteristic in buying patterns with instalment buying being generally the most popular means of acquiring appliances.[362]

It is suggested that electrical appliance purchases between 1990 and 1995 had four important economic effects, these being as follows:

a) They had a secondary impact on the South African economy, i.e., they stimulated the appliance industry from manufacturer through to retailing, creating employment and adding to GDP growth in the process;
b) As appliances were accumulated a more electricity intensive life-style was adopted in households;
c) Because, as mentioned above, appliances were usually bought on credit, the broad money supply (M3) in South Africa was increased; and
d) Because the import content of appliances purchased in South Africa was high the current account of the country's Balance-of-Payments was negatively effected.

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[362] Access to finance was a problem only to purchasers that could not provide some sort of security e.g., a stable income, (Van Rensburg, 1994, p.32)

In the period 1990 to 1994 several surveys were undertaken concerning the purchases of electrical appliances by electrified households. Examples of these studies are Englebrecht (1992), Hofmeyer (1993), DRA (1993), Van Gass for the NELF (1993) and Van Rensburg for the NELF (1994). The most influential of these studies are the DRA and Van Rensburg studies. The DRA study is particularly important since it produced a time-series of appliance purchases, which can be used to determine the micro and macro-economic impacts of electric appliance sales on the South African economy. The study itself was conducted in Kwa Zulu/Natal and covered 856 peri-urban and urban township dwellings, covering the mix of dwellings electrified in Eskom's national electrification programme. Two important conclusions (apart from those relating to the micro and macro-economic impacts to be calculated later) can be drawn from this study.

Firstly the purchase of electrical appliances followed a stepped pattern, i.e., there were periods when appliances were bought and periods when they were paid for and no further appliances were bought. This regime of purchase, accumulation and further purchase allowed low income households to amortise their hire purchase commitments. Appliances were by these means accumulated over many years with the more expensive ones such as TV sets and refrigerators reaching saturation level of around 80 to 90 per cent over a five year horizon.[363]

Secondly an indication of the most desirable appliances purchase could be discerned. The order being lamps for lighting purposes, (one of the universally prime images of newly electrified homes in South Africa)[364], audio systems such as radios and hi fi's, and electric irons with over 50 per cent of electrified houses buying these items in their first year after electrification. TV sets and refrigerators ranked second in importance as being the next most desirable electric appliance to own with over 50 per cent of electrified houses buying these items within 18 months of being supplied with power. Following on from these appliances, kettles and electric stoves (which replace hotplates as households progress in the plateau of appliance purchase and accumulation described above continued) were next in order of priority, and these achieved a 50 per cent saturation level after 3 years.

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[363] With respect to appliance purchases amongst newly connected black households in South Africa the situation parallels that of Western Europe in the 1930's where the transition from a non-electric way of life to one where electricity was widely used was influenced by social action, relationships and disposable income. In Europe the pattern of appliance purchases was also stepped reflecting the lack of means of purchases and changes in lifestyle that the acquisition of electric appliances brought, (Landes, 1972, pp. 338-339).

[364] Foley (1989, p.33) also mentions that people's desire to have electric lights is one of the strongest motivating factors for obtaining an electricity supply. It being virtually unknown for consumers to take a supply of electricity and not use it for lighting purposes.

The Van Rensburg, (1994) study presents a picture of consumer requirements pertaining to the acquisition and utilisation of electrical appliances amongst selected socio-economic groupings. These groupings include, like the DRA study, both peri-urban and urban households. This study was conducted by both a literature survey and a field study. The data is extensive but it does not offer a time-series of appliance purchase and is therefore of less use than the DRA study for purposes of determining the micro and macro-economic benefits of Eskom's electrification programme. It does, however, also contain data on the desire households showed for certain appliances, (which generally agrees with the DRA's ranking in this respect). Data on future purchases of appliances and the preferred retail outlets from which appliances were purchased is also provided in this report. The sample of 175 electrified households is considerably smaller than the DRA study. There is in addition 175 unelectrified households surveyed to compare situation and needs, however. An important observation in the Van Rensburg study is that the long-term appliance saturation levels i.e., 5 years plus, do agree with the DRA study results.

The accumulation of electrical appliances by household for the first and fifth years of the period 1990 - 1995 i.e., the time period covered in this study, in the areas surveyed by DRA are shown in Table No 9.10 below.

ELECTRICAL APPLIANCE	YEAR 1 (PERCENT)	YEAR 5 (PERCENT)
KETTLE	34	75
IRON	63	80
HOT PLATE	46	28[365]
TELEVISION SET	52	88
STOVE	15	75
REFRIGERATOR	42	82
GEYSER	2	9
HI FI SYSTEM/ RADIO	69	76
FAN	12	34
HEATER	13	41
FREEZER	6	19
TOASTER	2	11
SEWING MACHINE	4	6
FRYING PAN	3	8

TABLE NO 9.10 PERCENTAGE OF ELECTRIFIED BLACK HOUSEHOLDS OWNING VARIOUS APPLIANCES
Source: Condensed from the DRA Survey, (1993).

A particularly revealing statistic from Table No 9.1O is the percentage of television sets and Hi-Fi/Radios owned by newly electrified households. These percentage levels suggests that one of the main uses of electricity in low income electrified households is for entertainment, provided by radios and television sets. The Business Section of the Sunday Times on the 17th October 1993 observed in this respect that "the local manufacturing of TV tubes which to some extent can be linked to increased electrification could generate savings and foreign currency earnings of R 533 million per year".

Using the DRA time-series for the percentage of houses owning various electrical appliances and the total number of households electrified by Eskom between 1990 and 1995, the total number of electric appliances sold in South Africa as a result of Eskom's electrification programme can be estimated for the period. This estimate is shown in Table No. 9.11 below.

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[365] As mentioned above hot plates are replaced by electric stoves as the accumulation of electric appliances proceed year-on-year.

ELECTRICAL APPLIANCE	TOTAL NO OF APPLIANCES PURCHASED 1990-1995
KETTLE	467 998
IRON	700 058
HOT PLATE	49 513
TELEVISION SET	652 038
STOVE	385 785
REFRIGERATOR	578 110
GEYSER	47 449
HI FI SYSTEM/RADIO	718 631
FAN	201 182
HEATER	231 651
FREEZER	107 184
TOASTER	53 476
SEWING MACHINE	42 724
FRYING PAN	50 426

TABLE NO 9.11 ESTIMATED TOTAL NUMBER OF ELECTRICAL APPLIANCES SOLD AS A CONSEQUENCE OF ESKOM'S ELECTRIFICATION PROGRAMME: 1990 – 1995

Table No 9.11 graphically illustrates the impact Eskom's electrification programme made in the period 1990 to 1995 on the South African electrical appliance industry.

It would seem logical to assume that there is a connection between the demand for electrical appliances (and therefore electricity) and income levels. It is curious to note, however, that even in the inflationary economic climate of 1990 to 1995 there was strong growth in the demand for electrical appliances and TV sets and radios and hi-fi's. In this respect Van Gass (1993, p.20) has noted that "an unexplainable change took place in retail appliance rates despite the recession". It would seem then that the provision of electricity to black households in South Africa is a catalyst for the purchase of electrical appliances and of course as more appliances are bought the circle widens and there is a concomitant increase in the demand for electricity.

In attempting to estimating the impact made by the sales of radios, television sets and electrical appliances, (resulting from Eskom's electrification programme) on South Africa's main macro-economic variables, i.e., GDP, Balance of Payments (BOP) and employment creation use will be made of the historical time-series data on such sales in the period 1990 to 1995 presented in the DRA survey. The prices of such appliances (which when multiplied by the numbers of appliances

bought equals the change in final demand that sets the multiplier to work) are as given by research carried out for the NELF, see Van Gass (1993, Appendix 3). The numbers of houses electrified by Eskom are taken from Eskom's own records cf., Table No 8.13 Chapter 8. The quantification will be carried out by Input-Output analysis using the 1993 South African National Input-Output Tables. A list of the multipliers calculated from these tables is provided in Appendix A of this study. The direct, indirect and induced impacts are shown in the tables given below. These impacts give a truer estimation of the impacts than do the direct and indirect effects only since they include the contribution made by the private consumption expenditure of households. Table No 9.12 shows the estimated contribution to GDP and the Balance of Payments (BOP) burden and Table No 9.13 shows the contribution to employment creation.

YEAR	GDP R (MILLIONS)	BOP R (MILLIONS)
1990/91	75,03	(16,58)
92	475,95	(105,49)
93	892,65	(199,24)
94	1 323,82	(296,24)
95	1 868,99	(418,66)

TABLE NO 9.12 CONTRIBUTION TO GDP AND THE BOP BURDEN: ELECTRICAL APPLIANCE PURCHASES: 1990 –1995

YEAR	1990/91	1992	1993	1994	1995
S	373	2 072	3 490	4 761	6 157
S/S	1 137	6 306	10 621	14 492	18 739
L/S	989	5 482	9 234	12 598	16 292
TOTAL	2 499	13 860	23 345	31 851	41 188

TABLE NO 9.13 CUMULATIVE JOB CREATION FROM ELECTRICAL APPLIANCE PURCHASES: ESKOM'S ELECTRIFICATION PROGRAMME: 1990 – 1995

NOTES:

S: SKILLED LABOUR
S/S: SEMI-SKILLED LABOUR
L/S: LOW SKILLED LABOUR

THE CUMULATIVE EMPLOYMENT FIGURES INDICATE THAT WORKERS EMPLOYED IN ANY PARTICULAR YEAR INCLUDE THOSE EMPLOYED IN THE PREVIOUS YEAR SO THAT THE ACTUAL NEW JOBS CREATED IN ANY ONE YEAR IS THE NUMBER OF EMPLOYED IN THAT YEAR MINUS THE NUMBER EMPLOYED IN THE PREVIOUS YEAR.

The contribution to GDP from the sales of radios, televisions, hi-fi systems and electrical appliances, resulting from Eskom's electrification programme, was about 0,02 per cent in 1991 rising to about 0,5 per cent in 1995.

4.2 The Civil Engineering and Building Construction Sectors

The other two sectors of the South African economy that benefited directly from Eskom's electrification programme were the Civil Engineering and Building Construction sectors.[366] The work undertaken by these sectors included the building of transmissions networks, cable laying and providing the electrical services for houses by means of sub-contracting this work to specialists. In the period covered here 1990 to 1995 the work was almost exclusively carried out by Eskom approved contractors. These contractors were established firms that had a proven record of work with Eskom in the past. This process meant that in the period 1990 to 1995 there was essentially little black empowerment or capacity building in the kinds of work undertaken by Eskom's electrification programme so far as construction was concerned. This situation was to change after 1995 when black managed enterprises were encouraged to tender for such work.[367]

In attempting to estimate the impact made by work undertaken by the Civil Engineering and Building Construction sectors (as a result of Eskom's electrification programme) on South Africa's GDP, BOP and job creation use will be made of the historical capital expenditure on the programme given in Table No 9.4 above. This capital expenditure (representing the change in final demand which sets the multipliers to work) year-on-year started in 1990/91 as a very small percentage of the value of construction being carried out in South Africa being a mere 0,5 per cent. By 1995, however, this percentage had risen to 4,6 per cent, (Central Statistics Data 1996). Again I-O modelling is utilised for estimating the required multipliers and once more the direct, indirect and induced impacts are estimated for the reasons already given. The results of the analysis are shown in Tables No 9.14 and 9.15 below. Table 9.14 shows the amount of GDP generated year-on-year and also the Balance of Payments burden on the country's Current Account. In Table No 9.15 an estimate is given of the job creating potential of Eskom's electrification programme from economic activity in the building and civil engineering sectors over the years 1990 to 1995.

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366 Due to the multiplier effect, see Appendix A, all or most of, the sectors of the South African economy benefited indirectly from Eskom's electrification programme.

367 Telephonic conversation with Mr Paul Maré, 11th December 1998.

YEAR	GDP[368] R (MILLIONS)	BOP (R MILLIONS)
1990/91	163,46	(24,42)
1992	722,28	(107,90)
1993	955,28	(142,70)
1994	1 320,74	(197,31)
1995	1 725,27	(257,75)

TABLE NO 9.14 CONTRIBUTION TO GDP AND THE BOP BURDEN: CIVIL ENGINEERING AND BUILDING ACTIVITY: 1990 – 1995

YEAR	1990/91	1992	1993	1994	1995
S	656	2 651	3 182	4 065	4 871
S/S	2 695	10 461	10 461	16 039	19 222
L/S	2 381	9 242	11 096	14 170	16 982
TOTAL	5 732	22 354	26 837	34 274	41 075

TABLE NO 9.15 CUMULATIVE JOB CREATION FROM CIVIL ENGINEERING AND BUILDING ACTIVITY: ESKOM'S ELECTRIFICATION PROGRAMME: 1990 – 1995

NOTES:

S : SKILLED LABOUR
S/S: SEMI-SKILLED LABOUR
L/S: LOW SKILLED LABOUR

THE CUMULATIVE EMPLOYMENT FIGURES INDICATE THAT WORKERS EMPLOYED IN ANY PARTICULAR YEAR INCLUDE THOSE EMPLOYED IN THE PREVIOUS YEAR SO THAT THE ACTUAL NEW JOBS CREATED IN ANY ONE YEAR IS THE NUMBER OF EMPLOYED IN THAT YEAR MINUS THE NUMBER EMPLOYED IN THE PREVIOUS YEAR.

4.3 The Informal Sector

In addition to the costs and benefits (as recorded in increased GDP and job creation) of Eskom's programme to electrify black households in South Africa in the formal sectors of the South African economy discussed above, there were additional such benefits arising from what was strictly speaking business development in the micro-economy of the informal manufacturing sector. For purposes of continuity, it will be appropriate to discuss these benefits at this juncture. Eskom had, certainly from 1993 onwards, concerned itself with this aspect of their electrification programme and it will be recalled that each of Eskom's five distributors i.e., Bloemfontein, Cape

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[368] By 1995 Eskom's electrification programme was responsible for 13 per cent of the construction industry's contribution to South Africa's GDP, or about 0,4 per cent of the country's GDP, as measured from Central Statistics Data (1996).

Town, Durban, Johannesburg and Pretoria had a Co-ordinating Division with specialists in small business development. Additionally part of the R50 million annual contribution that Eskom made for the electrification of schools and clinics by others was earmarked for community development by means of small business development.[369]

Very little historical evidence is available, however, on the numbers of jobs created in the informal sector of the South African economy as a direct result of Eskom's electrification programme. What is available is reviewed here. In the Supplement to Eskom Annual Report (1991, p.17) it was stated that for every 100 houses electrified, 14 new jobs would be created in the informal sector. If this estimate was accurate it meant that in the period 1993 to 1995, based upon the number of households electrified by Eskom, 108 691 jobs would have been created. As will be shown presently this number is greater than the estimated job creating capacity of Eskom's electrification programme in the formal sector for this period. Eskom's initial estimate of informal sector job creation as a consequence of their electrification programme is therefore suspect and, like its macro-economic counterpart (the BEPA analysis), it was overstated by an order of magnitude. As a result of the efforts of Eskom's small business development consultants in the period 1993 to 1995 the total number of businesses established in the informal sector and the resulting job creation are shown in Table No 9.16 below.

	1993	1994	1995	TOTAL
JOBS CREATED	760	1 600	2 023	4 383
INFORMAL SECTOR ACTIVITY				
SMALL BUSINESSES ESTABLISHED	233	534	502	1 269
INFRASTRUCTURAL DEVELOPMENT			10	10
AGRO BASED BUSINESS			16	16
ENTREPRENEURIAL TRAINING			150	150

TABLE NO 9. 16 SMALL BUSINESS DEVELOPMENT FROM ESKOM'S ELECTRIFICATION PROGRAMME: 1993 -1995
Source: Eskom's National Electrification Planning Division.

The small businesses developed ranged from such things as Spaza stores, sewing and knitting businesses, welding and small mechanical repair facilities, to shebeens and bakeries. Infrastructural development included providing employment to people for maintaining simple aspects of the electrification programme's reticulation system. Agro-based businesses included

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[369] Interview with Paul Maré, 29th October 1998.

such activities as the maintenance of electrically-driven implements used on small farms whilst entrepreneurial training included training people in the use of electronic computers etc.

From the results shown in Table No 9.16, even if these represent a gross understatement of the informal jobs created, the reality of the situation was that the informal job creating potential of Eskom's electrification programme was limited. Some confirmation of the low figures for informal business creation can be found in the results of a survey carried out for Eskom by Integrated Market Research in three electrified informal settlements in 1993 and 1994. The number of businesses created in these settlements are shown in Table No 9.17 below.

SETTLEMENT	NUMBER OF BUSINESSES CREATED BETWEEN 1993-1995
IVORY PARK	(18)[370]
ORANGE FARM	22
STRETFORD	18
TOTAL	22

TABLE NO 9.17 INFORMAL BUSINESS CREATION IN SELECTED SETTLEMENTS: 1992 – 1994
Source: Integrated Marketing Research, (1994, p.5)

The types of businesses created were butcheries, shebeens, medical services, welding and dry cleaning. It can be seen from Table No 9.17 that the actual numbers of businesses created was small and in fact in Ivory Park in the period 1993 – 1994, 18 informal businesses closed down.

With respect to the creation of small informal businesses it was seemingly assumed by Eskom that in their original estimate of the job creating potential of their electrification programme access to electricity alone encouraged the development of a diversified informal business sector. The figures quoted in the tables above suggest that this assumption was incorrect. The Elandskraal electrification project confirms this. In this township Viljoen, (1993) showed that the development of small businesses was not primarily a function of the availability of electricity but that other supportive measures such as finance and managerial skills were equally important, see Chapter 8.

The limited existing historical evidence on small business development does not give a clear indication of electricity's role in such informal sector development, but it is suggested that Eskom's hopes in this regard were optimistic and the process is very much more complicated than the Corporation at first envisaged. Viljoen, (1993, p.54) maintains that electricity provision was

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[370] Indicates that 18 businesses closed down.

not an essential item in the small businesses he surveyed in Elandskraal and that "most will survive without it if forced to do so." A study by Theron (1991) also found that only 10 per cent of households operating informal sector businesses in Khayelitsha were dependent on electricity. In that study respondents were asked if they had been able to start an informal business as a result of being supplied with electricity, only about 7 per cent answered in the affirmative. The results presented above tend to confirm that electricity is not necessarily a sufficient condition for founding an informal type of business, and other inputs are required as well, particularly artisan skills and establishing businesses requires some capital for the purchase of essential equipment. Theron and van Horen (1992) have confirmed this and they too indicated that the development of small businesses is not primarily a function of the availability of electricity but that other support measures such as finance and managerial ability are equally important.

Inward industrialisation is nevertheless important as a development strategy and electrification is clearly useful in encouraging this. The rapid growth in urbanisation in South Africa, already commented upon, will create a demand for low-cost, low-quality goods that can be manufactured in the informal sector, particularly with the aid of electricity, e.g., simple welding tasks. Such activity will go some way towards generating economic growth. The historical evidence suggests, however, that this growth was lower than expected by Eskom. Inward industrialisation is, therefore, constrained by capital and skills needs. A low income elasticity of demand for products which are typical of this type of manufacturing process also tends to work against success in engendering economic growth in informal sector manufacturing. The historical evidence discussed in this section does suggest, however, that inward industrialisation does, offer a means of employment, and even skills acquisition, if sufficient capital can be mobilised to complement the supply of electricity to lesser developed areas of South Africa.

5.0 THE MACRO-ECONOMIC IMPACT

5.1 The BEPA Study

As mentioned in Chapter 8, on behalf of Eskom's Chairman Dr John Maree, The Bureau of Economic and Policy Analysis in the University of Pretoria undertook an analysis to calculate the macro-economic impact of electrifying 7,5 million black urban households between 1991 and 2015, i.e., 300 000 connections would be made annually. The results of this analysis were widely reported e.g., Business Day of the 24th December 1991 said " According to a study by Prof. Geert de Wet of Pretoria University, the electrification of 1 million households over three years could create 270 000 jobs and add 5 % to SA's GDP". Eskom itself made much of the results of the

BEPA study, see the supplement to Eskom's Annual Report, (1991, p.17), Eskom in Perspective. The economic benefits of Eskom's electrification programme as given in the BEPA study were also enthusiastically acclaimed in other research reports on electrification, for example Terblanche (1993, p.35) and Van Gass (1990). The results were clearly an important factor in Eskom's decision to undertake their electrification programme. The results of this analysis were, it is suggested, over optimistic and because of this and it's importance in Eskom's electrification programme decision making in 1990 it is considered appropriate to briefly comment on this report at this juncture.

The methodology used in the BEPA analysis was to determine the changes in black consumer patterns and investment arising from the electrification programme and then determine the direct and indirect economic consequences of these changes by means of macro-economic modelling using a Keynesian type multiplier. The investment figures in reticulation and transmission structures required for the programme were calculated in conjunction with Eskom in 1991 rand, as were the expected maintenance costs. These figures were then adjusted for inflation from 1991 to 2015 and then converted to 1985 rand. Known 1985 GDP and employment multipliers were then used to estimate the cumulative increase in GDP over the period of the study and the actual number of new jobs created by the electrification programme year-on-year.

With respect to black consumption patterns the BEPA analysis postulated that potential changes in these would be induced by the wholesale electrification of urban areas causing a shift in the consumption pattern of black households towards electrical and related goods and away from alternative more traditional sources of energy. It was assumed that this shift, would lead, inter alia, to the establishment of a whole range of new small manufacturing and maintenance industries in the black urban areas electrified. Comparing the results discussed in the last section with this statement it is suggested that this expectation was also optimistic. It was also posited that the impact of electrifying black urban areas would change the demand for the supply of technically superior goods and services which would have a dramatic effect on productivity and socio-economic improvements such as education. With respect to the maximum cumulative number of new jobs that would be created as a result of Eskom's electrification programme, the BEPA analysis estimates are shown in Table No 9.18 below.

YEAR	JOB CREATION
1995	300 000 – 600 000
2000	700 000 – 900 000
2015	1 800 000 - 2 250 000

TABLE NO 9.18 JOB CREATING POTENTIAL OF ESKOM'S ELECTRIFICATION PROGRAMME: BEPA ANALYSIS
Source: BEPA Report (1990).

And the influence on GDP was estimated to be as follows;

YEAR	MIN CUMULATIVE EFFECT ON GDP (INCREASE) %
1995	6
2000	11
2015	24

TABLE NO 9.19 CUMULATIVE EFFECT ON GDP FROM ESKOM'S ELECTRIFICATION PROGRAMME: BEPA ANALYSIS
Source: BEPA Report (1990).

The detailed macro-economic benefits that the South African economy would enjoy from electrifying black urban households in the period 1991-1995 in terms of increased GDP and job creation according to the BEPA analysis are shown in Table No 9.20 below.

YEAR	GROSS DOMESTIC FIXED INVESTMENT R (MILLIONS)		CONSUMPTION EXPENDITURE R (MILLIONS)			TOTAL R (MILLIONS)	DIRECT AND INDIRECT EFFECT ON GDP R (MILLIONS)	DIRECT AND INDIRECT EFFECT ON JOB CREATION, I.E., NO OF JOBS CREATED
	TRANSMISSION	RETICULATION	SOCIAL	DURABLE	NON DURABLE			
1991	276	62	616	743	237	1 934	5 802	185 664
1992	290	106	647	991	316	2 350	7 050	225 600
1993	304	150	678	1 239	396	2 767	8 301	265 632
1994	318	194	709	1 487	475	3 183	9 549	305 568
1995	332	238	740	1 735	554	3 599	10 797	345 504

TABLE NO 9.20 MACRO-ECONOMIC IMPACT OF ESKOM'S ELECTRIFICATION PROGRAMME: 1991 – 1995, BEPA ANALYSIS (1985 Rand)

Source: BEPA Report (1990).

In Table No 9.20 the multiplier used to arrive at the direct and indirect GDP (the Keynesian multiplier) was 3 and the employment multiplier was 32 (Appendix 6 of the BEPA Report), i.e. it required 32 workers to produce R 1 million of GDP in 1985. From an examination of Table No 9.20 it appears that a major error has occurred in calculating the GDP and employment creation arising from this electrification programme. The error is this. If the investment in the transmission and reticulation infrastructure is considered as the initial autonomous change that stimulates the income multiplier to work the related changes in black consumption and social investment cannot also be regarded as the stimulus. The figures under Consumption Expenditure in Table No 9.20 above should therefore be ignored when estimating the macro-economic impact of the electrification programme by means of a Keynesian type multiplier. Correcting Table No 9.20 results in a final growth in GDP and job-creating potential of the electrification programme being much smaller than that postulated in the BEPA Report. The corrected impacts are shown in Table No 9.21 below.

YEAR	GROSS DOMESTIC INVESTMENT (TRANSMISSION & RETICULATION) (R MILLIONS)	DIRECT & INDIRECT EFFECT OF GDP (R MILLIONS)	DIRECT & INDIRECT EFFECT ON EMPLOYMENT
1991	338	1 014	32 448
1992	396	1 188	38 016
1993	454	1 362	43 583
1994	512	1 536	49 152
1995	570	1 710	54 720

TABLE NO 9.21 MACRO-ECONOMIC IMPACT OF CORRECTED BEPA ANALYSIS (1985 Rand)

It must be remembered that the employment figure given in Tables No 9.20 and 9.21 are cumulative since, as was the case of the I-O analysis undertaken for the electrical appliance sector and the building and civil engineering sectors, the numbers of workers employed each year included those that were employed in the previous year. Comparing the results of Table No 9.21 with the results from Table No 9.20 it is seen that by 1995 instead of the electrification programme requiring 345 504 employees, Table No 9.20, it actually required only 54 720 i.e., about 16 per cent of the original estimate. So far as the effect on South Africa's GDP was concerned. This would similarly have to be adjusted downwards. The minimum cumulative effect on GDP by 1995 would now be one per cent rather than the six per cent postulated in the BEPA report. (see Table No 9.19 above).

5.2 Other Macro-Economic Electrification Studies

As a prelude to analysing the macro-economic impacts of Eskom's programme to electrify black households in South Africa between 1990 and 1995 using historical cost data it will be instructive to examine the main characteristics of three hypothetical economic studies of electrification programmes undertaken by other research organisations. These studies will be compared with the Eskom initiated BEPA study and later they will all be compared with the macro-economic impacts derived from historical data. In this way the degree of confidence engendered by the historically inspired calculations can be assessed.

The three studies referred to above are the Dingley Study (1990(a)) The EDRC study (1993) and the Human Sciences Research Council Study (HSRC) (1995), undertaken by Conningarth Consultants. Table No 9.22 below compares the main characteristics of each of these studies as well as the BEPA study already discussed.

CHARACTERISTICS 0F STUDY	DINGLEY (1990)	EDRC (1993)	HSRC (1995)	BEPA (1990)
PERIODISATION OF STUDY	1990 – 2010	1993 – 2007	1994 – 2010	1991 - 2015
GEOGRAPHICAL FOCUS	RURAL AND URBAN	RURAL AND URBAN	RURAL AND URBAN	URBAN
ANALYTICAL TECHNIQUE	NO FORMAL MODEL	NO FORMAL MODEL	SOCIAL ACCOUNTING MATRIX (SAMS)	MACRO-ECONOMIC
NUMBER OF CONNECTIONS/ YEAR	350 000	344 000	VARIES (AVE 388 000)	300 000
AVERAGE COST PER CONNECTION	R 2 000	R 3 000	R 1 465	R 2 480
AVERAGE ANNUAL CAPITAL EXPENDITURE[371]	R 700 MILLION	R1032 MILLION	R 604 MILLION	R 744 MILLION
JOB CREATION CUMULATIVE TOTAL	556 500	126 000-210 000	212 170	1 800 000-2 250 000
CUMULATIVE INCREASE IN GDP (%)	NOT GIVEN	NOT GIVEN	NOT GIVEN	24

TABLE NO 9. 22 COMPARISONS OF DATA FOR VARIOUS ELECTRIFICATION STUDIES

Source: Condensed from the Dingley, EDRC, HRSC and BEPA studies.

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[371] Capital expenditure is made up of house wiring, electricity reticulation and building and civil engineering costs.

From Table No 9.22 it can be readily seen that all the studies have certain important similarities (and differences). Firstly the size of each study's electrification programme is of the same order of magnitude, i.e., 7,35 million, 5,16 million, 6,6 million and 7,5 million houses respectively. The number of household connections/year in the Dingley, EDRC and BEPA studies, are comparable. The HRSC study has a varying number of connections per year from 450 000 in the period 1994-2004 to 50 000 in the years 2005-2010.[372] The BEPA assumption of 300 000 connection/year was just below the peak actually realised in Eskom's electrification programme in 1995 when 313 179 houses were connected to the grid. With regard to the costs of each connection with the exception of the costs given in the BEPA report they seem low, cf., the costs of rural connections given in Fig No 8.1 of Chapter 8 which increase dramatically over urban connections and would tend to increase the average connection costs shown in Table No 9.22 for the Dingley, EDRC and HSRC studies. So far as the BEPA study is concerned only urban formally planned dwellings are considered and the cost per connection also assumed (R 2 480) is conservative when the average cost for urban connections, also as given in Fig No 8.1, is considered. Furthermore the HRSC and BEPA studies are based on formal models whilst the Dingley and EDRC studies are not. Meaningful comparisons between the four studies cited in Table No 9.22 are, therefore, made with difficulty.

What is perhaps of importance, however, is the order of magnitude of the job creating potential of the different electrification programmes for an equal number of black houses electrified. Such a comparison between the BEPA electrification programme and Eskom's actual electrification programme is particularly important. This is because, and as was suggested already, the BEPA analysis played a role in Eskom's decision to proceed with a programme to electrify black households in South Africa in the period 1990-1995. Considering the EDRC study first the analysts postulate that between 9 000 and 15 000 jobs per year are created on average from their electrification programme. The Dingley study asserts that there would be 26 500 jobs being created each year as increases in domestic demand took effect which, explains the large difference in job creating potential between the two studies. The BEPA report presents job creation figures which, for the reasons already given, are incorrect by orders of magnitude. So far as cumulative totals are concerned the HRSC and the EDRC studies are comparable, however, particularly when the upper bound of the EDRC projections are considered.

What remains to be done now is to take the historical data that has been gathered by Eskom concerning the Corporation's electrification programme over the period 1990 - 1995 and

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[372] Connecting 450 000 households per year to the national grid is seen by Eskom as probably not feasible. Interview with Mr P Maré, 29th October 1998, (300 000 connections/year seemed to be the figure that Eskom was comfortable with).

estimate what this data suggests the historical macro-economic impact of this electrification programme over this period really was. The numbers of jobs created by Eskom's electrification programme can then be compared with the results obtained from the hypothetical electrification programmes described above. This is the subject of the following section.

5.3 Macro Economic Impact of Eskom's Electrification Programme Using Historical Data

In attempting to estimate the macro-economic impact of Eskom's electrification programme in the period 1990 to 1995 the effects of the micro-economic impacts discussed thus far will be summated and added to the effects of the programme on Eskom itself i.e., the micro effects will be drawn together to enable an estimation of the historical macro-economic effects to be made. For this purpose the following historical data for purposes of calculating changes in final demand that make the multipliers work has to be processed. Firstly, the times-series data on radio, television and electrical appliance sales resulting from research carried out by Data Research Africa (see Table No 9.10). Secondly the costs of such appliances arrived at from research carried out for the NELF by Van Gass (1998, Appendix 3). Thirdly, data gathered by Eskom itself concerning the capital costs associated with their own electrification programme (see Table No 9.4). Fourthly, data gathered by the NER on the average household electricity consumption pattern over five years (see Fig No 8.3 in the previous chapter), and finally data, again gathered by Eskom, on the number of households and farm workers dwellings electrified by the Corporation between 1990 and 1995 (see Table No 8.13 also in the previous chapter). The quantification of the macro-economic impact will, once again, be carried out using input-output analysis using multipliers derived from the 1993 national input-output tables for South Africa. In this analysis, however, both the direct and indirect, and the direct, indirect and induced effects will be estimated so far as the job creating potential of Eskom's electrification programme is concerned. As previously noted the direct, indirect and induced figures probably give a truer estimate of the programmes macro-economic benefits because they include the effects of the private consumption expenditure of households i.e., the input-output model is closed in this case. The direct and indirect employment effects are given because these are required for comparison purposes with the results of the employment potential of the four other studies on electrification programmes in South Africa given in Table No 9.22 above. The macro-economic impact of Eskom's electrification programme in the period 1990-1995 estimated by submitting the historical data cited above to input-output analysis is given in Table No 9.23 below.

	CLOSED MODEL				OPEN MODEL	
YEAR	GDP R (MILLIONS)	BOP R (MILLIONS)	DIRECT, INDIRECT AND INDUCED EFFECT ON EMPLOYMENT	CUMULATIVE EMPLOYMENT	DIRECT AND INDIRECT EFFECT ON EMPLOYMENT	CUMULATIVE EMPLOYMENT
1990/91	250,99	(41,69)	S 1 074	8 389	S 608	5 072
			S/S 3 889		S/S 2 421	
			L/S 3 426		L/S 2 043	
1992	1 248,66	(217,72)	S 4 823	36 951	S 2 781	22 414
			S/S 17 091		S/S 10 654	
			L/S 15 037		L/S 8 979	
1993	1 964,05	(351,94)	S 6 883	51 724	S 4 151	31 523
			S/S 23 856		S/S 14 856	
			L/S 20 985		L/S 12 516	
1994	2 846,85	(510,95)	S 9 164	68 605	S 5 368	41 595
			S/S 31 618		S/S 19 658	
			L/S 27 823		L/S 16 569	
1995	3,909,03	(703,51)	S 11 511	85 807	S 6 758	51 986
			S/S 39 514		S/S 24 539	
			L/S 34 782		L/S 20 689	

TABLE NO 9.23 MACRO-ECONOMIC IMPACT OF ESKOM'S ELECTRIFICATION PROGRAMME: 1990 –1995 USING HISTORICAL DATA.

NOTES: *S = SKILLED LABOUR*

S/S = SEMI SKILLED LABOUR

L/S = LOW SKILLED LABOUR

THE CUMULATIVE EMPLOYMENT FIGURES INDICATE THAT WORKERS EMPLOYED IN ANY PARTICULAR YEAR INCLUDE THOSE EMPLOYED IN THE PREVIOUS YEAR SO THAT THE ACTUAL NEW JOBS CREATED IN ANY ONE YEAR IS THE NUMBER OF EMPLOYED IN THAT YEAR MINUS THE NUMBER EMPLOYED IN THE PREVIOUS YEAR.

5.4 Job Creating Comparisons

Comparing the direct and indirect job creation figures for electrifying 952 473 black households and 60 744 farm workers dwellings by Eskom between 1990 and 1995, i.e., 1 012 917 connections, and shown in Table No 9.23, with the job creation figures in the studies shown on Table No 9.22 for making the same number of connections the following comments can be made.

a) The BEPA study presents employment figures which are an order of magnitude greater than those found by analysing the historical data relevant to Eskom's electrification programme. Table No 9.24 below offers comparisons between the BEPA and the Eskom studies.

	(1) BEPA ANALYSIS	(2) CORRECTED BEPA ANALYSIS	(3) ANALYSIS USING HISTORICAL DATA	(4) PERCENTAGE DIFFERENCE (1) & (3)
DIRECT & INDIRECT EFFECT ON EMPLOYMENT CREATION	275 616	44 975	51 986	530

TABLE NO 9.24 COMPARISONS BETWEEN THE BEPA ANALYSIS AND AN ANALYSIS USING HISTORICAL DATA FOR JOB CREATION: (1 012 917 ELECTRICAL CONNECTIONS)

b) So far as the EDRC study is concerned after the same number of connections had been made as that contained in the historical analysis presented above, i.e., 1 012 917 the number of new jobs created varied between about 27 000 and 45 000. These figures are then of the same order of magnitude as those projected in the historical analysis and the corrected BEPA study.

c) The HRSC study postulates that an annual number of 388 235 connections are made per annum over a 17 year period. The programme is, however, divided into two phases. The first phase, where 3 728 235 connections are made, has an accumulative job creating potential of 124 763. This infers that for each connection in the programme 0,0335 jobs are created, therefore for 1 012 917 connections the number of jobs created is 33 897. This figure is also clearly of the same order of magnitude as the one derived from the historical analysis and the corrected BEPA study.

d) The Dingley study suggests that 77 000 new jobs would be created after 1012 917 electrical connections are made. Whilst this figure is about 1,5 times that estimated with historical data for the direct and indirect job creativity potential of Eskom's electrification programme it does approach the figure of 85 807 jobs created by that programme when private consumption expenditure is included in the analysis, i.e., when the I.O. model is closed.

e) Because of the comparisons that can be drawn between the order of magnitude of the job creating potential of the EDRC the HSRC the Dingley and the corrected BEPA studies and the analysis presented here using historical data and I-O analysis, some confidence can be placed in the historical analysis. On the other hand the BEPA study gives rise to some disquiet because of the shear magnitude of its job creating potential. On a practical note it is hardly likely that the employment creation postulated in the BEPA study could have occurred. For example, the BEPA study claimed that by merely electrifying 300 000 black households in 1991 the total number of those employed in South Africa would increase by 185 664 (Table No 9.20). Using the 1996 census this would account for a 2 per cent increase in the work force; a very large growth for such a small investment.

6.0 NEGATIVE EXTERNALITIES ASSOCIATED WITH THE GENERATION OF ELECTIRICITY

This chapter has emphasised the economic benefits arising from the use of electricity in Eskom's programme to bring power to black households in South Africa; for example health benefits and increased GDP from the purchase of electrical appliances by newly electrified households. There are, however, negative economic externalities attached to the generation of the electricity used by these households. These negative externalities reduce the positive economic returns of Eskom's black household electrification programme.

Two fairly recent studies which attempt to place a value on the negative externalities arising from electricity generation in South Africa are the Dutkiewicz and de Villiers (1993) study and the 1996 study van Horen. Both studies used the damage function[373] approach in attempting to quantify the costs of the externalities from each stage of the fuel cycle in the generation of electricity, starting, in the case of coal-based generation, with the impacts arising from the

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[373] A damage function requires data to be gathered from the main impacts of electricity generation, e.g., the emission of pollutants and their deposition; an economic value is then attached to these impacts.

extraction process itself. The researchers in both studies noted that their efforts to quantify the cost of these negative externalities were hampered by serious data gaps.

The Dutkiewicz and de Villiers (1993) study covered four electricity generation options (coal, nuclear, wind and solar). This study concluded that most of the negative externality costs were small (pp. 14 and 40) and would not make any difference to the competitiveness of adopting the softer renewable generation options which are generally thought to be less polluting than conventional electricity generation processes, i.e., wind and solar, to those of fossil and nuclear fuels.

The van Horen Study (1996), which is the more detailed of the two studies, concentrated upon the most important steps in the input pathway of the coal and nuclear fuel cycle in terms of their scale and frequency in South Africa. Van Horen attempted to put values to the following issues:

a) Morbidity and mortality in coal mines;
b) Water consumption in power stations;
c) Health effects of power station air pollution emissions;
d) Damage from greenhouse gas emissions; and
e) Subsidies to the nuclear fuel industry.

The problems arising in attempting this task as emphasised by van Horen himself (p. 87) were as follows:

a) Morbidity and mortality rates in coal mined encompassed the mining industry as a whole. Data for the amounts of coal used by Eskom alone was not available.
b) No epidemiological studies for dose-response functions were available for South Africa. The ones used by van Horen were derived from North America and these were applied to the South African situation.
c) Uncertainty was expressed with regard to the atmospheric modelling approach used by van Horen for estimating the health impacts of air pollution.
d) Uncertainty was also expressed with regard to the impact of anthropogenic greenhouse gas emissions in the economic social and environmental sphere.
e) Very little reliable data was available on the environmental and human health issues so far as water consumption in power stations was concerned.

In short some very important data were not available to draw specific conclusions regarding the actual social costs of electricity generation by Eskom. As a consequence, while the presence of

negative economic externalities which accompany the electrification of black households in South Africa is acknowledged, it is considered appropriate for purposes of this study, not to make any attempt to adjust the economic benefits associated with the electrification of black households, and qualified here, downwards, but simply to suggest that they are an upper bound value.

It is important to note also that because of Eskom's excess generating capacity no new power stations needed to be built to meet the power requirements of the corporation's black household electrification programme. From the electricity generation viewpoint then this programme did not necessarily increase the value of the extant negative economic externalities arising from power generation in South Africa.

7.0 CONCLUSIONS

Because of the low electricity consumption patterns, the theft of and the non-payment for electricity, Eskom's electrification programme required the South African taxpayer to cross-subsidise the programme in the sum of R 4 486 million, (1995 rand)[374]. With the advent of the RDP Eskom was required after 1995 to also include the electrification of rural areas in their programme. This of course would put an even greater burden on South African taxpayers because of the lessened ability-to-pay for electricity by rural dwellers. Although the RDP stated that "concessionary finance" would be available for the electrification of poor households in remote rural areas if the incidence of non-payment and theft persisted and increasing levels of cross-subsidisation became necessary the sustainability of Eskom's electrification programme could still come under threat.

The employment creation potential of Eskom's electrification programme as postulated in the BEPA report was shown to be incorrect by an order of magnitude. Likewise the informal job creation potential of the programme according to Eskom's own estimates were optimistic when these estimates were compared to historical reality. The expected cumulative growth in GDP as a result of Eskom's electrification programme i.e., 6 per cent in 1995 also seemed to be over optimistic and it is suggested that in reality this growth was of the order of one per cent based on known historical capital investment in the South African economy arising from Eskom's electrification programme.

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[374] Net funding requirement (Table No 9.4) in 1995 rand.

Showing that the BEPA study grossly overstated the benefits of Eskom's electrification programme is significant since the potential macro-economic benefits of this programme coupled with the political imperative was, it is suggested, the raison d'être for Eskom undertaking the programme in the first place. If the true potential of the programme had been known a more carefully planned approach to the programme with greater government involvement would have been advisable and possibly sought.

Whilst Eskom's electrification programme stimulated the electrical appliance market such appliances have a large imported content in the order of 30c in the rand (1995 prices). This means that as a direct result of the provision of electricity to black households there would be a negative impact on the Current Account of the South African Balance-of-Payments.

Despite Eskom's programme to electrify black households in South Africa (their "Electricity for All" programme) performing in a more economically subdued way than originally expected, South Africa's GDP was positively impacted by the programme as was demonstrated in Table No 9.23. In addition there was a positive increase in employment levels as a consequence of the programme. What was of particular significance, so far as employment creation was concerned, was that 87 per cent of all jobs created by Eskom's electrification programme, i.e., 74 296 jobs, were created amongst semi- and low-skilled workers the categories of labour most in need of jobs in the period 1990 - 1995.

It is suggested that the results for GDP growth, the balance of payments burden and employment creation as a result of Eskom's programme to electrify black households in South Africa between 1990 and 1995, shown in Table No 9.23 above realistically represent the macro-economic impact that that programme had on the South African economy. In particular, the results of the closed I-O model, which includes the effect of private consumption expenditure, are considered to be the most likely historical impact. It is further suggested nevertheless that the figures quoted in Table No 9.23 are conservative since they do not take into account slack in the productive capacity of the South African economy in this period nor do they take into account the negative economic externalities associated with the generation and use of electricity. It is important to mention therefore that the historical micro- and macro-economic benefits and disbenefits calculated in this chapter must be regarded as estimates only, and rather conservative estimates at that.

CHAPTER 10

CONCLUSIONS

1.0 INTRODUCTION

The foregoing six chapters have traced the contemporary history of Eskom's programmes to electrify white-owned commercial farms and black households in South Africa in the period 1980-1995. The theme running through these six chapters is encapsulated in the four hypotheses postulated in Chapter 1, these being that:

1) Politics played a crucial role in Eskom's decision to undertake its electrification programmes;
2) The benefits arising from the programme to electrify black households were in reality much smaller than expected;
3) Large cross-subsidisation was required to sustain both the farm and black household electrification programmes; and
4) Eskom lacked adequate regulatory oversight.

This concluding chapter considers the following fundamental question: Are the hypotheses postulated above correct or not?

If the first three are proved to be correct then the following questions present themselves for consideration:

1. What are the important issues that will have to be addressed in future energy policy formulation in South Africa? And
2. What actions can be suggested to help ensure that the electrification of black households in South Africa is sustainable in the long-term?

With respect to the fourth hypothesis the following questions have to be addressed:

1. How was Eskom regulated with respect to the hypotheses underpinning the normative theory of public utility regulation discussed in Chapter 2 of this study? And
2. What suggestions can be made for the future regulation of Eskom and the South African ESI with respect to the whole energy sector of the South African economy?

The first three hypotheses will be considered first, leaving the fourth hypothesis to be treated separately thereafter.

2.0 THE FIRST THREE HYPOTHESES

With reference to the first hypothesis this study has shown that statements were made by Eskom's managers and commissioners and certain decisions were recorded in Eskom's Management Board meetings and expansion plans that showed that politics had a major influence on Eskom's decisions to undertake both the electrification of white-owned commercial farms and black households in South Africa in the period 1980 – 1995. With regard to Eskom's programme to electrify black households it is clear then that the programme was not undertaken with social upliftment and social justice in mind. Furthermore, the ANC's actions and statements from 1990 onwards emphasised the politicisation of the electrification of black households.

A major telling factor so far as the farm electrification programme was concerned was that even in the years when Eskom ran a deficit on the electricity supply account (see Chapter 5) the finances for that programme went unchecked. It was eight years into the programme before a detailed analysis of its financial impact on Eskom took place. With respect to the black household electrification programme, even when it was clear that it required large amounts of cross-subsidisation, no analysis of its financial impact on Eskom took place; such an investigation only took place two years into the programme. Likewise Eskom's 1991 restructuring programme, which was initiated to make the task of electrifying black households an easier matter was undertaken prior to the programme's financial impact on Eskom being assessed. These actions tend to confirm that financial considerations were secondary and subservient to the political imperative so far as Eskom's decision to electrify white-owned commercial farms and black households in the period 1980 – 1995 was concerned.

With respect to the second hypothesis the macro-economic benefits arising from Eskom's programme to electrify black households between 1990-1995 were shown to be much smaller than those confidently assumed by Eskom. In the case of additions to GDP this proved to be overstated by over 600 per cent and so far as job creation was concerned this was overstated by over 500 per cent, i.e., both variables were overstated by orders of magnitude. Eskom's programme to electrify black households also negatively impacted South Africa's balance of payments, a fact which had seemingly never been even considered at the inception of the programme.

Turning to the question of the cross-subsidisation necessary to sustain both the electrification of white-owned farms and black households i.e., the third hypothesis, it was shown that subsidies

were required for both initiatives year-on-year. In the case of the electrification of black households these subsidies amounted to the startlingly large sum in 1995 terms of R 4 486 million in the five years from 1990-1995.

From the study it is clear then that the three hypotheses have been proved. Prior to addressing the questions which arise as a consequence of this proof and which are enumerated in the introduction to this chapter, i.e., how these findings could impact future energy policy formulation in South Africa it is necessary first to discuss the economic characteristics of electricity itself because energy policy formulation should ideally be conditioned by such characteristics.

2.1 The Economic Characteristics of Electricity

Considering electricity as an economic good it is clear that from the turn of this century electricity has become an essential factor of production in almost every country in the world. In addition, because of it's importance in the home as an energy source for cooking, heating and lighting, electricity has become a significant force in providing social welfare on an individual and household level.[375]

Electricity is, however, not a public good in the way that national roads and national defence are. This is because people benefit from roads and defence collectively whilst the amount of electricity used by each consumer can be measured and charged for on an individual or household level. Hence each consumer must pay for the amount of electricity used and failure to do so renders the consumer liable to having his supply of electricity cut off. Under these circumstances the excludability criterion applies and electricity is clearly a private good.

Considering the non-rival aspects of electricity supply it is also clear that if one consumer uses more electricity than he needs e.g., leaving lights burning during daylight, this has theoretically, the effect of reducing the amount of electricity left for others. As a consequence the individual who uses the most electricity presumably obtains the greatest satisfaction from the good. Under these circumstances electricity must once again be classified as a private good.

An electricity consumer is of course also a price-taker and a quantity adjuster, hence each individual consumer decides what is affordable. Under this criterion electricity is shown once more to be a private, rather than a public good. Electricity can then never be a good where the

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375 And more recently for use in providing entertainment via television, radio and hi-fi equipment.

consumer becomes a quantity-taker and adjusts price, i.e., his willingness-to-pay. Goods exhibiting this characteristic belong to the public variety.

From what has been said about electricity it can, without doubt, be classed as a private good, hence the findings of the de Villiers Commission, which contended that it must be treated as such, were founded on sound economic principles. There are nevertheless, elements of what may be termed "public goodness" attached to electricity supply. "Public goodness" here means the overall socio-economic benefits that accrue to a community from the increasing use of electricity. These benefits come about because each person in a community will benefit from the general provision of electricity, i.e., access to the good. Even if some members of a community do not use one unit of electricity personally they will still benefit from the community's general access to electricity. Electricity has then an element of "public goodness" attached to it, which is quite different from the benefits derived by individuals from using electricity. Some of the communal or collective benefits that accrue from access to electricity, and which have been discussed in this study, are as follows:

a) Street lighting which helps to prevent accidents and crime;
b) Job creation from small businesses (some in the informal sector) which depend on electricity, e.g., welding shops;
c) Increased educational levels as electronic equipment is introduced into school curriculae, furthermore the days are lengthened for study purposes by means of electric lighting;
d) Health benefits from the ability to refrigerate food and, as described, in the reduction of morbidity and mortality rates from chest ailments and burns; and
e) Preservation of natural resources from the reduced use of fuelwood.

As more and more electricity is used these benefits allow, indeed force, each individual to acquire more of the material and social comforts which electricity is able to provide. Increased energy use, up to certain limits then, makes living easier, safer and more comfortable. Beyond certain limits the depletion of natural resources can be problematic and waste accumulation and pollution become detractors from electricity's "public goodness'.[376] Acknowledging the "public goodness" of electricity does not of course take away it's private good characteristics. The governing considerations in managing its supply should therefore include both its private good characteristics and it's "public goodness". This is part of the dilemma presented in the way that

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[376] In South Africa electricity generation is almost exclusively reliant on coal and coal is, at least within the short to medium-term, a non-renewable natural resource Furthermore there are negative economic externalities attached to electricity generation which may, with increasing electricity generation, counter the benefits derived by society from this available energy, see Chapter 9.

electricity supply was managed in the period covered by this study i.e., 1980 to 1995. From the private good viewpoint the supply of electricity should have been governed by sound business practices and the market mechanisms. This is precisely what Eskom attempted to do in the period, particularly after Dr John Maree took over as chairman of Eskom in 1984. Because of the "public goodness" nature of electricity, however, it can be argued that those who could not afford to pay for it should have been subsidised, not by Eskom, as they were, but by the government. Relying on the facts discussed above it is suggested that decisions concerning national energy policy with respect to electrification should never be the prerogative of Eskom but are the prerogative of government.

2.2 Energy Policy

Turning now to questions on energy policy these are for convenience considered under three headings, these being finance, economic efficiency and equity. Each of these issues are of course interconnected as will be shown in the discussion below and require sound regulatory practices to be put in place with respect to public utility decision-making and management.

2.2.1 Financial issues

The first consideration, if Eskom's black household electrification programme is to be sustainable in the long-term, is the source of funding required to cross-subsidise the programme, this is of prime importance. Taking the arguments developed in the section on the economic characteristics of electricity into account, in theory the amount of money required to cross-subsidise Eskom's electrification programme should be provided by the government. If this is not done at least two major complicating factors can arise. Firstly rural electrification may be jeopardised, and this is a prime requirement of the RDP. Rural electrification would be jeopardised because the costs of electrifying such areas would require even greater amounts of cross-subsidisation than have been provided in the past. The costs of connecting rural areas to the national grid are on average at least twice the cost of urban connections and also because there would, in all probability, be low levels of electricity usage in rural areas. Whether Eskom could continue to cross-subsidise the supply of electricity to such areas without ever-increasing tariff levels is then a moot point which leads to the second problem. Eskom claim that, South Africa has for many years had a competitive advantage in the quality and low cost of its electricity compared with some of its competitors in the markets for export goods. This fact is time and again mentioned in Eskom's Annual Reports. If the tariff levels to industrial enterprises, were increased to cross-subsidise a rural electrification programme then these enterprises may lose their competitive advantage of cheap electricity. It is suggested therefore, that because the subsidies required to sustain Eskom's

electrification programme embrace social equity and national development they should be a prerogative of government. A difficulty does present itself with this, however. If the subsidies required to keep an electrification programme going were obtained from the fiscus then the programme would, in all probability be curtailed in magnitude because it would have to compete for funding with other development needs. In spite of this it can be argued that whilst Eskom should indeed be a player in national economic and social development, it cannot be responsible alone for the electrification portion of such development, and this seems to have been the case in the period 1990 to 1995.

The second consideration also concerns the cross-subsidisation of Eskom's electrification programme. This issue raises questions on how these cross-subsidies should be distributed if the government is to take responsibility for them. This is an extremely complicated issue because of the fragmentation of the electricity supply industry in South Africa. As described already this topic was the subject of much debate in the period from 1993 onwards. It will be recalled that there were some 400 separate electricity supply entities in South Africa in 1995. It was also pointed out that, because of the inability of many of these supply entities to electrify black households Eskom gradually began to augment its consumer base by taking over their electricity supply rights. There remain, however, many individual electricity suppliers. Parcelling out funds to each of the remaining electricity supply entities for electrifying black households on an equitable basis would be a monumental task. The fragmentation of the South African ESI is therefore a critical problem that could jeopardise an efficient electrification programme and this fact alone presents a strong case for the establishment of only a limited number of large electricity supply entities in South Africa which are adequately regulated. Such a situation would make it easier for cross-subsidisation funds to be distributed by government.

A third consideration, concerns the question of electricity tariffs themselves. It was shown that electricity tariffs varied between newly electrified black townships and adjacent white townships. From a business viewpoint such tariff differentials made good economic and financial sense and can readily be understood. These different tariffs did, however, exist because of Apartheid policies. They came about because of the propensity of Eskom to electrify white areas of South Africa that could afford to pay for the service whilst ignoring black townships and rural areas that could not, and which were anyway inhabited, according to the tenets of Grand Apartheid, by "sojourners" who were soon to return to their homelands. Furthermore, in the more affluent white areas the electricity load factors were better than those in black townships, that were electrified in the period 1990 to 1995. The costs of the reticulation systems in white areas had also usually been long paid for which would bring the marginal cost of electricity supply to these areas well below the cost of supplying electricity to more recently electrified black townships. Financing

electricity supply to black townships was also a more difficult proposition than financing electricity supply to white townships since connections to white townships were invariably paid for by householders themselves, whereas in black townships connections were financed by the supply entity and costs were recovered by way of the electricity tariff. This situation made the tariffs in black townships higher than those in adjacent white townships and presented equity problems (this topic will be discussed in more detail presently). This was the situation that obtained with Eskom's "Electricity for All" programme, and which also contributed, to unrest in Greater Soweto and to the problem of non-payment. Selecting tariff levels then that could ensure good service provision and payment for services is related to the cross-subsidisation issue. Formulating tariff structures, particularly for newly connected black households it can be argued, is therefore the prerogative of government's energy policy, and not the prerogative of Eskom. The structuring of such tariffs, if they are to produce the benefits mentioned above, should ideally be done in conjunction with a competent regulatory agency.

A fourth consideration is the raising of funding by municipalities for electrification purposes. Historically the limited financial capacity of many municipalities curtailed Eskom's ability to help them gain access to electricity prior to the "Electricity for All" initiative and cross-subsidisation was introduced by Eskom. The introduction of the Electrification Participation Note, which was intended to be an annual issue by Eskom, was to enable the burden of financing a programme to electrify black households to be shared by contributors. Eskom was the only entity in the ESI, however, which could possibly issue such a note and which had access to considerable amounts of local and international finance. Municipalities, that needed money to upgrade and maintain electricity distribution networks, were, between 1990 and 1995, almost in every case operating on small margins near bankruptcy, (Morgan, 1993). This means that if South Africa is to be electrified on a grand scale government will have to become involved in the raising of finance attendant on the electrification programme particularly with respect to municipalities.

A fifth consideration concerns the positive economic externalities attached to an electrification programme. These being, inter-alia, reduced mortality and morbidity rates as a consequence of widespread access to electricity, the control of natural resource depletion, particularly with regard to fuelwood usage, and the accompanying environmentally sustainable benefits. The issue of externalities therefore presents a case for government funding for a nation-wide electrification programme that Eskom is funding at present by means of cross-subsidisation.

A sixth consideration involves the ability of consumers to pay for electricity provision. With respect to this issue the magnitude of the socio-economic benefits arising from an electrification

programme depends to a great measure not only on the consumer's ability-to-pay for an electricity supply *per se* but the purchase of electrical appliances as well. A key piece of energy policy research that is required then in South Africa for the formulation of a sound electrification policy is the affordability criterion of different strata of society with respect to the purchase of electricity and electrical appliances.[377]

A seventh consideration concerns the multiplicity of energy use by newly connected electricity users in South Africa. In this case, and as was shown in this study, many different energy carriers are in use, for example coal, fuelwood and paraffin. An energy policy should therefore ideally examine all energy carriers and determine how the extended use of one, for example electricity, would impact the financial viability of providing others in common domestic use. This situation impacts on how Eskom and the South African ESI should be regulated; this question will be discussed again presently.

An eighth consideration concerns electricity supply rights in areas under the jurisdiction of municipal authorities. This is a particularly controversial issue in South Africa that will have to take cognisance of the role played by revenue from electricity sales in municipal budgets in supplying other essential services. This issue is likewise important with respect to the regulation of Eskom and the South African ESI.

2.2.2 Economic efficiency

A controversial issue is that of the efficient use of scarce economic resources, by Eskom's electrification programmes from 1980 onwards. It will be recalled (see Chapter 2) that ensuring the efficient use of scarce resources is one of the prime tasks of public utility regulation. There are insufficient historical data to comment definitively on the cost-benefit ratios of the different aspects of the programmes, however. Nevertheless, some comments can be offered concerning economic efficiency and the results obtained from the study in general terms. This section

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[377] South Africa's income distribution was, during the period of this study, one of the most unequal in the world. In the 1970's a Gini coefficient of 0,66 obtained, (Wilson and Ramaphele 1987). What was particularly ominous, however, was the fact that in 1990/91, at the start of Eskom's programme to electrify black households on a national scale the Gini coefficient was in fact higher at 0,68, (Whiteford in the Weekly Mail and Guardian, 18-24 May, 1994). It is suggested that energy policy should therefore make provision for people who simply cannot afford a basic supply of electricity just as water policy in South Africa is addressing the needs of people who cannot afford to pay for a subsistence supply of potable water. The reason for making such a provision is based upon the fact that both the positive and negative externalities attached to the provision of services like water and electricity affect the nation as a whole.

concentrates on Eskom's electrification programme in the period 1990 to 1995 only because this is the ongoing electrification initiative in South Africa.

Firstly, it was seen that the expected macro- and socio-economic results of Eskom's electrification programme, so far as job creation and growth in South Africa's GDP, fell short of Eskom's expectations, in fact by orders of magnitude. The question of employment creation is a particularly important issue in South Africa. Secondly, the effect of the electrification programme on micro-industry development was also very disappointing so far as the historical evidence is concerned; Eskom's forecasted growth in micro-industries was optimistic and this too fell short of the Corporation's expectations. The magnitude of the subsidies spent on Eskom's electrification programme therefore raises two important questions 1) whether such sums of money can be justified in the national context so far as the economic efficiency of scarce resources usage is concerned? and 2) whether that investment placed in other economic sectors of the South Africa economy would yield higher returns than money invested in electrification projects? This second question is especially relevant when all kinds of services provision are required in South Africa, e.g., health, education, the provision of water and housing.[378] Because of the lack of historical data the question cannot be answered. It does, however, highlight an omission in the planning of the programme to electrify black households in South Africa. Ideally, the costs and benefits of electrification projects should be compared, not only with each other, but with the provision of other services as well prior to the decision to proceed if the efficient allocation of South Africa's scarce resources such as capital and labour is to be assured. From the research carried out for this study seemingly this was never done. Whilst it can be argued that it was not Eskom's prerogative to carry out such analyses, it can also be argued that, as a parastatal using public money, Eskom should have. These counter arguments aside what is clear is that for the efficient use of scarce capital in all its forms an electrification programme should be part of a strategy for efficient services provision which should form part of a national energy policy embodying sound regulation principles as discussed in Chapter 2.

The history of the electricity supply industry covered in this study throws up another problem of scarce resource usage and economic efficiency that deserves mention, although it is only indirectly connected with Eskom electrification programme. During the 1980's Eskom was responsible for the largest portion of South Africa's foreign debt, this amounting to some 15 per cent of the total. This debt was the result of Eskom's massive generation expansion plan already described in Chapter 3 and which contributed to making the Corporation's electrification programme financially viable to poor consumers. The repayment of this debt clearly had the

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[378] It can be argued that the provision of fresh clean water is of the greatest priority for without it life ceases to exist, which is not the case with respect to electricity provision.

effect of curtailing socio-economic growth in South Africa. It can be argued therefore that in a sense this expansion programme was an inefficient usage of scarce capital resources. This was because in the event not all the electricity generated in the power stations built with the money borrowed was needed in the forecasted period. The results were the mothballing of older stations and excess generation capacity. These illustrations also emphasise that the electricity supply industry cannot act as an isolated entity if the efficient use of scarce resources is to be contemplated but must form part of a national energy policy, again embodying sound regulation.

2.2.3 Equity

In the section on Financial Issues above certain questions on Eskom's electricity tariffs for black households and cross-subsidisation were discussed. This section enlarges on the debate by considering the equity implications of these tariffs and the cross-subsidisation of small electricity consumers. Again, these are important issues with respect to the regulation of public utilities. The tariff level for consumers in Eskom's electrification programme was set to break even at an electricity usage of 355 kWh/month and there was only a nominal connection fee of R30 charged, (McAdam, 1989, p.3). The tariff was the result of Eskom's "Vision for the Future, electricity being made available to all people in South Africa at a price they could afford", (McAdam, 1989, p.4). In reality, as was shown, the monthly consumption of electricity by black households did not reach 355 kWh/month but varied between 83 kWh/month and 138 kWh/month over a five year period, see Chapter 8. The original tariff was the result of limited information, uncertainty with respect to consumption and risk taking on Eskom's part. In effect the tariff was a manipulated tariff to make Eskom's electrification programme financially viable to the poorer sections of the community and depended on Eskom's excess generating capacity which in any event would only be available for a certain period of time, i.e., until there was sufficient demand made upon it, whereupon the tariff would be thrown into jeopardy. This tariff gave rise to an equity problem because of its redistribution implications. The redistribution of income via the manipulation of electricity tariffs as was the case in Eskom's electrification programme involved the use of a set of hidden indirect taxes on larger electricity consumers who provided the revenue to allow the cross-subsidisation to take place.[379] These taxes were clearly not under the same scrutiny or assessed against the same criteria as other taxes, and it can be argued that they represented an inequitable situation for large consumers. It is suggested that a system of income transfers and taxes which are explicit and which are subject to economic debate would have been a more equitable way to proceed with funding the shortfall in the returns from the electricity tariffs for black households.

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[379] This of course was really no different from the situation with respect to the electrification of white-owned commercial farms between 1980 and 1990, see Chapter 4.

Compared with policies which treat poverty at its root cause by providing such income transfers, income redistribution policies based upon manipulated electricity tariffs suffer from the disadvantage that they are non-selective and therefore it is difficult to increase the real income of the target group since consumers who are wealthier than others will also benefit. The real problem with manipulating electricity tariffs for black household is that the underlying cause of poverty will remain unattended. It is therefore suggested that the problem would be better dealt with via social security policies and by equating electricity tariffs to levels where economic efficiency is achieved so that scarce resources can be efficiently allocated. Tariffs structured along efficiency criteria would require marginal cost pricing structures as per those governing the theory of public utility regulation (as discussed in Chapter 2), and not manipulated tariffs.

Apart from the inequity associated with manipulated electricity tariffs for the poor such tariffs are still contentious. According to Turvey and Anderson, (1977, p.19) there seems to be nothing unfair in tariffs that do not cover a utilities accounting costs so far as the poor is concerned. It is suggested, however, that such tariffs can only be defended where the more appealing methods of redistribution through fiscal policy approaches are not administratively possible. This does not seem to be an impediment in South Africa. What does seem to be the case with Eskom's tariffs for electricity supplied to black households is their political acceptability rather than their inequitable nature with respect to large electricity consumers.

The electrification of black households in South Africa was intended to serve both economic and social aims. This ideal also presents an equity problem, however, with respect to who benefited from the provision of power. In Eskom's 1990 – 1995 black household electrification programme the Corporation had to make difficult choices regarding which area to electrify. Eskom's programme took the most sensible course considering the financial burden of the programme. Households in urban and peri-urban areas were chosen to be electrified first. The perceived ability-to-pay was also an important criterion in the decision making process.[380] The decision to electrify urban households mitigated against rural dwellers, however, and they were not provided for and equity was not well served so far as they were concerned. This raises the important question of whether or not Eskom has the right to make decisions concerning who should, and who should not, be provided with power. The question is particularly relevant so far as the electrification of schools and clinics is concerned. The pragmatic answer to this question is that it is better for government to make such decisions since they are, or should be, the custodians of any national energy policy especially one that has to address the problems associated with social

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[380] Seemingly both the willingness-to-pay and the ability-to-pay was, however, badly overestimated.

upliftment and that these decisions should ideally be overseen by an efficient public utility regulator.

3.0 THE FOURTH HYPOTHESIS

Chapter 2 of this study discussed the fundamentals of public utility regulation and the rules underpinning such regulation which take into account, inter alia, the efficient use of scarce resources, equity considerations and pricing policies which allow the goals of regulation to be achieved. Eskom's governance should ideally have ensured that these goals played an important role in the Corporation's decision-making process. The remaining chapters of this study have shown, however, that Eskom's decision making was predicated on political imperatives and the rules of public utility regulation were largely subservient to these requirements. This conclusion alone suggests that the fourth hypothesis postulated in Chapter 1 of this study that Eskom lacked adequate regulatory oversight is proved. To add weight to this conclusion it is appropriate to now examine the mechanisms which were in place to regulate Eskom since its establishment to see if they constituted a sufficient platform for the adequate regulation of the Corporation.

It was established in Chapter 2 that certain types of industry have historically been the subject of regulation. Electric utilities are one such industry. The history of electricity supply regulation in South Africa goes back to the Victoria Falls Power Company which operated as a monopoly under the Transvaal Power Act of 1910[381], see Chapter 3.

With the establishment of Eskom the Transvaal Power Act was superseded by the Electricity Act of 1922. This act regulated Eskom and was concerned with the provision of the supply of abundant reliable cheap electricity for the mining industry, the railways and white-controlled municipalities.

Under this act Eskom was to operate at neither a profit nor a loss; this rule was to remain in force until 1985 when a new operating philosophy was established for Eskom as a result of the de Villiers Commission of Inquiry into Electricity Supply in South Africa. Clearly under such a firm financial constraint, with no mention of marginal costing being made in the act, tariffs which reflected the normative preferred pricing regime for public utilities, i.e., marginal cost

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[381] This act regulated the prices that the Victoria Falls Power Company could charge for electricity and depended on a controlled rebate system the size of which depended on the company's annual surplus profits, these profits being the balance of the revenue remaining after all expenses and certain agreed capital charges had been met.

pricing, would occur rather by accident than by design. Under this pricing rule it is doubtful then that the most efficient allocation of resources resulted. Furthermore the pricing of electricity was left entirely to Eskom's managers as opposed to some independent agency that could have protected consumers from price abuses that could have arisen. Price regulation was therefore lacking under the Electricity Act of 1922.

Eskom did, however, live up to its mandate to provide abundant power for South Africa. This service was in practice, however, limited to the delivery of power to white power blocs under the prevailing apartheid socio-economic system. Hence one of the most important characteristics of a pubic utility, and one always borne in mind in setting up regulatory norms (i.e., service provision to the entire community, social justice and equity) was also lacking under the regulatory measures provided by the Electricity Act of 1922

Effectively then the state had created an enterprise in Eskom without central regulation in two key aspects of the service an economy could expect from an electric utility. What was a large problem, however, was the fact that this situation applied to the South African ESI in its entirety. The Electricity Act of 1922 did, however, leave the door open for private enterprise to supply electricity in South Africa. With Eskom's take-over of the Victoria Falls Power Company (see Chapter 3), however, Eskom became to all intents and purposes the monopoly supplier of electricity in South Africa, a situation under which diligent regulation is required. The Electricity Act of 1922 was not amended to allow more strict regulation of Eskom than that in force when the Victoria Falls Power Company also supplied power to South Africa and the act was, as shown, already weak in two key areas of public utility regulation.

The Electricity Act of 1922 then created what can only be described as a rudimentary regulation system for Eskom and the South African ESI. The normative rules of public utility regulation are clear: where a monopolist supplier exists diligent and detailed regulatory oversight is necessary to protect consumers from monopolistic abuses and to ensure that the public accrues benefits that may arise from monopolistic supply such as decreasing costs (see Chapter 2). These rules do not seem to have been in force so far as Eskom was concerned under the electricity Act of 1922.

The separate Electricity Control board that was established to resolve disputes between electricity suppliers and consumers was also rendered ineffectual by the Electricity Act of 1922 itself. This was because the act exempted many entities e.g., white municipalities from requiring a licence to supply electricity. As has been shown the ESI in South Africa became highly fragmented as a consequence, making the task of regulating it very difficult indeed, and effectively diluting the regulatory force that may have been brought to bear on Eskom and the ESI by the Electricity

Control Board. Furthermore, the Electricity Control Board had almost no power to regulate the tariffs charged for electricity by the various entities in the supply market. Both the Electricity Control Board and the 1922 Electricity Act were ineffective then with respect to regulating electricity pricing in South Africa; (Armstrong, Cowan and Vickers 1994, p. 13) and (Laffont and Tirole, 1992,p.19) emphasise the importance of controlling prices set for the provision of monopoly services in regulation theory.

The prevailing regulatory system applicable Eskom and the South African ESI up to the de Villiers Commission of Inquiry in 1984 rather negated certain normative theories of public utility regulation, such as the Equity-Stability Theory and the Public Interest Theory, that have been developed to protect electricity consumers, see Chapter 2. Public outcry after 1980 against Eskom's tariffing policy and accusations that Eskom was a law unto itself, as reported in the press, seems to bear this out.

The other regulatory presence governing Eskom's activities was the Minister in charge of the Corporation. His power to control Eskom was also very limited, however. Eskom was, for example, only required to report to him annually: he was, moreover, only empowered to react to Eskom's generation expansion plans and tariff structures, he had no power to set these tariffs or to influence Eskom's planning.

A further complicating factor in regulating Eskom was that each of the Corporation's undertakings set their own tariffs and were responsible for their own financial wellbeing. Electricity tariffs were therefore different in various parts of South Africa making the Electricity Control Board's task and the Minister's ability to regulate Eskom very difficult, particularly with respect to commenting on how efficient and equitable such tariffs really were from the point of view of allocating scarce resources and improving social welfare, key ingredients in the regulation of a public utility (see Chapter 2).

As described in Chapter 4 of this study, in the 1980's the state took a keener interest in the regulation of Eskom following the recommendations put forward by the de Villiers Commission. The ensuing rules under which Eskom was to be governed were, however, not geared to regulate Eskom along lines established to control the actions of a public utility, but rather to make the Corporation a more attractive target for privatisation. It is arguable whether the interests of individual electricity consumers were given due consideration in the formulation of Eskom's new operating procedure.

With respect to tariffing policies during this period, i.e., post the de Villiers Commission, operating under a more "business-like" approach to its consumers Eskom introduced a social compact into its pricing process. This essentially amounted to no more than a voluntary price cap which may or may not have been based on marginal cost principles. The regulation of Eskom after the de Villiers Commission was also still concerned with the apartheid status quo and Eskom's social compact did little to alleviate the plight of the sixty per cent of the South African population that did not have electricity, again demonstrating a violation of the normative regulatory rules with respect to public utilities and the provision of services to the community as a whole.

Eskom's behaviour in the period covered by this study can to some extent be explained by a poorly regulated control of the Corporation's budget maximisation policy, hence Eskom's massive generation expansion plan from the early 1970s and their subsequent excess generation capacity due to this overbuilding. The Averch-Johnson effect (see Chapter 2) is in evidence here where growth would constitute a measure of success as seen in the eyes of the Corporation's management[382], and serves to show how powerful and autonomous they really were.

In conclusion it has been shown that since Eskom's establishment the Corporation's managers endeavoured to hold those charged with governing them at arm's length. Van der Bijl himself started this trend, and it continued. In Eskom's 1943 Annual Report for example the Corporation describes itself as operating outside political control[383]. The fragmentation of the ESI also made the task of regulating Eskom more difficult and the Electricity Control Board and the Electricity Council which came after (following the restructuring of Eskom after the de Villiers Commission) had in effect limited powers to regulate Eskom. A particularly important situation that curtailed the ability of these bodies in regulating Eskom was that their members were drawn from diverse backgrounds and many of them had little detailed knowledge of governance as applied to an electric utility. They were furthermore usually political appointments. As a consequence their knowledge of power generation was, with few exceptions, inferior to that possessed by Eskom's managers, a situation that the literature on public utility regulation terms adverse selection (see Chapter 2). In addition these bodies met only once a month; they were then under a distinct disadvantage when it came to regulating Eskom and Eskom's managers were the real force in Eskom's decision-making process.

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[382] Although he does not identify the Averch-Johnson effect by name, Christie, in his history of Eskom, alludes to this phenomenon.

[383] Although this has been shown to be a false statement in itself, the sentiment expressed is important with respect to how Eskom's managers viewed regulation and their own autonomy.

It is suggested therefore that the hypothesis that Eskom lacked adequate regulatory oversight has been proven. Weight is added to this assertion by the fact that Eskom has been described as a law unto itself in the press and even members of the NELF Working Group on the Restructuring and Regulation of the South African ESI arrived at a similar conclusion. It was this lack of regulatory oversight that allowed Eskom to become so autonomous and enabled the Corporation to always consider its own wellbeing in its decision-making process, when dealing with political imperatives such as the electrification of white-owned commercial farms and black households in South Africa as described in this study.

4.0 THE WAY FORWARD

One of the realities of Eskom's electrification programme and a basic element of this study was the qualitative and quantitative assessment of the changing form of newly connected electricity consumers' common life-styles and the macro-economic impact electrification had on the South African economy. Such changes force government and electricity suppliers alike to re-examine how electricity supply in South Africa should be managed and regulated in future. This re-examination results not in a single conclusion but in several. In addition to the suggestions made above for dealing with the different aspects of energy policy four all-embracing suggestions for the way forward with respect to the electrification of black households and the regulation of Eskom are made below. These suggestions could equally be considered by any developing country about to embark on an electrification programme. The suggestions are as follows:

1. A cohesive energy policy should be formulated for the future electrification of black households in South Africa. That the government should initiate such a policy is inherent from the "public goodness" characteristics of electricity presented in section 2.1 above and the arguments presented in section 2.2 above on energy policy. A cohesive energy policy would have to deal, inter alia with 1) Cross-subsidisation, 2) Electricity tariffs, 3) Funding for municipalities, 4) The fragmentation of the South African ESI, 5) Economic externalities, 6) Affordability criteria, 7) Multiplicity of energy carriers, 8) Electricity supply rights and 9) The regulation of the energy sector of the South African economy. With respect to cross-subsidisation it is important to note that whilst the government has made the electrification of black households a priority in its RDP programme up to the present time the electrification portion of the RDP has been successful only because of Eskom's ability to cross-subsidise it.

2. The writing off of outstanding service debts, including those for electricity should be considered; this may help overcome two constraints to economic advancement in South

Africa; i.e., low economic growth and the skewed income distribution which limits opportunities for the poor sections of the community. With respect to the redistribution of wealth the benefits of writing off outstanding service debts are twofold. Firstly, debtors immediately accrue increased disposable income. Secondly, fiscal savings will also accrue as a consequence of the removal of the administrative burden of dealing with such debts.

3. The question of the privatisation of Eskom, which was actively pursued in the period 1980 to 1990, could also be re-examined. After all electricity has been shown to be a private good and Eskom may well operate in a more efficient manner as a private utility. Redistributing these industrial assets could be achieved by share issues to the public or by way of funds from the actual sale itself being used to enhance the programme to electrify black households. A problem that presents itself with privatisation is that a private utility may not willingly undertake non-profitable initiatives like the electrification of black households. It is important therefore that the money from a sale of the utility be used for this purpose. Subsidies for the continuation of the electrification programme would have to come from the fiscus. Government funding does, however, have distinct advantages so far as electrification is concerned. It can for example help the development plans of a utility to expand their services into unprofitable areas. This is the situation in India under the administration of the Rural Electrification Corporation. Furthermore, the system has the advantage that it encourages co-operation and co-ordination in policy formulation including the exchange of experience from one area to another and dialogue between government and service providers.

4. With respect to the regulation of Eskom and the way ahead it is suggested that a single authority be set up to regulate public utilities in South Africa i.e., water, transport and telecommunications and, of course, Eskom. The advantages of this would be many, perhaps the most important being that the problem attached to "industry capture" (as outlined in Chapter 2) may be obviated. A single regulatory authority would also allow the sharing of expertise across boundaries thus enabling an experienced core of regulators to be developed in South Africa. Such an entity would make the efficient allocation of scarce resources via appropriate tariff structure design and addressing questions of equity with respect to services delivery an easier task to manage and aid in the delivery of a superior service to the general public and South African industry.

5.0 CONCLUDING NOTE

In spite of the fact that the economic benefits initially estimated for Eskom's electrification programme were, as shown in this study, to be grossly inflated the electrification of black urban and rural areas of South Africa do lead to significant macro, micro and socio-economic benefits. These have to some extent been quantified in this study at least as far as the available historical data allows. These benefits will, however, be lagged. They will grow in magnitude as more electricity and appliances are bought over time and as black incomes increase to levels approaching those of whites in this country. The lagged time period has been shown to take at least five years before a reasonable level of electricity usage and electricity appliance ownership is achieved by black households. This means that each "electrification" consumer will, in all probability, require financial help for many years after the initial electricity connection has been made.

Despite this an important connection can be discerned between the electrification of black households and the manufacturing and building sectors of the economy. Economic activity in these sectors is enhanced by the increased sales of electric appliances and the construction work required for infrastructural development that accompanies an electrification programme. Furthermore, growth in the national economy results from the indirect and induced effects of this activity within many, if not all, sectors of the economy via the multiplier effects which were estimated in Chapter 9. Eskom's electrification programme between 1990 and 1995 not only contributed to the social upliftment of the poorer elements of South African society then, but made a contribution to the country's GDP growth and much needed job creation as well. Just as electricity enabled the mining and manufacturing sectors to expand from the turn of the 20th Century, the programme to electrify black households in South Africa today is contributing to growth in the manufacturing, building, civil engineering and other sectors of the economy.

6.0 POSTSCRIPT

In December 1998 a White Paper on the Energy Policy of the Republic of South Africa, prepared by the Department of Mineral and Energy Affairs was published. Part 3, (pp. 39-56) dealt with Electricity Supply. What can be discerned from the White Paper is that solutions are still required for the following critically important problem areas: 1) The Restructuring of the ESI, 2) The development of an electrification funding policy, 3) The development of a national electrification planning strategy within a cohesive energy policy framework, 4) Investigations into competition

within the ESI and, 5) The provision of a clearer legislative mandate and policy framework for the NER.

What is of concern here is that this study has shown that these issues had been largely identified as early as 1993 with the founding of the NELF. It can therefore be concluded that slow progress is being made in dealing with the problems of electricity supply in South Africa and this could jeopardise the sustainability of the electrification of black households throughout the country. With respect to the crucial restructuring of the ESI the White Paper states that "the distribution sector of the industry is highly fragmented with more than 400 distributors, resulting in low efficiencies, high costs, wide disparities in tariffs, and financial viability problems in many distributors", (p.3a). This was precisely the position identified by the NELF in 1994. If any way out of this impasse is to be found it has to entail a transformation of the South African ESI from fragmentation to integration. It is suggested that such a transformation is required in any event if the ESI is to be adequately regulated with the public good in mind.

With respect to the formulation of a cohesive energy policy for the electrification of black households, the nearest the White Paper got was the statement that "government intends to address these problems by developing a detailed strategy", (p.46). The strategy cited concerning the provision of off-grid technologies such as photovoltaics and others, with respect to costly rural electrification as opposed to urban electrification. It is suggested that this approach may fall short of the mark. This is because of the diverse policy issues arising from problems attached to electrification programmes, some of which have been raised in this study, and commented upon in this chapter. A cohesive energy policy involving all these issues should therefore be developed if the efficient use of South Africa's scarce resources is to be achieved and social upliftment amongst previously disadvantaged groups by means of an electrification programme is to occur. That government initiates such a policy is crucial since any attempt to redistribute economic opportunity in South Africa by means of an electrification programme cannot be left to Eskom alone, no matter how well-intentioned their efforts are, or have been, in the past.

This problem has now been recognised however. From late 1999 future electrification programmes are going to be jointly planned and managed by Eskom, the NER and the Department of Mineral and Energy Affairs, by means of a National Electrification Co-ordinating Committee, reported in Business Day (10th October 1999) and Eskom News (an internal Eskom newsletter) (November 1999). This being the major change that has occurred in the management of the electrification of black households in South Africa since 1995. Eskom will, however, still

have to contribute R 300 million/year towards electrification so the question of cross-subsidisation of the programme remains.[384]

Not withstanding this latest development from the issues raised in the December 1998 White Paper on energy policy in South Africa and the problems attached to the regulation of Eskom and the ESI it is suggested that the financial, economic efficiency and equity problems associated with the electrification of black households in South Africa identified in this chapter still obtain and have to be solved and the way forward for the electrification of black households and the regulation of Eskom proposed here still has currency as the new millennium commences.

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[384] Telephonic interview with Mr I. van Gass 5th December 1999. With respect to the financial viability problems attached to the electrification of black households mentioned in the 1998 energy White Paper Mr van Gass stated that these arose from costs of connecting rural consumers to the national grid and the low electricity demand of these newly connected consumers. This does explain the reference to off-grid technologies in the White Paper and confirms statements regarding the high costs of rural connections and low electricity demand made in this study.

APPENDIX A

INPUT-OUTPUT ANALYSIS: AN OVERVIEW

1.0 HISTORICAL BACKGROUND

Input-output (I-O) analysis was developed by the late Professor Wassily Leontief in the 1930s. In 1973 he received the Nobel Prize in Economic Science for this work. The fundamental purpose of I-O analysis is to capture the interdependence of industries in an economy; economic interdependence then lies at the heart of I-O modelling. This concept will be expanded upon below.

The first attempt at formulating an inter-industry model was undertaken much earlier, however, by Francois Quesnay in France in 1758. As a result of this work Quesnay published his "Tableau Economic". This table describes how expenditures can be traced through an economy in an orderly fashion. Quesnay used as an example the expenditure pathway of a sum of money received as rent by a landowner; the landowner spending half the sum on different agricultural products and half on the products of artisans. Farmers in turn bought industrial products and artisans bought food and raw materials.

Although Quesnay's work was not well received in his lifetime, in fact it was suggested that "it be reduced to an embarrassed footnote" (Gray, 1931), I-O analysis is today "one of the most widely applied methods in economics" (Miller and Blair, 1985, p. 1).

2.0 ECONOMIC INTERDEPENDENCE

A change in the final demand for the output of a particular sector of an economy affects the entire economy because of the interdependence of the sectors that make up that economy; Such a change not only has a direct influence on the output of the relevant sector then, but it impacts most (if not all) other sectors of the economy as well. This change in final demand therefore causes a ripple effect throughout the entire economy. One of the main objectives of I-O analysis is to study this ripple effect by determining the direct as well as the indirect and induced effects of a change in the final demand for a sector's output on the whole economy.

The direct effect can be defined as the value of the inputs purchased by the relevant industry from all the other industries (including itself) in order to produce an output of R1 and can be represented by the so-called technical coefficients of an I-O table. Unfortunately these technical coefficients cannot be directly applied to represent higher order effects (the ripple effect) arising from the change in final demand because they only explain the direct or first-order effects. Other coefficients, referred to as the interdependent coefficients, have to be calculated to study second- or higher- order effects (or the so-called indirect and induced effects).

3.0 MULTIPLIER ANALYSIS

Economists have long been interested in measuring the total impact of changes in final demand (the ripple effect) on, for example, income and production. One of the more practical technical analytic techniques for doing this is by multiplier analysis, an approach developed by JM Keynes from the initial research done by RS Kahn. The Keynesian income and employment multipliers are, however, highly aggregated. Consequently the possibilities of applying these multipliers for analytic and policy purposes are limited. The I-O system, however, offers a method that can be used to disaggregate these global multipliers and improve the identification of the causal factors, which underpin the increased economic activity resulting from any autonomous change in final demand. The principal factors that determine the I-O multipliers are the industrial structure (technical coefficients) and the final demand structure of an economy.

4.0 MULTIPLIERS

I-O multipliers can measure the ripple effect of an exogenous variable on an economy. This measurement can be refined if the indirect and the induced impacts as well as the direct effects are taken into account. Measurement of the multiplier effect can be done in terms of GDP, employment creation, and many other macro-economic variables.

5.0 INPUT-OUTPUT MODELS

There are two basic I-O models, these being the open model and the closed model.

5.1 The Open Model

An open model is defined as an I-O model that includes only the producing sectors of an economy. This means that only the interindustry ratios are used in the computation of the interdependent coefficients. In an open model a change in the income of households, for example, will have no effect on expenditure on private consumer goods and services. An open model multiplier cannot then give a complete picture of the economic impact (the ripple effect) occasioned by a change in final demand.

5.2 The Closed Model

A closed model includes the effect of the indirect behaviour of households. The output row in an I-O table defining households in the closed model shows the income derived by households from each sector in the form of wages, salaries and investment income. The input column representing households shows the purchases made by households from other sectors. Where the household column and the household row meet this figure shows the sales by households to each other (for example the services of domestic servants). Simply put the closed I-O model includes households in the intersectoral flow matrix for the whole economy giving a more complete picture of the ripple effect than does an open model.

6.0 INPUT-OUTPUT MODELLING

6.1 The Rationale

The rationale behind I-O modelling is that many economic problems cannot be solved by the mere manipulation of macro-economic aggregates. Such problems require the quantitative detail of the interdependence of the various sectors of the economy to be exposed and submitted to the economic problems under consideration. I-O modelling allows this to be done.

6.2 Characteristics of Input-Output Modelling

The distinctive characteristics of the I-O approach are the following:

a) Specific relationships between economic sectors are empirically determined given the existing technology;
b) The characteristics of the economy are not concealed by variables such as total industrial production, total industrial employment, average price levels, and total gross domestic product, instead specific measurements are given for each sector of the economy. This means that more detailed answers can be obtained from I-O analysis than from using aggregated multipliers like the Keynesian multiplier;
c) The detailed nature of the basic I-O approach provides a highly flexible framework for the solution of economic problems. The amount of detail can be adapted to the requirements of a particular analysis; and finally
d) The approach can be applied to a broad spectrum of problems, including quantitative problems associated with changes in the structure of an economy such as, for example, the electrification of black households in South Africa.

6.3 General Assumptions for Input-Output Modelling

It is assumed that every product or group of products is supplied by a single industry; that a unique method is used for the manufacture of the products; and that every industry manufactures only one primary product. This means that the inputs of every individual industry are considered to be a linear function of the production of that industry. It is also assumed that the total effect of production by different industries equals the sum of the effects of the production of individual industries.

7.0 LIMITATIONS OF INPUT-OUTPUT ANALYSIS

One of the most serious concerns in I-O modelling for applied purposes, such as undertaken in this study, is that technical coefficients in I-O tables may reflect data from an earlier period. For example the United States I-O table based upon 1977 transactions between and among sectors of the economy was not available to analysts until 1984 (Miller and Blair, 1985).

Time lags such as this reflect the fact that when enterprises are surveyed for information concerning purchases for their production processes and sales of their output it takes a great deal of time and money to obtain the data, organise it and produce an I-O table.

Clearly production processes can, and do, change over time because of such things as technological advances, increasing demand for products and new product development. Relative prices can also change causing substitution among inputs into production processes. For such reasons the technical coefficient matrix of an I-O table will in reality change over time.

In using an I-O system for forecasting it is assumed that the technical coefficients remain constant for the forecast period. This implies of course that neither input substitution, owing to price changes, nor technological change takes place. I-O models therefore are "static" models.

The empirical question of concern is therefore how quickly does the coefficient matrix change? and perhaps more importantly, how much difference does this change make to the results obtained from I-O modelling?

Carter (quoted in Miller and Blair, 1985. pp. 267-269) addressed these problems with regard to the US economy, it appeared that in most sectors structural change was very gradual. His findings support the contention that I-O tables may remain useful for a number of years, even though the year in which they were formulated may make them seem out of date and not useful for undertaking economic analysis.

I-O tables are, moreover, updated on a regular basis to take into account structural change in an economy. The limitations discussed above should therefore not deter economic analysts using I-O tables which may seem at first glance outdated. The tables used in this study were published in 1993 and therefore fall midway in the 1990-1995 period over which the historical macro-economic impact of Eskom's programme to electrify black households was estimated, they are therefore eminently suitable for use in this study.

8.0 MATHEMATICAL EXPOSITION OF THE INPUT-OUTPUT SYSTEM[1]

8.1 The Input-Output Table

The basic table of the I-O system, which is known as the transactions table, provides values reflecting the different economic flows characterising the economy in a particular year. It shows how the output from an industry is divided between the different industries and the final demand. At the same time it also shows each industry's inputs from other industries and primary inputs. A concise schematic representation of the South African I-O table is supplied in Table A1 below.

Input \ Output		Intermediate demand / output	Final demand / output						Total gross output
		1.....j.....n	C	G	K	V	E	(-)Q	
Intermediate Inputs	1	x_{11}.....x_{1j}.....x_{1n}	c_1	g_1	k_1	v_1	e_1	$(-)q_1$	x_1
		QUADRANT I			**QUADRANT II**				
	i	x_{i1}.....x_{ij}.....x_{in}	c_i	g_i	k_i	v_i	e_i	$(-)q_i$	x_i
	n	x_{n1}.....x_{nj}.....x_{nn}	c_n	g_n	k_n	v_n	e_n	$(-)q_n$	x_n
Primary Inputs	W	w_1.....w_j.....w_n	w_c	w_g	w_k	w_v	w_e	$(-)w_q$	W
	P	p_1.....p_j.....p_n	p_c	p_g	p_k	p_v	p_e	$(-)p_q$	P
		QUADRANT III			**QUADRANT IV**				
	T	t_1.....t_j.....t_n	t_c	t_g	t_k	t_v	t_e	$(-)t_q$	T
	(-)S	s_1.....s_j.....s_n	s_c	s_g	s_k	s_v	s_e	$(-)s_q$	(-)S
Total gross inputs		x_1.....x_j.....x_n	C	G	K	V	E	(-)Q	x

TABLE A.1 SCHEMATIC REPRESENTATION OF AN INPUT-OUTPUT TABLE
Source: South African Economic Analysis (Mohr & van der Merwe, 1988)

[1] Adapted from: South African Economic Analysis (Mohr & van der Merwe, 1988, pp. 121-146).

8.2 Schematic Exposition of an Input-Output Table

Quadrant I shows the flows of goods and services produced and consumed in the current production process, the interindustry flows.

Quadrant II shows the final demand components for the output of each industry. Final demand is made up of private consumption expenditure (C), government expenditure (G), gross domestic fixed investment (K), inventory change (V), exports (E), and imports (Q) which are subtracted.

Quadrant III shows the primary inputs of manufacturing industries.

Quadrant IV shows the primary inputs that are directly integrated with final demand.

The interpretation of the table can be summarised as follows:

1) To read off the value of the purchases of one industry or sector from another, find the column under the name of the industry or sector doing the buying and then find the place in the column where it meets the row assigned to the industry or sector doing the selling. The value given at this intersection is the one sought.

2) To read off the value of sales of one industry or sector to another, first find the selling industry or sector on the left of the table and then find the place in the relevant row where it meets the column under the name of the industry or sector doing the purchasing. The value given at this intersection is the one sought.

8.3 Mathematics of the Input-Output System

Quadrant I: Intermediate demand/output

x_{ij} = the sales of intermediate goods manufactured in industry i and consumed by industry j

Quadrant II: Final demand/output

$$GDP = F = C + G + K + V + E - Q \quad \text{(at market prices)}$$

$$\Rightarrow f_i = c_i + g_i + k_i + v_i + e_i - q_i$$

$= $ sales of industry i to final demand.

where c_i = final sales/output of industry i to households

g_i = current purchases/inputs of government from industry i

k_i = value of the proportion of gross fixed investment manufactured by industry i

v_i = change in inventories of output of industry i

e_i = exports of industry i

q_i = imported proportion of intermediate and final sales/output of industry i

Quadrants I and II: Intermediate demand/output plus final demand/output

$$X_i = \sum_j x_{ij} + f_i$$

= intermediate demand/output plus final demand/output of industry i, for j = 1, … , n

= total production/output of industry i, for j = 1, … , n.

Quadrant III: Primary inputs

$$GDP = Y = W + P + T - S \quad \text{(at market prices)}$$

$$\Rightarrow y_j = w_j + p_j + t_j - s_j$$

= purchases of primary inputs by industry j,

where: w_j = remuneration of employees in industry j;

p_j = gross operating surplus in industry j (i.e., the net operating surplus before provision for depreciation);

t_j = indirect tax paid by industry j; and

s_j = subsidies received by industry j from government.

Quadrants III and IV: Primary inputs plus final demand/output

$$X_j = \sum_i x_{ij} + y_j$$

= primary inputs plus final demand/output of industry j, for i = 1, … , n

= total production/inputs of industry j, for i = 1, … , n.

Total gross input and output (equilibrium condition):

$$X_i = X_j \qquad \text{for all } i = j$$

$$\Rightarrow \sum_j x_{ij} + f_i = \sum_i x_{ij} + y_j \qquad \text{for all } i = j$$

=> Gross production/output of industry i = gross production/input of industry j, for all i = j.

8.4 Input Coefficients or the Technical Coefficient Matrix

A table of technical coefficients can be derived from an I-O table that has been compiled for a particular year. A technical coefficient represents the value of the input(s) purchased by one industry from another (or from itself) in order to produce an output of R1. Technical coefficients are only calculated for quadrants I and III,. which represent the manufacturing industries and primary inputs, the coefficients being usually expressed in monetary units as the direct requirements per R1 gross output of an industry.

To calculate the technical coefficients, every column entry for a particular industry in Quadrants I and III is simply divided by the gross output of that industry. The formula for the calculation of the technical coefficients can therefore be derived as follows from Table A1.

$$a_{ij} = x_{ij}/X_j \qquad \text{for all } i = 1, \ldots, n;\ j = 1, \ldots, n$$

$$= \text{input coefficients per R1 gross output (direct requirements per R1 gross output).}$$

8.5 Interdependence or Inverse Coefficients

As explained already, a change in the final demand for the output of an industry affects the entire economy because of the interdependence of the industries and sectors that make up that economy. Also as previously mentioned, interdependence coefficients have to be calculated to study second- or higher- order effects.

For example, manufacturing will buy inputs directly from the other industries if there is an increase in the final demand for manufacturing output. These purchases, however, will induce other industries to purchase inputs from each other in order that they may manufacture the inputs which they supply to manufacturing. Thus the initial increase in the final demand for manufacturing output causes a ripple effect throughout the entire economy. The technical coefficients can be used as follows to derive the inverse coefficients from the ratios given in Table A1. The total final demand for the outputs of the industries in an economy can be defined as a column vector F such that:

$$F = C + G + K + V + E - Q = \begin{bmatrix} f_1 \\ . \\ . \\ f_i \\ . \\ . \\ f_n \end{bmatrix}$$

The matrix of technical coefficients can be defined as follows:

$$A = \begin{bmatrix} a_{11} & \cdots & a_{1j} & \cdots & a_{1n} \\ \cdot & & \cdot & & \cdot \\ \cdot & & \cdot & & \cdot \\ a_{i1} & \cdots & a_{ij} & \cdots & a_{in} \\ \cdot & & \cdot & & \cdot \\ \cdot & & \cdot & & \cdot \\ a_{n1} & \cdots & a_{nj} & \cdots & a_{nn} \end{bmatrix}$$

The column vector of industry production or output is:

$$X = \begin{bmatrix} X_1 \\ \cdot \\ \cdot \\ X_i \\ \cdot \\ \cdot \\ X_n \end{bmatrix}$$

The production achieved by each individual industry after the first-order effect has spent itself can be obtained by multiplying the technical-coefficients matrix by the final demand column vector as follows:

$$X^{(1)} = AF,$$

where $X^{(1)}$ = the first-order changes in output/production.

The second-order effect is:

$$X^{(2)} = AX^{(1)}, \quad \text{and so on.}$$

Comparison of the first-order effect with the second and higher-order effects will reveal that the higher the order of the effect, the smaller its value becomes until it eventually tends towards zero. The effect at any level is obtained by multiplying the effect at the immediately previous lower level by the technical-coefficients matrix. The total effect can be obtained by summing the effects at all the levels.

This means that

$$X^{(0)} = F \qquad \text{(initial change in final demand)}$$

$$
\begin{aligned}
X^{(1)} &= AF \\
X^{(2)} &= AX^{(1)} = A^2F \\
X^{(3)} &= AX^{(2)} = A^3F \\
&\cdot \quad\quad \cdot \quad\quad \cdot \\
&\cdot \quad\quad \cdot \quad\quad \cdot \\
X^{(n)} &= AX^{(n-1)} = A^nF
\end{aligned}
$$

The total of the different effects is:

$X^{(0)} + X^{(1)} + X^{(2)} + X^{(3)} + \ldots + X^{(n)}$, and is denoted X^n.

It follows that

$$
\begin{aligned}
X^n &= F + AF + A^2F + A^3F + \ldots\ldots + A^nF \\
&= [I + A + A^2 + A^3 + \ldots\ldots + A^n]\, F,
\end{aligned}
$$

Where I = the identity matrix, which is a matrix having zero values for all its elements except those on the main diagonal which have a value of 1.

Where the order (n) of the vector of production X^n obtained above is relatively large, that vector is for all practical purposes the same as the value obtained where the vector of final demand is multiplied by the inverse coefficients. By approximation the inverse-coefficients matrix equals:

$$
(I - A)^{-1} = I + A + A^2 + A^3 + \ldots\ldots + A^n
$$

$$
= \begin{bmatrix}
r_{11} & \cdots & r_{1j} & \cdots & r_{1n} \\
\cdot & & \cdot & & \cdot \\
\cdot & & \cdot & & \cdot \\
r_{i1} & \cdots & r_{ij} & \cdots & r_{in} \\
\cdot & & \cdot & & \cdot \\
\cdot & & \cdot & & \cdot \\
r_{n1} & \cdots & r_{nj} & \cdots & r_{nn}
\end{bmatrix} = R
$$

The A and R matrices are used for calculating the direct, direct and indirect, and direct, indirect and induced (I-O table closed) multipliers used to determine the impact (the ripple effect) on the entire economy from a change in final demand in any one sector of that economy. How these multipliers are calculated is shown below.

8.6 Calculation of Multipliers used in the Study

Industry income multipliers, reflect the change in value added (GDP) that is directly, indirectly and derivatively attributable to an autonomous change in the demand for the final output of an industry. Industry income multipliers are calculated by multiplying the matrices of the input and inverse coefficients, element-wise across the columns, by the total primary input coefficients of the relevant industry (representing the column), i.e., y_i/X_i, where $y_i = w_i + p_i + t_i - s_i$.

Three types of income multipliers can be distinguished:

(i)	Y_j^D	=	$\Sigma a_{ij}\, y_i / X_i$	Direct impact
(ii)	Y_j^I	=	$\Sigma r_{ij}\, y_i / X_i$	Direct and indirect impact
(iii)	Y_j^A	=	$\Sigma r_{ij}\, y_i / X_i$	Direct indirect and induced impact, where r_{ij} and y_i are closed for households.

Industry import multipliers are calculated by substituting the imports for industry i for y_i in the equations for income multipliers given above. In performing the calculations an I-O table with import leakages shown as a separate row is required. The South African 1993 I-O Table is structured in this fashion.

Industry employment multipliers show the number of workers required from an autonomous change in final demand for the output of an industry. The assumption that full employment in the economy prevails. Industry employment multipliers can also be calculated by substituting the employment for industry i for y_i in the equations for income multipliers above.

These three types of multiplier were calculated for use in the analysis undertaken in Chapter 9 of this study. These multipliers estimate the value of the appropriate economic indicator when multiplied by the relevant change in final demand. For example, the GDP multiplier when multiplied by the change in final demand for household appliances, i.e., the purchase of household appliances, provides the income (GDP) earned by that industry from the purchases of such appliances in any particular year. The multipliers calculated are shown in the tables below,

9.0 MULTIPLIERS USED FOR DETERMINING THE MACRO-ECONOMIC IMPACT OF ESKOM'S ELECTRIFICATION PROGRAMME: 1990 - 1995

ECONOMIC SECTOR	DIRECT & INDIRECT	DIRECT, INDIRECT & INDUCED
Electricity	0.9411	1.3905
Radio & television	0.7854	1.4500
Electrical appliances	1.0020	1.7969
Building construction	0.8516	1.6423
Civil engineering	0.8768	1.6269

GDP MULTIPLIERS[2]

ECONOMIC SECTOR	DIRECT & INDIRECT	DIRECT, INDIRECT & INDUCED
Electricity	0.0601	0.1196
Radio & television	0.2091	0.2971
Electrical appliances	0.3190	0.4243
Building construction	0.1539	0.2586
Civil engineering	0.1305	0.2586

IMPORT MULTIPLIERS[3]

[2] Multipliers derived from the 1993 South African National Input-Output Tables

[3] Multipliers derived from the 1993 South African National Input-Output Tables

ECONOMIC SECTOR		DIRECT & INDIRECT	DIRECT, INDIRECT & INDUCED
Electricity	s	0.8570	2.1130
	s/s	2.8361	6.8553
	l/s	2.8732	6.6554
Radio, television & electrical appliances	s	3.5265	5.4170
	s/s	10.5310	16.4860
	l/s	8.7287	14.3324
Building construction & civil engineering	s	2.4060	4.6150
	s/s	11.2908	18.2117
	l/s	9.5841	16.0894

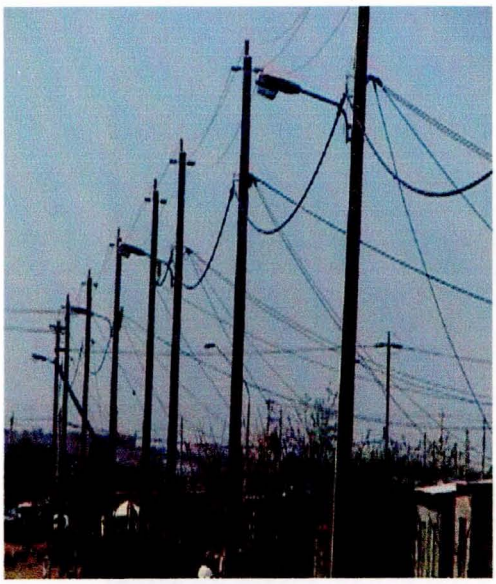
s skilled worker
s/s semi-skilled worker
l/s low-skilled worker

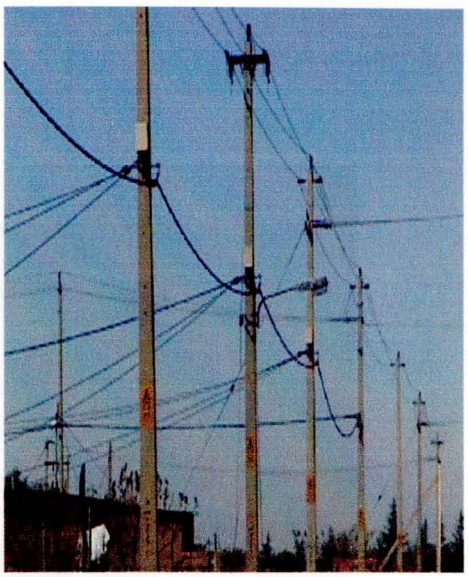
EMPLOYMENT MULTIPLIERS[4]

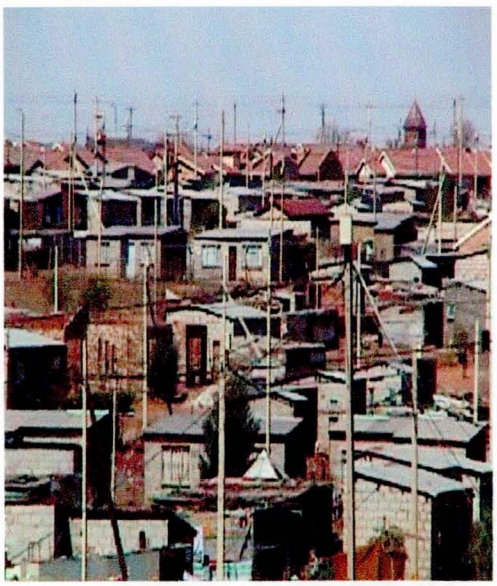
[4] Multipliers are derived from data given in South African Competitiveness Monitor Vol. II, WEFA Group, Pretoria: 1996. The table shows multipliers in jobs per million rand of final demand in 1995 rands. Adjustments to these multipliers for the relative value of the rand in different years have been made in calculating the job creation potential of Eskom's programme to electrify black households in South Africa in the period 1990 - 1995.

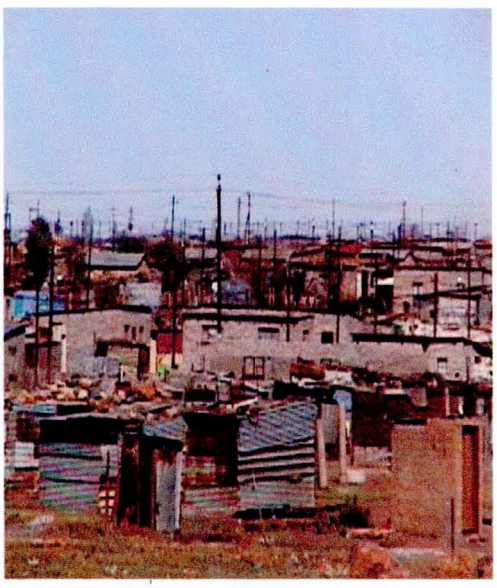
APPENDIX B

TOWNSHIP ELECTRIFICATION ILLUSTRATED





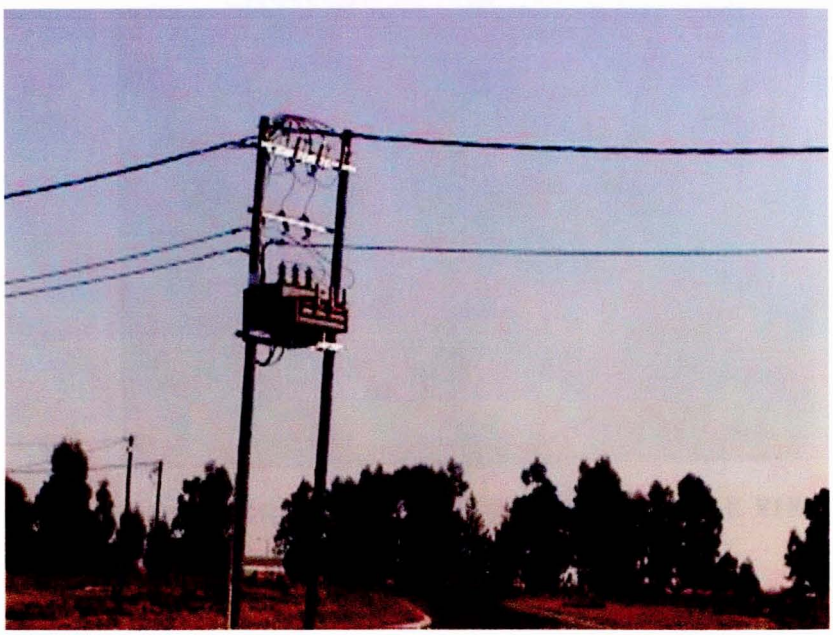




A TOWNSHIP IS ELECTRIFIED:



STREET LIGHTING:



A POLE MOUNTED TRANSFORMER:



A READY BOARD:



A CONSUMER GETS ELECTRICITY FOR THE FIRST TIME:

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