GLOBAL NETWORK ON ENERGY FOR SUSTAINABLE DEVELOPMENT

Electricity Access III theme:
Explicit focus on the poor

Impact of energy reforms on the poor in Southern Africa

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Abstract

Most poor households in sub-Saharan Africa cannot afford an electricity connection and even if they get a connection they can only afford to use electricity predominantly for lighting, television and radio. They cannot afford to use it for their most energy-intensive use: cooking.

Some countries in Southern Africa have approved policies to assist the poor to get access to electricity. South Africa, Botswana and Malawi have successfully implemented energy reforms and strategies aimed at this, though with different approaches in the three countries. South Africa has a strong economic base and the capacity to provide efficient energy services and highly subsidised electricity access. Botswana's rural electrification programme is based on cost recovery for the utility: asa result of extending the loan period for the connection fee and adapting the monthly repayment amount to the ability of poor households to pay, electricity connections increased significantly. In Malawi a fixed-rate tariff and a limited-current supply was introduced. The repayment for the ready board was amortised over five years and added to the fixed monthly payment, the amount being adjusted to the ability of the households to pay.

In Access II populations were divided into poor and non-poor. These broad categories limited a more differentiated analysis of the impact of power sector reform. In countries which have a high proportion of poor people – in some cases up to 80% of the population – we need to divide them into groups of very poor and not so poor. In this study the poor are ranked by income, and the division into different income groups permitted a more differentiated analysis than just looking at 'poor' and 'non-poor'. The very poor who need further support can be targeted for further assistance. The analysis of the South African data also revealed that the higher urban income groups among the poor can afford to use electricity for most of their energy requirements and need no additional policy support. The analysis also showed how the poor change their energy portfolios as their income improves.

The persistent use of fuelwood for cooking among all income groups of poor rural households has remained a matter of concern, particularly as the burning of fuelwood leads to indoor air pollution and affects the health of women and children. The sustainability of fuelwood supplies are also not guaranteed as population increases and fuelwood becomes more commercialised putting pressure on rural areas supplying cities. Even after electrification, households continue to use fuelwood for cooking. The income-differentiated analysis shows that as incomes rise, fewer households use fuelwood and substitute it by kerosene, electricity and gas.

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1. Introduction

The first two phases of the Electricity Access theme: the *Policy Research Phase (Access I)* and the *Dissemination Phase (Access II*) examined how far energy reforms have contributed to solving the problem of inadequate access to energy services for the poor in developing countries and which are policy options lead to improved, cleaner and more sustainable energy services for the poor in developing countries.

After 1994 various policy documents and legislative instruments were enacted by the democratic South African government. Important among these was the White Paper on Energy Policy for South Africa (1998), an overarching document that sets out the government's official policy on the supply and consumption of energy. In the early 1990s the government established the National Electrification Fund (with fiscal allocations and grants from the electricity utility Eskom and local authorities) to subsidise the capital costs of the first phase of the National Electrification Programme (NEP), 1994 – 1999. Between 1994 and 2001 electrification grew from 34% to 70%. In 2003 a free basic electricity allowance was introduced for low-income households as a key strategy for improving energy services for the poor. During the first phase of the NEP, it was realised that the poor were not benefiting optimally from the country's enormous investments in electrification. Electrified households with very low incomes still found electricity consumption difficult to afford. The Electricity basic service support tariff (EBSST) was therefore introduced, as a means of decreasing the cost of electricity consumption for the poor, thereby increasing possible benefits from electrification. A subsidy of 50 kWh per month is given to grid-electrified poor households who use less than 150 kWh electricity per month. Off-grid electrified households receive a government subsidy of R40 per month towards the service fee.

In 2001 the off-grid concessions programme was initiated to provide energy services to remote rural areas. The government provides a subsidy of R3 500 to the concessionaire for each installation and the users pay a monthly service fee of R58 for maintenance (ERC 2005).

The specific objectives of this third phase, the *Policy Implementation Phase (Access III)*, are to show which policy options and strategies have actually worked and to back up the experiences by well analysed case studies. In Access I and II it was not possible to discern who among the poor would derive the greatest benefit from the proposed policies and recommendations, nor to provide detailed implementation guidance. This study, being part of the policy implementation phase, examines three case studies: South Africa Botswana and Malawi, three countries which have successfully implemented policies and strategies which increase electricity access for the poor. Detailed data on poor households have been collected to reveal how different income groups among the poor benefit in different ways from access to electricity – and who remains excluded.

The three cases demonstrate three very different strategies to enable electricity access. They also show the roles of the utility and government. South Africa heavily subsidised electricity connections while Botswana insisted on cost recovery. The presented data make it clear that when poor households have access they are often unable to afford electricity for their thermal needs such as cooking.

Many countries have implemented some form of power sector reform. High-level power sector reform was expected by many to, inter alia, benefit the poor: deregulation would stimulate competition and efficiency, lower energy prices would result and, after privatisation, government subsidies once paid to inefficiently run national utilities

would now be invested in social and development programmes. So far it has not been proven that high-level power sector reform has benefited the poor.

In this study we look at all types of energy reforms and changes and analyse their impact on the poor. South Africa was included in the Access II report, but Botswana and Malawi were not. They are included here because new and interesting data have become available since the Access II report was prepared. New similar data for South Africa have also been collected and made available since then.

All three countries have undergone some kind of reform or changes of the power sector. South Africa has corporatised its formerly state-owned electricity company Eskom and then stopped all further reforms towards privatisation; Eskom remains a government-owned corporation generating most of the national electricity supply and owning the transmission system. Distribution is being rationalised and the over 260 municipal electricity distributors will be replaced by six regional electricity distributors (REDs) in the next years, starting with the Western Cape RED at the end of June 2005. Botswana has not implemented any high-level power reforms in the electricity sub-sector but has made changes at lower level to facilitate access to electricity connections for rural households. Malawi has also instituted some low-level power sector reforms of which the evidence is less visible.

This report describes pro-poor policies in Botswana, South Africa and Malawi and it attempts to analyse how far such policies have succeeded in benefiting different groups of poor. Reforms which improve the efficiency of the utility and reduce blackouts benefit all electricity customers, including the poor. Other reforms such as lifeline tariffs are intended exclusively for the poor but these well-intentioned measures have in some instances benefited other income groups more than the poor. For different reasons, the poorest of the poor are often excluded from accessing subsidised energy – as for example in Khayelitsha in South Africa, where households settling on land not authorised for housing will be excluded from an electricity connection.

All three countries have fairly large proportions of poor. The percentages depend on the definition of poverty and it appears most appropriate to use poverty lines prepared by the countries themselves. The proportion of poor in South Africa is estimated to be 40%, for Botswana it is 37% and 80% for Malawi.

In countries with large proportions of poor it is essential to analytically divide the poor into several groups. Policies which benefit the not so poor may not have any impact on the very poor. The poorest of the poor generally need subsidies while the not so poor could be assisted by other measures without additional burden to the government. The income differential is highest between urban and rural households, and in the South African study a comparison between a poor urban and poor rural areas has been included. The response to accessing modern energy services is different in the two situations and might require a differentiated policy response.

2. Objectives

The primary objective of the Access programme is to examine the impact of energy sector reforms on the poor by answering the following two key questions:

- Have previous energy policy reforms addressed the energy access challenge facing the poor or have the reforms actually contributed to the growing problem of inadequate energy services for the poor in the developing world?

- Based on rigorous analysis, which are the proven and robust policy options that would lead to improved, cleaner and more sustainable energy services for the poor in developing countries?

The objective of this study is to find out in which way different groups of poor households could gain greater access to electricity and the extent to which greater access impacted on social welfare, productivity and income generation, education and the use of traditional and other modern fuels. It is important to assess the effect on the use of other fuels because of the health impact of fuelwood and kerosene use and the dangers of devastating shack fires caused by open-flame kerosene stoves and candles. The specific objectives are

- to analyse the pro-poor reforms, policies and changes in the electricity sub-sector;
- to assess the impact of these reforms and changes on poor households;
- to disaggregate the poor into different income groups and to investigate the impact of reforms and changes on the different groups of poor;
- to assess the impact of access to electricity on the use of other fuels the poor use.

3. Methodological approach

Access to affordable, clean and safe energy is believed to improve living standards. The challenge is to demonstrate that poor households indeed benefit from policies designed to widen access. Where the poor constitute a very large proportion of the population it is important to analyse effects on different sections of it.

This paper mines data from household sample surveys conducted to assess the impact of energy interventions. The following four case studies are investigated:

1. South Africa: Electrification of the urban township Khayelitsha.
2. South Africa: Electrification of rural areas in the province of Limpopo.
3. Botswana: Rural electrification.
4. Malawi: Electrification of the urban township Mbayani.

The two South African case studies draw on data of one urban and one rural study. The urban case study is taken from a study on barriers to modern energy services in low-income urban communities (Cowan & Mohlakoana 2005). It was carried out in Khayelitsha an urban township in Cape Town, biased towards the poor areas there, and included 226 households. The rural study is an assessment of the impact of decentralised rural solar electrification by the concession approach. For this study the baseline survey in poor rural areas of Limpopo was considered (ERC 2005). The impact was assessed by a survey of three household groups. A total of 280 households were surveyed to ascertain the impacts of solar home systems (SHSs) on fuel switching, rural livelihoods and the attitudes of households exposed to the systems. Of the households surveyed, 121 were solar-electrified, 45 were grid-electrified and 114 were non-electrified. The latter two groups were used as control groups.

The Botswana case study draws on data monitoring the impact of the rural electrification policy and the process of implementation (EECG 1999).

The case study from Malawi investigates the supply- and demand-side benefits and costs of low-cost urban electrification of Mbayani township in Blantyre City (Matinga 2004). 53 households were interviewed in a household sample survey.

The quantity of available data is much greater for South Africa and Botswana than Malawi. However, the fixed-tariff approach in Malawi was different from implementations in the other two countries and there are valuable lessons to be learned.

For some of the analyses the sample populations are ranked by income and then divided into five groups of equal number of households (quintiles) permitting differentiation among different groups of poor. This, however, reduces the number of households in each group, making the result less representative. Household energy use varies considerably in urban and rural areas, and in the two South African case studies these two groups are analysed separately and also compared to gain greater insight regarding the rural urban differences. The analysis will also indicate how the electricity use of very poor households will change with rising income.

Access to electricity is a development issue and development is location-specific and what is suitable for one area may not be suitable for somewhere else. The response to energy interventions is also dependent on the resources of a household. National statistical averages of household connections and fuel use have value for general assessments and planning. They have to be used with caution when designing energy intervention for the poor at the local level where specific conditions such as access to local income and employment determine the ability of the poor to pay for energy services.

4. Pro-poor energy policies

Pro-poor energy policies aim to assist the poor in accessing and using affordable, clean and safe energy. In the electricity sub-sector it means that the cost of connection is adjusted to the ability of the poor to pay or the connection is subsidised. We are looking at pro-poor policies in South Africa, Botswana, and Malawi and their impact on the poor. In South Africa we analyse the impact of the NEP and EBSST, or free basic electricity (FBE), as well as SHSs by the concession approach. In Botswana we investigate the rural electrification programme; a low-cost electricity pilot programme for Mbayani, a densely populated township in Blantyre, is investigated.

4.1 Targeting the poor

There are different ways of targeting the poor to make electricity services affordable for the poor households as well as the utility. If the policy intends to increase the use of electricity, both the electricity connection as well as use have to be considered. A financial subsidy is the most common tool of assisting the poor with their electricity needs.

When a connection or the consumption of electricity is subsidized the subsidy could be extended to all households or only to poor households. If the subsidy is extended to a specific group only, the method of targeting is important. Targeting the poor can be achieved in different ways; the following indicate some of these:

- Geographic targeting means subsidizing every household in an area where mostly poor people live. Geographic targeting is broad based and leakage is common, as it usually includes some non-poor households.
- Means-tested targeting, where the income of every household is assessed and households below a determined income receive the benefit. As households move into or out of poverty testing has to be done at regular intervals. Means testing is time-consuming and therefore expensive.

- Looking at the level of electricity consumption: here all households which use less than a predetermined amount, e.g. 150kWh per month, receive the benefit. Monitoring consumption levels can be done automatically by the electricity service provider and it is much less expensive than means testing. There is no leakage in this method. However, households without an electricity meter are excluded.

The cost of targeting the poor should be kept to a minimum and should be smaller than the benefit for which the household is targeted. The method of subsidy has to ensure that the benefit is restricted to the targeted group and leakage to non-poor groups is avoided. Poor households not connected to electricity are excluded from the electricity subsidy and it is being discussed if the subsidy should be extended to other fuels.

The South African case study shows the impact of a capital subsidy for the connection and in addition a subsidy for the monthly use of electricity. These subsidies are a financial burden on the government. In Botswana the poor were not targeted to receive subsidies. Their ability to repay the connection cost and pay for monthly cost was assessed and the repayment amount was adjusted accordingly. In Malawi the fixed-rate tariff was adjusted to the ability of the poor households to pay. Another important consideration was that the utility does not make a loss.

When grid extensions are planned, urban electrification is generally prioritised because it is more cost effective. In Botswana, like in many other countries with centralised supply, the grid is extended from the periphery of the existing grid and which area gets electricity first is often determined by the cost of grid extension and the number of people who benefit.

In Botswana households receive a loan on commercial terms. The repayment conditions of the loan are adjusted to the ability of poor households to repay the loan and pay for the monthly electricity bill. This requires no subsidy and the scheme is operated on full cost recovery for the utility.

In Malawi a poor area was connected to the grid. The connection fee and the fixed tariff was affordable for most households in the area.

4.2 The impact of pro-poor policies in South Africa, Botswana and Malawi

The majority of poor in Africa live in rural areas and one of the measures to reduce poverty and slow down migration to the cities is to extend infrastructure, including electricity, to a larger number of rural people. As part of power sector reforms many countries with low electrification coverage in rural areas have introduced separate programmes to facilitate rural electrification.

Countries have taken different approaches to facilitate access to electricity for the poor. In this section we assess how effective these different approaches have been in South Africa, Botswana and Malawi.

4.3 South Africa

Since the early 1990s South Africa has attempted various strategies and energy policy interventions aimed at improving the welfare of the poor. The major policy interventions were the NEP (Integrated National Electrification Programme), the EBSST (Electricity Basic Services Support Tariff) and the off-grid concessions programme. The implementation of the first phase (1994-1999) of the NEP was subsidised and financed by the utility and to a lesser degree by the municipalities. The second phase (2000-2005), as well as the EBSST and the solar concession programme,

were fully subsidised by the government – newly connected customers paid about R120, a fraction of the actual connection cost which was approximately R3500. Here we are investigating two case studies to assess the impact of EBSST and NEP on grid-connected urban poor in Khayelitsha and rural poor households in Limpopo province, which included solar electrification by the concession approach. The Limpopo case study is of particular interest because data have also been collected from grid-electrified households and households without electricity as a control sample for households which received SHSs.

The NEP facilitated access to electricity but this did not mean that the poor could fully benefit from being connected because they could not afford to use the electricity, and consumption rates among the poor remained very low. In order for the poor to benefit from the country's huge investment in the national electrification programme, the government introduced the EBSST in 2003, giving poor households 50kWh per month free of charge. The 50 kWh is credited to a metered supply and households, which receive electricity from a neighbour by using an extension cable are not eligible for it. Not all local authorities have implemented the EBSST policy, mainly because of a lack of capacity and institutional and funding problems. Keeping the cost of targeting the poor low is also a major challenge. Municipalities decide who is poor and should receive free basic electricity. For example, in the City of Cape Town all households using less than 450 kWh of electricity per month over the previous 12 months period receive 50 kWh free.

Earlier surveys (Mapako & Prasad 2005; Prasad & Ranninger 2003; UCT 2002; UCT 2003) conducted in areas where the EBSST was introduced, indicated that poor households used electricity mainly for lighting, media and some appliances. They continued to use other fuels such as fuelwood, kerosene and LPGas for their most intensive energy need; cooking. Households remained multiple fuel users. There is a distinct difference in rural and urban electricity use and urban households use electricity more widely than rural households.

4.3.1 Impact of NEP and EBSST on urban grid-electrification: Khayelitsha

Khayelitsha is a township about 30 km southeast of the inner city of Cape Town. It is a poorly serviced high-density settlement established in 1984 during the apartheid period to house a labour pool to work in the industrial and commercial areas of Cape Town. Today the township has more than 600 000 inhabitants. There are poorer and richer areas, and house types range from shacks to formal brick houses, which people bought with housing bonds.

In South Africa electricity is usually supplied by municipalities or Eskom and Khayelitsha presents an unusual situation for South Africa where the electricity service provider is PN Energy (PN stand for "Phambili Nombane" which means "Forward with energy"), acting as an agency for Eskom. It is a joint venture between the utilities Eskom, Electricité de France and, initially, East Midlands Electricity, and was set up in 1994 to address the electrification challenges in the area. In 1994 only 6000 households were electrified and this number rose to 60 000 in 1998; in the same period the non-technical losses (mainly non-payment for electricity) were reduced from about 80% to about 5%. One of the major strategies was community involvement. Today 80% of Khayelitsha's homes are electrified. Formal and informal houses have legal electricity connections but informal houses in non-authorised areas are not electrified.

One of the most important findings of a recent survey on barriers to modern energy services (Cowan & Mohlakoana 2005) was that two thirds of households which have

access to electricity use electricity for cooking. This finding challenges the conventional view that low-income electrified households tend not to use electricity for their main cooking tasks.

Approximately 50-60% of connected households said that they have been using more electricity since the introduction of free basic electricity. Consumption figures provided by PN Energy showed that monthly electricity consumption rose by 30-35 kWh per customer since the introduction of EBSST. EBSST was achieving two intended purposes: people are able to make greater use of electricity, and at the same time (on average) people are economising somewhat on their energy bills (Cowan & Mohlakoana 2005). The majority of households surveyed had access to an electricity connection and made use of electricity for various energy services. This was made possible because of the NEP and the EBSST largely removed the barrier to use electricity. However only one third of households surveyed had an electricity meter and could benefit from EBSST. One third of households, mostly backyard dwellers, had extension cord supplies from nearby households and one third had no electricity supply because they lived in areas not authorised for housing.

4.3.2 Rural electrification by the concession approach: rural Limpopo

Poor rural households have least access to electricity, and bringing electricity to rural homes is a great challenge. Extending the grid to every household in the country however remote is not feasible now for technical and financial reasons, and the question arises as to what distance from the grid makes SHSs, or other decentralised energy supply, the most appropriate solution – even if the grid is gradually expanded. The SHS programme was also designed to give more rural people access to limited electricity until such a time they get grid connections. All solar cells have been imported and some of the systems have been assembled in the country. The extent to which the programme has been pushed by the technology providers has not yet been explored.

Solar electrification in rural Limpopo

Limpopo is one of nine provinces of South Africa, situated in the north-eastern part of the country, with a population of over five million (Census 2001). Agriculture forms the mainstay of the economy; there are also significant mineral deposits such as platinum, coal, diamonds as well as gold and emeralds.

The total electrification rate for the province was 66.4% and rural electrification was 61.3% in 2002 (NER 2002). Many rural areas were still without grid electricity, and for this reason part of Limpopo was included in the solar concession programme.

In a survey assessing the impact of SHSs on households in Limpopo (ERC 2005; Prasad & Mapako 2005) three groups of households were interviewed: SHS users, households with grid electricity, and households without electricity. SHS users were found to have a higher income than the other two groups, and households with no electricity had the lowest (Table 4.1). SHS-users also had the highest energy expenditure, followed by non-electrified households, with grid-electrified households spending the least of the three groups.

Table 4.1: Mean monthly income and expenditure on all fuels of solar home system users, grid users and non electrified households (ERC 2005)

	Mean income (R)	*Monthly expenditure on all fuels including electricity (R)*
Solar home system users	1 543	128
Grid users	1 134	59
Non electrified households	819	73

The major impact of SHSs on fuel use saw a reduction in the use of the two major lighting fuels – mainly candles, and to a lesser extent paraffin (kerosene). Because SHS do not satisfy the thermal needs, there was no impact on the fuels supplying households' thermal needs.

Table 4.2 shows the most important changes resulting from solar power and grid electricity. SHS-owners saw listening to the radio and television, buying less fuel, saving money and bright lights as being the main benefits resulting from SHS electrification. Grid-owners on the other hand saw the daily use of appliances, reduced candle use, less work and bright lights/safety and reduced need to collect firewood as their most important changes (ERC, 2005).

Table 4.2: Most important changes resulting from solar power and grid electricity in Limpopo Province (ERC 2005)

Change	*SHS-users (%)*	*Grid-users (%)*
Less work	2	13
Less candle use	7	24
Appliance daily use	11	36
Less wood collection	0	9
Safe/brighter lighting	27	9
Children are studying	6	2
Save money	8	0
Nothing	0	4
Missing	31	6

The SHSs did not have a significant impact on the employment situation in Limpopo Province. Results have shown that the SHSs have reached the wealthier rural people because the poorest of the poor cannot afford the monthly service fee (Table 4.1).

4.3.3 The rural-urban divide – comparing energy use by area and income group

Infrastructure in rural areas is much less developed than in urban areas. Urbanisation rates in sub-Saharan Africa are lower than in many other parts of the developing world and a larger proportion of the population receives very limited or no infrastructure services. Rural households have generally lower incomes than urban households and this is reflected in different energy use patterns. It is important to know what poor households can afford when designing policies.

Rural areas have generally lower electrification rates than urban areas (Table 4.3) because distances to villages are longer and houses are more dispersed than in urban areas raising connection costs. The NEP has substantially increased rural electrification rates but in 2002 the rural rate was still only 50%, while the urban rate was 80%.

In this study we do not only look at overall electrification rates, but also at rates by income quintile (Q), in order to assess how different groups of poor households stand in comparison to better off households (Table 4.3). The poorest 40% of households (Q1 and Q2) in rural areas had the lowest electrification rates (41% to 45%) while the highest rural income group (Q5) had a rate (76%) almost approaching the national average for urban households (80%). In urban areas the lowest-income quintile (Q1) had by far the lowest electrification rate and the difference between lowest- and highest-income quintile is 35% – the same as in rural areas. Almost all urban highest-income

quintile households (98%) were connected to electricity. The difference in electrification rate between the poorest rural and the richest urban household was 57%.

The NEP connected almost all households to the grid in the areas to be electrified. The fact that the lowest income quintiles have less access to electricity appears to indicate that they live predominantly in more remote areas, which are not yet connected to the grid. Living in the more remote areas they cannot benefit from electrification and other modern infrastructure, which create opportunities for income generation and jobs, and the remoteness of their homes traps them in a vicious circle of poverty and lack of opportunity. The solution to the dilemma is migration to small towns and cities or the extension of infrastructure to rural areas. But in urban areas households in the two lowest income quintiles (Q1 and Q2) had electrification rates below the national average of 80%.

Table 4.3: Estimated electrification levels of rural and urban household by income quintile (Q)

Source: UCT (2002); data from October Household Survey (1999)

Rural households					*Urban households*				
Q1(low)	*Q2*	*Q3*	*Q4*	*Q5(high)*	*Q1(low)*	*Q2*	*Q3*	*Q4*	*Q5(high)*
41%	45%	59%	68%	76%	63%	78%	87%	91%	98%

Table 4.4 indicates how much different income groups spent on energy. In absolute terms, households spent more on energy as incomes rose. This was true for both rural and urban households. But poor households spent a higher proportion of their monthly income on energy (Table 4.4 row 3 for rural households and row 6 for urban households) than the higher in come groups. The poorest rural households (Q1) spent 19% while the least poor rural households (Q5) spent only 6% of their income on energy. The poorest urban households (Q1) spent 14% while the highest urban income group (Q5) spent only 3% of their monthly income on energy. Considering the proportion of their income spent on energy the poorest rural and urban households spent over three times more on energy than the best-off households in their area.

Table 4.4: Monthly income and household expenditure on all fuels in rural Limpopo and urban Khayelitsha by income quintile (Q)

Source: Rural: Prasad & Mapako (2005); urban: Cowan (2005)

	Q1(low)	*Q2*	*Q3*	*Q4*	*Q5(high)*
	Rural Limpopo				
Mean monthly income in R	341	613	934	1 424	2812
Monthly energy expenditure	64	89	79	98	160
% of monthly income spent on energy	19	15	8	7	6
	Urban Khayelitsha				
Mean monthly income in R	514	928	1448	2149	4610
Monthly energy expenditure in R	74	93	90	104	133
% of monthly income spent on energy	14	10	6	5	3

The proportion of households connected to the grid using electricity for lighting and cooking (Table 4.5) is an indication of how poverty restricts households from making full use of accessed infrastructure, and gives a comparison of access to electricity and

being able to afford to use electricity for cooking. The inability of poor households to afford electricity for thermal needs remains one of the unresolved problems.

Table 4.5: Household use of electricity for lighting and cooking (%)
Based on census 2001 figures from SSA (2003)

National	
Lighting	*Cooking*
69	51

Energy use patterns in rural and urban communities are different. Table 4.6 indicates household fuel use for cooking in rural areas in Limpopo and the urban township Kayelitsha. Fuelwood is by far the most common cooking fuel in the rural area and 91% of households use it, while urban households use mainly electricity (56%) and kerosene (37%) for cooking.

Table 4.6: Household fuel use for cooking in rural Limpopo and urban Khayelitsha (%)
Sources: Rural: Prasad & Mapako (2005); Urban: Cowan & Mohlakoana (2005); National: SSA (2003)

	Rural Limpopo	*Urban Khayelitsha*	*National*
Fuelwood	91	0	21
Kerosene	3	37	21
LPGas	3	6	3
Electricity	4	56	51

Table 4.7 indicates fuel use by income quintile. The rural households in Table 4.7 include all households in the three subsamples, ie., SHS owners, electrified and unelectrified households. In rural households the proportion of households using fuelwood decreases from 98% for the lowest income group to 79% for the highest income group. Electricity is little used for cooking and shows a weak pattern in the opposite direction to fuelwood such that the highest income quintiles use it more frequently than the poorer quintiles. There are no distinct patterns for the other cooking fuels.

Table 4.7: Household fuel use for cooking according to income quintiles in rural Limpopo and urban Khayelitsha, South Africa (%)
Sources: Rural: Prasad & Mapako (2005); Urban: Cowan & Mohlakoana (2005)

	Q1(low)	*Q2*	*Q3*	*Q4*	*Q5(high)*
Rural Limpopo					
Fuelwood	98	93	96	89	79
Kerosene	2	2	22	5	2
LPGas	0	2	0	0	13
Electricity	0	4	2	5	7
Urban Khayelitsha					
Fuelwood	0	0	0	0	0
Kerosene	58	43	48	25	13
LPGas	7	5	5	2	13
Electricity	35	52	48	73	73

In Table 4.8, fuel use of rural households in Limpopo has been given by subsample: unelectrified households, SHS owners and electrified households. The trends come out

more clearly than in the combined sample in Figure 4.7. The four lowest income quintiles of unelectrified households, which are the poorest households in the total sample, use exclusively fuelwood for cooking, and only 17% of households in quintile 5 use gas. Among the SHS users the fuelwood use for cooking gradually decreases from 100% for the poorest income quintile (Q1) to 85% for the highest (Q5). Electrified households use least fuelwood and the proportion of households continuously decreases from 89% for quintile 1 to 50% for Q5. There is no trend for kerosene in this subsample.

From correlating income to cooking with electricity, it can be inferred that a substantial proportion of SHS owners would cook with electricity if they were connected to the grid.

Table 4.8: Fuels used for cooking of unelectrified households, SHS owners and electrified households by income quintile in rural Limpopo, South Africa(%)

Unelectrified households					
	Q1	*Q2*	*Q3*	*Q4*	*Q5*
Fuelwood	100	100	100	100	83
Kerosene	0	0	0	0	0
LPGas	0	0	0	0	17
SHS users					
Fuelwood	100	92	93	93	85
Kerosene	0	4	7	7	0
LPGas	0	4	0	0	15
Electrified households					
Fuelwood	89	71	90	56	50
Kerosene	11	0	0	11	10
LPGas	0	0	0	0	0
Electricity	0	29	10	33	40

In Khayelitsha households do not use fuelwood. The most frequently used energy for cooking is electricity. The proportion of households in the lowest income group (Q1) is 35% and this proportion rises to 73% for the highest income group (Q5), which is more than double the households in the poorest income group. Kerosene use for cooking decreases from the lowest income group to the highest income group, showing an opposite trend to electricity use. A higher proportion of low-income households (58%) than high-income households (13%) use kerosene. There are expenditure trends in the urban area. Kerosene expenditure (Table 4.9) declined with rising income and LPGas and electricity expenditures increased with higher incomes.

Although access to and use of electricity is subsidised, the rural poor the rural poor can still not afford to use electricity for cooking and continue to use fuelwood. The fact that fuelwood can be collected for free is a further incentive not to switch to electricity which has to be paid for. In urban Khayelitsha there is no fuelwood to be collected and it has to be bought. Also households have higher incomes and can afford to pay for electricity or kerosene for their cooking needs.

Table 4.9: Monthly household expenditure on fuels by quintile in rural and urban South Africa (in R)

Sources: Rural: Prasad & Mapako (2005); Urban: Cowan & Mohlakoana (2005)

	Q1(low)	*Q2*	*Q3*	*Q4*	*Q5(high)*
Rural Limpopo					
Candle	13	12	16	23	26
Fuelwood*	100	143	59	64	104
Kerosene	31	37	34	34	45
LPGas	120	193	84	92	124
Electricity					
Urban Khayelitsha					
Candle					
Fuelwood	0	0	0	0	0
Kerosene	41	46	45	33	34
LPGas	35	31	48	53	72
Electricity	59	65	65	82	94
* The expenditure for fuelwood is only for those households which buy fuelwood. Most households self collect fuelwood 'free of charge'.					

In conclusion ranking poor households by income permits an analysis of fuel use in a more differentiated way. It reveals trends, which suggest that the higher income groups in urban areas are moving out of poverty but the poorest of the poor need further assistance.

The urban households in the higher income groups gradually increase their use of electricity for cooking, and such households do not need further assistance such as more concessionary tariffs as they can afford to buy electricity for cooking. Urban households in the lower income groups in poor rural areas need further support to afford to buy electricity for cooking.

It appears that access to electricity is necessary but not sufficient and other policy support such as the facilitation of income generation activities and SMEs are necessary so that the poor can lift themselves out of poverty.

4.3.4 Lessons from South Africa

South Africa has enjoyed democratic rule since 1994. The economic power which it has inherited from the previous apartheid government, together with its present political priorities, enables the country to support pro-poor policies and to implement a national infrastructure programme. Other developing countries may not be in a position to do so. It also has low-cost and reliable electricity generation, supply and distribution capacity and a favourable policy environment to support national electrification and subsidies for poor households.

The following lessons may be learned from the South African experience:

- Policies were in place and there was political will to implement the policies.
- Electricity supply was available.
- The electrification programme had dedicated financing, in the first phase (1994-1999) from the utility and to a lesser extent from municipalities, and in the second phase (2000-2005) from the government.

- Cost reducing technologies and pro-poor technologies were implemented, eg. 20 volt supply, pre-payment meters.
- The connections were almost fully subsidised, giving almost all poor households in electrified areas affordable access. If households had settled on land not authorised for housing they were excluded from electricity access. This is intended to facilitate relocation of such households.
- Monitoring and evaluation of the programme was carried out and adjustments were made.
- Subsidy for electricity of 50 kWh per month was given to poor households which could not afford the use of electricity for basic lighting, media and cooking.
- When subsidies are given, the method of targeting poor households has to be well selected to keep the cost of targeting low, to avoid leakage to higher-income groups and to include as many poor households as possible.
- Even after electrification fuelwood remained the major cooking fuel in many poor rural areas. Rural households self-collect fuelwood where it is available generally free of charge. A sustainable supply of fuelwood will have to be maintained to meet the needs of poor households. Fuelwood use is disappearing in urban areas and it was not used except for one household in the case study in Khayelitsha. Fuelwood cost, availability and convenience are most likely the major reasons for the phasing out of fuelwood in urban households. This may be a self regulatory process avoiding indoor and outdoor air pollution.
- Some groups of poor people, such as people living on land not approved for settlement and backyard dwellers, are excluded from electrification and benefits of EBSST.
- In the concessionaire model the very poor households are excluded because they cannot afford to participate, not being able to make regular monthly payments of R58. Many very poor households find it difficult to pay a monthly fee of even the reduced monthly maintenance fee of R18 (after R40 EBSST) as these households still have to provide energy resources for cooking and water heating.
- The SME sector was not encouraged. This remains a task for the future
- Cost recovery was not considered essential. After the deprivation during the apartheid era it was considered that large-scale electrification of poor households had and still has political and socio-economic benefits.

4.4 Botswana

The energy sector in Botswana has not undergone any high-level structural reform, but the government introduced a number of low-level reforms such as policies on financing of electrification, technologies, price setting and community involvement, which were intended to assist the rural poor to gain access to electricity. Widening access will depend on the availability of supply. Botswana imports over 70% of its electricity supply from South Africa and the increasing electricity demand in the last years has been satisfied by higher imports. It is not sure how sustainable the supply from South Africa will be in the future when South Africa's internal demand will exceed supply in 2007 and additional electricity will have to be generated.

Over the last years electricity delivery and the mode of payment for connections have been adjusted to be more affordable to the poor. The process, which led to a five-fold

rise in rural connections from 1996 to 2003 under full cost recovery for the utility, is described here in some detail (EECG 2004a and 2004b).

4.4.1 Policy reform and rural electrification schemes in Botswana

Botswana introduced a rural electrification scheme in 1988 and gradually adapted it to the needs of the rural customers, developing a financing scheme, which made connections affordable for the poor. As a first step the average electricity expenditure of rural households was determined, then two scenarios were developed indicating the amounts required to cover monthly electricity bills as well as repayment of the connection fee (Table 4.10).

4.4.2 Cost of connecting electricity to households and rationale for determining the amount of monthly repayment

Monthly household expenditure on electricity is estimated to vary in urban and rural areas and is dependent on the income level of the household. For average rural households, the mean monthly payment for the connection fee was P38 and the cost of consumption averaged P50 per month (the currency is the Pula; 1US$ = P5). 40% of rural households in Botswana are not able to afford the monthly bill (EECG/RIIC 2001; EDRC/EDG/FAB 2001). Table 4.10 indicates payments that would be required to cover monthly electricity bills as well as capital costs for two different financing scenarios. In the year 2003, the results indicated that while full capital recovery payments may be unaffordable to poorer households, concessionary financing of connections is likely to allow the majority of households to afford the connection.

Table 4.10: Connection, ready-board and hotplate finance repayments, in Pula
Source: BPC (2002)

	Cost (P)	*Monthly payments with commercial financing (20% over 2 years) (Pula)*	*Monthly payments with concessionary financing (10% over 20 years) (Pula)*
Connection cost	10 000	545.5	97.9
Ready-board	50	27.30	4.9
Small hot plate	300	16.4	2.9

The lowest monthly repayments for low-income households (Table 4.11) was far higher than the majority in rural households pay for energy sources and was more than 40% of mean rural incomes, implying that the majority cannot afford to connect to electricity under this cost recovery arrangement.

Table 4.11: Estimated monthly connection cost recovery, fixed cost, and energy charge payments for households, in Pula
Source: BPC (2002)

	Monthly energy consumption (kWh/month)	*Monthly payments with commercial financing (20% over 2 years at current tariffs (Pula)*	*Monthly payments with concessionary financing (10% over 20 years) at current tariffs (Pula)*
Low-income households	20	603.4	158.8
Mid-income households (no cooking)	50	640.9	193.3
Mid-income household (cooking)	100	703.4	255.8
Higher-income households	400	1078.4	630.8

4.4.3 Rural Electrification Collective Scheme

The Rural Electrification Collective Scheme (RCS) is the major policy reform accelerating rural electrification. The scheme reduces the burden of upfront costs of rural customers connecting to the grid. Potential consumers form groups of four or more customers when applying for connection to benefit from economies of scale – i.e. they share the cost of extending the grid to their premises. This scheme, which began in 1988, has undergone several phases and modifications (Table 4.12). However, as of 2003, under this scheme prospective customers upon receipt of budgetary quotation by BPC, pay P100 each as down payment. This forms part of the 5% upfront down payment of total project cost required before connection work begins. The balance of 95% is repayable over 18, 60 or 180 months, depending on the customers' preference. BPC advances consumers the loan and consumers eventually pay it back in full. There is no income guarantee nor security attached to the loan. Government's rationale for insisting on full cost recovery is to sustain the electrification programme. The subsidy is only in the provision of the grid infrastructure into the village.

4.4.3.1 Standard costing

Standard costing was implemented in 1993 as part of RCS and was intended to give a fair chance for customers in a village or area to pay the same amount for electricity connection. Standard costing aimed to increase access to electricity in addition to decreasing front-end down payment by customers. It is applicable to potential consumers who are within 500 metres of reticulation corridors. The cost of connection through standard costing approximates to the cost of acquiring a 50 Wp SHS (P5000–6500). There is more government subsidy in this scheme than in the first part of the RCS because the government extends the grid deeper into the villages.

4.4.3.2 Evolution of RCS and its impacts on rural grid connections

The rural electrification scheme in Botswana evolved gradually. It was monitored at several stages and adjustments were made based on the scheme evaluations.

A summary of developments that have taken place in implementing the electrification programmes, particularly through RCS is given in Table 4.12.

Table 4.12: Evolution of the rural electrification collective scheme and its impact on connections

Source: EECG (2004)

Year	*Policy measures*	*Cost of distribution extension covered*	*Cost of service connection covered*	*Impact of policy on Consumers particularly rural consumers*
1975	Consumers to pay BPC in full for distribution extensions and service connections	√	√	Prohibitive for rural poor but affordable by affluent
1983-1988	Revolving Fund	√	Paid by consumers	143 connections only to rural consumers
1990	Rural Electrification Collective Scheme	√	Paid by consumers	7 villages per annum were targeted for electrification.
1990		40% – paid by group of 4 consumers 60% advanced by government payable over 10 years at 8% interest		
1995		10% – paid by group of 4 consumers 90% paid by government payable over 10 years at 9% interest		Over 3046 consumers used the RCS by 1995

1997		Standard Connection Costing based on flat rate for connection per village for consumers within 500m of reticulation corridors was introduced in 1993. (10% / 90%l payment applicable)	511 schemes supported made up of 5120 customers representing 68% from previous year. By 1997, 45 villages were electrified as part of rural electrification programme.
2000		Customers requiring less than 35kW: 5% – paid upfront 95% paid by government payable by consumers over 15 years at prime interest or 5 years at prime rate less 0.5%; or 18 months at no interest if less than P50000 or 18 months at prime rate less than one percent if balance is above P50 000.	By 1998 8227 consumers connected (3% of total of 265 748 households in Botswana). As a result of revision of RCS by 2000 49170 households in urban area (43.3% of urban households) and about 50 000 households in rural villages (17.1% of rural village households) have been connected to the grid. Of all households in Botswana (rural villages and urban cities and towns excluding the localities) 24.5% were electrified.
		Customers requiring more than 35kW: 10% – minimum paid upfront 90% payable by consumers over 10 years at prime interest or 5 years at prime rate less 0.25%; or 12 months at no interest if less than P50000 or 12 months at prime rate less than one percent if balance above P50 000.	

4.4.3.3 Impact of RCS on customer base for grid electricity

Survey data on performance of RCS covering all districts in Botswana is shown for different sample sizes according to district in 1998 in Table 4.13. The programme was countrywide, targeting rural and urban village areas. Remote districts where rural communities dominate benefited less from the RCS.

Table 4.13: Survey data on RCS (Nov 1998 data)

Source: EECG (1999)

District	*Total schemes in district*	*% of schemes indistrict*	*Total consumers in district*	*% of consumers in district*	*Average scheme size (HH)*
Central	279	35	2525	31	9
Kgatleng	73	9	858	10	12
Kweneng	136	17	1491	18	11
Southern	62	8	734	9	12
SE	97	12	1009	12	10
NE	38	5	491	6	13
Chobe	14	2	152	2	11
Kgalagadi	6	1	208	3	35
Ngamiland	90	11	732	9	8
Ghanzi	4	1	27	0	7
TOTAL	799	100	8227	100	10

4.4.3.4 The positive impacts of RCS

Rural electrification has been successful and many more households have been connected through RCS. Access to electricity increased five-fold from 1996 to 2003 for rural households. 80% of RCS beneficiaries could not have connected to the grid without it (Figure 4.1). Grouping households increased affordability of rural electrification. Reticulations initially installed by those who could afford it eventually benefited poorer customers who could only connect when the grid was close to their households.

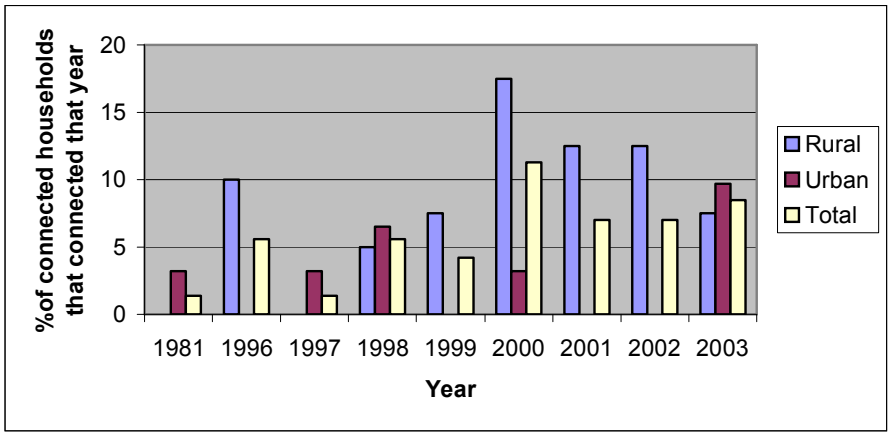

Fig 4.1: Rate of household connections by year for rural and urban households in Botswana
Source: EECG (2004b)

RCS loans have no requirement of income guarantee and security, and in some cases attract lower interest rates than commercial loans, hence improving affordability of low-income households. The uptake of RCS accelerated with positive changes in repayment terms since 1999 when an evaluation was done (EECG 1999).

However, despite all these encouraging gains, a significant proportion of very poor households still cannot afford down payments on a monthly basis because they have low and irregular incomes. There is need for further comprehensive policy review for poor beneficiaries, as the sustainability of the programme has been jeopardised as some customers defaulted on their loan repayment.

The rate of connections to the grid is not significant in the villages where the government has provided the grid. The level of electricity consumption is also low as electricity is largely being used for lighting and the households are too poor to pay for more consumption.

4.4.4 Impact of pro-poor policies in Botswana

In Botswana the deposit and repayments for the RCS changed from 40% to 10% with a repayment period of 10 years in 1996. In 1999, after the evaluation of the Scheme, the deposit was dropped further to 5% with a repayment period of 15 years and most villages qualified for uniform connection fee (standard costing). Figure 4.1 suggests that the reforms of the Scheme had a direct positive impact on the rate of rural household connections. The reactions to the payment modalities are much more pronounced in rural areas than in urban localities, as the reforms targeted rural customers and urban areas did not benefit. Connections rose from 7.5% in 1999 to 17% in 2000, whereafter connections were still substantial, but declining.

4.4.5 Lessons from Botswana

Botswana has enjoyed political stability and democratic rule for the last 40 years. It has consistently implemented its own infrastructure programmes. Cost recovery in the electrification programme was considered important for sustaining the programme. For the same reason poor households do not receive subsidies for electricity consumption. Evaluations at crucial intervals and subsequent adjustments were an essential part of the successful delivery of electricity to poor rural households.

The rural electrification programme is based on a model that may be successfully implemented in other developing countries. The lessons from the Botswana case study are as follows:

- Imported electricity was available from South Africa.
- Low-level reforms regarding financing of electrification, technologies, price setting and community involvement were formulated, approved and implemented.
- Cost recovery was considered essential if the electrification programme was to be sustainable.
- The electricity expenditure of poor households was determined and their ability to afford monthly electricity bills as well as repay instalments for the connection were assessed.
- Electricity delivery and the mode of payment for connections was adjusted to be affordable to the poor.
- Customers were encouraged to form groups of four or more to benefit from economies of scale. These groupings increased affordability and also reticulation initially installed by those who could afford it eventually benefited poorer households who could only connect when the grid was close to their home.
- The loans of the scheme have no conditions of income guarantee and security, and in some cases had lower interest rates than commercial loans.
- The utility paid for the extension of the grid into the village.
- Very poor households still cannot afford regular monthly payments for electricity because they have low and intermittent incomes.
- A significant number of customers defaulted on repayment, jeopardising the sustainability of the electrification programme.
- There is a need for policy review to address the issues of defaulting customers and the thread to the sustainability of the programme.

4.5 Malawi

The case study investigates the supply and demand side benefits and costs of low-cost urban electrification of Mbayani township in Blantyre City in Malawi.

Malawi is a poor country in Southern Africa. It has a population of 11.3 million, with 86% living in rural areas. Hydropower is the dominant source of power production. Only about 6% of the population has access to electricity: less than 1% of rural households and about 46% of urban households (Matinga, 2004).

Power sector reforms were instituted in 1998 with a new Electricity Act (1998), which allowed the participation of players other than the Electricity Supply Corporation of Malawi (Escom), the national utility. The results of the power sector reforms are currently not evident (Matinga, 2004). Aside from private power generation by big

commercial customers, who generate about 30 MW for private use, there are no independent power producers in Malawi. Escom is owned by the Malawi government. Electricity is generated in the country and the maximum installed capacity is 306 MW, made up of hydropower (285 MW), natural gas (15MW) and diesel (6.4 MW).

The project described here was carried out under the new energy policy, which aims at increasing access to electricity from 4% of the population in 1998 to 10% by 2010 (Lungu 2002) and also in response to numerous inquiries from poor households asking for an electricity connection.

Escom financed the low cost electrification in Mbayani out of its own resources. A low voltage line and a transformer, whose capacity was sufficient to transmit electricity to all households in the area were already in place. Before the project started only about five households had access to electricity and it was felt that the available transmission infrastructure was under-utilised and constituted a hidden cost to Escom (Matinga 2004).

The pilot project at Mbayani was the first low-cost electrification project of Escom and if this pro-poor approach was successful it was to be extended to 24 other areas and electrify 5000 households in five years.

4.5.1 Low-cost electricity pilot programme for Mbayani

In 2001 Escom embarked on a low-cost electricity pilot programme for Mbayani, a densely populated township in Blantyre with about 10 000 households. This programme was entirely funded by Escom's revenues. 150 households got access to electricity using compact ready boards with a supply capacity of 15 Amps. The ready board had four well marked sockets for TV, refrigerator, hotplate, iron and bulb use. Households paid for the connection including the compact ready board. The average cost was US$300 and households paid US$570 over a period of five years.

The mode of payment was adapted to the ability of the poor to pay. Households paid a flat tariff of US$5 per month of which 79 USc was the contribution towards the ready board costs amortised over five years.

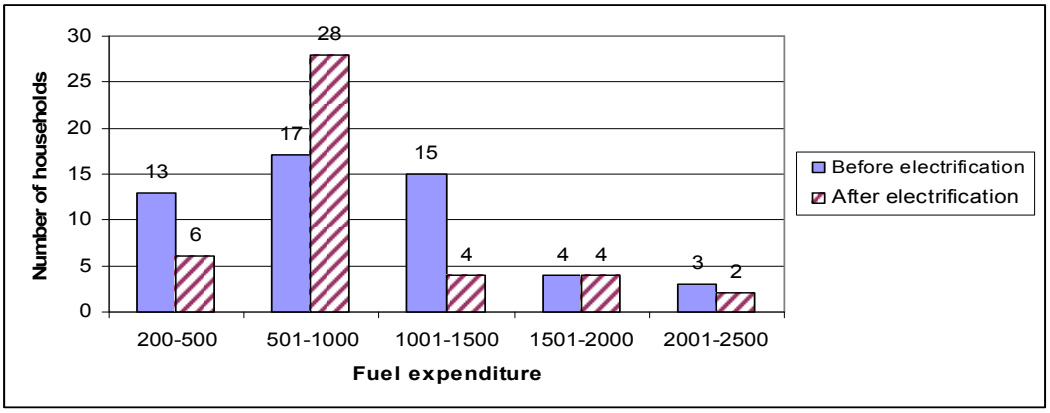

Figure 4.2: Fuel expenditure (in MK) before and after electrification in 53 sampled households

Before electrification 13 households, that is 25% of the sampled households, spent between MK200 and MK500 (the currency is Malawi Kwacha) per month on fuels (Figure 4.2) and after electrification only 12% spent this amount. Most households spent between MK501 to MK1000 on fuels both before and after electrification. The proportion increased from 33% before to 54% after electrification. In this category the proportion of households is the highest because the fixed-tariff cost is in this

expenditure range. In the next higher expenditure category (MK1001 – 1500) the proportion of households decreased substantially from 27% before to 8% after electrification, indicating that households in this category saved most on energy expenditure after they got access to electricity. Although the proportion of households in the lowest expenditure category decreased by about half there are still 12% of households spending less than is necessary to get access to electricity. This may be attributed to the fact that some households have not substituted other fuels with electricity and as a result are paying for other fuels.

There was a clear change of cooking fuel after electrification (Figure 4.3 and Figure 4.4). The majority of households changed to electricity for cooking after electrification and 58% of households used electricity as their only cooking fuel. Charcoal, and to a lesser extent fuelwood, was used for cooking before electrification. The proportion of households using charcoal as their only cooking fuel decreased from 66% before to 30% after electrification. Kerosene was hardly used as cooking fuel in Mbayani.

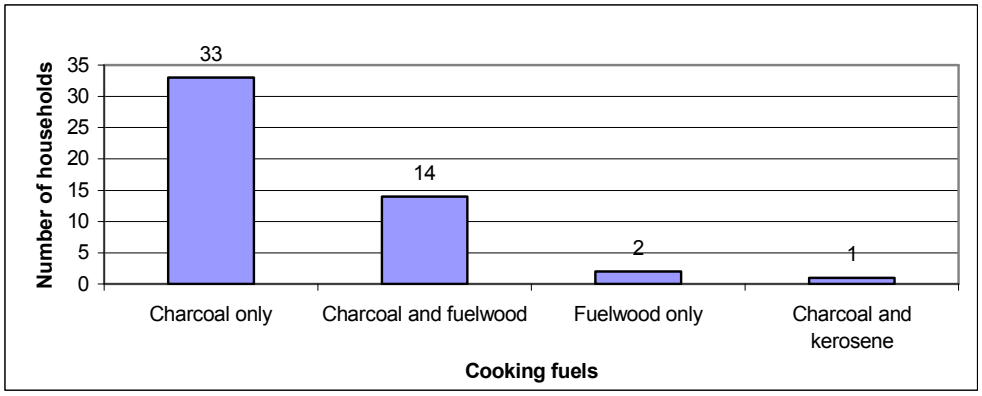

Fig 4.3: Cooking fuels in Mbayani, Malawi before electrification

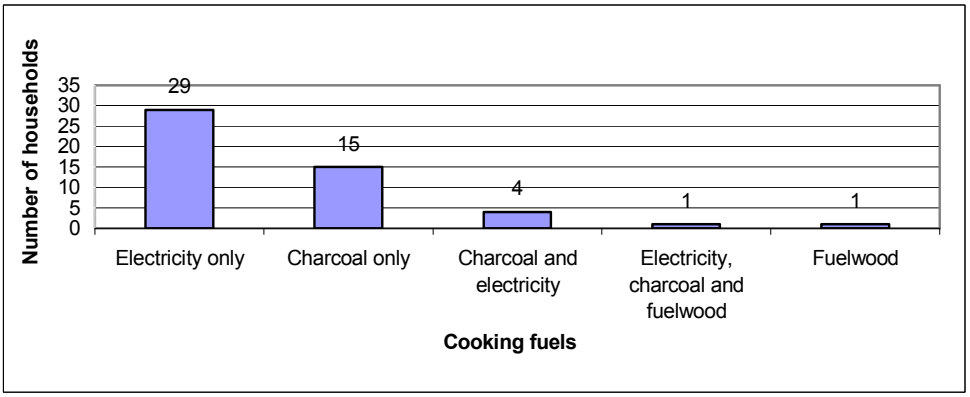

Fig 4.4: Cooking fuels in Mbayani, Malawi after electrification

The fixed-rate tariff permits extensive cooking without additional payment, and substituting charcoal and fuelwood by electricity greatly reduces indoor air pollution. Women and children are less exposed to the cooking fumes and this has a long term beneficial effect on their health.

It was found that the programme was not beneficial to the utility and may in the long run, or when carried out on a large scale, have a negative impact on the revenue intake of the utility. This may be attributed to poor planning, unsustainable financing and poor tariff design (Matinga 2004).

Net benefits to the poor include: cash savings due to change in fuel use, reduced energy burden, changes in fuel use from low quality fuels to electricity, increased appliance ownership and benefits accrued to small businesses.

On the other hand, the main problems experienced by the newly electrified households are: high costs of electrical appliances; unreliable electricity supply; poor quality appliances and poor dialogue between supplier and customer (Matinga 2004).

4.5.2 Lessons from Malawi

Malawi has only recently held democratic elections and it has remained a poor and indebted country. Efforts are being made to improve economic growth and to develop infrastructure. The utility is trying to expand the electric grid to poor households who would not be able to afford the expense of customary connections. The lessons from the case study in Malawi are as follows:

- There was political will to assist the poor.
- Electricity supply must was available at reasonable cost.
- Pro-poor technologies and amortisation of connection costs improved poor households' ability to access electricity.
- Tariff design is vital to programme success. While the flat-rate tariff is beneficial for consumers and the majority of households changed from charcoal and fuel wood for cooking before electrification to electricity after electrification. This reduces indoor air pollution and has a positive long-term impact on women's and children's health.
- The flat-rate tariff will strain utilities finances especially if capacity is as high as 15Amps and the flat-rate tariff is rolled out to a large number of customers. A reassessment is required.
- There is need for simple modification of the compact ready board to enable cost effective extension of wiring in households.
- Fuel and appliance choices remain complex even after electrification.
- Strategies of making appliances affordable should be part of urban electrification program to enhance benefits of electrification.
- After electrification, education is vital since electricity is a new product and despite information campaigns at programme onset, various questions will arise as households gain experience.
- In poor urban areas SME development should also be supported since it contributes to poverty reduction.
- Introduction of affordable electricity has eased the energy burden but continued efforts are needed to optimise benefits of electrification. In particular, detailed research and planning are required.

5. Comparison of pro-poor policies in South Africa, Botswana, and Malawi

In all three countries there was political will to assist the poor through electrification and policies were enacted. The extent of the assistance to the poor was not the same in and the capacity to implement the pro-poor policies differed from country to country.

Compared to Botswana and Malawi, South Africa enjoys a number of advantages, which favour access to an electricity connection and enable poor households to use

electricity for various end uses. These include the country's economic capacity to carry out a subsidised national electrification programme, a poverty tariff, a supportive policy environment, low-cost electricity generation and reliable supply and distribution of electricity.

The three countries used different strategies to make access to electricity affordable. In South Africa subsidies were paid in the first phase of national electrification (1994-1999) by the utility and the municipalities and in the second phase (2000-2005) by the government. Utilities and governments in other developing countries might not have the economic base to afford such substantial subsidies for grid extensions and connections. There is also the question of how sustainable such subsidies are even in South Africa in the future.

South Africa also introduced a number of pro-poor technologies such as prepayment meters, compact ready boards, looped service connection, use of lower After Diversity Maximum Demand (ADMD), which are applicable in other countries and which will reduce the cost of grid extension and electricity connections.

In Botswana access to electricity in rural areas was increased without subsidies and it was based on a strategy of cost recovery. Implementation and impact on households was evaluated at intervals and adjustments were made several times. The upfront down payment and the repayment amounts were adjusted to the ability of households to pay the monthly instalments and the electricity consumption. Newly connected households could reduce the monthly repayment by extending the loan period. When connection rates increased from 7.5% in 1999 to 17% in 2000 the programme was considered successful and no further adjustments were made. However, a substantial number of customers had defaulted on repayment, undermining the sustainability of the programme and a review of the programme had been advocated.

In Malawi existing capacity and equipment was used for a pilot project to connect households in a poor township. Connection costs were also adjusted to the households' ability to repay and were recovered over a five-year period. The fixed-rate tariff is advantageous for the poor if they are high consumers but if they use only very little electricity they may pay more than the standard tariff. The limited capacity of 15 Amp restricts productive activities. The fixed-rate tariff as implemented in Mbayani is disadvantageous to the utility if rolled out at a large scale and would need reconsideration for a wider adoption.

In the three countries the policies did not include strategies for productive or income generating small or medium businesses. This may not fall within the activities of an energy ministry or an electricity utility, and it is suggested that when electricity expansion is planned and implemented a programme be developed in cooperation with the trade ministry and the newly connected households to encourage SMEs. This would have been feasible in South Africa and Botswana but not in Malawi where the current restrictions to 15 Amp would have severely limited SMEs.

6. Implementation guidelines

There is a growing awareness that an energy development strategy which seeks to benefit the poor must not be restricted to electrification, but needs to improve access to complementary non-electric fuels, appliances and safe/efficient practices – and that this is applicable in both grid-electrified and non-grid areas.

Electrification investments could achieve greater development benefits if they are not solely driven by numerical connection targets, but instead are integrated in more

detailed, cross-sectoral local development plans and implementation. The following have to be in place or have to be developed at the same time to implement the pro-poor programmes successfully:

- political will;
- policies and strategies;
- financial plans;
- availability of power;
- capacity of the utility to implement;
- adaptation of electricity expenses to the ability of the poor to pay.

South Africa, Botswana and Malawi have increased access to electricity for the poor in different ways. Overall the electrification programmes and projects have been successful. The prevailing situation and the available resources have greatly influenced the approach taken. The case studies from the three countries suggest some general guidelines for pro-poor electrification, as follows.

- Pro-poor policies have to be formulated and approved if there is no policy framework to assist the poor.
- There must be political will at government level as well as at the level of the utility to implement pro-poor policies.
- Additional power supply to the newly connected poor households must be available. It may be generated in the country as in South Africa and Malawi or it may be imported as in the case of Botswana.
- Dedicated financing must be secured. It may come from revenues of the utility as in Botswana, Malawi and the first phase of electrification in South Africa or it may be a direct subsidy from government a in the second phase of electrification in South Africa.
- The affordability of poor households has to be assessed and the mode of payment has to be adjusted to the ability of the poor to pay. The rural electrification programme in Botswana is a good example of an adjustment process.
- The sustainability of the pro-poor electrification programme has to be considered from the planning stage. The three countries faced different situations regarding sustainability. In South Africa the utility and the government paid for the connections and there was no cost recovery from poor households. In Botswana cost recovery is part of the utility's policy and the repayment of the connection fee was adjusted so that the poor could afford to pay and the programme remained sustainable. In Malawi the payment for the connection and the ready board was also adjusted and was to be repaid in small monthly instalments over a period of five years.
- The tariff design is important for the success of the programme. The three countries had three different tariff designs. While South Africa had introduced a concessionary tariff for the poor subsidised by the government, Botswana had just one tariff for everybody reflecting cost recovery. In Malawi a fixed tariff was introduced together with a limited current supply of 15 Amp, which benefits the consumers in general but it will strain the finances of the utility particularly if capacity is as high as 15 Amps. It will also benefit the large consumers more than households with low electricity consumption.

- When households get electricity for the first time an information and education programme to acquaint the household members with the new technology is essential. It is more effective if an initial programme is followed up at intervals until household members have become familiar with the use of electricity.
- The electrification programmes in the three countries did not include strategies for productive and income generation activities. As this falls outside the responsibilities of utilities and energy ministries cooperation with ministries ans organisations active in SME development is suggested. If newly connected poor households take up well integrated productive activities using electricity they will be able to pay for the electricity they consume and will have an opportunity to move out of poverty.

7. Conclusions

South Africa, Botswana and Malawi have implemented policies and strategies to give poor households greater access to electricity and to make the use of electricity more affordable. Emphasis on access was in all three cases the primary focus and in their different ways the policies and strategies have achieved their objectives.

The approaches in the three countries have been different and there are lessons to be learned for other developing countries from the implementation of pro-poor electrification. The lessons are summarised at the end of each country study. The implementation guidelines are based on the lessons learned from the individual countries.

When very poor households get connected to electricity they generally continue to use fuels such as wood, kerosene, charcoal and gas and add electricity to their energy portfolio for lighting, media and some appliances because they cannot afford to pay for electricity. For this reason it is important to facilitate affordable access and the safe and clean use of other fuels or energy sources for the most intensive energy use of the poor cooking.

In Africa the poorest people live in rural areas and in South Africa most of the households, which have no access to electricity are in rural areas. Extending electricity to these households would contribute to alleviate poverty effectively.

Monthly electricity consumption figures for Khayelitsha show a substantial increase since the introduction of EBSST. People are using electricity for more purposes now than before. On the other hand, EBSST is not reaching the poorest of the poor such as households residing on land not designated for housing development since such dwellings are considered illegal and do not receive an electricity connection. Backyard dwellers have no independent connection and meter and therefore cannot receive EBSST.

Results have shown that the very poor cannot afford the SHS because of up-front costs and the monthly service fee.

The methodology of dividing the poor population into five groups permits an analysis of households by income group. The results showed that the very poor use different fuels or combination of fuels than the less poor households.

In South Africa when poor rural households were ranked by income it became obvious that even when connected to electricity the lowest income groups hardly used electricity for cooking and the proportion very gradually rose with rising income. The same pattern was observed for urban households. But a higher proportion of the poorest urban households (35%) already used electricity for cooking while only 7% of the least poor

rural households used electricity for cooking. The use of fuelwood in rural households had an opposite trend decreasing with increasing income. Fuelwood was not used in the urban area. The fact that fuelwood can be collected free of charge in the rural area and has to be bought in the urban area supports this energy use pattern.

The higher income groups among the poor, especially in urban areas, are already on their way out of poverty and do not need any additional policy support. But the poorest of the poor in rural areas need further assistance. It appears that access to electricity is necessary but not sufficient and other policy support such as the facilitation of income generation activities and SMEs are necessary so that the poor can lift themselves out of poverty.

In Botswana the approach to electrifying the rural poor did not require subsidy. The repayment period for an electricity connection was extended for a longer time allowing the monthly repayment amount to be smaller. This adjustment led to increased connection rates for the poor without additional cost to the utility or the government.

The Mbayani urban pilot project in Malawi had net cost to the utility, which was mainly the result of limited planning. The country has no pro-poor urban electrification policy and the tariff was poorly designed. On the demand side, the low-cost electrification programme had net benefits to the consumers, despite a number of problems. The use of compact ready boards lowered the cost of electrifying households, thus making electricity affordable to those who may otherwise have been unable to afford electricity.

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