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COST-BENEFIT ANALYSIS OF ELECTRICITY SUPPLY IN A DEVELOPING TOWNSHIP

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COST - BENEFIT ANALYSIS OF ELECTRICITY SUPPLY IN A DEVELOPING TOWNSHIP

by

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TO MY SON - ZOLILE

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"God grant me the serenity to accept the things
that I cannot change, courage to things I can
and the wisdom to know the difference".

M.N. Putuma
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SUMMARY

Investment in electricity is a key element of the development process. Its importance is reflected in the growing recognition, since the 1960's, that investing in electricity provides and enhances knowledge, attitude and motivation necessary for economic and social development.

The development and utilization of electricity create an economic atmosphere that has direct and indirect benefit for the economy. The direct impact is felt by most households who are able to affect households tasks more rapidly than before and save much time and effort in the process.

Electricity also has an indirect impact on development. It improves the quality of life of the community by raising their income. The results of the survey at Katlehong confirms that the availability of electricity as a basic need appears to be far from satisfactory. Areas without electricity experience major social and economic costs as a result of dependency on costly and inconvenient energy sources.

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Abbreviations

BNA	-	Basic needs approach
CBA	-	Cost-benefit analysis
Unicef	-	United Nations Children's Fund
ILO	-	International Labour Organisation
OECD	-	Organisation for Economic Cooperation and Development
ESCOM	-	Electricity Supply Commission
PWV	-	Pretoria-Witwatersrand-Vereeniging
PDL	-	Poverty datum line
IMF	-	International Monetary Fund
CPI	-	Consumer price index
CEA	-	Cost effectiveness analysis
SWR	-	Shadow wage rate

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CHAPTER ONE

INTRODUCTION

1.1 STATEMENT OF THE PROBLEM

1.2 MOTIVATION FOR THE RESEARCH

1.3 METHODOLOGY

1.1 STATEMENT OF THE PROBLEM

South Africa is entering a critical stage in her existence. Major forces are interacting on the social, political and economic front, changing the fabric of society. Aspiration levels among the developing segments of the population are rising fast and the available resources are concomitantly put under increasing pressure to satisfy these aspirations.

One such a group of basic aspirations concerns the provision of housing in the urban environment. With the abolishment of influx control as part of the gradual political reform process, the present housing backlog (estimated at about 634 000 units for black families in 1985 by the National Building Research Institute, and the associated undesirable social manifestations such as uncontrolled squatting, poor hygienic conditions, crime, etc., could become one of the major problems of the 1990's in South Africa, unless pro-active innovative action plans are implemented.

The economics of supplying housing can be daunting. On the financial side, few or no overseas loans are available, due to the international financial sanctions campaign. This means that demands must be made on the limited internal funds, competing with other demands such as education, defence, etc.

The actual supply of housing is also not as simple as it might seem at first glance. Firstly , land must be made available by the Government at low or no cost, (effectively redistributing wealth from taxpayers to new homeowners). Alternatively, private developers have to acquire land at market rates, increasing the final cost to the prospective homeowner. There are many and ingenious ways to supply physical housing to lower income groups, over and above the traditional brick/block contractor-built house. These include site-and-service schemes, shelter housing, shell housing and core housing.

The erection of dwellings in a new township or suburb, while a very visible operation, is however, only the tip of the iceberg. The provision of appropriate services is an important dimension of the housing problem, and one often overlooked in the discussion of this problem.

These services include the provision of roads, water supply, stormwater drainage, sewerage removal, electricity reticulation and house wiring, telecommunication infrastructure, etc. The importance of the costs associated with the provision of services is underlined by the fact that services could account for half the purchase price of a low-income house in some instances. (Escom 1991:41).

The supply of electrical infrastructure is an important component of the provision of services to a new township or suburb. Electricity in abundance has become commonplace in the developed sector. It has been accepted as a given and is even viewed as a right. People expect to be able to acquire and use any number and size of electrical appliances in their homes without problems.

When viewed in the context of the peculiar problems facing the developing sector, specifically in the light of the multitude of needs versus the economic constraints, the provision of electrical infrastructure clearly needs to be completely reevaluated. Electricity supply is not only competing with the provision of other services for each rand invested, but in many cases with the provision of land and actual dwellings as well.

Conceptually, two alternatives emerge: either retain electrical reticulation standards at developed sector standards and supply a small part of the developing sector backlog with electricity; or maximise the availability of electricity to as many people as possible.

1.2 MOTIVATION FOR THE RESEARCH

Preliminary research conducted by the author, in 1990, into the importance of electricity supply in South Africa, revealed

certain salient points. Several local researchers are active in the general field of energy supply to the developing sector of South Africa's population, both urban and rural. The specific subject of high benefits of electricity supply to cost has not been extensively researched and reported upon. The National Building Research Institute, produced a literature study which concluded that coal was the most important and cheapest source of energy for low income urban communities. (Escom 1991: 12).

The capital intensive nature of electricity supply resulted in high connection fees, resulting in many low income households opting not to connect to the grid even when electricity was available.

It was therefore decided, after consultation with academics, Town Council officials and Katlehong residents, to conduct a study in this complex field in South Africa, and to see if reasons could be found for making a number of relevant recommendations. The main aims of this study are:-

(1) to investigate the implications of limited electricity supply to urban residential consumers.

(2) to identify the correlation between electricity supply and the standard of living.

(3) to identify the spillover effects of electricity supply.

1.3 METHODOLOGY

A theoretical study on related aspects of the urban electrification process was firstly undertaken and this included the basic needs approach, cost-benefit analysis and the economic impact of electrification in general. This was followed by an indepth discussion with various experts on electrification at both consulting and municipal/township level, to determine various practical aspects of limited electrification of the Katlehong township in particular.

Other organisations active in the subject field were also contacted. A survey of consumers in Katlehong township (Hlahatse, Phoko and Ramakonopi East section) was also undertaken to determine attitudes towards and perception of electricity in general and limited electrification in particular. The obtained data was analyzed, collated and integrated. A wide range of relevant publications, journals and newspapers were reviewed so as to comprehensively evaluate the topic in these regards. Additional discussions were held with number of persons in the township on an informal basis.

As Escom is responsible for supplying electricity in the township through town councils, it provided valuable data and comment and also disclosed important relevant information during a series of confidential discussions held in Megawatt Park during 1990.

The dissertation is divided into seven primary areas of analysis, forming the contents of chapters two to seven. Chapter two to four, provide a theoretical framework in various degrees, while chapter six analyses the application of cost-benefit analysis in South Africa and Katlehong in particular. The conclusions are reported on in chapter seven.

The study begins with an analysis of the basic needs approach in chapter three, as well as a critical evaluation of this approach, so as to provide a theoretical framework, in which to evaluate the importance of electricity supply. The following chapter deals with the applied theory of cost-benefit analysis. The origins and nature of the cost-benefit analysis, are identified and discussed in the first half of chapter four. The remainder of this chapter is devoted to the possible adjustment policies and mechanism of the approach which is further extended to chapter five which looks at the economic impact of electrification.

In evaluating the purposes and impact of electricity supply and the costs thereof, the specific theory of the dissertation is addressed. Chapter six therefore, forms the core of the theoretical analysis conducted. The main purpose of this chapter is to show how the expansion of electricity supply to various townships will affect the standard of living of the households. With the theoretical framework in place, chapter six conducts an analysis of the perceived electricity supply and try to reconciliate the theory and practice with each other.

The final chapter of this dissertation, summarizes the main findings of the research, both theoretical and applied, and makes a number of relevant recommendations. Other pertinent areas covered during the course of the study, are summarized in terms of suggestions for further research, thereafter.

CHAPTER TWO

ELECTRIFICATION IN SOUTH AFRICA

2.1 ELECTRIFICATION IN SOUTH AFRICA

Electricity supply in South Africa is more than a hundred years old. In fact this country was one of the first in the world to use electricity. Initially, various generating authorities were formed and some of the mine municipalities generated their own power. The need for a central generating authority soon became evident and in 1923 a public utility, the Electricity Supply Commission, today known as Escom was established.

In South Africa the vast distances between the metropolitan areas and the relatively low population density rural areas present unique problems for electricity supply. With millions of people moving to urban areas, traditional energy sources such as wood and coal have become inadequate. Moreover, electrification will play a major role in combating damage to the environment, which has become a serious problem in South Africa. The fact that people are moving into urban areas had led to the deforestation of large areas and unhealthy levels of pollution in urban areas.

Most of the Escom's electricity is sold directly to the mines, heavy industry and the railway system i.e. about 63 per cent. The rest (37 per cent) is supplied in bulks to municipalities and neighbouring countries who resell the electricity to consumers in their own areas. It is estimated that industry uses 55 per cent of the electricity consumed in South Africa,

the mines 27 per cent, households 14 per cent and the railway system 4 per cent (Escom 1991: 36)

Only about thirteen million of South Africa's total population of 39 million have electricity in their homes. Many more, of course, are exposed to the use of electricity in their workplace (Gervais 1987:4). In urban areas the provision of the electricity is the responsibility of local authorities who buy electricity from Escom and resell it to end-users in their areas. Little progress has been made during the past few years in the provision of electricity to non-electrified urban areas. Major cities like Soweto, in the PWV area with between one and a half and two million inhabitants, still have very little access to electricity.

2.2 INEQUITABLE ACCESS BY THE POOR

Heavy public spending on rural infrastructure is often justified as a measure to help the poor. Incomes in rural areas are indeed lower on average than those in urban areas, but the range is wide.

Highly subsidized rural electrification does not mean that all village families have equal access to electricity. Findings from a survey of ninety villages in the TBVC states in 1991 indicate that about 15 per cent of the population was connected during the first few years of electrification and only 5 per cent after five years (Gervais 1987: 43).

The poorest often live far from the main electricity lines and can rarely afford to connect to them. Data for 1991 show that nearly 65 per cent of the highest income group in the TBVC area had electricity compared to 20 per cent of the lowest income group.

2.3 IMPACT OF ELECTRICITY SUPPLY ON LIVING STANDARDS

As a substitute for wood, paraffin, coal and candles, electricity reduces damage to the environment. By being available at the flick of a switch, electricity improves productivity because it allows users more time for constructive activities. Electricity for all will definitely enhance economic growth and prosperity.

Although electricity supply might appear as being a good business, the wider implication for stable community life are obvious. Taking Kwa-Nobuhle township in Uitenhage as an example, the quality of life has really improved (Escom 1991:100).

It is an area where residents have been asking for electricity for some years and the Volkswagen motor industry took the initiative and approached Escom for assistance in upgrading the quality of life of the residents. Escom has introduced a low cost pre-metering system which has an advantage in low income areas: it allows the consumer to control his own usage, which is crucial where you have great variations in affordability.

A householder might allocate his electricity to cooking, for example, and use candles for lighting or choose electric light and cook with coal. To give the consumer this degree of control over his personal life-style is of great importance.

This pre-paid metering system that has been installed in Kwa-Nobuhle is operated through inserting a coded card (purchased in advance rather like punched bus coupons). This method does away with the risk of theft: cards can't be stolen, and the card will not work in any other meter. The consumption will be shown on the meter by a series of coloured lights, with a distinctive warning light to indicate that the household is running 'on reserve'.

The locally developed meter incorporates an over-current and earth leakages relay, which eliminates the need for these devices on the customer's distribution board and hence effects an installation saving of about R160 per house. Reticulation costs that is, the price of bringing electricity into a home has greatly been reduced by up to 50 per cent (Escom 1991:139).

It is clear that electricity has a psychological impact on the residents with it. For the first time residents from Kwa-Nobuhle confirmed the idea that electricity creates a sense of personal identity - and with it, heightened the self-esteem. Electricity plays a general role in the development process.

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CHAPTER THREE

CRITICAL EVALUATION OF THE BASIC NEEDS APPROACH

3.1 INTRODUCTION

In most of the current international theory and writing on questions of economic development, a strong emphasis is placed on the assertion that everyone has the right to a standard of living adequate for the health and well-being of himself and his family, including food, clothing, housing, medical care and necessary social services. A fundamental premise of this assertion is that an improvement in the living standard or the quality of life of the poor should be afforded priority in economic development. This implies that for most developing economies emphasis should be directed to combating the widespread poverty and inequalities and in shifting the distribution of resources in favour of the poor. The basic needs approach (BNA) to development presents some contributions to assist in combating these deficiencies. (Urbanization, 1980:128; Hopkins and Van der Hoeven, 1988:74).

The purpose of this chapter is to illustrate the extent to which electricity supply can be regarded as the most versatile and convenient energy source whilst at the same time being a key basic need. The BNA to development will be defined and elaborated on. Following this, the specific application of electricity supply in the provision of basic needs will be examined in the next chapter.

3.2 DEFINITIONAL ISSUES

In the last chapter, it was established that a clear distinction should be drawn between economic growth and economic development. Economic growth, for example, measures "... increases in an economy's output capacity over time, while economic development embraces the wider concept of the impact of economic growth on the living standards of all those living within an area" (Keeton, 1983:68). Furthermore it was pointed out that the dominant ideology of the 1950's and the 1960's viewed growth as inherently good and necessary in the interest of society, thereby "... creating more jobs, more income, more goods and services to be enjoyed" (Goldstein, 1985:596). This assertion, however, turned out to be wrong, and the first major move away from growth maximisation took the form of emphasis on employment as a development objective.

However, the complexity of employment problems in poor countries soon revealed this to be unsatisfactory. "While open unemployment and people working short hours constituted one aspect of the employment problem to which additional employment was an appropriate response, people working long hours with very low productivity and incomes constituted another significant element of the problem" (Stewart, 1985:10). By the mid- 1960's, policy emphasis had changed to a structuralist approach of Redistribution - with - growth.

This approach suggested that development efforts should be focused directly on raising the incomes of the poor, thereby facilitating greater self-support in future in these groups (Ahluwalia et al, 1974:24).

This approach recognised the need for urban industrial investment, but it acknowledged that the fruits of growth would not automatically filter down to the poorer sections and poorer areas of the economy. As a consequence, intervention through government policy was deemed necessary to boost the provision and distribute the benefits of economic growth more equitably throughout society.

In the early 1970's, the ideology of economic growth and the Redistribution - with - growth programme came under attack from several quarters. More precisely, it seemed "... unlikely that the growth strategy could be maintained while additional incomes were redistributed and investments relocated; in addition it was argued that in most societies, political opposition would prevent redistribution of the type advocated" (Stewart, 1985:11). Furthermore, evidence suggested that widespread poverty had not, in fact, disappeared and economic growth and Redistribution - with - growth programmes had "... widened the global gap between the industrial countries of the 'south'" (Streeten, 1979; Van Wyk, 1982; Goldstein, 1985).

The implication is that the poor continued to be impoverished and the gap between rich and poor became increasingly marked. As a result, basic human needs began to emerge as a new framework for looking at economic development.

While Redistribution - with - growth programmes emphasized the 'top down' approach, the basic needs approach is based on the 'bottom up' pattern and concentrates on programmes aimed at providing goods and services to the poor. In other words, it is synonymous with "... a grassroots approach to development in which the needs of the individual households and communities are of paramount importance " (Moller, 1985:68).

The basic needs approach (BNA) to development originated by planners working in the International Labour Organisation (ILO) and the World Bank is, however, seen as a natural progression from the Redistribution - with - growth school. In fact, "... it is a modification of, and not a radical departure from that school. It rests upon the view that the record of the Redistribution - with - growth approach is, when measured in terms of living conditions of the majority of people in developing countries, unsatisfactorily: the emphasis has been too much on growth and not enough on redistribution" (Dewar et al, 1981:31).

The BNA promotes economic development through fulfilling the basic needs of all people in a cost - effective manner and

within a specific time frame. Its major strength is its concern for people rather than other abstract systems. Put differently, the main purpose is "... not to develop things but to develop man. Human beings have basic needs ... [and] any process of growth that does not lead to their fulfilment or even worse disrupts them, is a travesty of the idea of development" (Ghai et al, 1979; Keeton, 1984:69). The BNA aims at eliminating absolute poverty on a permanent and sustainable basis. This is a broadening of the concept of development in the sense that it (the BNA) promotes the development of underprivileged areas, thereby enabling even the lowest income groups to enjoy a minimum standard of living. Appropriately, Reynolds (1981:13) maintains that this meeting of needs should be seen as a means of "... strengthening the hand of the poor, the women and rural as against urban dwellers, ... for he seeks to define an acceptable social order in which human fulfilment is possible". Slabbert (1984:22) interprets this description as a challenge to present day economic theory with regard to ignorance of the fundamental principle that the satisfaction of human needs is the foundation of economics.

The contention that the BNA is a logical step along the path of development thinking rests on the argument that it provides a key to the solution of a number of separate, but related problems. If basic needs "is made the starting point, these otherwise recalcitrant problems fall into place and become solvable" (Streeten et al, 1981:22).

Streeten (1979:30) and Slabbert (1984:18) assert that the aspects of urbanisation, protection of the environment, equality, the relation between rural development and industrialisation, rural-urban migration (urban directed); domination and dependence appear in a new light once the meeting of basic needs becomes the central concern in economic development. Nattrass (1980:58) points out that the BNA allows the peripheral states in Southern Africa to attack the problems of poverty, growing inequality and economic dependence on the South African centre with one policy package. Such an attack is facilitated through the creation of jobs since the BNA is both labour intensive and import replacing.

Of major importance is that jobs reduce the developing economies need to rely on the migrant labour system. At the same time, the output from jobs provides the necessities of life presently imported from the South African centre economy. Ghai et al (1977:6) argue that this expansion in domestic production levels opens up "... the possibility of autonomous self-sustained growth for the Third World which is currently ruled out by the dependent status." Other cases on the effectiveness of the BNA are those associated with the experience of developing economies such as Sri Lanka and the state of Kerala in India where at extremely low income levels, life expectancy, literacy and infant mortality have, in recent years, reached levels comparable to those in most advanced countries.

In his study on intergrated rural development programmes, Ruttan (1984:397) noted that in Sri Lanka, life expectancy at birth rose from 46 in 1945 - 1947 to 64 in 1973 - 1975; infant mortality declined from 182 to 65 per 1000 between 1945 - 1949 and 1965 - 1969; literacy increased from 68% in 1953 to 81% in 1969. These improvements were achieved in an economy in which per capita income was below 200 (1974-1976 US dollars).

More specifically, the advocates of the BNA contend that it represents a radical departure from conventional development approaches: "The evolution from growth as the principal performance criterion, via employment and redistribution to basic needs is an evolution from abstract to concrete objectives, from a preoccupation with means to a renewal awareness of ends and from a double negative (reducing unemployment, alleviating poverty or reducing inequality) to a positive (meeting basic needs)" (Streeten and Burki, 1979; Ruttan, 1984). The implication is that the above evolution has made it possible to define development thought in less abstract and more disaggregated, concrete and specific terms. Central to this development thinking is that the needs of the most deprived sectors of the population are afforded priority in order for them to live a decent life.

While a large spectrum of writers (Ghai, 1977; Streeten, 1979; Burki, 1980; Hicks, 1980; UL Hag, 1980; Keeton, 1984; Stewart, 1985 are prominent exponents) agree on the objectives of the

BNA, there is, however, much disagreement on its precise meaning and interpretation. Streeten et al (1981:8) assert that this concept has unfortunately "... evoked emotions that have little to do with the meaning that lies behind it". Accordingly, UL Hag (1980:135) writes that "... To some, the concept of providing for the basic needs of the poorest represents a futile attempt to redistribute income and provide welfare services for the poor without stimulating corresponding increases in their productivity to pay for them. To some, it conjures up the image of a move toward socialism and whispered references are made to the experience of China and Cuba. To others, it represents a capitalist conspiracy to deny industrialisation and modernisation to the developing countries and thereby to keep them dependent upon the development world. To still others, it is a pragmatic response to the urgent problem of absolute poverty in their midst". Le Roux (1985:6) adds that some radicals interpret the BNA as representative of policies of appeasement which are adopted to prevent any real change from taking place.

Despite these controversies regarding the BNA, the definition of basic needs include: First, certain minimum requirements of a family for private consumption: adequate food, shelter and clothing as well as certain household equipment and furniture.

Second, they include essential services provided by and for the community at large such as safe drinking water, sanitation, public transport and health, educational and cultural facilities. A basic needs - oriented policy implies the participation of the people in making decisions which affect them through organisations of their own choice. In all countries, freely chosen employment enters into basic needs policy, both as a means and an end" (ILO, 1976:191).

The above description includes both material and non-material needs. More precisely, the list contains a number of components of basic needs that are publicly provided services, though not necessarily public goods. This can be aligned with the aim of the BNA, which, according to Lal (1984:100) is to expand the supply of these basic services as well as converting the bulk of private consumption into publicly-provided goods and services. It could, however, be concluded from the above list that growth objectives are replaced by consumption targets. Furthermore, current consumption is stressed ahead of saving, as future investment benefits will flow from a healthier, better housed and more productive population. This represents an attempt to provide immediate opportunities for the full physical, mental and social development of the human personality or what Streeten (1979) and Stewart (1985) regard as providing "... all human beings with the opportunity for a full life". Making provision for the opportunity of a "full life" implies that basic needs should try to integrate policies

on production, investment and income to meet this objective. According to Ul Haq (1980:32) pursuing the "full life" objective is the only method which can eliminate poverty in the long run.

Basic needs can be specified according to two approaches. In this study, these needs are afforded priority, a framework in which electricity supply can be regarded as providing these needs. The other is to order elements into hierarchies of importance through the specification of a "core" bundle of basic goods and services.
Such a specification is preferred to an extensive list because it highlights the critical importance of the most essential goods and services that should be given attention in the first stage of the development programme. Wide disparities in living standards exist between various developing countries as a result of "... differences in their economic, social, political and cultural characteristics" (Lisk, 1977:338).

Notwithstanding the above disparities, a common trait exists in these countries in that they are, to varying degrees, deprived of certain goods and services essential for a decent life. A "core" list of basic needs in most developing countries will therefore contain many common elements. Any such list must, however, be country-specific,i.e. it should take into account "... the particular circumstances, problems and resources of the economy concerned" (Keeton, 1984:71).

This "core" of basic needs consists of food, shelter, health, clothing, water and sanitation. The "core" specification is certainly not a predetermined blueprint that could be designed for all developing countries.

As Burki (1980:19) points out, plans to provide people with basic needs have to be evolved individually for each country. Employment is not included as it is not a basic need per set. It provides the income necessary for the purchase of basic goods and services. It is thus an essential means to attain basic needs and must be prominent in designing a basic needs strategy. Of particular importance, however, is that employment should be productive. Keeton (1984:11) argues that "... not only should employment opportunities as such be present, employment should be productive". Thus low productivity jobs result in low wages, basic needs deprivation may then follow from comparatively unproductive jobs rather than from unemployment.

While the proponents of a BNA argue that employment creation and income redistribution are essential to the satisfaction of basic needs they do, however, emphasise that these elements in isolation are not sufficient conditions for the elimination of poverty. As Seers (1981:742) points out, they are "... also needs, but of quite a different type, they are instrumental needs, sources for producing or purchasing the basic input needs, e.g. food, water and shelter."

For example, as Keeton (1984:78) appropriately asserts, it may not be sufficient for people to have enough income to purchase enough food for subsistence, they instead, should also consume the right kind of food if their nutritional requirements are to be met adequately. By the same token, it may not be adequate that people attend school unless the education they receive is relevant to their employment opportunities. Hence, the government has an important educational role to play in nutrition and in designing the contents of formal education.

A related and important issue concerns the functional linkages and complementaries that exist in the satisfaction of various basic needs through government services. This is particularly noteworthy as the activities of the various sectors involved in meeting basic needs are closely related. For instance, health is required not only for its own sake, but also for work, which produces food, water and shelter and satisfies other basic needs either directly or through the income it provides. This important circularity of needs carries a positive implication in that once improvements take place in one sector, they may become cumulative. Furthermore, linkages and complementarities are essential as action in one sector without correlative action in other may even be counterproductive. For instance, a water supply system installed without a corresponding drainage system may attract germs and insects that can spread infectious diseases.

The implication is that some basic needs are best delivered together in an integrated program, rather than separately. This is a laudable policy in terms of costs involved in the programs. It is, for instance, less costly to have a coordinated supply of water, nutrition and health than if these goods and services are supplied by separate government agencies.

The interdependence between sectors brings up an important issue of sectoral and geographical priorities. "Basic needs cannot be supplied unlimitedly, which means that countries should have some priorities in supplying them" (Van Wyk, 1982:142). Of cardinal importance, however, is that such priorities in social policy in any country are naturally supposed to reflect its social situation.

The insistence on sectoral priorities arises from the recognition that impossible administrative and financial costs tend to be imposed on many developing countries when efforts are made to improve all sectors together. Although a definitive conclusion about priorities and linkages cannot be reached, there should be agreement on material needs: education, basic health, water and sanitation, shelter, nutrition and clothing, as well as non-material needs: public participation, change in attitudes, equality and self-reliance.

These needs are the key issues that directly affect the quality of life of the poor. In this study, these needs are afforded priority in that they provide a framework upon which electricity supply can be regarded as providing these needs. A section that follows is devoted to coverage of these needs.

3.3 KEY MATERIAL NEEDS

3.3.1 EDUCATION

Education is a basic need in that it plays several roles in the development process. It enhances an individual's chances of obtaining adequately paid employment as well as improving "... the people's understanding of themselves, their society and their natural environment and gives them access to their cultural heritage. It improves living skills, increasing productivity by improving work skills and lowers reproduction by raising women's status ..." (Streeten et al, 1981:134). In summary, education in its many forms has the potential to help fulfil and apply every individual's collection of abilities and talents.

Despite the various conveniences that are linked with education, most poor people in developing countries have limited access to it. The same may well be said of other public services such as health care and water supplies which the poor need if they are to break out of the vicious circle of low productivity and poverty.

Essentially, lack of access to education denies the poor

opportunity to participate fully and meaningfully in the social, economic, cultural and political life of the community. This is the reason why education needs to be of such a standard and availability that it will enable an individual to participate fully in society. For the purpose of prosperity in economic growth and development, this need should be attended to by the government. However, its provision necessitates that authorities should direct greater attention to these groups and areas which are qualitatively and quantitatively disadvantaged. According to Ghai et al (1980:40) quantitative deficiencies in education ensue when educational institutions and facilities are inadequate in some areas, or simply because some people are too poor to be able to afford paying for the education of their children. Furthermore, cultural barriers may inhibit parents in their willingness to send their children to school. On the other hand, qualitative defiencies arise from inadequately trained or poorly motivated teachers, inadequate facilities and inappropriate syllabuses.

The quantity and quality of educational services can be improved by, inter alia, concentrating efforts in the following areas as indicated by Burki (1980:19) and Van Wyk (1982:149):

(i) Expanding basic educational opportunities. This is,perhaps, the most important task for educational planners in developing countries in that such expansion needs to be assured by building more schools and increasing participation through the removal of

disincentives. Keeton (1983:124) suggests that programmes such as a system of bursaries, the provision of free education for the entire primary school period, improved equipment and facilities in general and in-service training of teachers, can all contribute positively to achieving such an expansion. In particular, education of women may be one of the best investments a country can make in future economic growth and welfare. Women have great influence on future generations and providing them with better education would improve their attitude to education, which in turn would eventually benefit the country as a whole. The World Bank (1989:50) reports that studies in Bangladesh, Kenya and Colombia show that infant mortality is inversely related to the education of mothers, even allowing for differences in family income. Concerning nutrition, a sample of households surveyed in Sao Paolo, Brazil showed that for any given income level, families were better fed the more educated the mothers were (World Bank 1989:22).

Yet in most developing countries, women have been excluded from the educational system to a significant degree. In Nigeria, for example, expenditure on adult education, especially for women during 1977-79 was reportedly ".. very low, receiving about 2% of capital expenditure on education" (Stewart, 1985:129).

(ii) Improving the quality of education and making it more

relevant to local needs. This could be interpreted as involving people in every facet of their development. The suggestion is that education should be extended not only to cater for the poor, but also with regard to the level of demand for skills. As Lisk (1977:188) argues, some developing countries have significantly expanded their educational systems in the past two decades without achieving considerable improvements in the living conditions of the population.

The chief reason advanced for this failure is the widely known "mismatch" between procured skills and job opportunities. This implies that it is possible to be educated, but their education may be ill-suited to the actual needs or requirements of the economy. A current problem in most developing countries is the existence of considerable numbers of university graduates with few job opportunities, while at the same time, a shortage of appropriately qualified skilled workers and technicians exists.

It is obvious that the creation of ambition beyond possible fulfilment is instrumental in unemployment among the educated and the resultant brain drain (people who are educated and seek to escape their miserable rural existence in the hope of finding employment in towns).

Similarly, it is possible for people to start behaving irrationally, thereby creating "... anti-basic needs political constituencies that sometimes go with professionalisation" (Streeten et al, 1981:134). One solution to the above deficiencies lies in designing educational systems that are revelant to real labour demands as well as to local social and physical conditions. This efficiency could, to a certain extent, be facilitated by reducing the wastage of repetitions and dropouts as well as by making fuller use of buildings and equipment by multiple shifts and summer sessions, and where teachers are in short supply, by using substitute teachers (for instance, public servants, students, workers, retired persons, etc.).

(iii) Improving the out-of-school environment of the poor, such as community preschool programs, while the above requirements suggest that education should be viewed as an end in itself and as a necessity for the betterment of the quality of life, it is noteworthy that education also contributes to the satisfaction of other basic needs.

3.3.2 FOOD

According to Berg (1980), Ghai et al (1980) and Slabbert (1984), food is the one item of basic needs which in most poor countries should be assigned dominance. Among all human needs,

the need for nutrition is the most fundamental. Food is essential for survival and is a critical factor in an individual's growth as well as the ability to perform competently in society. This is why Streeten et al (1981:124) stress that "... the poor must eat, even if they drink unsafe water, are illiterate and are not inoculated".

Essentially focus on food as a basic need is frequently associated with the contentions that inadequate nutrition leads to high mortality rates, morbidity and a decreased capacity to work or educate and raise children. As Berg (1980:24), Streeten et al (1981:125) and Keeton (1983:124) maintain, insufficient nutrients during pregnancy may lead to low birth weights and high infant mortality. During lactation, it may result in poor health for both mother and infant and increase infant mortality. Poorly nourished children will experience diminished physical growth and in extreme cases, reduced brain size. The significance is that the BNA should reflect the necessity to ensure that adequate nutritional needs of people of all ages, income groups and both sexes are catered for both as an objective in itself and as an instrument of economic development.

Actually, the increased well-being and survival implied by improved nutrition is itself a sufficient justification for a country to invest in better nutrition for all. Moreover, and as Keeton (1983:127) points out, the favourable impact on work capacity and cognitive ability which it connotes, qualifies

improved nutrition as an essential part of any policy of economic growth through its impact on potential output.

Ghai et al (1980:42) propose that nutritional deficiencies may emanate from inadequate levels of income, suboptimal use of income and suboptimal use of food. These factors probably result from different causes which need to be identified and policies designed accordingly. Inadequate levels of income may emanate from inadequate household production, the insufficient use of resources, unequal resource endowment or low factor incomes.

The suboptimal use of income may result from a nutritionally unbalanced pattern of food production, excessive sales of nutritionally essential foods or a misallocation of resources between food for own consumption and cash crops. The suboptimal use of food may arise from poor methods of preparation, unequal distribution patterns within households and customs that prevent the consumption of certain nutritionally valuable kinds of food. Of cardinal importance, however, is that policies to be pursued must depend on the cause of the nutritional deficiency.

For instance, if the cause is inadequate income due to inadequate production, the policy implications should include the introduction of high - yield cash crops, the expansion of extension services, irrigation schemes, land reform and establishment of agricultural cooperatives.

The response most commonly given to counteract the problem of nutritional deficiency has been to accelerate growth in the incomes of the poor, and encourage increased food production. Berg (1980:26) insists that while growth in income and food production is a necessary condition for satisfying basic needs in nutrition, it is not sufficient. Without growth in income, the poor will be unable to afford food even if it is available. Higher incomes may also lead to increased government tax revenue with which to finance nutrition and other basic needs programmes. Along similar lines, increased food production is also necessary to meet the expected increase in demand as a result of higher incomes, without raising food prices which would in turn, reduce consumption levels. However, it is of vital importance that food production should be nutrition - oriented, i.e. satisfying requirements such as calories, proteins, vitamins and other vital nutrients. This should, in turn, be reasonably consistent with consumer preferences.In addition, food production should reach those in need. This implies shifting the focus towards food demand programs, including the strong possibility in some cases of food subsidies aimed at specific target groups.

These programs may, however, vary between different countries depending, as Berg (1980:26) continues, "... on the distribution of malnutrition between rural and urban areas, the extent to which the rural malnourished are small farm families, the particular nutritional problems and their causes the likely cost-effectiveness of feasible intervention, institutional and

finding capacity and political constraints".

Broadly speaking, therefore, policy should be used to influence the character of production, the processing and distribution of food within a country to raise the quantity consumed by the poor. One key solution, which Berg (1980:26), Streeten et al (1981:129) and Keeton (1983:133) all suggest, is that malnutrition should be viewed as part of a complex set of issues contained in the concept of poverty. However, while most people suffering from calorie deficiencies are poor, not all poor people suffer from such deficiencies. In addition, some high - income countries suffer from considerable malnutrition and certain low-income countries have little or none. This implies that countries that are committed to eliminating malnutrition appear capable of doing so.

3.3.3 HEALTH

Health services should receive high priority in all developing countries, and should ensure a certain average life expectancy and eliminate mass disease and ill-health.

Notwithstanding the above basic needs theorists have discovered that efforts to improve health of the majority of people in developing countries have, inspite of high levels of expenditure and the technical possibility of solving many of the most common health problems, had only modest success.

Burki (1980:19) attributes this deficiency to the fact that developing countries give priority to curative and urban health care at the expense of preventive and rural health care services. Furthermore, not only are the services inaccessible to most rural population, but the little health care that does exist is ill - suited to their health needs. This is because health care has either been patterned on that of advanced countries or it has been imported without adaptation and with inadequate resources from western models.

Most developing countries also put emphasis on sophisticated hospital facilities at the expense of primary health service. Health problems may be reflected by the unreliable supply of drugs and physical amenities such as health centres, equipment, transport, sanitation, pesticides and other provisions in remote areas. Even where basic medical facilities do exist at some health centres, there may be a problem of insufficient finance for the day to day running of such centres. In addition, the deficiency in technical, administrative and operating procedure and in leadership and supervision reduce efficiency.

Perhaps the most fundamental problem is the shortage of adequately trained staff, exacerbated in rural areas by the majority of qualified personnel being employed in large hospitals in major urban areas.

The solution proposed by some advocates (Burki, 1980:29; Van Wyk, 1982:150 are but a few leading ones) of a BNA is the introduction of a simple community - based health care system which concentrates on preventive health care and focuses on the needs of the people of that area. Specifically, special attention should be given to the following recommendations:

(i) Health care should be primarily preventive rather than curative. This should take the form of providing, inter alia, latrines and nutrition centres. The provision of such facilities should, however, be accompanied by genuine participation on the part of the people themselves in, for instance, the design and construction of such facilities;

(ii) communities must participate in health programmes. However, community participation is difficult to implement in a system which does not allow for participation on a broader level.
Thus the basic needs approach can effectively be implemented only when power is redistributed on a more equal basis.

Health care is an important facet of the basic needs approach. The realisation that even when the gross national product per capita increased in development countries, the income gap generally widened gave rise to the "basic needs approach to development".

When determining the criteria for adequate health care it is necessary to refer to universally acceptable norms. Unfortunately, differing levels of economic development, transport systems and population densities make such norms difficult to formulate. In the case of black health care in South Africa these norms must be those of developing countries since a comparison with western industrialized countries with their high levels of private ownership (with facilities) and greater ability to afford private health care results in invalid comparisons.

However, the danger of proposing one set of health standards for the wealthy and another for the poor perpetuates apartheid in a totally unacceptable manner. It is suggested therefore that accessible primary health care for all population groups should be the goal, although financial constraints may mean that this would be at the expense of certain sophisticated hospital - based service.

An annual publication by the United Nations Children's Fund (Grant 1988:68) regards the indicator of "access to health services" as "the percentage of the population that can reach appropriate local health services by the local means of transport in no more than one hour".

In South Africa, the Brown Commission of Inquiry into health services (Race Relations Survey 1986:770), which was appointed by the State President in 1980 and reported in 1986, found that the situation in South Africa was far from adequate. The findings included:-

(a) An inappropriate underemphasis on preventive and primary health care, with only 4,7 per cent of total health expenditure being used for preventive services.

(b) Concentration of facilities in major urban areas, with the rest of the country being inadequately served.

3.3.4 SHELTER

A need exists in most developing countries for expansion of housing in urban and rural areas. Like food, shelter is fundamental to basic needs. Shelter gives protection against the elements and without it, human existence cannot be ensured. In rural areas, the housing problem tends to be that of the low quality of housing as measured in terms of materials used in construction, types of roofing and flooring, number of rooms and their adequacy in providing shelter from the elements. On the other hand, the problem of urban shelter is more severe since it is concerned with insufficient housing to meet demand and the resultant overcrowding of existing dwellings.

Consequently, the provision of housing to the urban poor is considered to warrant more urgent attention than that of the rural poor.

The principal reasons advanced for this emphasis are, as Keeton (1983:140) suggests, the following: First, increasing numbers of people (usually due to population growth) in most developing countries tend to migrate from rural to urban areas, an exodus which, coupled with natural population increase in urban areas, will grow faster. Secondly, the environmental conditions arising from dense concentration of people in urban areas imply that living conditions are more undesirable in urban than rural areas.

Finally, since the daily contact between the rich and poor is more evident in urban than rural areas, the provision of adequate housing for the poor is a more politically sensitive issue in dense and compact urban areas than in more scattered rural communities.

There is frequently a mismatch between effective demand for and the supply of housing. Available evidence suggests that income is not a constraining factor in the provision of adequate shelter. Streeten et al (1981:144) insist that, with the exception of the poorest,income is seldom the binding constraint, and the major problems in providing shelter therefore do not lie on the side of effective demand".

The consumption of adequate shelter is thus probably because of bottlenecks on the supply side, most evidently in the supply of land, public services and financing. A shortage of land for housing is almost exclusively an urban problem and mostly institutional, legal and institutional barriers to the acquisition of land such as monopoly powers; confused or complicated title deeds, cumbersome legal systems and unrealistic costs involved in land transfers effectively exclude the poor from the land market. Furthermore, without security of tenure, the urban poor will not make the necessary investments to improve the quality of their housing. The above means that enough land should be available to meet the basic housing targets of a decent dwelling per family. This situation often requires a change in the legal and institutional framework of society.

The lack of available public services is also an acute problem in the provision of low-income housing. The cost of services such as water supply, electricity, sewerage, usually account for a large proportion of the total cost of shelter. For instance, it is common practice to find the low-income groups being able to provide their own basic housing but are unable to provide the services to go with it.

In addition to the shortage of public services, a lack of finance also inhibits the supply of low-income housing. While some finance, usually highly subsidised, is lent through public sector institutions and is available only for public sponsored

housing, the bulk of low-income housing is financed from personal savings without the use of institutional intermediary.

To sum up, it is of cardinal importance to note that housing may be supplied through both the private and public sectors of the economy. While the supply of housing in the private sector depends upon such factors as the price of houses, the cost of housing, the availability of credit and seasonal factors, in the public sector the supply is essentially a political issue determined by the estimated social need or value attached to housing by the authorities.

3.3.5 WATER SUPPLY AND SANITATION

An adequate supply of clean water is an essential component in every aspect of life - for domestic use, in agriculture, in industry and in recreational activities. In each of these spheres, water is used in a variety of ways ranging from drinking and food preparation to its use as a cleaning agent and dilutant. For health and hygiene, clean water needs to be available in fairly abundant quantities. The World Bank (1980:1) reports that for a reasonable minimum standard of living, each individual needs between 20 and 50 litres of clean water daily to provide for food preparation, drinking and personal hygiene and sanitation. Furthermore, where the water supply is unreliable, there can be no steady growth in industrial, commercial and social development. The quality of water supply and sanitation services is also a potential health

hazard. In particular, it is often argued that ground water, especially that associated with traditional wells is subject to pollution from septic tanks and pit latrines.

Adequate access to water may be defined in terms of a maximum distance between households and such sources and places of disposal, as well as the number of households sharing the same facilities. Accordingly, Streeten et al (1981:139) assert that the easy availability of water spares women the time consuming task of fetching it and frees them for more productive work and for more attention to satisfaction of their basic needs.

Since a wide range of external costs and benefits exist in the provision of these two related basic needs, public sector intervention is essentially advocated as these needs cannot normally be met by individual action in densely populated areas. There are several ways in which public policy can be used to increase the supply of water and sanitation services. Burki (1980:20) and Van Wyk (1982:151) advocate that more modest standards can be used in the supply of water and sanitation facilities without incurring enormous financial burdens. Instead of supplying piped water to houses, standpipes could be installed in the urban areas. It is obvious that public standpipes are as more appropriate technology in areas where water has to be distributed to a large number of people at minimum cost. In the rural areas, the main alternatives are communal systems with standpipes or properly located and constructed village wells and springs. A

wide variety of technologies are available for sanitation and water disposal. These range from a conventional flush system to a simple vault or borehole, all of which are satisfactory from a health point of view.

3.3.6 CLOTHING

Although there is very little space devoted to this aspect in almost all the literature on basic needs, clothing forms an integral part of basic material needs. The failure to recognise its importance does seem to be a serious omission.

Clothing gives physical protection against elements such as cold, and affords the opportunity to appear decent in public. However, the provision of clothing should be compatible with the social and cultural needs of the population. Furthermore, factors such as climatic conditions and the type of work being executed should be considered when estimating basic clothing requirements.

3.4 NON-MATERIAL NEEDS

3.4.1 ECONOMIC EQUALITY

To promote economic equality, it is necessary under the basic needs approach to provide everybody with equal access to goods and services such as financial facilities, job opportunities and credit schemes. It is essential to note, however, that

access cannot be determined exclusively by the generation of job opportunities and incomes. Adequate availability of basic goods and services by the public and the private sectors should be ensured. A distinctive feature is that inequality, in the sense of only certain groups, classes or races having access to certain goods and services, leads to exclusion of other people from the fruits of development.

Under such circumstances, it is possible that many elements in society would feel ignored and rebel, often leading to rejection of the idea of development being introduced.

3.4.2 SELF-RELIANCE

The philosophy of the basic needs approach requires that each country stimulates initiative and effort in seeking its own way to development without relying on, applying or imitating the experiences of other people. With a few notable exceptions, self-reliance in developing countries has been patterned on that in the developed countries. The emphasis is on the "transfer" of development models and ideas of political decision-making from the developed to the developing country. To the latter group, borrowed models are held out as providing solutions to development problems.

Thus, it is vital that every self-respecting country, in striving to satisfy basic needs, breaks away from inherited and imposed structures and searches for institutions and processes

which attempt to meet the unique problems of its community. This could be successfully accomplished without excluding the need and desire to learn from other people's mistakes, experiences and achievements.

3.4.3 PUBLIC PARTICIPATION

Successful application of the BNA in a developing country requires mass participation. Popular public participation is an essential component of the basic needs - oriented policy which, according to the Programme of Action adopted by the ILO's World Employment Conference in 1976, implies "the participation of the people in making the decisions which affect them through organisation of their own choice" (ILO, 1976:191). People tend to participate in development only if they have a say in the decision-making process affecting their development. The inference is that economic development cannot be undertaken on behalf of people, but only through, by and with them.

The need for public participation in development, both as the means to an end and as an end in itself is illustrated by Szal (1979:28) who suggests that there are four ways in which the promotion of effective, grassroots popular participation can contribute to significant improvements in living standards.

These are by:

- helping to identify basic needs;
- mobilising resources to meet basic needs;
- improving the distribution of essential goods and services; and
- satisfying people's desire to participate in decisions which affect their lives.

In the light of these points, the value of popular participation can be recognised not only as the means of improving the well-being of the poor, but also as a tool for exciting community interest in the various development programmes. Since the resources embodied in the people of a nation are its most important asset, involvement in decision-making can act as a powerful inducement to offer labour and skills as well as other resources to development programmes and projects. This, in turn, may bring about a reduction in the resources required from outside the projects. In addition, involvement in decision-making may directly affect employment by encouraging people to provide resources voluntarily or more cheaply or simply with greater productivity. Assets such as schools, hospitals or roads created in this way can, in turn, contribute to the improvement of employment indirectly.

Above all, effective mass participation is critically dependent on the political and cultural environment of developing countries. As Reynolds (1981:14) points out, "well developed forms of organisation and representatives must exist which guarantee effective modes of participation to individuals in the formulation of needs and of governance over local and central functions during implementation". The important point to recognise is that few developing countries can boast such institutional development: many are basically authoritarians with participation, at best, being nominal and superficial.

Put differently, these countries reflect "... participation that is subject to official control and manipulation that is a mere front for authoritarian dirigisme or coercion [and] is not true participation at all" (Szal 1979:10). This means that the free and unconstrained expression of the people's will is frequently interfered with. This inadequacy in institutional and organisational structure naturally constrains the implementation of development programmes since there is a general lack of the purpose, intensity and support necessary for an attack on poverty and the satisfaction of basic needs.

In a system with adequate mass participation, decentralisation of decision-making in planning and production is ensured. People themselves can determine their basic needs, set local targets for production and consumption and ensure the implementation of these targets.

In this sense, decentralisation will guarantee greater efficiency and ensure production of goods and services that are more closely related to the needs of the people. The important point to recognise is, therefore, that participation patterned along decentralisation lines may prove to be the required tonic for real development. In many countries, however, decentralisation basically implies that incentives will have to be formulated to keep the majority of the people in the rural areas.

One solution lies in limiting decentralisation to certain growth areas in order to have any meaningful effect. Despite the above suggestions, one important aspect remains to be considered. Participation is unlikely to thrive in a hostile climate and its essential aims can only too easily be thwarted. This raises the question of creating positive attitudes in the masses if the ideas of basic needs approach to development are to be successful.

3.4.4 CHANGE IN ATTITUDES

Above all, the success of the basic needs approach to development is critically dependent on the support that people are willing to give it and the acceptance of its importance. It must be recognised that the political and cultural environment in many developing countries is not conducive to rapid and effective introduction of new development ideas.

Several bottlenecks exist, the prime one being the suspicion with which the poor view such ideas. They feel that there are merely a way for the rich to deprive them of something connected to their culture, which is important to them. Clearly, attitudes are of such paramount importance that the success of failure of the whole basic needs exercise turns on this very point. Appropriately Van Wyk (1982:154) argues that the "basic needs will require the co-operation of the people in implementing and supplying the needs ...

The implication of this is that the approach cannot be introduced by government alone and it cannot be expected that government can execute it by itself". Concerted efforts should thus be made by all concerned parties to change attitudes towards a positive contribution to development.

3.5 ELECTRICITY SUPPLY AS A BASIC NEED

Energy usage provides one striking example of the process and conditions of development and underdevelopment in South Africa and the concomitant inequalities in fulfilment of basic needs. Access to affordable and convenient fuels increases as households shift from underdeveloped rural and peri-urban areas to the developed metropolitan centres. The form and quantity of fuels used by households is constrained by the availability and cost of fuels, and household income.

The energy supply problem in developing areas centre on the fact that, the standard, most convenient and affordable domestic energy supply option, electricity, has still not been made available to many black townships, forcing them to rely on costly and inconvenient fuels and batteries. Electricity has been shown to be the most economical and preferred option.

In the field, underdeveloped areas in South Africa may be defined as being mainly the poorer black communities which do not have access to electricity for domestic energy requirements. These black townships around the metropolitan centres have little access either to agricultural land or natural woodland, opportunities for the collection of 'free' fuels are minimal nor do these households have access to inexpensive electricity. Sandwiched between metropolitan and rural areas, peri-urbanareas experience energy problems quite different from either.

Households are still reliant on wood and are heavily dependent on the most costly and perhaps least efficient, of cooking, heating and lighting fuels.

Electricity is the preferred supply option for households in developed urban areas, yet two-thirds of the black population living in and around urban centres still do not have access to it. There is still a widespread questioning of the appropriateness and affordability of electricity for black

townships. Black townships cannot afford electricity is the common refrain. However the evidence from many studies over the past decade would appear to contradict these assertions. Once the initial extension fee has been paid, electricity is in most cases cheaper than other fuels for cooking, heating and lighting (Department of Health 1977:20; Eberhard, 1984:235).

Some recent studies which have looked at newly electrified black townships have showed that those who use primarily wood and paraffin can no longer afford not to use electricity.

Electricity is undoubtedly the most versatile and convenient energy source yet its use by South African households has largely been restricted to commercial (white) farms, while most of the black residential areas around metropolitan centres have been denied its benefits. Ironically South Africa produces nearly half of total electricity supply in the entire continent of Africa and currently enjoys substantial excess generating capacity, so much so that a number of power stations have actually been closed. There is no overall shortage of energy in South Africa, only highly inequitable distribution of and access to energy resources.

3.5.1 THE ROLE OF THE GOVERNMENT

All governments allocate part of their budget to the production of basic needs commodities, e.g. education and health and electricity supply. The amounts allocated depend on social and

political forces in the country. It must be assumed that if governments decide to adopt a basic needs approach, then along with this decision goes some commitment to increasing the provision of basic needs commodities.

But governments which have adopted such an approach are still subject to constraints which may limit their freedom of manoeuvre in terms of size and allocation of the budget. There are certain measures likely to reduce these constraints: these include providing information on the benefits of basic needs outputs, in terms of full-life indicators, which may increase popular pressure for the provision of such outputs.

The allocation of expenditures within a given budget can be as critical as the total size of the budget. As stated earlier, too little is known about how to achieve effective redistribution of public expenditure at all levels, central, regional and local.

In general it seems that a socialist society, in which the method of production appeals to the co-operative rather than the competitive instincts, is more likely, ceteris paribus, to have a large budget and a more egalitarian allotment within it. This is one of the reasons why socialist societies are likely to achieve higher basic needs standards at any particular level of development.

Organisational deficiencies can affect achievement on basic needs in two ways: first, there may be an inappropriate organisational structure (for example, a centralised structure for the public sector, making it difficult for appropriate local units to develop); secondly, there may be deficiencies within any organisational structure which reduces its efficiency. Policies then can be designed to respond to both these (somewhat interconnected) phenomena.

As far as the first category is concerned, the appropriate needs of any set of institutions tends to be unique to each society, depending on historical evolution, cultural factors and political preferences. In many cases, there are alternative ways (institutionally) of meeting any given basic needs. For example, food may be produced collectively, co-operatively, through capitalist farming or household/family farms. The choice depends on many historical/political factors: but the choice is relevant to the meeting of basic needs and therefore the implications for basic needs could form a major consideration in determining the organisational choice.

The relevance to basic needs comes in three ways: first, the organisational choice affects the distribution of income and hence the ability to meet basic needs from the point of view of incomes. Capitalist farming tends to be inegalitarian compared with collective or family farms.

Secondly, the choice of organisation affects what is produced, that is, food for self-consumption, food for the market, or other cash crops which may in turn affect a society's ability to meet its basic needs through production.

In general, collective/co-operative farms and households tend to give greater priority to producing food for self-consumption than capitalist farms. Thirdly, the mode of production affects the efficiency of the unit - i.e. production for any given inputs and therefore the ability of a society to meet its basic needs from the point of view of production.

Within any given organisational structure, basic needs achievements are much affected by the efficiency of each of the major units. In some societies inefficiencies within the organisations appear to be one of the major obstacles to achievements. For example, the rural health services in some LDCs often lack vital drugs, while schools are poorly staffed and have minimal equipment. To some extent these deficiencies may be due to low expenditure, but efficiency of delivery systems and use when delivered is also a major factor.

3.5.2 THE ROLE OF HOUSEHOLDS

The household is a major focus for basic needs because of its dominant role both as producer and as consumer of basic needs goods. It is in the latter role that the household determines

the relation between basic needs outputs and basic needs achievements or meta production function. It is the activities of the household which determine, for example, how far health clinics are used; the extend to which children go to school; what food is consumed ... and so on.

The efficiency of the household then may be the critical factor in determining the success or failure of a basic needs strategy. If the household fails to make use of basic needs and services, then ensuring their availability will not be sufficient. Moreover, an efficient household can counter many deficiencies of supplies e.g. in making good use of what there is, following hygienic practices and so on. Thus a major area for policy vis-a-vis organisations concerned the efficiency of the household. In practice, this often means the women of the household who tend to be the people primarily responsible for basic needs type consumption, choosing the food, doing the cooking, responsible for family hygiene, for teaching the children, taking them to health clinics, to school and so on.

Policies towards household efficiency then largely come down to policies towards women: such policies concern female education (as adults and as children), female work and productivity and allocation of time to basic needs activities; female access to money, income and their disposition of that income; and more generally, the role of women in the family and in society.

Recently developments in household economics, have begun to focus on allocation of time within the household. Attention has, however, been directed towards measuring the contribution towards production, as normally defined, rather than the basic needs type full-life indicators with which we are concerned.

Electricity supply will undoubtedly alleviate the problems faced by most women, that of having to wake up very early in the morning preparing coal stoves, it will generally improve their status, and their standard of living.

3.6 CONCLUSION

The issue of poverty threatens, if unattended, to tear the social world fabric and create tension among classes and countries. The structure of asset ownership together with its concomitant economic and political power has led to more inequality of income and wealth and allegedly prevented the poor from benefiting from growth. The outcry against these offensive disparities was heard in the halls of power and in international organisations, and the advocates of re-orientation of economic development that was designed to deal more directly with poverty, gave it the name of basic needs.

In the spirit of exhaltation which often accompanies the promotion of ideas, basic need become a slogan of action and in their enthusiasm some referred to them as a new theory of

economic development while others treated basic needs more modestly as a new approach to such a theory. Neither of these characterisations reflect realistically the essence of basic needs.

Despite the stimulus given to research, basic needs do not represent a well-defined body of knowledge or thought to qualify as a theory because they do not constitute a structure of interrelated diverse forces which converge into a system of testable hypotheses in the sphere of development economics. They are theoretically equivalent to other hypotheses of development economics in the sense of leading to measurable results comparable to those derived from traditional theory.

Contrary to the rhetoric of their advocates the theoretical foundations of basic needs are shaky. Basic needs are nothing more than an income redistribution plan in favour of the poor, who are targeted to receive early the benefits of development instead of waiting until the fruits of economic betterment trickle down to them.

What at best basic needs policies are likely to produce, are certain development benefits whose probability of occurence is difficult to estimate in advance, and which fall under the category of externalities but they cannot form the core of development theorising. Theories require something more concrete and substantiate to be built on than the elusiveness of externalities.

CHAPTER FOUR

AN OVERVIEW OF COST-BENEFIT ANALYSIS

4.1 INTRODUCTION

For both governments and individuals, the choice between different ways of investing resources rest to a great extent on an evaluation of the costs and benefits associated with the investments. The alternatives will differ as to the magnitude of the costs that must be incurred, the expected benefits that will be generated, the time scale of both costs and benefits, and the uncertainty of risks surrounding the project. Keeton (1985:3) define cost-benefit analysis as an economic technique used in project appraisal which seeks to encompass in its arithmetic all costs and benefits associated with an envisaged act of investment. It has the potential therefore, to serve as a very useful guide in decision making on the canalization of public investments.

An investment is considered a profitable use of resources for the individual or society as a whole when the expected benefits exceed its cost. Thus, in choosing between alternative investments, individuals or governments try to evaluate both costs and benefits and identify the investments that will achieve the greatest possible benefit in relation to cost.

The technique of cost-benefit analysis has been developed to make this evaluation as systematic, reliable and comprehensive as possible and to eliminate the need for guesswork, hunch or intuition. Cost-benefit analysis is an aid to judgement,

however, not a substitute for it, since future costs and benefits can never be predicted with certainty, and measurement, particularly with respect to the likely benefits of a project, can never be completely precise. Therefore, judgement must be used in the economic appraisal of investment project. The value of cost-benefit analysis is that it provides a framework for evaluating both the magnitude of the costs and benefits, and their distribution over time. Such a framework allows the judgement that must be made in assessing the likely yield of an investment to be explicit rather than implicit and possibly vague.

For example, judgements must be made about the real value of the resources to be used in an investment project since their real value may not be fully reflected in their market price because of distortions in the market, such as exchange controls or government control of wages and salaries. Judgement of this type can be incorporated into the appraisal by means of shadow prices, which are intended to reflect the real value of resources to the economy in the light of social and economic objectives of a country.

Shadow prices reflect the weight given to different objectives, for example, to future growth as opposed to present consumption.

The World Bank uses the techniques of cost-benefit analysis - and, where appropriate, shadow prices and shadow wage rates -

to appraise investment projects. All cost-benefit analysis uses discounted present value of both costs and benefits, and to determine whether the benefits accruing from an investment project will be greater than the costs when both are measured in terms of present values. What is needed for such an appraisal is a convenient summary statistic that expresses the relationship between costs, benefits, and their distribution over time. This information can be expressed in three ways, which yield the following investment criteria: the benefit-cost ratio, which is the ratio of the sum of discounted future benefits and the discounted value of costs; the net present value, which is the value of the discounted benefits of a project minus the discounted value of its costs; and the internal or economic rate of return, which is the rate of interest that equates the discounted present value of expected benefits and the present value of costs (World Bank 1980:38).

The economic appraisal of investment projects by the World Bank and other development agencies is based on calculations of the net present value of projects and also on calculations of the rate of return.

These criteria are never used in isolation to assess the profitability of a project, but they are considered to be one of the essential yardsticks by which alternative investments can be judged (Squire et al 1975:89).

4.2 ORIGINS

Attention to this approach dates back to the nineteenth century according to Prest and Turvey (1966:102). In a comprehensive survey of Cost-benefit Analysis (C.B.A.) they suggest that Dupuit's paper on public utility works in France, published in 1844, was pioneering in this field. However, the widespread application of C.B.A. did not occur until the twentieth century and in its initial stages this was almost entirely in the U.S.A. In the United States it was introduced by the 1902 River and Harbour Act which required the accounting for of costs and benefits to commerce of the various river and harbour projects. Subsequent to this, the 1936 Flood Control Act consolidated the momentum built up in the application of the technique and from here it spread rapidly to other applications and countries.

In the field of education, C.B.A. took rather longer to make an impact and its widespread application appears only to have gained popularity with the tremendous surge of interest in the field of investment in human capital in the late 1950's and early 1960's. A pioneering figure in stimulating interest in this application was Theodore Schultz (1974:119).

Since then there have been a large number of studies on the return to education in many different countries. A landmark in this particular application of C.B.A. is provided in the mid-

1970's by Psacharopolous (1970:149) who attempted to synthesise the results of many such studies.

Parallel with the growth in use of C.B.A. has been growth in criticism of the technique and it is against this background that the more cautious modern approaches to use of C.B.A. are best understood. Initially the focal point of the criticism was theoretical, positive economics was set to being replaced by normative economics. It was realised that embodied in the technique was the need for subjective judgemental assessments. Following this, the centre of criticism switched to the empirical aspects of C.B.A. and a key issue to emerge was the identification problem. In the field of education this problem is particularly severe as one expects earnings differences to be associated with both education and individual ability (amongst other things).
Although there is no unanimity in the position taken up in response to these criticism, it appears that a more cautious approach to the use of C.B.A. dominates. Not all costs and benefits are aggregated, some are left out of the arithmetic and presented as statements of consequence, which are left for the decision maker to weigh up along with the 'partial' C.B.A. results (Blaug 1967:78; Weisbrod 1964:128).

Another standpoint commonly adopted is to abandon the attempt to value the more contentious outputs of public investments and only aggregate the 'hard' data on costs. The idea, then, is to determine various output indices which are compared over time

with aggregated cost data. Almost all authors would acknowledge that C.B.A. does not yield a 'precise' result but that it does suggest something useful about the relative attributes of possible investments (and as such constitutes a valuable tool to the decision maker).

4.3 THE MEASUREMENT OF COSTS AND BENEFITS

The cost of any investment must be measured by its opportunity cost, rather than simply by monetary expenditures. Economic (as opposed to financial) analysis of investment in electricity thus attempts to estimate the total cost of an investment in terms of alternative opportunities forgone.

All relevant costs and benefits must be included in the C.B.A. However, in doing this, two problems frequently occur. Firstly, there is the problem of categorizing the various costs and benefits. The main problems in this regard arise out of the variety of terms used to distinguish different effects the overlapping of meanings of these terms and whether to include 'non-economic' or psychic effects in the analysis. The argument that everything boils down to economics in the end will often lead to insuperable evaluation problems.

Secondly, there is the problem of 'double counting' i.e. the erroneous counting of a benefit or cost more than once.

The most common distinction between types of costs and benefits is that made between private and social effects, and the differences between these effects are normally attributed to externalities (alternatively termed spillovers), market imperfections and government intervention. Pigou in his celebrated discussion on the definition of marginal private and social net products provides the basis for a distinction between private and social effects. The private effects are those, "which accrues in the first instance i.e. prior to sale, to the person responsible for investing resources there", while the social effects relate to everything which affects the "national dividend" which describes the material welfare of people. Excluded from consideration are the costs and benefits accruing to people in other countries and any psychic effects (World Bank 1990:68).

The way that government intervention may lead to divergence between private and social effects is roughly through the imposition of taxes, subsidies, exchange control and direct regulation. State intervention cannot be relied upon to equalize the private and social effects because it is often motivated by reasons such as revenue or balance of payments deficits or redistributional considerations, which may work against this equalization.

As a result although private effects completely encompass State intervention in their calculation, social effects usually do not. Besides state intervention, market imperfections and externalities (the latter two being discussed later), differences between the private and social effects can also be attributed to the timing of costs incurred as social costs are incurred as soon as resources are moved but private costs may occur well after this (Psacharopoulos 1970:34).

Both private and social effects may be said to have technological and pecuniary externality components. Technological effects are those which change the satisfaction consumers are able to derive from given resources, e.g. pollution of water and the realization of economies of scale.

Pecuniary effects are brought about through an alteration in the demand conditions facing other markets. However, for practical purposes the distinction between the technological and pecuniary externality effects is not very useful. The example of economies of scale which are realised in other industries illustrate the point. While this is a technological externality, it is brought about through a change in demand and therefore, is also a pecuniary externality. Furthermore, there is a danger that with the inclusion of pecuniary effects in the analysis, that redistribution effects could be mistakenly be counted as externality effects.

By way of example, it is incorrect to count extra café earnings in a certain locality as a result of a newly built highway when the extra trade that these café are getting is merely trade diverted from other cafés on the old road.

4.3.1 THE USE OF SHADOW PRICING

A major valuation problem to which analysts using the cost-benefit apparatus have devoted considerable attention, relates to the inefficiency of market prices as indicators of the social value of particular commodities and the social cost of factor inputs. These inefficiencies arise out of distortions in the economy such as excessively high tariff barriers, politically inflated wages, monopoly profits, administered prices of basic goods and foreign exchange constraint.

It is difficult to estimate shadow wage rates or shadow prices. A certain amount of guesswork is involved since the purpose of shadow prices is to estimate what factors would be paid if their price, or wage, reflected their true economic value. Thus, if distortions in the labour market are so serious that it is estimated that certain groups of workers are paid twice the value of their marginal product, their market wage should be reduced by half to provide a shadow wage rate.

Similarly, if scarcity of foreign exchange means that the official exchange rate in a country underestimates the true value of imported goods and services, then shadow prices should

reflect the shadow exchange rate rather than the official exchange rate, which may be kept artificially low through exchange controls. In this case, the shadow exchange rate is an estimate of the exchange rate that would prevail if the price of foreign exchange were allowed to respond to market forces rather than to administrative control (McMeekin 1971:135; Perraton 1982:74).

The World Bank, for example, uses specially calculated conversion factors, which adjust market prices of imported goods or equipment to take account of foreign exchange shortages, in cases where the use of market prices at official exchange rates would distort investment appraisals (Psacharopoulos 1970:78).

A few attempts have been made to use shadow wage rates and prices to estimate the social rate of return to investment in education in developing countries, but in general, cost-benefit analysis of education has relied on market prices and wages (Dougherty 1972:109). The various adjustments that have been made to earnings, however, to allow for probabilities of unemployment or the influence of ability or other factors, all resemble attempts to establish shadow wage rates, since they are attempts to improve the reliability of earnings as a measure of the true social product of educated labour.

From the point of view of the economy as a whole, the reliability of rates of return measures to investment, depends on

the market prices accurately reflecting social costs and benefits.

Distortions imply that market prices do not accurately reflect social costs and benefits and thus adjustments to market prices are desirable for project appraisal. These adjusted prices are variously called shadow prices, social prices or accounting prices. In this section the pricing of commodities is considered first and the costing of the two relevant factor input classes, land and labour, are considered after that (Bennet 1972a:39).

Despite the existence of distortions in the domestic economy it could be argued that market prices should still be used for valuation purposes. There could be other forces at work such as the fear of competition or government intervention which lead monopolistic firms to set prices which would approximate those which would prevail under perfect competition. Furthermore, tariffs, taxes and subsidies could be set as a deliberate attempt by the government to correct for market imperfections. But while these situations may be true for particular cases, they are clearly not generally valid - given the profit motive predominates in the private sector, monopolies will be inclined toward abnormal profit situations, and tariffs and taxes are set for quite different reasons than to correct for market imperfections.

It would appear, therefore, that domestic commodity prices, taken as they are, may not be desirable for C.B.A. purposes (Eicher 1977:180).

One possible solution to domestic distortions is to look outside of the domestic economy for a guideline on prices i.e. at international prices. International prices offer a real opportunity price alternative to domestic prices, but clearly before one may argue that they are directly applicable, the goods should be imported or exported by the domestic economy. This does not mean however, that goods not traded in this way should be left out of the analysis, they could still be valued in terms of the same unit of account (numèraire). Little and Mirrlees are the leading proponents of this approach; "In any price system what matters is relative prices, for these relatives measure the rates at which real goods and services can be exchanged for each other. If one can find, in any otherwise chaotic system, some price relatives which reflect real opportunities open to the economy, then these can be used as sheet anchors. In our system the border (source) prices of traded goods fill this need.

4.3.2 PUBLIC GOODS

Public goods, by definition are characterized both by non-rivalness in consumption and by the fact that the seller cannot exclude non-payers.

Thus, if pure public good is provided to a group, a member can receive the benefits without contributing to its cost. The usual implication is that government intervention is warranted to overcome this free rider problem.

Many goods and services once considered public goods e.g. fire prevention and garbage service meet neither condition of the public goods model. If there is a choice between equal and selective access, the proprietor can exclude and there is no free rider 'problem'. It is increasingly being realized that public goods theory cannot be used to justify the financing and production of the broad range of collectively provided goods (Pasour 1981:453).

Seldom (1985), after analysing government expenditures, estimates that no more than one-third of current government expenditures pose a free-rider problem and recognizes that pricing mechanisms are being developed for some goods traditionally considered to be jointly consumed. Thus, it seems clear that the current method of providing most public services is not rooted in a "free rider" problem. Moreover, as Seldon emphasizes, it is ironic that externalities associated with not charging for goods have received little attention even by many economists.

There is an inherent evaluation problem associated with an equal access system of distribution. When an economic good is provided at no cost to the user, the user has no incentive to

economize but rather has an incentive to use the good or service as though it were a free good. Moreover, there will appear to be a shortage so long as the marginal value of the good or service is positive.

4.3.3 EXTERNALITIES

An externality exists where "a variable controlled by one economic agent enters the utility function of another economic agent" and this influence is unpriced to the controlling economic agent (Hosking 1985:22). There are two types of economic agents between which such an interdependence could exist - producers and consumers. The interdependence described above could be between producers or between consumers themselves or between consumers and producers, but normally analysis focuses on the producers effect on the consumer.

Externalities can be defined in different ways, but for the purpose of linking them with public goods only one division is considered here - excludable and non-excludable externalities. Excludable externalities are of the type which can be priced and thus regulated through the market mechanism.

Non-excludable externalities are not pricable because there is no incentive for consumers or producers to reveal their preferences. No one could prevent the consumer or producer from bénefiting from such a commodity and he would be induced to act as a so-called 'free rider', such commodities are called

public goods (i.e. a non-excludable externality is equivalent to a public good).

Of course, many goods are neither pure public goods in the sense of their absolute non-excludability, nor pure private goods in the sense of their complete excludability in consumption and complete competitiveness in production. Blaug, describes such goods as having varying "degrees of publicness" (Blaug 1982:209).

A common approach to the problem of valuating externalities is to look for market situation where a price is implicitly suggested. One such technique uses property prices as an indicator of externalities, where positive externalities are taken as increasing the value of the property and conversely, negative externalities are taken as decreasing the value of the property. There seem to be considerable differences among economists on the merits of this approach to the valuation of externalities.

On theoretical grounds, it is questionable whether the individual's behaviour in the choice of property is constrained by nothing other than his income and an objective set to the property's attributes and even if this was accepted, it is doubtful whether a complete objective set of quantifiable attributes are practically determined from different individuals in the community.

4.4. CONSTRAINTS WHICH MAY BE INCLUDED IN THE ANALYSIS

After having determined what costs and benefits should be incorporated in the analysis and how they should be valued, the next step in C.B.A. is, as far as possible, to incorporate other factors which may have to the considered in the decision making process. This step takes the form of determining the constraints within which the project functions. The constraints may related to scarcities, such as limited capital, availability of materials and competent personnel; or to welfare considerations, such as the distribution of income; or to risk and uncertainty.

4.4.1 SCARCITIES

Clearly, scarcity constraints are very important at the project planning stage. The scope of the project must take these factors into account. A technique which is commonly used where optimization is sought, given certain constraints, is linear programming. In respect of relevance to C.B.A., perhaps the greatest factor is the scarcity of capital which manifests itself to the public sector in the form of high social opportunity costs of borrowing or budgetary expenditure ceilings. This often makes some form of capital rationing necessary and one way of achieving this is through the determination of cut-off rates of return where a project is only accepted if it is expected to yield a rate of return to the investment higher than the cut-off rate.

4.4.2 WELFARE CONSIDERATIONS-DISTRIBUTION OF INCOME

Over the last half century the Paretian welfare basis for the ranking of different economic situations, for example, before and after a project, have been a centre of controversy. In this section some of the main issues of this controversy are described. As it turns out, whether a cardinal or ordinal approach to the measurement of welfare is adopted, the same conclusions are reached. In both cases it emerges that unless some prior value judgements are made, very little can be said without considerable qualification about alternative economic situations.

Beginning with a cardinal approach it is demonstrated that unless one assumes something of the functional nature of the marginal utility of income function, for example, by some 'arbitrary' specification of a social welfare function, ('arbitrarily determined by the economist in terms of either his normative values or those he determines from a study of the political mechanisms in society); that one has no basis for socially preferring projects. This is followed by a rough description of the paradoxes inherent in the ordinal approach - the only apparent resolution to these paradoxes lying in the conclusion that welfare superiority can only be determined on the basis of distributional criterion - a conclusion no different to that revealed by the cardinal approach.

4.4.3 TREATMENT OF CAPITAL COSTS

Because capital costs have great bearing on decisions of electrification, special attention must be given to measuring and defining these costs. In the first place, it is essential to estimate capital costs accurately and to measure the annual cost of capital correctly, taking into account armotization and depreciation. Frequently the cost of projects is underestimated because of faulty assumptions or treatment of capital costs.

Capital expenditure is incurred to acquire goods and services that will be of use over a long period, whereas recurrent expenditure purchases goods and services of immediate, but shortlived usefulness. The problem in calculating the total cost of a project is how to add these two categories of expenditure and allow for the differences in time scale. In other words, a stock of capital that is purchased at one point of time is aggregated (but from which services are consumed over a period of time) and a flow of services that are consumed as they are produced.

This calculation is particularly important when the costs of introducing new media such as radio or television are being estimated, since a high proportion of the total costs is for the purchase of equipment that is expected to last for many years. If this equipment is assumed to have a useful life of

ten years, then the initial capital cost can be divided by 10 to provide a measure of the annual depreciation of the asset. To assume that the annual cost of a project simply consists of annual current expenditure plus depreciation of capital, however, would be to seriously underestimate the social opportunity cost of a project. The purchase of a large piece of equipment or a building locks up resources for a number of years, with the result that alternative opportunities to invest these resources are foregone.

The loss of alternative returns, or interest, must be counted as an additional cost, and the capital must be amortized over its expected lifetime in such a way as to take account of the loss of interest as well as depreciation (Farrel 1982:109; Sirken 1983:74).

This can be done by annualizing capital costs, using a discount rate that represents the interest forgone (that is, the opportunity cost of capital). This annualization is sometimes called imputed rent since an alternative to purchasing the capital asset is to rent it. In the case of public investment, the opportunity cost is the social discount rate. Because of the problems of identifying the social discount rate, some cost calculations use alternative discount rates - say 7,5 per cent and 10 per cent - in annualizing capital costs. Others use shortcuts, for example, the original cost of the capital can simply be multiplied by the discount rate and this annual interest charge added to the annual depreciation. This is only

a rough approximation, however, since it ignores the changing value of the capital asset over its lifetime (Jamison 1977:209).
The correct way to allow for both interest forgone and depreciation is to calculate an annual capital cost, or annualization factor, which is dependent on the social rate of discount, the lifetime of the capital, and the original cost of the capital.

In the terminology discounted cash flow, the annual capital cost is the present value of the annual sum required to repay the original cost of the capital over its assumed life.
From the value of the annual capital cost calculated below, it can be seen that the actual value of the annual capital cost depends critically on the assumed rate of interest and lifetime of the capital. If the social discount rate is 15 per cent, for example, extending the lifetime of equipment costing R1 million from five to six years reduces the annual capital cost by R34 000, the same effect would be produced by reducing the discount rate from 15 to 10 per cent, and assuming a life of five years.

In the example below this calculation makes a significant difference of almost 305 percent of the total capital cost. Yet the rate of interest and assumed life of the equipment are seldom discussed in detail in the assessment of the costs of the project, and more attention is paid to items of far less quantitative importance.

Table 4.1: Total capital costs of a project

Life of equipment	Rate of interest	Rate of interest	Rate of interest	Rate of interest
(Years)	7,5%	10%	12,5%	15%
5	247	264	281	298
6	213	230	247	264
7	189	205	223	240
8	171	188	204	223
9	157	174	191	210
10	146	163	180	199
11	137	154	172	191
12	129	147	165	184
13	123	141	160	179
14	118	136	155	175
15	113	131	151	171

This is a significant source of error in some calculations of capital costs. Indeed, some cost estimates ignore the problem of interest altogether and use a zero discount rate. The use of an appropriate social discount rate is not just a theoretical nicety, but can make a significant practical difference in the assessment of the real costs of a project (Jamison 1977:312). A zero interest rate implies that the project planner is indifferent to the choice between spending a million rands now or doing so ten years from now. Given the scarcity of funds for capital investment in developing countries, this position is obviously untenable, and to assume otherwise, can lead to a serious underestimate of the costs of an instructional technology project, and an overestimate of its advantages compared with traditional systems, which involve much less capital expenditure (Speagle 1972:228).

4.5 CONCLUSION

In its ideal form project appraisal demands the impossible - it requires that all relevant costs and benefits attributable to a project be specified, weighed against each other on a basis which would enjoy consensus support from society, exactly reflect relevant scarcities, responsible weight the interest on future generations and demonstrate perfect foresight. The aim of C.B.A. is not to achieve this and - some sort of "all inclusive" decision matrix which incorporates all non-quantifiable considerations would be more appropriate for this purpose.

C.B.A. is a technique for appraising the quantifiable aspects of public projects which necessarily involves value judgements and operates with uncertainties.

The pessimist may well argue that this amounts to very little but surely the usefulness of C.B.A. varies from project to project. Some projects may lend themselves more to quantification than others and furthermore different authors may reach different conclusions about the same type for public expenditure. The most common treatment of the non-quantifiable elements of public expenditure on education is to incorporate a statement of their expected significance (impact) in the text of the C.B.A. thereby demonstrating an awareness of their existence. Unfortunately one is still left doubting whether this is really satisfactory.

The omission of the non-quantifiable elements of electrification from the calculus of C.B.A. casts serious doubt over just how reliable the conclusions from the analysis are in establishing a social ranking of economic alternatives which reflect individual preferences and scarcities - a primary purpose of the project appraisal. It seems worth asking then, whether there are any acceptable alternatives to project appraisal as outlined, which yield a preferable social ranking of economic alternatives? What of the ballot box, political lobbying and a greater reliance on the market mechanism? Arrow demonstrated that voting does not necessarily yield a conclusive result, even if it was a viable alternative, which

it is not. A referendum or election cannot be called for every public economic decision. Nor do single votes reflect preference intensities.
Furthermore, they are usually made on the basis of general public policies rather than particular questions (Levin 1983:197).

The weaknesses of the alternatives to project appraisal do not justify C.B.A. on their own, however, De Wet (1990) in an evaluation of C.B.A. points out that it necessarily involves value judgements and believes the introduction of this normative element into the analysis to be severely damaging. His assertion is in principle valued, for even if no explicit account is made of the distribution of income, this implicitly amounts to an acceptance of the existing distribution of income.

Certainly interpersonal utility comparisons are inevitable consequences of cardinal utility justification of C.B.A. and unfortunately an ordinal utility approach using compensation criteria does not provide an acceptable alternative. As, for example, De Wet has argued, compensation is never paid to the losers and in any case, an indeterminate result is produced in the event of intransitive utility curves occurring (the Scitovsky paradox). The great weakness of De Wet's analysis was that he failed to consider the possibility that interpersonal utility comparisons may in fact be socially desirable. Therefore, rather than this being a serious defect

inherent in C.B.A., it may offer the potential for being an outstanding attribute in that distributional criteria may easily and explicitly be incorporated into the analysis. (It is however, acknowledged that the afore going argument in no way diminishes the constraining effect non-quantifiable aspects have on the C.B.A. outcomes of a particular public expenditure) (Levin 1983:229; Unesco 1977:31).

Notwithstanding the possible social virtues of incorporating distributional criteria, a position taken up by Mishan is that it remains of doubtful value. His objection is not with the hypothesis of diminishing marginal utility to increasing income, but with the deductions made on the basis of this hypothesis (Mishan 1987:102).

If an ordinal framework is adopted for analytical purposes it can be shown that distributional weighting does not remove the reversals 'problem' (or perhaps 'possibility' is a better word) which besets the compensation criterion basis for the social ranking of projects. If, on the other hand, a cardinal approach is followed, the 'crux' becomes the measurement of a marginal utility of income function. This necessarily involves arbitrariness as there is no general agreement, or is there ever likely to be, on a unique relationship between 'utils' (i.e. a supposed measure of utility) and commodities (including money).

If, as it seems then, in order to achieve the socially desirable end of incorporating distributional weighting into C.B.A., we have to retreat to arbitrary assessment, the logical question which follows is who should make this assessment? Should it be the economist based on his expert knowledge of relationships within the economy, or, is this in fact beyond his domain? Sugden and Willians say it is beyond his domain - they argue that he is the 'analyst' not the normative assessor for society. Where value judgements are involved, his function is not to make them but to identify the activities of the Government. What societies preferences are and to base his weighting measures on this assessment (Hosking 1985:69).

Their rationale is really quite simple, and on the face of it quite appealing - the economist's 'right' concern is stated to be with the purely technical manipulation of given data to produce consistent decisions, and the government's 'right' is determining public policy (a function the electorate would assuredly expect their political representatives to perform) and thus also, the public policy parameters, such as distributional weights and the social discount rate. Part of the economist's role, given this scenario, would be to interpret for analytical purposes, the dimensions of these political parameters from the government activities. Sugden and Williams suggest the possible guiding avenues for such investigation - the precedent set by past government actions in investment, the use of marginal rates of income tax based on

the belief that their determination involved the principle of equalising the share of real burden of any incremental tax across all income groups and most obviously, direct liaison with the relevant policy makers. Mishan has also come out very strongly against the use of politically determined parameters. He does not believe that there can be any stability in their setting with continual short-term variance being induced by political vogue and the exigencies of state and he is doubtful as to whether it would, in this case, be a mechanism for the redistribution of national wealth. He contends that it is possible that a politically determined C.B.A. could be used to "legitimize" maintenance of the status quo or even enhance the position of the rich.

Such a consequence could result from the presence of powerful 'elite', lobbying representation in government. In short, he does not believe such a system does the economist's or C.B.A.'s reputation any good and that in particular, it erodes the credentials of the economist with respect to his ability to provide a valuable independent contribution to project evaluation. The economist's role becomes :-

> "As the creature of bureaucracy, or the agent of political opinion entrusted with the task of translating its current prejudices into respectable looking numerals - it is far removed from his traditional role as an independent specialistdrawing his inspiration wholly from economic principles of valuation".

Mishan's view is however, extreme and fails to reject the 'core' issue, that is, who other than the government 'should' decide on public policy?
Another issue which has aroused considerable controversy is that of the pricing techniques used in C.B.A. For example, De Wet, basing his argument on the theory of second best, had this to say:

"We actually face quite a disheartening situation, the very need for cost-benefit analysis, namely market failure, renders the correct pricing rule to be used unascertainable".

It is a theorem of economics that given perfect competition and an absence of externalities that a competitive equilibrium can be a welfare optimum where wealth is suitable distributed. But where some of the conditions for a competitive equilibrium are not met, then the pricing rule becomes more complex. It is not as one would expect, that all changes in the direction of perfect competition necessarily bring the economy closer to a welfare optimum.

To illustrate this consider an economy where three substitute goods X, Y and Z are produced but where goods Y and Z deviate from their original costs by 10 and 20 percent respectively, although both are produced at optimal levels.

The problem is, given this state of affairs, how is "new good" X to be priced such that an optimal output of X, Y and Z is produced? Optimality under perfect competition may be obtained where the ratios of marginal costs equal the ratio of prices, but given the deviations from marginal costs, as above, the correct pricing rule for good X seems, indeed, "unascertainable".

The price at which X should be valued appears to be between 10 to 20 percent over its marginal cost if optimality is to be approached. If the price of good X was set equal to its marginal cost of production, this would involve a greater departure from the ideal position of equal price - marginal cost ratios (Zymelman 1984:105; Spain 1977:105).

Mishan feels that the impact on the rest of the economy of the single project is however, not sufficient to fear making things worse by pricing commodities at their marginal costs. Little and Mirrees justify their approach on an efficiency proposition. They contend that if public production is inefficient, this implies that a change in plans makes it possible to have more of some goods without having best of others. Given then, the not very demanding condition, that the government could distribute the 'surplus' in such a way as to give rise to an unambiguous improvement in welfare, it appears that valuation by their numeraire does not give rise to ambiguous welfare results, as implied by the second best

theorem line of attack. Graaff on the subject of the Little - Mirrees approach, does not accept that their approach offers a solution to domestic market distortions because international prices are also subject to distortion, e.g. by cartel formation and surplus output dumping (Hosking 1985:103).

The weakness of this criticism lies in its failure to appreciate the flexibility of the Little - Mirrees approach in accounting for such distortions.

Clearly C.B.A. has severe limitations and it is only one consideration in a wide range of other economic, social and political influences which must necessarily be borne in mind by the decision maker. Nevertheless it remains an important consideration for the decision maker. It not only serves to bring all relevant costs and benefits of a project to the notice of the decision maker (which some claim is all it achieve, e.g. Graaff), it also serves as an indicator for the relative economic worth of projects, even if this is within a context of underlying value judgements, uncertainty and a margin of imprecision in the pricing of factors and commodities.
The technique is least applicable to projects which contain predominantly non-quantifiable elements and or, are large relative to the economy and as such are expected to have widespread economic impact, C.B.A. is a partial analysis and is not suited to such situations. A general equilibrium analysis may be recommended in such a case. It would seem reasonable to conclude then, that C.B.A. does constitute a useful analytical

technique for guiding decision making in many areas of public expenditure, electricity being one of them, but that every effort has to be made by the analyst to bring the subjectivity, uncertainty and imprecision necessarily inherent in the results, as well as the omitted non-quantifiable elements of the expenditure, to the attention of the decision maker (Speagle 1982:198).

CHAPTER FIVE

THE ECONOMIC IMPACT OF ELECTRIFICATION

5.1. INTRODUCTION

Energy use is an important factor in economic growth and development. Electricity, especially is regarded as an essential and convenient form of energy and it is easily converted into other forms of energy such as heat, light and mechanical power. As an 'indispensable' service, by reason of the absence of close substitutes, electricity assumes a position of ever-increasing importance in almost every facet of daily activity in the home, work place and community centre. Described by Christie (1984:1) as a 'spirit of progress', electricity may be viewed as the driving force behind the growth and prosperity of a modern society. It can provide the means towards better health and education, a more efficient labour market, more recreational time and greater security, all of which should help to improve the quality of life and the prospects for sustained economic growth.

Access to affordable and convenient fuels increases as households shift from rural areas to metropolitan centres, but this is constrained by the availability and cost of fuels and household income. The shift from the use of muscle power and the combustion of fuelwood in early and developing cities, to water and windpower, and then to the more energy intensive fuels, such as coal, gas oil and uranium, has determined the degree to which economic and productive activity has been able to expand.

For example, the industrial revolution in Britain was dependent on a shift to the use of coal. Growing energy requirements of the iron smelting industry were causing massive deforestation through their demand for charcoal which ultimately could not be met even if the total land area of the British Isles were covered in forests or plantations. The same could be argued for the growth of the mining industry in South Africa which simply would not have been possible without abundant (and inexpensive) electricity generation from coal.

But development has seldom been even or equitable, either between countries or within individual countries. In South Africa, these inequalities are particularly evident not only in terms of personal income but also in terms of access to basic services and needs such as food, shelter, health, education, sanitation, water and energy supplies.

Energy usage provides one striking example of processes and conditions of development and underdevelopment in South Africa with the existence of a developed energy - intensive industrial capitalist economy dependent on fossil-fuels supporting a minority of the population at a high standard of living, in conjunction with an underdeveloped sector where the majority of the population (mostly black) live in relative poverty and traditionally dependent on scarce fuelwood resources but are increasingly having to shift to the use of some of the more expensive forms of fossil fuels such as paraffin, gas, candles

and even coal, particularly in areas where they do not have access to electricity (Best 1979:213).

Patterns of energy use are thus relevant to processes of economic development, they also effect the quality of life of individual households in an immediate way. In this chapter a number of recent studies of the form and quantity of energy used by households in underdeveloped rural and metropolitan areas are reviewed and some of the key problems associated with energy supply constraints are discussed.

5.2 ENERGY CONSUMPTION IN UNDERDEVELOPED AREAS

In the energy field, underdeveloped areas in South Africa may be defined as being mainly the poorer black communities, which do not have access to electricity for domestic energy requirements. There have been a number of studies in the past decade (Best, 1979; Liegme, 1983; Gandar, 1982; Eberhard, 1984; Eberhard, 1986; Eberhard and Dickson, 1987; Black and Themeli, 1990) which have measured fuel consumption in different rural and metropolitan areas, and have documented some of the problems associated with dependence on these fuels.

Energy consumption in underdeveloped areas is almost exclusively confined to household fuel use. The breakdown of fuels used by households in homeland villages, on commercial farms, in peri-urban areas and in urban townships is summarized in Table 5.1.

Table 5.1: Percentage of households using different fuels in South Africa 1989/1990.

	Electri-city	Wood	Waste	Paraf-fin	Coal	Gas	Bat-tery
Homeland	<1	99	80	96	12	5	55
Farm labourers	14	97	30	19	5	9	-
Peri-urban	3	68	22	84	53	7	60
Townships	29	38	2	71	47	14	-

Source: Eberhard, 1986 a; Moller, 1985

The average quantity of fuels consumed in a number of representative 'homeland' villages and peri-urban areas in South Africa has been estimated as shown in Table 5.2.

The consumption data may be converted into equivalent energy values in order to evaluate the proportional contribution of each fuel to total net or useful energy consumption. Net energy is the total purchased by the user and useful energy is the amount available from the conversion appliance for cooking and heating. This topic is discussed extensively in paragraph 5.3.1.

Table 5.2: Mean annual per capita domestic energy consumption in the RSA

	Fuel wood	Dung	Paraffin	Candles	Coal	Gas
	kg	kg	Litres	Number	kg	kg
Villages	604	118	23	27	20	966
Peri-urban	334	-	47	51	156	1,9

Source: Eberhard, 1986 a.

Figure 5.1. Net and useful energy consumption for rural and peri-urban areas (GJ/cap/year)

Rural : useful

Peri-urban : useful

Source: Eberhard 1984

5.3. FACTORS DETERMINING ENERGY USE

Energy consumption studies often present only a static picture of consumption patterns with very little understanding of processes of development and the factors which constrain or determine the form or quantity of fuels or how these patterns might shift over time.

5.3.1 LEVEL OF URBANIZATION

The data presented in Figure 5.1 and Tables 5.1 and 5.2 show a clear pattern of transition in energy use in relation to urbanization. As expected, the use of fuelwood (which is probably the least convenient of all fuels and is difficult and expensive to transport) declines markedly from rural areas to peri-urban areas to townships. Coal is a substitute for wood in peri-urban areas, while in black townships access to bottled gas (LPG) and electricity increases, although coal is still used extensively for heating. The use of paraffin (which is also widely perceived to be a smelly, messy and expensive fuel) increased steadily from rural to urban areas. Batteries and, in some cases, generators are used extensively by households in peri-urban areas and in townships where there is no electricity.

One of the phenomena associated with increased urbanization is the growth of informal settlements in peri-urban area around

metropolitan centres and in closer settlements within the homelands where people have settled or have been settled in or close to urban densities, but with more rudimentary facilities, and seldom with access to electricity. These areas should become increasingly important in national energy planning and investment decisions.

5.3.2 SITE - SPECIFIC FACTORS: AVAILABILITY/COST

It should be noted that while the form and quantity of energy used differs markedly between villages and peri-urban areas, individual studies by Eberhard (1986a:102) have shown that there is fairly large variation between villages themselves and, to a lesser extent, between peri-urban areas. These variations may be attributed largely to site-specific factors such as the local availability and cost of alternative fuels.

For example, fuelwood consumption is higher in those areas where natural woodland is still abundant, coal may be used in those villages close to railway sidings, and paraffin or gas is used extensively in areas closer to metropolitan centres where these fuels are cheaper and 'fire' wood is not readily available (Eberhard 1986a:102).

5.3.3 INCOME

While settlement patterns, levels of urbanization, fuel availability and cost are all important factors in determining

energy use, household income is also a key factor. Eberhard and Dickson (1987:29) have shown that in a number of areas in Bophuthatswana, for example, there is a clear correlation between income and the use of substitute fuels, with coal being used by lower income households exclusively and gas and electricity by those with a higher income.

Lower income households spends proportionately much more of their income on energy, and in some cases this can be as high as 20 percent compared with a few percentage points for wealthier families (Eberhard, 1986a:17). Procurement of adequate energy supplies is a heavy burden for the poor.

In absolute terms, higher income households tend to spend more on energy. However, it is not immediately obvious that they use more energy. Figure 5.1, for example, indicates that the net energy consumption actually declines from rural to peri-urban areas (13,1 to 11,7). One would have expected that with the higher levels of disposable income available in peri-urban compared with rural areas, per capita energy consumption would also increase (Cecelski, 1979:108).

The fact that this does not happen is explained by the change in the fuels used. Coal, paraffin, gas and electricity can be used more efficiently than wood and dung burnt in open fires, and it is the greater use of these fuels in peri-urban areas which results in little change in net energy consumption, but a higher useful energy consumption (2,1 compared to 1,7 for rural

areas as shown in figure 5.1).

5.4. ENERGY SUPPLY PROBLEM AND SUPPLY CONSTRAINTS IN UNDERDEVELOPED AREAS

The energy supply problems in underdeveloped areas centre on two critical and immediate issues.

Firstly, demand for fuelwood is exceeding supply with devastating social, economic and environmental consequences. Women, and increasingly other members of the household are involved in time-consuming and burdensome fuelwood collection trips, at ever-increasing distances from the home. Wood has to be transported into areas of greater scarcity and households are having to pay for what was once a 'free' resource. Perhaps of greatest concern is the environmental impact of woodland denudation and irreversible loss of topsoil. The national fuelwood demand/supply balance has only recently moved into a deficit situation, and will soon assume alarming proportions unless action is taken to restore the balance (Eberhard 1986a:344).

The second major problem is that the standard, most convenient and affordable domestic supply option, electricity, has still not been made available to many black townships. With increasing population and rates of urbanization, the problem of adequate household energy supply is shifting to these areas, which experience major social and economic costs as a result of

dependence on costly and inconvenient fossil fuels and batteries.

5.4.1 ELECTRIFICATION PROBLEM

A subject of growing concern, is the scarcity of electricity in the black townships around the metropolitan centres. With little access to either agricultural land or natural woodland, opportunities for the collection of 'free' fuels are minimal, nor do these households have access to inexpensive electricity. Sandwiched between metropolitan and rural areas, peri-urban areas experience energy problems quite different from either. Households are often still reliant on wood, which is mostly purchased from vendors, and are heavily dependent on the most costly, and perhaps least efficient, of cooking, heating and lighting fuels.

Electricity is the preferred supply option for households in developed urban areas, yet two-thirds of the black population living in and around urban centres still do not have access to it.

There is still widespread questioning of the appropriateness and affordability of electricity for black townships. Black households cannot afford electricity is the common refrain. However, the evidence from many studies over the past decade would appear to contradict these assertions. Once the initial extension fee has been paid, electricity is in most cases

cheaper than other fuels for cooking, heating and lighting (Rivett-Carnac, 1979:108).

Studies by Eberhard and Dickson in 1987, which have looked at newly electrified black townships have indicated that the difference in expenditure is less marked than previous studies have recorded (Eberhard & Dickson 1987:45). For a fair comparison it is important to calculate how much energy is being consumed so that the average unit cost of energy may be compared. Within individual townships, household with electricity tend to be those with higher incomes as they can more readily afford the connection fee and the cost of wiring their house. Higher income households tend to use more energy. In net energy terms electricity is always more expensive than wood and coal, and could be more expensive than gas and paraffin, depending on relative prices. At current prices, electricity is cheaper than gas, but more expensive than paraffin.

Useful energy from wood and paraffin are the most expensive. At current prices, electricity is still cheaper than gas, but in most cases is more expensive than coal. These comparisons are highly price sensitive and could change according to local price conditions. For example, electricity at 7c/kWh would be cheaper than coal costing more than 12c/kg (Department of Health,m 1977:169).

These data clearly dispel the popular myth that most black households cannot afford electricity, the truth is that those who use primarily wood and paraffin can no longer afford not to use electricity (Gervais 1987:310).

The benefits of grid electrification are not automatic, however, and many electrification schemes in Third World countries have revealed a number of unforeseen problems. Thought should be given to how the financing of electrification could be structured so as not to burden the initial consumers unfairly. Appropriate billing systems are also important to avoid confusion and resentment over how the electricity account are arrived at and to pre-empt over expenditure. The use of prewired harnesses can also significantly reduce house wiring costs (Moller 1985:122).

For electrification to be successful, it should be coupled with an integrated package of energy conservation and supply measures, including better house insulation, solar water heating, smokeless solid heating fuels from waste coal dumps and awareness programmes on ways to use electricity efficiently in the home.

Against this background, this study seeks to identify and evaluate the relative importance of some of the private and external costs and benefits of electricity vis-a-vis the other source of energy. For this purpose a survey of households in a

developing region of Katlehong was undertaken in February 1991. Some of the chief findings and recommendations from the survey are briefly outlined in the next two chapters. Suffice is to mention here that the survey region consisted of three sub-areas, Hlahatse area and Phoko area, Ramokonopi East all in Katlehong. The following section deals with definitional matters and gives some examples of the various costs and benefits normally associated with electricity supply.

5.4.2 DEFINITIONAL MATTERS

The decision of investing resources to a great extent depends on an evaluation of the costs and benefits associated with the investments.

The alternatives will differ as to the magnitude of the costs that must be incurred, the expected benefits that will be generated, the time scale of both costs and benefits, and the uncertainty or risks surrounding the project. Psacharopolous (1988:32) defines cost-benefit analysis as a technique designed by which these factors can be compared systematically for the purpose of evaluating the profitability of any proposed investment. Cost-benefit analysis is an aid to judgement, since future costs and benefits can never be predicted with certainty, particularly with respect to the likely benefits of a project, can never be completely precise. Cost-benefit analysis should take into account externalities or spillover benefits, since they spill over to the members of the

community. Externalities are hard to identify and even harder to measure. The cost-benefit analysis (C.B.A.) should also take into account the external cost that may be generated by investment. Such externalities include pollution, congestion and other undesirable side effects of certain industrial projects, as well as external benefits.

In the case of education, some have succeeded in identifying externalities, but few have been able to quantify them. An early attempt in the United States (Weisbrod, 1964:192) drew attention to the magnitude of externalities, and a recent study (Haverman and Wolfe, 1984:329) concluded that the standard rate-of-return estimates may capture only about three-fifths of the full value of education in the United States, including externalities and non-market individual benefits.
The external benefits of education cited in those studies include crime reduction, social cohesion, technological innovation and intergenerational benefits (which refer to the benefits parents derive from their own education and transmit to their children). As is well known, an externality exist when the actions of one party harm or benefit another party without any compensation or monetary reward changing hands in the process. The parties may be either consumers or producers and one or more activity may be involved.

External effects may be classified as either 'technological' or 'pecuniary'. Technological external effects entail changes in the real consumption or production possibilities of recipient

parties, and can manifest themselves in many possible ways. A 'producer-producer' externality may be defined as one in which the scale of operation in one production unit affects the output of other units, given that there is no change in their inputs of capital, labour or other factors of production.

Likewise, a producer-consumer externality occurs when the installation of street lighting reduces the incidence of crime or when leaves from the tree brings dissatisfaction to neighbours (Black & Themeli, 1990:682).

'Consumer-consumer' externalities is an individual who overloads his own supply connection and causes voltage depressions elsewhere and expose his neighbours to a serious risk of fire, electric shock, radio interferences and damage to electrical appliances. Consumer-producer effects are typified by vandals who damage substations, transformers and transmission lines. In all these cases, a negative technological externality either reduces utility or decreases productivity, depending of course, on whether it affects a consumer or a producer (Black and Themeli, 1990:682).

Prest and Turvey, (1966:192) believe that pecuniary externalities are common in a developing region characterised by large income inequalities and widespread unemployment and underemployment. These effects are brought about by a change in the demand and supply conditions facing the recipient parties, and are reflected in changes in the prices of inputs

and outputs. The construction of a new electrical power station may raise the demand for electrical appliances and boost the profits of retailers, wholesalers and producers of such appliances, thus ultimately leading to increased investment and the creation of new job opportunities.

Since these 'induced benefits' (Prest & Turvey, 1966:166) can have a significant impact on production and employment in developing regions, it is important that they be included in a realistic assessment of the social worth of a new public project.

5.5 CONCLUSION

Investment in electricity is a key element of the development process. Its importance is reflected in the growing recognition, since the 1960's, that investing in electricity provides and enhances knowledge, attitude and motivation necessary for economic and social development.

For more than twenty years, the World Bank has been lending for electrification in developing countries and experience has been accumulating with respect to the formulation of policies. This experience not only underlines the importance of electricity investment but also demonstrates the complexity of introducing tested policies so that they will make the maximum contribution to a country's development effort.

As a substitute for wood, paraffin and coal, electricity reduces damage to the environment. By being available at the flick of a switch, electricity improves productivity, because it allows users more time for constructive activities. Electricity for all will definitely enhance economic growth and prosperity. Energy supply is just one facet of the development process and redressing the inequalities in access to adequate and affordable energy supplies has to be aligned to efforts to restructure the economy so as to provide fairer access to its benefits for all in South Africa.

CHAPTER SIX

COSTS AND BENEFITS OF THE ELECTRIFICATION OF THE KATLEHONG TOWNSHIP

6.1 INTRODUCTION

Katlehong township is characterised by an air of desperation and uncertainty and a culture of poverty. Residents lack most essential services and amenities. They are the product of both population growth and old government policy which halted the provision of electricity supply with every newly erected house. This chapter tries to bring to the fore the extent of the scarcity of basic necessities of life and limited access by the poor to these necessities of life. The problem of homelessness, a problem that has become especially acute since the lifting of restrictions on migration from designated homelands, has resulted in a greater demand for services and amenities and all these problems has a direct bearing on township electricity supply. A demand for houses also creates a demand for energy in order to cook, light and also to perform all household chores.

Paul Streeten (1985:31), one of the originates of the 'basic needs' approach to poverty, makes the point that the least disagreeable feature of the voyage from Britain to a camp in Canada was the crammed space. As a result he has never regarded housing as quite so basic a need as food, water or sanitation. In South Africa, this view seems, at first glance, to have been confirmed when looking at an urban residential township of Katlehong, which is overcrowded and the majority of residents do not have electricity and have to rely mainly on wood, the availability of which varies widely.

In the Hlahatse section of Katlehong, where there is no electricity, paraffin is the standard fuel used by everybody, but more than a third of the households also burn wood, most of which they collect themselves. Indeed these city dwellers consume five times as much wood per person as do the 'rural' inhabitants (Wilson and Ramphele 1989:80). Another dimension of the problem of fuel was shown by a study of energy and poverty in Soweto, where Eberhard found that fuel for cooking, heating and lighting often costs more per unit of energy for the poor than it does for those who are better off (Eberhard 1986a:12). In Eden Park, a coloured township adjacent to Katlehong, those households wealthy enough to afford the connection fee for electricity, spent on average R25 per month on energy. Poorer households that had to use paraffin and candles, incurred running costs nearly three times as high - R75 per month. Rivett-Carnac (1979:158) have found the same results in Umlazi outside Durban, where households without electricity spent more than twice as much (R42 per month) on fuel as did those better-off households in the same township who spent only R18. This conclusion was furthermore confirmed by even starter findings in a later survey by Eberhard (1986:9). The question about fuel, as Gandar (156:13) has pointed out, is not whether the poor can afford electricity in South Africa but whether they can afford not to have it.

Indeed, given the ecological consequences of the 'relentless search for fuel' by people without electricity, the real

question surely is whether the country as a whole can possibly afford not to ensure that everybody has access to it.

Table 6.1 presents thirteen townships within the Pretoria-Witwatersrand-Vereeniging (PWV) area and their accesses to services provided by their respective municipal services. The table also tries to bring to the fore the extent of the need for basic necessities in Katlehong.

Table 6.1: The provision of basic services in certain PWV townships, 1990/1991

AREA	ELECTRI-CITY	WATER	SEWERAGE	ROADS
ALEXANDRA	10%	1%	BUCKET-BORNE	3KM TARRED
ATTRIDGEVILLE	100%	100%	WATER-BORNE	75KM TARRED
BEKKERSDAL	1.2%	100%	BUCKET-BORNE	3.5KM TARRED
DAVEYTON	90%	100%	WATER-BORNE	60KM TARRED
DUDUZA	10%	100%	66,7% WATER	10KM TARRED
EVATON	9%	15%	15% BUCKET-B	30KM TARRED
IMPUMELELO	1%	100%	WATER-BORNE	1KM TARRED
KAGISO	10%	100%	WATER-BORNE	65KM TARRED
KATLEHONG	40%	100%	50% WATER-B	7KM TARRED
RATANDA	48%	100%	10% WATER-B	12KM TARRED
THOKOZA	70%	100%	60% WATER-B	42KM TARRED
TSAKANE	5%	100%	BUCKET-BORNE	25KM TARRED
VOSLOORUS	100%	100%	WATER-BORNE	50KM TARRED

SOURCE: URBAN FOUNDATION 1990 a: 134

Against this background, the general living conditions in the different urban residential townships of the PWV can be further highlighted with reference to:

6.1.1 Housing

6.1.2 Sewerage and other rubbish disposal; and

6.1.3 Quality of life

These three dimensions are important as they directly relate to the electrification process. For example, it would be useful to know the total number of housing units in the PWV area, number of residents per housing units, number of shacks and shortages. This has a direct bearing on the costs and benefits of electrification as they serve as the measure of the standard of living of the particular area.

6.1.1 Housing

One of the most striking features noticed during the period 1989 to 1992 when conducting interviews was the extent to which research workers were surprised about overcrowding and inadequate housing conditions generally, and backed up their objective descriptions with assessments by people themselves as to what they thought about it all. A typical example is the case of aunt Laura, aged 52, who has been living in the small shack at Katlehong all her life. She lives with her bedridden mother and her brother who receives a disability grant because

he suffers from tuberculosis. The mother receives a pension. Aunt Laura does not work because she has to look after her mother. Before the family moved to where they are now living, they were lodgers in a two-roomed house. They moved because the house was overcrowded. There were seven adults and six children staying in the two-roomed house. The mother, brother, and aunt Laura all sleep in one room. They have to sleep head-to-toe because there is not enough space. If people are living like this, then they lose respect of each other. The absence of privacy for married couples, the need for space for children to play, the impossibility of having visitors, are all part of the pain, quite explicitly felt by those enduring a dimension of poverty that is to be found across the length and breath of the Pretoria-Witwatersrand-Vereeniging area. The extent of overcrowding is overwhelming, particularly on the Reef.

On the Witwatersrand, excluding the densely settled homeland area of Winterveld, north of Pretoria, there was an estimated shortage of 150 000 houses. In Soweto alone the estimated shortage in 1988 was 50 000 houses and growing at a rate of 4 000 per year, whilst over the previous seven years an average of only 1100 houses per year had been built (Central Statistics Services 1988:42).

6.1.2 Sewerage and other rubbish disposal

One of the most unpleasant aspects of poor housing in the Reef area relates to sewerage and removal of garbage. Evidence was presented to the conference of the Carnegie inquiry from all corners of the Pretoria-Witwatersrand-Vaal townships about the chronic failure of local authorities to plan an appropriate infrastructure for the dense concentrations of working - class people (Wilson & Ramphele 1989:205).

In greater Soweto, the outbreak of a measles epidemic which claimed the lives of nearly 300 children in 1982/3, led to the appointment of a special committee to investigate the conditions, particularly in the squatter area on the edge of the city. There, the investigation found an overflow and random dumping of sewerage from the pit latrines which were still being used. A bucket system is now provided in some areas, but, according to residents, they still need pit latrines because collection is inadequate (Wilson and Ramphele 1989:71).

In Alexandra, on the Witwatersrand, a report for the Carnegie inquiry described sewerage flowing in the streets as a result of the overloading of the existing bucket system. The report also drew attention to the 'uninviting bad odour' in consequence.

On the other side of Johannesburg in the Mapetla hostels, there are three toilet pans for a block housing 544 people - one more statistic that the eye slides over without registering anything, an average of 180 people needing to use one toilet in a densely settled city environment. Small wonder that conditions become squalid and people get angry (Wilson and Ramphele 1989:102).

6.1.3 Quality of life

At first glance, living standards seem to have improved dramatically. In Soweto, for example between 1962 and 1982, the proportion of african households with an income less than R2000 a year (measured in constant 1982 prices) halved from 42 per cent to 21 per cent. At the other end of the spectrum, the proportion of households with an annual income of more than R4500, more than quadrupled from 7 per cent to 33 per cent. These figures exaggerated, to some extent, the changes that have taken place (Wilson & Ramphele 1989:102). Over the same period african households became much bigger as a result of the lack of housing, which compelled many families to 'double up' as one household. Nevertheless, the figures do reflect significant improvements that took place over two decades but particularly during the first half of the 1980s. Despite this, however, poverty remains endemic in the area. After a careful survey of nearly twenty studies undertaken in the PWV between 1982 - 1988, Pillay concluded:

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TABLE 6.2: Household demand patterns of different South African groups, 1985

Percentage of group's household expenditure					
	Metropolitan areas				Home-lands:
	Whites	Indians	Coloureds	Blacks	Blacks
Food	13,2	23,0	26,3	30,3	41,4
Clothing & footwear	3,2	5,5	5,9	8,1	10,2
Housing and electricity	20,5	22,7	19,1	10,5	5,1
Fuel and light	0,1	0,4	0,4	1,4	4,4
Household equipment	3,5	4,8	4,7	5,3	7,8
Recreation and entertainment	1,7	1,1	1,0	0,6	0,3
Communication	1,1	1,7	2,7	1,4	0,4
Average annual expenditure/person	R11 140	R3 914	R2 400	R2400	-

SOURCES:

Bureau of Market Research. 1988A. Household expenditure in the National States and TBVC countries, 1985. Research report no 145. Pretoria: Bureau of Market Research, University of South Africa, P.14, Table 2.3. Bureau of Market Research. 1989A. A comparison of the income and expenditure patterns of metropolitan households in the RSA, 1985. Research report no 159. Pretoria: Bureau of Market Research, University of South Africa, P.42, Table 3.13 & Appendix A.

Unfortunately, electricity expenditure is not presented separately in the Bureau of Market Research reports; it is nevertheless very instructive to consider the breakdown of the total expenditure on fuel and light (Table 6.3).

Gas, coal, wood and paraffin are shown to be the most important commercial forms of energy amongst blacks in the metropolitan regions. Coal and paraffin are most important; as will be shown below, there is a paraffin dominance in areas where coal is not freely or cheaply available.

Apart from charcoal and furnace oil - black expenditures dominate all the categories of fuel and light expenditure to the extent that black spending on all items of fuel and light makes up 82 per cent of the total expenditure by all groups in South Africa.

It is also instructive to note the differences in black metropolitan expenditure patterns across regions. Some pertinent figures are presented in Table 6.4.

TABLE 6.3: Expenditure on fuel and light by metropolitan households, 1985

(Thousands of rands per annum)

	Whites	Coloureds	Indians	Blacks	Total
Gas	3 073	3 929	81	7 665 52,0%*	14 748
Coal	395	791	1 143	70 880 96,8%	73 209
Charcoal	7 561	171	368	775 8,7%	8 875
Wood	2 532	493	120	17 689 84,9%	20 834
Paraffin	572	4 800	77	56 510 91,2%	61 959
Methylated spirits	1 350	208	33	2 393 60,1%	3 984
Matches	2 826	1 398	710	6 759 57,8%	11 693
Candles	1 642	1 148	196	15 459 83,8%	18 445
Furnance Oil	816	6	0	393 9,7%	4 071
Total	23 623 10,8%	12 944 6,0%	2 728 1,3%	178523 82,0%	217818 100%

* Percentage of total.

Source:

Bureau of Market Research. 1988B. Household expenditure in the metropolitan areas of the RSA by population group, 1985. Research report no 155. Pretoria : Bureau of Market Research, University of South Africa, P.50, Table 2.10.

In the Cape, Port Elizabeth, East London and Durban, spending on coal is limited.

The ratios differ markedly from those calculated for the metropolitan areas for 1977 (Viljoen, 1989:53), probably, mainly because the low overall level of expenditure influences the accuracy of the sample data, but the overall pattern remains the same. The Transvaal, on the other hand, shows mainly a coal-dominated consumption pattern, thus confirming "a regional division into coal dominant and paraffin dominant regions" (Viljoen, 1989:54).

Across metropolitan regions, fuel and light spending by blacks is remarkably stable as a proportion of their total household expenditure. In only three regions does this proportion fall outside the range 1,4 to 1,7 per cent. The discrepancy between the ratios in these three regions (Johannesburg, lying above this range at 2,0 per cent, as against Cape Peninsula at 1,0 and Pretoria at 0,7 per cent) is at first glance anomolous, for Pretoria and Johannesburg are almost continuous. The reason for the different behaviour lies in the fact Pretoria's black townships have long been electrified, whereas the same did not yet apply to those of Johannesburg in 1985. Table 6.5 shows how consumer behaviour differs between regions in terms of expenditure on (non-electric) fuel and light, electrical equipment (mainly home appliances) and television sets.

Table 6.4: Black household expenditure on main items of fuel and light for selected metropolitan regions, 1985

(Thousands of rands per annum)

	Gas	Coal	Wood	Paraffin	Total Fuel
All metropolitan regions	7 665 (4%)	70 880 (40%)	17689 (10%)	56510 (32%)	178523 (100%)
Cape Peninsula	1 440 (22%)	893 (14%)	472 (7%)	2 720 (42%)	6 481 (100%)
Port Elizabeth/ Uitenhage	1 984 (22%)	275 (3%)	177 (2%)	5 116 (56%)	9 075 (100%)
East London	169 (22%)	23 (3%)	15 (2%)	435 (56%)	9 075 (100%)
Durban	289 (9%)	43 (1%)	13 (0%)	2 129 (63%)	3 377 (100%)
Pretoria	78 (1%)	2 291 (35%)	477 (7%)	1 148 (18%)	6 518 (100%)
Johannesburg	216 (0%)	27 339 (45%)	6 568 (11%)	12806 (21%)	60 653 (100%)
Rest of Witwatersrand	1 822 (3%)	26 719 (46%)	5 866 (10%)	15017 (26%)	57 701 (100%)
Vaal Triangle	239 (2%)	5 573 (47%)	1 528 (13%)	2 022 (17%)	11 954 (100%)
OFS Goldfields	617 (4%)	3 395 (21%)	678 (4%)	9 173 (56%)	16 501 (100%)

SOURCE:

Bureau of Market Research. 1988A. A comparison of the income and expenditure patterns of metropolitan households in the RSA, 1985. Research report no 159. Pretoria: Bureau of Market Research, University of South Africa, Table 2.10 and Annexure A, Tables A1 to A13.

Total black expenditure on non-electric fuel and light at R178,5 million in 1985, was considerably in excess of black

spending on electrical equipment of all sorts (R51,5 million), and on television sets (R61,0 million). Yet black spending on electrical equipment and television sets was in overall terms already large proportions (13 per cent and 41 per cent respectively) of all spending on these categories in metropolitan regions in 1985 - an indication of the extent to which blacks have become important consumers of electricity and electrical appliances.

The growth potential is obvious; if television purchases of blacks in metropolitan regions already make up 41 per cent of the total television purchases, their share in total electrical equipment expenditures may soon also rise to such levels, as electrification proceeds and black incomes rise. Blacks would usually purchase less expensive appliances, given low income levels, thereby reducing their share in the overall appliance market below their share in electricity consumption.

In overall terms, the most important items of electrical equipment purchased by black metropolitan consumers are fridges (R22,7 million, 30 per cent of the total market), the category hot plates/stoves/microwaveovens/broilers (R7,1 million, or 10 per cent of the market), deepfreezers (R3,8 million, 17 per cent), electric irons (R3,6 million, 25 per cent), heaters (R3,2 million, 40 per cent), and electric kettles and filters (R3,1 million, 35 per cent of the market).

Notably absent from the list are washing machines, tumble dryers, dishwashers, and carpet cleaners or polishers - all appliances that are at this stage outside the financial reach of the majority of blacks (Bureau of Market Research, 1989a:54, Table 6.10).

TABLE 6.5: **Black household expenditure on fuel and light, electrical equipment and television sets for selected metropolitan regions, 1985**

(Thousands of rands per annum)

	Fuel and light	Electrical Equipment	Televi-sion sets	All exp-enditures
All Metropoles Ratio	178 523 100	51 469 29	60 980 34 *	12341906
Cape Peninsula Ratio	6 481 100	2 891 45	3 123 48	638 849
P.E/Uitenhage Ratio	9 075 100	2 289 25	5 936 65	655 709
East London Ratio	772 100	195 25	506 66	55 735
Durban Ratio	3 377 100	1 554 46	1 584 47	316 076
Pretoria Ratio	6 518 100	4 106 63	5 266 81	969 386
Johannesburg Ratio	60 653 100	17 504 29	22 507 37	3050 236
Witwatersrand Ratio	57 701 100	16 313 28	12 488 22	3964 843
Vaal Triangle Ratio	11 954 100	1 952 16	3 922 32	808 484
OFS Goldfields Ratio	16 501 100	2 059 12	3 147 19	988 484

* Percentage of total expenditure on fuel and light.

Source:

Bureau of Market Research. 1988A. A comparison of the income and expenditure patterns of metropolitan households in the RSA, 1985. Research report no 159. Pretoria : Bureau of Market Research, University of South Africa, Table 2.10 and Annexure A, Tables A1 to A13.

The ratios shown in Table 6.5 are useful in allowing us to see in which areas purchases of electrical equipment and television sets in relation to the expenditure on fuel and light (non - electrical) amongst blacks are relatively more common - a crude proxy for the extent of electrification. As is to be expected, expenditure on electrical equipment and television sets by black households in Pretoria is much closer to their overall expenditure on non-electric fuel and light. Cape Town shows a pattern of a relatively electrified community, perhaps partly due to the definition and drawing of boundaries for the sample survey.

In the last few years, rising incomes, urbanisation, the availability of television, and to some extent electrification, have altered black demand patterns considerably. The effect of electrification is reflected in the fact that black metropolitan expenditure on fuel and light decreased by 26 per cent in real terms between 1975 and 1985, while the black metropolitan population grew and total black metropolitan expenditures increased by 51 per cent in real terms. In a decade, fuel and light expenditure thus halved (from 2,95 per cent to 1,45 per cent) as a proportion of total black metropolitan expenditure.

As previously argued (see chapter 3), the rate of urbanisation in South Africa would in all likelihood be much more rapid in future than in comparable semi-industrial countries, at least until the urbanisation "backlog" has been eliminated.

Given the past under-provision for black urbanisation, the large numbers of new arrivals from rural areas and the rapid urban population increase, would often not have access to suitable formal housing, urban land or infrastructure.

Without such facilities, including electricity, their consumer demand would not be significantly different from those of rural inhabitants at the same income level. The transformation of consumer demand requires housing, electricity and potable water as complements to consumer durables.

Electrification is thus one of the factors that may affect black consumer demand patterns and may thereby enhance the growth of the domestic market for durable and semi-durable goods. The middle ranges of the spectrum of consumer goods will chiefly benefit from such changed black demand patterns. As there is already a well-developed domestic market for such goods and given the existence of economies of scale, the effect would be to stimulate domestic industry without severely threatening the balance of payments (Dreyer & Brand, 1986), currently the chief constraint on economic growth.

6.2 MAIN SOCIO-ECONOMIC FEATURES OF KATLEHONG

Katlehong, part of the East Rand, was singled out for the survey because a large section of Katlehong does not have electricity.

It also forms a geographic unit and consists of the total population of ± 37 000 households in formal housing units rented, ± 18 000 households in formal units owned. There are no accurate statics on the number of people who live in the 10 hostels in Katlehong. The population in Katlehong shack areas is estimated around 50 000. Shack settlements, a consequence of population growth are today a common feature of african township life within South Africa's industrial heartland - the Pretoria-Witwatersrand-Vereeniging region. Though these shacks, or informal dwellings were originally limited or confined to backyards, they have now risen in open spaces either within or adjacent to the townships.

Some have been erected without authority, even on land which does not belong to the local authority administering the area. Registered tenants charging sub-tenants and backyard dwellers monthly rentals (as much as R50 in some cases), has added to this rise in shack settlements as families who resented paying the high rentals fled from the overcrowded homes and backyards to put up their own houses on vacant land. 200 Houses from 37 000 formal units rented were randomly selected for the purpose of the survey. Katlehong was established in 1945 and is located south of Germiston beyond the Heidelberg freeway. It is sandwiched between Thokoza (Alberton) on the west and Vosloorus (Boksburg) on the east. The Katlehong township is divided into sixteen wards for the purpose of electing members of its council. Its geographical size is 2597 hectares.

Table 6.6 Socio-economic statistics for Katlehong township,1990

A. HOUSING

Type of accomoda-tion	**Number**	**Rentals**
Formal units owned	17058	R45 per month
Formal units rented	37000	R45 per month
Hostels	10	Rentals start from R10 to R25 per month(varies with the size)
Shacks	50 000	R15 per shack per month

B. INFRASTRUCTURE

Percentage of electricity supply available to households	Percentage of houses with sewer-age	Percentage of tarred roads	Percentage of lit streets
32	100	7	52

C. AMENITIES

	Total Amenities	Electrified Amenities
Sports stadiums	2	1
Soccer fields	15	13
Tennis courts	1	0
Netball fields	1	0
Golf courses	0	0
Bowling greens	0	0
Swimming pools	1	0
Cricket pitches	0	0
Softball diamond	1	0
Rugby fields	0	0
Athletic tracks	1	0
Boxing gymnasium	1	1
Volleyball courts	1	0
Public halls	1	1
Libraries	1	1
Post offices	2	2
Police stations	3	3
Cinemas	2	2
Night clubs	2	2
Food outlets	Many	all
Hardware shops	Many	all
Pleasure resorts	1	1

D. HEALTH

Health centres	Number	Electrified Centres
Hospitals	1	1
Clinics	4	4

E. EDUCATION

Institutions	Number	Electrified
Creches	4	1
Primary schools	29 plus 3 farm schools; number of pupils is 43941 plus 9316 at farm schools	7
Secondary schools	7 plus 1 technical plus 1 for deaf & blind- number of pupils is 13289 plus 363 at farm schools	2
Tertiary Institutions	1 teachers training - college 29249 students - 1 technical college - 54321 students	1 1

F. COST OF TRANSPORT

Destination	Rail	Bus	Taxi
Alberton	Single R1.40	Single R1.15	R2.30
	5 Day R9.90	5 Day R8.20	
	6 Day R11.90	6 Day R9.90	
Johannesburg	Single R1.90	Single R2.00	R2.90
	5 Day R9.40	5 Day R10.00	
	6 Day R11.20	6 Day R12.00	

G. TRANSPORT DISTANCES

Distances to employment	Destination
13 km	Germiston
6.7 km	Wadeville
5 km	Alberton
21 km	Johannesburg

H. COMMERCIAL ACTIVITIES

Type	Number	Description
Industrial parks	2	1 with 25 units - Urban Foundation
		1 with 48 units - Anglovaal concern

I. OTHER REGISTERED BUSINESSES

Type of business	Number	Businesses with electricity
General dealers	84	72
Electricity	3	3
Carpet & tile	1	1
Timber yard	1	1
Dry clean depots	4	4
Radio/TV repairs	1	3
Motor spares	3	1
Undertakers	1	1
Paraffin depot	1	1
Concrete works	1	1
Scrapyards	2	2
Upholstery	1	1
Carpentry	2	2
Hardware	2	2
Cold drink sales	1	1
Scouring pad	1	1
Bottle recycler	2	2
Panelbeating	2	2
Motor repairs	1	1

I. cont.

Spring manufacturer	1	1
Bakery	1	1
Steelworks	1	1
Detergent manufact.	1	1
Welders	5	5
Butchers	11	11
Window frame manuf.	1	1
Cinemas	2	2
Garages	2	2
Paper distribution	1	1
Fresh produce	17	11
Glass works	1	1
Milk depot	5	5
Restaurants	10	6
Tailor/dressmakers	7	4
Driving schools	2	2
Herbalists	4	0
Dairies	2	2
Dry cleaners	6	6
Art gallery	1	1

Source: Van der Berg (1990:45)

6.2.1 THE KATLEHONG SURVEY

During the study, information was gathered by the use of a questionnaire (Appendix B) from Katlehong residents, people who have been staying in the township for a period of at least five years and their ages ranging from 21 to 65 years.

Since it is generally not feasible to study the entire population, the study relied on random sampling and 90 households were interviewed in Ramokonopi area, 45 households in Phoko and 65 households in Hlahatse East (200 households in total).

Three field-workers were hired to help in the collection of data and to avoid biasing the information from the respondents. The field-workers were extensively briefed and a 100 per cent response rate was obtained as the respondents were told in advance by the councillor of the region and also through letters, and telephonically to expect the field-workers.

In Katlehong's townships, only sections of the formal housing have electricity, (the Hlahatse and Phoko areas do not have electricity at all), and this amounts to 32 per cent of all formal homes. The remaining 68 per cent has to make its own arrangements for cooking, lighting, etc. This obviously includes all the shack areas, the homes of the most poor. According to residents, these shack settlements, started in 1982 when a small number of families who were tired of living in congested conditions in backyards, erected 90 shacks on an open piece of ground beyond the railway line on the north-side of the township. It rapidly grew into a settlement with a population of about 35 000. These people relied mainly only on a 750ml bottle of paraffin per day.

This works out to be expensive, it raises the cost of reading, washing and eating dramatically, and is a significant factor in impoverishing the very poor still further.

The survey revealed that all the residents of Hlahatse and Phoko would prefer to have electricity. In an interview with the mayor of Katlehong, he indicated that 70 per cent of the residents of those areas have applied for electricity and are on the waiting list and have even paid their installation fee. The remaining 30 per cent are mostly people living in the shacks with a very low income level or are unemployed. In the electrified area, 90 per cent of the householders interviewed by the field-workers are utilising the service, and are even up to date with their payment of bills i.e. a R45 flat rate. The Hlahatse and Phoko residents are mostly making use of paraffin and gas for lighting and cooking.

6.2.2 EMPIRICAL RESULTS OF THE SURVEY

The total sample population consisted of 200 households, 90 households from Ramokonopi East (electrified) and 110 from the area without electricity, being Phoko and Hlahatse sections of Katlehong.

Section one of the questionnaire consisted of the personal data of 160 females and 40 males all of whom were personally responsible for paying rent. The ages of the females ranges from 21-63 years and those of males ranges from 31-64 years.

Table 6.7: Distribution of respondents by educational level

Educational level	Number	%
Primary school (sub A - std 6)	32	16
Secondary school (std 7 - std 10)	80	40
Diploma certificate	56	28
Degree	32	16
Higher degree	-	-
Total	200	100

As reflected in Table 6.7 most respondents had received a fair level of education. The majority (84 per cent) had completed some high school education.

The survey revealed that all houses in Ramokonopi East have access to electricity and all the residents were up to date with their flat rate monthly payment of R45. Respondents also indicated that they cannot afford to have even one day without electricity. Houses randomly selected at Ramokonopi East showed an overwhelming (about 98 per cent) satisfaction towards the flat rate system, but major dissatisfaction was cited towards the poor metering system. The remaining 2 per cent preferred the metering system as opposed to a R45 flat rate.

On the other hand, Phoko and Hlahatse residents do not have access to electricity at all. Of the 110 households interviewed, 85 have applied for electricity and 60 residents have even paid their installation fee of R170.

In both areas, households are forced to rely on fuels such as gas, wood, coal, candles and paraffin. Only those areas close to the main road have street lights. The survey results indicated that of the 110 houses from Phoko and Hlahatse, 85 (77 per cent) houses would prefer to use electricity for household chores such as cooking, heating and lighting. The remaining 25 (23 per cent) of those interviewed stated they would not prefer electricity due to perceived cost implications, like purchasing expensive electrical appliances.

The last section of the questionnaire looked at the household income to see if there was any correlation between the desire for electricity supply and the household's income. The survey revealed that there is a clear correlation between income and the use of substitute fuels, with coal being used by lower income households exclusively and gas by those with higher incomes at Phoko and Hlahatse section. In absolute terms, higher income households tend to spend more on energy. As far as income levels were concerned, it appeared that households in Ramokonopi East (electrified) area earned an average income of +R1000 per month, while those in Phoko and Hlahatse area (unelectrified) earned a monthly average of +R790.

The average amount spent on energy requirements (including wood, paraffin, gas and candles) by those households that did not use electricity in the Hlahatse and Phoko areas came to R49.20 and R67.00 per month, respectively.

This compared with an average monthly amount of R45.00 spent on electricity by the households in Ramokonopi East. These figures seem to suggest that the utilisation of electricity as an energy source is relatively cheaper.

All the residents at Ramokonopi East have been using electricity ever since they came to the area. Although they could not easily quantify how much they spent on electrical appliances as the prices varies from shop to shop, the following are estimated figures obtained from residents:

TV= Ranges R499.00 (small)-R1900.00 (big)
Fridge = R1500.00
Stove = R1200.00
Iron = R 95.00
Kettle = R 49.00

Not all residents have these appliances, but the most popular was the TV, iron and kettle.

Four open-ended questions were put to respondents, giving them the opportunity to express their general feelings about electricity, their likes, their dislikes as well as the perceived benefits of electricity. General feelings about electricity are summarised in Table 6.8.

Table 6.8: General feelings about electricity

Feelings	% of respondents
Easy, helpful, convenient	38,1
Fast	14,5
High account (cost)	13,8
Clean	6,0
Economical/cheaper	5,0
Like it	4,8
A necessity	4,0
Improve way of living	3,6
Supply extra light	3,1
Good & reliable	1,9
Other feelings	1,9
No feelings	1,9
Don't know	0,7
Meter checkers should know how to read meters	0,5
No fires/candles are good	0,2
Total	100,0

The major feeling about electricity in general (mentioned by 38,1 per cent of respondents) is that it is easy, helpful and convenient. The fact that it was fast (compared to a coal stove for example), was also appreciated by 14,5 per cent of respondents, but the high cost was mentioned by 13,8 per cent. Most of the other feelings in general were positive.

A question on the positive feelings about electricity were included and the results are summarised in Table 6.9.

Table 6.9: Positive feelings about electricity

Feelings	% of respondents
Easy, helpful, convenience	36,5
Fast	22,9
Supply extra light	13,1
Clean	11,0
Economical/cheaper	5,0
Many uses at same time	4,8
It is modern	1,9
Nothing	1,9
Many appliances to choose	0,7
Good and reliable	0,7
Other	0,7
No fires/candles are good	0.2
Total	100%

The convenience of electricity again made the top of the list with 37 per cent of respondents mentioning it. Electricity as a work-relieving mechanism for women is especially appreciated. The quickness of electrical appliances relative to appliances using other energy sources, is also a strong positive point and is appreciated even in small things like being able to make a quick cup of tea when coming home after work. The extra light supplied by electricity and the cleanliness of the home (without the fuss of a coal stove) are strongly appreciated. The cost-effective entertainment provided by television, was also a big plus of electricity (no mention was made of the educational effect of television). The results on the negative feelings about electricity are summarised in Table 6.10.

Table 6.10: Negative feelings about electricity

Feelings	% of respondents
Nothing	42,9
Too much money	34,8
Power failures	12,6
Other	6,5
Danger	1,9
Not applicable	0,3
Main switch weak	0,3
Using more appliances	0,3
Pay a lot, but don't use a lot	0,3
Total	100

It is heartening that 42,9 per cent of the respondents had nothing bad to say about electricity. The main criticism concern the cost (34,8 per cent) and power failures (12,6 per cent).

The benefits of electricity, as perceived by respondents in electrified homes, are summarised in Table 6.11.

The perceived benefits as presented in Table 6.11 show a high correlation with the positive feelings about electricity as indicated earlier.

TABLE 6.11 Perceived benefits of electricity

Perceived benefit	% of respondents
Easy, helpful, convenient	27,8
Fast	21,6
Clean	13,1
Economical	7,9
Supply extra light	5,9
Improved way of living	5,5
Don't know	3,6
Many uses at same time	3,6
Other	2,4
Nothing	1,7
Many appliances to choose from	1,4
Essential/necessity	1,4
Pay once and not in bits	1,2
Good and reliable	1,0
Modern	1,0
City is bright	0,7
No fires/candles are good	0,5
Travelling safer at night	0,2
Total	100

Some specific feelings/perceptions/attitudes towards electricity were tested among respondents, by asking for agreement and disagreement with a specific statement. The statements and percentage of respondents agreeing with each are presented in Table 6.12.

Table 6.12 Agreement with specific feelings towards electricity

Feeling/perception/attitude	% of respondents
Electricity is way of the future	91,1
It must be used sparingly	85,1
It is convenient to use	79,7
It is a necessity	79,1
It is a luxury	66,7
It is dangerous	66,0
Has improved my way of living	49,7
It is easy to afford	31,7
Total	100

A very high 91,1 per cent of respondents agreed that electricity was the way of the future. A surprisingly high 85,1 per cent agreed that electricity must be used sparingly, which could be an indication that, notwithstanding the fact that respondents appear not to fully realise the relationship between consumption and cost, they in actual fact know that they have to use less if they want to pay less.

Electricity was rated as a necessity by 79,7 per cent of respondents, indicating that no large-scale disconnection will take place on a permanent basis. The convenience of electricity also found wide support (79,4 per cent).

The involvement of the town council with the communities that have electricity was also surveyed (Ramokonopi East) and the results are shown in Table 6.13.

Table 6.13a: Frequency of visits by town council

Frequency of visits	1 Officer	2 Officers
Everyday	20,0%	5,0%
3 times per week	5,0%	-
once a week	55,0%	2,5%
Twice a month	-	-
Once a year	2,5%	-
Irregular	2,5%	-
Don't know	15,0	92,5
Total	100%	100%

Table 6.13b: Time spent by officers with respondents

Particulars	Ramokonopi East
Little time	7.5
15 minutes	5,0
30 minutes	7,5
1 hour	12,5
More than an hour	55,0
As long as needed	12,5
Total	100%

It seems as if a considerable amount of time is spent with a respondent once the officers are in the area. Approximately 50 per cent of the respondent see officers for more than an hour, more than 10 per cent for an hour and 12,5 per cent for as long as needed. Nearly 80 per cent of the respondents therefore have access to professional advice for more than an hour as long as needed. Only a few people 7,5 per cent meet with officers for a short period of time only.

Another factor determining the cost of energy supply cited by most respondents at Phoko area, was that coal was cheaper to residents closer to the railway siding compared to those further away. A bag of coal (needs for about a month) cost residents from Phoko R20.00 compared to R65.00 those staying further away from the railway station. This is attributed to high transport cost, poor infrastructure in the area and the rising demand by workers for high wages. But in most instances, respondents preferred to travel from their homes to railway station shops in order to buy coal at a lower price than it being delivered to their homes.

6.2.3 Findings of the survey

The study set out to find whether electricity can really improve the standard of living in the black townships. This was done in four steps as outlined in the introduction in chapter one. The summary will also follow the similar logistic order.

Electricity is the preferred energy supply option for households in developed urban areas, yet two-thirds of the black population living in urban areas still do not have access to it. There is still widespread questioning of the appropriateness and affordability of electricity for black townships. The evidence from many studies over the past decade seem to contradict these assertions.

Once the initial installation fee has been paid, electricity is in most cases cheaper than other fuels for cooking, heating and lighting (Eberhard 1986:124).

There was a general agreement amongst the respondents that electricity was a more convenient and safer service capable of providing much greater comfort than alternative fuels.

Users of electricity pointed out that its plug-in capability was a source of much convenience because it enabled them to carry out household tasks more rapidly than before and save much time and effort in the process. Respondents generally perceived electricity to provide better lighting, heating and personal securities than other energy forms. They also felt that electricity was an important means of improving the educational standards of individual users within the household. These advantages can be viewed as private benefits which accrue to the individual users of electricity themselves.

6.3 CONCLUSION

The overall impression from the survey is that the benefits from electricity far exceeds the cost of electricity. The private benefits include greater reliability, efficiency, conveniency and safer service capable of providing much greater comfort than alternative fuels. It enables households to perform their household chores much quicker and save much time and effort in the process.

Electricity provides better lighting, heating and personal security than other energy forms. Electricity also improves health conditions and educational standards. Social benefits also accrue from electricity in the form of an improvement in the quality of social life.

On the cost side, most respondents felt that electrical appliances were very expensive and the fact that they still have to pay R170.00 installation fee was too much. Although most respondents acknowledges the benefits of electricity, the majority of them showed reluctance of using it unless its coupled with awareness programmes of how to use electricity. They cited a major risk involved in using electricity for the time especially when seeing the red and blue wire. The rent on itself is a major cost to respondents because at the end of the month, respondents have to pay their monthly tariff.

From the ensuing discussion it is clear that electricity remains the key basic need for a better life as it is an important mean of improving the educational standard of its users within the household. It can provide means towards a more efficient labour market, more recreational time and greater security, all of which help to improve the quality of life and the prospect for sustained economic growth.

CHAPTER SEVEN

SUMMARY, CONCLUSION AND RECOMMENDATIONS

7.1 SUMMARY AND POLICY IMPLICATIONS

The procedures involved in estimating the net social value of a public project are both complicated and controversial at the best of times. Very few of the non-pecuniary costs and benefits of electrification can be quantified and incorporated into a standard cost-benefit analysis, aimed at determining the social desirability of extending the supply of electricity in such townships as Katlehong. Nevertheless, it is possible to identify certain broad trends which may at least facilitate such exercise.

Energy use is an important factor in economic growth and development. Underdeveloped areas may be defined as those areas which do not have access to electricity for domestic energy requirements. One critical factor for development centres on the realization that progress will be difficult unless the quality of 'human resources' is improved directly.

The basic needs approach promotes economic development through fulfilling the basic needs of all people in a cost-effective manner and within a specific time frame. The main purpose of the basic needs approach is to develop man.

Human beings have basic needs and any process of growth that does not lead to their fulfilment or even worse, disrupts them, is in transgression of the idea of development.

Basic needs are nothing more than an income redistribution plan in favour of the poor, who are targeted to receive early the benefits of development instead of waiting until the fruits of economic betterment trickle down to them. What at best basic needs policies are likely to produce are certain development benefits, whose probability of occurrence is difficult to estimate in advance, and which fall under the category of externalities.

In terms of evolution, basic needs represent a random shock introduced to enhance human dignity and accelerate the realisation of human potential. Basic needs therefore becomes a goal to which the evolutionary socio-economic forces are expected to adjust in time. In this framework basic needs are manifestations of a new mentality towards the alleviation of poverty.

For both the government and individuals, the choice between different ways of investing resources rest to a great extent on an evaluation of the costs and benefits associated with these investments. The alternatives will differ as to the magnitude of the costs that must be incurred, the time scale of both costs and benefits, and the uncertainty of risk surrounding the project. The technique of cost-benefit analysis has been developed to make the evaluation as systematic, reliable and comprehensive as possible and to eliminate the need for guess work, hunch or intuition.

The development and utilization of electricity creates an economic atmosphere that has direct and indirect benefits for the local economy. Examples of these benefits are the economic, social, demographic and public services. The direct impact is felt by most households who are able to effect household tasks more rapidly than before and save much time and effort in the process. Electricity undoubtedly provides better lighting and heating than other energy forms.

Electricity also has an indirect impact on development. It improves the quality of life of the community by raising their income. There is a strong argument among the residents that the absence of electricity supply impoverishes communities (along with the inadequacy and expense of other services such as transport) as households are forced to rely on expensive fossil fuels which consume a disproportionate amount of their income. Energy provision is seldom thought to be an important factor in the planning of mass housing projects. Yet, through the denial of electricity, and the poor design, insulation, construction and orientation of houses, which increase their heating requirements, household spend more on energy.

Electrification leads to higher productivity and income, which also means increases in the income of producers and shop-owners through purchases of electrical appliances.

Given the interdependence of the economy, this higher income and the demand for electrical appliances stimulates a multiplier effect that eventually results in an increase in economic activity.

The results of the survey confirms that availability of electricity as a basic need appears to be far from satisfactory. However, Ramokonopi East seems to be better off in terms of its access to electricity. With the increasing population and rate of urbanization, the problem of adequate household energy supply is shifting to these areas, which experience major social and economic costs as a result of dependence on costly and inconvenient fossil fuels and batteries.

Electricity is a basic need in that it plays a general role in the development process. It enhances an individual's chances of obtaining a balanced diet as well as improving the peoples understanding of themselves.

Private benefits, social benefits as well as macro benefits emanated from the survey. Individual households pointed out that electricity was the most convenient and safer service and it was capable of providing much greater comfort to its users. Gas cylinders were reportedly cumbersome to carry.

The entire community believed that electricity improves the standard of living and improves health conditions among their families and also reduced the risk of damage to personal property. The provision of street lighting reduces the number of criminal acts and enables residents to attend meetings at night.

Macro benefits also accrue to new industries. Introduction of electricity supply creates a demand for electrical appliances. New entrepreneurs may see an opportunity to enter the market, create new vacancies and generate income to the entire community of Katlehong.

Turning to the various costs involved, the Katlehong survey found that the cost of alternative energies (coal, wood, gas and paraffin) far exceeded the corresponding cost of electricity. Smoke emitted from coal and wood fires was a constant danger to the health of the community. The costs involved in electricity includes the installation fee, flat rate rental, risk in its operation and the rising costs on electrical appliances.

In summary, therefore it appears that benefits that accrue from electricity supply exceeds the cost that can be incurred. In the long term this means better quality of life, improvement in employment and a conducive learning environment.

Electricity can really substitute coal and wood usage and thus has the potential to substantially reduce the severe air pollution in the Pretoria-Witwatersrand-Vereeniging areas. On the whole, the Katlehong survey seems to suggest that an economic case can indeed be made for involving the broader township in subsidising the supply of electricity in Hlahatse and Phoko. This can be done by encouraging the government to subsidise the supply of electricity but this on the other hand means imposing higher taxes on businesses and employed households. This may also be achieved by encouraging the Escom organisation to supply the bulk of electricity to the entire Katlehong township while at the same time lowering the cost per unit of electricity. For example this involves lowering the R45.00 flat rate to R42.00, which the residents of both Phoko and Hlahatse are prepared to spend. Bulk supply of electricity will also generate income to Escom as well.

It was also evident from the survey that certain producer - consumer external benefits arose from electrification. The provision of street lighting by the state-owned electricity company was considered to have contributed to a significant drop in the number of criminal acts in the Ramokonopi east area. Respondents also mentioned that street lighting made it easier to organise and attend social events such as funeral night vigils, meetings at the community centre, discos and churches in the evening. Given the structure of urban township societies, this is arguably one of the most important and neglected external benefits of electrification.

While these technological externalities all appear to benefit the inhabitants of Katlehong, the same is not necessarily true of pecuniary external benefits. The latter include increases in the demand for and the supply of electrical appliances such as television sets, refrigerators, stoves and smoothing-irons and ultimately also in the demand for productive inputs used in these industries. The introduction of electricity to all the areas of Katlehong can be expected to encourage at least some local industries and business enterprises to expand their operations (or new enterprises might be attracted) and thus create new job opportunities for the unemployed.

Likewise, to the extent that electricity improves the health and educational standards of individual users, it may ultimately generate spillover effects on the consumers and producers alike. But these effects will be lost to the economy, if the newly educated also happen to be those most likely to join the stream of migrants to the rest of Southern Africa. It would thus appear that the pecuniary benefits associated with an increase in electricity supply are likely to extend beyond the Katlehong area.

Other benefits of electricity supply include:-

1. Environmental protection - since electrification eliminates the problem of deforestation.

2. Electricity also has indirect long term effects of improving the balance of payment. Manufacturing volume would substantially increase as a result of the demand for domestic appliances and other electrical goods brought about by electrification.

3. Electrification would decrease the marginal propensity to import. Local manufacturing would become more viable due to the economies of scale benefit arising from mass manufacturing and expansion of new markets. This will facilitate import replacement.

4. Electrification could also facilitate competition which could reduce inflationary pressures. Electricity is a key to productive resource utilisation in as far as it contributes to the use and development of technology.

5. Electricity bring with it long-term social benefits such as high literacy levels, lessening political tensions related to large disparities in wealth and a reduction in the birth rate.

6. Electrification could also result in an increase in household's disposable income available for the purchase of other durable goods. The savings on energy costs arises because households can also buy their appliances on credit.

The survey also revealed that the private cost of alternative energy sources far exceeded the corresponding costs of electricity. This is reflected in different amounts spent on electricity and alternative fuels.

The amount spent on energy requirements (candle, wood, paraffin and gas) by residents of Phoko and Hlahatse was estimated at R67.00 and R49.20 per month respectively compared to R45.00 by those staying in Ramokonopi East. It is not surprising that the majority of households in Hlahatse and Phoko could not afford not to have electricity.

Certain technological external costs were found to be significant in the case of alternative energy sources, but virtually non-existent in the case of electricity. Respondents in both areas mentioned the constant high risk of damage and injuries resulting from using gas and coal.

In one extreme case, a respondent in Hlahatse recounted how a gas fire once set his house ablaze and in the process completely gutted an adjacent resident's backyard shacks. Individual users of alternative energy fuels all indicated that the smoke emitted from coal and wood fires was a constant danger to health.

7.2 Recommendations

The Katlehong survey highlighted several important features which showed a strong preference for electricity over alternative forms of energy. In the light of the above findings, the report makes the following recommendations:

1. There is a general need of electrification of all townships on a massive scale. This may be achieved by encouraging Escom organisation to supply the bulk of electricity to all areas while at the same time lowering the cost per unit of electricity. Bulk supply of electricity will generate income to Escom but at the same time ensures that all residents have access to electricity.

2. Improvement of the overall supply quality is needed. There is a need to upgrade and improve the electricity supply network and related services in the Pretoria-Witwatersrand-Vereeniging area. The situation facing residents is daunting: too few pay-points, broken meters, inaccurate meters, broken meter boxes and an incomplete and inaccurate customer data base.

3. Thought should be given as to how the financing of electrification could be structured so as not to unfairly burden the initial consumer. The installation fee could

perhaps be spread over four months.

4. Also in new housing projects, it could be considered to build in the cost of reticulation into the lease or purchase cost of the house, so spreading the capital of electrification over the longer period of repayment of the mortgage by the householder.

5. Innovating financing schemes could also be developed to ease the initial costs of purchasing a range electrical appliances.

6. A better system of payment of electricity has to be installed in all areas. A pre-paid metering system as introduced in some areas in the Eastern Cape allows the consumer to control his own usage. The pre-paid metering system is operated through inserting a coded card and the consumption will be shown on the meter by a series of coloured lights, with a distinctive warning light to indicate that the household is running 'on reserve'.

7.3 AREAS FOR FURTHER RESEARCH

The study concluded could not as a result of time, funds and space constraints, analyze and indeed quantify a number of pertinent issues. These are listed below as a guide for possible further research.

Firstly, to establish whether there is a close relationship between electricity supply and labour mobility in several developing countries.

Secondly, it is suggested that an empirical study be conducted into the comparative performance of the various councils in all the townships in supplying electricity. In the course of this dissertation, it becomes apparent that the performances by different councils varied significantly in many respects.

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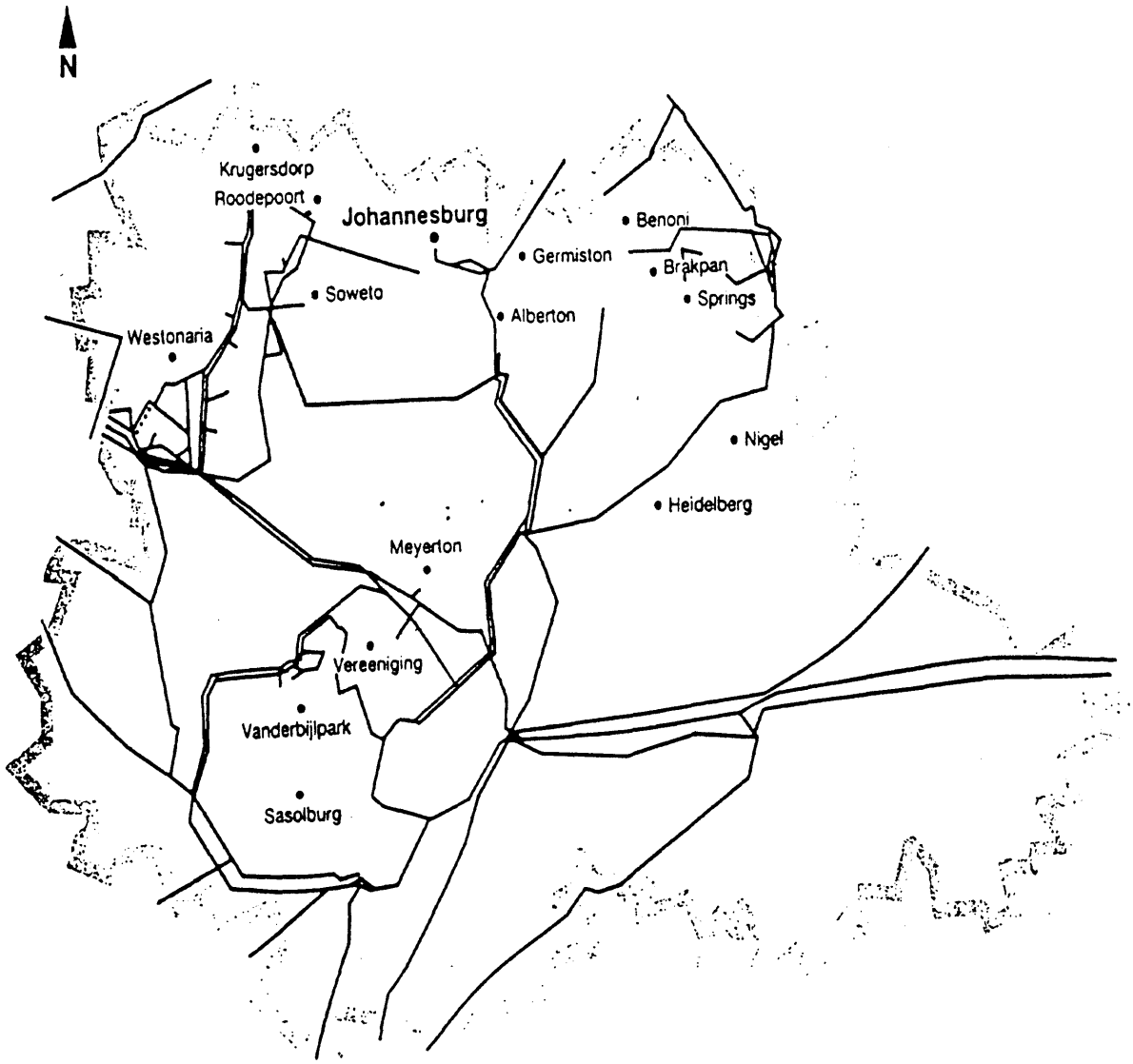
APPENDIX A

ELECTRICITY SUPPLY IN SOUTH AFRICA: SOUTHERN TRANSVAAL DISTRIBUTION AREA



SOURCE: ESCOM 1991

APPENDIX B

QUESTIONNAIRE TO ESTABLISH RESIDENTS ATTITUDE TOWARDS ELECTRICITY

Instructions

1. Please answer all the questions in numerical sequence by circling the applicable number.

2. Whenever asked to elaborate or specify please be as specific as possible.

3. All information will be treated as strictly confidential as and will be only used for research purposes.

Enquiries:

M N Putuma
969-4930 (o/h)

SECTION A

PERSONAL DATA

1. Sex:

1	2
MALE	FEMALE

2. Age:

1	2	3	4
15-30	31-46	47-63	64 +

3. Marital Status:

1	2	3	4
Married	Never Married	Divorced	Widowed

4. Education Qualifications:

1	2	3	4
Up to Std 6	Std 7 - Std 10	Diploma	Degree

5. How many members reside on the same premises as you:

1	2	3	4
0-2	3-5	6-9	10 +

6. How many are employed:

1	2	3	4
0-2	3-5	6-9	10 +

1. Which of the following energy sources woul you prefer?
   Please indicate three most important.

   1. Wood
   2. Paraffin
   3. Coal
   4. Gas
   5. Candles
   6. Electricity

2. Which of these energy sources provides better lighting?

   1. Wood
   2. Paraffin
   3. Coal
   4. Gas
   5. Candles
   6. Electricity

3. Which of these energy sources pose serious health hazards?

   1. Wood
   2. Paraffin
   3. Coal
   4. Gas
   5. Candles
   6. Electricity

4. As regards monetary costs, which of these is the most expensive?

   1. Wood
   2. Paraffin
   3. Coal
   4. Gas
   5. Candles
   6. Electricity

5. Which of these sources is very risky to have at home?

   1. Wood
   2. Paraffin
   3. Coal
   4. Gas
   5. Candles
   6. Electricity

6. Which of these energy sources, ease the way of studying?

1. Wood
2. Paraffin
3. Coal
4. Gas
5. Candles
6. Electricity

SECTION B

This page is only for respondents with electricity

1. How long have you been using electricity?

    1. Less than a year
    2. 1-5 years
    3. 5-10 years
    4. More than 10 years

2. How much do you pay per meter on electricity?

    1. 0-8
    2. 8-16
    3. 17-26
    4. 27 +

3. Is the administration doing an effective job as regatrd meter reading management?

    1. Sometimes
    2. Always
    3. Never
    4. Undecided

4. What effort is expended by the council to measure the cost effectiveness of electricity?

    1. Little effort
    2. No effort
    3. Some effort
    4. Substantial effort

5. How much do you spend on electricity per month?

    1. Less than R10
    2. R10-R25
    3. R26-R36
    4. R37 +

6. In total, how much have you spent on electrical appliances?

    1. Less than R50
    2. R50-R100
    3. R101-R150
    4. R150 +

7. Does the council work well as regard management of electricity in your area?

    1. No- there are complaints that Councils is unreasonable and the costs of electricity rises frequently.

2. Somewhat. The relations are amicable although reseidents are not satisfied all the time.

3. Yes. Complete cooperation and the council tries to resolve issues in the best interest of the communicty as a whole.

8. When were the latest research studies of residents on electricity conducted?

1. Several years ago.
2. A few years ago
3. Recently

9. Given a choice between electricity and other energy forms,would you continue to use electricity?

1. Yes
2. No

10. If yes please state briefly why?

_____

_____

_____

_____

11. Income contributed by members of the household per month.

1. Less than 800
2. 800-1 000
3. 1 000-1 500
4. 1 500 +

This page is for residents without electricity

1. Have you ever considered the option of having electricity?

    1. Yes
    2. No

    Have you ever applied for electricity?

    [Yes]
    [No]

    If yes about how many times?
    [once]
    [2 to 5 tiems]
    [6 to 10 times]
    [11 to 20 times]
    [more than 20 times]

2. How developed is the infrastructure in your area?

    1. Poorly developed
    2. Fairly developed
    3. Not at all
    4. Successfully

3. How far are you to the area which is utilising electricity?

    1. Meters away
    2. Kilometers away
    3. Very far.

4. Who is responsible for paying installation fee of electricity?

    1. Each household
    2. The Council
    3. Do not know

5. How much are you paying towards service charges per month?

    1. Less than R10
    2. R10-R25
    3. R25-R35
    4. R35 +

6. Have you ever experienced any problems with regard to the form of energy source you are using?

    1. Yes
    2. No.

7. If Yes, please state the problem briefly.

_____

_____

_____

8. Income contributed by members of the household per month

   1. Less than 800
   2. 800-1 000
   3. 1 000-1 500
   4. 1 500 +

9. Are you able to attend evening ceremonies?

   1. Yes
   2. No

10. If Yes, which of these have you attended in the past three months?

    1. Wedding reception
    2. Night Vigils
    3. Churches at night
    4. Discos at night
    5. None of the above

11. Briefly, suggest what do you think will contribute to the electrification of the whole Katlehong township?

_____

_____

_____

SECTION C

1. Beside each of the statements presented below please indicate whether you Strongly Agree (SA), Agree (A), Disagree (D), Strongly Disagree (SD) or undecided (U).

	SA	A	D	SD	U
1. Electricity provides better heating.					
2. Electricity improves personal security than other forms.					
3. It reduces criminal acts by installing lights in the streets.					
4. It raises the cost of living.					
5. It endangers the life unless coupled with awareness programmes on ways to use electricity efficiently.					
6. It improves social life.					
7. It is modern.					
8. Electricity is good & reliable.					
9. Supplies extra light.					
10. A basic necessity.					
11. Easy, helpful & convenient.					
12. Expensive					
13. Fast					
14. Cleanliness					
15. Power failures					
16. In the long term it improves educational standards.					

Thank you very much for your co-operation with this survey.
Please feel free to contact the researcher if you need any information concerning the questionnaire.